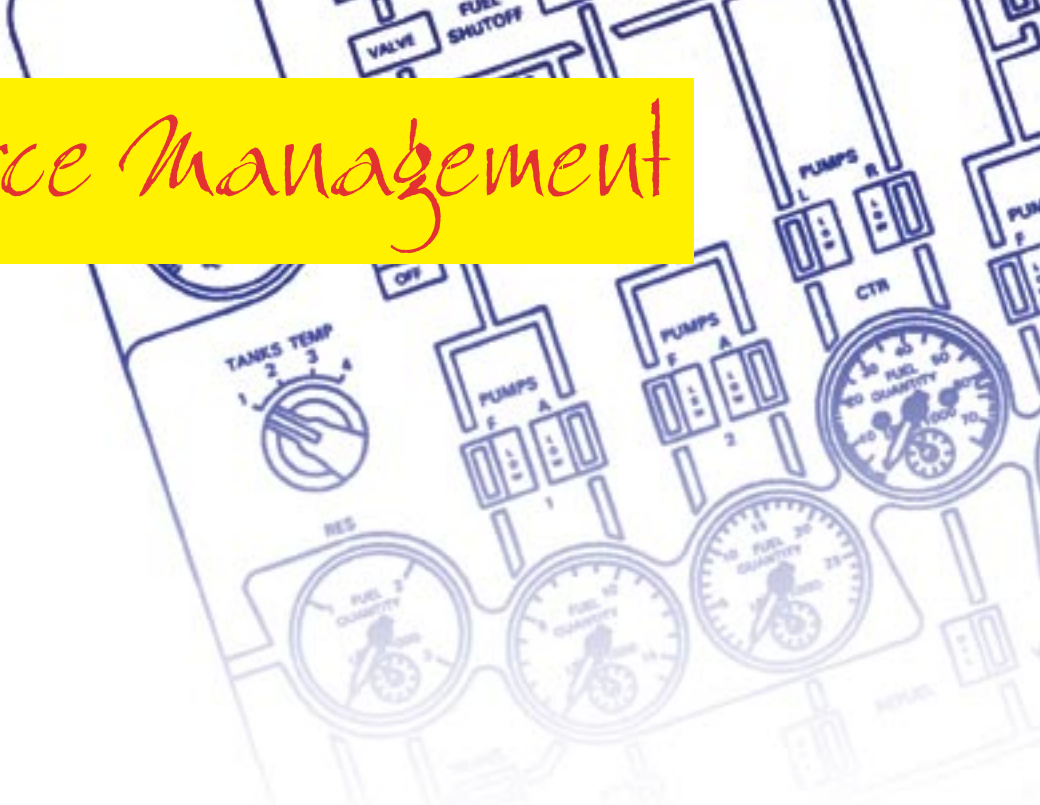
Crew Resource Management

Situational Awareness
Assertiveness
Decision Making
Communication
Leadership
Adaptability/Flexibility
Mission Analysis



Sharp Eyes

By Ltjg. Pete Haynes

We were running to our E-6B for an exercise-alert launch to test our capability to "beat the threat." Our aircrew this night was very junior. I was on my aircraft-commander (AC) route check, my engineer was on his first flight since he qualified as a flight engineer (FE), and the flight-engineer trainee (FE-T) was on his third trip ever. The pilot in the left seat had joined our crew just for this night flight, and he hadn't flown in a week.

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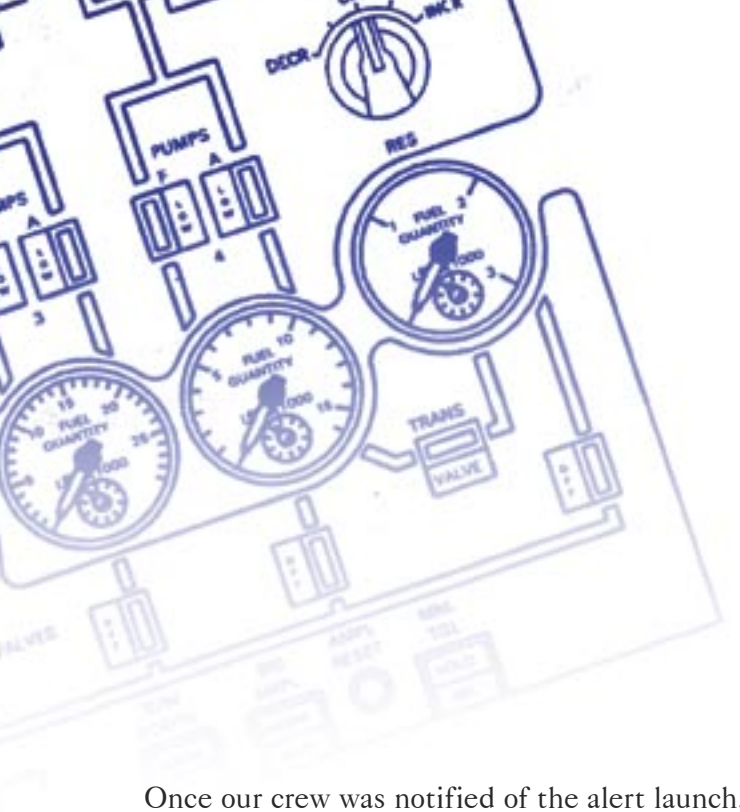

Once our crew was notified of the alert launch, we quickly headed to the jet. With it already preflighted and cocked, our goal was to get airborne as soon as possible. I jumped into the right cockpit seat, while the FE-T started the auxiliary-power unit (APU). My guest pilot then strapped into the left seat and cleared the engines for start. The engine starts went as planned, and we waited on the radio-access door to be closed before we could begin the short taxi to the active runway.

Just as the "Radio Access Door Open" light flicked out, the FE-T exclaimed something like, "Holy @#%@#." The other pilot and I looked at the FE-T and asked for an explanation. He simply said, "We have no gas in the No. 1 tank, and the center tank has 60K."

I turned around in my seat, not having a good view of the engineer's panel from the right seat, and checked the gauges. Sure enough, the gauges looked very strange. The following chart indicates our planned fuel load, compared with our actual fuel load:

	No.1 Reserve Tank	No.1 Outboard Tank	No.2 Inboard Tank	Center Tank	No.3 Inboard Tank	No.4 Outboard Tank	No.4 Reserve Tank
Planned Fuel	3K	16K	25K	30K	25K	16K	3K
Actual Fuel	3K	0.7K	25K	60K	25K	4K	3K

Note: 1k = 1,000 pounds of fuel.

An off-duty engineer noticed we were not taxiing and came out to see if he could help. We explained our situation to him on ICS. He checked the ground-refueling panel, located on the exterior of the aircraft, and confirmed the gauges had the same indications we saw in the flight deck. From the time we fueled the aircraft and were ready for launch, nearly 30,000 pounds of fuel had migrated to the center fuel tank.

If my FE-T hadn't spotted the discrepancy and brought it to everyone's attention, this event probably would have resulted in a mishap report and a different *Approach* article. The center of gravity with the actual fuel load was out of forward limits. The required stabilizer-trim setting for takeoff, calculated based on the migrating fuel load, also severely was out of limits. In fact, it was extrapolated off the NATOPS chart. If we had tried to take off, the jet may not even have left the ground because of the extreme control forces. The pilot at the controls might not have been able to pull the jet off the deck. However, this fact would not have been realized until rotation speed, which was 142 knots. At this speed, we only would have had about 4,000 feet of runway remaining: an insufficient distance to stop the aircraft without departing the runway. If the pilot at the controls had taken off and managed to get airborne, he may not have attained a positive rate of climb.

Fuel loading on the aircraft is designed to limit the stress and bending loads on the aircraft wings. The reserve tanks were full, which applied weight on the wing tips. The outboards were empty, leaving no weight two-thirds down the wing. The inboards were full, adding stress to the inboard wing. The full center tank would have added stress and bending loads at the wing roots, where it attaches to the fuselage. NATOPS prohibits fuel loading inconsistent with tested charts to prevent unacceptable stress on the wings. Thank goodness we didn't flight test this aircraft configuration.

Fortunately, the FE-T had his scan going for our late-night takeoff, and he spoke up at the first sign of a problem. I don't think I'll ever again underestimate the importance of assertiveness as one of the seven critical CRM skills. We also received a good refresher on the center-of-gravity concept. Despite being a relatively junior member of the crew, the FE-T's assertiveness may have saved our lives.

Ltjg. Haynes flies with VQ-3.