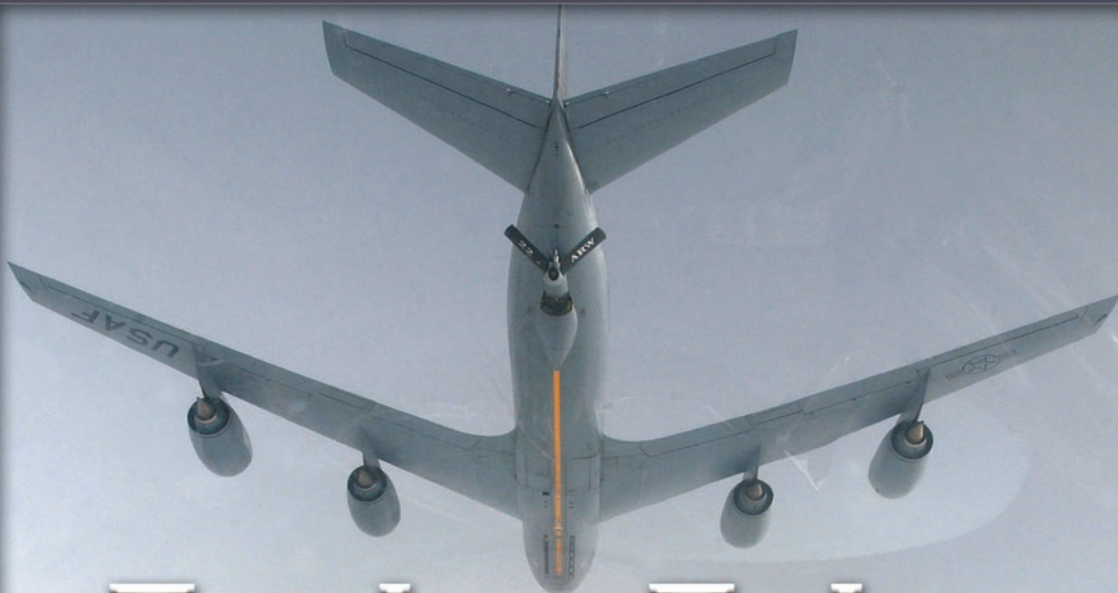


UNITED STATES AIR FORCE  
**FSM** MAY 2006  
FLYING SAFETY MAGAZINE



# Tanker Tales





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U.S. AIR FORCE

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## Tanker Tales

### They're not just for gas-passers

Our tanker friends get overlooked in those exciting "There I Was" stories, so this month we thought we'd take a look at some incidents involving our friendly neighborhood flying gas stations. Let's face it: On some missions, we wouldn't get far without them. These stories run the gamut from amusing to harrowing, but they all teach some valuable safety lessons. Enjoy!

## Distro Blues

Regular readers have probably noticed some difficulties with the receipt of their issues of Flying Safety. We apologize for the lateness of the distribution. We think the problems have been solved, but if you encounter continuing delays, or do not receive your copies of FSM, please contact Pat Rideout at the phone/e-mail listed below.

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# Another Routine Evening

**MAJ KARL KORNCHUK**  
101 ARW/Training Flight  
Bangor ANG ME

"Tanker Ops, FUELR 58..."

"FUELR 58, Tanker Ops, go ahead..."

"Tanker Ops, FUELR 58... Tanker Ops, FUELR 58..."

"They must still be out of range. We'll give them a call back in five minutes."

So far, the evening watch in Tanker Ops at Incirlik AB had been busy as usual, but routine. A senior squadron navigator and I had "the conn" during that night's 3-11 p.m. shift. We were responsible for executing all tanker missions, refueling assets going to and returning from the Iraq/Afghanistan AOR. A mix of Air National Guard and active duty KC-135Es and Rs were at our disposal, along with several highly trained aircrew. We anticipated another routine evening, followed by midnight chow and possibly something cold to drink. Our "routine" evening lasted another couple of minutes or so.

"Tanker Ops, FUELR 58..."

"FUELR 58, Tanker Ops, go ahead..."

"FUELR 58 has experienced a total right hydraulic system failure. We're about 20 minutes out and will be declaring... sssssshhhhhh CLICK." The Tanker Ops UHF radio just died.

About an hour prior, the Boom Operator of FUELR 58 was just about to "plug" the C-17, when the pilot noticed the flickering of one, then two, hydraulic system pump inoperative lights. Wisely directing the receiver to "back out and return to pre-contact," he scanned the hydraulic panel to notice the right hydraulic system pressure rapidly fall to "zero." Establishing positive altitude separation by directing the receiver to the bottom of the air refueling altitude block, the FUELR 58 Instructor Pilot (IP), along with a highly experienced Boom Operator and a new but proficient Aircraft Commander in the right seat, put a plan into action to safely RTB. Their first priority was, "Fly the aircraft." This proved a challenge, given that the outboard spoilers, powered rudder (manual mode still worked), yaw damper, and

**...FUELR 58 was just about to “plug” the C-17, when the pilot noticed the flickering of one, then two, hydraulic system pump inoperative lights.**

USAF Photo

# In Tanker Ops

autopilot were rendered inoperative due to loss of hydraulics. Turbulence and thunderstorms in the area added to their difficulty. In an attempt to climb to Flight Level 260 to get above the cloud tops, the heavyweight tanker experienced significant “dutch roll”—just as the flight manual says! A little lower worked better—FL220—in the clouds, but also in control.

Meanwhile, the Boom Operator needed to raise the boom. With the primary hydraulic source gone, her only option was to execute the Emergency Boom Hoist Checklist—a checklist requiring the assistance of another crewmember, who in this case would have to be the copilot.

The Pilot said, “Grab your flashlight and a checklist, and go back and help the Boom Operator. I’ll fly, talk to ATC, and dodge these thunderstorms.”

With that, the “Co” headed back, plugged into the Instructor Boom interphone, reviewed the Boom Operator’s checklist, in addition to performing several important steps himself, while the Boom Operator struggled to keep the boom in the raised, centered position (no easy task). Those

“several” tasks included finding both the Boom Hoist Manual Bypass Shutoff Valve and the Boom Hoist Hand Pump, located back “upstairs” in the cargo compartment. After a couple of attempts, the boom was finally latched in the stowed position.

The crew now focused on burning down fuel (there was no fuel-dump capability without the Right Hydraulic System), and running several other critical checklists involving landing with manual flaps, landing with rudder power inoperative, leading-edge flap malfunction (along with no outboard spoilers), and lack of nosewheel steering. With the Copilot back in the right seat, flying around thunderstorms in the weather without an autopilot, while reviewing emergency procedures, now seemed a little more plausible.

Back in Tanker Ops, when our sole UHF radio had overheated and “died” for the evening, I got on the radio to Incirlik Air Mobility Command Center (AMCC) and asked them to relay to FUELR 58 that our radio was dead and to please relay any time-critical information via radio to AMCC. They, in turn, could call us while we came up with a plan. We asked if an Instructor Pilot could come to AMCC with the appropriate Tech Orders (T.O.) and handle the emergency procedure using their radio. “No problem,” was their initial response. However, they suggested that we report to Approach Control (RAPCON) and communicate with the stricken aircraft on a discrete frequency. That sounded like a workable plan; AMCC coordinated with RAPCON while we found an IP to handle the inflight emergency (IFE).

As an IP myself, perhaps I should have run over to RAPCON with the T.O.s; however, we were in the middle of other problems in Tanker Ops. Global Decision Support System (GDSS)—our essential computer-based lifeline to Tanker Airlift Control Center (TACC) and deployed locations—just went “down,” another tanker crew was experiencing maintenance problems coupled with thunderstorms on the field that might mean a lost refueling, and still another crew had just shown up sans copilot—still couldn’t find him by show time plus 10! AMCC called back and advised us that FUELR 58 was in the local area, but would have to burn down fuel prior to landing. We had a little time to come up with a workable game plan, balancing this IFE with operational requirements. Two trained people were absolutely needed to run the “routine” tanker operation, given all the problems at the time. I was overloaded with both the IFE and everything else, and needed help (hard to admit), thus the call to bring in another IP.


Once the communications fiasco with Tanker Ops was resolved, the aircrew now could review upcoming events, with the IP stationed in RAPCON and talking to the crew over discrete UHF. Based on the seemingly worsening weather,

a wet runway, aircraft gross weight, and limited divert bases in Turkey, the aircrew (with IP concurrence) decided to manually crank the flaps to 40 degrees, as opposed to the “normal” manual flap setting of 30 degrees. When manually lowering flaps in the KC-135, either the inboard or outboard flaps on both wings are lowered at a given time, maintaining no more than a five-degree differential between them for adverse pitching-moment reasons. Furthermore, the Boom Operator had to crank eight times per degree of flap movement, with the flaps becoming progressively harder to move as they extended into the slipstream. By the time she extended the Inboard Flaps to 30 degrees and the Outboards to 35 degrees (for a total of 520 turns of the crank handle), fatigue set in. Once again, the Copilot came back and finished the physically strenuous job of cranking the flaps to 40 (a “measly” 120 turns). After additional coordination between the aircrew, IP, and ATC, and after dodging thunderstorms for 4.5 hours, it was time for the approach and landing.

ATC initially vectored the aircraft for an ILS RWY23. What had been a headwind component changed to a tailwind as the crew broke out of the weather at around 1,000 feet AGL. At that heavy gross weight with a wet runway, a tailwind was unacceptable. Therefore, the Aircraft Commander elected to circle southeast for a landing on the opposite runway, turning inside of a large storm cell south of the field. Circling at night at a strange field can be dicey enough. Throw in low ceilings, reduced controllability, extra flaps, and fatigue, and you’ve got a recipe for failure if the crew isn’t on their game; FUELR 58 definitely was! Landing was uneventful other than the knee-jerk reaction to use nosewheel steering (which was inoperative) to help maintain centerline control. Differential brakes came to the rescue here, however. Once

stopped on the runway, the jet was turned over to maintenance. Whew! Definitely time for a cold one! (A blown hydraulic pressure line was soon discovered as the culprit.)

While perhaps not the most critical inflight emergency ever experienced in the tanker community, ample opportunity existed to compound problems. This crew, however, didn’t forget to fly the jet first and foremost, prioritize and handle the multiple problems, and finally communicate effectively within the aircraft and among all agencies involved—great crew resource management (CRM) overall! Furthermore, effective communications between Tanker Ops, AMCC, and RAPCON, and the ability to quickly locate a qualified IP greatly aided the situation. Could things have gone better? Sure—hindsight is always 20/20. A designated Tanker SOF might have alleviated any worries about getting timely assistance. A backup radio would have been more than helpful. Normalizing crew rest cycles might have prevented a fatigued crew, but given the constant state of BRAVO ALERT, this wasn’t practical at the time. Training came into play here—the crew really didn’t face anything not seen previously in the aircraft or simulator *except* running the Emergency Boom Hoist Checklist for real—with the copilot out of the seat, locating and actuating various components. Needless to say, this exposed a weak area in our unit’s training and provided a great hangar flying topic.

While many of our operational missions may now seem routine, disaster is lurking just around the corner. We’re constantly emphasizing this in mission briefings, instructor meetings, and hangar flying sessions. Increased Ops tempo coupled with old aircraft can turn a “routine” mission into an IFE in an instant. There’s simply no substitute for thorough training, comprehensive systems knowledge and effective CRM—whether in the air or on the ground! 

***Their first priority was,  
“Fly the aircraft.”***



# Another Routine Combat Sortie

**CAPT MARK ALLEN**  
76 AS  
Ramstein AB GE

USAF Photo

As OPERATION ENDURING FREEDOM and OPERATION IRAQI FREEDOM have extended over the past few years, the combat experience of our aircrews, maintainers and support personnel has continued to grow. As these personnel endure their second, third or even greater numbers of deployments, what used to be the exception has increasingly become the norm. Our personnel are becoming increasingly comfortable with desert combat ops to the point where many joke that the desert uniform should become the new uniform standard service-wide.

With this increasing familiarity also comes the threat of complacency, as much of what we do remains the same, day-in and day-out. How many times can you fly the same route in and out of the AOR, or land at the same airfield day after day for three months, without feeling some increased level of comfort with what you are doing? Max weight takeoffs, max duty days, multiple cargo legs or air refuelings, all in one duty day, have become the rule rather than the exception.

This sense of routine is exactly what happened to our crew while flying yet another everyday combat sortie. We were nearing the end of our deployment with almost 20 combat refueling sorties under our belt for this deployment. Our flight was scheduled to take off just before sunset and fly a 10-hour combat sortie over Afghanistan. We accomplished the usual max weight takeoff from our deployed location and settled in for what we figured would be another long, uneventful night combat sortie. After flying for several hours we finally entered the area and began setting up to establish our tanker orbit.

We were tasked to fly a north-south orbit pattern, which at that time was established adjacent to another tanker track of the exact same orientation. The tracks were separated by roughly 10 miles laterally, which should provide sufficient lateral separation. However, tanker crews had become accustomed to coordinating with each other while in these orbits, to prevent possible conflicts when multiple receivers transit the orbits, and that is just what we did when we entered the orbit. We report-

ed on station while relaying to our unit mates our position, altitude, and the current sports scores reported on AFN.

We established ourselves in the orbit and set up flying the outer border of the orbit in order to maximize the leg times on the track. We quickly noted that winds would be a factor tonight. It being wintertime, the jet stream was putting a 100-plus-knot crosswind across the anchor. We were established in the eastern of the two orbits, so being blown out the east side by the strong crosswinds was not a major concern for us. But being the consummate professionals we are, we adjusted our turns to remain within the border and took note of what would be required to fly a smooth operation while we had receivers in tow.

After only 20 minutes or so on orbit, we heard the most dreaded words a KC-10 crew or KC-135 receiver-capable airplane could hear, that there was a KC-135 en route with excess gas, and that we would be consolidating. This is a very common endeavor in the AOR. When a tanker completes its fragged off-load and has excess fuel available, the Combined Air Operations Center (CAOC) attempts to maintain this fuel on-station in case a contingency occurs and the fuel is needed immediately. Since it is more efficient to have one tanker carry the gas than two, it often means tankers consolidating fuel to ensure the maximum operational capability over the AOR. For us, this meant our night was only going to get longer, and we would shortly have more gas on board than when we departed our desert home.

As soon as we received word that we would be accomplishing receiver AR, we began running our checklists and talking to the tanker in order to expedite our rendezvous. After a brief discussion, we concluded that a "tanker turn-on" rendezvous would be accomplished in order to expedite join-up and get the tanker crew back to their tents a few minutes sooner than fragged.

Though this turn-on maneuver is not in the receiver AR manual, it has become a frequently used tool in the AOR. Since the orbits were generally very close to each other, the time between contact and the planes being close to each other was often very short. This made setting up a point-parallel rendezvous or true en route rendezvous difficult. In order to expedite the join-up, the crews would coordinate to head to a certain area or location in the orbit, or basically a modified en route rendezvous. Once you had the tanker in sight as the receiver you would use lead and lag (you know, that stuff we all once learned in pilot training) to close on the tanker to the pre-contact position. Due to the angle the tanker was coming from, this often meant having the tanker start a shallow turn once visual contact was made in order to avoid a tail chase, giving the receiver more angles to work with. This was the case this night, as

the clear conditions allowed us to make visual contact with the tanker at some distance.

As we closed on the tanker, one of the crewmembers pointed out the communication occurring on the control frequency. The other KC-10 in the parallel orbit was scheduled to refuel a C-17, and he had just checked up on frequency. He reported a rapid ascent as he was light-weight and reported small arms fire at the airport he had just departed. This caught our attention, as it brought us back to the fact we were flying a combat sortie, not just another tanker training mission. We listened to the communication for a short period, but quickly turned our attention to the task at hand as we closed to the pre-contact position. It was at this time that the radios caught our attention again. We were informed our first receivers were early and were currently inbound to our station and requesting our status. We backed out a little and began talking to our tanker about a new plan of attack to avoid delaying the refueling of the fighters due to our consolidation.

We came up with a plan and relayed it to the now-busy controllers, who were working us, the C-17, our fighters and several other aircraft entering and exiting the airspace. Our plan was to have the KC-135 give their gas to the fighters while we moved to the formation position. If they had any gas after the refueling, we would take it from them at that point. They approved this plan immediately, as the fighters were requesting immediate gas so they could report on station, and our receiver AR would have delayed that for some time. We then began our climb to the tanker formation position, as the lead tanker began an immediate turn toward the southern section of the orbit and began communicating with the fighters en route to our position. As we continued our turn toward the incoming receivers, we completed our post-air refueling checklist as a receiver.

As our formation rolled out on the western edge of the orbit, it was now the Traffic Collision Avoidance System (TCAS) "Traffic, Traffic, Traffic" alert that caught the crew's attention. As the pilot flying, I looked at the TCAS expecting to see one yellow target, slightly to our left, that of our leader tanker 1,000 feet below us. Well, much to my surprise, there were three targets present on the scope, all within a relatively close area. Our eyes quickly moved outside to our right, promptly visually acquiring our partner KC-10 1,000 feet above us with the boom extended and all his aircraft lights up full-bright.

We then saw the more troubling traffic, the C-17. According to the TCAS, he was 500 feet above us, in a turn closing on the tanker. While there was some lateral distance between us and them, at least 500 feet at the closest point, no one in our cockpit was happy with the limited distance between the two formations as we passed almost overhead



each other. We immediately communicated with the other formation; they were surprised as well at the proximity of our two formations. We mentioned that our TCAS was still in Traffic Advisory (TA) only as we were transitioning from receiver air refueling. They reported the same condition due to their refueling. Whether or not a Resolution Advisory (RA) would have been triggered we will never know, but because of our changing formation and the C-17 in the process of closure, our electronic tools were only partially available to prevent our formations from coming in contact with each other. We continued our mission uneventfully while paying close attention to all other formations for the rest of the night and accomplishing the "standard" multiple refuelings, both tanker and receiver.

So, what happened? How did three "seasoned" tanker crews allow our two formations to come so close that they almost passed directly overhead each other with as little as 500 feet altitude separation? What would have been the result if the C-17 had not closed to that altitude and been at a co-altitude with us? After a thorough debrief with our deployed staff and a long talk at the wagon-wheel, we came to some conclusions on what caused this too-close a call.

First and foremost: complacency. We had all been in theater, doing the same things day-in and day-out, and this was just another day. We had all become so accustomed to expediting closures and rendezvous that these procedures had become standard. Hearing the other formation on frequency was a routine event, and we had paid little attention to their rendezvous, other than knowing they were doing it, not where they were. Our formation turning early in the orbit to head south to the fighters, and the other tanker making an early turn north to meet the C-17, was a common thread. While both crews had noted and accounted for the strong crosswinds on track, our aggressive turns mid-orbit had placed us right on the edge of, or a little out of, the west side of our orbit. Their rapid turn with the crosswind, while attempting to meet the airlifter on a route in between the orbits, had placed them outside their orbit as well. While this had been a common tool on many previous sorties, these expeditious turns had finally put us in harm's way.


Additional issues that we discussed were the procedures we were using that were now considered standard, but were not clearly published in our regulations. Though our regulations do not prohibit the visual rendezvous and formations, they do provide guidance on their accomplishment. The regulations state that the crews should brief, either in person, through a phone call or by electronic means, all planned formation procedures, to include refueling, lead changes and orbit procedures. While we did discuss the formation with the tanker in-flight, we did not thoroughly brief all

aspects, in particular altitude considerations. If we had, we would have noted the formation 1,000 feet above us on orbit, and would have thought twice about climbing to a conflicting altitude so quickly without awareness of their current position.

These impromptu formations and refuelings have become an overly routine necessity in the AOR, as the CAOC works to most efficiently manage our limited fuel and airborne assets. As crews flying these missions, we must remain aware of the actual complexity of these changing missions, and not fall into the trap of feeling comfortable with the fluid combat environment.

After a thorough discussion of this matter, our team decided that the best way to mitigate this risk was to stick to our regulation guidelines and educate crews on the importance of avoiding the outside-the-norms "routine." Avoid the need to expedite at all times without having a clear picture of what is happening in the overall AOR airspace. Unless a receiver is battle-damaged or on emergency fuel, the implied urgency to expedite closures needs to be tempered, a proper tanker orbit maintained, and a normal rendezvous accomplished. By slowing things down, crews have more time to run checklists, communicate effectively, and de-conflict orbits laterally as well as vertically, as we had been routinely accomplishing.

As desert deployments continue to linger into the future, more and more crews will become increasingly familiar with this environment, so much so that it may actually be more familiar to many than their actual home station. As aircrew, we need to remember that just because it is a contingency operation, we don't need to cut corners or do things we wouldn't do outside this region, without doing a thorough mission study and mission briefing.

Avoid letting these non-standard routines become the norm or, as in our case, the standard operating procedures. 

USAF Photo





## TAILWINDS ARE AWESOME, RIGHT? (A Tanker Pilot's Version Of "There I Was")

**CAPT SAM LOPEZ**  
78 ABW  
Robins AFB GA

It was a normal mission. I had done it lots of times before. I was No. 4 in a four-ship of tankers helping some F-15s cross the Pacific on their way home. The best part about the plan was that it called for me to take the first two refuelings, then turn around and go back to Kadena. The gas looked a little tight, but it wouldn't be a problem as long as the weather back at Kadena cooperated.

We looked at our mission planning paperwork and everything looked like it was in order. I looked at the 1801 (international flight plan), weather sheet, Weight and Balance form, and our divert options. NOTAMs and Takeoff and Landing Data (TOLD) all checked, and we were ready to go. We aircraft commanders went to the fighter brief, while the rest of the crews bought a few snacks at the shoppette and then went to the airplane. The fighter brief was very thorough, so I arrived at the aircraft a little later than normal. The crew had not started the preflight yet, so we were all behind schedule.

### **The Good:**

Our preflight was blazing fast! We were ready to go on time, and I felt like I had caught up with normal mission timing. I briefed the details of the flight, and that the copilot would be flying the first part of the sortie. He and I had been alternating takeoff and landing duty, and today was his turn to take off. It was only supposed to be a 2.5-hour flight, and I felt confident that my Co would be able to handle staying in formation while I pumped the gas to our receivers. We should be back in time to go downtown and get some sushi!

### **The Bad:**

We didn't do a full crew brief. I felt it wasn't necessary, since this would be our third mission together on this trip and we are all highly experienced crew dogs. We had discussed most of the details while we were reviewing our paperwork. But taking the time to do a good brief sets the mood...in other words, it gets the crew ready for work.



USAF Photo

The takeoff, climb and first part of the cruise all were normal, although it's always exciting when you're in formation with two KC-10s, two KC-135s and six F-15s. The weather started to become a factor after the first refueling. The tailwind started increasing, and turbulence made it difficult for our receivers to get their gas quickly. Needless to say, good ole' Murphy showed up and made sure our autopilot stopped working. So, now we were in turbulence, at night, autopilot off...and then the clouds showed up and everything started to go badly.

It became more difficult for us to stay in formation and give the receivers their gas. I was furiously working the fuel panel, monitoring the radios, the weather radar and our formation position. The copilot was valiantly attempting to keep a stable platform for the Eagles who were doing a good job of cycling through. It was a hair-raising experience, but we got the job done. Unfortunately, because of the 100-plus-knot tailwinds, we had traveled far beyond our physical turnaround point. Remember, I said the gas would be tight?

We coordinated with the Japanese controllers to refile our flight plan and turned around into what had become about 120 knots of wind on the nose. We were at our BINGO fuel, so I started to look into divert options. Misawa, Iwakuni, Yokota.... All those options floated through my head as I instructed the copilot to ask for a higher flight level. We leveled off at FL390 and set a power setting that would give us our best fuel burn for our cruise. Quick calculations and a weather check told us that it would be best to go back to Kadena. We settled in for the long cruise.

What was scheduled to be a 2.5-hour sortie turned into a 4.6. We got to the fix with a little more than an hour's worth of fuel (we burn about 10K pounds an hour), but other than that, the descent and setup for the approach was all fine. I was about to relax when four miles from the runway I heard our Ground Proximity Warning System (GPWS) say, "Go around, windshear ahead!"

I executed a go-around and landed on the next approach. We taxied off, parked, shut down and breathed a sigh of relief. Our totalizer said 12.3K, and although on the outside I was calm, inside there was anger, frustration, fear and relief.

#### **NTIW: Next Time I Will...**

There are certain things that are always out of our control. No matter how much I scrutinized those weather briefing sheets, I might have never caught the fact that there was going to be that much turbulence, wind, clouds, etc. That's not the point. I should have taken the time to study them in order to arm myself with the knowledge I would later need. It all seems so clear now that I feel kind of stupid. *With that much tailwind I should have reset my BINGO fuel higher.* In tanker words, I needed to put more fuel on the airplane in order to get the Eagles their gas and also have my own required reserve. Failing to do that, I should have stopped giving the receivers gas when I reached my turn-around point. They were ahead of schedule, too, given the tailwind.

I will never fail to accomplish a thorough crew brief again. *I did not use all the talent available.* My copilot and boom operator might have been able to see what I had not and backed me up with our fuel available vs. flight time remaining.

So, this is the little speech I gave myself after this event: Give yourself as much of a chance to battle against things you can't control by taking care of the things that you can. Don't think that because you're on final it is all over. The mission is not done until the paperwork is filed. Finally, what we do as aviators is inherently dangerous, so don't become complacent.

I was lucky that this time being complacent didn't kill my crew or me, and I'm going to make sure it doesn't have another chance. How about you? ✈️



# Over The Pacific At 8K Feet

12 FSM • MAY 2006

**MAJ DOUGLAS SIRK**  
355 FW  
Davis-Monthan AFB AZ

USAF Photo by MSgt Val Gempis

From inflight emergencies (IFE) to bad weather to combat, a pilot can expect to encounter a multitude of risks during his or her Air Force career. I have been fortunate that to this point in my career, none of these have been so severe that I could not analyze the situation and take the appropriate action. The following is a true story from one of my sorties flying the A-10 across the Pacific Ocean along with a crew of unsung heroes in a KC-135.

I was fortunate enough to be chosen by my commanders, along with one of my fellow aviators, for a good deal TDY to the United States from Korea. The mission was to ferry an A-10 from Hill AFB, Utah, to Osan AB, Korea. This particular A-10 had previously had a mishap that caused it to depart the landing runway, collapse the landing gear, and extensively damage the wings and fuselage. It was taken apart into three major sections, loaded onto a C-5, and transported to the depot at Hill AFB, UT for a major rebuild. There were to be four legs of the trip: Hill to Miramar; Miramar to Hickam; Hickam to Guam; and Guam to Osan. After a multitude of rock-paper-scissors games, it was decided that we would alternate the legs of our trip back to Osan, with the odd man out riding in the KC-135 and the lucky pilot flying the Hawg. I got the second and fourth legs (Miramar to Hickam and the Guam to Osan).

As we started our journey from the west coast of the United States to the island state of Hawaii (second leg of the trip), it appeared that we were going to have another uneventful sortie. However, this all changed when the KC-135 pilot called me over the radio and said there was an EC-130 with an IFE that needed help. He said the EC-130 had an oil leak and had to shut down one of his engines. Due to the lack of power and heavy gross weight, the EC-130 could not climb above 10K feet AGL. With one engine shut down and halfway between the west coast of the United States and Hawaii, the EC-130 was fearful of running out of gas due to the increased fuel consumption of flying at a lower altitude than originally planned. The KC-135 aircraft commander asked me what I wanted to do, since it was my gas that we would be sharing with the EC-130. I responded, without hesitation, that we would help out the EC-130 crew and give them whatever assistance we could.

Since the EC-130 was about 30 minutes ahead of us, the KC-135 aircraft commander and I had some time to make a few critical decisions. I decided to top off my fuel prior to the rejoin, so that if anything went wrong I would have enough JP-8 to make it back to the coast of California. Meanwhile, the KC-135 crew was busy doing the mathematical calculations to determine how much fuel they could spare and still complete the mission. After a descent to 10K feet, and a rejoin with three dissimilar aircraft, the KC-135 started refueling the EC-130. At this point I could only be a high-speed cheerleader. During the refueling, the EC-130 radioed

that he could not maintain altitude and requested a toboggan down to 8K feet. After several minutes of air-to-air refueling, the EC-130 commander said that was enough gas, and the tanker disconnected and began to pull away from both the EC-130 and myself. Since the EC-130 crew did not know what had caused the oil malfunction, I asked if they would like a battle damage check. They more than welcomed it, and I began my check of the aircraft. I checked them over and reported that there was an abundance of oil spilled out onto the engine cowling. I completed my check of the aircraft and bid them farewell and much luck.

The whole time I was performing the battle damage check, the tanker was pulling away from this makeshift tri-factor formation. Suddenly, I found myself in a single-seat fighter at 8K feet in the middle of the Pacific Ocean with no one in sight. I radioed the KC-135 and asked for his position. He radioed back that he was in the altitude reservation at 20K feet. With three Sergeant Fletcher fuel tanks on board, there would be absolutely no way for an A-10 in a climb from 8K to 20K feet to catch a KC-135. After the tanker aircraft commander and I sorted out the details of how we were going to expedite the rejoin, I finally got eyes on the tanker and was able to rejoin and refuel again so I could make any divert base in case an emergency arose.

The rest of the sortie was uneventful and both the tanker and I landed safely at Hickam AFB, Hawaii. After completing my post-flight shutdown checklist and egressing the aircraft, I began to query about the whereabouts of the EC-130 crew. No one had a clue as to the status of the aircraft and crew. Three-and-a-half hours later, the EC-130 limped into the Transient Alert parking area with one engine feathered. It must have been a long, nerve-racking sortie for the EC-130 crew.

I often reminisce about this flight and reflect on all the coordination that went into making it possible for the crippled EC-130 to reach a safe landing strip and not have to perform a ditching maneuver. We never really thought about CRM, but we subconsciously used it to help out our fellow brothers-in-arms. From the moment we received the call from the distressed EC-130 to the time we landed, CRM was in use. CRM extends beyond Crew/Cockpit Resource Management. It is more like Coordination Resource Management. In this case, it was coordination between three dissimilar aircraft to save resources and lives. In other cases, it may be the coordination between a pilot and the SOF or with an ATC controller, or all three.

The KC-135 crewmembers, especially the aircraft commander, were heroes that day. They did what they needed to do and they did it flawlessly. They saved a combat aircraft and possibly 10 Air Force personnel. So, to the KC-135 crew (you know who you are), I raise my glass in a toast to you. Thanks for all you did. You are truly unsung heroes. 🍷

# HOW TO BE A

**CAPT DAVID LEE**  
349 ARS  
McCConnell AFB

I'll be honest. I hate the current "wingman" slogan that the Air Force is touting. It sounds lame to me. Really lame, actually. I mean, let's face it; only fighter pilots have actual wingmen, and those guys are in the extreme minority. But despite that fact, all of us, even the non-flyers, are expected to be "good wingmen." Whatever. Half the people in the Air Force don't even know what a wingman *is*, much less how to translate that into real life. Basically, it just means that we should be looking out for each other. So, why don't they just say that? How frustrating.

Anyway, as lame as I think it sounds, the concept is a good one. So, here's my "wingman" story.

I was your average KC-135R copilot and the mission was a typical nighttime tanker sortie out of Al Dhafra. Tanker crews don't usually have the most exciting missions in the world, so there wasn't anything worth remembering as we did our pre-flight. At that time, about a year and a half ago, the procedure for departing from Dhafra was to take off blacked-out, minus the landing light, which we would turn off right after we raised the gear. For descent and landing, we would turn out all our lights descending through 13,000 feet, and then switch on our landing light at decision height. Sadly, this is about as "stealthy" as the KC-135R can get. (Stop laughing.) Also, the runway lights were set to full dim, and there's no centerline lighting.

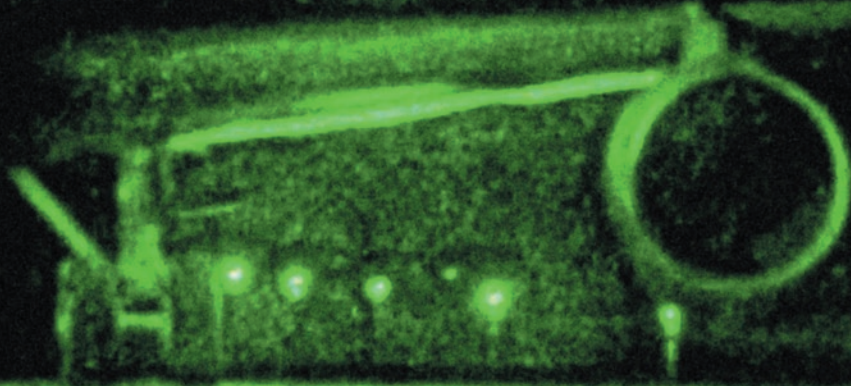
So, this night, we were sitting at the hold short line and finishing up our checklists, when we heard a KC-135 from Al Udeid coming in. They were diverting for weather and short on fuel. Since it was darker than a black cat in a coal mine that night, we

could see them just fine as they flew the downwind leg. They didn't know about our local procedures, so they were lit up like a Christmas tree. Right as they were turning base, we heard tower call and advise them that the local procedure was to come in blacked-out. They acknowledged, and then—poof—they disappeared from the sky. My crew still had a few minutes until scheduled takeoff time and, like a good tanker crew, we were already bored, so we amused ourselves by trying to spot them on final approach. Of course, it was pitch black out there, so we weren't having much success.

So, while we were sitting there staring intently at nothing, the proverbial light bulb suddenly came on above my head. Since this tanker crew didn't know to come in blacked-out, they also probably didn't know to turn their landing light back on at decision height. So, after thinking about this for a while and debating whether or not I would sound stupid if I said anything, I finally turned to my AC and said, "Hey, I wonder if we should tell them to turn their landing light on at 200 feet?" My AC thought about it for a while, then finally shrugged his shoulders and replied, "Nah, they'll figure it out." Which, of course, got a good laugh from everybody.

Guess what happened next... After a couple more minutes, the tanker suddenly blasted out of the darkness right over the threshold and landed completely blacked-out. To which, all three of us said in unison, "Wow!" I remember thinking, "Man, I bet they'll have a good story to tell after that one." Then I shrugged it off and went on with the job at hand.

# LOUSY WINGMAN



USAF Photo

At this point, the C-17 and C-130 folks are thinking, "What's your point? We land blacked-out all the time." Well maybe so, but tanker pilots aren't as nuts as you are. In fact, we tanker folk *never*, under *any* circumstances, land without our landing lights on. We *never* land with NVGs, and we *never* land on blacked-out runways. We don't practice it, we don't simulate it, and we sure as heck don't do it real-world. We operate out of long, fat runways in low-threat locations which are patrolled by bored SF troops because there's nothing within a hundred miles to shoot at. Or, to put it another way, in 45 years of KC-135 history, the Air Force has never lost a tanker due to hostile fire. In fact, I'm pretty sure we've never received any battle damage either, but I could be wrong on that one.

Anyway, after they landed, we were given takeoff clearance. So, we departed, flew our mission, and returned uneventfully. Another boring eight-hour tanker sortie in the AOR.

Well, that's pretty anti-climactic. So, why did you just spend the last three minutes reading this? Because much later I realized the seriousness of what had happened that night, and learned a lesson I thought would be worth repeating.

When that tanker landed that night, they violated the rules. Not only that, but since they had never before landed at night with the lights off, they did something that was *very* unsafe. Of course, you could argue that they had been led down that path by tower's instructions, and you'd be correct. You could also argue that the AC should have realized it was unsafe, and either turned the landing light

on or taken it around. That would also be correct.

But that's neither here nor there. What got my attention when I thought about it later was this: My crew had let them down. More specifically, I had let them down. I *knew* they were going to make that mistake. Everyone on my crew could see it coming. But instead of intervening, we had laughed about it. What the *heck* were we thinking? Talk about being lousy wingmen.

What if they had wrecked? What if they had gotten off centerline and departed the runway? What if they had scraped a pod? It's usually pretty easy to go back after an accident and identify the error chain. It's a lot harder, and less common, to actually see and recognize the error chain while it's developing. I saw the warning flags and the links in the error chain coming together that night. But instead of stopping it, I did nothing. Maybe I was feeling lazy and complacent. Maybe I didn't think it was my job. Maybe I had a morbid curiosity to see if they would actually land blacked-out. I honestly don't know. But I do know that I wasn't being a good wingman. Thank God they landed safely. I doubt I'd have ever been able to forgive myself if they hadn't.

The story has a happy ending. The other tanker was fortunate and landed safely. And I learned my lesson without any loss of property or loss of life.

So, here's the lesson: If you see an error chain developing, STOP IT! Step out of your comfort zone and *say something!* Second chances are never guaranteed. Be a better wingman than I was that night. 🛩️



**NKAWTO**





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Photo Illustration by Dan Harman

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# “Who’s Gonna Try To Kill Me Today?”

**CAPT PETER BIRCHENOUGH**  
65 AS/DOT  
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USAF Photo by SSgt Laura K. Smith

There was a term that we used to call the new guys in the KC-135 at Grand Forks who came into the squadron around the summer of 2001, the summer before 9/11. Obviously the term didn't come about until about a year or so later, but it described every copilot who would enter from that period of time on.

War Babies.

These pilots have more combat time and combat support time than they do non-combat time. All they've ever known are the deployments to the desert, and the countless hours of orbiting and complacency that go with it. Gone is the vast experience pilots used to get from flying business efforts, medical evacs, and Coronets, hopping from

country to country. When talking to ATC becomes difficult without an ATO kneeboard, when you have to make a conscious effort to *not* fly over 250 knots below 10,000 MSL, and when the local area is briefed as strange field procedure, that's when you know you've been in the desert much too long.

I consider myself one of the last pilots before that era, having arrived at Grand Forks in 2000, but even so, my combat time was split almost 50/50 over the 4½ years I spent there. Although I didn't consider myself a War Baby, I could occasionally feel the symptoms after several long, back-to-back deployments, particularly the complacency. As a pilot, that's one of those things you can control or mitigate. One thing that always helped me gain

control of it was to think, as I stepped to the jet, "Who's gonna try to kill me today?" My instinct was usually to look at the copilot, but that risk was already accounted for most of the time. My vigilance would usually increase about 10 days before going home, and I would become especially aware of the airspace around me. I didn't want to be the guy you hear about occasionally in the news who died with only a week left of his deployment. Then you think about the family that was waiting for him and your heart just sinks. Melancholic and sobering to think about, I know, but I was bound and determined that I wouldn't let that happen to me, and that thought always kept me on my toes, especially those last 10 days of a deployment.

I had eight days left of my third deployment. I was the aircraft commander (AC) and already had over 60 combat missions under my belt. The Boom Operator was a very experienced instructor, and the Copilot was ready to become an AC himself. On this night, we were to fly over the Persian Gulf and refuel a C-130, then top off a flight of F-14s. It was a fairly short mission compared to the ones we'd been flying over Afghanistan, and a welcome change. The refueling with the C-130 was uneventful, and we headed to our next track to wait for our F-14s. We talked to Red Crown (the Navy controllers) as we entered, and they set us up in orbit at FL210. There was a KC-10 above us at FL240 and a C-130 well below us. We had a bit of time before the F-14s were scheduled to show up, so we waited. We noticed that once we were at the west end of the track, the communications with Red Crown became broken and intermittent, and it wasn't until we were headed back east that we could get good comms back. (Standard radio coverage with the Navy.)

We had just made our turn back toward the east. The Copilot and I noticed at the same time another aircraft at our altitude on the Traffic Collision Avoidance System (TCAS) about 40 miles away. I told the Copilot to keep an eye on him as I looked outside to see if I could pick him up visually. I looked back down, and the Copilot said it looked like he was heading toward us. That caught the Boom's attention, and he was now in the jump seat helping us to look for this guy. I told the Copilot to make a call to RC asking for a traffic report in front of us. It was common that maybe they knew who this aircraft was and just didn't inform us of them because it wasn't going to be a threat, but I liked to be proactive. No answer from RC. I scrolled the TCAS scope down to 20 miles to get a better idea of how close this guy was going to get to us. Sure enough, he was at our altitude still and on a heading toward us. I told the Copilot to call RC again. We picked him up visually and began flashing our landing light on and off to possibly get the aircraft's attention. No answer

from RC and no response from the oncoming aircraft. At 10 miles, the aircraft had not changed course, and we began calling for radio checks with RC, and still flashing the landing light to get the unidentified aircraft's attention.

Somewhere between 10 and 5 miles I couldn't take it anymore and began to roll the KC-135 left toward the middle of our "protected" airspace to avoid a collision. As we got closer and closer to this aircraft I saw that we needed to come further left, and began to roll more bank away from him to the point where I couldn't see him anymore. I told the Copilot to let me know if I needed still more bank. The Boom Operator was helping the Copilot look out the window, and both of them were telling me to keep the bank in. I saw the aircraft pass us in the Copilot's window, and I could see the lights were up bright in their cockpit.

When I rolled out, I was heading to the southeast corner of the track, and the shock started to settle in as to how close we had just come to colliding. I was just about to call RC in a fury to file a HATR, when I heard the KC-10 above me file a HATR with two unknown aircraft that just busted through his altitude 3,000 feet above us. I gained communication with RC and filed my HATR as well. It was obvious to me that Red Crown had no idea who or what was in their airspace, and I told the Copilot to turn our RA (Resolution Advisory) back on until our F-14s showed up (per our refueling checklist, we had turned it off).

Twenty minutes had passed, and our hearts were still pumping. Becoming extremely vigilant, we were keeping all the aircraft in the track in sight the best we could, on TCAS and visually. This time, we were coming around the east end of the track when I was trying to account for the aircraft I had on TCAS whom I could see visually by their strobe lights behind me in the turn. I could account for the KC-10 above us and the C-130 below us, but there was another set of lights that didn't add up. It was pitch black and I couldn't tell how big or how close this guy was to me just by his strobes. I told the crew there was another set of lights in between us and the KC-10, but not on TCAS. We were still in the turn when the target showed up on our TCAS in a climb and on an intercept heading into us. We couldn't believe it. I turned to look out my window, and all I could see were strobes getting closer and closer. Another KC-135? It looked big, but I couldn't see an outline.

That's when all hell seemed to break loose in my cockpit. "Climb, Climb;" the RA came alive in my headset. I disengaged the autopilot and rolled out level, heading north, and started to climb. I quickly remembered the KC-10 was above me, and that he would stay inside the track. If I continued to climb and tried to stay in the track as well, I knew I would present a hazard for him; so I made the deci-

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# BACK TO THE BASICS

CAPT JASON BROWN  
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USAF Photo



Did you ever have one of those flights? Everything goes just fine. After the debrief everyone goes home feeling good, but the next morning it hits you: We just got lucky—that really could have been bad!

This flight was one of those. The mission planning portion was standard except for the fact that our receiver information and refueling track changed four times the day prior, and once more the morning of the flight. It didn't really bother either pilot much—both the copilot and I had just returned from theater where this kind of frag change was normal. So, it didn't really shake up the copilot much, despite the fact that this was his annual checkride.

The new and improved plan involved refueling two flights of two F-117s near Holloman AFB, NM. The flight went smoothly from takeoff all the way to New Mexico. When we arrived at the anchor track, the view was awesome from FL250. The sky was crystal-clear and it seemed like the mountains stretched on forever.

We conducted a standard point-parallel rendezvous with the first flight. Usually this is not required when refueling fighter-type aircraft, because they can acquire us on their radar and conduct the rendezvous using that equipment. However, that is not the case with F-117s because of radar limitations. The rendezvous was uneventful as we rolled out in front of them and began to refuel.

As we were refueling the first flight, we picked up the second flight on our TCAS screen approximately 30 miles out at our 12 o'clock. I pointed to the screen to bring it to the copilot's attention. He was very busy copying information from the first flight regarding tail numbers and the receiver's end-of-AR request, so he just gave me a quick nod, and I continued to keep an eye on the approaching flight. One thing that struck me as a little strange was that they were co-altitude with us. This didn't make us uncomfortable at the time—I'm sure it had a lot to do with the fact that we had just come back from the desert. Refueling in the desert is anything but standard most of the time, and pilots get accustomed to doing business in non-standard conditions.

I called the second flight on our AR primary frequency and let them know we had them on TCAS about 25 miles out. I told them we were level at FL250. They replied with "Copy that," and remained co-altitude. We continued the rejoin until, at six miles out, I caught a glimpse of the flight at our 11 o'clock. I let them know I had them in sight, and they replied with "Gotcha, we'll do a fighter turn-on." I pointed to the flight—now three aircraft instead of the planned two—to help the copilot get visual contact with the second flight. He responded that he saw them. The

cockpit was quiet in an attempt to sanitize the radios during the refueling. It is difficult to hear what the receiver is saying over the radio when there is lots of interphone chatter in our own jet. We limited our communications to hand gestures and cross-cockpit conversation (yelling is more accurate—it's loud in that cockpit).

We watched them come through our 9 o'clock—still about a mile away—and I told the boom operator they would be coming to our 6 o'clock shortly. The boom operator then advised them that we had "chicks in tow" and to maintain one mile in trail until cleared in. As the second flight came around, the first flight finished up and departed. The second flight was cleared in by the boom operator, and the following AR was pretty unremarkable.

As an Aircraft Commander, it is important to put your crew at ease so they won't be intimidated when it comes to advice or input. An authoritative AC who shuts out advice from the crew will soon find that he/she gets no communication at all. If my crew felt uncomfortable about anything we did during the sortie, I am confident they would have voiced their opinions—either in the air or during the ground debrief. As I said, both pilots were fresh from the AOR and I think that had a lot to do with our high comfort level during that second rendezvous.

In retrospect, there were a couple of things that happened during the second rendezvous that were incorrect and potentially unsafe. Procedurally, when I saw them co-altitude at 30 miles beak-to-beak, I should have had them climb or descend 1,000 feet until they were in visual contact. This would have negated the possibility of a midair collision if they failed to acquire us or our receivers visually during the rendezvous.

Secondly, when they replied to us saying, "Gotcha, we'll do a fighter turn-on," I assumed "gotcha" meant they had eyes on us. If this was, in fact, the case, it was legal for them to maneuver as required to effect the rejoin. However, "gotcha" could have meant "I understand," and they could have rejoined on our flight without knowing we had F-117s on our wing and boom. I should have confirmed that they had us visually and informed them about the structure of our formation before I cleared them to turn toward our flight. I assumed they wouldn't initiate that turn unless they had us in sight. I also assumed they knew we had chicks in trail, since both receiver flights took off from the same base in close proximity. These assumptions had the potential to become very dangerous for everyone involved.

Bottom line: The rules are there for a reason. Even though we often can't fight exactly like we train, we need to focus on safety and following our procedures while we're at home. ➤



# Fatigue In The Tanker

**CAPT BRIAN DUMOND**  
121 ARW  
Rickenbacker IAP OH

It was the beginning of March during the kickoff of OPERATION IRAQI FREEDOM. I had flown 12 straight days, one sortie per day, at an average of six hours per sortie. I was awakened by my beeper going off. I sat in my bunk for about 30 seconds until my Aircraft Commander's pager went off. As I got up from bed, I didn't notice any fatigue or exhaustion. In fact, I felt very good about my physical state. I had probably slept for about nine hours that night. I remember putting myself to sleep by watching a DVD on my laptop. My usual routine after my flight would be to debrief, go to the gym, eat dinner, and then watch a movie. My routine was very simple and pretty much robotic. After I got out of bed I grabbed my toothbrush and shaving kit, and walked down to the shower trailer. I shaved and washed up like I did every morning, then walked back to the trailer and changed. My Boomer and I went to breakfast, which was routine life for us. My Aircraft Commander would meet us at breakfast later. Then, after we ate, we would get our brief and go fly.

We took off as planned and accomplished our refueling. I think our senses were much keener during the first part of the sortie, than post-refueling. My reasoning was that as tanker pilots you want to be on station, on time. You know the fighters will need gas, so you have a sense of urgency

to accomplish that part of the mission. After giving the fragged gas to our receivers we were released and it was time to fly back to base. It was at this point in the flight where the incident occurred.

In the KC-135, there are about ten separate tanks from which you can move fuel back and forth. One of the touchy things about the fuel panel is that you like to keep the tanks balanced. For instance, if tank No. 3 reads 3,900 pounds and tank No. 2 reads 3,000 pounds, you will try to balance No. 3 to match tank No. 2. Well, at that time tank No. 3 was reading 10,000 pounds and tank No. 2 was at 9,000 pounds. I decided to drain tank No. 3 down to 9,000 pounds to become equal with tank No. 2. I announced to the crew that I was "draining No. 3 to match 2." I was going to drain 1,000 pounds out of No. 3 tank into the aft body tank. I had done this procedure many times and didn't think about backing myself up on the draining procedure.

With the fuel panel, there is no automatic shut-off valve to stop the drain, so you have to remember to pay attention to it. One way to remind yourself is to set a limit electronically on the fuel panel so it will blink at you when you have drained a certain amount of fuel. Some other ways are to set a timer, put one of your gloves on the fuel panel, or have the other crewmembers back you up. There are many different techniques a person could use, but I wasn't



USAF Photo SSgt Quinton T. Burris  
Photo Illustration by Dan Harman

really concerned about the fuel panel draining procedure at that time. My attention became focused on the story the Boomer was telling about a certain restaurant he was going to visit when we got back to the States. A couple of minutes went by, and the Aircraft Commander and I were half-turned around in our chairs, listening to the story. Suddenly, I remembered I was draining fuel and immediately stopped the drain from No. 3 fuel tank. I looked at the No. 3 fuel gauge, and it read 3,500 pounds. I then looked at the No. 2 fuel gauge, and it read 8,700 pounds. Immediately, I knew we had a big fuel imbalance.

Upon recognizing my error I felt pretty bad, since I had let the crew down. I looked to my Aircraft Commander for an answer on how to fix the problem. He had never had this much of a fuel imbalance before. Luckily, we still had about 3½ hours to go on the flight. We decided to isolate the No. 3 tank from feeding the No. 3 engine, or any engine for that matter. We planned on burning all the gas I had drained into the aft body into three engines, excluding the No. 2 engine. We would let the No. 2 fuel tank feed the No. 2 engine, thereby equalizing itself with the No. 3 fuel tank. After a while, we had both tanks within 1,500 pounds of each other, and we could safely land. We landed and everything else went as planned, but I felt pretty tired, along with the rest of the crew.

After the flight the three of us went to lunch, and that's when we noticed that we looked like the walking dead. After the flight, we were relieved to find we were off the schedule for the following day. It was then that I realized we had flown a dozen straight missions that were, on average, six to seven hours long, not including briefing, debriefing, and aircraft pre- and post-flight requirements. I remember taking a nap about one o'clock in the afternoon and waking up for dinner. We all still looked very tired when we were eating dinner. After dinner I went back to bed and didn't wake up until noon the next day. It was at this point that I finally realized how tired the crew and I were.

I don't think you really know the fatigue that sets into your body until you are finally able to rest. I believe that if I had only flown only five straight sorties consecutively instead of 12, the fuel imbalance might not have happened. Even though I was getting enough rest at night during the 11 straight sorties, my body and senses became very numb. That kind of situation could become very dangerous if you are not in a forgiving jet.

I truly believe, because of the demand for the missions in OIF, our crew had become so tired that we forgot the little things, which can add up to big things. 🛩️



USAF Photos

# TRUSTWORTHY ILS?

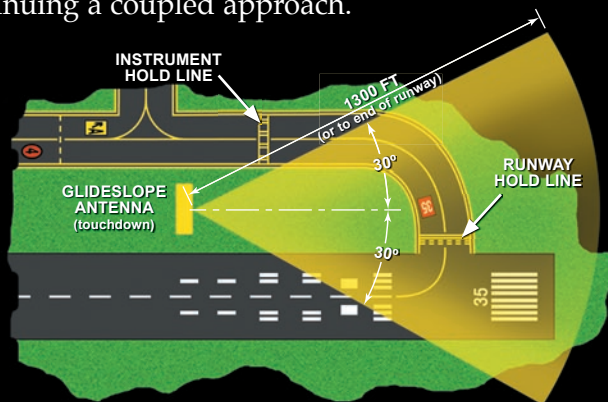
**LT COL JAMES HAM**  
**USAF Advanced Instrument School**  
**Randolph AFB TX**

Imagine you're in the cockpit of a C-5 receiving vectors for an Instrument Landing System (ILS) approach into Spangdalem AB, Germany. It is a night approach, with weather being reported around 700 feet with moderate turbulence and strong crosswinds. As the aircraft rolls out on the localizer, the glideslope pointer immediately comes into view, and the aircraft captures the glideslope and starts down while the crew configures for final approach. The ILS ident checks good, and the aircraft is centered on course, on glideslope with no warning flags. Approach control asks the pilot to say altitude about the time the pilots notice a descent rate of almost 1,500 feet per minute. This is followed shortly by Ground Proximity Warning System (GPWS) warning "Sink Rate, Sink Rate," and the crew makes the decision to go missed approach just as the radar altimeter audible warning sounds "minimums, minimums." The crew executes the missed approach almost five miles from the airfield at a height of 240 feet AGL, obviously well below the actual glidepath for the approach and obstacle clearance altitude.

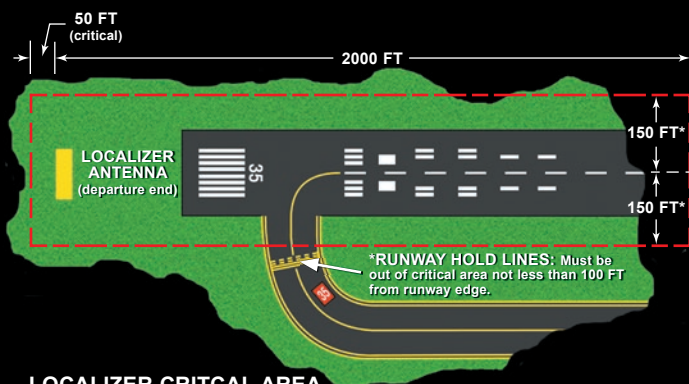
Fortunately, this true story had a happy ending (there are many others that didn't end so well). The crux, though, is how could an aircrew, with full normal ILS indications and a valid ident, end up so close to becoming a controlled flight into terrain (CFIT) event? As aviators, we have learned to trust the ILS approach so much that we routinely fly ILS approaches down to 200 feet and/or 1/2 mile visibility (and, in some cases, even lower with Cat II and III approaches). Even though the ILS is the standard for precision approaches, pilots should be aware of its limitations and anomalies that can and do occur with ILS signals.

One of the limitations of the ILS is its susceptibility to signal interference. For each ILS approach, there is an ILS critical area that must be protected from objects which may interfere with the accuracy of the localizer and glidepath signals. Objects in this critical area can reflect the navigation guid-

ance signals in unwanted directions causing contamination of the signal, generally in the form of bends in the course. In the U.S., this critical area is generally protected by preventing objects (i.e., taxiing aircraft or ground vehicles) from entering the area when the ILS is in use and the weather is less than 800 feet and/or the visibility is less than two miles. Preventing objects from entering the critical area during lower weather provides some measure of protection when course accuracy is most critical. However, when ILS approaches are flown with weather above 800 feet and two miles visibility, there is no guarantee the critical area is being protected unless confirmed with the air traffic controller (ATC). By AFMAN 11-217, Vol. 1, *Instrument Flight Procedures*, pilots must advise ATC if flying an autopilot coupled ILS approach no later than the Final Approach Fix (FAF) whenever the weather is greater than 800 feet and two miles visibility. This will allow the controller to clear the critical area or issue an advisory that the signal is not protected. In these situations, the pilot is alerted to the potential for signal interference which may preclude continuing a coupled approach.



**ILS GLIDESLOPE CRITICAL AREA**



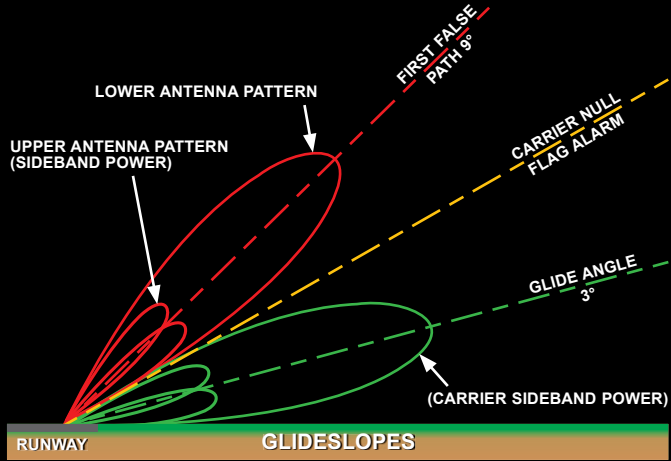
**LOCALIZER CRITICAL AREA**

Illustrations by Dan Harman

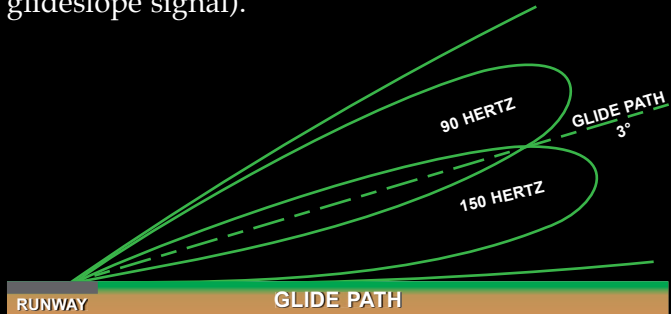
Another drawback to the ILS system is the existence of false glideslopes and localizer courses. Because of the way glideslope and localizer courses are produced, there are circumstances that can also produce false indications. The first false glideslope is at an angle three times that of the glidepath angle. For example, if the normal glideslope is at three degrees, then the first false glideslope will



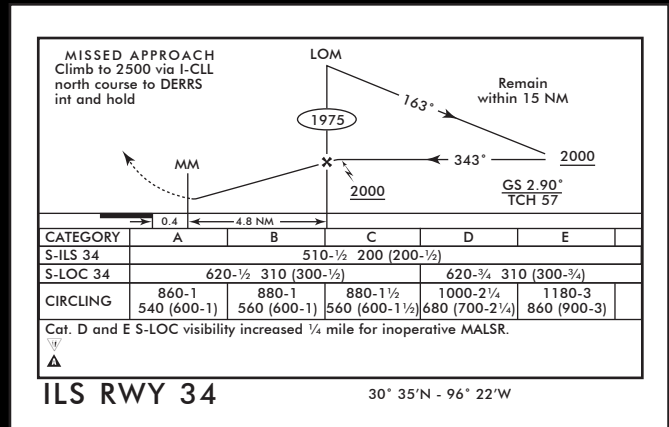
be around nine degrees. The electronic signals are modified to minimize the size and extent of the false signal lobes to reduce the possibility of an aircraft intercepting the false signal, but the possibility does exist. Of note, though, intercepting the glideslope from below the glideslope intercept altitude will make it nearly impossible to intercept the false glideslope.



While false glideslopes and localizer courses are a result of the inherent ILS design, malfunctions of the ILS transmitters can also cause erroneous glideslopes and localizer courses. At the risk of being labeled a "math geek," I'm going to get into some technical specifics on how this all works. The localizer signal is produced by a carrier wave of equal amplitude of 90 Hz and 150 Hz tones and a signal consisting of two overlapping lobes, one of 90 Hz and one of 150 Hz. The ILS receiver detects the strength of these signals and displaces the localizer course as needed to direct the aircraft to the course. When the receiver detects equal amounts of both 90 Hz and 150 Hz signals, it will display an on-course indication. A malfunction of the transmitter, though, could create a situation where only the carrier wave is transmitted without the side lobe signal. Since the ILS ident is transmitted inside the carrier wave and because the carrier wave has equal amplitude 90 and 150 Hz signals, the pilot will receive a valid ident and the receiver will display on-course indications regardless of the aircraft's actual position. The glideslope signal is produced in a similar manner and is, therefore, susceptible to the same phenomenon (with the exception there is not a separate ident for the glideslope signal).



All this being said, the reliability of the ILS is generally very good. Nevertheless, there have been numerous reports filed in the NASA Aviation Safety Reporting System (ASRS) database where aircraft have encountered signal anomalies while executing ILS approaches. Some of these reports are a direct result of the limitations of the ILS system and created an increased risk of CFIT like the C-5 mission mentioned above. Aircrews need to be cognizant of ILS limitations and use all available means to confirm aircraft position and expected altitudes when flying an ILS approach. By noting aircraft altitude at the FAF and crosschecking it with the expected altitude annotated on the approach plate, the pilot can ensure the aircraft is tracking the correct glideslope.



AFMAN 11-217, Vol. 1, prohibits pilots of USAF aircraft from flying an ILS procedure "if the outer marker (OM) (or at least one of its substitutes) is not available." The OM, or substitute, is required to crosscheck the aircraft's altitude at the FAF. Pilots can use other navigation aids, if available, to crosscheck the localizer course to guard against the potential erroneous localizer course. In the rare case when a pilot discovers or suspects a problem with an ILS signal, a report of the anomaly should be made to ATC as soon as possible.

Until newer technologies become available to the majority of the aviation population, the ILS will continue to be the standard system for precision approaches. The likelihood of an anomaly is extremely small considering the procedures and redundancies built into the system, but all pilots should be aware of the potential shortcomings of the ILS. Blindly trusting the ILS and becoming complacent is a recipe for disaster. By remaining situationally aware and using all information to ensure ILS signals are correct, pilots can comfortably trust the ILS to guide them safely to the runway. →





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# Ready To Take Over

**CAPT JUSTIN T. WATSON**  
60 AMW  
Travis AFB CA

USAF Photo  
Photo Illustration by Dan Harman

What would you do on final if you were the pilot not flying (PNF) on your airplane and all of a sudden the pilot flying (PF) passed out? Hopefully, all pilots would answer, "Take the airplane to maintain aircraft control, and either continue with the landing or go around."

What if you were the PNF and you were receiving gas behind another tanker, and that same excellent PF, again, passed out? I'm predicting the answer would be, "Take the aircraft, and effect the emergency separation." In fact, I would put money on the fact that any pilot would answer these questions with some sort of correct response for any critical or non-critical phase of flight—unless he didn't care about his life or the lives of others. (And if you are that person, hopefully you aren't flying airplanes.) Of course, these questions are simple at groundspeed zero (or zero knots and one G for you fighter-types reading this). As a pilot and aircraft commander in the KC-10, I have had the chance to

actually see what might occur when a fellow crew-member "passes out" or does not perform as they should in various "critical" phases of flight.

So, there I was with my crew en route to Mildenhall following an air refueling with some F-16s, when all of a sudden we were powerless. We had no lights, no engines and had begun a slow descent: an all-engine flame-out was screaming at us. We ran our boldface and respective checklists and successfully got one engine, No. 3 in this case, restarted. At this time we were in a single-engine situation in a heavy jet, and I knew this approach was going to be faster and slightly more complicated than normal. My crew and I acted superbly and dealt with all the curve balls that the simulator instructor threw at us.

Oh, yes, I forgot to mention the fact that this was a quarterly emergency procedure simulator. We decided to shoot the most precise approach back into Mildenhall's north-facing runway. I got the

jet all trimmed up and began a nice predictable descent on final. All of a sudden, I got a tap on my left shoulder. The simulator instructor passed me a note and asked me to subtly pass out at 600 feet AGL. I gave the note back and did as instructed. The instructor wanted to see how the first pilot, in this case Lt. X, would react in this situation, and it was a perfect time to effect this sort of situation in the simulator. So I pretended to pass out when the magical altitude arrived. Lt. X made his respective altitude calls, and I did not acknowledge. In fact, I got a light slap to the chest to "wake-up," but Lt. X still thought I was flying, heads down, looking at my approach plate. Luckily, our engineer was a very "high speed" evaluator type, and told the first pilot to take the jet. Lt. X did, and successfully landed the plane.

My question is: When would he have noticed I had passed out, without the flight engineer's assistance? His hands were not on the control column, and what if our engineer was not as "high speed?" The fact of the matter is we get very comfortable with the aircraft commander (AC), instructor pilot (IP), or evaluator pilot (EP) that sits next to us. We think that they have everything under control, which they should, but what if that inopportune thing occurs? When are you going to take the plane?

Another example of this type of lackadaisical behavior was while I was in aircraft commander upgrade, also known as PUP. The instructor was demonstrating to me what I might see as an aircraft commander letting a first pilot perform receiver air refueling. My job in this exercise was to tell him what he was doing incorrectly and what he should be watching. I had my hands nowhere near the control column as I should have. I had one on the glare shield and one on my lap. The instructor asked me what I was doing. I told the instructor pilot about where he was in the boom envelope, what he was doing incorrectly, and what he should be seeing; thinking that this was another typical general knowledge type of question.

The point he was trying to make was that I should have one hand on the control column and the other ready to pull those throttles back acting like an instructor pilot, because that is what in effect an aircraft commander was practicing to be. I should always be ready for an emergency situation or to effect an emergency separation when needed. My job as the PNF in a KC-10 during a breakaway is to push the autopilot disconnect switch and maintain visual contact with the tanker until the tanker is clear. How could I press that button expeditiously if my hand was nowhere near the control column?


Additionally, as the aircraft commander, I am ultimately responsible for what happens to the plane. I need to ensure the jet gets away from the tanker if the first pilot is not performing the emergency separation as per procedure. This is not meant to be

a "poke in the eye" to a first pilot either. All pilots need to be ready for that contingency and not be so dependent on the person who is in command, who may or may not have as many hours and as much experience as you in the aircraft.

My final example is very valuable to any crew-member, and especially to the pilot and first pilot. Let's just say you are in your local pattern, flying autopilot off, after a touch-and-go and going back to radar for another approach. In the KC-10, we are not very used to flying autopilot off during an instrument approach, so this can seriously task-saturate the PF in a busy pattern. You are currently the PNF and briefing the approach, heads-down in the cockpit, for one of your two semiannual proficiency sorties. Let's say the PF makes a mistake—after being instructed by approach control to proceed direct to the VOR for identification, he forgets to change the bearing and course information and begins a turn toward the TACAN, which is 8.7 NM (approx) SW of the VOR. This happened to me with an IP who was playing "bad pilot" in the Travis AFB local pattern. Luckily, before a 270-degree turn was accomplished, I caught the mistake during my briefing, corrected it, and instructed Capt. X to turn back toward the VOR. I did not catch this right away because I fell into the trap of flying with an IP and believing that they know what they are doing. I did not think that the IP was going to "play games" with me to teach me a lesson. The fact of the matter is, any pilot who is task-saturated could make that error.

During your brief, look up at what the PF is doing occasionally. Don't always trust they are doing the right thing. Get the boom operator and the flight engineer involved, if your jet is blessed with the presence of a crew, to help the PF out with calls and navigation. They will only add to your overall situational awareness in the pattern.

The point I am trying to impart, although simplistic and elementary to most aviators, is to always be ready and bring your "A-game" to the airplane. As I said before, these situations are simple to solve at ground speed zero, or zero knots and one G, but add a little speed, and things drastically change. You need to be prepared to dedicate more brain cells to other aspects of your flight. Keep your hand on the control column and the other ready to grab those throttles during critical phases of flight. You never know when you might have to intervene.

Lift your head occasionally when briefing an approach to keep your situational awareness about you. It is really easy to trust the AC, IP or EP (evaluator pilot), and by all means, you should. But this does not mean you can be complacent. You should always be ready for that contingency situation. After all, the PNF, in any phase of flight, is only a heartbeat away from becoming the new aircraft commander. 

# How Did I Get Myself Into This?

**MAJ DAVE DURKEE**  
107 ARW  
Niagara Falls NY

Did you ever have a sinking feeling when you were flying about something you were doing that you knew wouldn't turn out too good, no matter how you reacted? Well, I did.

My story starts as I was lying on a hotel bed in Boston after an exhausting day of flying for my airline. I was just about to fall asleep, when my cell phone rang, with my home phone on the caller ID. Usually when my wife calls when I am on an airline trip, it is something minor. But she was frantic and kept saying, "Chris is dead, Chris is dead." The first person who popped into my head was my brother Chris. I soon found out that there had been an airplane crash, and the Chris she was talking about was a friend that we'd had dinner with just 72 hours before.

My wife and I had gone out with Chris and his wife. Chris was an inspiring pilot who had just received his commercial pilot's license and was working for a company transporting personnel throughout the upstate area. Since I was flying full-time for an airline, and part-time as a KC-135R Aircraft Commander for the Air National Guard, he and I always had plenty to talk about. We enjoyed our dinner and our talk of flying.

But now this call turned my life upside down.

The next day, I was only scheduled for one leg with the airline, followed by my return deadhead leg to home. I completed the day without incident, trying to compartmentalize my thoughts to flying.

I found out after I got home that I was to be a pallbearer for the funeral. My airline schedule was clear, since I was scheduled to go with my Guard unit to Iceland for alert for two weeks. I decided I wasn't ready to leave my wife and friends during that trying time, so I sheepishly called my unit and let them know my predicament. As usual, they were awesome and told me to do whatever I had to do to make sure everyone got through the unfortunate events.

Afterward, my wife and I had discussed my going back to the Guard unit the next week. She had concerns with me flying again so soon, but she understands what I do for a living and the risks I take. I knew I would always think of what happened to my good friend whenever I flew, so for this first flight I would ensure I had looked at all risk management techniques. On the first flight after the tragedy I wanted to make sure I left no stone unturned. I wanted to make sure I would be completely safe—almost too safe, if that's possible.

My scheduled mission was easy. We would fly to an anchor pattern over the New England area, refuel a KC-10, and return home. Scheduled duration was about three hours. The day of the flight, we were all well-rested, and the weather was perfect for flying. My copilot was a full-time guy with about 1,000 hours in the KC-135R. He was scheduled to go to upgrade in about six months. The

DoD Photo  
Photo Illustration by Dan Harman

boom operator was a semi-experienced guard-  
man who had been flying with our squadron for  
about two years.

Takeoff, climbout, and the air refueling were  
uneventful. I was flying the aircraft as we de-  
parted the anchor pattern for our return leg home.  
Being the great copilot he was, my copilot started  
to balance the left-side wing tanks with the right  
side. Standard practice was to drain that wing  
tank to the aft body tank, to even it up with the  
tank on the opposite side. We were straight and  
level at FL260 at this time. Being the extra safety-  
conscious person that I was on this particular  
flight, it seemed like I was scanning and perform-  
ing checks continuously.

It was about 15 minutes after this that I remem-  
bered scanning outside and seeing what looked  
like streaming fuel on the top of the wing. I im-  
mediately brought it to the attention of the crew. The  
Boom went back and scanned the left-wing from  
the overwing hatch. He reported back and reiter-  
ated what I had seen. There was an area just aft of  
the No. 1 engine that appeared wet. He didn't see  
misting from the trailing edge of the wing, but it  
definitely looked wet. As we were talking through  
our options, we noticed the No. 1 tank slowly los-  
ing fuel quantity as compared to the symmetrical  
tank No. 4.

We discussed our situation. Using good cockpit  
resource management, I queried the crew on their  
opinions. My copilot had just been to the simula-  
tor and had the scenario of a main tank fuel leak.  
Everything we were looking at seemed to point this  
way. A main tank fuel leak in any aircraft is a big  
deal, but in the KC-135R it is *really* a big deal.

The checklist calls for shutting down the inboard  
engine on that side due to fuel tank location.

The way fuel migrates down toward the inboard  
engine could possibly start a fire.

Since wing tanks on the KC-135R are integral  
tanks, there is a possibility of wing structural prob-  
lems. Therefore, the checklist says not to exceed  
255KIAS, not to use speed brakes until landing,  
and land with flaps at only 30 degrees.

For some reason, the problem we were having  
just didn't seem feasible. Everything up to this  
point was flawless. We had no turbulence or high-  
G maneuvering that could have caused this situa-  
tion. Usually, you hear of planes that have engine  
or system problems. These planes are old, but in all  
my years of flying, I have never seen a problem of  
this magnitude without some previous write-ups,  
or discussions in hangar fly, etc. Since I have been  
in the Guard, the maintenance that I have seen has  
been nothing short of exemplary. But thoughts  
were going through my mind: "What if I didn't do  
anything, and we really did have a fuel leak?" I was  
taking a very conservative approach, I thought.

We briefed the approach and decided we would


clear the runway and shut down in the ham-  
merhead. As we approached home for our three-  
engine, flaps 30 landing, we called the SOF and  
informed him of our predicament. He verified all  
things were covered, and alerted Tower and the  
fire department. We declared an emergency with  
Approach, switched to Tower, and were cleared to  
land. Our approach, landing, and shutdown were  
uneventful. Maintenance was there to meet us in  
the hammerhead.

After we had shut down, maintenance and the  
fire personnel began inspecting the wing. To our  
dismay, maintenance said there was no fuel leaking  
from the wing. I followed the maintenance person-  
nel onto the wing to see for myself. From the over-  
wing hatch it still appeared wet. But, as you stood  
behind the No. 1 engine, you could see it wasn't  
wet with fuel. It was just a different type of shiny  
paint they used in that area during some anti-cor-  
rosion work. The sinking feeling was starting to  
grow. I told the maintenance personnel to look at  
the No. 1 fuel tank level. As we did, the fuel sensor  
in that tank—which had been written up several  
times before—fixed itself. The quantity in the No. 1  
tank was exactly the same as the No. 4 tank.

My ego was crushed. I had just shut down an  
engine, landed with a minimum flap position,  
declared an emergency, and possibly jeopardized  
safety because of shiny paint and an intermittent  
fuel quantity gauge.

We were met by the SOF and driven in for  
the debrief. The Ops Group and Maintenance  
Commander were there for the debrief, as well. I  
went through the entire scenario with them. As I  
finished, I was waiting for the formal "come-into-  
my-office-I-want-to-talk-for-awhile." I was floored  
when they both said they would have done the  
exact same thing with the information I had. Just  
goes to show why I love this place and the people I  
work for.

To correct this situation, we have implemented  
many changes. For one, maintenance has repainted  
all those areas on the jets so they don't appear wet,  
and they don't use that type of paint anymore. We  
have also worked with them on seeing some of  
the older write-ups in the book so we will have  
some inkling on issues that may arise during a  
flight. Operations has developed increased Hangar  
Flying time into our drill weekends to discuss more  
of the situations guys see out there.

I was still upset with the way things went down.  
I was so worried about having an error-free flight  
that I put my crew and myself into a position of  
higher risk, even though my gut feeling was tell-  
ing me otherwise. Thinking back on it, though, I  
followed all the rules with the information I had.  
And even though I took a conservative approach, it  
would have been far harder to explain a major fuel  
leak if I hadn't taken any action at all. 

sion to turn outside the track to the east to avoid climbing into the KC-10. I remember debating in my head for a split second that I was breaking the rule of going outside my "protected" airspace, but I knew staying inside was a worse decision, and at least I wouldn't hit the KC-10 above me.

The Boom Operator checked off headset to go to the back and check back on to give me some inputs from his view over the wing. I was calling RC, advising them that we were in a climb to avoid an unidentified aircraft off our left side that appeared to be climbing into us. RC admitted they did not know who that aircraft was. No surprise to me; they had already let three other aircraft transit their airspace without knowing who they were 20 minutes ago, why would they know who this was? I continued to call out my heading and altitude, passing every 15-20 degrees and 500-1,000 feet over RC freq. The Copilot was calling on the A/R primary freq, thinking maybe this aircraft was on that freq rather than RC. No luck. The Boom Operator reported from the back that the aircraft was still climbing into us, that it was dark, and he couldn't tell what kind of aircraft it was, but it looked big.

Was it one of ours? Was it someone passing through the airspace that got lost and realized it, and just happened to start climbing and turning when we got the RA, and hadn't looked out the window yet? Was it a commercial airplane that had terrorists on it that had snuck into the airspace and was going to run it into a United States warplane? Who the hell was this guy, and why was he trying to kill me? All these questions were going through my head. "Climb, climb," the RA was still yelling at us.

The one thing that kept me somewhat sane was knowing that the KC-135 is pretty fast for a four-engine airplane, and that I could probably outrun whoever this was in the climb. The throttles were maxed, or close to it, and I was still calling on RC with altitude and heading calls. My heart was in my throat, and I was doing all I could to get away from an airplane that wanted to kill me. The radios were silent. I knew that every aircraft on the frequency could hear the fear and desperation in my voice: "All aircraft in Tango track roll out and level off now!" I was hoping that maybe the guy next to me was listening to the radios, but was so clueless that he just didn't make the connection that it was him causing the problems. No such luck. RC informed me that they were still trying to acquire the traffic. I called out my heading and altitude again, and shortly after that the unidentified aircraft began to turn and descend away from me. That's when RC informed me that they had possibly figured out who it was.

I had finally leveled off at FL270 and had done a 270-degree turn, which had me heading back west into the track, when the aircraft left me. I had climbed 6,000 feet to get away from this guy! Shortly afterwards, our F-14s called in, informing

RC that they weren't entering the airspace until they had it under control. All I wanted to do was go home; there was no way I wanted to stay in that airspace after two near-midairs in my aircraft within 20 minutes of each other. Needless to say, we filed another HATR, refueled the F-14s, and went home. The whole crew was shaken up pretty good, so the ops guys gave us the next day off to do laundry.

Had we been complacent that night with our nose in a book or staring out the window instead of being proactive in the cockpit, the outcome could have been extremely different. Having three HATRs filed in one refueling track within a 20-minute period of time, right before another major operation was about to kick off, got some attention. They found that there were overlaps in airspace control, and non-compliance with ATO procedures, as well as standard procedures with the Navy pilots.

The first airplane that night we estimated missing us at about 250-300 feet was actually a Navy S-3 Viking who we later found out was at the time in the middle of a rendezvous with some F-18s. That could've sucked. They apparently never got handed off from the other controller and were never told to descend therefore transiting the airspace at our altitude.

The second incident was later found out to actually be our F-14 receivers. They never checked in with Red Crown, never checked up on AR freq, and never turned their air-to-air refueling TACAN on, and then afterward pretended like they just got into the airspace, checking in with their tactical callsign rather than their non-tactical callsign, which Red Crown had already identified to us as the HATR aircraft.

There was a lot on the shoulders of the Navy, but I wondered if there was anything else I could have done that night that would have avoided either incident. The first incident I think would have happened regardless. However, had we not had the first incident (along with the KC-10 incident) and lost faith in the Navy controllers, causing us to turn our RA back on, it's hard to say if the second incident would even have happened. It surely wouldn't have happened during the day, because we could have at least identified the F-14s as friendly (although Iran uses F-14s). The one thing that I thought about later with the second incident was a call on Guard. Although it's not as easy or quick to change the radio to transmit on Guard in the KC-135, I think that definitely could have helped; it is, after all, Navy Common. At the time, I was trying to fly my airplane and make my position known to everyone else in the track as I evaded this other aircraft. It never crossed my mind that someone might not be on *any* of the required frequencies.

What keeps you from becoming complacent? Maybe all it takes is a story like this every once in a while. 🐣



**FY06 Flight Mishaps  
(Oct 05-May 06)**

**17 Class A Mishaps  
0 Fatality  
7 Aircraft Destroyed**

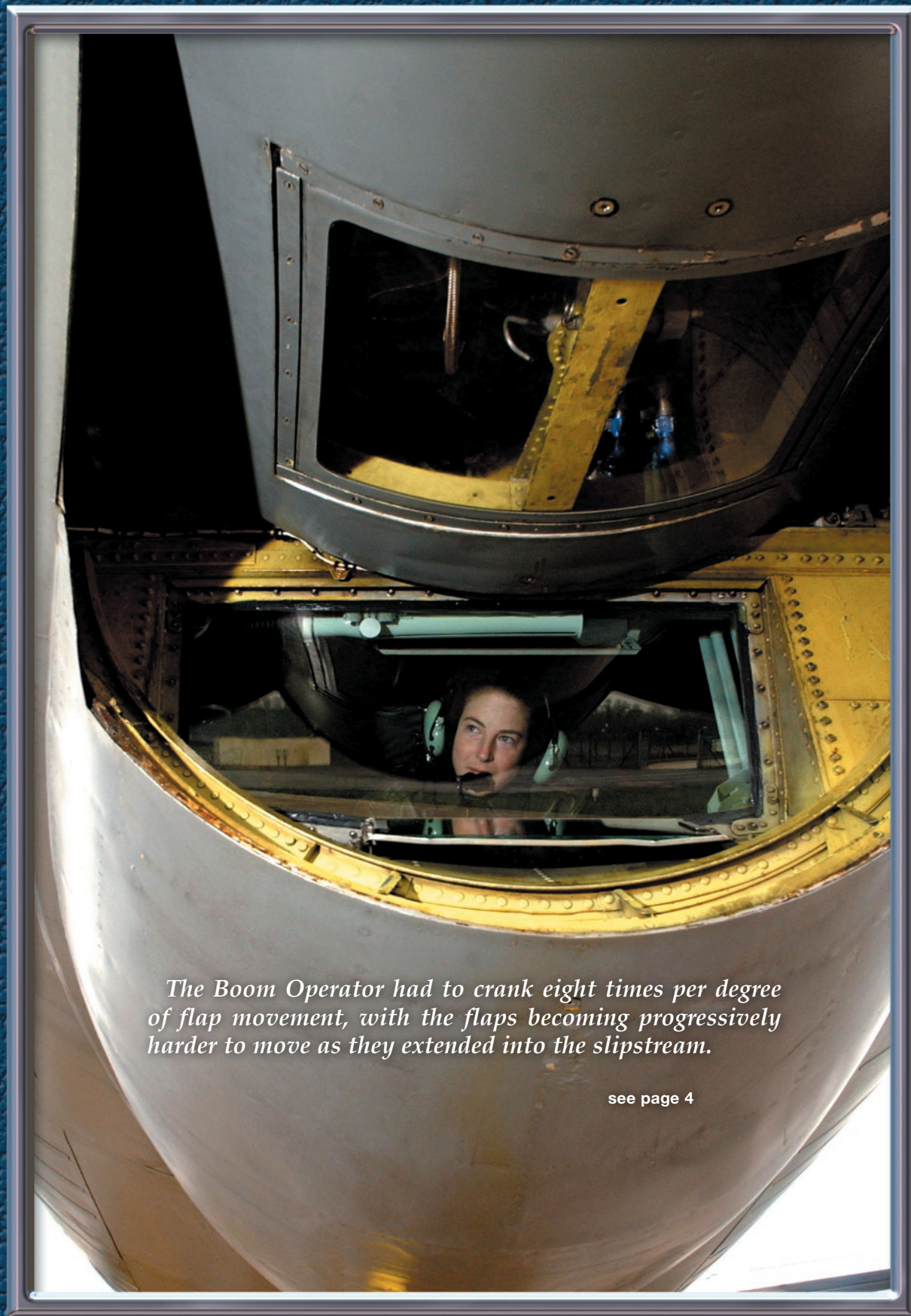
**FY05 Flight Mishaps  
(Oct 04-May 05)**

**23 Class A Mishaps  
11 Fatalities  
9 Aircraft Destroyed**

- 09 Oct** An F-16C departed the runway on landing rollout; pilot egressed safely.
- 20 Oct** \* An F-22A ingested an NLG safing pin into the #2 engine; no intent for flight.
- 21 Oct** \* An MQ-9L landed short of runway; gear collapsed.
- 24 Oct** \* An Aerostat was destroyed during a hurricane.
- 28 Oct** An F-16C departed the runway on landing rollout; pilot egressed safely.
- 02 Nov** A C-5A had a #2 MLG bogie fire after landing.
- 17 Nov** A C-17 had a #4 engine compressor stall and fire.
- 28 Nov** An F-16C departed the runway on landing rollout; pilot egressed safely.
- 06 Dec** An A-10A had a landing gear collapse on takeoff.
- 13 Dec** ➔ A T-38 had a bird strike; aircraft crashed, pilots ejected safely.
- 17 Jan** ➔ An F-15C crashed into the ocean; pilot ejected OK.
- 14 Mar** ➔ An F-16C experienced buffeting and uncommanded pitch/roll; pilot ejected safely.
- 30 Mar** ➔ An F-16C crashed; pilot ejected safely.
- 30 Mar** A T-38C landed short of runway.
- 03 Apr** ➔ After an emergency RTB, a C-5B landed short of runway, aircraft destroyed.
- 05 Apr** ➔ An F-15C crashed into the ocean; pilot rescued with multiple injuries.
- 11 Apr** ➔ An F-16C crashed after takeoff; pilot ejected with minor injuries.
- 20 Apr** An F-15E suffered FOD damage to right engine inflight; RTB OK.
- 21 Apr** An F-16C sustained engine damage from bird strike on takeoff; RTB OK.
- 02 May** Main left gear on an F-15C collapsed on landing, departed runway.
- 08 May** A B-1B landed gear-up.

*Editor's note: The 30 Mar T-38C mishap was upgraded from Class B.*

- A Class A mishap is defined as one where there is loss of life, injury resulting in permanent total disability, destruction of an AF aircraft, and/or property damage/loss exceeding \$1 million.
- These Class A mishap descriptions have been sanitized to protect privilege.
- Unless otherwise stated, all crewmembers successfully ejected/egressed from their aircraft.
- Reflects only USAF military fatalities.
- "➔" Denotes a destroyed aircraft.
- "\*" Denotes a Class A mishap that is of the "non-rate producer" variety. Per AFI 91-204 criteria, only those mishaps categorized as "Flight Mishaps" are used in determining overall Flight Mishap Rates. Non-rate producers include the Class A "Flight-Related," "Flight-Unmanned Vehicle," and "Ground" mishaps that are shown here for information purposes.
- Flight and ground safety statistics are updated frequently and may be viewed at the following web address: <http://afsafety.af.mil/AFSC/RDBMS/Flight/stats/statspage.html>.
- **Current as of 12 May 06.** 🛩️



*The Boom Operator had to crank eight times per degree of flap movement, with the flaps becoming progressively harder to move as they extended into the slipstream.*

see page 4

