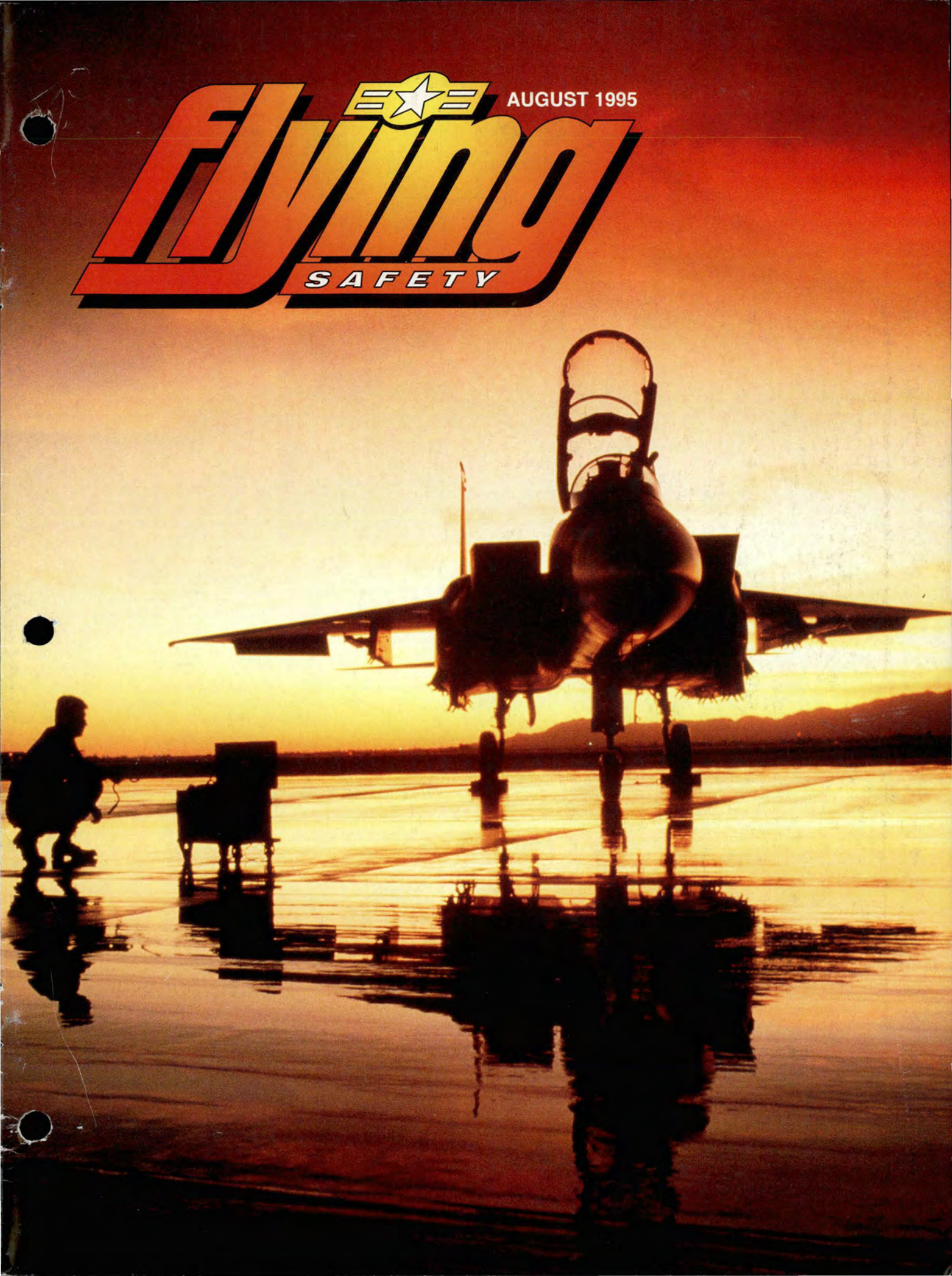
flying SAFETY

AUGUST 1995



WE ARE A PROFESSIONAL FORCE PREPARING FOR COMBAT

By General John G. Lorber
Commander, Pacific Air Forces

■ Imagine yourself being stopped on the sidewalk back in your hometown while on leave by a local news reporter and asked the questions, "What is PACAF? What does it do?" I think you'd agree that the title of this article might come close to answering the question.

We all like to think of ourselves as a professional as we go about our business of preparing for combat. However, permanent membership in the "professional" club is not automatic once you're initially qualified in your job, and it's not grandfathered just because you've been everywhere and done everything. To keep your membership current, you must "pay dues" continuously to keep your professionalism untarnished. Remember, you are only as good as your last mission. Here are some of the "dues" each of us are expected to "pay" to keep the title of a professional aircrew member.

A professional aircrew member comes to the flight briefing physically and mentally prepared to execute the mission. A tailored physical conditioning regimen, coupled with adequate crew rest and proper nutrition, provides the stamina and mental alertness our bodies require to perform on a professional level. Mission preparation takes into account the qualifications of the least experienced flight member and accommodates the differences in skills among the participants. The training sortie marries up with the unit's expected wartime tasking as described in its DOC statement against the expected enemy threat. The mission briefing is thorough, covers all details and contingencies, and ensures time is spent discussing ROE and training rules situations, emergency procedures and basic aircraft handling characteristics. No one should shove away from the briefing table until the flow and details of the mission are understood by all.

Preflight of the aircraft and weapons must be thorough as well as the crew coordination briefing with the crew chief prior to engine start. Any discrepancy overlooked now may set the stage for a potentially catastrophic event. From the correct weapon loaded on the correct station to proper engine oil and fuel servicing, all items have to come together exactly to ensure proper weapons systems performance.

Takeoff is the most critical phase of flight aside from the time you are in enemy airspace. You must be ready to rapidly and accurately react to any problems you may have on takeoff roll, be it engine failure or a high-speed abort. If you get airborne and the aircraft gets sick, you must be ready to jettison stores and bring it right back around to land. Takeoff is not the time to be daydreaming or thinking fifteen minutes downstream into the mission. A professional is expected to maintain aircraft control while analyzing the situation and selecting the proper course of action for a safe recovery.

No matter what mission you are flying, professional aviators stick to the briefed game plan. The flight leader makes the decisions if things need to change and communicates these changes clearly to the wingmen. By the same token, wingmen should not let illogical actions go by without questioning. Professional crewmembers sound sharp on the radio, execute their tactics as briefed, and comply with the established rules. Whether it's staying in the vertical or lateral confines of your assigned airspace until tally-ho, or being restricted to certain weapons delivery run-in headings, all restrictions must be properly adhered to all the time for safe completion of the mission.

Just because the main part of the mission went well doesn't mean you're home free. Rejoining the flight after the tactical portion of the mission has been completed has been proven hazardous due to lack of attention to the task at hand. Returning to base safely should receive as much planning and attention as weapons employment. Being prepared to execute your best instrument approach is a critical first step for sortie regeneration. The mission's not over until you're in the chocks, the aircraft discrepancies debriefed to maintenance, and the flight members have been apprised of their performance and mission results. Professional aviators learn something on every sortie they fly and pass that information on to the rest.

This article does not cover all the attributes it takes to be a professional flyer but emphasizes the basic skills. We have not always executed the basics professionally across-the-board, and it has cost us aircraft and lives. Let's make sure each of us does our part in executing our portion of the mission professionally. After all, we are a professional force preparing for combat. ■

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FRONT COVER: Sunset F-15 photographed by MSgt Fernando Serna

SPECIAL FEATURES

REGULAR FEATURES

CONTRIBUTIONS

Contributions are welcome as are comments and criticism. No payments can be made for manuscripts submitted for publication. Call the Editor at DSN 246-0936 or send correspondence to Editor, *Flying Safety* magazine, HQ AFSA/SESP, 9700 Ave G, S.E., Ste 282, Kirtland Air Force Base, New Mexico 87117-5670. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

SUPERMAN DISCOVER

MAJ BILL BASSETT
19th Air Force/DOVC

■ It was supposed to be a fairly "easy" mission. This should have been my first clue for the events to come.

I was TDY to augment an overseas squadron transitioning to a new location which had recently lost most of their experienced pilots to PCS returns to the states. The unit had only two experienced pilots to fly with about six relatively new copilots but was obligated to fly multiple back-to-back exercises, regardless of their manning shortage. I'd already flown extensively with the squadron, and I was nearing the end of my TDY commitment. I was looking forward to getting home after months on the road. One more "Op" to go, and I'd be homeward bound.

My copilot was a recent graduate of the mission qual course, still "cutting his teeth" on what the mission was all about. Just weeks before, he'd been a student of mine at the schoolhouse, and now I was his instructor in an "operational" squadron. I saw this as the ideal opportunity to round out his education and introduce him to the "real mish."

Our tasking was simple: Infil a 26-man team, at night, at a provided set of coordinates. In my line of business, this was not an unusual mission. If anything, it was routine. After flight planning, the copilot and I determined the weight of the team would require us to perform multiple air refuelings, one every hour and a half. Normally, we could go 3 or more hours without A/R, but we were flexible. Minor setback.

The colonel who was our mission commander demanded we not fail in our mission. The credibility of the squadron was paramount as we were demonstrating our capabilities to these new "customers." My crew's marching orders were clear: "Continue flying to get the team in, even if it means you have to cycle between air refueling and trying to get them in until the expiration of your waiverable crew duty day. Do not return without getting that team in!" Just a little pressure to ensure success.

Prior to takeoff, I remember completing the aircraft "walkaround" and noting a light drizzle which was expected to change to a scattered cloud deck prior to the objective site. Behind the clouds was what I was interested in — high moon illumination. It would translate night into day with the night vision goggles the crew would be wearing and provide us with the visibility to land at this unfamiliar LZ (landing zone).

Not long after takeoff, we flew to the first A/R track. The moon broke out from behind the clouds and provided blinding illumination — I was looking directly at it while refueling. At least it was better than nothing, I reminded myself. It looked as though the weather would be great at the objective site. So I thought.

After some time, we alerted the team in the back of the aircraft we were "15 minutes out," and we start-

S, HE'S NOT SO SUPER

ed climbing the sloping terrain leading to the site. The illumination was great. I clearly saw the twin towering mountain peaks in the distance, one on either side of the ingress route.

We were flying between 100 and 200 AGL during our ascent, passing through several thousand feet MSL. As we passed through a Dash One prescribed altitude, I noticed the terrain following (TF) radar suddenly stopped working — blank, nada, nothing, "hard fail." "Okay," I thought to myself, "no biggie. The FLIR (forward-looking infrared) is still looking good." Besides, this was going to be a visual approach. I wouldn't need the radar.

As we continued our climb to the objective site, I noticed the moon was beginning to disappear behind what looked to be a thick cloud deck. The clouds looked like they were sitting right at the saddle between the two mountains. The site was just a few miles beyond the backside of the saddle. We were almost there.

"Okay, guys," I said. "It looks like there might be a cloud deck at the objective. I think we can make it in, but it might be a little dark as the moon is eclipsed by the clouds. Everyone stay heads up." With this said, the tail gunner piped in with, "Five minutes out!" to the team.

I was thinking how much I wanted that "warm fuzzy" the TF radar provided as the visibility started decreasing. At least I could still see the ground. But as we continued, the visibility continued going down, probably now less than a quarter of a mile. I thought it might be a good idea to preset my infrared light — just in case. "Whoa! I'm blinded! Turn that off!" The infrared light reflected off the haze like a landing light in a snow shower. I should've taken it as a warning.

"Okay, crew," I said again. "We're descending to 50 feet and slowing down to keep the ground in sight. If we start to lose (visual reference with) the ground, I'll start a flare and we'll land or hover our way in to the site. One mile out." As I was struggling to keep visual contact with the ground, I could feel the aircraft center of gravity change as the team began to position themselves in preparation for the landing. We were almost there. Then it happened.

There we were. Fifty feet, at night, and the left gunner (on my side of the aircraft) called, "Left side's Popeye," meaning, "I've lost visual contact with the ground." Almost simultaneously, I lost contact with the ground too. I knew we had to turn, but I also knew there was rising terrain on either side of our course sloping up to the two peaks I'd seen minutes before. I needed that damn TF radar — NOW!

As I surrendered the controls, I sensed impending doom. So this is where my arrogance had brought me — my last 5 seconds of life! I just knew the copilot's inexperience would descend us in the turn and we would be a smoking hole.

"I've got the controls," the copilot responded. "I still have visual with the ground. Coming right," he said to the right scanner. "Roger, sir. I still have visual with the ground too. Cleared around 180 (degrees)," the scanner called out.

As I surrendered the controls, I sensed impending doom. So this is where my arrogance had brought me — my last 5 seconds of life! I just knew the copilot's inexperience would descend us in the turn and we would be a smoking hole. There was nothing I could do. I was along for the ride. All my experience, and here I was, relying on a copilot with one-tenth my goggle experience to get us through. Heightening the crew's "pucker factor" even more, the flight engineer, seated between the copilot and myself, was yelling for me to do something. "Take the controls, sir!" He, too, knew how inexperienced the copilot was. "I've got the controls. Right scanner, talk me around the turn," I commanded.

As quickly as we went IMC, we broke out. No one said anything for some time until I spoke up. "Okay, guys, I guess we're going to go back to the tanker for some gas and then try again." I recalled the mission commander's directive. This was not what the crew expected to hear. Some pleaded we not try again. I somberly said, "We have to."

After topping off with gas, we headed back in. This time we were just fortunate enough to get in — but just barely. During the ingress, everyone was "cocked" to aborting again. Luckily, the weather had improved from total zero-zero to haze and probably one-half mile visibility. Once we landed and let the team out, I was all too happy to say, "Outstanding! We're outta here!" We left the team to do their thing in a remote site with nasty weather. We could now start "letting our hair down." Only one more A/R to home.

I decided to let the copilot fly the A/R, but since our last refueling, the winds had picked up considerably and so had the turbulence. I could see the copilot working hard to "hit" the probe in the basket. After some time, he decided to take a break and let me flail around for a while.

"Sir," the engineer said, "we're reaching bingo to our divert base." "Great." It was the only response I

continued

SUPERMAN DISCOVERS HE'S NOT SO SUPER

continued

could muster. I chased that basket for what seemed like forever before finally getting the contact. By that time, my arm was one big cramp, and I again surrendered the controls to the copilot while we onloaded more gas than we needed. No more surprises for me!

Well, we obviously made it back unscathed except for our egos. At the debrief, I apologized to the crew for having almost killed them and recognized the efforts of the copilot and right scanner for getting us through this near disaster.

Then I unleashed my fury on the mission commander's representative. The colonel was in bed and was represented by another officer tasked to attend our debrief. "How dare you put such pressure on my crew to press for the purpose of appearance to our customers? Do you realize how close you came to losing a crew and a 26-man team tonight?" I swore and stood my ground. I promised myself I'd never again let another commander convince me to push my crew beyond our limitations like tonight. This mission was not worth the potential loss we almost provided.

Lessons learned? Too many to list. No one individual event in the chain leading up to our near disaster was insurmountable, but cumulatively, they had an awesome effect. Luckily, time has provided me some valuable insight in mission management, particularly at the crew level.

Only recently, I've been happy to see a new, viable risk assessment program implemented in my squadron because of the commander's vision. Does your squadron quantitatively evaluate risk factors? How do you know when the risks involved exceed the requirement to complete the mission? How can we lessen the risk without compromising mission accomplishment? As a commander, do you trust the judgment of your crews to "make the call" when they're pressing too far? Do you add a little pressure by telling them they must not fail to complete their assigned mission?

I've found the bottom line at the crew level is this: As the aircraft commander, do you have the fortitude to stand up to a commander and tell him you've exceeded the capability of your crew? I've spent my time in front of the mirror since that flight because, in the end, the blame, the "pressing," the crew, was driven by me.

At that time, I never thought it might be me because I was invincible — made of steel. But now I know better. How about you, Superman? ■

Flying Safety

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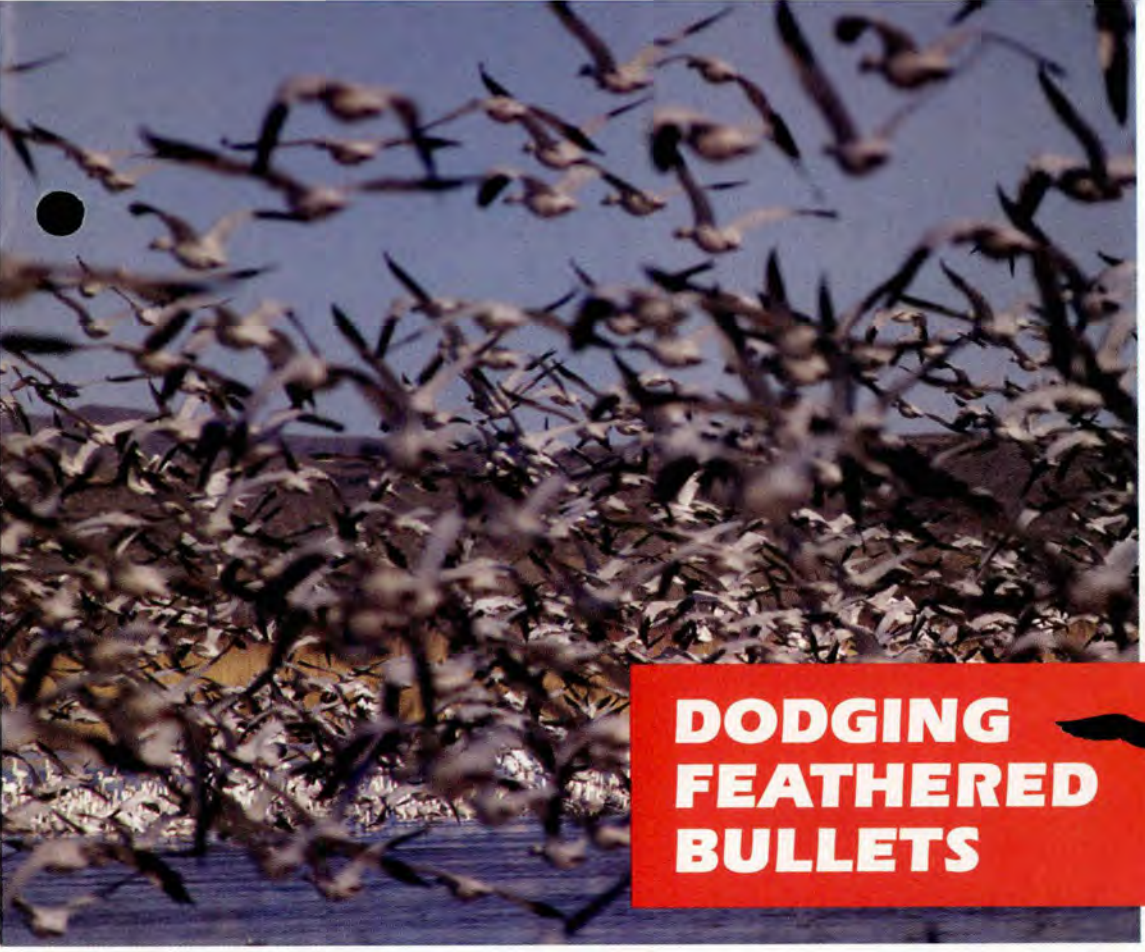

USAF Photo by TSgt Perry Heimer

DODGING FEATHERED BULLETS

CAPT RUSSELL P. DeFUSCO
Bird-Aircraft Strike Hazard Team

CAPT RUSSELL A. TURNER, MC, FS
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■ A safety mishap investigation board determined the loss of a jet was partially a result of improper pilot response in an attempt to avoid hitting a flock of birds. The pilot pulled his aircraft down and away from the birds, striking high tension lines. The pilot later lost control of the aircraft during recovery for landing. Fortunately, he escaped without injury.

The question many of you have is "What *is* a proper pilot response for avoiding birds?" The question is much more complicated than it may appear on the surface, and specific guidance has not been available.

The bird strike problem is a serious one, costing the Air Force approximately $20 million (currently $50 million) per year. Each year, 2,300 bird strikes (presently 3,000) are reported to the Bird-Aircraft Strike Hazard (BASH) Team. While many of these strikes are unavoidable, a reduction in the hazard is possible by a variety of means, not the least of which is pilot response to an imminent strike. The effectiveness of a maneuver to avoid birds is contingent on a number of factors including human physiology, the decision process, and aircraft response to pilot inputs.

Studies conducted on pilots give an indication of the amount of time required to maneuver to avoid colliding with birds and must be recognized in determining proper pilot response. The average pilot tested required 0.10 seconds for sensation of an image to travel from the eye to the brain. Focusing on the sensed object required an additional 0.29 seconds. Perception, or recognition of the object, took another 0.65 seconds for the average pilot.

Each of the above factors will vary between individuals and in differing situations. Object size, relative motion, object color, background color and composition, contrast, and light intensity level, among other factors, greatly influence the amount of time required to perceive an object to be avoided.

The problem doesn't end there though, as the average pilot required 2.0 seconds to decide to act on the perceived situation. Decision time varies with experience, level of concentration, and situation awareness and is significant in all cases. Once the decision to react is made, 0.4 seconds are required to operate the flight controls (i.e., pull back on the stick).

The response of the aircraft to control inputs varies greatly among aircraft. Larger aircraft generally require significantly more

continued

The USAF BASH Team has received numerous calls concerning bird avoidance maneuvers. Although written in 1986, this article is still valid and should answer most questions you have about this subject.

DODGING FEATHERED BULLETS

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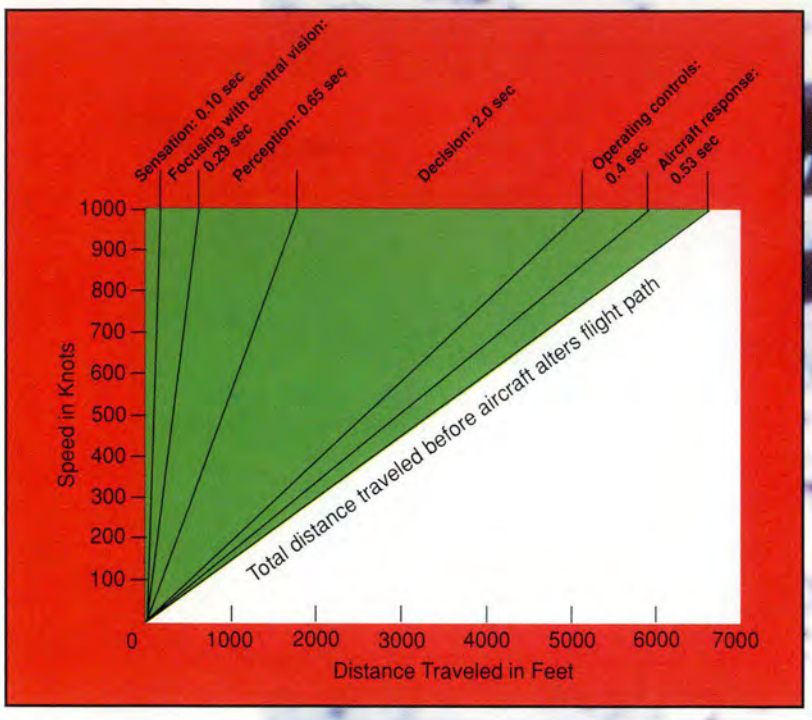


time to react to control inputs than smaller aircraft. For example, we'll use the F-15. This aircraft is capable of an instantaneous pitch rate of 22 degrees per second with maximum control deflection. Assuming a 0.5-second aircraft response to control inputs and a 5,000-foot turning radius at 450 knots, 0.52 seconds are required to move the aircraft 20 feet to avoid a bird strike. At 300 knots, 0.53 seconds are required for the same 20-foot movement in the airspace.

Totaling all this up, we see it requires approximately 4 seconds from the time of initial object sensation until the aircraft has moved sufficiently to avoid a bird strike. In other words, at 500 knots, a bird must be sensed from a distance of at least 3,342 feet/0.63 miles to avoid colliding with it (see figure above).

Oftentimes, it is not possible to maneuver to avoid birds, and the strike is inevitable due to the birds' proximity. A Class B investigation board basically found because of the mental reaction time and the time that it takes for a control stick input to actually move the aircraft, it is unreasonable to assume that the pilot could have avoided hitting the bird. In situations like this (i.e., when the bird is within the *green* region of the figure), it is best to remain level, possibly duck your head, and take the strike. Maneuvering within this region may only create additional problems such as pilot disorientation, unusual aircraft attitude, or increased damages following the bird strike.

When birds are perceived outside the green area of the figure, maneuvering the aircraft to avoid the birds may prevent a strike. In most cases, birds will tuck their wings and dive if they perceive the oncom-

craft as a threat. We've all observed this behavior at times. There are exceptions, however. Gulls, for instance, often turn and attempt to outrun the oncoming threat and are often struck from the rear as a result. Some birds maneuver laterally to avoid danger, but it is the very rare bird that climbs to avoid danger. From this, we can conclude that in the vast majority of cases, a climb should be initiated if bird strikes are to be avoided.

Most pilots queried have an intuitive feeling that a climb is best to avoid birds. The BASH Team would highly recommend this maneuver to avoid birds for a number of reasons. Since most birds tuck and dive from danger, pulling up is best. Also, by pulling up, the pilot may be able to protect the canopy or engines by taking a strike on the hard undersurface of the aircraft. Lastly, the possibility of collision with the ground or other structures is greatly reduced.

Since bird avoidance is rarely a practiced maneuver, you, as pilots, should have an idea of what to do before you encounter a "feathered bullet" in your airspace. Ideally, this avoidance maneuver should be practiced in the simulator so that it becomes an automatic response. Remember, however, that there are times when a bird is too close to avoid. Remaining straight and level and protecting your face in this situation is best. When you can respond, pull up to avoid damage to your aircraft and possible injury to yourself.

For more information on the bird-aircraft strike hazard problem, contact the BASH Team at DSN 246-0698. Personal experiences or comments will be appreciated. ■

TRAINING.

EVERY F-16 PILOT SHOULD HAVE

MAJ RUSS PRECHTL
416 Flight Test Squadron
Edwards AFB, California

The F-16 Combined Test Force (CTF) is training the world's operational F-16 pilots to improve their departure from controlled flight resistance and deep-stall recovery procedures — one pilot at a time.

Some deep-stall incidents prompted an awareness program that educated visiting pilots about the F-16's flying qualities in the high-angle-of-attack regime. The program is gaining in popularity, and a growing number of F-16 pilots from Air Combat Command, Air Education and Training Command, as well as foreign military services, are participating in the training program. The F-16 CTF has trained 428 pilots to date.

The training begins with a multimedia presentation explaining the F-16's characteristics in the high-angle-of-attack regime as well as how to avoid departing from controlled flight. The F-16's characteristics in a deep stall are reviewed as well as how to safely and confidently recover from a deep stall. A squadron instructor test pilot provides a detailed analysis of the F-16's behavior in this regime.

Once the academic foundation is presented, the visiting pilot and his instructor climb into one of Edwards' general support fleet Block 10, small-tail F-16s to fly the familiarization profile. First, several maneuvers are flown to demonstrate how the F-16 can be aggressively maneuvered near the edge of the operational envelope without departing controlled flight. This is an important lesson that is emphasized in the program.

After these departure avoidance maneuvers, several intentional departures are flown which are allowed to progress into deep stalls. This allows the pilot to observe the post-stall characteristics and recover the aircraft to controlled flight. After 8 to 10 departures, the pilot has the confidence to handle the F-16 in any operational situation that requires flying the aircraft near the edge of the envelope.

The mission concludes with several simulated flameout (SFO) approaches to Edwards' main runway. The pilot practices SFO touch-and-gos and an SFO full stop. This training is also important for familiarizing the pilots with the F-16's landing qualities in the SFO pattern.

For the past 6 years, most USAF F-16 pilots have been unable to practice these approaches to touchdown. The familiarization program at Edwards AFB allows these pilots to observe how the F-16 will actually float as far as 3,000 to 4,000 feet in ground effect as the transition to landing occurs from an SFO approach. This type of real-world training is greatly supported by every pilot who has visited the F-16 CTF. Some typical comments are "Every F-16 pilot should have this training," and "Reading about it just isn't the same as actually rocking the jet out of a deep stall."

Another benefit of visiting the F-16 CTF is that exposure to the corporate knowledge of all models of the F-16 that is contained here. Pilots and engineers working at the F-16 CTF have tested avionics, propulsion, weapons, and flight controls of every model of the F-16 operational today. Any visiting pilot can satisfy any questions they may have about the latest update to the world's greatest single-engine fighter.

Got any questions? Contact us at DSN 527-3103. ■

Official USAF Photos

ART AND LIVE BOMBING BASICS

CAPT MERRICK E. KRAUSE
57 OG/OGV
Nellis AFB, Nevada

■ *"Two's in." Steep, fast, but at least I'm pressing — standard! I'm a tiger, so tiger errors are A-OK. Pipper on the target, and "Pickle!" Five Gs in 2 seconds; going like clockwork. Moving mud is what it's all about. A quick look back, and "BAM!"*
"Hey! What was that, and why're the fire lights on?"

Art and Bombs

In peacetime and in war, accurate planning and precise flying are required to get bombs on target *and* to live to brag about it. Using Mr. Computer to do math in public while computing bombing parameters, then adding a "pad" of "a couple of feet for Ma" to adjust the bomb release altitude, just doesn't hack it anymore. This article discusses some brief live bombing basics. These basics include the critical elements of planning, briefing, flying, emergencies, and debriefing a live munitions sortie. Knowing the basics is required as part of good airmanship, but how the basics are manipulated is truly an art form.

If you aren't a bomb dropper, please note what we "iron haulers" consider, and take these comments into account for combined force operations. A C-130 cruising over a hot target area to drop supplies and an F-15C chasing a bandit at low altitude near a potential target are both susceptible to "frag" from friendly bombs or secondary explosions. In fact, a friendly may actually fly through bombs as they fall to their impact point after being dropped from a fighter or bomber flying at a higher altitude if all players are not aware of the "wheres" and "whens" of bombing missions. For bomb-dropping crews, this article is a review of a few of many events you should already accomplish prior, during, and after a live bombing mission.

Planning

There are a variety of aids to assist in the important exercise of planning a live ordnance mission, including MCM 3-1, MCM 3-3, Weapons Officers, Instructors, the Weapons Review, and specific aircraft technical orders (TO). The IM-34, aircraft specific -34, combat weapons delivery software (CWDS), and your jet's Dash One are key players too.

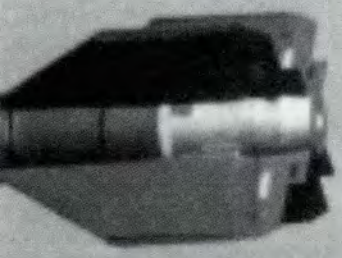
Some planning elements that become critical for a live ordnance sortie include the mission attack card, operating limits, safe separation, safe escape, and takeoff and landing data (TOLD). TOLD is required for every flight, but with the added weight of the ordnance, numbers may look unusual. If an air tasking order (ATO) is distributed for a Red Flag flight or in combat, additional considerations might include the characteristics of the weapon assigned, the target type and composition, the Joint Munitions Effectiveness Manual numbers, and package members or other aircraft around the target area any time near (including both before and after) the ordered time on target.

Typically, after following the process of reading the ATO, determining if the fragged munition matches the target, and coordinating the mission package, a flight lead will assign someone in the flight to plan an attack. The attack planner, entering the TO tables with a specific munition delivered from a particular attack pattern (pop pattern, dive bomb delivery, medium altitude delivery, low altitude loft, etc.), determines desired altitude of release for his munition and other required data. Particularly important are the computations of safe separation (if required), safe escape, the bomb's frag pattern, minimum release altitudes to avoid damage to your aircraft

USAF Photo by TSgt Ralph V. Hallmon

from your own bombs or a wingman's bombs, and minimum altitude to release to ensure the fuse has time to arm and each bomb functions correctly. The CWDS can provide much of this data from a computer, but it should always be confirmed by consulting the tabular data.

The creativity involved in planning requires the crews to construct a simple plan that is both effective, adaptable, and easy to memorize. In combat particularly, a missile shot at the flight can change a game plan in seconds, so the plan itself and the people flying the attack must be flexible. Complicated plans are usually too tough to memorize and execute under fire, either from the enemy or a flight examiner.



Briefing

The flight should know the plan prior to the briefing. Draw, copy, and distribute attack cards early to allow for changes and memorization. A good attack card typically contains all information required to navigate from the initial point to the target, release ordnance, and egress. Bomb settings and preflight information are also frequently available on attack cards. The briefing ties together all the various planning factors so everyone in the flight is "reading from the same sheet of music." This includes preflight, departure and recovery, contingencies, alternate missions, emergencies, and special subjects.

Live ordnance missions require additional depth while covering some high interest items including hung ordnance procedures, jettison procedures, and a reemphasis of the training rules (TR). With hung live munitions, procedures vary with base, type aircraft, type ordnance, and how the munition is mounted to the jet. Switchology, resetting switches to attempt another release, and jettison procedures are also worth reviewing. TRs are always briefed, but the attack and TRs should be associated in the briefing.

"What ifs" are an important briefing issue to discuss. There are three techniques to "what if-ing" a mission — too many contingencies explained in far too great detail, hitting the most likely contingencies briefly, and the "we'll just see what happens" technique. Obviously, it pays to think about as many "what ifs" as possible and then brief the most likely in the limited time available. The idea of brainstorming a mission and contingencies in advance of the briefing applies to all flight members, not just the attack planner or flight leader. Not discussing contingencies is a frequent mistake as is spending too much time on unlikely events and not enough on the real plan. Sometimes a situation occurs in flight that was not covered in the briefing, but the general procedures and game plan briefed, good judgment, and basic airmanship will fill in any contingencies not discussed in depth.

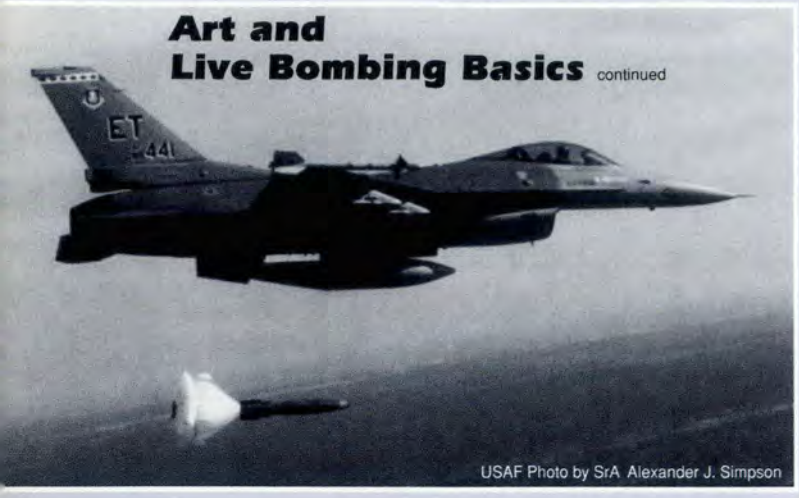
Flying

All good flights begin with a solid plan, strong briefing, and a thorough preflight. Always use the appropriate checklists, and check *all* munitions on the jet. Live bombs have checklists for their fuse, the bomb, and the rack or pylon. Even if there are quite a few bombs on a jet, every single aspect of all bombs should be inspected by the aircrew. More than once, bomb no. 11 or 12 is found with a bad fuse setting or incorrect pitch valve. Step as early as required so rushing is not necessary.

After a detailed briefing, everyone knows that any contingency not covered on the ground will invariably occur at the worst possible moment. Taxi and takeoff emergencies with live munitions always ratchet up the tension

continued

Art and Live Bombing Basics continued



USAF Photo by SrA Alexander J. Simpson

of any jet problem. A solid foundation of simulator practice and a review of the TOLD and takeoff emergency procedures in the briefing pay big benefits. It is important to be cognizant of folks on the ground and have a plan in mind for a takeoff problem prior to rolling onto the runway. A jettison immediately after takeoff is a hazard, not only to the folks driving to work just off the departure end of the runway, but to your own aircraft and the wingman in trail if the bombs explode with low or high order detonations.

Going to a bombing range or en route to an enemy target, keep the weapons master arm switch safe as long as possible. Almost everyone has heard a horror story of someone splitting out bombs on downwind on the range when they thought they were trimming. Use briefed regulation and checklist procedures to decrease the likelihood of a gross error.

When on the range or at the point in a combat mission when arming the weapons is logical, select the appropriate arming switches. Since the attack card should be memorized, a quick glance at the card is the most that should be needed. Obviously, in a threat situation or high risk portion of the flight (a low altitude ingress, for instance) time may not be available to reference a card, so memorization is important. The attack should be flown as closely as possible to the planned parameters. Even with "fancy" computer bombing systems, if the pipper is not on the target or the velocity vector is not on the steering line, then a miss will make the mission noneffective. Correct parameters are also important to ensure the desired weapons effects are achieved and no duds or fragging occurs.

After releasing the bombs, the first instinct is to check the score. (If you don't care about the score, then why did you work so hard planning?) Well, that instinct is exactly wrong. Almost everything up to this point has been technique, but the escape maneuver from any bombing delivery, and particularly a live bomb delivery, is a critical procedure! To fly the escape maneuver incorrectly not only increases the chance of fragging the jet, but staring back over a shoulder while climbing away from a delivery near the ground or in multiship attacks, regardless of threat, increases the chance of smacking a jet into the ground or hitting a wingman. Complete any escape maneuver fully, and check the target area later, away from the ground and other aircraft, and past target area threats. If the mission was flown correctly to this point, then the bombs will most probably hit the ground near where they were expected.

After egressing the target area and enemy airspace, a battle damage check is appropriate. These were called "bomb checks" in the brown-shoe days. Check not only for remaining bombs on your jet's computer, but visually check each wingman, and look for holes in both your and each wingman's plane. Early fuse function has caused damage on more than one jet, even when the bombing attack was flown flawlessly.

Emergencies

There are a couple of typical emergencies that can occur on live bombing missions. It is best to "think them out" or chair-fly them in advance. Hung ordnance procedures and jettison procedures discussed in the briefing should be second nature, but always refer to the appropriate checklist or in-flight guide. Battle damage or bomb damage to a jet may lead to further problems, so emergency airfields, their services, and a snap heading should be at an aircrew's fingertips. If landing with a hung live bomb, or even live unexpended bombs, consider avoiding populated areas and land from a straight-in without maneuvering over the airfield any more than is absolutely necessary.

Debriefing

No mission is complete without a well-structured debrief. The debrief is not for fear and ridicule. Instead, a recap from planning to filling out the forms, while distilling lessons learned, is the best overall method. Debriefing guides and techniques vary, but the theme always must be to learn from both mistakes and "good calls." Live missions should obviously focus on the event of weapons delivery with a tape and score review, but ancillary topics cannot be ignored. Although gloves must come off in a good debriefing, egos should be left at the door, allowing constructive criticism to flow freely. There should never be any "slack." *Bad days* are not acceptable when hauling 12,000 pounds of iron. And lessons learned should be passed to other flights to increase everyone's capability.

Conclusion

Good bombing is not only science — it is one of the more ethereal arts. A few minutes spent thinking and planning on the ground can save a boat-load of time standing in a brace in front of an ops officer. Attention to detail in planning, briefing, flying, and while handling emergencies can increase chances for a successful sortie with live bombs. Debriefing becomes the opportunity to tie together lessons learned and pays great dividends by improving techniques for the next mission while increasing combat capability. Just remember if you must use rules of thumb: A "pad" is only something to write on, and "slack" is half a pair of pants. ■

G-Excess, "I Hate It When That Happens"

LT COL SAM HOLOVIAK
USAFSAM/FP
Brooks AFB, Texas

■ The fighter pilot just executed the perfect 30-degree angle bomb delivery. Breaking hard to the right in a crisp, snappy fashion, then back to the left, he looks back over his shoulder to spot that 2-meter bomb — what a thing of beauty! Just look at that!

Turning back to the big ADI in the sky, he sees a windscreen full of dirt, rocks, and trees! What the!!?! He rolls and pulls for all the limiter will give him. Squeezed down into the seat, he instinctively tenses every muscle from his toes to his nose. Feeling the peripheral vision closing in on him, he fights it until that beautiful pastel shade of blue fills the windscreen. Safe at last! Unloading, he finally feels the beads of sweat that tracked down his temples joining the ones already coming out from around his mask. "What the heck was that all about!" runs through his mind.

Back at the ranch, he pulls into the chocks and shuts down. On his way home, his mind replays the events over and over, trying to make sense of it all. Then he remembers something one of those physiology guys mentioned during his last altitude chamber refresher class. The guy mentioned something about this thing called the G-excess illusion. Could that have been it? What could have contributed to the setup for such an illusion? It started coming back to him now.

The instructor put up a slide showing spheres on a black background, seemingly floating in space — a bunch of them (see next page). He began: "Starting now, I want you to count all the spheres you see on the screen." He continued to talk for a little longer. Not really paying much attention to the instructor, I was counting the spheres. "Okay, stop," was the next thing I heard. Then the instructor asked, "How long was that?"

Wait a minute! He asked us to count the spheres, not pay attention to the time! One guy said 5 seconds, another said 25, and still another said 40. The point was, apparently, we as humans slightly lose track of time

continued

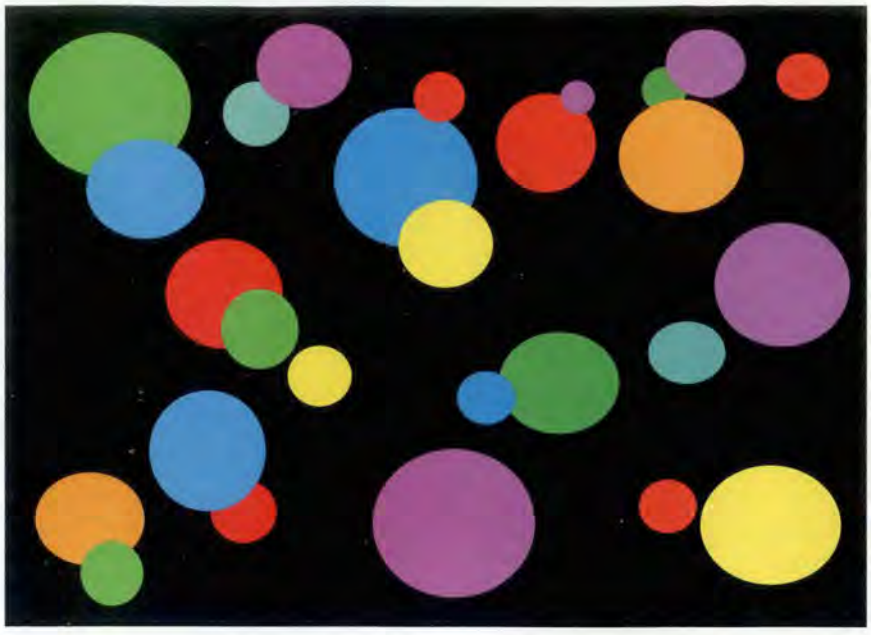
continued

whenever we start to concentrate on something.

Next, he asked for a volunteer to read the words written in three columns on the screen. The words were colors, like RED, GREEN, BLUE, and so on. They were written in simple black-and-white type. Another guy timed while a volunteer nonchalantly read down the three columns of words. "Eleven seconds," the timer reported. The instructor wrote that time on the board.

Then the reader was asked to read the words again. But the instructor switched things on him. Now the words were in color — but the wrong color! The first word, RED, was colored green. The second, BLUE, was colored red, and so on. The trick now was to look at the printed word but not read it. Instead, he had to say what color it was. Well, that brought a chuckle from everyone. The reader tried hard, but he was obviously slower this time. "Twenty seconds," the timer said this time.

"Wouldn't you agree," the instructor asked, "that for some simple tasks, if you complicated them into becoming true cognitive tasks, it could take almost twice as long to perform?" Well, sure. We just proved it. I mean, 11 seconds compared to 20 seconds — that's 9 seconds more. It doesn't take a rocket scientist to figure that one out.



The instructor continued: "Remember back in pilot training they talked about a 'standard' pilot reaction time?" Yeah, I remembered that. It was something around 3 seconds — pretty short. He asked, "Would you not agree with me, if we use the same criteria we just demonstrated, if you were challenged with a true cognitive task, you could conceivably double that 'standard' reaction time?" Adding another 3 on the board, the time now went up to 6 seconds. Everyone nodded. Yeah, so...

Then he put up a slide showing some times to ground impact for aircraft flying between 100 and 500 feet for speeds between 240 knots to 480 knots. He said, "For a minute, imagine yourself flying at 500 feet above the ground at 480 knots, and all you did was simply ease off the back pressure on the stick and allow the aircraft to nose over only 1 degree, just a single degree. How long would it take for that aircraft to impact the ground?"

Well, for a 480-knot aircraft, it was 35 seconds. "Is that a long time?" he asked. "For pilots, you bet it is.

"Now, let's look at that same aircraft in a 3- to 4-G turn, and because of some large head movements (looking back), the pilot unknowingly rolls an additional 10 degrees into the turn. His lift vector becomes lower than it should be, the nose of the aircraft starts to drop, and no matter how much back pressure he puts in, it just pulls the nose lower. His aircraft begins to slice through the horizon and falls faster, aided by the force of gravity. Now the time to impact is only a measly 5.8 seconds." He pointed to the 5.8 seconds on the slide with one hand and the 6 seconds written on the board with the other, and said, "You just ran out of time!"

Wow! Is that what happened to me today? That big head movement looking back over my shoulder was only part of it. Looking at my 2-meter bomb seemed to take only a second, but could I have

RED	BLUE	BLUE
BLUE	GREEN	GREEN
GREEN	RED	BLUE
GREEN	BLUE	RED
RED	GREEN	RED
GREEN	RED	BLUE
BLUE	BLUE	GREEN
RED	RED	GREEN
GREEN	BLUE	BLUE

spent more time looking than I imagined? I mean, I did have to change my focus a little. Maybe I took longer than I thought. Now, add that to the G-excess stuff he described, and maybe it kept me from recognizing the increased roll. I guess I needed to get back looking out the front sooner and get the nose tracking above the vertical again. I wonder!?!

But the instructor said something else that now makes sense. He said, "It wouldn't be enough for me to tell you about this illusion without recommending something that may help. Next time you start to look for that perfect score on the range or clearing with large head movements, limit the time you spend away from cross-checking your flightpath, whether it be an instrument cross-check or visual look out front."

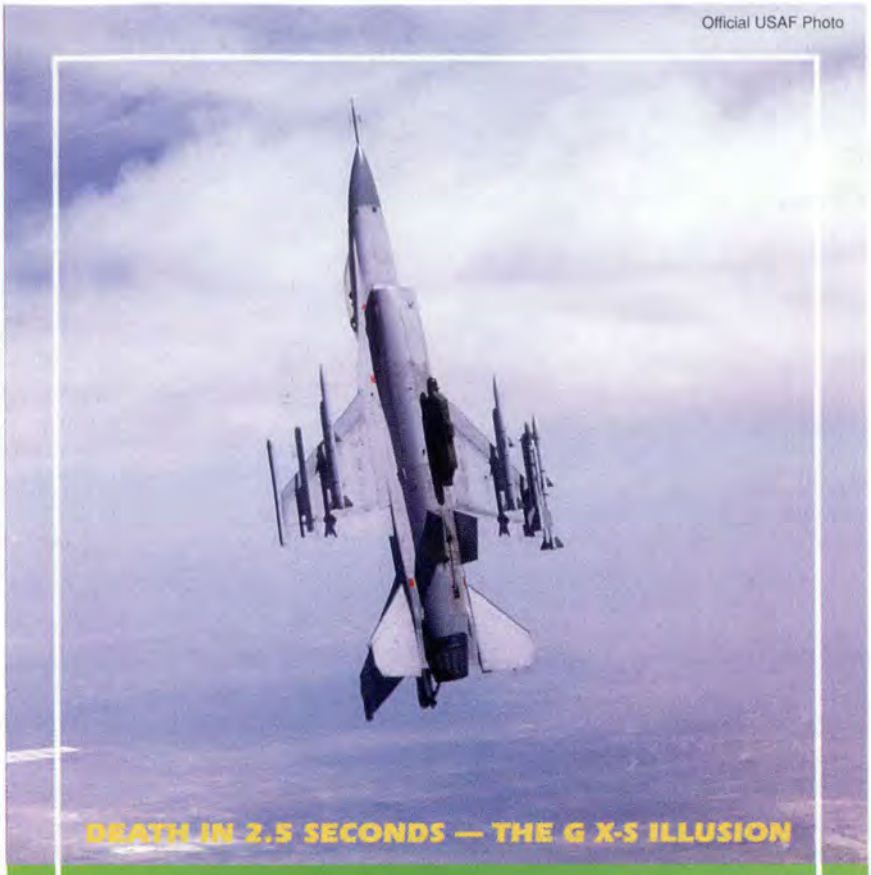
Then a guy in the back said, "Wait a minute! You told us we can experience temporal distortion when we get busy, and we might not be able to tell for sure how long we were looking away."

"EXACTLY!" he replied. "That's why you need to go back to basics. Do what you were taught as a kid in counting seconds. That's right — 1 potato, 2 potato, stop. All you have is about 2 seconds to take a mental picture of that perfect score and then get back forward clearing again." He made the point that pilots do this all the time anyhow, glancing down at the gauges to check the engines or another instrument, taking a mental snapshot of what the gauge looked like, returning to the clearing task out the windscreen, and then thinking about what the gauge said.

Try to limit my time away from my cross-check. I mean, big head movements clearing or checking my six are just a part of the job. But I didn't realize it would have that great an impact on my orientation. My spatial orientation! Wow! The clue bird just landed! It made sense.

I'll have to try that next time before I scare the dickens out of myself — again! ■

Official USAF Photo



DEATH IN 2.5 SECONDS — THE G X-S ILLUSION

No. 2 pulled off the target at 300 feet AGL and executed a 4-G turn. About 6 seconds later, he was observed to enter a steep bank and impact the ground with no attempt at ejection. An analysis of the findings indicated the fatally injured pilot had experienced a loss of situational awareness due to the G X-S illusion.

The G X-S illusion: When sustaining a banked turn of 3 to 5 Gs for 3 to 5 seconds, with no discernible horizon, no reference to flight instruments and distraction with traffic or a bomb score, and perceiving your position in space by body inputs, your inner ear lies to you.

What happens: Your primary source of orientation in flight is visual. With no ground reference, your backup modes for situational awareness are vestibular (inner ear) and somatic (seat of the pants).

When looking either to the inside or outside of the banked 3- to 5-G turn, the otolithic membrane of the inner ear will change position and send false information to the brain. You will perceive that your wings are level, and without thinking, automatically crank in more bank. At 300 feet AGL, you're in the dirt in 2.5 seconds. The somatic input is, at best, confusing and not strong enough to counter the misinformation coming from the inner ear.

The fix: (1) Understand the physiological threats of the low-level environment. (2) Realize this illusion is not related to G tolerance but to lost visual reference. (3) Always cross-check and maintain situational awareness.

AIR FORCE FLIGHT STANDARDS AGENCY

MR. TOM SCHNEIDER
MAJ MIKE WILSON
HQ AFFSA/XOIP

■ Life gets a little easier for you on this version of the IQ — it's an open-book exam, and we'll even give you the references. Some of the answers to the following questions you can easily find in the documents referenced. However, some of the information, while vital to the aircrew, is not easily available to anyone. A crass, quick, commercial message: *We at AFFSA continue to wage the battle to see that this information becomes more easily accessible — but it is a "Herculean" task.*

Enough griping! On to the quiz. This month's issue centers on holding.

1. **In a turbojet aircraft, what is the maximum airspeed allowed when cleared to climb in holding?** (Ref: *General Planning*)
   a. 250 KIAS
   b. 265 KIAS
   c. 310 KIAS
   d. 350 KIAS

2. **Prior to holding, at what point is the pilot expected to start a speed reduction in order to cross the fix at or below the maximum holding airspeed?** (Ref: *General Planning*)
   a. 5 minutes or more
   b. 3 minutes or less
   c. 3 minutes
   d. As soon as holding is assigned or suspected

Okay so far? For the remaining questions, assume you're at Altus AFB, the new hub (seemingly) of all AETC training. Your IP has you heading to Clinton-Sherman Airport to escape the 97 other airplanes in the pattern.

3. **You have been told to expect the ILS Rwy 17R, and ATC instructs you to hold at 6,000 feet over FOSSI LOM, "as published." You have crossed FOSSI, established yourself in holding, and have just completed a left turn and are heading northbound. Abeam FOSSI, ATC clears you for the approach. You will:** (Ref: AFM

51-37, eventually AFI 11-217)

a. Acknowledge the clearance, start an immediate left-descending turn to 3,800 feet, intercept the localizer, and proceed with the approach.

b. Acknowledge the clearance and begin a descent to 3,800 feet; if a turn inbound is not begun immediately, advise ATC of your intentions and turn inbound at your discretion.

c. Acknowledge the clearance and continue outbound for 1 minute while descending to 3,800 feet and completing the procedure as published.

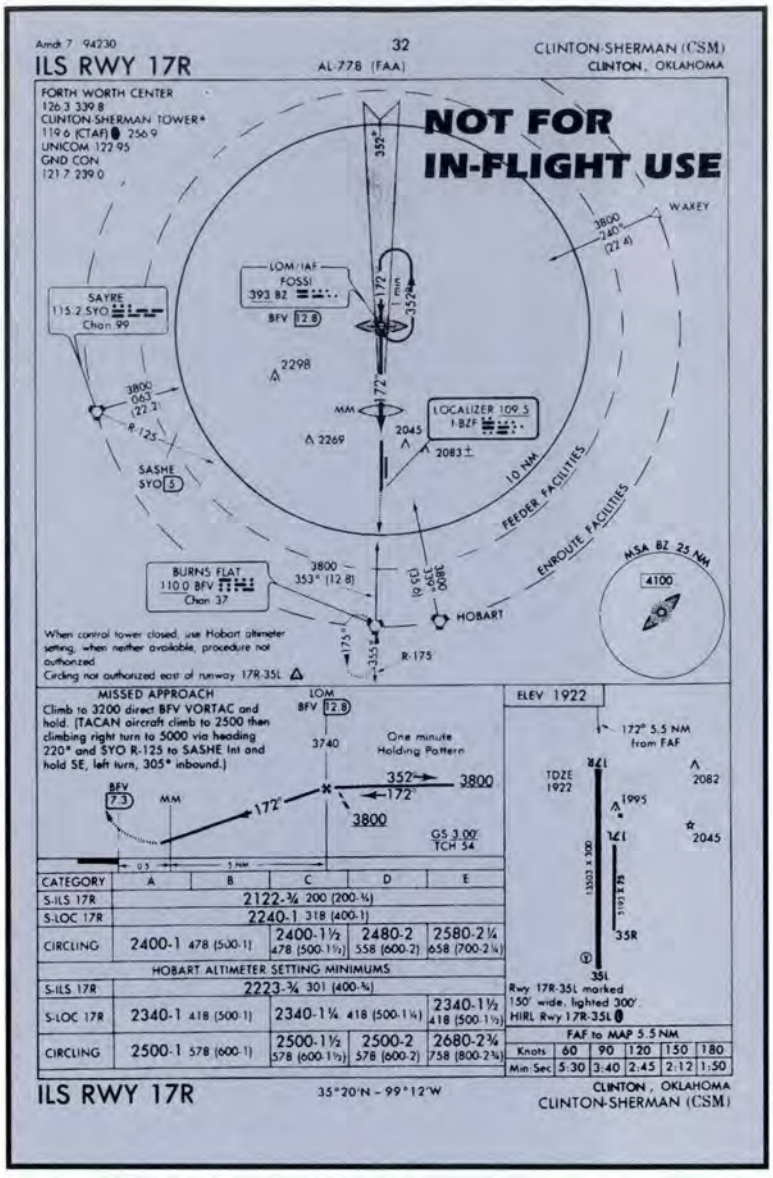
d. Cancel IFR and proceed VFR — real pilots don't hold.

4. **Your airplane finally has updated avionics and is now VOR equipped. You just missed that "truck on the runway," and are flying the missed approach for the ILS Rwy 17R. What is the *maximum* level holding airspeed over BFV VORTAC?** (Ref: FAAO 7130.3)

a. 175 KIAS
b. 230 KIAS
c. 250 KIAS
d. 265 KIAS
e. 310 KIAS

5. **Of course, the new VOR broke and now you're TACAN only, flying the missed approach procedure. What is the *maximum* holding airspeed over SASHE Intersection?** (Ref: FAAO 7130.3)

a. 175 KIAS
b. 230 KIAS
c. 250 KIAS
d. 265 KIAS
e. 310 KIAS



ANSWERS:

1. **C — GP, 5-21a(8).** Additional reference (so you can see how the military gets their information) is FAA Order 7130.3, para 35. This is the FAA Order detailing the design criteria for holding patterns. Note, however, this order says holding patterns used (read planned) for climbs by turbojet aircraft must accommodate speeds up to **310 KIAS**. The key word is "used." Typically, only missed approach and departure procedures may have a holding pattern designed for climbing (see the Seattle-Tacoma Intl IFR departure procedure in the low volume 1 approach plate). ATC clearing you to climb in a holding pattern, however, does not ensure that the pattern was designed at 310 KIAS. If there is any question about the size of the pattern, tell the controller your climbing/holding airspeed.

2. **B — GP, 5-21b(4) and AFM 51-37, 9-4d.** Also the *Airman's Information Manual* (AIM) 5-36J6(a). These documents direct we "start the speed reduction 3 minutes or less from the holding fix. Cross the holding fix at or below the maximum holding airspeed."

3. **C — AFM 51-37, 12-3 or AIM, 5-47b(3).** The Holding Pattern in Lieu of Procedure Turn is a *segment* of the approach procedure and must be completed to allow time to configure the aircraft prior to crossing the FAF. AFM 51-37 states, "If cleared for the approach while holding in a published holding pattern (in lieu of procedure turn) and the aircraft is at an altitude from which the approach can be safely executed, additional circuits of the holding pattern are neither necessary nor expected by ATC." The key words here are "additional circuits." This **does not** mean that you can shorten this holding pattern. If ATC wants

continued

Instrument Quiz continued

you to make an immediate turn, they will tell you. This will be further clarified in an upcoming change to AFM 51-37 (to AFMAN 11-217, Vol 1).

4. **B — FAAO 7130.3, para 14.** By the way, this FAAO should be at your TERPs office. (See your local Chief of ATC.) Another specific reference is the FAA Form 8260-2, maintained in your local TERPs office. As a rule, holding patterns are built for the aircraft which use them. At USAF facilities, holding patterns are constructed at 310 KIAS unless otherwise indicated. Holding patterns at civilian airports (which Clinton Sherman is) are normally designed to accommodate turbo jet aircraft holding below 14,000 feet and at or below **230 KIAS**. The exceptions are if the holding pattern will be used for climbing, if the procedure has been designed for use primarily by military aircraft, or if the procedure will support propeller-driven (including turboprop) aircraft only. If a procedure supports propeller-driven aircraft only, holding patterns will be designed to accommodate speeds up to 175 KIAS. Other factors which may impact the size of the holding pattern airspace include keeping the pattern clear of neighboring airways, other holding patterns, or terrain. The information on each specific holding fix under U.S. jurisdiction is carried on an FAA Form 8260-2. This form indicates the pattern's maximum airspeed, as well as the minimum and maximum holding altitudes.

5. **D —** We go back to the same regs and forms as in question 4, but the information is a little different. Because the missed approach procedure refers to a TACAN-equipped aircraft, the "clue light" should come on. If a procedure uses the TACAN specifically, then it was designed for military aircraft. Clinton-Sherman is frequented by USAF aircraft from Vance, Sheppard, and Altus (like you). Of the aircraft assigned to these bases, the T-38 has the fastest holding speed: 250 KIAS. This pattern, however, was built by the FAA (see the top of the approach plate), so instead of 310 KIAS, the holding pattern is built for **265 KIAS** (pattern selections are based on 175, 230, 265, or 310 KIAS holding airspeeds). Not surprisingly, the holding pattern at FOSSI, which is *not* designed for the faster fliers, is built for 230 KIAS. Obviously, all holding patterns at a particular airport ***are not*** designed at the same maximum holding airspeed!

At this point, you're probably thinking, "I'll just ask the controller for the maximum holding speed." Unfortunately, that doesn't always work. The controller probably won't know the designed holding speed for a particular pattern. ATC can keep you clear of terrain by holding you above the minimum vectoring altitude (MVA) for the area and keep you clear of traffic using normal procedures, but they don't usually have access to the maximum holding pattern airspeeds.

Those of you who pay attention to the NOTAMs are probably wondering about the note published in the **Notices to Airman Publication** (Class II NOTAMs) regarding holding speeds below 14,000 feet. Specifically, this NOTAM directs civil turbojets to hold at a maximum of 200 KIAS below 6,000 feet and 210 KIAS between 6,000 and 14,000 feet. The reason for this NOTAM is because the FAA changed the holding speeds below 14,000 feet in the late 1980s from 200 KIAS and 210 KIAS to 230 KIAS. Unfortunately, most of the patterns were constructed under the 200/210 KIAS limit. This means that at a holding speed of 230 KIAS, aircraft cannot stay in the TERPs protected airspace, hence the NOTAM.

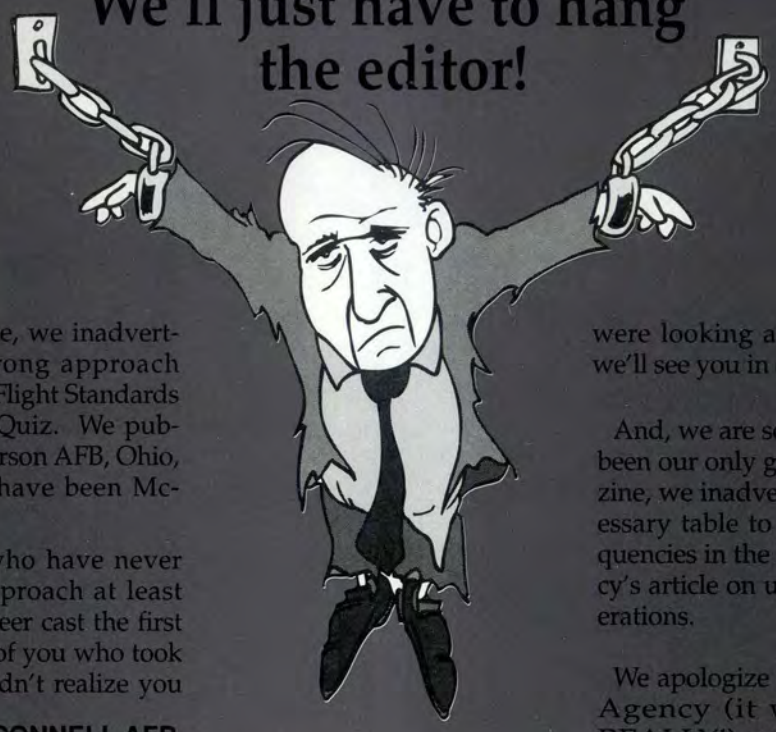
The USAF has elected not to get into this fray. Instead, *prior to holding, advise the controller of your plane's holding airspeed* if it is greater than 200/210 KIAS. With this information, ATC can make allowances for your increased airspace requirements or assign a safe holding altitude. However, don't count on ATC keeping you from spilling out of your holding airspace. AIM, para 5-37 L 2, NOTE states that the controller will monitor your holding, workload permitting, and holding pattern clearance "does not relieve a pilot of his/her responsibility to adhere to an accepted ATC clearance."

So how'd you do on the quiz? Yes, this was a tough one, but the information is out there, and you need to know it. We at AFFSA recognize that information like the maximum holding speed should be immediately available to the pilot. For this reason, we submitted a proposal to the Inter-Agency Cartographic Committee (IACC — the people who write the criteria for what information is printed on approach plates) to annotate holding fixes with "Maximum Holding Airspeeds."

We hope you learned a little more about holding while taking this IQ. We sure did while writing it. If you have any comments, questions, or disagreements, contact us at HQ AFFSA/XOIP at DSN 858-2103 or COMM (301) 981-2103. ■

We goofed!

We'll just have to hang the editor!



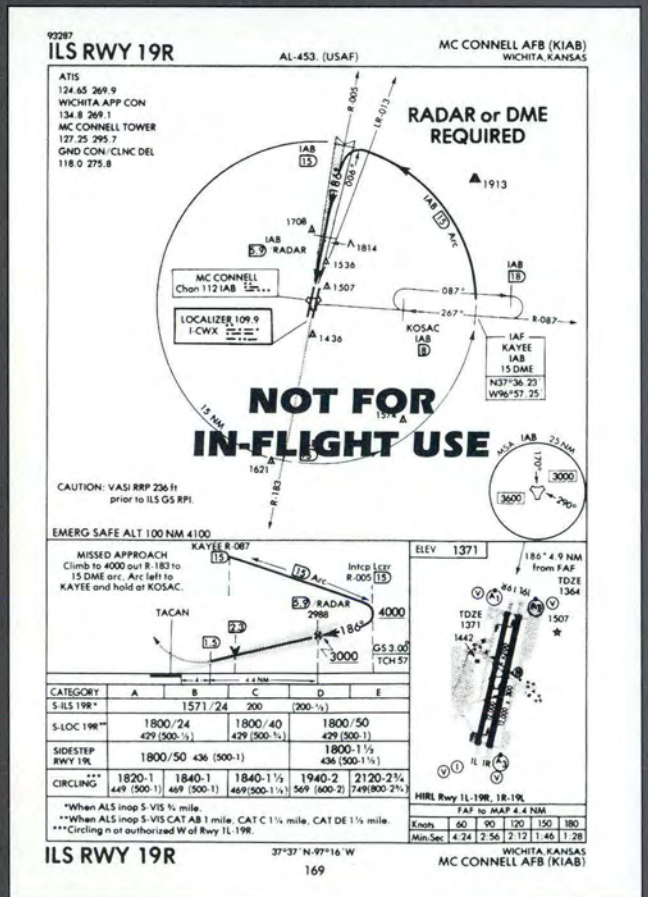
In our May magazine, we inadvertently printed the wrong approach plate for the Air Force Flight Standards Agency's Instrument Quiz. We published the Wright Patterson AFB, Ohio, plate, and it should have been McConnell AFB, Kansas.

Let those aviators who have never briefed the wrong approach at least once in their flying career cast the first stone. Now, for those of you who took the whole quiz and didn't realize you were looking at the wrong plate . . . we'll see you in class.

And, we are sorry to say, that has not been our only goof! In our June magazine, we inadvertently left out the necessary table to determine proper frequencies in the Flight Standards Agency's article on uncontrolled airport operations.

We apologize to the Flight Standards Agency (it wasn't their fault, REALLY!) and to those of you who had to go looking for your own copy of the McConnell plate or the Summary of Recommended Communication Procedures.

MC CONNELL AFB



SUMMARY OF RECOMMENDED COMMUNICATION PROCEDURES				
	COMMUNICATION / BROADCAST PROCEDURES			
FACILITY AT AIRPORT	FREQUENCY USE	OUT4BOUND	INBOUND	PRACTICE INSTRUMENT APPROACH
UNICOM (No Tower or FSS)	Communicate with UNICOM station on published CTAF frequency. In unable to contact UNICOM station, use self-announce procedures on CTAF	Before taxiing and before taxiing on the runway for departure	10 miles out. Entering downwind, base, and final. Leaving the runway	
No Tower, FSS, or UNICOM	Self-announce on MULTICOM frequency 122.9	Before taxiing and before taxiing on the runway for departure	10 miles out. Entering downwind, base, and final. Leaving the runway	Departing Final approach fix (name) or final approach segment inbound
No Tower in operation, FSS open	Communicate with FSS on CTAF frequency	Before taxiing and before taxiing on the runway for departure	10 miles out. Entering downwind, base, and final. Leaving the runway	Approach completed/ terminated
FSS closed (No Tower)	Self-announce on CTAF	Before taxiing and before taxiing on the runway for departure	10 miles out. Entering downwind, base, and final. Leaving the runway	
Tower or FSS not in operation	Self-announce on CTAF	Before taxiing and before taxiing on the runway for departure	10 miles out. Entering downwind, base, and final. Leaving the runway	

Figure 1

IT'S A PRIVILEGE

COL CHARLES MATTHEWSON
Staff Judge Advocate
HQ Air Force Safety Agency

■ By the time this goes to press, I will have departed AFSA for a new PCS assignment. This column has generated a lot of positive feedback to the *Flying Safety* editorial staff (so they tell me), so I anticipate that my successor will continue addressing current privilege issues and answering your questions in this format. Although my tenure as "Safety's JAG" has lasted only 2 years, I can honestly say, **"It's been a privilege."**

Despite occasional headlines to the contrary, I'm convinced that commanders, operators, and other safety professionals in the Air Force are truly committed to mishap prevention as their primary peacetime concern. Our system of investigating and reporting mishaps is definitely not perfect, but I haven't seen many systems of any type, inside or outside the military, that are. Improvements don't occur speedily in an organization like DoD where all the services and various staffs within them need to reach consensus on issues like those involving the safety privilege. The important thing is that there are top-notch people at headquarters and in the field working every day to make the system better.

One of the weightier topics being debated by safety policymakers, MAJCOM safety professionals, and various others with related official interests is whether the safety privilege still has viability in today's operational and technological environments. Is it "adding value" to the safety investigation process? Is it essential to determining mishap causes quickly and accurately? Is it worth the trouble caused by restrictive handling, duplicate investigation, and adverse public perception? Is it really helping us learn the lessons necessary to keep people safe?

These are tremendously difficult questions which can't be answered by engaging in shallow media dialogues or deeply rooted litigation. The answers can only be found after a thorough and complex analysis of our entire mishap investigation system. I regret that I'm leaving this analytical process just as it's reaching a "point of return." I would have enjoyed continuing in the fray to see if I could make a difference for future generations of aviators, mechanics, and managers.

Readers, such as yourself, who have a sincere interest in the subject and the system have the opportunity of a lifetime to do just that — make a difference. Let your commanders, chiefs of safety, and headquarters staffers know how you feel about it. Make yourself heard constructively. **You** are the ones the system is there for. If it's not helping keep you safe, change it. If it is helping keep you safe, protect it. Either way, it's a privilege. ■

IN A RUSH

TO MISHAP!

USAF Photo by SrA Andrew N. Dunaway II

CMSGT DON A. BENNETT
Technical Editor

■ ***How do two experienced instructor pilots — with over 3,700 total flying hours between them and almost 1,000 combined hours of first pilot/instructor time in the mishap aircraft type — fail to do a very important predeparture planning activity? Not getting an adequate weather briefing before departure resulted in extensive structural damage to a valuable training aircraft.***

The jet trainer crew was on the return sortie of a 1-day, out-and-back training mission. There wasn't any significant weather on the first leg, and most of the flight to their turnaround base was under VMC. They must've thought the return leg was going to have similar weather conditions. **Wrong!!!**

Before departing for home, they asked for a DD Form 175-1, Flight Weather Briefing, from the weather shop. But, they decided to forego the **verbal** weather update briefing because there were a lot of other aircrews already waiting for verbal weather briefings, and they were concerned about getting home too late. What the mishap crew didn't know was the weather changed significantly for their planned flight route home!

The information on the DD Form 175-1 should've given the crew the first clues to the changing weather conditions they could expect en route so they could **plan in advance.** Block 11, Local Weather Warning/Advisory, called for thunderstorms within 100 miles of their departure base. And Block 21 provided an advisory for isolated thunderstorms reaching up to 35,000 feet MSL along their planned flight route.

After takeoff, and upon reaching 15,000 feet MSL, the crew entered IMC and soon missed a second opportunity that something might be a little ominous about their chosen flight route. There was a lot of radio chatter from other pilots requesting and receiving permission for weather deviations east of their position. However, the mishap crew failed to connect the other pilots' weather dilemmas with their proposed flight route.

Later on, the crew also had to request a change in altitude and heading when they entered some significant icing conditions. Nevertheless, they soon encountered hail for about a minute. They saw no exterior damage except for some paint missing on the wings' leading edges. Luckily, the two pilots didn't experience any more adverse weather. However, they did remain IMC until minutes from home station.

Upon closer examination, the hail damage was extensive. There was fiberglass damage to both engine intakes and vertical stabilizer tip. Both wing leading edges were dented. And both wing strobe and position lights were broken as well as a few other light assemblies.

***Get-home-itis* is notoriously contagious.** It has often affected entire crews. Such was the case here. Both of these experienced pilots got caught up in bringing about this mishap. All it would have taken was for one of them to raise the B.S. flag and stop the sequence of events.

We can patch and repair dented intakes and leading edges, and even replace broken light assemblies. But it's extremely difficult to patch and repair broken hearts and replace destroyed aircraft or lost loved ones! ■

DROPPING SOMETHING BESIDES THE PROPS!

CMSGT DON A. BENNETT
Technical Editor

Ever forklift a C-130 prop dolly?

Yes, you say? Then you failed the only test question I had, and this article is definitely for YOU!

■ In accordance with TO 35D-3-5-10-1, a C-130 propeller dolly is designed for transporting, storing, and protecting the prop. At the operational level, it's used extensively to move props between maintenance shops and supply and transportation agencies.

The dolly is constructed of a pyramid-shaped steel frame mounted on four steel wheels. It has a metal equipment box mounted on one side which adds extra weight to that side. Consequently, the dolly has a tendency to be unbalanced when a prop is installed.

For this reason, **the TO directs the dolly *not* be forklifted. It was designed to be *towed!*** In addition, there are stenciled warnings to alert personnel on all four sides of the equipment box: *"CAUTION — DO NOT USE FORKLIFT."* The tech data instructions and stenciled warnings are reasonably clear and understandable. However, we've had some costly ground mishaps involving "dropped" prop dollies and forklifts. Why?

Two "Dropped Prop Dolly" Mishap Examples

Case #1: A 10K forklift operator was tasked to offload some dolly-mounted C-130 propellers from a tractor trailer. Because of the position of the tractor trailer, the individual grabbed hold of the dolly *opposite* the weighted side (equipment box). Ground handling of this unbalanced load would automatically be a risky proposition for even the most highly trained and experienced forklift operator. *However, in this mishap, the operator was not properly trained or certified on the operation of the 10K forklift.* So it's no wonder the unbalanced dolly eventually got away from him and resulted in a damaged prop!

Unfortunately, the mishap safety office didn't discover the prop dolly **should not** have been forklifted! Besides identifying the lack of 10K forklift training for the operator, the safety folks **incorrectly** determined the mishap unit **didn't** have written operating instructions on the proper forklifting procedures for the tipover-prone prop dolly. **Wrong! Remember — writ-**

ten "forklift" instructions wouldn't be necessary because, in accordance with the equipment tech data, the dolly shouldn't be forklifted at all!

The untrained 10K forklift operator had performed this same unsafe task in the past but hadn't observed tech data precautions. That's hard to comprehend since the stenciled warnings on the equipment box about **not** forklifting the dolly are easy to see and read, and, of course, there's also the tech data restrictions. And there weren't any safety spotters utilized. So besides not being adequately trained, the mishap operator exhibited a lack of self-discipline.

Case #2: In this mishap, a trained forklift operator was supposed to **load** a C-130 propeller-mounted dolly onto a tractor trailer. A supervisor, who had assigned the loading job to the operator, was at the loading site. The forklift operator conveyed to the supervisor that he had **never** performed the task before and was clearly a reluctant participant in the operation. The supervisor believed the operator could do the loading with the aid of some spotters and left the area to find a couple of them.

But after a while, the operator started the loading operation anyway because nobody (supervisor or spotters) had returned. He was also under the impression he would be in hot water with the supervisor if he didn't get the prop dolly loaded. Of course, the unbalanced prop dolly eventually toppled over, and the prop and dolly were damaged to a tune of over 40 grand!

What if several spotters had shown up and were under or near the falling prop/dolly assembly? This is just one example of how close our Class C mishaps come to being Class A's!

The shop supervisor had experienced problems obtaining a tug to tow the prop dolly assembly, so it soon became a common practice among shop personnel to forklift the prop dolly assemblies. However, the mishap operator wasn't one of the earlier "prop dolly" forklift operators — this was his first shot at it!

Synopsis

This article highlights two mishaps which caused two C-130 propellers and their dollies to be damaged during unauthorized forklifting operations. Both deserve the emphasis they have been given to prevent future mishaps. But they also point out some very disturbing preconditions which significantly increased the risk of the operation and resulted in a high potential for a mishap. They are lack of adequate forklift training (specific task qualification or certification), ineffective supervision, and hints of a lack of organizational tech data discipline and safety culture.

It's clear some of the mishap units' supervisors and managers were responsible for ***dropping something besides the props!*** ■

USAF Photos by TSgt Perry J. Heimer

Forklifting prop dollies is risky, precarious, and a forbidden operation. It may look tempting and easy for you so-called experienced forklift operators, but don't try it!! Just go get the tow tractor and do it right the first time — every time!!

BUT DOC, IT'S ONLY ASPIRIN

USAF Photos by TSgt Perry J. Heimer

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■ There I was, in the middle of a busy sick call, flu patients everywhere, and one more patient walks in saying, "Doc, I think I've got the flu."

It seems this 5,000-hour former fighter pilot, current C-12 driver, was so sick he could barely stand up and was as pale as the proverbial sheet. He wasn't throwing up, but he had stomach pain and had almost G-LOC'd getting up from the couch. Then came his answer to my question, and it locked on the probable diagnosis. "Yes, my stools are black."

A quick exam, including the dreaded finger wave, and my suspicions were confirmed. It wasn't the flu — it was a gastrointestinal (GI) bleed, probably a stomach ulcer. A blood count revealed his hematocrit to be 19 (42 is normal for males). He had lost over half his red blood cells.

Naturally, he was DNIF'd and admitted to the hospital. The surgeon performed an esophagastroduodenoscopy — a boroscope of the GI tract — and he did, indeed, have a bleeding stomach ulcer. After four units of blood and some medications, he felt much better.

What was the cause of this ulcer? Our pilot had been having sinus headaches for several years and was taking aspirin to make his headaches go away — usually 20 to 30 aspirins a day! Well, aspirin, or acetylsalicylic acid, erodes the stomach nicely and is a common cause of ulcers.

What about his headaches? The pilot had diagnosed himself with sinus headaches. Aspirin helped a lot, so he took a lot. After a while, his headaches seemed to come when the aspirin wore off. So he took more aspirin, and the headaches would go away. He had been doing this for a couple of years. No big deal, right? It was now — it had caused an ulcer, and he was physically addicted to aspirin. Yeah, a lieutenant colonel aspirin junkie!

Had our hero been flying? No, he hadn't been flying. He had the engine off his Pitts Special and was putting in a bigger one so he could really twist his tail. I was glad the guy who had nearly blacked out getting out of his chair had enough sense not to fly. His plane was broken, so he couldn't fly anyway.

After a couple of months, he was completely recovered, his blood levels were back to normal, a scope showed no ulcers, and he was off all medications. He had no problems stopping the aspirin, and his headaches went away. He received a waiver and was returned to flying duties.

And now for the rest of the story. Who showed up in my office a couple of years later? The same pilot. (By the way, I'd flown with him several times, and he was one of the best pilots I'd ever seen.) It seems he'd been under a lot of pressure lately. He was retiring, trying to sell a house, and was going to move to Florida to his new house by the airport. (Tough life, right?) His wife was already in Florida, and he didn't have another job lined up.

The pilot had felt that familiar pain in his stomach and had those black stools again. The antacids didn't stop it, so he came to sick call. A quick blood count showed him to be just as low as the first time. We admitted him to the hospital for a while and tuned him up a little before letting him go back out. We didn't transfuse him any blood this time as he was not quite as symptomatic, and there was more concern about transmitting an infectious disease.

Of course, he was DNIF'd and admonished not to fly at all. He went home and showed up every couple of weeks for a blood count. A month went by, and his blood count was up to 23.5. He hadn't been flying, but he was very anxious to get his (by now) three airplanes down to his new home in Florida.

I told him his blood count was way too low to be flying and not to try it. Two weeks later, he returned. His count was 26. Asked directly if he had been flying, he said he'd gone around the pattern a few times in another guy's plane and had done okay. He really needed to get his planes to Florida and wanted up. Again, I told him he wasn't ready to fly.

Two weeks later, he showed up in my office for his next blood count. It was better — now above 30 — but no, he still wasn't ready to fly. He agreed sheepishly. I questioned him on any recent flying, and he admitted he had flown one of his planes to Florida.

I asked him if he had any problems and at what altitude he had flown. He said 7,000 feet, and he took a portable supplemental oxygen unit and used it. He said he had no problems flying down there. He added he hadn't had any problems on the first airliner coming back. But he said on the second airliner he became hypoxic and passed out. He recovered later at a lower altitude. After the flight, he asked the airliner captain what the cabin altitude was and was told around 7,000 feet.

Without the supplemental oxygen, and with a longer flight than the first one, his blood had desaturated its oxygen and he became hypoxic and unconscious. He was now a believer and knew he was lucky to be able to come back and tell me of his adventure. He waited until he was cleared to fly by his flight surgeon to resume flying.

Self-assessment of medical problems and self-medicating should not be done by fliers. They lack the training necessary to make a proper diagnosis, get appropriate medical treatment, and to have an objective medical assessment of their flying status.

Even seemingly minor problems that persist should be evaluated by the flight surgeon. If it's minor, you'll be told that. If not, you'll get the proper evaluation and treatment. Experimenting with your life is not the way to test your medical judgment. Medical assessments, treatments, and determination of flying status should be left up to the flight surgeon. ■

Self-assessment of medical problems and self-medicating should not be done by fliers. They lack the training necessary to make a proper diagnosis, get appropriate medical treatment, and to have an objective medical assessment of their flying status.

Maintenance Matters

Nose Landing Gear Cocked 90° on Landing?!?

■ *Landing with your nose gear cocked 90° off center will sure make for exciting times, won't it?* You know, the kind of exciting times pilots don't particularly care to experience. We bet the maintainers and supervisors who were responsible for the unsafe condition would not want to experience that kind of landing either!!

On takeoff roll, a jet trainer started to drift off the centerline, so the instructor pilot (IP) took control of the jet from his student. However, shortly after liftoff, the IP found out real fast the student probably didn't have poor handling techniques after all — especially after it was discovered the landing gear wouldn't retract. A chase jet helped solve the mystery: The nose gear was cocked off center by 90°! No wonder the jet drifted during the takeoff roll and the gear didn't retract!

USAF Photo by TSgt Perry J. Heimer

What happened during the next hour of flight until the jet was safely stopped on the runway was indicative of the high caliber of people the Air Education and Training Command screens, selects, and trains to be professional pilots and aircrew members. Coordination, cooperation, teamwork, and some exceptional piloting skills got the aircraft and crew safely down and stopped, **without departing the runway!**

Earlier, the jet had been towed by maintenance to the flightline in preparation for the training sortie. The tow job requires the torque link to be disconnected, but it has to be properly reconnected after the tow is completed. Of course, it's a grounding condition, so an inspector would have to verify the task was "tech data" correct.

Unfortunately, the nose gear torque link had been **improperly reconnected** by maintainers just prior to the aircrew stepping to the jet. To add insult to injury, the inspector and the preflight pilot *did not* discover the faulty connection! Of course, later on during the takeoff roll, when the jet started to lighten and the weight on the torque link lessened, the torque link disconnected. Hence, no directional control or gear retraction!

And Another One!!

Same incomplete, unsafe maintenance action as just described but with a different type jet, pilot, mission, maintainers, and the mishap's time and place. It's unbelievable, but true.

This time a fighter was taking off in formation when the pilot felt an excessive nosewheel shimmy and aborted his takeoff. The reason: The nose gear lower torque arm had not been properly reconnected after the last tow job! It sounds like a broken record, doesn't it?

In addition to someone on the tow crew who didn't reconnect it properly, there was the crew chief, production supervisor, pilot, and the end-of-runway crew involved in **"missing"** the bad connection! That sure adds up to a lot of human errors, inattention to details, failures to verify checklist-required items, etc.!

Can you imagine the disastrous consequences if the pilot lost control of this squirrelly beast and it took out his wingman too?

Look, ladies and gentlemen, we've highlighted the improper connection of the nose landing gear scissors or torque links and arms several times in the past! So far, at least, *not* recently, no one has gotten killed. But we have busted up some perfectly good aircraft in the past for this!

Enough is enough! It isn't that hard to properly connect the scissors or torque links! And it certainly isn't that hard for you supervisors to ensure task inspectors are properly trained and certified to "get the job done right"! Mishaps caused by **multiple** human errors while performing simple tasks such as these are extremely dangerous, not to mention totally embarrassing to the aircraft maintenance community! We — no, YOU — owe your pilots a quality aircraft the first time, every time!

If you can't trust a task inspector, revoke his/her red X orders — today! If you aren't sure a maintainer is trained properly, decertify them — today! If you don't do it today, a safety board finding may prompt you to take these mishap-prevention actions later!

Snap, Crackle, Pop Goes the Spindle!!

After a transport maintainer finished troubleshooting a cargo ramp problem, he used the cargo door's **door/ramp** switch with the intent of closing the cargo door. When the cargo door neared the closed position, the maintainer heard some rather unusual noises and saw something fly across the ramp. He immediately stopped the operation to investigate and found a down latch spindle broken off. The unfortunate mechanic found, to his dismay, the consequences of **not** following tech data. He had tech data available at the job site but wasn't reading and heeding it during the course of work. This oversight in good judgment caused him to miss a very important temporary change in the tech data which altered the instructions for closing the cargo door and ramp.

The temporary change was issued approximately 5 months earlier. It required the operator to close the ramp *first* with the ramp switch, then close the door with the cargo door switch. Meaning: Close one *before* the other — ***not* both at the same time!** By using the **door/ramp** switch, *both* the ramp and the door were powered hydraulically to the closed position. What does science say about two solid objects trying to occupy the same space?

Any aircraft, regardless of age, could warrant a tech data change at any time during its service life. However, the Air Force's newer aircraft inventories are extremely vulnerable to slews of temporary and permanent tech data changes. So be careful before starting any task, especially during those routine, day-to-day activities. And remember, staying current and informed on the many tech data changes means **"Staying in the Books!"**

Regardless of whether your aircraft is new or old, following tech data will help ensure a quality and safe task is performed every time!

Keep Your Eyes Peeled — Not Your Tanker!!

While on a routine cross-country flight, a sharp KC-135R crew chief noticed some strange noises while he was in the cargo compartment. During his next postflight inspection, he looked into it. What he discovered was scary.

Part of the tanker's skin was ready to fall off in flight — reminiscent of an infamous commercial airline's "convertible" aircraft, when catastrophic fuselage skin failure exposed a huge chunk of the passenger cabin, and the crew miraculously accomplished an emergency landing.

USAF Photo by TSgt Perry J. Heimer

The crew chief found the skin beginning to separate — with several rivets popped along an upper lap joint. When a structural repair specialist arrived from the home unit, over 120 other failed rivets were discovered. Depot was consulted, and they dispatched a structural engineer. Eddy current NDI revealed no skin cracks, but numerous blind fasteners were missing, and surprisingly, several missing rivet heads were found painted over. Insulation blankets were removed, revealing many other improper rivets.

An investigation of maintenance records concluded the improper rivets were installed during depot-level repairs, and three other aircraft could have a similar problem. The units owning those tankers were notified to inspect accordingly.

Engineers concluded if the aircraft would have flown one more sortie, the failing skin panel would have been ripped off by the airflow in flight, weakening the structural integrity of the airframe. Would the failure of one panel cause others to fail? Would we have had a "convertible tanker"? Luckily, we didn't find out. The crew chief is to be highly commended for his professionalism and attention to duty.

Maintenance Matters

Chute Door Closed — But *Not* Really!!

An F-117 ***Nighthawk*** pilot performed a planned no-chute landing after completing an uneventful mission profile. Well, as far as the pilot was concerned, the mission was uneventful. What he didn't know, until maintenance informed him, was that his jet's right **chute door was open and the chute was missing!**

USAF Photo by MSgt Fernando Serna

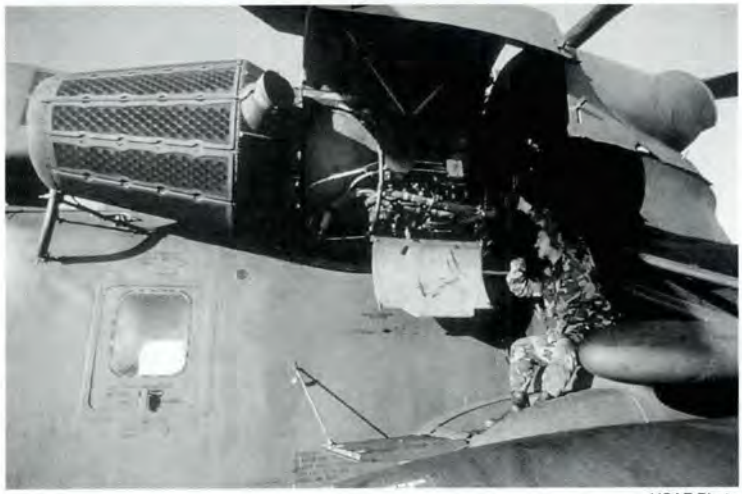
The chute's installation on the jet was performed by a trainee, and the completed task was inspected by a dedicated crew chief. All their work had been accomplished in accordance with tech data. The only problem encountered was the chute door latching mechanism was difficult to close but had passed a rig check.

It was determined the chute could be installed in such a way as to get the chute door to close and pass a properly installed chute check, but **still *not* be installed properly!** It seems if the chute **is not** correctly seated in the chute well, it will compress against the chute door. This, in turn, causes an internal bowing pressure effect on the chute door. The bowing effect creates an unsafe condition when the latching mechanism pins won't catch completely — just enough to pass all the security checks! Of course, any encounter with air turbulence or a landing could jar the aircraft enough to move the latching mechanism pins.

So for all you *Nighthawk* maintainers, make sure the drag chutes are completely bottomed out in the chute well! If the chute door is too difficult to close and latch, then check the chute for proper positioning in the well or have the airframe repair shop folks check things out for you. Better safe than sorry!

Here's hoping all your aircraft return "Code One"!

Glow-in-the-Dark Engine?



USAF Photo

An Air Force helicopter was minutes into a terrain-following night training mission when one of the scanners saw sparks coming from the exhaust of one of the engines. The other scanner could tell there was a discernible glow under the engine's cowling.

All engine indications were normal with no fire lights on. The engine was shut down, and the crew made a single engine return to base.

Later, a quality deficiency report determined the mishap engine had experienced an internal failure; i.e., the compressor case. Cause: While undergoing a recent overhaul at depot, the compressor clearances were **improperly set.** Also, **a 6th stage vane had been installed in the 5th stage section** of the compressor case.

Just one of these two "mistakes" could be considered a forgivable, one-time human error. However, the two combined might be an indicator that something isn't right within the unit's safety, quality culture. ■

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THE Well Done AWARD

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Mishap Prevention Program.

Captain Paul C. Strickland
86th Fighter Wing

Captain George A. Uribe
31st Fighter Wing

Aviano Air Base, Italy

■ Capt Strickland was lead and Capt Uribe the wingman in a two-ship of F-16s returning from an Operation DENY FLIGHT mission over Bosnia-Herzegovina. Over the Adriatic Sea at 20,000 feet, while rejoining the formation, Capt Uribe experienced a serious engine malfunction, and his engine automatically reverted to the secondary mode of control, quickly followed by a significant loss of thrust. At this point, he discovered that the engine would not respond to throttle movements.

While running the Abnormal Engine Response checklist, Capt Uribe informed his lead of the problem and turned back toward the Slovenian coast. Capt Strickland passed him the lead, maneuvered to a chase position, and contacted the Aviano SOF. Capt Uribe declared an emergency with the controlling agency and directed them to coordinate his recovery into Croatian airspace.

No longer able to maintain altitude or airspeed, he jettisoned his ordnance and external fuel tanks. Capt Strickland read him the Controlled Bail-out checklist in anticipation of not reaching a suitable landing site. Crossing the coast at 8,000 feet, Capt Uribe ceased efforts to restore normal thrust, and the flight began discussing the impending ejection.

At this time, Capt Strickland saw a small airfield within gliding distance. As Capt Uribe set up for the flamed-out approach, Capt Strickland flew over the field to ensure it was clear. He told Capt Uribe that it had 4,000 feet of runway with a canal off the departure end and a tall ridgeline perpendicular to the approach end. Because of the canal, he reminded Capt Uribe to be prepared to eject if it became apparent he could not stop the jet on the short runway. The ridgeline forced Capt Uribe to fly a steep final approach resulting in a higher energy state than desired.

Capt Strickland maneuvered to resume a chase position as Capt Uribe completed his difficult approach and put the Falcon on the ground in the first thousand feet of runway despite the ridge and a 25-knot crosswind. Recognizing that full antiskid braking was not going to stop the jet on the remaining runway, Capt Uribe made the decision to eject. He informed lead, and then approaching the end of the runway, he bailed out. Capt Strickland monitored the ejection and established contact on the survival radio net.

Now at minimum fuel, he passed the Search and Rescue (SAR) control to the Airborne Command Control and Communications (ABCCC) and returned to Aviano. Capt Uribe was picked up by SAR forces within a few hours. The F-16 came to rest in the canal and did not suffer major damage. The aircraft was subsequently retrieved and after repairs will fly again. Both aviators displayed superb skill and judgment throughout the incident, including textbook responses to a serious emergency over hostile territory, a successful flamed-out approach to an uncontrolled field, and a perfect SAR effort returning the pilot, and eventually the aircraft, to fly again.

WELL DONE! ■


FLIGHT
SAFETY