Flying SAFETY

When They Stop Talking, You Fly Solo!

Human Failings and Fallout

Night Toss: Lessons Learned by the F-III

NOTAM Nightmare Revisited

JANUARY 1993

Mishap Summaries

THERE I WAS

■ There I was . . . inverted, doing 500+ knots, 15 degrees nose low, 150 degrees of bank, about 1,000 feet AGL, at night!

The day had not started out so bad. We were lead of a three-ship night, low-level and range sortie — six mission-ready guys (three instructors, 6,000 hours of experience in this jet between us, 2,500 in our jet alone). This was going to be an easy night — NOT!

The plan was simple — radar trail departure, 400-foot TFR low level, an en route target attack simulating GBU-12s from a pop to level delivery. Then to the range for two level passes on the target of the night and then two loft deliveries on a target in the airfield complex.

Now the fun starts. For openers, the lead aircraft commander (AC) had not flown in 20 days due to leave and a week's DNIF. He was legal to fly and do night loft (21-day currency), but filling 51-50 squares is probably not a great reason to make his first sortie in 3 weeks a night loft ride.

He and I had flown together once or twice before, but that was day VFR to chase TAC checks. We had never flown together at night. (No big deal, right?) We won the money on the first pass and took the silver medal on the second pass.

The weapons delivery which provided the night's excitement was a 400-foot/550-KTAS ingress to a 20-degree LOFT delivery with a tactical recovery. I'm doing my best aiming, TF commentary, and systems operations ... "Twenty seconds to pull, I've got the target, cleared hot, 10 seconds ... Give me a ready ... Yo, turn on the master arm!" Up the chute we go, paddle, pull, pickle, bomb gone.

My AC rolls the jet to 135 degrees of bank and pulls toward the ground. He channelizes his attention on the egress heading (Cause).

"Dang!" he says, "we're not going to get to 330 heading? What's the deal?" In the meantime, I'm busy setting the CARA to 900 feet, going wide scan on the radar, and trying to set the TFR to 1,000 feet SCP. Where's that stupid knob. . . it's supposed to be a flat one, not a round one.

Now, we are 500 knots, 15 degrees nose low, and going downhill fast. We pass through recovery initiation altitude (Cause).

"Roll left and pull! Roll left and pull!" I holler. Nothing happens. I "gently" push the stick in the correct direction.

"What the heck," says my left-seater as he begins his left roll and pulls out at about 600 feet AGL. We climb to a safe altitude and try to figure out what went wrong.

First of all, we were doing a 20-degree LOFT (not a 45-degree max range LOFT). I assumed my AC knew this meant 100 to 110 degrees of bank max, not the 135 to 150 we actually flew. We didn't specifically brief this (Cause).

Second, we were both relying on each other's experience to keep us out of trouble. I was flying with a highly experienced IP who had recently been "Downtown" in the war. He was flying with a guy who had a reputation of "keeping you out of trouble."

The lack of a few words in the briefing, i.e., "Remember that in a 20-degree LOFT, we're going to get to RIA (recovery initiation altitude) before we reach egress heading. All we have to do is roll out to 80 to 90 degrees of bank until we get to the desired heading."

Those few words would have kept some new gray hairs off the tops of our craniums. MAKE SURE YOU BRIEF THE DETAILS OF THE ENTIRE MISSION! ■

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A/OA-10

MAJOR MARK "FRIENDLY" PENDLEY
Action Officer, AFSA

■ Another fiscal year has passed and, as usual, the A/OA-10 community had another good year. FY92 has been a year of returning to peacetime flying, closing bases, converting to other aircraft, flying Hogs to the boneyard, and winning Gunsmoke '91.

Unfortunately, we had three Class A mishaps resulting in three destroyed A-10s and the tragic loss of a fellow Hog driver.

A Look at FY 92

We had an increase in our mishap rate from FY91's record best 0.88 mishaps per 100,000 hours to FY92's rate of 1.74. That rate is a little higher than the USAF overall rate of 1.66, but much better than the overall fighter/attack rate of 3.21.

This year's three crashes all had one thing in common: Pilots were the primary cause of the mishaps and compounded their problems by going heads down in the cockpit at the wrong time. All three aircraft were airworthy before they created smoking holes.

The Three Class A's

Landing Mishap This crash involved a flight lead bringing a fourship to initial at home base. Unfortunately, he lined up on the first runway he saw, which was not the landing runway (there are those who have and those who will).

The flight lead finally noticed his mistake and eventually lined up on the correct runway. Infuriated with himself, he vented his emotions by aggressively and abruptly maneuvering his jet in the final turn, resulting in his in-flight guide falling to the floor.

While trying to retrieve his in-flight guide, his airspeed dropped well below final turn airspeed. He was slow to recover from the subsequent stall and landed short of the overrun. During the go-around, the main landing gear struck the edge of the overrun, severely damaging the left main gear.

After an extensive conference call with ALC, the on-scene commander determined the aircraft was unsafe to land, and the pilot performed a

successful controlled ejection.

This is a classic case of letting emotions get the bigger hand. This mishap has been produced into a particular video NOTAM and will be incorporated into human factors training. Lessons learned will also be incorporated into the Dash-1 to give better guidance on damaged gear situations.

Big Human Factors Mishap

This one involved a pilot with degraded basic and simulated single engine (SSE) event proficiency due to extended intervals between flying periods, use of short sorties to build sortie count, and the lack of SSE practices.

The mishap pilot was shooting an SSE approach with a chase pilot in another aircraft. For an undetermined reason, the landing gear would not extend, and the mishap pilot went around using only one engine vice the usual two. During the turn to downwind, the mishap pilot went heads down in the cockpit and allowed the aircraft to enter a steep banked turn into the idling engine.

Meanwhile, the chase pilot, who was repositioning to an emergency chase position, also went heads down. He looked up to see the mishap aircraft in a nose-low steep bank and directed the mishap pilot to pull up and then to bail out.

The mishap pilot recognized an unrecoverable position, but ejected out of the envelope and was killed.

This crash was primarily caused by the mishap pilot having his hands full in the aircraft and probable distraction due to a "full plate" in his personal life.

FCF Mishap

This sortie was a functional check flight (FCF) after a phase inspection. The pilot shut down the right engine in accordance with the FCF checklist and attempted two restarts. The engine would not start, so he initiated a dive in accordance with the FCF checklist to see if windmill airstart parameters could be attained.

Noting no rise in core RPM, he started what he perceived to be a 20-degree climb but was actually 40- to 45-degrees nose high. The pilot then looked inside the cockpit, checking switch and circuit breaker positions. The pilot inadvertently allowed the aircraft to continue to pitch up to more than 70 degrees. High AOA and asymmetric thrust resulted in a sideslip departure and left engine compressor stall.

The pilot experienced unrecognized spatial disorientation and applied full left rudder resulting in a left spin. He finally applied correct flight control inputs for an out-of-control recovery but was too low to recover and ejected successfully.

Class C Mishaps

FY92's most common Class C mishaps were engine failures followed by oil system problems, engine FOD, birdstrikes, and cabin pressurization failures.

For the past 3 years, the most common Class C mishaps have been engine failures. So the odds are your next serious EP could result in a single engine situation caused by engine/oil/FOD problems.

Making the Tank Killer Safer

The Low Altitude Safety and Targeting Enhancement (LASTE) modification is almost complete, preventing collision with the ground and helping dethrone the Vipers in Gunsmoke '91.

To solve one of the engine problems, the aft cooling plates are being replaced at 2,500 engine cycles by ones with fewer cycles, or with an improved aft cooling plate which will be replaced at 3,700 cycles.

The majority of oil pressure problems have been caused by engine-driven gear box failure. The gear box will now be a time change item versus fly-to-fail. Improved roller bearings vs ball bearings are being installed to improve the gear box performance.

Looking Ahead to FY93

This year will see increased emphasis in A-10 night operations due to the success of the A-10 night fighters of Desert Storm. The challenges of night flying and using night vision goggles can keep a single-seat fighter pilot very busy, and spatial disorientation can come up to bite you.

The A-10 has a super safety record for the past decade thanks to the hard work of the maintenance folks on the ground and the pilots at the controls. However, the last four Class A mishaps have been caused by the pilots flying them.

Human factors training is aimed at halting this trend. Perhaps one year we can have a zero smoking hole record.

FY92 was a good year, but not as good as it should have been. Let's make FY93 the safest yet by flying smart and safe. Happy new year and happy hunting! ■

The A-10 has had a super safety record for the past decade! This record is due to the hard work of the maintenance people on the ground and the pilots at the controls.

F/RF-4

LT COL PETER H. N. SCHALLER-KALIDE, GAF
Action Officer, AFSA

For the first time in its history, the F/RF-4s had no Class A mishaps!

■ Another year of intensive flying in the F-4 community, a pretty small one now, has passed by. It was an outstanding year. For the first time in history, the F/RF-4s had no Class A mishaps. Great job to all fliers, maintainers, supervisors, supporters, etc. Congratulations!

All was not perfect, however. We had two Class B mishaps which easily could have been worse. But as lucky and professional as we were, they did not. We'll look at them later.

FY92 in Review

During the year, the F/RF-4 community shrank from 3 active and 5 Guard units (with 360 Phantoms) to 1 active and 5 Guard units (with 182 aircraft). George AFB in California was closed, and Bergstrom AFB in Texas closed the book on its RF-4 operations.

Total flying hours this year added up to almost 50,000 — half of last year's. The two Class B mishaps provide us with a Class B rate of 4.5 per 100,000 flying hours. Let's take a closer look at the reports. Maybe there are a few lessons to be learned.

High Speed Abort

The mishap aircraft was lead of a two-ship formation. The mishap aircraft aborted during the formation takeoff, and it engaged the BAK-12 departure end barrier. The aircraft stretched the barrier cable to its full length and, in doing so, impacted the ILS antennas located in the overrun.

Whatever caused the barrier to be stretched to its full length is one story, but having an obstacle in the stretch zone of the barrier was a major contributor to this mishap. There you are, smoking down the runway for the barrier, good engagement, okay deceleration, and bam — you hit an obstacle built right in front of you.

How did the ILS antenna get into the stretch zone of the barrier? Who installed the barrier at a point such that the stretch zone went beyond the ILS antenna's position?

In this case, the barrier was installed first. Because of airport boundaries and antenna effectiveness problems, the antenna was later installed at its present location. To move and reinstall the barrier would

have closed the runway for an unacceptable time (especially for a civilian airport). The risk was accepted and made public (IFR supplement). Bad luck — the mishap crew was stationed at that airport.

Aircraft on Fire

During initial takeoff phase, the no. 2 engine surged to 103 percent and then dropped to 50-60 percent rpm. The takeoff was aborted at approximately 30 knots. After throttles were positioned to idle, the EGT was observed above 900 degrees C, and the fire light was on.

The no. 2 engine was shut down, and the mishap aircraft cleared the runway at the nearest intersection. As the crew departed the aircraft, they observed flames around the centerline tank and the wing root area. The fire was extinguished by the responding fire department.

A failed afterburner fuel pump impeller worked its way through the housing. Fuel got into the engine bay where it was ignited by the hot parts. It looks like the pump was not assembled correctly somewhere. A little inattention, complacency, or not following rules and regs can cause a lot of trouble, cost a lot of money, and worse, could have cost someone's life. Think about it!

With most of the mechanical "bugs" worked out of the venerable Phantom, human factors form our strongest safety tool.

Safety Concerns

On the operators' side, you did an outstanding job of keeping those Phantoms in the air, in one piece, and landing them on hard surfaces within the required landing roll.

The "loggy" community leaves us with some nuts and bolts to deal with: the inadvertent ejection after nose gear collapse and the fire and overheat lights.

The inadvertent ejection problem is one we have to continue to live with. Put it in your thoughts so if your aircraft is leaving a hard, prepared surface into soft, rough ground where a nose gear collapse would be most likely to occur, the result would be most likely an uncommanded, inadvertent, out-of-envelope ejection — at least for the rear seater. There is no procedure to tell us what to do. You can either stay with the aircraft, ride out the groundrun, or take your chance and get out of possible trouble by ejecting. But, what you should keep in mind (and make a briefing item) is: Whenever you are going to depart the runway and the decision is made to bail out, don't rely on a dual-sequenced ejection (by whomever initiated it), but pull your own ejection handle. Does this sound familiar? Yes, you read it in the fighter pilot's bible, *The Dash-1*, in the part where it tells you about "Runway Departures."

The fire and overheat light situation still exists, but going through all the mishaps/incidents of this year, there is no trend visible. No particular part is a weak point. Treating every light with the respect it deserves is the best insurance to get the machine and yourself on the ground safely. You have an aircraft that flies very well on one engine — don't mess around.

FY92 was the best year ever for Phantom mishaps. The outstanding performance of the Phantom during the Gulf War ensures it will be around a little longer than was planned.

Summary

FY92 was the best year ever for Phantom mishaps. It looks like we're down to a level number of aircraft for the future. Due to the outstanding performance of the Phantom during the Gulf War, the F-4 will be around a little longer than was planned.

Treat this gracefully aging warrior well so it may survive the coming years. Fly safely and many happy landings. ■

F-15 EAGLE MISHAP REVIEW

MAJOR GRAHAM A. LARKE, CAF
Action Officer, AFSA

■ It is annual review time again for the F-15. I considered writing two separate articles this year (F-15A-D, F-15E) but found there simply wasn't sufficient data base on the F-15E to warrant a separate report. So now that I have both communities' undivided attention — READ ON.

FY92 can, for all intents and purposes, be considered an average year for the F-15, with five Class A mishaps and three Class B mishaps. Here are some statistics for FY92: 210,000 hours were flown on the Eagle/Beagle for a Class A rate of 2.37; the Air Force Class A rate was 1.66 and the fighter Class A rate was 3.21. Last year, the F-15 rate was 1.09, the Air Force rate 1.11, and the fighter rate 2.54.

As in previous years, let's look a little closer at this year's mishap data and see if there are any lessons to be learned from our mistakes so we don't have an old mishap repeated by simply a new face.

First, on the Class A side, we had

10,000 feet AGL out of control and had to be *told* to eject. Unfortunately, in one case, the mishap crew ejected out of the envelope and were fatally injured.

The Dash-1 is quite clear. When out of control and below 10,000 feet AGL — EJECT!

Class A Review

Midair *Midairs accounted for 20 percent of the F-15 ops mishaps.*

The mission was initially briefed as a 2V2. However, lead aborted, and no. 3 led a 2V1 ACM backup sortie. During the third engagement, the flight lead collided with his wingman. The lead aircraft experienced substantial structural damage and safely recovered his aircraft at a nearby airfield. The wingman lost control and safely ejected.

There are two very important lessons to be learned from this mishap. First, flight leads must have a face-to-face brief with their wingman. Briefing "ACM is standard" over the

continued

three ops, one log, and one placed in the undetermined category for the time being (more on this later). On the Class B side, we had two ops and one log — all three landing mishaps and all of which could have easily been Class A's.

We were extremely fortunate on several Class Cs and HAPs, as you will read, where we could easily have lost either the aircraft or the crew, or BOTH. Disappointingly, you will also see we had two cases of crew staying in the aircraft below

radio just isn't good enough. The complexities of the air-to-air mission require a detailed understanding of the in-flight maneuvering parameters necessary to achieve the desired learning objectives and to bring you and your jet safely back home.

Second, in this mishap, both offensive fighters were engaged at the same time — one offensively, the other defensively. Although this situation developed as a result of poor position management on the part of the supporting fighter, it is a realistic scenario and provides an opportunity for the bandit to bring weapons to bear on one of the offensive fighters. Depending on the desired learning objectives, this situation could warrant a knock-it-off call, or, if properly briefed and understood, could be safely flown.

A role switch must be established (communicated) followed by a change in responsibilities on the part of the engaged fighter. Clearly, a visual must be established by the offensively engaged fighter, or a dangerous situation has developed and warrants an immediate knock-it-off call. The engaged fighter can remain engaged and can even bring weapons to bear on the bandit. However, it assumes full responsibility for maintaining the visual until the supporting fighter has negated the threat and can maintain a visual.

Ejection

The mission was a 1V1 BFM continuation training sortie. The mishap pilot was the flight lead and was briefed to be the defender on all engagements. During the third engagement, the pilot was ejected from his aircraft and sustained a major injury to his left shoulder. The mishap aircraft was destroyed on ground impact.

In this mishap, the pilot failed to remove a defective communication cord from the aircraft before flight. The cord remained attached to the oxygen hose along with the replacement cord. The ejection handles were inadvertently pulled by one of the following possible mechanisms: left-hand pull on the left ejection handle, left-hand pull on left handle in conjunction with trapped communication cord and the right knee or kneeboard; or, trapped communication cord and right knee or kneeboard combined with the pilot's subconscious tug on the oxygen hose and communication cord with his left hand.

The big lesson to be learned here, of course, is the importance of stowing loose articles before flight. Have you ever heard this before?

GLOC

The mission was a two-ship low altitude air defense (under GCI control). The two-ship was engaged on a four-ship, and during the final portion of the intercept, the mishap pilot (no. 2) began a notch maneuver to the target group and was fatally injured when his aircraft impacted the ground.

Most probably, the pilot performed an inadequate anti-G straining maneuver and became incapacitated during the turn due to GLOC. From the radar tapes and radio transmissions, the mishap pilot called "notching north" while pulling 8.5 Gs. A G-warmup maneuver was not required on this sortie (it will be from now on, however).

Earlier this year, we had an Eagle driver place so much emphasis on a radio call (creating a high accident potential) he failed to adequately perform an anti-G straining maneuver and recovered the jet 28 seconds later. Fortunately, he had "mucho" altitude under him. Unfortunately, our Class A mishap pilot didn't and

was fatally injured. The big lesson here, of course, is to not let your guard down for your anti-G straining maneuver. Remember, too, on some days, we are G-monsters, and, on others, we have problems with a 4-G turn. Know your limits, but more importantly, be ready for your anti-G straining maneuver — **it could save your life.**

Log Mishap

The mission was a 1V1 BFM continuation training sortie. The mishap pilot (no. 2) was offensive off a 3,000-foot perch setup. The flight lead began a nose-low left break to create a closure problem. The mishap pilot selected idle and speed brake, and during a quarter plane maneuver, the yaw warning tone began to sound and progressed rapidly to high rate. The mishap aircraft entered a departure, yawing suddenly to the right. It then entered a slightly nose-low flat spin to the right. Lead observed the other aircraft's speed brake deployed and called for a retraction. Below 10,000 feet AGL, flight lead commanded the mishap pilot to eject.

The auto retract mode failed to retract the speed brakes above 25 units AOA. We learned the F-15 is extremely unstable above 25 units AOA with the speed brake out. Another lesson to be learned on this mishap is the importance of making the early decision to eject below 10,000 feet AGL when the aircraft is out of control. The instability of the F-15 at high AOA with the speed brake out will be added to the Dash-1, as will ensuring speed brake is selected to the "in" position in out-of-control situations.

Undetermined Mishap

The mission was a 1V1 BFM syllabus sortie. The mishap pilot was offensive on a 3,000-foot left turning perch setup. At "fights on" call, the defender broke hard left 10-15 degrees nose low. The mishap pilot appeared to immediately pull lead and close for a gunshot. The defender rolled left and proceeded to jink out of plane, attempting to force an overshoot. The mishap pilot pulled left to avoid breaking the 500-foot bubble and then pulled up into a quarter plane maneuver. The aircraft yawed left in a nose slice and entered a fully developed flat spin to the left. The mishap crew ejected too late (out of envelope) and were fatally injured.

The aircraft was not recovered from the spin. Possible reasons for this mishap include unknown flight characteristics of the F-15E, misapplication of flight controls, flight control anomaly, or other aircraft system anomaly. So although we do not know the real cause of this mishap at the moment, we do know the F-15E has not been spin tested. This might call for a little caution when pushing the edge of the flight envelope. **This is the second mishap this year where the mishap crew has stayed with the aircraft too long below 10,000 feet AGL.**

Class B Review

Landing Dilemmas All three Class B mishaps occurred during the landing phase of the mission. Two of them were almost identical (ops mishaps). In both cases, the mishap pilots *attempted to turn their aircraft off the runway at excessive speeds.* The result — uncontrollable skids. Both aircraft departed the prepared surface and made ground contact with the wingtip resulting in a violent pivoting action at ground impact. Pieces of fuselage and landing gear were ripped off along the mishap aircraft's decelerating path.

There are two important lessons to be learned here. First is the importance of getting the jet slowed down to a safe taxi speed before making a 90-degree turn off the active runway. Second, if you think you have a brake malfunction, consider lower-

continued

ing the tailhook before attempting to restore braking.

The third Class B was a log mishap. The MP experienced a utility hydraulic circuit A failure and returned to base for a planned approach-end arrestment. The MP configured the aircraft and received down-and-locked indications, confirmed from a chase aircraft. During the landing phase, the right main landing gear collapsed, and the mishap aircraft engaged the approach-end BAK-13. Prior to stopping, the centerline fuel tank ruptured and caught fire. The mishap aircraft slid to a stop, the mishap pilot jettisoned the canopy, and the crew egressed. The crash crews extinguished the fire, and the aircraft was saved.

Air was introduced into the utility hydraulic system through the use of an AN/AWA-6A hydraulic cart, a hydraulic test stand, or through a canopy accumulator leak resulting in an erroneous "full" indication. The design of the F-15A-D landing gear permits temporary unlocking of the jury links (overcenter locks) when landing. To prevent further mishaps of this nature, recommendations have been made to replace the main landing gear wiring and switches and main landing gear actuators, re-evaluate the minimum combined overcenter spring tension required, and add warnings in the Dash-1 concerning the possible collapse of the main landing gear on landing with a utility A circuit failure.

We were lucky on this one. When the aircraft came to a stop, the canopy unlocked but would not raise. The pilot was advised by radio the aircraft was on fire. Knowing he had a rear seat occupant (flight surgeon) and realizing the urgency of the situation, he jettisoned the canopy in the egress process.

HAPs

Class Cs and HAPs can be extremely useful tools in mishap prevention. Here we can see trends developing and, after careful analysis, can come up with preventive measures. We have seen good examples of this in the Eagle, especially on the engine side (augmentor burnthroughs, fan blade failures, turbine blade failures). Clearly, the number of engine-related mishaps has been dramatically reduced — proof the system works.

Other areas where we have been successful include redundant shielded mild detonating cord (SMDC) lines, cabin altitude warning light, and wing transfer pump failure warning. In many cases, the preventive measures developed or implemented prevented another Class A mishap.

In analyzing this year's Class Cs and HAPs, there are two areas of possible concern with Class A mishap potential: out-of-control (departures and spins) mishaps and physiological mishaps (GLOC, hypoxia, or hyperventilation). Neither are new to the Eagle community, but if unchecked or disregarded, **both can be deadly**. This year's Class A record is proof enough.

Some of the reasons that have been cited for the departures and spins this year include:

- Faulty wire in splice 5002 going to PIN 54 on J2 at the roll/yaw computer and rudder actuator failed roll/yaw computer.
- Abrupt control inputs when operating in region of reduced directional stability.
- Failure of the speed brake auto-retract mode.
- "Undetermined" reasons.
- Failure to act in a timely fashion on the failure of the speed brake auto-retract mode (Class C) this year cost us a Class A. Some possible reasons on the undetermined side could be pilot rudder inputs at high AOA, bent airframes, or aggressive maneuvering in regions of reduced lateral or directional stability. What is important here is to be aware out-of-control mishaps are on the rise and "**Be READY For It**" if it happens to you. Most important — recognize when it is time to get out (below 10,000 feet AGL and still out of control).

The reasons cited for the GLOC incidents are mainly insufficient anti-G straining maneuvers. In one case, this was combined with a failure on the part of the pilot to connect his anti-G hose. I don't have to say any more on this. We all know the solution. Remember, though, it could happen to you if you let your guard down.

The reasons for the hypoxia and hyperventilation mishaps include oil leaking into the ECS separator, rust, dirt, or sand ingested into the oxygen regulator causing restricted airflow, canopy seal damaged while maintenance is being carried out in the cockpit area, and canopy misrigging. So far, your physiological training has paid off as you have all recognized your personal symptoms. Remember, though, we have lost one Eagle driver and aircraft to hypoxia. AGAIN, DON'T LET YOUR GUARD DOWN.

Summary

FY92 could have been a better year for the F-15. All three Class A ops mishaps were preventable, and one of the log mishaps may have been prevented had we acted in a timely fashion on the similar Class C mishap.

Hopefully, in this review, we have learned a few lessons — lessons which will make us much smarter when we brief and step for our next sortie. For the most part, whether you are a jock, a WSO, a maintainer, or support personnel, you are doing it right. Keep up the good work. Learn from the mistakes of others. Hopefully, these few tidbits of information will help reduce the number of mishaps in FY93. Until next year, FLY SMART, and you will FLY SAFE! ■

When they stop talking, you fly solo!

J. NORMAN KOMICH
Flight Safety Institute Consultant

■ The majority of POWs who arrived at the Hanoi Hilton did so by way of SAMs and Triple A. A few, however, were shot down by MiGs. One former POW, a personal friend, related the following story.

He was a new F-4 backseater, flying no. 3 in a MiG-CAP flight on a large strike mission over Hanoi. His pilot was also the squadron commander who was flying wing that day, not to observe the newly upgraded flight lead, but simply because they were short of pilots. In previous situations similar to this, it was typically this CO's personal policy to just fly a good wing and avoid usurping the new flight lead's authority.

They had just crossed the beach en route to Hanoi at high speed when one of the other wingmen called "Bandits at 6 o'clock." My friend looked over his shoulder from the back seat to see four MiG-17s in pursuit. The newly upgraded flight lead's response to this call was not to accelerate or break up the formation, but rather just to enter a constant left turn.

No one in the flight said a word of challenge to this action, and my friend observed to the Squadron Commander in the front seat, "One of them is drawing a bead on us." This was followed by a salvo of 37 mm cannon fire across their canopy. Still nothing was said to lead, and no action was taken other than to continue to fly that loose left wing in the left turn.

My friend could see the MiG maneuvering, and he said over the interphone, "He'll probably get us on this one." But again, no transmis-

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When they stop talking, you fly solo!

continued

sion was made to lead nor was any evasive action taken. My friend's observation was as accurate as the second salvo which shot them down, and he spent the next 6-plus years of living hell as a POW in Hanoi.

I realize there is considerable opportunity for Monday morning quarterbacking on what took place there, but I want to address just one aspect: communication, or in this case, a lack of it. Why didn't anyone challenge the maneuvering the new and inexperienced flight leader chose? Why was my friend reluctant to get on the radio and transmit something directly to lead himself? And why was the squadron CO so committed to not challenging a new flight lead that he allowed such a disastrous decision to be carried out?

These questions of a wingman's response to his lead's choice of actions are not easily answered. When I first flew formation in UPT decades ago, one IP observed, "The quality of your ability to fly wing is directly proportional to the spacing between our smoking holes if I auger in." Such a philosophy has taken on the aura of gallows humor since the tragic Thunderbirds T-38 mishap at Nellis. In this mishap, all four impacted the ground on the backside of a loop when lead experienced a jammed elevator and had both hands on the stick trying to pull out, thus preventing him from punching the transmit button on the throttles to warn his wingmen of the problem. I raise the following question: Were his wingmen victims of the jammed elevator or victims of not monitoring lead's flightpath? So then, exactly what DOES constitute the role of a good wingman?

I am reminded of a story told by another friend in the southeast Asia conflict who got a Thud to Takhli AB, Thailand, out of UPT. He was a newly upgraded flight lead on a four-ship who was asked by his crew chief if he would accept his aircraft without the primary ADI. Being young, aggressive, and confident his standby horizon would suffice, he readily accepted.

En route, in some of the thickest soup he'd ever seen, one of his wingmen curtly transmitted "Check your bank." My friend confirmed straight and level but suddenly realized he was looking at his inoperative primary ADI!!! A quick look at the standby showed a left bank. Kudos to a wingman who not only made the extra effort from flying very close formation in very thick weather to confirm their flightpath, but who also was not reluctant to speak up.

Granted, such a reluctance to speak up assertively occurs only infrequently, but if Murphy has his way, it will occur when and where the consequences are most disastrous. The purpose of this article is twofold: to make the reader aware the problem DOES exist for single-seat fighter pilots and lay some ground rules for its avoidance.

Significantly, the airline industry has attributed over 70 percent of all recent accidents, at least in part, to the inability of the crew to function as an effective team. Their "team" exists within the cockpit, but after listening to the above stories, I perceive the existence of similar "teams" within a formation.

The airlines are now advised by the FAA to teach courses in cockpit resource management (CRM), and such courses typically take several days. It would be a difficult task to cover all the aspects of such training in one article as this, so I will just address one here: "Barriers to Good Communication."

Extensive research and mishap analysis have shown there is a direct relationship between team effectiveness and communication within the team. There are many barriers to good communication, but two stand out in my mind as directly related to good formation effectiveness.

The first is that good communication is two-way — not just from the top down, but also from the bottom up. A 2 Lt wingman is definitely capable of being aware of something a full-bull flight lead might not realize. It is up to the team leader (i.e., flight lead) to establish an environment in the team which not only allows the 2 Lt to speak up when something is wrong, but actually *encourages* questioning decisions perceived as incorrect.

The second barrier to good communication in a formation is too

Fighter aircraft operators are not exempt from practicing CRM!

much of a "can do" attitude. Capt David Jones, in the July 1990 issue of *TAC Attack*, cites two experiences — one with him as wing and the other as lead, where no one challenged the decision to continue the training in marginal visibility. Both situations almost resulted in the loss of an aircraft. "If no one else is challenging it, and I do, I'll look like I don't think I can hack it." Sound familiar? Well, such an attitude is understandable but not always acceptable when it can be a killer. However, it CAN be overcome, not by stating a reputation threatening "I don't like the looks of this," but rather by a nonspecific "What do you think of the visibility?" Or, "Is anyone else having trouble seeing the horizon?"

Such an approach allows the decision to be made by the group without one person being singled out as the weak link. Good CRM is far more than just saying "You should speak up!" Good CRM acknowledges the group dynamics of a small squadron where everyone knows each other and will be working together for an indefinite period. It should provide guidance to make an "acceptable" challenge to a situation which threatens the margin of safety of the entire operation. So when you are confronted with such a situation, as additional incentive to speak up, remember the philosophy of the sage pilot who observed "Don't let can-do turn your flight into 'doo-doo.'"

So, yes, you ARE solo in your single-seat aircraft, but as soon as you add a backseater or a wingman, you are entering (heaven forbid) into the outer edges of the multiplace aircraft environment, and you need to adjust your thinking accordingly. But if they ever stop talking, you're back to flying solo. ■

A single word from the appropriate crewmember is all that is needed to keep airplanes from ending up where they don't belong.

F-16 MISHAP SUMMARY

MAJOR ROGER BENNINGER
MAJOR BILL WAGNER
Action Officers, AFSA

■ Some reflections on FY92 from the F-16 perspective indicate mishaps were virtually a "mirror image" of the previous year. The distinction between the 2 years being we experienced fewer aircraft destroyed (18 vs 21). Tragically, the mishaps resulted in more pilot fatalities (8 vs 5). Also, lest time allow us to forget history, Viper drivers recreated several FY91 mishaps: (1) LANTIRN-associated collision with ground, (2) piddle-pack-associated sidestick interference and loss of control, (3) night-associated spatial disorientation, fatal, and (4) channelized attention on an airstart resulting in an aircraft loss (this time, failed to monitor FTIT, vice FY91 where the mishap pilot monitored FTIT to the exclusion of all other critical parameters).

If FY91 and FY92 suggest a trend and if history writes the future, we should save the computer disk where this article resides because it might come in handy for writing the FY93 mishap summary.

Log

In the last year, 10 out of 18 Class A mishaps have been engine-caused or engine-related. These accounted for all but one of the log mishaps this year. There are definitely many "lessons learned" for the wrench-benders but the operators, in many instances, were in a position to "break the chain." Let's look at those "lessons learned" by engine type.

PW-200

Several recurrent themes have come up again this year, resulting in high-level attention given to the PW-200. The overwhelming answer has been to upgrade the motor with the -220E upgrade. There were five PW-200 mishaps this year.

A compressor blade failed due to an ECS failure. The fix was to redress the inspection cycle. "Tired iron" may have been a player. On a second mishap, the maintainer failed to properly install, and the supervisor failed to adequately inspect, the aircraft throttle coupling. This happened as a result of having done it many times, but a redesign of the coupling required exact procedural compliance (i.e., use the tech order).

Foreign object damage has been a

ENGINE MISHAPS IN REVIEW

F100 — PW-200
- — ECS failure caused catastrophic compressor failure
- — FOD in UFC
- — Throttle coupling misinstallation
- — Extra flapper valve
- — Thinned metal in A/B section

F100 — PW-220
- — No. 3 bearing failure
- — No. 4 bearing rear airseal
- — DEEC resolver failure

F110 — GE-100
- — Fuel starvation

recurrent theme this year accounting for three mishaps. In the -200, a safety wire clipping was left in the unified fuel control during buildup. In this case, if the operator had gone to backup control (BUC), he would have bypassed this mode and been able to recover the jet.

An extra flapper valve was found in the UFC on another mishap. This valve jammed internal components of the UFC resulting in increased thrust. The pilot selected BUC and regained engine control, but on landing, he reselected electronic engine control (EEC). This gave him just what he didn't want — another increase in thrust, and he was unable to stop the aircraft before departing the runway. Bottom line — don't mess with something that's working.

The highest potential for mishap continues to be the 1-2 spacer. Redesign is in the works, along with rigorous field eddy current inspections in the meantime.

PW-220

The -220 and the -220E upgrade to the -200 have shown a remarkably low mishap rate over the last 3 years. The three Class A's this year still have shown no significant trends. The first incident was a resolver failure due to a broken wire in the resolver. The mishap pilot did not properly monitor FTIT, thinking he was on fire, and allowed an overtemp to occur.

The second incident involved a common -200 design problem — no. 4 bearing rear air seal.

Lack of specific guidance in following the time compliance tech order (TCTO) allowed different interpretation on what schedule to use, although the intent was to do engines in order of risk priority. This was not conveyed in the TCTO.

GE-100

The F110 had only one mishap this year. Although we don't know exactly what caused the core RPM reduction and subsequent fuel starvation, which is still being looked at, there are several lessons learned for operators. First, do practice simulated flameout approaches, and practice them from odd altitudes and off-angle to hone your energy management skills. Realize the ACES II envelope parameters. With fire present, don't open the canopy until you're ready to ground egress. Finally, a big "attaboy" to the fireman who literally risked it all to save the pilot in this mishap.

Putting it all together, several etched-in-stone lessons have been relearned again this year. First, each guy in the chain can "break the chain" and prevent a mishap. Careless work ethics and poor attention to detail with an eye on getting the job done will catch up with you sooner or later. For operators, practice all of the engine problems you can get in the sim. Make sure you're up to speed on energy management in the SFO because you never know when an opportunity to shine will come your way. ■

Human Failings and Fallout

FY92 safety statistics show 13 out of the 19 Class A mishaps were human factor related!

MAJOR ROGER BENNINGER
MAJOR BILL WAGNER
Action Officers, AFSA

■ The human mettle within the F-16 community is showing signs of fatigue. The number of "stress fractures" among the human element of the flying equation figured dramatically in the FY92 safety statistics. Thirteen of the 19 Class A mishaps this year were due, in large measure, to human factors.

The mishap rate for fighter/attack aircraft suggests a less-than-acceptable status quo. Among devotees to the safety creed, there is widespread belief a zero mishap rate is a valid goal. More importantly, USAF leadership has noted a disturbing trend exists in most recent mishaps — they could have easily been prevented!

The fallibility of the human being is acknowledged. However, we should not fail as often, as has been noted in the FY92 mishaps. While the P_K (probability of kill) of the ground and with other aircraft still rates very high (near 100 percent), it is alarming to find, of the 13 human factors mishaps, 7 involved collision-with-the-ground or midair collisions. The results were predictable:

No one climbs into one of the Air Force's best jets intending to fail. But pilots are subject to human failings unless steps are taken to intervene.

eight fatalities, one pilot seriously injured, and another questionable as to whether he may return to the flying community. The price of not respecting the ground's P_K is extremely high.

Inexcusable, or plain "dumb," mishaps accounted for at least 3 of the 13 human factors mishaps. Improper recovery from an IMC unusual attitude, not monitoring FTIT during an airstart, and attempting to use the piddle-pack in flight created force reductions in their own unique ways.

With force drawdown and budget reductions, let's translate what FY92 mishaps really mean. Essentially, one F-16 squadron was lost this year. Should we poll the Viper community to find out which squadron is a volunteer to return their flying pay and sign up for "banked" status, permanently?

Mishap rates are useful for year-to-year comparison, but raw numbers tell the tally-sheet truth. If the community continues the senseless loss of resources, the Falcon may become second only to the spotted owl on the endangered species list.

Three of the 13 human factors involvement mishaps began as bona fide in-flight emergencies. The middle part of the scenario reads something like, "Mishap pilot executed an uneventful approach for landing." The bottom line reads ejection, aircraft destroyed.

Single-engine aircraft will, on occasion, be called upon to perform engine-related emergency landings. The engine portion of this summary indicates the continued (and logical) emphasis which needs to be placed on such related malfunctions. Politely stated, "improper procedures" contributed to these three aircraft losses.

Enough bad news. The nagging safety question still begs an answer — why? Investigations are extensive and filled with technical answers. Collision with the ground generally cites channelized attention, spatial disorientation, task misprioritization, reduced situational awareness, and task saturation. The answer to the second intuitive safety question is less definitive: "So, why?" The human factors specialists can be consulted for the more probing answers to the second question.

Replete in each report is a laundry list of responses to the agonizing "why?" Investigators found inadequate crew rest, lack of training currency, and inadequate training regulations contributed to one fatal mishap. Failure to adjust to circadian rhythm or make appropriate adjustments to body clocks caused the incumbent fatigue which contributed to two fatal mishaps. Competing job requirements suggested several mishap pilots were preoccupied with other than immediate mission concerns just prior to the mishap. All were major factors in significant numbers of FY92 mishaps.

Violations of flight discipline and inappropriate judgment were cited in several mishaps. Almost unbelievably, one mishap pilot had been hospitalized weeks before the mishap without documentation or grounding by the flight surgeon. Misapplied procedures knowledge and complacency appeared in the statistics at a rate inconsistent with professional operators. The fact supervision was implicated in virtually all these mishaps, although in subtle ways by the investigating board, is also disturbing. To supervision's credit, in several mishaps, provisions were in place to prevent the mishap, yet it still managed to occur.

The basic unit of any culture is the family. If we are to create a "culture of safety" in the flying community, we must address the basic unit. The "family" in the flying culture of safety is the squadron. Flying squadrons must provide the awareness and support required to monitor and provide quality control for their members.

Flight discipline relies on self-reporting and interdependent mutual support. It is apparent squadrons are experiencing some convulsions requiring the grounding of experienced pilots, pilots who decline the bonus, and those seeking a flying career outside of the Air Force. If the stress and fatigue which cause human failings to become prevalent (and therefore, cause flight mishaps) are to be curtailed, we must reinvigorate the family within the squadron, create the atmosphere conducive to safe operations under current circumstances, and reduce the fallout which accumulates from allowing human factors to drive our mishap rate. ■

F/EF-111 Aardvark/Raven

MAJOR NEIL "BONE" KRAUSE
Chief, Fighter/Trainer Division, AFSA

■ This year we've seen a lot of people come and go (but mostly go). Changes are happening fast, and the outlook is more of the same for a while before things settle down. Through it all, though, the F-111 keeps pressing on, strong as ever. Someday someone will build an airplane that can do as much as the Vark, but for now, we have a unique capability no other single plane can equal.

This year we lost two jets and two of our friends. We finished the year with a 2.57 Class A mishap rate per 100,000 hours, up from 1.13 last year. The good news, however, is the Class B rate of 1.28 is down from last year's astronomical 7.89.

Looking at our two mishaps this year, we see a continuation of the trend in the last 10 years of a 50-50 split between operations and logistics. Let's look closer.

Fire on Takeoff

The first mishap involved an EF-111 on initial takeoff. As soon as the weight was off the wheels and the fuel tanks pressurized, a refuel transfer manifold broke, pouring 2,000 pounds of fuel into the centerbody of the fuselage. This fuel ignited in the afterburner, and the flame propagated forward in the fuselage.

Within 2 minutes, the aircraft became uncontrollable as the fire melted aluminum push-pull tubes for the right stabilator and rudder. The crew ejected and received only minor injuries.

Two major points on this mishap — first, the push-pull tubes aft of the failed two were hardened many years ago, in response to similar mishaps, to buy time for the crew to troubleshoot the source of a fuselage fire and possibly land the aircraft. These new stainless steel tubes did not melt, but the fire spread further forward than anticipated.

Second — an average of 12 refuel transfer manifolds per year were replaced due to cracks at the weld joint, but 15 were replaced in the last quarter of 1991. This triggered an inspection requirement during the 300-hour phase. Unfortunately, the mishap aircraft had already gone through the phase before the new requirement. It looks like we lost two good opportunities to prevent this one.

A Short Landing

The second mishap involved an F-111E practicing a no-flap, no-slat approach from the visual straight-in pattern. Although the investigation is still in progress as we go to press, the aircraft appeared to be functioning as advertised. The aircraft touched down, tail first, in a low sink rate prior to the overrun. The nose gear collapsed into the wheel well, damaging the impact attenuation bag and the rocket motor nozzle on the crew escape module. The crew ejected during the sequence, but the rocket nozzle damage prevented the crew module from reaching a full trajectory. Both crewmembers were fatally injured when the capsule hit the ground.

Based on preliminary information, one lesson we can take from this second mishap is a no-flap, no-slat practice approach is not a training square. It's an emergency procedure calling for increased vigilance and thorough prebrief. It is far from "routine."

A Close Call

The single Class B mishap this year was an F-111F on a night terrain following mission. During the low-level, the crew noticed a sudden bright glow on the left side of the aircraft and a simultaneous engine fire light. They shut down the engine using the boldface procedures and diverted to a nearby base.

The fire, resulting from a failed no. 3 engine bearing, had burned

Photo taken by a "planespotter" of an EF-111 taking off. The jet is coming toward you, and a plume of fire can be made out in this enlargement.

through the outboard side of the engine casing, the engine bay doors, and the aft engine mounts. As bad as it sounds, a failure oriented inboard would not have been as pretty. An exceptional effort by the crew (and a little luck) saved the aircraft.

The retrofit of newly designed no. 3 engine bearings is being accelerated. In addition, the (joint or spectroscopic) oil analysis program (OAP, JOAP, or SOAP, depending on whom you talk to) has been revised to tighten the tolerances for wear metal concentrations in the oil and to give further guidance to interpret increases in readings.

Down the Road

So what does the future hold for us? We will start to see the promised Digital Flight Control System (DFCS) on F-models late this year, with the EF-models to follow. The E-models still have to wait for flight testing. The Ground Collision Avoidance System (GCAS), part of the DFCS, is still going through some growing pains, however. Certain GCAS modes may not be reliable enough to install right away.

The TF-30 engine is also going through some modifications to keep it alive and healthy. These changes address some of the problems we have had in recent years, particularly first stage fan blade liberation and high-pressure turbine failure.

Downtrimming the engine hot section, called "power management," is expected to increase the life of the hot section of the TF-30-P111 engine in the F-111F. Unfortunately, it could also be called "power theft," producing a loss of about 2,000 pounds of uninstalled thrust. Pratt & Whitney engineers have also tested new dampers for the turbine blades in the P111 engine, and they believe this may reduce stress enough to deactivate power management.

For Relief From Back Pain . . .

Following an in-house study here at the AF Safety Agency, I hit the road last summer with Mr. Bob Campbell, egress specialist and a leading expert on the crew escape module. We were concerned about some misinformation spreading among the jocks on their chances of walking again following an F-111 ejection. We visited Upper Heyford, Lakenheath, and Cannon.

While it's true 30 percent of the F-111 crewmembers experienced severe back injuries after ejection, these numbers don't tell the whole story.

In F-111 history, 128 crewmembers have successfully ejected from 64 aircraft. Of those 128, 7 have not returned to fly escape-system aircraft. Of those seven, only three have been medically discharged from the service. Notably, all seven were the result of escape system malfunctions, primarily repositioning (bridle) cable failures. The odds are with you!

Another useful statistic: The F-111 has a 79 percent ejection success rate, comparable with other ejection systems until the ACES II came along. In fact, engineers looked at installing the ACES II system in the F-111 but decided it would require major structural changes at a prohibitive cost. We would also lose some of the major advantages of a capsule system. The primary reason for an unsuccessful ejection, however, still remains—pulling the handles too late. So trust the system. It's better than the alternative.

Wrap-up

I'd like to end this article by congratulating every one of you for the exceptional job you've done flying, fixing, and servicing the Vark. As I hinted at the beginning, though, the times, they are a changin'. We all need to keep focused on what's important when we're flying or fixing or pumping gas. It's not CBPO, MPC, or the next RIF board. Remember this, and we can have the safest year yet in the F-111. ■

NIGHT TOSS:

Lessons Learned by the F-111 Community

CAPT SETH P. BRETSCHER
524 Fighter Squadron
Cannon AFB

■ For the past 25 years or so, most of the Air Force has looked at the F-111 community as being a little strange. For 2 decades, we, the Vark drivers, were the only ones who repeatedly flew low level at night and practiced delivering our entire weapons array from that particular environment.

The F-111s would do such crazy things as automatic terrain following radar (TFR) descents and night IMC low levels as low as 200 feet AGL (although, for training purposes, we are restricted to 400 feet) without ever touching the stick.

Then, to make things even worse, to deliver our weapons, we would prefer tossing our GBU-10/12/15 and 24s because we have a higher P_K with those weapons than we do dropping dumb bombs from level flight. This means hand-flying a loaded dynamic maneuver at anywhere from 90 to 135 degrees of bank (depending on the weapon), in relatively close proximity to the ground, when we can't see outside the aircraft. For years, the F-111s were the only ones who did this sort of thing, and the rest of the Air Force kept their distance. Well, guess what? "What goes around, comes around."

Based on all our preconceived notions about night operations, the F-111 community does not understand how a single-seat aircraft, like the F-16, can toss laser-guided bombs on a target and self-designate the target with a LANTIRN pod. Conventional F-111 wisdom states it takes two crewmembers to successfully toss PGMs at night. It's the WSO's responsibility to kill the target and the pilot's responsibility to fly the toss maneuver and not kill the WSO — two separate tasks, one

Night toss deliveries are one of the most complex and dangerous taskings within the Air Force. The tactics, planning, and safe execution of a night LGB toss are the most demanding event any aviator will fly.

for each crewmember.

The problem with this conventional wisdom is the F-111 drivers are not familiar with the technology leap which has taken place in the F-16 navigation and targeting system. System accuracy and reliability, combined with human engineering, make the system user-friendly. It also allows a single aviator to accomplish the same mission two aviators used to perform.

F-16CGs are regularly conducting night toss missions. Furthermore, night low-level operations — especially night toss deliveries — are one of the most complex and dangerous taskings within the Air Force. The tactics, planning, and safe execution of a night LGB toss is the most demanding event any aviator will fly. It would seem prudent, therefore, for single seat and F-111 communities to take a look at night operations. Together, everyone can better understand both the tactics and hazards associated with night toss deliveries.

Night, Low-Level Operations

The F-111 world has an enormous amount of experience conducting night, low-level operations — including night toss deliveries. We have killed experienced aircrews more than once doing auto TFR descents, during low-level TFR operations, and doing night tosses. We have learned just about every lesson there is to be learned about night, low-level operations.

Just to remind us every once in a while, we go out and kill another crew so we can relearn those same painful lessons we learned in the past. The F-16 LANTIRN world need not rediscover those same lessons for themselves. The F-111 community has already done the groundwork (pun intended) and has some answers for you.

Likewise, the F-111 community has an enormous number of preconceived notions as to how night, low-level operations are to be conducted. Now, for the first time in over 20 years, another community is taking a fresh look at that environment. However, the F-111 drivers are painfully unaware of the tactics the F-16 LANTIRN drivers have developed which could be useful.

Now, with that in mind, let me put on my night toss instructor's hat and pass on a few of the lessons I emphasize to new guys, not only to keep them alive, but also to help them kill the target. Hopefully, you'll be able to take some of this with you on your next sortie.

- Kill the target prior to the pull. In the F-111, looking through the Pave Tack pod is like looking through a soda straw. While the infrared picture is very clear, the field of view is extremely narrow. There is no peripheral vision, or any easy way to scan for visual lead-in clues. To counter those problems, the engineers who designed the system tied it into the navigation/bombing computers and the attack radar. This gives the pod the capability of "cueing up" to the same coordinates as the attack radar cursors.

Additionally, because of the low grazing angle of 3 to 5 miles from the target, it is extremely rare to acquire the target prior to the pull on a toss delivery. What this all means is radar aiming is critical to killing the target — even with LGBs. The WSO, through a combination of basic radar scope interpretation and the use of radar offset aim points, must have the radar cursors on the target prior to the pull. If he doesn't, the crew may as well abort the pass. They are going to miss the target for two reasons:

First, the WSO will probably never acquire the target in the pod. Even with the bird's-eye view of the target area provided by the toss maneuver, the pod field of view is just too limited to make target acquisition easy.

Secondly, even if the WSO lucks out and does find the target, his ballistic release solution is so poor — especially for GBU 10/12s — either the laser spot will be out of the bomb's field of view or the bomb simply won't have enough energy to make it to the target.

Very rarely does the pod compensate for poor radar work. The target must be killed on the attack radar prior to the pull. In the F-16, the leap in technology has simplified this task to the point it is now a one-man operation. However, the same basic concept ought to hold true whether the radar, LANTIRN pod, or GPS is being used for navigation: The INS must be "spot on" target before going up the chute. There is no better feeling than switching to the target video while in the pull and seeing nothing but your DMPI under the crosshairs. That makes the rest of the maneuver relatively simple for you.

- The ADI. There is one, and only one, instrument which will keep an aviator alive during a night toss delivery: the ADI. Why? Ninety-nine out of 100 times, aircraft crashes during night toss deliveries are caused by an overbank resulting in an excessive, undetected descent rate. The only way an aircraft will overbank during a toss recovery is for the pilot to fixate on something other than his ADI. That distraction can be anything — the altimeter, heading indicator, lights on the ground, a vague horizon at twilight or over water, tracers, target video, etc. None of the before-mentioned items will keep a pilot from overbanking. Only the ADI can do that.

Now, this doesn't mean all of the other instruments are dropped out of the cross-check. In fact, they can't be. In F-111s, we have a start roll altitude, a toss recovery altitude, an egress heading, and an airspeed indicator which all must be cross-

continued

NIGHT TOSS:

Lessons Learned by the F-111 Community

continued

Guideline: GBU-24 Low Altitude Night Toss

1. Ingress

a. Both

i. Review SRA, TRA, SAA, designator altitude (this ensures line of sight (LOS) above terrain and memory point track (MPT) avoidance), and heading for designator turn.

ii. Ensure delivery airspeed is achieved (usually 550 knots), 45-degree wing sweep, auto TF engaged, good ALT CAL, and altimeter tapes are calibrated.

b. AC: Give WSO pacing calls every 10 seconds to release.

c. WSO:

i. Set egress heading on BDHI and higher of TRA or required altitude for LOS or MPT considerations on the AVVI.

ii. Confirm weapons settings with AC, and select manual ballistics based on planned detection/release range.

iii. Confirm target acquisition before release, when possible. Track and lase if able.

2. Release

a. AC:

i. For level release (500 feet min), pickle as time to go (TTG) passes 5 seconds (or goes to zero for MAN pickle button).

ii.For mini-loft deliveries, depress the paddle switch and start a 5-degree climb at 2 seconds TTG, and pickle in the climb.

b. WSO: Acquire the TGT, track, and lase through impact.

3. Postrelease Maneuvering for Designation

One second after release, initiate a 3-G climbing 60-degree bank turn to TRA (ensure the aircraft is above the calculated SRA prior to roll initiation). TRA must be reached by the time the aircraft reaches the egress heading. Bank angle may be increased (but not to more than 90 degrees of bank) when passing through TRA. When the aircraft reaches egress heading, do not roll further than wings level back toward the target to prevent MPT. Do not descend below TRA until on auto TFR.

NOTE: If TRA is below MPT or LOS altitude, then climb to the highest of the three.

4. After Bomb Impact

a. AC

i. Reconfirm with WSO the 1,000-foot set clearance plain (SCP) is set. The CARA should be set on 900 feet.

ii. Set pitch steer switch to TF.

iii. Ensure all TF associated lights are out. Check E scope.

iv. Release autopilot lever and confirm RNE light out.

b. WSO

i. Set and confirm 1,000-foot SCP and 900 feet set on CARA.

ii. Confirm RNE light out and monitor descent (bank and pitch).

iii. Video switch back to radar (and auto/wide, 12nm) and monitor descent.

iv. Pave Tack pod standby retract, if applicable.

NOTE: Since GBU-10s and 12s fly differently than GBU-24s, a separate set of night toss guidelines exists for them in MCM 3-1 and MCM 3-3.

checked during the maneuver. However, these instruments only require a glance — then it's back to the ADI. Glance at the altimeter, then back to the ADI. Glance at your airspeed, then back to the ADI. Get the picture? It's basic UPT stuff.

In addition, our pilots literally talk their WSOs through the maneuver. We teach this for several reasons. First, the F-111 is built with 1960's technology. Therefore, we don't have an "autotrack" mode in our Pave Tack system. The WSO has to track the target manually throughout the toss maneuver until bomb impact. This takes 100 percent of his attention. Consequently, more than one WSO has died with his head in the scope.

So we have our pilots talk their WSOs through their instrument cross-check by calling out bank angles, altitudes, headings, etc. This gives the WSO situational awareness about what the pilot is doing with the aircraft. It works pretty well. If the WSO isn't comfortable with what he is hearing from his pilot, he always has the option of aborting the pass, letting the bomb go stupid, and getting his own eyes on the instruments.

The second reason our pilots talk through the maneuver is because the recording is a great debrief tool. They come back into the squadron and listen to their instrument cross-check. It helps identify what distractions broke down their cross-check and helps new guys learn theirs.

Finally, supervisors can use the tape to ensure their aircrews are following proper night toss procedures. In the F-111 world, we have clear-cut guidelines for each crewmember to describe each toss maneuver from ingress through the auto TFR letdown after the toss. These guidelines are very detailed and are recorded in MCM 3-1, 3-3, and our weapons and tactics guide.

The wording in our guidelines

Years of F-111 night operations experience provide a valuable resource to other crews expanding their missions.

has been carefully picked to ensure the prescribed procedures cannot be misinterpreted (another lesson we learned the hard way). Supervisors and instructors use the video and audio from the tape to ensure all aircrews are following the prescribed night toss procedures.

In a single-seat aircraft, obviously there is no WSO to talk to. So the idea of an F-16 driver talking to himself might sound pretty strange. However, I can't emphasize just how good a debrief and instructional tool the VTR recording really can be. A wingman or supervisor may pick out a procedural error in a buddy's instrument cross-check which could save his life.

To briefly summarize, no matter what aircraft you fly, after the bomb is released and the pilot rolls the aircraft on his toss recovery, he has to be committed to his ADI.

If he is not, and he tries to make a correction on his target video, he will overbank and put his aircraft in an unexpected and unsafe attitude.

However, talking out loud through the instrument cross-check will help keep wandering eyes on the ADI and ensure proper night toss procedures are followed. It is impossible to talk through an instrument cross-check and make a correction on the target video at the same time. Think of it this way — if there is a break in the verbiage, or the target video is mentioned, a distraction has occurred.

■ Frame of Mind. This is every squadron commander's favorite topic. When flying a night toss mission (the single most dangerous thing we do), your frame of mind is especially critical. The F-111 community has actually killed a crew because they became so angry at something they thought their wingman had done, they were "divided men" going up the chute on their final night delivery. Anger is, in itself, a distraction. The pilot's anger kept him from concentrating on flying the maneuver. Instead, he ended up flying the aircraft into the ground.

If you become distracted, note whatever it is, put it behind you, and get back to flying your aircraft. If you can't do so, knock it off, go home, and try it again tomorrow. Finally, bring whatever caused the distraction up in your debrief. That's what debriefs are for. Night toss is far too complex and dangerous to let anything get in the way of devoting all your attention to it.

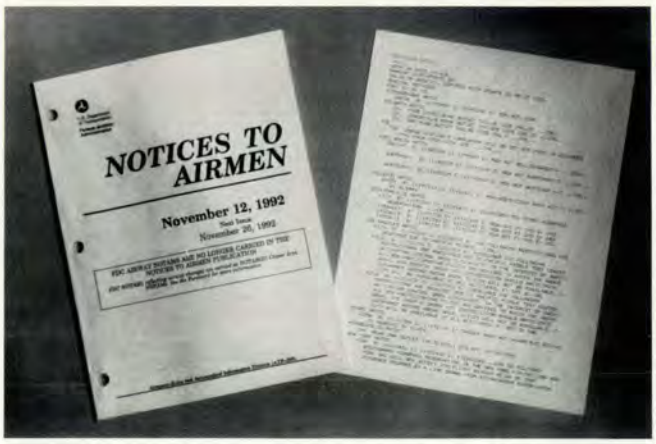
Communication is Key

There is a very good chance I haven't brought up anything new. Certainly, to the F-111 community, I have not. But, those of us who conduct night operations need to start communicating our triumphs as well as our problems more effectively. We need to pass on our ideas, tactics, and the lessons we have learned. Personally, I'm always open to a fresh point of view. ■

IFC APPROACH
By the USAF Instrument Flight Center, Randolph AFB TX 78150-5001

NOTAM Nightmare Revisited

The USAF Flight Standards Agency
Randolph AFB TX



FAA *Notices to Airmen* are just as important as the familiar military NOTAMs

■ Rats! It was 2330, and we were in the 15th hour of a 16-hour crew day, 30 miles from our fifth and last stop, Dyess AFB TX. RAPCON informs us a B-1 is sitting on the runway with two blown tires and no estimate when the runway would reopen. Okay, no problem. Our AF code 5 was sleeping like a baby in the back.

We asked approach to clear us to our alternate, Abilene Regional, turned the C-21 east, and lined up for an ILS to 35R. I dialed up ATIS, but as advertised in the NOTAMs, it was off the air. The AC and I went through the landing checklist, gear, flaps, hydraulics, and landing lights.

We broke through an overcast layer of stratus at 1,200 feet. Visibility was approximately 2 miles with scattered ground fog.

At 500 feet, I ran through the checklist again to ensure we were in final landing configuration. Touchdown was textbook perfect. The AC threw the thrust reverse levers back, and, at 40 knots, we turned onto the high-speed taxiway, partially obscured by fog.

"Holy cow!" We stood on the brakes, antiskid kicked in, and our tires alternately skidded and released.

Bang! A row of unlighted yellow construction barricades appeared, and we hit them dead center. The jet skidded and thumped through the barricades and came to a stop in the broken pavement beyond. Fortunately, there were no workers or vehicles in our path. I turned to see our code 5 sprawled across the cabin floor.

The nose gear collapsed, and through the windshield, I could see an ugly gash across the nose of our jet. I had what would turn into a giant goose egg on my forehead, and my nose felt like it was on the side of my face. As the reality of what happened sunk in, we shut down the jet, called tower to report we hit something, and requested the emergency equipment.

The AC and I looked at each other and asked the obvious: "What was *that* doing there? And why didn't we know it? Why didn't we know this taxiway was closed?"

We made sure our general officer was unharmed, obtained VIP transport to Dyess, and silently examined the damage to our jet.

During the ride back to the base, we both replayed the events over and over. We knew we'd have to face "Auntie AMC." How could this happen? Who was to blame? Was there an FEB in our future? *Did we have a future?*

As the right-seater, I did most of the preflight planning for this mission. I rechecked our flight plan, the weather briefing, and I even looked at the NOTAM board in Dyess' flight planning room. There was nothing showing a taxiway closure at Abilene. But then, there shouldn't have been.

The alarm clock jolted me awake. I sat up in bed, looked around the Q, and tried to remember what day it was and where I was. *God, that was the worst dream I ever had!* I've got to stop doing Friday nights at Randolph's Auger Inn! Thank goodness!! I'd been dreaming!!

Could a mishap like this ever really happen? The DOD's current system of disseminating NOTAMs on all DOD and selected civil locations takes vigilance on the part of the aircrew to ensure they receive all the information required. There are four types of NOTAMs and several means for obtaining them.

Of the four types of NOTAMs available, three civil and one mili-

tary, the most common civil NOTAM is the "Class D" (for distant), which is equivalent to the military NOTAM. These NOTAMs cover things like NAVAID shutdowns, airport, and/or runway closures. A military or civil D NOTAM is formally defined as "information not known sufficiently in advance to publicize by other means concerning the establishment, condition, or change in any component of or hazard in the NAS the timely knowledge of which is essential to personnel concerned with flight operations." For the DOD, this means any information required to depart from an airfield, operate through the national airspace system, and land at an installation.

With AWDS, it's not necessary to look for the diamond symbol in the en route supplement. Just enter the appropriate ICAO identifier, and the system will retrieve your NOTAMs.

The second type of civil NOTAM applicable to DOD aircrews is the FDC NOTAM, issued by the Flight Data Center, Washington DC. These NOTAMs are regulatory and deal with raising MEAs on airways or VOR changeover points. They're often overlooked or just given a cursory glance because of the large amount of seemingly inconsequential information they contain. An important point to remember about FDC NOTAMs, besides the fact they're regulatory, is an FSS briefer will not give you FDC NOTAMs over a telephone briefing unless you **specifically ask for them!** The daily summaries include FDC NOTAMs for selected civil airfields that DOD uses on a recurring basis.

The DOD "Airfield Advisory" and the FAA "Class L" (for local) NOTAM is information which requires local dissemination, but does not qualify as a military or civil D NOTAM. They generally warn of local hazards like bird activity, or *taxiway closures*, information which should not affect your ability to operate into or out of an airport. Class L NOTAM and airfield advisories are available from the FSS serving the affected airport, ATIS, or the local control tower. Calling the destination airfield base operations can also be helpful.

At DOD installations in the CONUS, NOTAMs are usually found in two places — on the daily summary (with hourly updates) hanging on the wall in the flight planning room and the FAA Notice to Airmen (formerly Class II) booklet, usually located just below the hourly update.

The FAA Notice to Airmen booklet is an integral part of flight planning. In addition to airway information, it's also the place you'll find most civil and selected DOD instrument approach procedure NOTAMs. Overseas DOD installations have the daily summaries, updates, the FAA International Notices to Airmen booklet, and usually additional host nation sources of NOTAM information. There are also some theater and command-specific products which contain material not meeting DOD NOTAM criteria.

Basically, the US NOTAM system provides NOTAM data to DOD aircrews on all DOD-owned or leased airfields and selected civil airfields. To determine if an airfield is covered by the DOD NOTAM system, look for the diamond between the airfield name and the ICAO identifier in the appropriate en route supplement. CONUS-based aircrews flying into civil airfields not depicting the diamond symbol in the en route supplement can contact any FSS (1-800-992-7433) for Class D NOTAMs. Remember, in addition to Class D, you must **specifically request** information on any applicable FDC NOTAMs. Class L NOTAMS and airfield advisories can be obtained through ATIS, FSS, the control tower, or base operations serving the destination airfield.

In my dream (nightmare), I should have remembered to ask the FSS or destination base operations for any airfield advisories or Class L NOTAMs. Ideally, the ATIS would have been up, and I would have gotten the information that way.

The Air Force Flight Standards Agency is aggressively working to improve the NOTAM systems' responsiveness. Our goal is to provide DOD aircrews with one-stop shopping for NOTAMs. Future enhancements include plans to integrate the weather and NOTAM features of the Automated Weather Distribution System (AWDS) with the Air Force mission support system. Until these changes can be implemented, it's important to understand the different methods of ensuring you receive all the NOTAM information required for your flight.

By now, you should have noticed the new personal computer in the flight planning areas of many Air Force and Army installations. As part of AWDS, it can provide separate systems for flying squadrons, control towers, base operations, and flight planning areas.

The system installed in flying squadrons provides local weather, NOTAMs, and airfield advisories for the host installation and up to five alternate locations. The system installed in the control tower receives weather, NOTAMs, and airfield advisories on the host installation only. The systems installed at base operations and flight planning rooms provide worldwide NOTAM data on any installation stored in the FAA's data base.

continued

IFC APPROACH:
NOTAM NIGHTMARE REVISITED continued

With AWDS, it's not necessary to look for the diamond symbol in the en route supplement. Just enter the appropriate ICAO identifier, and the system will retrieve your NOTAMs. The system is designed to eventually eliminate the summaries and updates hanging on the wall and let aircrews request their own NOTAMs by punching in the correct ICAO identifiers and receiving a personal copy of NOTAMs to take with them to their aircraft. It's currently installed at approximately 85 CONUS locations. As we go to press, there is an upgrade program in the works to make the system faster and more responsive to aircrew needs and desires.

Since 1989, when the DOD integrated its NOTAM system with the FAA's automated system, military NOTAMs have been presented in the ICAO format. While the ICAO format is an excellent way to enter NOTAMs into the system, several comments have been received saying it's not very friendly to Joe Crewdog who has to decipher it. Negotiations are currently under way with the software engineers at the FAA to provide military NOTAM data in a clear text format. For an example of the proposed new formats, see sidebar.

These format changes being accomplished by an FAA subcontractor can be expected in late 1993. The AWDS upgrade for a faster and more aircrew-friendly interface is an Engineering Change Proposal which will start in early 1993 and will take about 8 months to implement.

Europe will start seeing AWDS in May 1993 and the Pacific in 1994. Be patient, be diligent, and above all, be safe.

If you have any suggestions or comments to improve the NOTAM system, please contact the Air Force Flight Standards Agency/ NOTAM Management Division, Washington DC 20330, or call us at DSN 224-7678.

Special thanks to *Flying* magazine and Mr Michael Maya Charles for allowing us to reprint portions of the "NOTAM Nightmare" article published in the March 1992 edition of *Flying* magazine. ■

PROPOSED NEW FORMATS

CURRENT SUMMARY/ UPDATE FORMAT
OHIO
KFFO WRIGHT PATTERSON AFB
B) WIE C)UFN E)BAK 9 DEP END 23R RWY ARST GEAR NOT AVBL
B) WIE C) UFN E) 23L/05R RWY CLSD
B) WIE C) UFN D) 1100/2200 WKDAY E) 1ST 2000FT RWY CLSD EXC
LCL AERO CLUB
B) 07141400 C) 07142300 E) TACAN NOT AVBL

PROPOSED SUMMARY/UPDATE FORMAT
OHIO
WRIGHT PATTERSON AFB KFFO
BAK 9 DEP END 23R RWY ARST GEAR NOT AVBL
23L/05R RWY CLSD
1ST 2000FT 23R RWY CLSD EXC LCL AERO CLUB 1100/2200 WKDAY
TACAN NOT AVBL 14 JUL 1400
TIL 14 JUL 2300

CURRENT AWDS FORMAT
REQUESTOR:FAST01
122300 KCNFYNYX R
(122300 KFFO
(KFFO M0022/92 NOTAMN
A) KFFO
B) WIE
C) UFN
E) BAK 9 DEP END 23R RWY ARST GEAR NOT AVBL
(KFFO MOO92/92 NOT AMN
A) KFFO
B) WIE
C) UFN
E) 23L/05R RWY CLSD
(KFFO M0118/92 NOTAMR
M0017/92
A) KFFO
B) WIE
C) UFN
D) 1100/2200 WKDAY
E) 1ST 2000FT 23R RWY CLSD EXC LCL AERO CLUB
)
NOTAMS FOUND 03)
131314 KCNFYNYX A
(131314 KFFO
(KFFO M0131/92 NOTAMN
A) KFFO
B) 07141400
C) 07142300
E) TACAN NOT AVBL
)
NOTAMS FOUND 01)

PROPOSED AWDS FORMAT
REQUESTOR:FAST01
WRIGHT PATTERSON AFB KFFO
BAK 9 DEP END 23R RWY ARST GEAR NOT AVBL
23L/05R RWY CLSD
1ST 2000FT 23R RWY CLSD EXC LCL AERO CLUB 1100/2200 WKDAY
TACAN NOT AVBL 14 JUL 1400 TIL 14 JUL 2300

OPS TOPICS

That's Easy for You to Say

■ No matter what your problem is, always fly the airplane first. Sure, that's easy for somebody else to say, but what if …

You've just departed an airfield and are trying to contact Departure Control for permission to enter the ARSA on your VFR flight plan. Suddenly, a large (and most probably "deadly") spider swings down from the top of the windscreen. Dangling just inches away from your eyes, the spider appears angry at having her sleep disturbed.

The closest thing you have to a "spider interrupt mechanism" is your still-folded sectional. Since a half-hearted hit will only anger her further, you begin swiping wildly at the spider. Your first swing must have missed, because the spider drops from her thread onto your pants.

You now have a very angry spider crawling south and out of reach of your sectional. Oh yeah! Now's the time my instructor would have told you to forget everything else and fly the airplane. That's easy for instructors to say.

Come to think of it, maybe it's not a bad idea. While you were trying to "level" a spider, the airplane continued its climb, right through the ARSA floor. Since the FAA is about to exert a bigger fear factor than the spider, you once more start flying the airplane and return to proper airspace. A quick glance to the cockpit floor shows the spider is out of your danger zone and you quickly tap dance it into oblivion.

If the spider, or wasp, or bee is not already mad at you, chances are you won't get it mad by performing the appropriate aircraft maneuver. It's hard to do sometimes, but always fly the airplane first. ■

What Trouble Could It Possibly Cause?

■ There are many times when the connection between a minor annoyance and a serious emergency is not very clear. Such was the case for a transport crew heading east across the Atlantic.

During preflight, the crew discovered a fair amount of water on the flight deck and in the map case. Since it had been raining for days, they assumed the water was "normal" and dried it out before heading out on the mission.

Sometime during the climbout, first one, and then the other, ADI failed. The weather along the entire route and into the destination airfield was VMC so the flight continued.

Apparently, the heavy rainshowers back at the station soaked more than the floor and the maps. It may have entered the AHRS controller unit and associated system cannon plugs. Either corrosion or shorting of components caused the failure.

There's a lesson here about simple gripes: Just because you can't see a more serious problem doesn't mean it couldn't happen. ■

MAINTENANCE MATTERS

Oxygen Mask Warning

■ During a recent inspection of oxygen mask hardshells by a unit's life support technicians, they discovered several were manufactured of a material which is very brittle and prone to crack or shatter easily. The results of a product quality deficiency report (PDQR) submitted by the unit confirmed the deficiency stating it was due to inadequate controls during the molding process.

Deficiencies were verified on hardshells manufactured with contractor document numbers F41608 — 86-C1506 and F41608 — 86-C1319 with the following national stock numbers:

1660-00-794-0868LS
1660-00-794-0869LS
1660-00-794-0870LS
1660-00-820-3223LS

All units using these hardshells should inspect them for evidence of embrittlement and cracking. ■

F-16 Wire Chafing

■ Upon entering a low-level run, the mishap aircraft experienced a main generator failure. The EPU activated automatically. The pilot immediately started a climb and headed to an airfield 25 miles away.

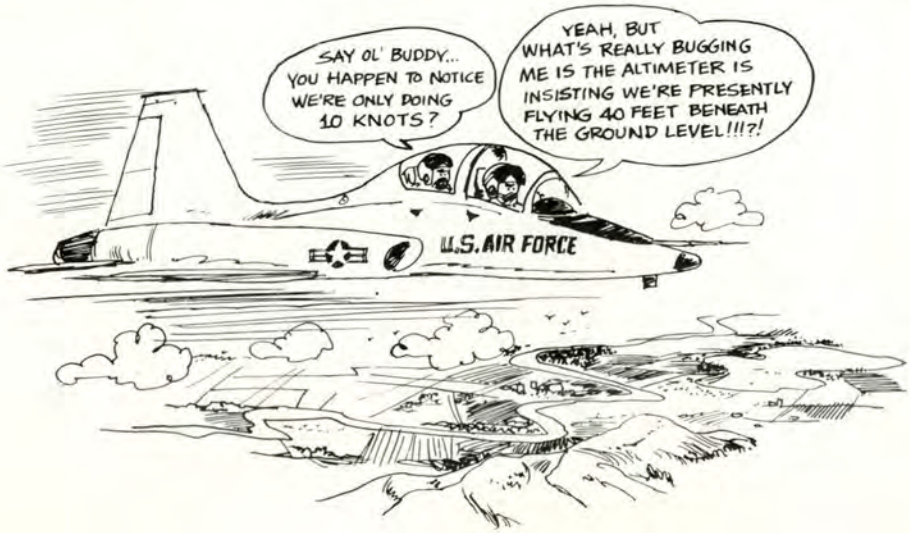
The generator reset, but on final approach, it failed again. However, this time the EPU also failed to activate. The pilot performed the Multiple Generator Failure Checklist and accomplished an approach end cable arrestment for a successful heavy landing.

Maintainers found the cause of the mishap was chafing of a wire bundle in access door 2002. Additional chafing was also found on a wire bundle in access panel 2004. Chafing of improperly routed cables, wires, and lines can, and most often does, lead to catastrophic consequences. ■

Static Documentation

■ Takeoff roll was uneventful. However, shortly after rotating the T-38, the pilot noted the indicated airspeed instantaneously dropped to 70 KIAS. Since he felt normal acceleration, and engine indications were normal, the pilot elected to continue the takeoff.

Once airborne, the pilot noted the altimeter was also reading incorrectly. A chase aircraft confirmed the instrument error and led the mishap jet to an uneventful landing.



A check of the aircraft forms showed the front cockpit EGT indicator had been removed and replaced prior to the last flight. Further investigation revealed the static pressure line was disconnected to facilitate the EGT indicator removal. Unfortunately, the disconnected line was not documented in the forms, and the aircraft was cleared for flight.

Improper, or lack of, documentation is a major cause of maintenance-related mishaps. ■

* U.S. GOVERMNMENT PRINTING OFFICE 1993-679-016/60005

UNITED STATES AIR FORCE

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.

MAJOR

Michael H. Weaver

Tactical Fighter Group (ANG)
Pittsburgh, Pennsylvania

■ Maj Michael H. Weaver departed Greater Pittsburgh International Airport on a low-level surface attack mission as no. 2 in a two-ship flight of A-7s. One-third of the way into the low level route, he reacted to avoid a large bird. Instinctively, he began a climb and ducked behind the glareshield/HUD. At 300 feet AGL and 450 KTAS, the A-7 struck a 5-pound turkey vulture.

The collision was violent. The radome disintegrated with a loud explosion. Already climbing, Maj Weaver aborted the low level and directed the flight lead to rejoin.

The situation deteriorated as IMC conditions were encountered at 4,000 feet MSL. Compounding the emergency were erroneous airspeed and altitude indications caused by damage to both pitot tubes. In a 10-degree climb and unsure of the status of his engine, Maj Weaver started preparations for a possible ejection.

He was able to confirm a positive climb on the radar altimeter and a valid ground speed via the weapons delivery computer. Upon regaining VMC conditions at 12,000 feet MSL, he directed the flight to rejoin and obtained clearance from ATC for his return to Pittsburgh.

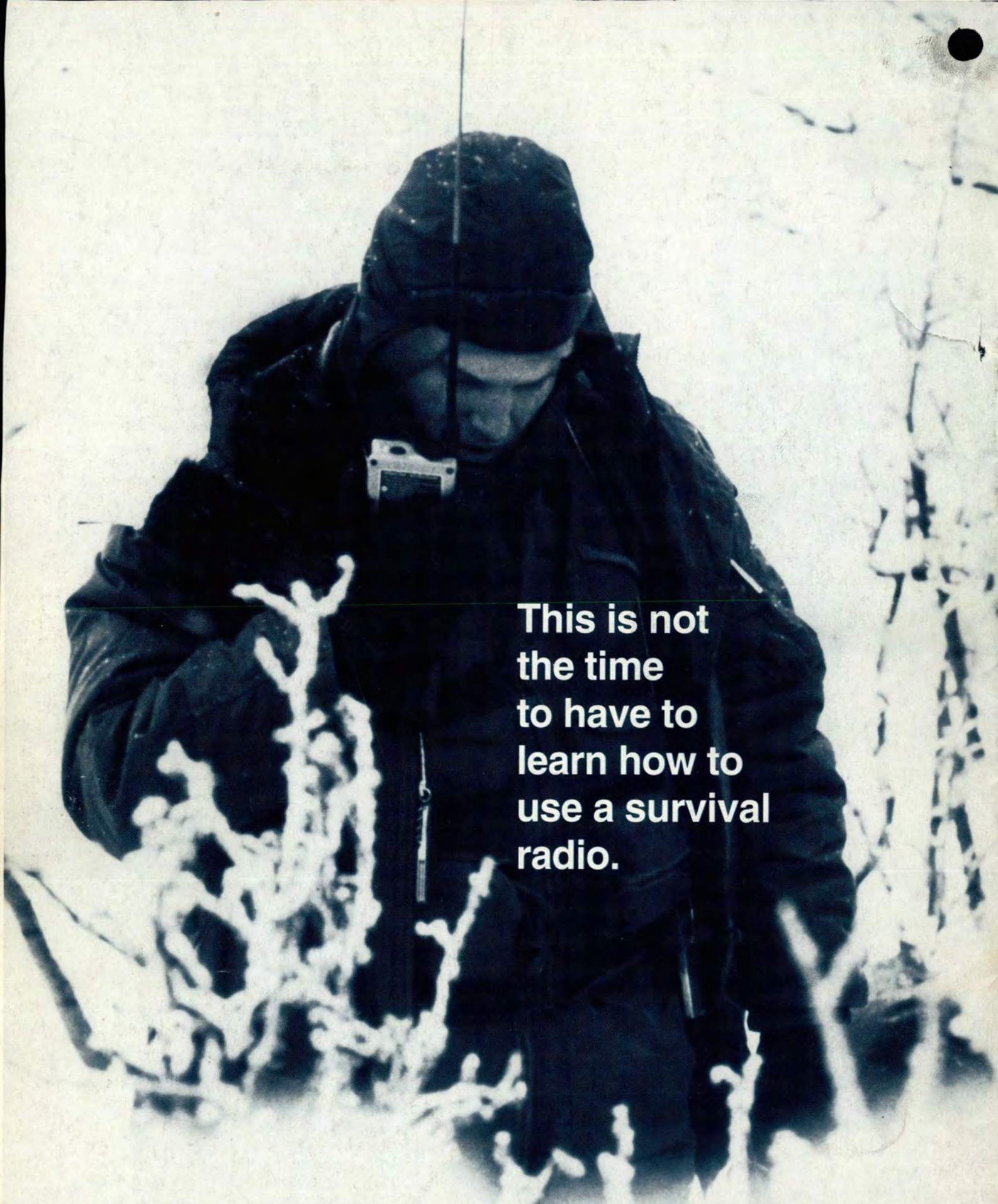
During RTB, debris flew past the windscreen and Major Weaver extended the ram air turbine, again preparing for ejection. Throttle movements were minimized since engine FOD damage was likely as he continued toward home.

A controllability check 30 miles out confirmed 160 KIAS as the minimum safe airspeed. Following an IMC penetration on the wing, Maj Weaver again took the lead in VMC conditions. A precautionary landing pattern was flown to an uneventful landing.

The engine suffered extensive FOD damage to the inlet extension casing, the fan, and to both compressor sections. Analysis confirmed engine failure had been imminent.

The calm, methodical, and expeditious handling of this emergency by Maj Weaver, and the textbook coordination between himself and the flight lead, enabled him to avoid the potential loss of a valuable aircraft.

WELL DONE! ■



The first rule for survival is to pre-prepare for the unexpected. The second rule is to expect what you don't expect.