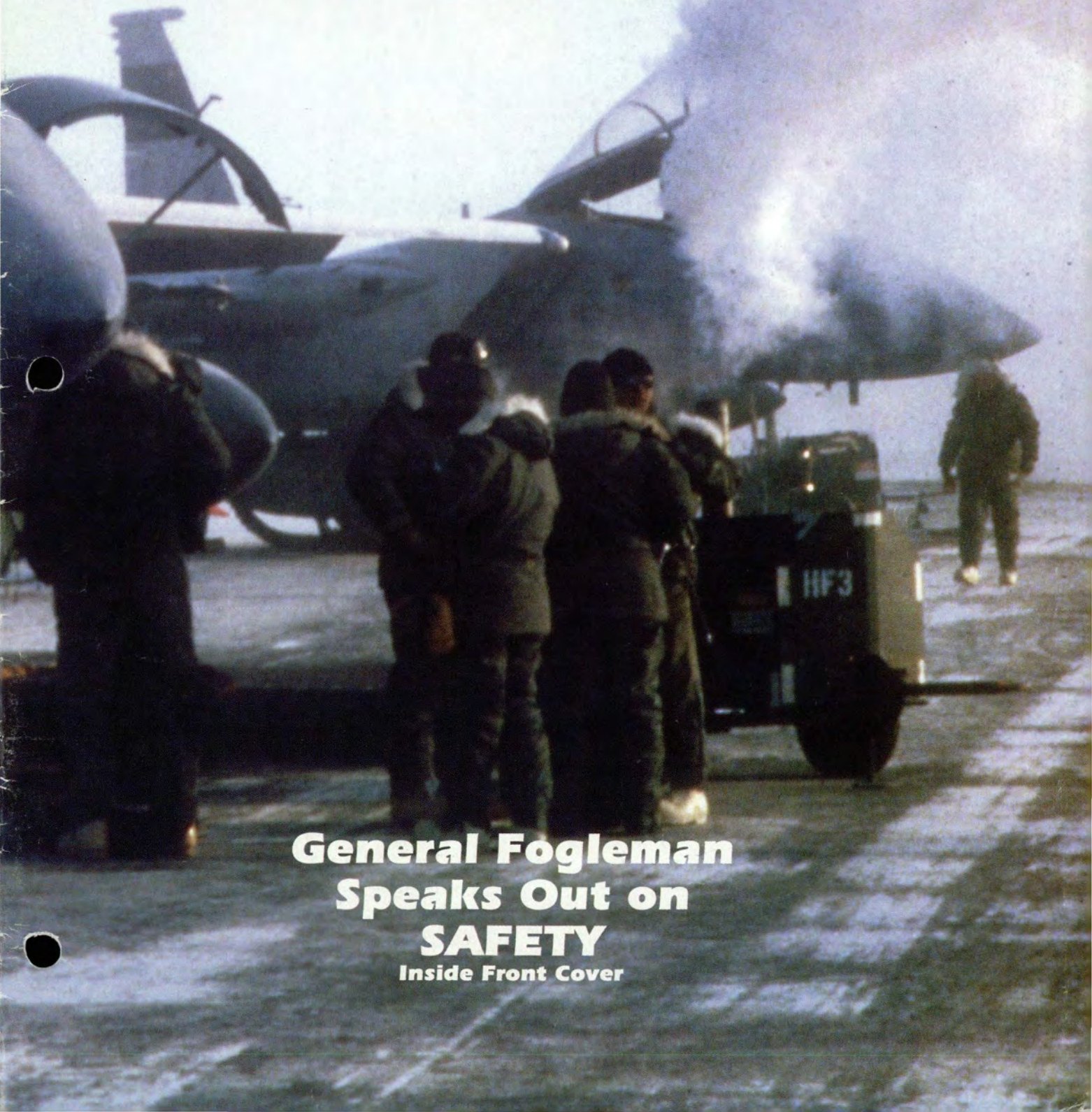
# flying SAFETY

## 1994 FIGHTER/TRAINER MISHAP REVIEW

JANUARY 1995




## General Fogleman Speaks Out on SAFETY

Inside Front Cover

# COMMON SENSE AND SAFETY

**GENERAL RONALD R. FOGLEMAN**
Chief of Staff, USAF

■ Most readers of *Flying Safety* have probably picked up on a pattern over the years — new Chief comes in, new message to the troops is published. It's a smart policy, and I'm pleased to have this forum to give you my take on safety early in my tenure.

There are no new accidents. It's trite, but it's true. With the exception of growing pains in new weapon systems and power plants, our mishaps are variations on old themes: loss of situational awareness, crew resource management, discipline problems, pressing, lack of leadership, lack of training . . . the litany goes on. Change the names, dates, and airplanes, but it doesn't matter — the reports read the same.

We need to take a fresh look at old problems. We need to take a fresh look at what "safety" is all about. I think it's about preventing the loss of increasingly scarce resources — our people and our airplanes. It's about commanders taking responsibility and accountability for their programs and individuals taking responsibility for their actions. On a basic level, it's about people using their heads, thinking things through, and doing the right thing.

As a community, we have had great success in reducing the number of mishaps caused by equipment failures. Unfortunately, our record in the human factors arena is not as pristine. In fact, 61 percent of our FY94 Class A mishaps were caused by human failure, a 14 percent increase from FY93. We have to do better. Human factor mishaps are preventable mishaps. Somewhere in the accident chain there is an opportunity for intervention, an opportunity to break the chain and prevent the mishap. All too often, we are missing that opportunity. I challenge all of you to get involved. My rule of thumb is simple: If it doesn't feel right, it probably isn't right, and you probably ought to do something about it. Our Air Force is made up of some of the smartest, best-trained people in the world. We can't afford to lose even one of you.

The past few years have been tough ones — hard on people, hard on aircraft. We've responded to flash points all over the world, while at the same time we had to cope with a great amount of turbulence generated by external and internal changes. While I do not anticipate any reduction in taskings in the foreseeable future, I do think we should start to see a more stable environment as a result of approaching a steady-state force structure, completing the current round of base closures and realignments, and bringing internally generated change to an end.

During the coming months and years, we will need every person and every weapon system to meet the challenges ahead. My solution is simple. I expect our Total Force — officers, enlisted, and civilians — to be diligent and professional, to pay attention to the task at hand, and to use common sense. That's my prescription for mishap prevention, and all I expect from you. ■

Our 51st Year

UNITED STATES AIR FORCE

# Flying SAFETY

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## SPECIAL FEATURES



## REGULAR FEATURES



### CONTRIBUTIONS

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DEPARTMENT OF THE AIR FORCE • THE CHIEF OF SAFETY, USAF

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# THERE I WAS

■ There I was, No. 2 of a two-ship air-to-ground sortie during a UTA. I had two bags of gas, but due to a late takeoff and a very quick turn — typical of a UTA — we had to fly a short mission.

On the way home, we found out that Navy was 600 feet overcast and 5 miles. Flight lead broke the flight up for separate PAR approaches. I was No. 2 for the approach and was trying to burn down some gas by lighting the burner and making high G turns with the boards out. I was, by the way, Victor Mike at this time.

My assigned altitude was 3,000 feet, and I was doing about 350 KIAS. I went idle and boards in preparation to put the gear down when GCA gave me a left-hand turn to final and a descent to 1,600 feet.

Immediately after starting the turn and descent, I went popeye. I wasn't sure about the new course for Runway 22. (This was right after the inbound courses for the TACAN approaches had changed.) So I looked down at the approach book to confirm the course and dialed it in. Then I reached for the gear handle and looked up at the HUD. Immediately my gyros tumbled, I didn't know which way was what, and I couldn't control my eyeballs well enough to read the instruments.

Now, I know what you're thinking. You're saying, "I've had the leans before," or "I've refueled inverted before." Well, this just ain't the same. I was totally out of control of my eyeballs, I couldn't focus on my instruments, and I was completely unable to determine my attitude.

This is not a comfortable position to be in. Fighter pilots like to be in control, and I was out of control. I perceived that I was in a very nose-low attitude, and I immediately and simultaneously applied full aft stick and selected full reheat. Then I moved my hand directly from the throttle to the ejection handle and preloaded about 25 of the 40 pounds required to activate it. At this time I believed I was going to either jump out, or die, or maybe both.

The first recognizable attitude I saw was 30 degrees nose down and 1,600 feet. I can't tell you what the airspeed was because I was still very disoriented. As far

as I knew, I could have been on the back side of a burner loop at that time. I focused on the altimeter and made up my mind to pull the extra 15 pounds on the handle if I saw 800 feet on the clock. My biggest thought (read as fear) at this time was that I was going to break out of the weather at 600 feet pointed straight down.

Well, I saw 800 on the clock, but by then I was beginning to recage, and I could tell I was only about 10 degrees nose down. So I stayed with the jet as it promptly entered a nose-high unusual attitude. I didn't mind this too much because the altimeter was climbing, and I had a clue about my attitude.

I let the jet climb for a while and then executed an instrument nose-high recovery. Then I flew around in the weather for 5 minutes trying to get ATC to understand what happened.

After I broke out of the weather, I was completely cured of my spatial disorientation, as expected. I went around for another PAR and landed uneventfully. When I got out of the jet, I was, no joke, shaking. I'm almost ashamed to admit it, but in my entire flying career (civilian and Desert Storm included), I had never been that scared.

After I got into the ops building, the guys who have never been in that predicament looked at me funny, and the guys who had been there congratulated me on surviving. A lot of pilots never live to tell this story.

Now, what did I do to get in this condition? Well, in talking with the human factors people at the safety center, I found out I did everything right — that is, if I wanted to get spatial disorientation. The turn, the deceleration, the descent, tilting my head, all caused my gyros to tumble. I think the HUD had a little to do with it also because I didn't really tumble until I looked at the HUD. Maybe my subconscious mind interpreted/misinterpreted the HUD attitude faster than my conscious mind, and when the attitude didn't match up with what the subconscious thought it should be, my somatosensory system went Tango Uniform.

So what did I do right? Well, let's look at each action.

- Full aft stick. It worked this time because I was right-side up. I could have just as easily been inverted, but when you don't know, the natural reaction is to pull.
- Full AB. I was below 300 KIAS, and I believe selecting the AB was a good idea.
- Grabbing the ejection handle. This is the one thing I feel best about. Later, it felt good to know I grabbed the handle by reaction. I can't recall thinking about reaching for it — I just did it. On the bad side, I told myself I was going to leave the jet at 800 feet, but I didn't. You can see how "just a little longer" can kill you. I was just lucky I had correctly interpreted my instruments that time.

Now I fly round dials a lot more, and I limit extreme changes in any parameters while flying in the weather. We don't like to talk about luck in the safety world, but in this case, I was lucky I saved myself and the jet. Be careful, and don't let the same thing happen to you. It just might not be your lucky day.

*Come on, y'all. If I can tell this story, you can tell yours.* ■

**Foddie**

## NEW FOD VIDEO

**■ Has your wing LST/MAT received the new FOD prevention video? If not, your troops are missing out on a very up-to-date and hard-hitting program for *ALL* aircraft maintenance, AGE, and munitions personnel. This 10 minute-program shows actual incident photos from several different aircraft reinforcing the importance of everybody doing their job in preventing FOD.**

**To order a copy, fax a letter to USAVIC/JVIA (at Tobyhanna PA) at DSN 795-6106, asking for PIN 612629, FOD Prevention.**

**For further ordering information, call DSN 795-7439. This program was released in October by the AETC Training Support Squadron at Hill AFB UT, DSN 458-0160. ■**

Our photo is 'Foddie', the mascot for the National Aerospace FOD Prevention Advisory Board.

# A-10

Combat Camera Photo by SrA Steve Thurow

**MAJ J.G. BEAUMONT, CAF**
HQ AFSA/SEFF

■ This past fiscal year was somber for the A-10 community. Final statistics for FY94 are four Class A mishaps, five aircraft destroyed, and one pilot killed. Our Class A rate for FY94 was 3.31 with a 4.13 aircraft destroyed rate. This is our worst A-10 safety record since FY80, 14 years ago, when we experienced a Class A rate of 3.84 with a 4.61 aircraft destroyed rate and four pilot fatalities.

The A-10 aircraft flew 130,159 hours during FY80 and 120,961 hours during FY94. Our FY94 flight mishap record is exclusively attributable to one accountable category (OPERATIONS) and various people reasons.

FY 94 proved that our greatest risk remains with our pilots performing day-to-day A-10 missions within arenas which require timely and sound judgment as well as precise execution. Flying fighters in the USAF is done by people, and people are highly subject to human errors. It is relatively easy to sit back at the hangar, or at some ivory staff tower, with hot coffee and 20/20 hindsight, and criticize the lackluster performance of fellow fighter pilots.

We must deny ourselves the summary judgment and execution of the unfortunate mishap aircrew. Above all, we must refrain from assessing our own ability, judgment, and airmanship as so outstanding we could never make such costly mistakes. If such is the case, I assure you that your overconfidence and/or complacency may precipitate the addition of your posthumous personal statistics to our ever-expanding USAF mishap data base.

Statistically, the AFSA bookies predict three A-10 Class A mishaps during FY95. This gloomy prediction does not account for increased deployed operations in support of our country's foreign policies as well as our continued expansion of A-10 night and NVG flying phases. The addition of these two new catalysts leads me to anticipate a total of four A-10 Class A mishaps during FY95.

## My Aim

The focus of this article is to provide you with information pertinent to the future safety of A-10 aviators. I will, therefore, not restate detailed mishap events which were already transmitted to you via other communication mediums. These mediums provide for a safe and more timely handling of privileged safety information. Should my skimpy description of events prove insufficient, see your squadron or wing safety officer who will gladly dot the i's for you. Expect micro event descriptions, lessons learned, and expanded suggested corrective action(s) where applicable.

## Events, Lessons, and Corrective Actions

During FY94, one A-10 crashed while attempting a night single-engine recovery at a diversion airfield, a midair destroyed two aircraft, a takeoff abort failed, and an A-10 collided with Mother Earth shortly after its pilot experienced unrecognized disorientation. Generally, judgment and preparation factors initiated the mishap sequence, sometimes forcing the aircrew into time critical, superior decision-making situations. As you might expect, there are no new lessons learned; mishap scenarios are repeats with new actors.

Loss of aircraft control under single-engine conditions has been a thorn in our side ever since 1977. Invariably, the initial in-flight emergency is handled expertly IAW the emergency checklist. The final stage of the actual or simulated single-engine approach or the go-around seems critical: Prioritize and manage tasks well to avoid channelized attention and maintain effective instrument crosscheck. To protect yourself and your jet, here are some of my suggestions:

■ Read the excellent A-10 single-engine operations article from the ACC *Combat Edge* magazine, September 1994, reprinted in this issue of *Flying Safety*, page 8. Major Joe Wallace from the 47 FS/DOV at Barksdale AFB, Louisiana, will pass on to you some valuable hints that could just keep your buns above alligator alley.

■ Have an external stores jettison plan prior to stepping to the jet.

■ Plan your single-engine recovery profile to avoid high power and large rudder deflection situations. Use excess altitude wisely. Make sure that recovering ATC agencies are fully aware of your predicament so they will authorize you to utilize your planned single-engine profile. Be persistent with your request, but be ready to accept something like: *"Negative HOG 31, you are No. 2 in the emergency pattern behind a lawn dart with no motor ..."*

■ Do not slow down to computed single-engine speed until landing is assured.

■ Take full advantage of the training opportunity afforded you every training cycle by executing all authorized practice simulated single-engine approaches and overshoots.

■ Be aware that if an A-10 is allowed to depart due to the asymmetric thrust during a single-engine situation, a minimum of 1,200 to 1,300 feet of altitude will be required to recover the jet. Plan your ejection accordingly.

One of the most critical coordination items for any kind of warfare is to deconflict the ingress route, the target area, and the egress route for all the elements of your strike and support force. Aerial warfare, with its three-dimensional premises, allows you a wide array of methods to effect this force deconfliction.

Proper deconfliction is your insurance against undesirable fratricide losses due to midairs and/or friendly fire. It is the key to mutual support and force effectiveness in both peace and war. Whatever the deconfliction method(s) adopted, it must be fully understood and flawlessly applied once airborne.

Once aloft, any deviation(s) from the deconfliction plan is/are only to be executed following a positive voice or data link acknowledgment from the controlling and affected elements of the force. When similar aircraft types are involved, we want to discourage discarding positive timing, altitude, or geographical deconfliction methods for a visual tally.

In summary, we aim to utilize the flexibility of air power during our preparation phase so that we will remain predictable to our friends and an enigma to our foes. My suggestions are:

■ As a supervisor, never task yourself at a level that will downgrade your situational awareness to a point preventing you from being totally aware of the effective execution of your portion of the battle plan so you can intervene in a timely manner if required.

■ As a supervisor, ensure all participants are fully conversant with adopted deconfliction method(s) as well as the procedures to follow to deviate from it once airborne.

■ As participants, no matter what was briefed, always remember you are ultimately responsible for deconflicting your own flightpath. Never assume it is provided for.

Effectively handling any takeoff or landing emergency in a single-seat aircraft requires forethought, training, knowledge, quick analysis, and swift execution. My personal experience shows that the MP's total flying time is not a mitigating factor. On the contrary, statistics demonstrate that an *old sweat* is more likely to mishandle such an emergency situation.

This pilot is likely to be a flying supervisor involved in a multiplane departure or recovery who has failed to devote all of his attention to the task at hand. Unwillingly, he will have allowed his attention to wander from his own cockpit to some personal or unit personnel problem(s). He will have also unknowingly neglected forethought and training in the days and weeks preceding the mishap due to an intense personal schedule. Remember to avoid these common takeoff and emergency handling faux-pas:

■ Not being mentally prepared to handle an emergency.

■ Attempting your takeoff or a go-around with improper trim setting(s), less than full power, or speed brakes out.

■ Attempting to land or abort your jet with full or more than idle power, speed brakes in, and mishandling the

continued

Combat Camera Image by PH2 Aguilar, USN

# A-10

continued

max-arrest system.

In the mid 1980s, the A-10 abort procedure was reduced from a critical action to a normal procedure in the emergency checklist. This action, jointly with the phaseout of all line A-10 simulators, has led us to insufficiently emphasize this procedure. The A-10 abort procedure will be returned to a bold face procedure. This will emphasize its importance and assure us of its formal review during our training cycles. To maximize your chance of survival and enhanced possibility of safely recovering the jet, I suggest that you:

- Develop a personal sequential corrective plan for all likely major emergencies from brake release to 1,000 feet AGL. Ideally, this plan must be a sequence of your natural chronological reactions to possible unforeseen event(s) during the takeoff phase. This plan must encompass all of the actions detailed in your approved checklist and be so logical that you can do a quick mental review of it prior to each and every one of your future takeoffs. My suggestion is that you include the following points and update them for the airport location, runway condition, and density altitude as well as single ship or formation operations:

(1) Your takeoff and immediately after-takeoff recovery data.

(2) Your actions in case of an unsafe canopy, an engine failure, or a fire while still in the ground abort range.

(3) Your actions in case of an unsafe canopy, an engine failure, or an engine fire once beyond the ground abort range, including your external stores jettison plan.

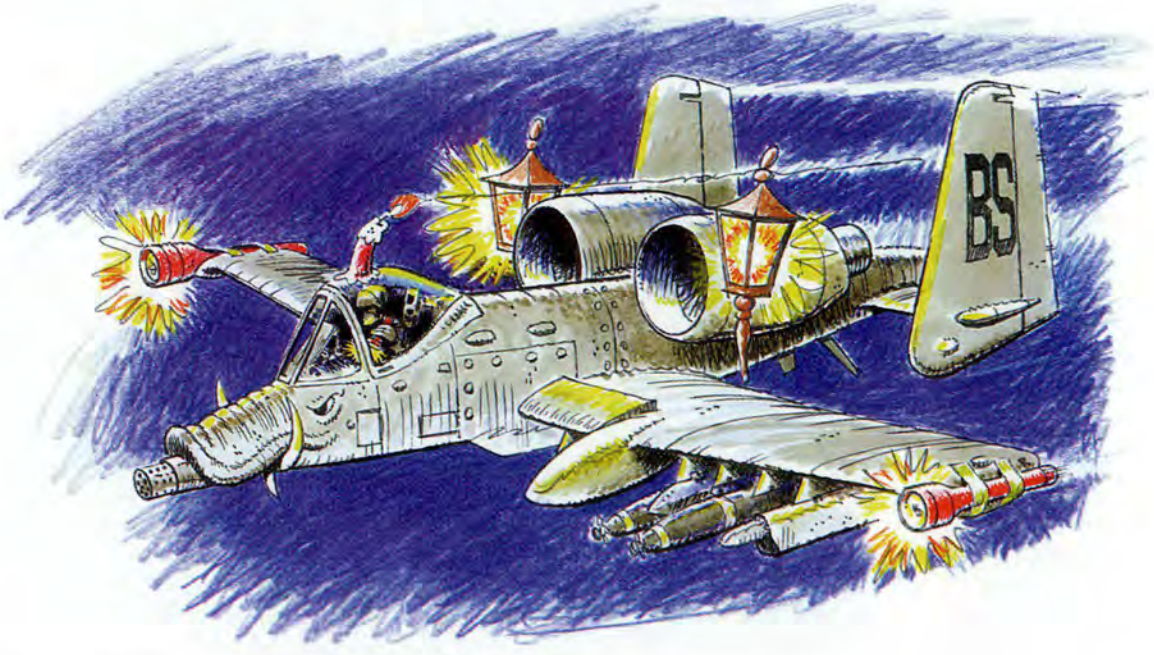
(4) Your actions in case of a low-level ejection.

Controlled flight into the ground has produced the most A-10 Class A mishaps and is the major killer of A-10 pilots. The addition of low altitude safety and targeting enhancement (LASTE) and its associated ground collision avoidance system (GCAS) has helped to markedly reduce this type of deadly mishap over the past 3 years. The A-10 GCAS is not a forward looking system. It uses the aircraft's radar altimeter, CADC, and INS data while assuming that the terrain is flat and that your energy state sits at 300 knots. This basic system has limitations due to a need for compromising GCAS predictive algorithms to balance the need for in-time-warning capability against the annoying false warnings.

Suffice it to say that the A-10 GCAS will occasionally, at airspeeds less than 300 knots, give the pilot a predictive warning from which a safe recovery cannot be effected. GCAS will be analyzed and further flight tested in the 250-knot speed regime. This will, hopefully, allow us to modify the GCAS algorithms so that this system provides us with more timely warnings in the low-speed regime (250 knots). It will also allow us to provide you with a much more accurate description of GCAS capabilities and limitations. This is at least 12 to 18 months down the road. Meanwhile, how can an A-10 pilot protect his life and his jet? Be aware of the following:

- The human inner ear sensory system is **totally unreliable** when you try to achieve or maintain a given attitude while carrying out a turn in an aircraft. Relying on this sensory system will readily create hazardous situations responsible for your premature graying and ulcers. Prolonged use will KILL YOU!!
- Once you elect to rely on your inner ear sensory system, 2 to 4 seconds is all the time required for you to inadvertently change your aircraft attitude from a safe level, or slightly climbing attitude, to a stick-in-the-gut, pull-as-hard-as-you-can, you-are-going-to-get-hurt-and-die aircraft attitude.

The majority of past fatal mishaps involved single-seat pilots initiating or attempting to initiate shallow climbing turns (45 to 60 degrees of bank and 10 to 15 degrees of climb) between 400 to 2,000 feet AGL. All of them wrongly assumed that this climbing attitude while turning would guarantee their safety while



they brought their heads into the cockpit or attempted to tally a bandit or wingman within a 40-degree cone of their rear hemisphere. The aircraft attitudes that sealed their fate were attained within 2 to 4 seconds. Those nonrecoverable aircraft attitudes were between 90 to 125 degrees of bank, with their noses buried 12 to 45 degrees below the horizon.

The only sure way for a single-seat pilot to clear his flightpath and maintain a given attitude while turning is for him to constantly cross-reference his nose attitude against the actual horizon or artificial horizon (preferably through a HUD) while constantly scanning towards his new flightpath.

NEVER, NEVER, NEVER rely on your inner ear sensorial system to keep you alive while flying. It is totally inadequate.

NEVER, NEVER, NEVER focus your visual and mental attention into your cockpit while turning.

Loss of control while flying the A-10 under simulated or actual single-engine conditions, midair collisions, and controlled flights into the ground, during day VFR conditions, have cost us dearly in the past as a result of loss of situation awareness and some form of pilot disorientation. The expanding night and NVG A-10 mission will further reduce our available outside visual cues as well as the effectiveness of our human visual acuity. As a result, all A-10 aircrew will be much more prone to all forms of disorientation which, in turn, will drastically increase our risk of a Class A mishap and a pilot fatality.

What you must ask yourself is not *Am I going to experience disorientation?* but rather *What can I do to prevent the onset of disorientation and/or minimize its effect? Where and when is it going to happen to me, and what am I going to do when it hits me?* **Remember that *STAYING ALIVE* is the prime directive.**

Safe ejection under most of the above-mentioned conditions will likely require ejection initiation within a maximum of 2 to 5 seconds of your aircraft entering an unrecognizable or unrecoverable attitude below 2,000 feet AGL. Answer these questions before flight:

Combat Camera Image by PH2 Aguilar, USN

You just pulled out of a 15-degree night dive attack and are rolling out onto crosswind. You look back for your wingman and then visually confirm your radio selections. As you move your head forward again, evil is about to test you. Your personal gyros have toppled, and your body (its sensory system) is attempting to convince your brain that you are in a 30-degree dive inverted with the earth coming up at you. Your HUD and A/Is have you straight and level. Which one do you trust and how will you react?

- You confirm your aircraft attitude as 30 to 40 degrees nose down, airspeed 260 knots, and your altitude as 1,200 feet AGL. What do you do during daytime? Is this same action viable at night?

In summary, I believe that night and NVG A-10 missions will be extremely challenging and hazardous. To enhance your survival chances, you must take time to reflect upon its many demands and devise your personal code of conduct. A mistake or an erroneous assumption made at night is usually insidious. It is much more difficult to spot, analyze, and correct due to less defined visual cues, a reduced field of view, and/or extremely strong and erroneous inner ear sensory inputs. Being fully aware of forthcoming hazards and your personal limitations as well as being duly prepared for any disorientation scenario is the key to your survival. Establish now, while on deck, the extreme emergencies and/or disorientation circumstances that will warrant you to jettison the jet and effect a silk letdown.

We feel bad when we hear that an A-10 has been destroyed due to a preventable mishap. We feel awful when we learn that a fellow fighter pilot was fatally injured in the process. Let's minimize our loss of airframes and nullify our loss of pilots in 1995.

I welcome and need your comments and concerns. They allow me to serve you better. Being removed from the sharp end causes me, at times, to feel like I am driving down some interstate with an opaque windshield and side windows. This forces me to rely exclusively on a rear-view mirror (accident and incidents reports) for my guidance. Receiving your comments and concerns allows me to acquire a tally on a problem prior to merging with it. Please help me be proactive and offensive. My coordinates are as follows: AFSA/SEFF, 9700 Avenue G SE, Kirtland AFB NM 87117-5670; or phone commercial (505) 846-0737, DSN 246-0737; or FAX: DSN 246-2721 or 2710; E-MAIL: beaumonj@smtps.saia.af.mil

Your overall mission accomplishment rate for FY94 was 99.992725 percent, and you generated approximately 54,982 successful sorties. My sincere congratulations to "U-ALL." My best wishes to you and your loved ones for 1995. ■

# A-10 SINGLE ENGINE OPERATIONS

**MAJ JOE WALLACE**
47 FS/DOV
Barksdale AFB, Louisiana

■ They teach us in Total Quality Management training that there are no bad people, just bad processes. Well, then, folks, we must have a bad process in the A-10 community when good, experienced pilots let otherwise flyable single-engine Warthogs hit the ground.

Hog drivers know the problem (single-engine operations) has been with us since we've had the A-10 and that the most critical situation is a one-engined beast on a hot day in the landing configuration or just after liftoff with the gear still down. Asymmetric thrust and the yaw it generates are the natural and mortal enemies of the Warthog. Airspeed, or the lack thereof, negates or amplifies the danger of these enemies.

Every section of the A-10 Dash One dealing with single engine operations carries a warning that states: **"... failure to use sufficient rudder ... can result in large sideslip angles and yaw rates. It is possible to create a condition where the yaw rate becomes so high that there is insufficient rudder available to correct it, and the aircraft will depart controlled flight."**

Despite this emphasis, and numerous comings and goings over the years of critical action procedures dealing with controlling yaw, we are still having single-engine Hogs hit the ground. It seems the typical crash is not an engine failure on takeoff, but a previously flying Hog that gets away from its driver. Why? It sounds like a basic airmanship problem, right? We all know the way to keep the nose pointed in the right direction is to mind the rudder.

I think I know what the problem is, and those of us in the Stan/Eval community share a large portion of the blame. The root of the problem is not a lack of airmanship but a misplaced emphasis on rudder control over airspeed in single-engine approach situations.

In takeoff engine failure situations, we know that gaining airspeed is the key — we jettison stores and disable temperature control on good engines to help us go faster. The Dash One also has several admonitions about gaining a minimum speed of 150 knots to enhance yaw control and climb capability.

If you want to aggravate your single-engine rudder control problems in the A-10, just get slow. As the warning quoted above indicates: The slower you go, the more rudder you need. The more rudder you use, the more drag you create. The more drag you create, the more thrust you need. The more thrust you need, the more rudder ... well, I think you get it.

The cure for the problem is to not get slow! And that is where the process is broken in the single-engine Hog arena. For single-engine approaches, our Dash One says, **"Fly no-flap approach at 150 KIAS plus 1 knot for each 1,000 pounds of aircraft gross weight over 30,000 pounds until landing is assured."** There are many references about rudder forces and effectiveness, but that reference is the only one about


Combat Camera Photo by SrA Steve Thurow

airspeed.

While there are many references to the bad things that can happen to a Hog driver who fails to use enough rudder, there are no references to what can happen if he fails to use enough airspeed. In fact, those of us in the Stan/Eval and instructor world have grabbed hold of the **"fly no-flap approach *at* 150 KIAS ..."** and turned it into a mantra. Over the years, we have developed it into a precision maneuver and expected our examinees and A-10 students to establish single-engine landing configuration and airspeed prior to the final approach fix on an instrument approach and hold it with great precision.

Wrong, Hogbreath!

The expression "speed is life" is never more true than on an A-10 single-engine approach. It is, by definition, a nonprecision, emergency event, and our emphasis should be on a controlled approach that can be landed from (and then stopped from), not precise plus or minus airspeed control from 9 miles out on final.

We should warn Hog drivers not to be stingy with airspeed on single-engine approaches for the same reason we already warn them to be generous with the rudder. Okay, we'll take care of that with a trusty AF Form 847. It seems the bone of contention is the word **at** in the phrase **"... at 150 ..."** Let's make it say ... **at a *minimum* of 150 . . . until landing is assured."** Then we need to move on to the bigger problem of our misplaced emphasis in the Stan/Eval and instructor worlds.

Even if we are not successful in getting the Dash One changed, we should not be writing up examinees and students for holding extra airspeed on final on a simulated single-engine approach. If the pilot can fly a controlled approach above 150 KIAS and then use available drag devices to slow to normal touchdown speed once "landing is assured" as our Dash One now allows, he should be congratulated for using the common sense and basic airmanship he was issued.

I can hear the Jurassic Hog driver's objections to the more-speed-on-final idea now. They are as old as the A-10 and usually come in two flavors: "Some lieutenant will fly final at 200 knots and run off the runway," and, "When you do it for real, you'll be landing on 5,000 feet of wet autobahn." Both objections are wrong and helped us get where we are today.

Many experienced Hog drivers have forgotten or misplaced the current emphasis in our Dash One on slowing from single-engine approach speed to normal touchdown speeds and using available drag devices once landing is assured. One thing no Hog driver will argue about — THE A-10 KNOWS HOW TO SLOW DOWN IN A HURRY!

When the Hog stuff has hit the turbofan, we need all the help we can get. But, if we are flying our single-engine approaches with no margin for error, it becomes more likely we will make one. ■

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Courtesy *The Combat Edge*, September 1994.


USAF Photo

**LT COL KARL-HEINZ ASCHENBERG, GAF**
HQ AFSA/SEFF

## Looking Back

■ On the memorable day of 27 May 1988, the thirtieth birthday of the F-4 Phantom, of which 5,068 were produced (not including the 133 jets produced under license in Japan), about 1,300 were in service with the US Air Force. These 1,300 aircraft produced 253,486 hours flying time in that year. For FY94, I counted 106 of the PHABULOUS PHANTOMS and 26,000 hours for the F-4 fleet USAF-wide. Mental dead reckoning tells us that you professionals out there produce around 50 hours more flying time per aircraft per year today than in 1988.

FY94 brought a lot of deployments and changes for the F-4 community. Without favoring any, let me just mention a few.

## F-4G Wild Weasel

The F-4G Wild Weasels out of the 561 FS, Nellis AFB, have been continuously deployed since August 1990. The air and ground crews launched missions in support of both PROVIDE COMFORT and SOUTHERN WATCH operations. Supporting these deployments are highly motivated and extremely dedicated maintainers. The average F-4G aircrew flying out of the 561 FS has 1,750 flying hours, 260 combat hours, and 80 combat missions. The quality of maintenance, paired with this kind of flying experience, made it possible — the F-4G has flown mishap-free since the end of the Gulf War.

The second Wild Weasel leg is based at Gowen Field, Boise, Idaho. The 124 FG looked at similar deployment rates. Coming out of Red Flag, they supported Operation SOUTHERN WATCH in the first half of 1994. Assignments to TAC ACES, Red Flag, and Utah Tactical Training Range (TTR) followed rapidly.

Sadly, February 1994 also saw the last F-4G fly out of Spangdahlem, Germany (52 FW).

## RF-4C

The 152 RG RF-4 "HIGH ROLLERS" out of Cannon IAP, Reno, Nevada, were also busy in FY94. They deployed to Europe (Denmark), participating in the Coronet Apollo Exercise and supported the Navy CFT during exercise Roving Sands. Photo interpretation personnel and equipment were deployed for Operation SUPPORT HOPE and used in support of Operation OPEN SKIES. RF-4s from Reno supported PACAF Special Operation Forces in Hawaii and Drug Enforcement Agency operations in the CONUS.

One unit we will miss in the F-4 community needs to be recognized. On 26 May 1994, the last RF-4C of the 117 RG was flown to Davis-Monthan, Arizona. The proud and long history of the now 117th Air Refueling Wing had to make a drastic heading change in 1994. In February 1971, the 117 RG became the first Guard unit to receive the RF-4C Phantom II. During DESERT SHIELD and DESERT STORM, the 117th's collective skills, determination, and professional attitude proved vital to the success of the tactical intelligence gathering.

On 4 June 1994, the first KC-135R aircraft arrived at Birmingham, Alabama, and the 117th Air Refueling Wing began its new mission. Congratulations to you all for a job well done in the past, and best

**FLIGHT MISHAP** Figure 1

**as of 30 Sep 94**

| | Class A | | Class B | |
|---|---|---|---|---|
| | No. | Rate | No. | Rate |
| All F-4s | 1 | 3.99 | 0 | 0.00 |
| F-4G * | 0 | | 0 | 0.00 |
| RF-4C | 1 | 16.35 | 0 | 0.00 |

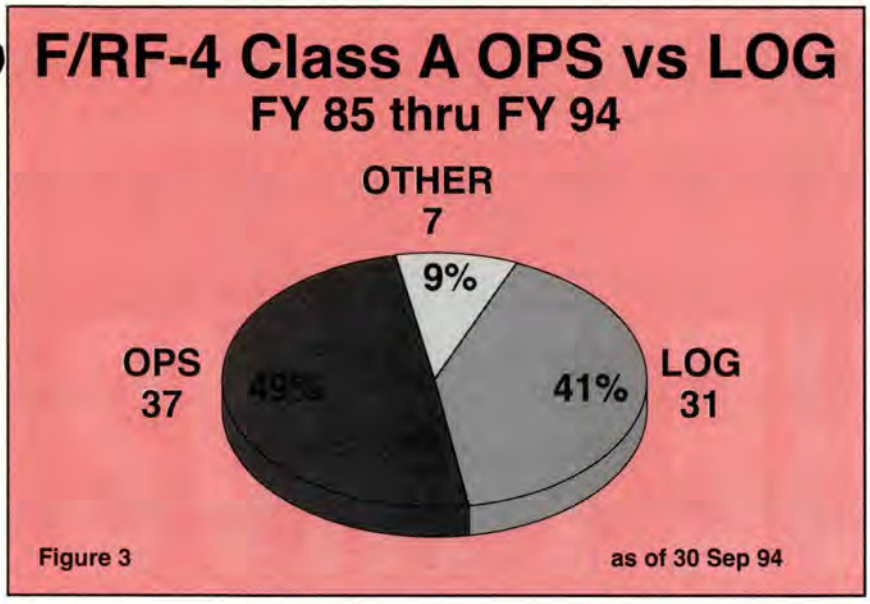
* One F-4G Class B flight mishap with missile involvement not included (nonrate producer).

USAF Photo

Figure 2
**FLIGHT MISHAP CLASS A**

| FY | OPS | LOG | UNDET |
|---|---|---|---|
| 88 | 3 | 4 | 1 |
| 89 | 4 | 1 | 1 |
| 90 | 7 | 5 | 1 |
| 91 | 2 | 2 | 0 |
| 92 | 0 | 0 | 0 |
| 93 | 1* | 1 | 0 |
| 94 | 0 | 1 | 0 |

* Nonrate producer F-4G




for a safe and successful conversion to the new aircraft.

### F-4E

The 20 FTS plays a quiet, but vital, role in the south of New Mexico at Holloman AFB. Without deploying as much as other F-4 units, they operate together with the 1st German Air Force (GAF) Training Squadron's 21 F-4Es. The 20 FTS is providing basic F-4 training for GAF pilots graduating from Euro NATO Joint Jet Pilot Training out of Sheppard AFB, Texas, and host two Fighter Weapon Instructor Courses per year for experienced GAF F-4 aircrews.

The F-4 community (like everybody else in the operational Air Force) had a very busy year, and the operations tempo did not, and does not, seem to slow down. We did not have our best year ever, but we did pretty good considering the circumstances of FY94 mentioned above.

### FY94 in Review

Air Force-wide, we have to attribute about 60 percent of our flight mishap losses to operations causes. Looking at the F-4 from FY85 to FY94, we are doing better, particularly in recent years.

Although we achieved a steady improvement, the average 49 percent operations factors for the F-4 is still too high. (See figure 3.) I firmly believe that supervisor involvement — particularly at the squadron level and below — is a key element to prevent a majority of the operations factors. There are enough rules and regulations to cover what we are doing.

What we need to do as supervisors at all levels is to know what is going on. Know your people, know their true performance, and know what is bugging them. We need to get involved in the daily operational routine and maybe reorganize our priorities. "Do the right things right." The Air Force is improving or implementing new tools to help us manage the different tasks of today. CREW RESOURCE MANAGEMENT and OPERATIONAL RISK MANAGEMENT are two which should become part of our way of doing business in the near future.

Even though the official statistics show only one Class A for the F-4, I'd like to talk about three mishaps which occurred in the F-4 community. Remember, this is done only to learn from unfortunate events so as to avoid a similar recurrence. My discussions of mishap details were derived from the releasable AFR 110-14 (now AFI 51-503) accident investigation reports.

### Catastrophic Engine Failure

A two-ship took off for tactical low-level training, including aerial photographic reconnaissance. Approximately 30 minutes after takeoff, while flying in a tactical line-abreast formation, the mishap aircraft became engulfed in flames, impacted the ground, and was destroyed. The weapons system officer ejected and landed about 300 yards from the crash site. The pilot did not survive.

From the investigation, we learned that one of the engines experienced a catastrophic combustion case failure. Laboratory investigation and metallurgical evaluations revealed that a duct attach point on the combustion case had inadequate welds. Fatigue began from these weld imperfections and progressed to a point that the combustion case failed. After the mishap, all affected combustion cases underwent a special magnetic particle inspection (MPI) or were taken out of service. Improved MPI procedures were also incorporated into tech orders and work cards.

Aside from the engineering lessons learned, we are once again reminded that our job is inherently dangerous. Due to the explosion in the engine, the aircrew were thrown against the side of the cockpit with extreme force and had only 11 seconds from the first indication of the malfunction until ground impact.

Particularly when flying in the low-level regime, we need to realize there may be no time for the three-step "perfect" solution:

- Maintain aircraft control,
- Analyze the situation,
- Take proper action.

Let's take a look at our emergency procedure training and realize the typical situations we give ourselves. They are well set up, conclusive, and nearly always have no limit on the time available factor. Definitely good for ground training, but they could be spiced up once in a while. Add some dynamics to your scenarios, and set a time limit like 20 seconds until ground impact or a closure rate of 1,500 feet/second. Including the time factor in realistic scenarios tailored to your typical mission will demonstrate that sometimes there is a one-

continued

continued

step "perfect" solution:

- Maintain aircraft control and/or eject.

### Unintentional Release of Training Weapon!

The mission was planned as a single ship cross-country. During the cruise portion of the flight, while testing the weapon system, a training missile was unintentionally released.

Several factors contributed to this mishap. A self-imposed time limit for takeoff, an unnecessary configuration for the planned mission, and a minor discrepancy on the aircraft forced everybody involved to work under a time constraint. Inadequate communication between the aircrew resulted in an imperfect preflight allowing the carted configuration of the training missile to be missed.

One lesson I have learned from nearly 30 years of service experience is:

*If you have a stuck gas pedal on a runaway car, passing 50 mph, it is not the time to analyze the big picture and wait for 80 mph while fighting the next street corner. It is time to turn the engine off and jump on the brakes.*

And sometimes we, as aircrew, have to do it because we are ultimately responsible for the safe conduct of the flight, the aircraft, and all people on board.

Taking responsibility for a late takeoff or a cancelled cross-country would be a better choice than allowing a situation to "accelerate" until a mishap occurs.

### Uncommanded Ground Ejection!

This very unfortunate incident has something in common with the previous one. It's a situation we face in our job frequently — a task needs to be done, and there is not much time to do it. There are both perceived time pressures and real time pressures such as needing to take off in 30 minutes or the tire needs to be changed now because the aircrew will be out here soon.

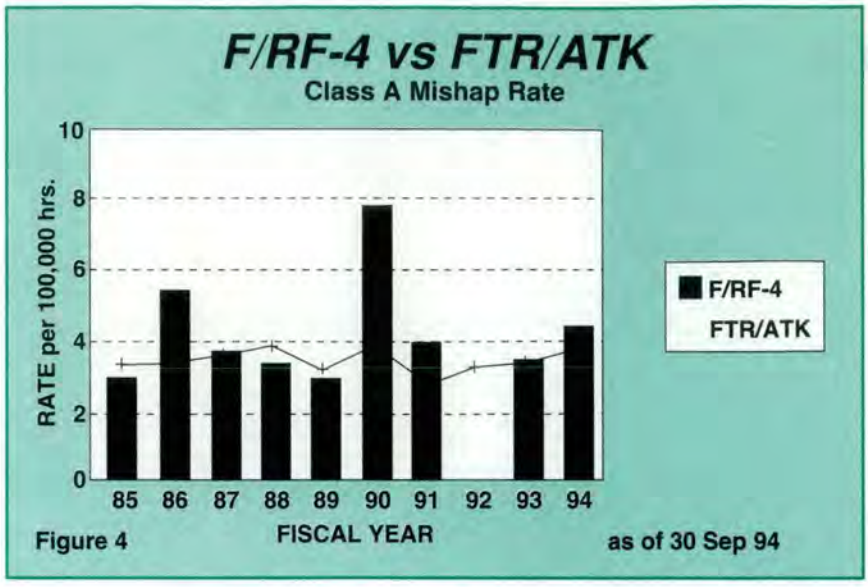


Figure 4

After completing a normal refueling procedure, the REFUEL/DEFUEL switch was inadvertently left in the "On" position, causing the battery to drain dead. This necessitated an unscheduled battery change, removing the aircraft from the scheduled takeoff time and projecting it for a late-afternoon sortie. Three crew chiefs were tasked to change the battery to meet the proposed takeoff time.

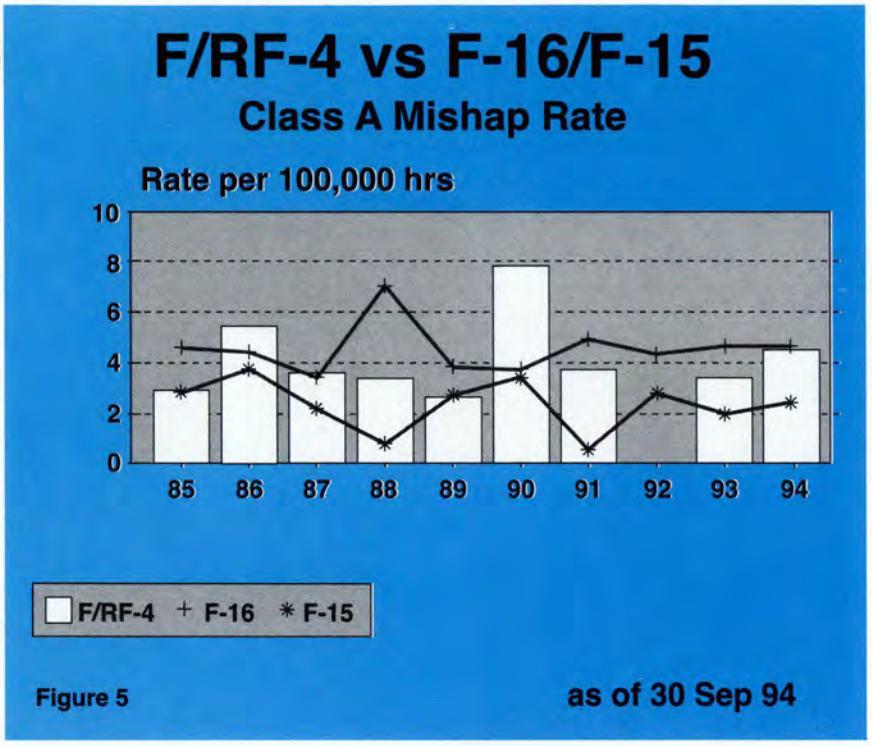
During the battery change, the rear ejection system fired, ejecting the seat upward through the open canopy and out of the cockpit. One crew chief, seated in the cockpit when the seat fired, was fatally injured. A second one was badly burned but able to jump from the aircraft intake to escape the seat rocket blast.

The F-4 battery is located in an awkward position in the rear cockpit, down beside the right rudder pedal, behind the right-side instrument panels. Normally, the aft seat is lowered all the way down to remove the battery. However, since the battery was drained and no electrical power was available, the seat could not be moved and stayed in the "Up" position.

Next, the No. 7 circuit breaker panel (CBP) was released, but electrical connectors were not disconnected and, therefore, the CBP was not removed from the aircraft as stated in the tech orders. With the new battery installed and electrical power available, the aft ejection seat was lowered. Arcing and heat from the No. 7 CBP terminals ignited the ejection seat rocket motor, and the ejection system inadvertently fired.

There are some lessons to learn from this mishap. First, don't take shortcuts when performing work at or around aircraft — your life or another's could depend on the quality of your work. Second, correct those "normal" procedures that violate tech order guidance. Third, you should follow technical orders to the letter. They are written to give us guidance to perform a task safely and efficiently.

Tech orders are upgraded and revised when technology changes, parts get modified, or when unfortunate mishaps teach us to change the way we do our job. Another reason to change a tech order is experience — experience you get out in the field, on the flightline, or in your office, when you notice that procedures in tech orders are difficult or impossible to follow and could be improved. As a professional, you are responsible to submit an AFTO Form 22, or if you want to change a flight manual, fill out an AF Form 847. I challenge you as experts to take the time and participate in the way you perform



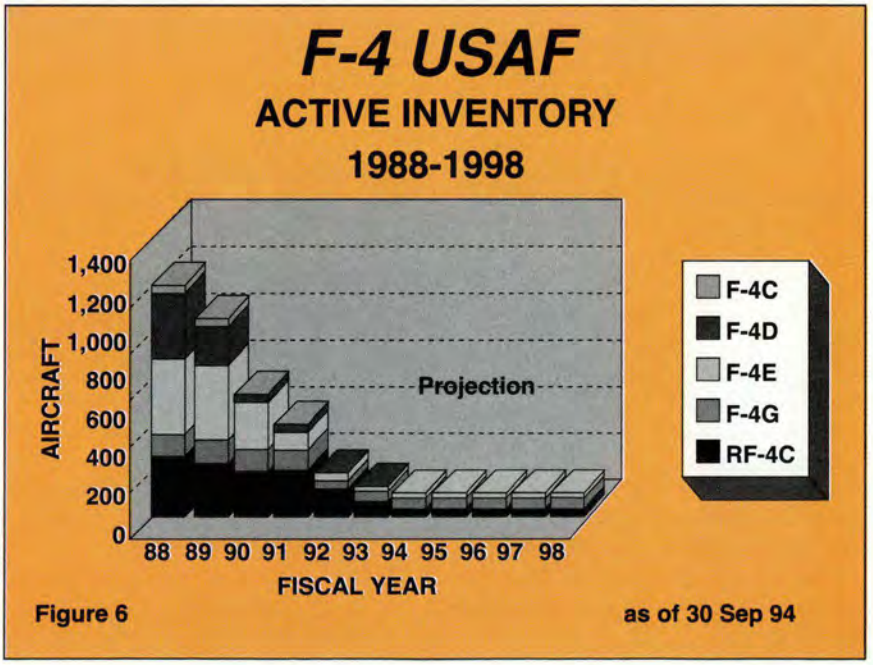

your job. You might save a life.

Concerning the above mishap, appropriate changes have been made to TO 1F-4G-2-13, and a new egress familiarization audio/video presentation will be implemented.

### Nice to Know

Over the years (1963-1994), the USAF lost 516 F-4s during peacetime operations and nearly the same amount in the Southeast Asia theater. With these 516 destroyed F-4s came the unfortunate experience of 593 Class A mishaps and the loss of 544 lives. For the ones among you who track ejection data, we show 750 ejections with the Martin-Baker seat. The success rate of 81 percent is not quite as good as the ACES II seat of the F-15/F-16/A-10 which stands at 91 percent.

Figure 4 compares the F-4 to the fighter/attack world in FY94. How we are doing compared to a fighter system of the third or fourth generation is shown in figure 5. Looking at a modern, *twin*-engine (F-15) fighter, we could improve. A reason for the higher F-4 mishap rate over the years is, to my belief, the dual-man concept. A breakdown in crew coordination/crew concept, a reliance on the second man — waiting for the second man to make a decision — has contributed to quite a few F-4 mishaps. The second curve compares us to the F-16.




### Summary

What lies ahead for the F-4 community? Figure 6 gives you the active F-4 USAF inventory and the prediction until 1998. I believe we will stay with these numbers for a while. The RF-4C and the F-4G Wild Weasels are very much needed. No other aircraft at the present time can do their mission.

Every sortie we produce must be viewed as if it is the last valuable mission ever being launched. This requires professional work on all levels involved in flying operations. Some areas, however, require special attention:

- The operations tempo and the direct effect on the people we are responsible for.
- Discipline in the air and on the ground to ensure we stay with published procedures until they are proven wrong and are changed.
- Crew resource management and operational risk management as integral parts of every task we perform.

I'd like to leave you with five words which are key in keeping an aging fleet like the F-4 Phantom safely airborne:

***Communication,***
***Information,***
***Understanding,***
***Discipline, and***
***Participation.***

One more time I salute all of you out there. Congratulations on a job well done in FY94. TAKE CARE, FLY SAFE, AND MANY HAPPY LANDINGS. ■


# F-15 EAGLE MISHAP REVIEW '94

**LT COL KEN BURKE**
HQ AFSA/SEFF

■ FY94 was an "average" year in the F-15 community from a statistical safety standpoint. With 212,914 hours flown, we had four accountable Class A mishaps for a 1.88 rate (mishaps per 100,000 hours). This is slightly higher than last year's rate of 1.38, with three mishaps over 217,547 hours. The overall USAF fighter/attack rate for '94 was 3.36. The '94 stats compare favorably against the last 12 years' historical rate of 2.05. That's 49 F-15 Class A's over 2,385,349 hours flying time.

The Class B numbers again were higher than the overall fighter/attack rate. We experienced three Bs for a 1.38 rate. Although this is above the fighter/attack rate of .62, it is an improvement over last year's F-15 rate of 2.3.

For those few who have not memorized AFI 91-204, let me try to summarize the flight mishap definitions.

**You have had a Class A when:**

- Reportable damage is $1 million or more.
- Fatalities or permanent total disabilities are involved.
- The aircraft is beyond economical repair.

**A Class B is:**

- Damage above $200,000, but less than $1 million.
- Permanent partial disability injury.
- Three or more persons hospitalized.

**Flight Class Cs include:**

- $10,000 to $200,000 damages.
- A loss of 8 hours or more.
- In-flight fires.
- Loss of thrust sufficient to maintain level flight at a safe altitude.
- Flameout, engine failure, or emergency shutdown anytime between attempted engine start and shutdown.
- F100-PW-100 engine stalls during non-AB, nonmaneuvering flight.
- Flight control malfunctions resulting in an unexpected hazardous change of flight attitude, altitude, or heading.
- Unintentional departure from controlled flight.

"Holy @*&#!" you say, "That covers a lot of stuff!" Right. So why don't we report the Class C rate in the stats? First, because we don't track Class C *rates*. Second (most importantly), because the *causes* of these events are what is important for the data base (not the rates), and we would not want to discourage any unit from reporting a Class C in the false belief that it may make them look bad in the proverbial shower.

## The Mishaps

Here's a really brief look at the four accountable Class A's this year.

- On a 2 v 2 sortie, the pilot experi-

Photo by Sgt Chris Putman

enced engine problems, confirmed by voice and light warnings. Following Dash One procedures, he shut down the engine and began recovery. While en route to base, the other engine's AB burnthrough warning triggered. Then things started getting bad. The pilot was barraged with an almost continuous cockpit light show, accompanied by Betty's soothing voice. Nonetheless, he was able to land the jet and safely ground egress. A cracked disc lug liberated the fan blade through the engine case, cutting a high pressure oil line. The oil ignited from titanium sparks, and the fire spread. The cost to repair exceeded the $1 million threshold.

■ During a mil-powered takeoff, the pilot encountered major controllability problems right after gear/flap retraction. The aircraft went through a series of significant roll excursions while the pilot attempted to maintain control and gain altitude. The problem deteriorated to the point where the pilot had to eject, landing unharmed in a tree. The jet did not. It had suffered a flight control problem, but the exact failure was not conclusively identified due to the extent of damage to the wreckage.

■ On a BFM sortie, very nose low over the water, the pilot made the decision to eject. At the relatively high speed that he exited the aircraft, he suffered significant flail injuries. G-induced loss of consciousness may have been one of the factors involved in this mishap.

■ Post-merge during a large-scale exercise, one Eagle Driver had a midair with an adversary aircraft. Both aircraft, and worse, the other pilot, were lost. No matter how many times we preach to others to keep "craniums on a swivel," "belly check," or "check six," there are times when a split second can make all the difference in the world.

■ Twice, in this soon-to-be award-winning article, I have referred to the Class A rate as "accountable." And the reason is not all of our real losses are attributable to the F-15 weapons system. This typically is the case of a midair between dissimilar aircraft.

In the bean counting, only one aircraft type is listed when compiling stats. I have tried to track this down for rhyme/reason/WOM. If one aircraft clearly is identified as the major contributor early in the investigation, then they "buy" it. Otherwise, it's subjective.

So where this is leading to is that in addition to the four accountable mishaps, we also were involved in another midair that shows up in a different aircraft's stats. Nonetheless, we did lose an aircraft. The bad part — really bad part — is that we lost another Eagle Driver. In this case, both of the pilots were aware of the other's presence, but the Big Sky Theory failed.

### The Class B Mishaps

■ On a test mission, a wing pylon support rib failed during a loaded roll maneuver. The wing tank and pylon separated from the aircraft, causing damage to the wing as it left.

■ Two more bird strikes to F-15Es this year caused Class B damage. On one, an approximate 2-pound buzzard went down an intake, eventually requiring the crew to shut down the engine. With plenty of thrust still remaining, the crew safely landed the aircraft, and it was repaired. The second Class B-producing bird strike happened when a duck hit near the canopy bow, shattering the canopy and causing damage to several other areas of the jet. The pilot diverted to an emergency field and landed safely.

### Other Stuff

What are the concerns this year? Same as usual — engine problems, midairs, and loss of control.

The engine manufacturers are working the problems aggressively. Obviously, the fixes aren't easy or quick (or cheap). In the meantime, it looks like a heavy inspection schedule for the maintainers is an unfortunate fact of life. The fliers can help by making sure they adhere to the ops limits, and when they detect abnormalities, write them up thoroughly.

I have no "pearls of wisdom" to prevent another midair. Each of us has the responsibility every time the canopy comes down to adhere to the training rules and look out for the other guy.

It appears that the rate of loss-of-control occurrences has decreased since last year but they have not been eliminated. Some response from the field says the change in the way the stabs are rigged has helped reduce the Bitburg roll. Hopefully, the emphasis on advanced handling characteristics has paid some dividends too. We cannot afford to reduce our vigilance in this area, though. Again, good writeups and debriefs after flight control problems will help maintenance do their part.

Well, folks, I'm Bingo words, and the computer is smoking from my Mach 2 typing speed, so I'll be signing off. Keep up the good work out there as you patrol the world. I sincerely hope that next year's article can boast of zero fatalities. Fight's on! Check six! (And twelve!) ■


USAF Photos

# F-16 YEAR IN REVIEW

**MAJ WILLIAM N. WAGNER**
HQ AFSA/SEFF

■ After a rip-roaring start and a significant midyear jump, we ended FY94 just about average for the last 10 years at 17 mishaps for a 4.24 Class A's per 100,000 flying hours. Good job on the end-of-the-fiscal-year finish with only two mishaps in the last 3 months.

## The Stats

So how did we actually do this year? Although the number of pilot **fatalities** (three) matched the lowest since 1982, this success was overshadowed by the worst year, by far, in other fatalities (the Pope AFB disaster where 23 Army troops were killed).

Here is the way the mishaps fell out this year in the various categories. The chart below gives us a comparison.

| | CLASS A | | DEST. | FATAL | | |
|---|---|---|---|---|---|---|
| | # | RATE | # | PILOT | ALL | HOURS |
| FY94 | 17 | 4.24 | 15 | 3 | 26 | 400,902 |
| FY93 | 18 | 4.15 | 18 | 4 | 5 | 433,960 |
| 10 Year Avg | 16 | 4.27 | 15 | 4 | 8 | 358,000 |

We passed the 4-million-hour point for USAF F-16s this year.

ANG had the lion's share of Class A mishaps with eight, followed by five for ACC, three for USAFE, and one for PACAF.

For **phase of flight**, three occurred during the air-to-ground phase while five involved air-to-air maneuvering. Two Class A's happened during the takeoff phase while three happened on landing. Two mishaps involved procedures.

Two mishaps occurred during **IMC** conditions. Only one happened at **night.**

On all ejection attempts this year, the **ACES II** worked as advertised, maintaining its impressive 93 percent reliability in the F-16.

In the **Class B** category, we had one mishap for a 0.25 rate.

We had 107 **Class Cs**, 30 **HAPs**, and 22 **Physios** that made it into our database for a rate of 28.6 per 100,000 flying hours.

So much for the laundry lists. More importantly, what does the data tell us?

## Mishap Review

For the past 10 years, the ops and log mishaps have been fairly even. This year was a significant departure from that trend. We had 12 ops-caused mishaps and only 5 log-caused.

All of the **log** mishaps were **engine**-related. "Black February" put the focus on the engine fleet at large with tasking from the Chief of Staff to investigate the nature of the mishaps and what could be done to avoid future occurrences. There were three F110-100 mishaps — one in the F110-129 and one in the F100-220 for the year. The engine mishaps themselves are referenced in the accompanying engine article.

The trend in engine-related mishaps is not out of proportion compared to other years. We are still having many other hardware issues showing up in Class B, Class C, and quality deficiency reports.

A Class B and several Class Cs highlighted the fact that "3 green" may not be what you think. A tiger team is addressing all of the issues with the **gear** to include wear limits on the bushings, the design of the gear handle itself, and the drag brace assembly. Finally, Class Cs highlighted the overcurrent sensing contactor (OCSC) as a cause of bus cycling in the Block 40 jets. A TCTO has been sent to the field to remove the bad actors from the applicable positions.

We have seen a big jump in the **ops**-related mishaps this year. This is possibly an indication of the increased ops tempo. Midairs have taken a significant upturn and have focused attention on the straight-in simulated flameout (SFO) pattern. Lessons learned: First, make sure everyone knows where you are in the pattern; second, accurately define your position; and third, make sure applicable personnel are familiar with unusual maneuvers such as straight-in SFO approaches.

Aside from the two midairs that are on the F-16 books, one additional midair with an F-15 was logged against the Eagle stats. Two near midairs also occurred, causing us to look hard at the rules of engagement (ROE). The good news is that the ROE remain intact, but now is a great time to reevaluate personal limits. If you have not flown high aspect BFM

for a while, then 2 miles might be a better distance to terminate that last 9M attempt. That gives you some room (not much) for "slow fingers" in the end game and more time to avoid hitting the other guy.

Other lessons we relearned this year:

Gas remaining in the tank is a whole lot less stressful and easier to explain than the quiet ride home. The latter is not the recommended road to enlightenment.

In the **collision-with-the-ground** category, cockpit duties done at low altitude require being straight and level. Although turns take up only a small percentage of the time at low level, a far greater percentage of mishaps involve turns at low altitude. Prioritize to your highest threat.

Under the **checklist discipline** category, center up the rudder trim prior to takeoff. The combination of a slight asymmetric configuration, a light crosswind, and the rudder trim off center in the wrong direction could combine to cause a mishap. Remember that the angle-of-attack probes can ice up and still move freely. It doesn't cost any JP-8 to turn on the pitot heat if icing is even slightly possible. And don't forget that although transient alert is usually fully up to speed on F-16 procedures, it wouldn't hurt to ask them a few key questions to make sure.

**Warning lights,** bells, and whistles all tell you something. Confusion in this area could be disastrous. Realize also what the limitations on some of the bells are. The gear warning horn doesn't work above 190 knots.

Wingmen need to **talk** to their leads when in doubt about starting down the chute with known problems on board. Asking your flight lead or the supervisor of flying might remind you about certain dangers such as landing from an SFO with the higher thrust provided by the secondary engine control.

Bombs hurt — jets and, potentially, troops. We want to save our combat resources (and our warm bodies), so wait to trim out that asymmetric load until you've safed up the system if you're dropping singles. Another disapproved technique is air scoring the bomb in the HUD field of view. It puts you on the same path as the ballistic trajectory of the bomb itself and could damage the jet.

USAF Photo by SrA Andrew Dunaway II

## Cats and Dogs

A few incidents have shown that the HUD **altimeter** can, in fact, be incorrect. To alleviate this possibility, cross-check the altimeter between ELECT, PNEU, and the HUD prior to coming in for that 300 and 1 approach.

**Switches** again "bit" a couple of pilots when they confused the main power switch with the electronic countermeasures pod power switch. Take a look at that switch before activating it. Don't rely on feel alone.

Using a bad lot of **ammo** resulted in shrapnel from a split gun entering the cockpit. The lesson here is obvious: Don't use the outdated lot.

**JP-8** has shown a bad tendency to be harmful if inhaled. A mask is in order. Inhaling JP-8 fumes and exhaust might be toxic to your liver; ensure there is an independent air supply in poorly ventilated areas (e.g., shelters).

## Recommendations

The manual ground collision avoidance system (GCAS) has been funded by ACC for blocks 30, 50, and 40, in that order. This should happen fairly quickly. The fully active auto-GCAS has been pushed back to at least FY2000 and probably later.

We had no Class A's implicating the **main fuel shutoff valve** this fiscal year. We are scheduled to be getting a completely redesigned valve.

The **paddle switch lockout device** should be making its way through the MAJCOMs and down to the units. Policies on its use will be up to the individual MAJCOMs, but the device is intended to prevent unintended stick actuation from that overzealous Airman of the Quarter on his incentive ride.

## Finally

Continue to take every opportunity to squeeze every drop of training out of each gallon of gas you can, but do it with a plan. Think about the risks ahead of time, and have a way out of those tight situations. Operational risk management is becoming a way of life to preserve combat resources as well as to enhance combat capability in the limited resource environment.

If I can help you out in any way, or if you just want to tell me about how great the flying is that I'm not doing (grrr!), don't hesitate to give me a call at DSN 246-4099. Check six! ■


USAF file photo

# F-16 ENGINE-RELATED MISHAP SUMMARY

**MAJ BILL WAGNER**
**CAPT DAVE WOOD**
HQ AFSA/SEFF

■ Overall, FY94 was a better year than FY93. We had one less engine-related Class A this year. Nevertheless, General McPeak, the former Chief of Staff, expressed concerns about F-16 engine safety. At his direction, an Integrated Product Team (IPT) was formed to determine what were the root causes of F-16 engine-related mishaps and what could be done to improve the mishap rate. What the IPT discovered was a dramatic increase in the number of maintenance-induced mishaps since 1993.

What's the problem? Well, whereas the ops tempo has remained at Desert Storm levels, funding for spare and repair parts and design fixes has been cut by almost $1 billion. So to keep our aging engine fleet safe, we increased the number and frequency of inspections.

In fact, on the F100 program, the number of maintenance man-hours per engine flight hour has doubled since 1989. The TCTO workload alone quadrupled! Now it doesn't take a rocket scientist to figure that something had to give, especially given force reductions and the change to two-level maintenance.

So what's the cure? Well, increased funding for a start. The IPT's work led directly to a 300 percent increase in spare/repair parts funding. Due to manufacturing lead time, it will be some time before hardware reaches the field. So there's no short-term relief from the inspections.

Another IPT recommendation was to fund some major engine modifications to cure some longstanding design deficiencies. Topping the F100 list is completion of the 220E upgrade. On the F110 side, the IPT recommended incorporation of the digital electronic control (DEC) on the

F110-100s and redesigning the variable stator vane (VSV) system. The ANG has secured funding to complete the 220E upgrade by mid 1996. Funding for the DEC and VSV mods is still being worked.

As you read the mishap summaries below, you'll see the same themes repeated over and over again. It's true, you can't get blood out of a stone.

## F100-200 Engine

It was a remarkably quiet year for the -200. There were no Class A mishaps attributed to the granddaddy of F-16 engines! However, that doesn't mean there aren't any concerns. The No. 5 bearing area continues to be a problem, both from a design and maintainability standpoint, the unreliability of the control system remains a major concern of our aircrews, and one mishap revealed a deficiency with the fan third stage disk lug.

Ask any maintainers and they'll tell you what's wrong with the No. 5 bearing area. It's just too hard to put back together and extremely unforgiving if you aren't 100 percent perfect. Even when all tubes are properly installed and all nuts correctly torqued, you can still run into problems from "black oil" and coking.

The good news is there may be some relief on the way. The contractor and SA-ALC have developed and tested an improved No. 5 bearing area design. It incorporates improved maintainability features which make it less sensitive to imperfect assembly and heat shields to prevent the black oil and coking phenomena. The engineering change proposal has been technically approved, but retrofit hardware awaits funding. In the meantime, the maintainers need to pay particular attention to this area.

There's also very good news on the horizon for the control system. As previously stated, if ANG plans stay on schedule, all remaining -200 engines will be upgraded to -220Es by mid 1996. That's right — no more EEC and UFC. They're replaced by the much more reliable digital electronic engine control (DEEC) and MFC. The -220E also comes with the much-improved 220-type CENC. These and the other improvements made as part of the 220E upgrade will significantly reduce in-flight emergencies and takeoff aborts as well as the workload on our maintainers.

Unfortunately, the 220E upgrade won't fix the fan third stage disk lug problem. We learned the hard way that our disk rework and Jet Area Reset DEEC logic change (220/220E only) did not eliminate all of the fatigue drivers in the engine. We've been forced, as an interim safety measure, to increase the ultrasonic inspection frequency. This appears to be working, but the maintenance burden is high. It takes approximately 150 man-hours to conduct the inspection. It's clear we need to solve this problem once and for all. Force reductions and two-level maintenance are facts of life — we can't continue in this mode forever.

## F100-220/220E Engine

In FY93, we had no -220/220E engine-related mishaps. This year we had one. This involved a fourth stage turbine blade fatigue failure. Until we understand what's going on and correct it, increased borescope and possibly ultrasonic inspections will be required.

## F100-229 Engine

The -229 has begun operational service in the F-16, and to date we've had no mishaps. The experience gained in the F-15E has helped since many of the problems discovered during F-15E operations have either been corrected or mitigated. Let's all hope it stays that way.

## F110-100 Engine

The F110-100 experienced three Class A mishaps in FY94, one more than last year. One involved erosion of high pressure turbine shrouds which eventually led to a turbine failure. The importance of borescope inspection accuracy has been highlighted. FOD in the main engine control (MEC) resulted in another mishap. An errant washer became lodged in the part of the MEC which controls the VSVs, causing a significant thrust loss. Spalling of the No. 4 bearing led to the third mishap. Improved chip detection capability and revised engine assembly procedures are being considered.

## F110-129 Engine

The F110-129 also experienced a Class A mishap in FY94 — its first. The culprit was a first-stage fan blade. More recently, a similar Class A in FY95 resulted in the grounding of all -129 engines with more than 700 hours as a precautionary measure, so causes can be found and fixes worked.

USAF Photo by SrA Andrew Dunaway

## F110 Three-Tooth Seal

Although the USAF didn't experience any mishaps due to the three-tooth turbine seal, our allies have not been so lucky. A new seal design was being retrofitted to cure the problem. Unfortunately, it doesn't appear to have corrected the problem. Engine testing and analysis continue. All indications are that this is an infant mortality problem. Therefore, until the root cause is identified and corrected, all F110 engines (-100 and -129) with less than 350 hours have been grounded.

If you have any questions, just give us a call at DSN 246-0991. ■


# TRAINER AIRCRAFT

USAF Photo by MSgt Fernando Serna

**CAPT RICHARD D. DUBLIN**
HQ AFSA/SEFF

■ For this article, trainers include Air Force aircraft used in flight screening and pilot training (UPT/SUPT) — the T-1, T-3, T-37, T-38, and T-41. Whew!

Trainers enjoyed an incredibly safe year. Amazingly, there were no Class A or B mishaps in FY94 although there were a few close calls. This was quite an improvement over last year's four Class A's (three in the T-38, one in the T-37). Rather than luck, I attribute this to the discipline and professionalism of our instructor pilot force and maintainers who continue to produce the world's finest pilots.

Congratulations again to my old squadron, the 559th Flying Training Squadron, Randolph AFB, Texas, for extending their incredible Class A and B mishap-free record to over 27 years!

While the fighter and overall Air Force Class A mishap rate significantly increased this year, trainers experienced zero Class A's. However, the absence of serious mishaps is not the sole means of judging a flying safety program's effectiveness. There are a few safety concerns in the trainer world which we should keep in focus since a Class C can easily become a Class A with bad timing or poor decision-making. This article will touch upon some of those concerns.

## '93 Wrap-Up

Before covering this year's interest items, I'd like to close the loop on a mishap investigation which was still in progress as last year's article went to press. A T-37 flown solo by an ACC CTP pilot went out of control on a cross-country and crashed. The pilot ejected safely. The following conclusions were drawn by the AFR 110-14 (now AFI 51-503) Accident Investigation Board.

The pilot made judgment errors by performing unusual and unauthorized maintenance on the aircraft, then flying it without further maintenance input. After acknowledging an aircraft trim problem prior to takeoff, he attempted to rectify it by pounding on the elevator trim tab (based on advice from maintenance personnel at his home unit). This procedure was offered as a remedy for the trim problem if the limit switches were stuck. However, post-crash analysis indicated a loose grounding wire internal to the trim motor, not a limit switch, was the problem. The trim problem was noticeable shortly after takeoff.

The pilot further compounded his problems once airborne by continuing to experiment with the trim system. Instead of accomplishing the appropriate checklist and returning to the departure base, he elected to continue to his destination. The problem was more pronounced at 180-200 KIAS and was less of a problem when he slowed to 120-130 KIAS. Yet the pilot elected to accelerate to a higher speed (about 180 KIAS) which further accentuated his problem.

Shortly after analyzing the trim problem, about 4 minutes later, the pilot lost control of the airplane and ejected close to the ground. Given the circumstances described by the pilot just before the mishap, runaway trim should not have caused loss of aircraft control. The pilot failed to control the aircraft. In the accident investigator's opinion, the pilot induced a stall condition through a combination of low power settings, high bank angle (60-90 degrees), and G-loading. The pilot concurred with this assessment.

## T-3

This year Flight Screening embarked on a new training philosophy and embraced a new aircraft, the Slingsby T-3 Firefly. The aircraft, selected largely for its aerobatic ability, is now being used at Hondo Air-

port, Texas. There are now about a dozen aircraft at Hondo with many more on the way. The new expanded flight screening syllabus and the T-3 provide a much better orientation towards UPT. The USAF Academy will soon start its conversion from the T-41 to the T-3.

A plus with this aircraft is its ability to greatly improve the pilot screening and selection process. However, a minus is a couple of mechanical bugs (not uncommon to new aircraft) which must be worked out. The most noteworthy of these bugs was an annoying tendency for the engine to quit. Fortunately, all of these engine failures occurred on the ground. Investigators were somewhat stumped at first. Though corrective actions were implemented, the engine failures continued. Recently, it appears they may have broken the code.

After detailed trouble-shooting of one engine, an unknown oily liquid was found in the air section of the fuel injector servo regulator. The substance was discovered to be a preservative oil used by the engine manufacturer during shipping. Eventually, after assembly with the engine accessories, the oil works its way into the fuel injector servo.

At low power settings and low induction airflow conditions (which occur on the ground), an abnormal condition, such as oil in the air diaphragm area, may slow the response of the servo regulator or cause it to stick momentarily. This may result in engine stoppages due to excessive or insufficient fuel flow. At higher power settings and higher induction airflow, spring forces in the servo regulator and airflow forces override the effects of oil contamination in the air diaphragm, thus no engines failed while airborne. After ensuring all T-3 aircraft in service are free of oil in the injector servo air regulators, there have been no more engine failures.


USAF Photo

## T-41

The T-41, which is still flying at the Academy, experienced a handful of Class C mishaps, mostly engine-related. An instructor and student had a very close call when an oil pump drive gear failed while airborne. The engine seized, forcing the instructor into a forced-landing in a small field which he performed well. Though the aircraft was severely damaged, the crew was not seriously injured. Corrective action has been taken.

## T-37

As mentioned, the Tweet (affectionately known as the 7,000-Pound Dog Whistle) experienced no serious mishaps, but since spins are near and dear to those who fly the T-37, I will briefly describe a spin mishap which occurred in an A-37 this year.

And then there were three.

One of only four remaining A-37s in the active inventory crashed while spinning. The mishap crew, a test pilot and test pilot IP, were on a USAF Test Pilot School spin sortie. Two successful spin entries and recoveries were accomplished by the test pilot. During the third spin, the recovery attempt failed. The IP assumed the controls and attempted recovery three times before the crew successfully ejected. A fuel imbalance in the tip tanks developed, making the aircraft unrecoverable. Though the T-37 does not have tip tanks, this mishap brings to mind the 70-pound fuel imbalance limit before spinning and is a good reminder for Tweet fliers to brush up on the effects of asymmetric conditions on spins.

The Tweet's Class C statistics didn't show any dramatic changes this year from last. Almost half of the reported mishaps involved engine problems. Of those, about a third were flameouts and a third oil system problems.

The most potentially serious type of J-69 mishap we are now experiencing involves a failure of the bevel gears which power the engine accessory package (which contain several essential engine components). Typically, there is an occurrence of this type every several months. When the gears fail, the engine dies and cannot be restarted.

Research has shown the bevel gear failures have resulted from the technique used in assembly, not a material failure. The appropriate T.O.s have been corrected, so as engines enter phase at 1,000 hours, the problem will be taken care of. The failures have typically occurred towards the end of the 1,000-hour cycle. Unfortunately, it may be 2-3 years before all engines enter phase, so the potential for more failures still exists. Beware!

Standard for the T-37, physiological mishaps comprised a large chunk of the total reported inci-

continued

# TRAINER AIRCRAFT

continued

dents, about one-fourth this year.

There were also a handful of false fire/overheat lights and pitot static problems. Interest items the System Safety Group are now following include compressor maintenance, the HBU-12A lap belt, and the canopy jettison system. The Tweet should easily last until the year 2000 when it is scheduled to be replaced by JPATS (Joint Primary Aircraft Training System).

## T-1

As the most visible new component of Specialized Undergraduate Pilot Training (SUPT), the T-1 Jayhawk is blazing new trails as one of the most modern military trainers in the world. T-1s are now based at Reese, Randolph, and Laughlin AF bases. With a "glass cockpit," including weather radar and a Traffic Alert and Collision Avoidance System (TCAS), the T-1 is a model of automation. The TCAS provided many valuable warnings this year and is soundly supported by the safety community. The T-1 is still a new aircraft and will likely have a few more mechanical bugs in the short term. This year revealed problems in the throttle design. However, about half of the mishaps this year involved a more serious factor—bird strikes.

The Jayhawk is a business jet, modified to be used as a tanker/transport trainer. Unlike a business jet, which cruises primarily at high altitude, the T-1 flies a great deal of approaches and low levels based on the SUPT syllabus. This clearly places the aircraft in a regime more susceptible to bird strikes than perhaps designers anticipated.

The most serious T-1 mishap to date occurred this year and involved a bird strike during a touch and go. Immediately after becoming airborne, a T-1 struck a large bird, severely damaging the fuselage and left engine nacelle before being ingested by the engine. The IP on board took charge and commenced a flawless single-engine approach and landing, aided by a chase ship and his trainee on board. Had the IP not acted so swiftly, the aircraft and crew could have been lost. But on the good side, the T-1 performed admirably on one engine.


USAF Photo by MSgt Fernando Serna

## T-38

The venerable Talon will probably remain in service until the year 2020. Already 30+ years old, engineers and maintainers are diligently working to keep the aircraft safe and up to date through a number of initiatives.

The numerous modifications and safety concerns will not be listed here, but suffice it to say that within the trainer fleet, the T-38 will continue to occupy our attention. One luxury that we don't have in our current fiscal climate is the option to buy new engines.

T-38 mishaps were divided amongst a handful of bird strikes, canopy, pressurization, physiological, and miscellaneous mishaps. But as usual, the bulk (about 60 percent) of the reported mishaps this year involved engines. Almost half of the engine mishaps involved flameouts, and about 15 percent involved compressor stalls. Last year, the percentage of flameouts was much lower, and compressor stalls comprised most of the reported engine mishaps.

It is unclear exactly what percentage of this year's flameouts were related to JP-8. The full effect of JP-8 on operations may not be understood for a couple years, but we know, at a minimum, engine starts in cold weather, the airstart envelope, and weight and balance are different with JP-8 versus JP-4. The Test Pilot School at Edwards AFB, California, will sponsor a test this fall on all aspects of introducing JP-8 into the T-38.

The System Safety Group is monitoring numerous items. Procurement of the new bird-proof windshield is progressing slowly, but steadily, and a risk analysis is underway on the impact of bird-proofing the front canopy. If incorporated, this would eliminate the through-

the-canopy ejection capability of the seat but may be preferable to the bird penetration risk.

The trim switch is still a problem. Several product quality deficiency reports (PQDRs) have been filed against the new "Mason" switch (which was supposed to correct the shock problem) for sticking. The old "Guardian" switch has been redesigned to correct the shocking problem, but several of the old switches are still in the fleet. In the interim, the Air Force is procuring a plastic cap to cover the tip of the defective switches.

The newer, more conservative TOLD charts have been incorporated, but discrepancies have been found between the checklist and the flight manual. Change 6 to the Dash One and Change 2 to the checklist should fix this.

The new higher SETOSs have exceeded the performance of the nosewheel tire design. A new design limit is being studied.

Input/Output Shaft Coupling failures are being studied to prevent the possibility of the loss of hydraulic and A/C power which may cause fires in the engine bay. Improved grease and temperature variant decals are being evaluated in this effort.

A few of the T-38/AT-38 modifications currently underway include aluminum flight controls, cockpit enclosure, 66 percent wing spar reinforcement strap, 325 bulkhead changeout, main gear trunion replacement, and the composite windshield assembly. Safety TCTOs, as the result of these modifications and others, are currently backlogged about 3 years due to funding. This is a problem with aircraft throughout the Air Force.

## On the Horizon

The Air Force and Navy are aggressively pursuing joint pilot training on several fronts. While details of the program are still unfolding, Air Force IPs are already being assigned to the T-34 at NAS Whiting Field, Florida, and Navy IPs are currently assigned to the T-37 at Reese AFB, Texas. Joint leadership, student exchange, and joint secondary training will occur next.

And all of this change is starting several years before the introduction of JPATS near the year 2000. The change in training philosophy has enthusiastic command support. It should save a great deal of money and produce a better pilot. Aviators thrust into this new environment must be cautious, though. After doing business essentially the same way for 30 years, a change in habit patterns and thought processes of this magnitude increases the need for attention to detail and safety's role in mishap prevention.

On a recent TDY, I ended up at Brooks AFB, Texas, where I received a demonstration of a strange new device under development. Partly in response to mishap recommendations, aerospace physiologists are attempting to create a trainer which can simulate various types of spatial disorientation in a lifelike cockpit.

The Advanced Spatial Disorientation Trainer (Gyrolab) resembles a multimillion dollar carnival ride. This simulator rotates freely in all axes and can produce about 2 Gs in a centrifuge-like fashion. The cockpit resembles a standard instrument simulator with a computer-generated visual display and basic instruments. Currently, it can simulate the T-38, A-10, F-15, and F-16 aircraft. (Note: It has both a center stick and side stick controller.)

To date, there are still some software and control-feel problems to be worked out. It remains to be seen how effective the Gyrolab will be as a spatial disorientation trainer or at what level of flying training it will be used.

USAF Photo by MSgt Fernando Serna


## Farewell

If things go well and I make it back to the cockpit next year, this, my third annual summary, will be my last. So I would like to close by thanking all the safety professionals I've worked with the last 2½ years who made my job easy and gave me a profound awareness of the role of Safety in our Air Force.

Safety is not paramount; never has been. The mission continues to be paramount. But I know now, more than ever, the right way of doing business is to do it the safe way, whether the mission is training or operational. Today, stress levels and the ops tempo are approaching an all-time high while the force structure is approaching an all-time low. The preservation of lives and resources is now absolutely essential. This demands the highest level of personal responsibility from all Air Force members, whether they're an Airman Basic or the Chief of Staff. This is only possible by adopting a safety culture which is second nature and through a careful approach towards managing risks. The "safety professional" is a key element in this effort. Together we ***can*** do it. We must! See you flying! ■


# F-111

USAF Photo by TSgt Frank Oplanic

**LT COL NEIL "BONE" KRAUSE**
HQ AFSA/SEFF

■ You did it — no Class A mishaps this year, the first since 1986! In fact, only a Class B bird strike stood between us and a perfect year.

## Where Have They All Gone?

This year saw the retirement of the last A-model from Sacramento ALC and a trimming of the fleet at Cannon AFB to 147 airframes. Of course, our forces at Davis-Monthan continue to build …

## Rates and Numbers

Since 1965, the first year the F-111 flew operationally, we've had 129 Class A and 111 Class B mishaps. Of the Class A's, 43 percent were logistics-related, and 46 percent were operations-related (the remainder were miscellaneous or unknown).

The lifetime Class A rate for the F-111 is 5.96, but over the last 15 years, we've averaged 3.50 Class A mishaps per 100,000 flight hours. Compare that with an average fighter/attack rate of 6.13 over the same period, and you'll see we're doing something right.

## Mishap Review

Last year's Class B mishap was a bird strike to the engine intake. A portion of the intake lip broke off and was ingested into the engine, resulting in severe damage to the compressor section. The crew landed uneventfully after shutting down the engine.

## Past Problems

In last year's article, I wrote about problems in the TF-30-P111 engine No. 3 bearing. Fortunately, these bearings are being replaced at the rate of 10 to 15 per month. Unfortunately, we still have the old bearings in some engines. Use caution.

Also in last year's article, I discussed some problems with the Main Line Contactor Assembly (MLCA). The MLCA is an electrical power distribution panel with a plastic faceplate. The EF-111 MLCA's plastic faceplate can melt and burn, tripping circuit breakers and making the flight controls go into auto-twitch. It seems to be a problem only in the EF due to the unique type of material used in the faceplate and the huge amount of juice going through the panel. New material is on the way, but, until then, maintainers need to conscientiously tighten the power cables on the MLCA to prevent arcing.

## Concerns

The top operational concern now is ops tempo. This is not unique to the F-111, but worldwide crisis response seems to take its toll, particularly on EF-111 crews and maintainers (everybody wants a piece of their action). Also, the on-again, off-again nature of some of these deployments puts an even greater strain on crews. And their families.

Watch for signs of stress in your crews, and know when to lighten the load. And watch their families. You can't effectively do the mission if all is not well on the home front. Fighter pilots and WSOs/EWOs know how to "compartmentalize," but their families may give you the first indication something isn't right.

In days past, when a part didn't work right, the crew chief got a big hammer and "tapped" it until it worked. Be careful you aren't doing the same thing with your people — tapping them until they work right. You may find they break, too.

Fly safe, fly smart, and let's go for another mishap-free record next year. ■

# FUNDAMENTALS OF DESTRUCTION

**CMSGT DON A. BENNETT**
Technical Editor

■ "Bad morning, class. My name is Constance Calamity. Mister USAF Mishaps and I want to welcome you to our Air Farce Mishap Instigators Course — *not* to be confused with the Aircraft Mishap Investigation Course taught by those Air Force bozos."

Roars of laughter filled the classroom.

The petite, well-dressed lady continued, "I will be your Block One-FOD class instructor. This class is the first step in acquiring your new Air Farce credentials as full-fledged Aircraft Mishap Instigators. I'm sure you know you were selected as candidates for this course because of your active and noteworthy participation in a spectacular Air Force mishap — the Class A kind which caused destruction and death, including your own. Congratulations!" A wicked sneer crossed Ms Calamity's face.

An eerie silence fell over the classroom. Ms Calamity's cold-hearted words had awakened the students to the reality of what had happened to them, why they were there, and what their afterlife role might be.

"Before Mister Mishaps comes in to give you his welcoming spiel, I'd like to explain what you can expect from this course and what the objectives are for this particular block of instruction. Because you and I *never* sleep, it shouldn't take you long to finish.

"At the end of the course, several other instructors and I will hold a short seminar — 'Overcoming Situational Awareness,' which was recently added to the school's curriculum for special emphasis on mishap recruitments. Basically, it covers how you can plant, with ease, extremely bad ideas into the once-brilliant minds of your constituents."

The little lady seemed to take on the personality of a drill sergeant and almost shouted, "Remember class, you have to hook them first! We aim for the ultimate in mishaps. If you're going to ride the shoulders of some of the Air Force's finest, you have to be the sharpest mishap recruiters and instigators ever! Our seminars will prepare you for this challenge. They will reveal the best personal, time-proven techniques for subconsciously controlling minds and actions.

"We point with pride to the instruction block called 'The Art of Taking Unnecessarily High Risks.' This seminar is one of the best tools for recruiting mishap potentials. And at the end of the seminar, each of you will have the opportunity to

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# FUNDAMENTALS OF DESTRUCTION

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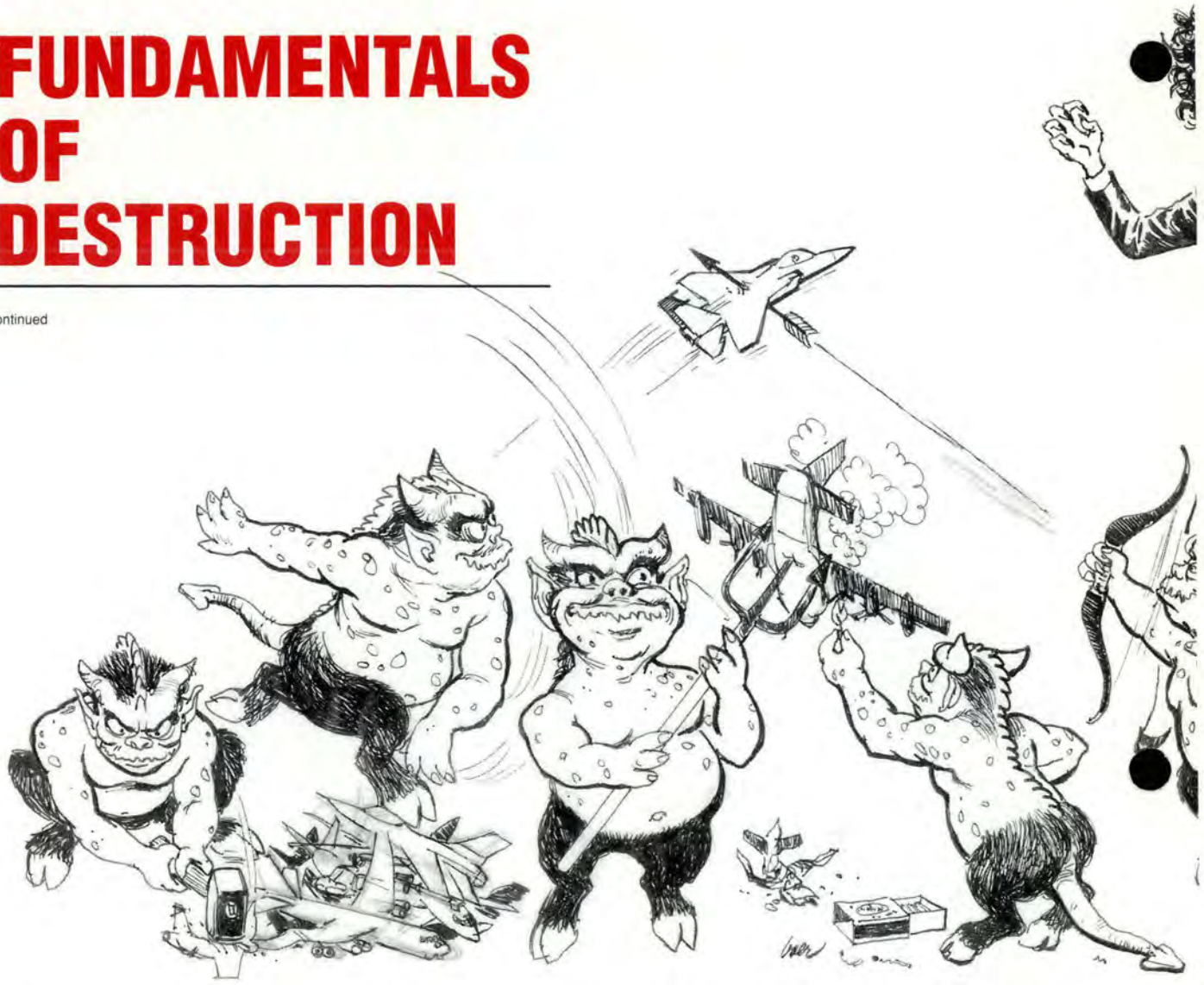

reveal how you were persuaded to take shortcuts in your own duties and responsibilities."

Ms Calamity had held the undivided attention of the class, even as some members suddenly realized they too had been one of those hooked. There was mumbling throughout the group — they knew they had done something wrong in their particular mishap, but each had made an "intelligent, calculated decision" to do the unsafe act anyway. After all, it had been done that way for a long time and nothing happened — except for this one LAST time. As uncomfortable as they might be feeling, they quickly turned their thoughts and attention back to Ms Calamity as she continued.

"Now, for those of you who had a short attention span and lacked the proper motivation while living, let me warn you the "Boss of Loss" does not like half-baked instigators. You will either get actively involved in this course and the school or, I promise you, Mister Mishaps will make sure you never visit another flightline or cockpit!"

"Block One, Fundamentals of Destruction, commonly known as FOD, is one of our oldest courses of instruction," continued Constance Calamity, the ex-aircraft maintainer. "It's one of the originals our founder, the Dishonorable USAF Mishaps, started back in '47 when the Air Force became a separate and distinct mishap gold mine.

"Ironically, many years ago, some clowns in the Air Force stole our FOD acronym for their so-called Foreign Object Damage Prevention Program, but as you know so well, their FOD acronym seems to be more of a contradiction in terms. Prevention my foot! In fact, I use examples of the pilots' and aircraft maintainers' nonadherence to Air Force FOD prevention principles as good examples of where you green instigators can get a couple of quick mishaps under your belt.

"To even things up, we 'borrowed' several of the Air Force's flight safety course titles — Human Factors and Crew Resource Management — twisted them just a little, and came up with Human Distractors and Crew Resource Mismanagement. The Air Force was making headway in preventing flight mishaps in these two areas. So Mister Mishaps countered with his own courses to aid our corps of instigators in combating the Air Force's downward mishap trend."

The dreadful instructor continued: "We're also here to teach the best mishappers how to be even better. We demand obedience and **will not** tolerate breaches of discipline, incomplete homework assignments, inattentiveness during training events, loss of situational awareness, and the like. You may have been the best at sloughing off in the world of the living, but here we demand your *undying* attention.

"Because of these strict standards, we expect a high washout in almost every class. You see, as we bring you along, block after block, on how to wreak havoc, most of you will start to regret your real-world misdeeds, especially you dummies, because your unsafe acts led to your own death. Some of you will become weak-kneed after recalling the grieving loved ones and friends you left behind."

Suddenly, out of the darkness, came a booming, terrifying voice ...

"... but the one group of folks we lose the majority of are those of ya who caused the death or injuries of yore fellow crewdogs or the trusting paxes ya were charged with safely transporting. And most of ya wannabe wrenchbenders will also crumble when ya tell yore own glorious mishap story of never-ending stupidity.

"Ya'll will tell us later on how ya caused the gloom and doom in your mishap. Why? Because it's a surefire way of throwing out the weaklings right off the bat. How I despise bein' 'round the idiots who can't cut the mustard in my school. They fought like hell to screw off and cause a mishap amongst the livin', but when they show up here for roll call they go belly up. I HATE THOSE SISSIES AND I WANT 'EM FERRETED OUT. DO YA HEAR ME, MISS CALAMITY!!!"

The classmembers had wheeled around in their chairs and caught a glimpse of a tall, dark, ominous-looking specter in the doorway. As the ghost-figure spoke, a cold chill swept through the souls of everyone present. Even the case-hardened Constance Calamity was overwhelmed by the apparition.

The presence slowly drifted to the front of the class where it began to materialize into a well-dressed, distinguished-looking gentleman with a cold, white face and steel-hardened eyes. Upon his appearance, the students jumped to their feet. The devious smirk on his face confirmed his command of his audience. The King of Pain had arrived.

"Yes, sir, it will be done!", Ms Calamity smartly reported back.

"Ladies and gentlemen, your new leader, Mister USAF Mishaps, the chief instigator of all active duty, Guard and Reserve misfits, no-good-doers, pretenders, screw-offs, and hoodwinkers who caused a flight or ground mishap or who is working on one as I speak. He is also the supreme commander of all you 'expired' mishap instigators. You will remain standing in his presence," announced the always-obedient Calamity.

The class gulped in unison. Now was the moment for commitment. Pilots and maintainers immediately, but silently, recommitted themselves to excel in their coursework. All of them missed the sights and sounds of flightline activities or slipping through the surly bonds of space. Their thoughts were trained on becoming the real professionals they should have been while living. Each one decided to be the best mishap instigator ever! Besides, there was no way to change the situation. It was either be here with this metamorphic creature or be banished from their beloved vocations. **There were no other choices!**

All eyes were glued to the front as their new boss continued to lay down the law along with his expectations. But one by one, students began to disappear from the room — students who were allowing themselves to be remorseful for past destructive deeds. Mister Mishaps' telepathic skills had scanned the students for penitent thoughts and nonvisual reactions to his words.

Their immediate expulsion and disappearance was just one of the Master of Disaster's many culling processes. These unfaithful pilots or maintainers had finally decided to accept the guilt and eternal shame for carelessness and selfish acts — criminal traits for future mishap instigators — and their immediate removal was mandatory. Mister Mishaps wanted only quality candidates for his school and eternal service. With an unlimited source coming in almost daily, he saw no reason to lower his standards.

The few hard-core students remaining were satisfied to know the only obstacle between them and being a successful mishap instigator was ... *you*! They were confident Mister Mishaps and his dedicated staff would teach them how to professionally manipulate you. Besides, after judging their own personal death and destruction mishap, they knew all too well how easy this school and the Air Farce mishap instigator job was going to be. Too easy!

This was something they could **do right — the first time — every time!** ■


# THERE I WAS

■ ... or rather, there I wasn't. But I was in the vicinity for awhile. My flying story doesn't involve me or any safety violation, for that matter. But it is one of the more entertaining stories I tell, and it does have a kind of moral to it that could justify its presence in this forum.

This event happened early in my flying career. I was attending Undergraduate Pilot Training at the time. Our class had recently passed the zenith of our T-37 experience and was anxiously awaiting the day when we would slip the surly bonds in "The White Rocket." The supersonic T-38 was the thing high performance dreams were made of, and we couldn't wait for that first exciting "dollar ride." We slogged our way through simulator ride after simulator ride hoping to be one of the first in the class to actually try out the real thing.

That first flying day finally came for some in my class, but not yet for me. However, since the "T" in ATC stood for training, those of us not flying on the first day accompanied those who were to observe their preflight procedures in hopes we might learn something. Accordingly, I was paired up with another student on his way out to the flightline. This is when the adventure began.

Our first stop was in the life support shop. As the lucky student took his helmet down from off its peg, his face was filled with bewilderment.

"My gloves are missing," he said as he gazed into the helmet. He apparently kept his flight gloves inside his helmet, and now they were not in their place. Not to worry. I had my pair in my pocket, and I certainly didn't need them today. Having passed through that minor tragedy, we continued.

As we headed out the door on our way to the jet, the instructor pilot and I instinctively put in our earplugs. Our intrepid aviator, so intent on the upcoming task, had yet to install his ear protection. Finally, after a



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prompting from the instructor, he set about to use his earplugs as well, only to discover he didn't have any on his person. Not to worry. I had an unused spare pair in my pocket, and so the adventure continued.

At last the preflight — the event I had come to witness. I found it to be highly educational just as advertised. But in a departure from the checklist, it was also amusing.

In accordance with instructor technique, the student removed his parachute and carefully placed it upon the tarmac as he commenced the inspection of the aircraft. Still high on the adrenaline of the moment, his thoughts were in other places as he scaled the ladder to his cockpit sans parachute.

Once in the cockpit, he attempted to complete his flying ensemble by donning his seat belt, shoulder harness, gloves, and helmet. After a few moments of discovery with his seat just not feeling quite right, he realized his error, unbuckled, unfastened himself from his jet, and descended the ladder to retrieve his pack.

Back in the cockpit, he began again the ritual of finalizing his outfit. At the instant he finished firmly tying himself into the aircraft, he noticed his flight publications bag still sitting on the ground below. Once more he retraced his steps, unstrapping and removing, descending the ladder, retrieving his once-forgotten goods, and back up the ladder to repeat the process for the third time.

The helmet went on, the oxygen hose was plugged in — but then a problem. The chin strap on his helmet just wouldn't snap. After several attempts, the crew chief saw his struggle, retrieved the ladder he had earlier removed, climbed up, and was able to get the stubborn snap to cooperate. Engine start and taxi out went without a hitch.

I went back into the squadron building, pondering the day's events without realizing the story was not yet complete. Later that day, as my gloves were returned (I let him keep the earplugs), I found out why his helmet refused to snap. It turns out he had the wrong helmet all along. Had he grabbed the correct helmet, he would have found his gloves still inside and his chin strap properly sized.

When did he realize his mistake? It was in the middle of his flight when he caught a glimpse of his reflection on the glass cover of his ADI. He had been issued a green mask, and it turned out his reflection was wearing a gray one.

Nothing unsafe happened on his flight — the reason being a pilot was along on the flight who had been there before.

The lesson to us is obvious. Encountering a new situation can be stressful. When you are tasked to fly into an area you have never been to before, when you are trying a maneuver or procedure new to you, bring along some experience. That experience could be in the form of another individual or in study and prior preparation. ■

## MAP DATUMS: A NOTE OF CAUTION

■ In a recent briefing by the Defense Mapping Agency (DMA) for the Chief of Staff, Army, the importance of map datums was a major item of concern and discussion. Datums are mathematical models of the earth used to calculate the coordinates on maps, charts, or systems.

Currently, many different datums are used throughout the world to produce maps. The standard datum for U.S. forces is World Geodetic System 1984 (WGS 84). It is also the standard that has been adopted by the International Civil Aviation Organization and the International Hydrographic Organization. The default output coordinates from the Navstar Global Positioning System (GPS) are on WGS 84. However, many U.S. and foreign maps based on other datums are still in use.

The use of different datums creates a problem. The coordinates for a point on the earth's surface in one datum will not match the coordinates from another datum for that same point. For example, on the Korean Peninsula, current maps used by U.S. and Republic of Korea forces were developed using the Tokyo Datum. Converting these maps to WGS 84 causes an average horizontal displacement of 755 meters. Not all disparities resulting from using two different datums are as large as this one. Disparities were also discovered for the Desert Shield/Desert Storm area of operation. This problem could exist within our own forces but occurs more frequently when U.S. forces are conducting combined operations.

In the past, we didn't worry too much about datums because our weapon systems usually didn't require highly accurate point positioning. Because of the inherent high accuracy of WGS 84 and the fact it is the standard, many current and developing weapon and navigation systems have been "hardwired" to use only WGS 84 coordinates. With today's technology, precise coordinates are vital for mission success, and WGS 84 provides the precision necessary to meet our most stringent requirements.

The bottom line is don't ignore the fine print at the bottom of maps. Be certain the maps being used in a given operation were produced using the same datum. If this is not possible, make sure the datum information is passed along with coordinates. Also be sure the datum is addressed in the operations order. ■

For additional information, contact either of the following POCs:

■ HQ DMA, Command Support Division, DSN 356-9329 (703-285-9329).

■ Defense Mapping School, Geophysics Department, DSN 655-3206 (703-805-3206).

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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.*

CAPTAIN

## Edward Corcoran

**First Fighter Wing**
**Langley AFB, Virginia**

■ Captain Edward Corcoran was No. 3 of a four-ship of F-15s on an air combat training mission with an Air Force Academy cadet in the rear cockpit receiving a familiarization sortie. After the mission was cut short by a wingman's in-flight emergency and subsequent RTB, Capt Corcoran returned to Langley AFB for an overhead pattern and "routine" landing.

Capt Corcoran's recovery and overhead pattern were normal. Upon landing (approximately 5 minutes after the IFE) in the normal touchdown zone, he pulled his nose up for a full aerobrake when he noticed a civilian sedan enter the runway from the left, approximately 1,000-1,500 feet from his position. The sedan drove onto the left half of the runway and turned toward the F-15. With only a split second to react, Captain Corcoran immediately selected full afterburner on both engines, applied right rudder to steer to the opposite half of the runway, and became airborne — passing within 100 feet of the car.

Capt Corcoran informed tower of the intrusion on the runway and gave a full description of the vehicle which allowed Security Police to locate and detain the individual. Tower was not in contact with the car on the runway — investigation later revealed an elderly civilian had inadvertently entered the runway via one of the remote NASA taxiways.

Capt Corcoran's superior airmanship and split second judgment allowed him to make the proper decision that avoided catastrophic results. His keen situational awareness saved two lives in the F-15, one on the ground, and a valuable Air Force aircraft.

WELL DONE! ■