

• flying

SAFETY

NOVEMBER 1990

Mishap Summaries





THERE I WAS

■ It was to be a standard range-hopping sortie for a three-ship of F-111s. During the preflight briefing, the flight leader briefed that after departing a bombing range, the flight would rejoin to fingertip formation for a battle-damage check.

The flight progressed smoothly through the low-level and onto the first bombing range. After dropping a half-dozen practice bombs, lead called the flight to depart and transition to another range about 60 miles away. Being good wingmen, no. 2 and I, as no. 3, followed the prebriefed procedure and rejoined to fingertip formation on our leader's right wing.

We cruised along in this position for a few minutes when suddenly, the leader initiated a hard 60- to 70-

degree bank turn to the right! The imminent midair collision between three F-111s caused sheer survival instinct to take over. No. 2 immediately pulled straight up, and I simultaneously rolled 90 degrees right and pulled to the stall warning horn.

The "Thunderbird Burst" quickly caught the flight leader's attention, as well as that of his WSO, both of whom had previously been unaware of the position of their wingmen. Lead had assumed his wingmen would stay in trail position since the second range was a short hop away, despite what he had been briefed. And his WSO never bothered to look to his right to check on the position of the other flight members.

We all survived, but this story could easily have had a very unhappy ending. The lessons learned here are obvious for both flight leaders and their crewmates. What I learned from it all is that in the flying business, things can go from smooth sailing to life threatening with absolutely no warning at all.

Ed note: What I learned from this was to be careful when we assume we know what another pilot or aircrew is thinking. A simple "two's in" would have reminded lead of what the situation really was in this case. SA is a fragile thing and needs inputs from everyone to be properly maintained. ■

flying

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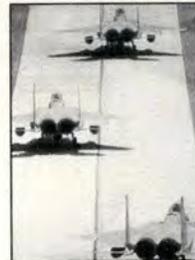
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A-7

LT COL DAVE ALLEN
Directorate of Aerospace Safety

■ It is annual review time again, and it is really nice to have only one Class A to discuss. Even better, it's great to report we had no fatalities. Of course, there is always some bad news. In this Class A mishap, we lost *two* jets at a time we can ill afford to lose any. Our logistics guys have attained another **ZERO** mishap year, coming off of three Class

A's in FY89—a remarkable improvement. This should make us ops types strive even harder to match their record.

The lower wing skin cracks and aircraft retirement schedule continue to be the major concerns on the logistics side of the house. We can be very proud of the logistics and maintenance types in their dealing with these problem areas. Clearly, we need to have the A-7s combat ready at a moment's notice.

A large number of people are busy working to keep the A-7 operational. They have come up with an inspection program which appears to be working. They are maintaining an old airplane that has seen more than its share of work and

doing it in remarkable fashion. In a time of shrinking budgets, we need to remember maintaining a high state of combat capability truly is a team effort. The A-7 team has proven to be first class.

A Downward Trend

In 1989, we had a 3.93 rate that translates to three Class A mishaps. Not a great year, but certainly an improvement from 1988. The downward trend in Class A's and successful ejections carried over to FY90. We closed FY90 with a 1.42 Class A rate, flying some 73,000+ hours while dealing with complex maintenance and logistics problems. Let's look at the mishap to see if we learned from our past or if we invented new ways to crash jets.

The Class A

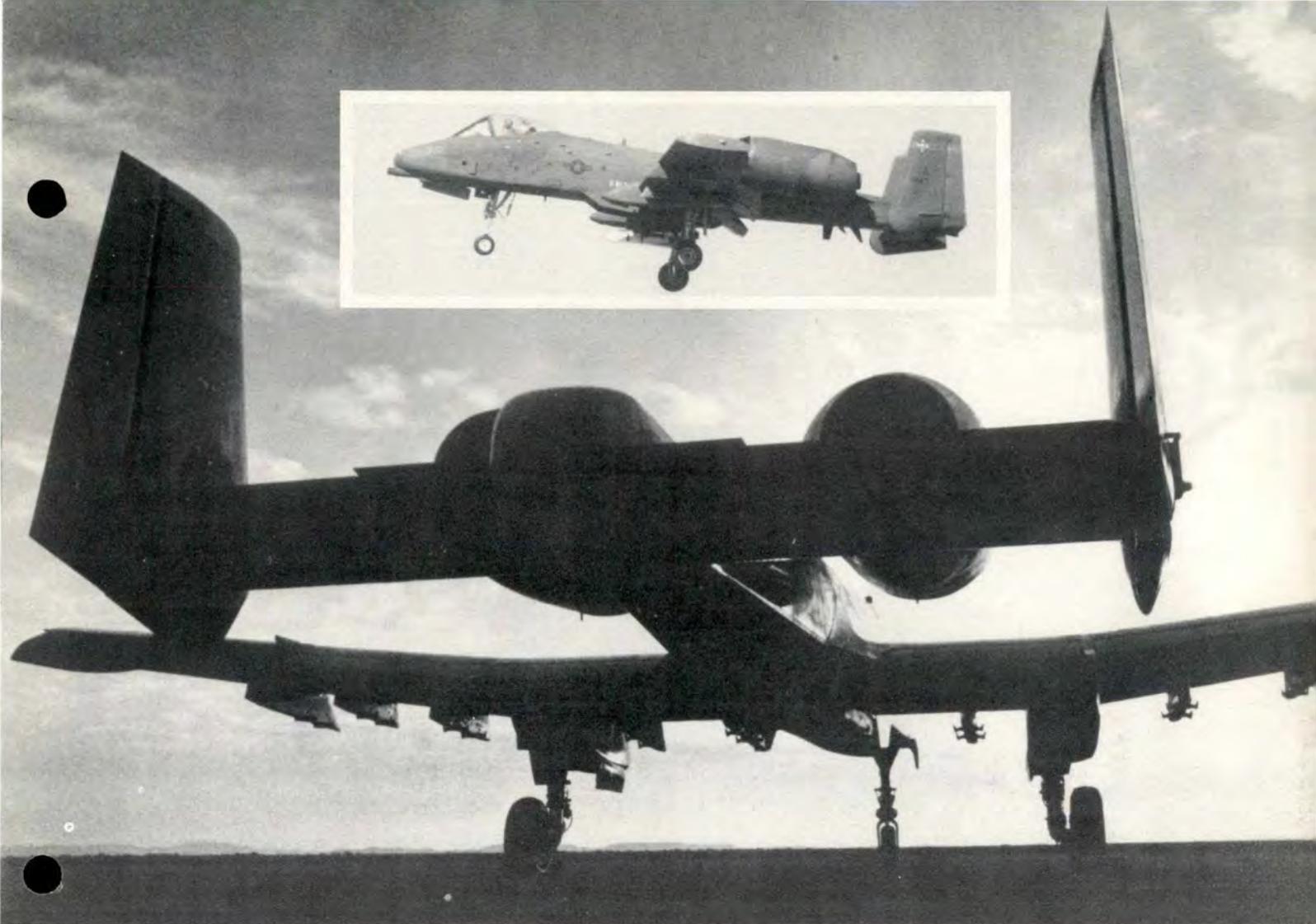
Our only Class A was a 2 v 2 aerial refueling and air combat training mission. The flight consisted of three Ds and one K model. The person in the rear seat of the K model was an orientation passenger. On the last planned engagement, lead and no. 4 collided. Both aircraft were destroyed and all three ejections were successful.

The Future

So where do we go from here? We know many of the older A-7s are on their way to the boneyard. However, we will still be flying the A-7 for several years to come. I hope we have begun our move toward a clean slate year—we have the challenge. We can retire the remaining A-7s with no further Class A mishaps over the next few years and, in doing so, set ourselves an enviable record.

This will take a concerted effort by all involved; our operators must fly smarter, and the maintenance people must be ever cautious for those little things that can slip in and catch us unaware. The logistics personnel will have to keep on top of the issues that will promote safety system-wide.

Let's all determine to set the pace for those who have yet to know (but desire) the thrill of single seat and single engine. Keep the mach up and the threat down. ■



A-10

LT COL DAVE ALLEN
Directorate of Aerospace Safety

■ Each year we come to this time when we review our past mishaps and seek wisdom from the lessons learned.

What say we take a little test? What do the years 1977 and 1990 have in common?

A) Nothing.

B) Three fully operational pilots and jets became smoking holes.

Not much has changed in the 13 years we've been flying the A-10. Oh yes, the answer is B.

Second question. Would you turn around and check six while taxiing into the arming area at Red

Flag? Of course not! Well, why do we incorrectly prioritize our tasks (check high right 5 o'clock in a left turn) at 500 feet and 300 KIAS?

Last question. Which is safer, flying at 500 feet or 100 feet? You bet, 100 feet! Why? It is really easy to see where the threat is, and you don't take time for all those things which can be put off until you climb to a more comfortable altitude. Maybe we need to take that low, low altitude thinking and apply it to our task prioritization at 500 or 1,000 feet.

A Look at FY90

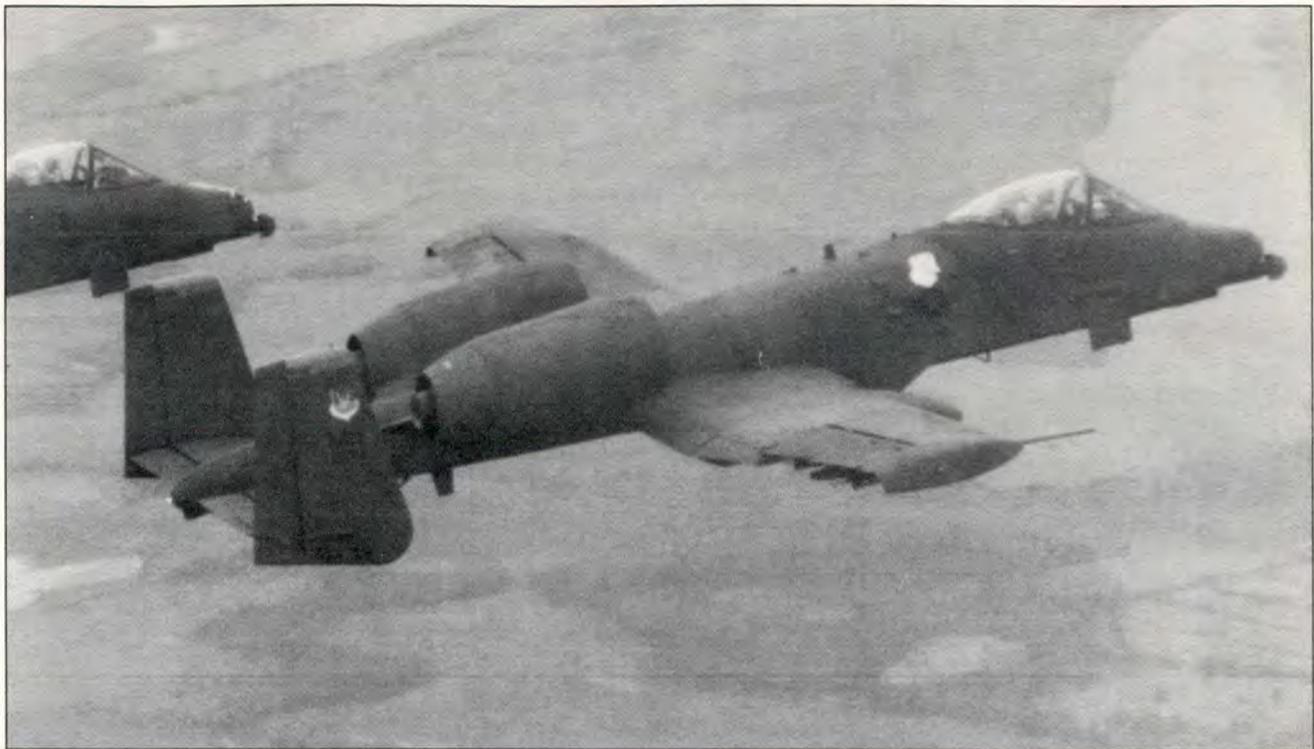
In FY90, we were back to a more normal 1.36 mishap rate; down by one-half from the 2.66 of last year. This rate is based on about 220,000 flying hours and translates to three Class A's. That's the better (not good) news. The bad news is we have three less A-10 pilots—none of

them attempted an ejection. I'm sure most of you reading this have already had a briefing on the particulars of each mishap. However, I would like to provide a brief refresher.

The Class A's

We had a young pilot leading a two-ship surface attack tactics (SAT) mission. His wingman went lost wingman and executed a route abort to VFR above the clouds. The mishap pilot elected to remain at low altitude and attempted to retrace his flightpath out of the marginal weather. He apparently became too preoccupied coordinating for his flight and directing his wingman to accurately know his position. He impacted the ground about 1,500 feet up the slope of a 2,100-foot hill. He was close, so close, but the rising terrain and reduced visibility just didn't give him

continued



enough margin for his error. Several questions remain unanswered as to why. Unfortunately, the answers died with the pilot.

Dry SAT with a FAC in an MOA within the local flying area—how many times have you done this? Enough for it to be pretty routine. That may have been the trap for our second young aviator. After one dry guns attack on the wing, he was leading the element in. He accomplished a proper recovery, then provided target info to his supporting wingman. For some unknown reason (distraction, channelized attention, or misplaced priorities), he did something other than fly his aircraft. However, the results are all too common in the A-10 community. He impacted the ground almost wings level, slightly nose low, at normal egress airspeeds. These losses are ones we cannot afford. The term **thinking wingman** means he is **thinking about flying his jet**.

Finally, we have a very junior wingman flying on a routine, but well-structured training mission.

The flight leader has a problem with his jet, directs a rejoin, and asks for some checklist help. The mishap pilot apparently neglects aircraft control while trying to dig into his checklist. The wingman, for whatever reason (see above), fails to maintain proper ground clearance and flies into the ground. We cannot seem to get away from these tragedies. They are an expense in both combat resources and personnel we can't afford.

Some Concerns

We are doing well from an overall standpoint within the weapon system. Our major concern on the logistics side remains the engine. They're getting older, and we are asking them to fly harder. We also have a few minor irritants, like the fuel quantity indicating system and oil pump failures that our "loggies" are working hard. While these events can be serious, good emergency procedures knowledge by the pilots and good inspections by maintenance have kept them at the noise level.

By and large, the maintenance and logistics folks are keeping us high on the list as the safest fighter/attack flying. The air logistics center produced the Low Altitude Safety and Targeting Enhancement (LASTE) ahead of schedule and are now getting them installed in our jets. It is our hope this will put a halt to some of the collision-with-the-ground mishaps. After talking with the guys who have flown LASTE, I think it will certainly raise some of the gun scores. Hopefully, the next mishap will be a fight at the ops counter to see who gets the LASTE jet for the upcoming range mission.

We, in the A-10 community, have an enviable safety record, all of which is a byproduct of smart pilots, flying jets maintained by good maintenance personnel, and using proven MCM 3-1 tactics. I believe this simple formula works. When we have all three parts working together, we will then realize our lowest mishap rates. Remember the good gunners **track—shoot—track**, after all, that's what it's all about. ■

Our Readers' Genius Outshines B.Q.L.!

AND THE WINNER
FOR THE JULY 1990
DUMB CAPTION CONTEST
IS . . .

SSgt Henry R. Harlow
907 CAMS/MAAA
Rickenbacker ANGB,
Ohio 43217

OOOPS!
MISSED IT
BY
THAT MUCH!



Pardon us for gloating, but it is so good to be right, especially when it comes to knowing you folks would beat the best efforts of the (in)famous Byron Q. Lackluster, President and International Director of the United Organization of Dumb Caption Writers of America (UODCWA). Ah, it is to laugh with joy! We want to send our most heartfelt appreciation to everyone who participated in this month's competition and to all the great examples of dumb humor which have thoroughly trounced ol' Byron-baby's best shot.

And, of course, the best effort of all was by SSgt

Henry R. Harlow (a previous winner who has risen to new heights of excellence), who sent in the winning entry you see printed above. Henry has won the legendary CHEAP LITTLE PRIZE and is hereby awarded the eternal right, whenever he should feel so inclined, to thumb his nose at Lackluster and his entire UODCWA gang. Wow! What a day!! And we also have the delightful honor of presenting the 10 Honorable Mention recipients, each of which was definitely better than BQL's pathetic best. You people are great!! Keep it up! We love you!

Honorable Mentions

1. Excuse me, I'm not sure I understand. How do you work this thing again? And could you explain this round thing once more!
SSgt Terri Andrade, 6732 Harbor Circle, Chattanooga, Tennessee

2. TSgt Mitchell demonstrating a new technique based on his unique persuasive abilities actually coaxed the aircraft into position over the bomb load. The judges awarded him a 9.9 (minus 0.1 for not following the technical order).
First Lieutenant Andrew C. Brunetto, 97 OMS/MAOZ, Eaker AFB, Arkansas

3. Take a left on taxiway B, go down three aircraft—that's where the latrine is.
MSgt LeRoy Trusk, SWC/SEG, Ellsworth AFB, South Dakota

4. I don't care how much time you think it will save, lieutenant, I'm not going to load these bombs while you're taxiing!!
Chuck Woodside, SA-ALC/PMR, Kelly AFB, Texas

5. OK, one last time! The widdle Tweety Bird was being chased by the bad ole' Puddy Tat. I didn't see the Puddy run in front of the jammer. I stopped too quick and the mark-82 fell off and landed on his head. That's when the little birdies started circling him and . . .
TSgt Timothy J. Etherington, 6510 CRS/MACAI, Edwards AFB, California

6. How long must I sit here and wait for that stupid bird to come back?!

Alvin Calender Field, 159 TFG/CAM SQ, USNAS, New Orleans, Louisiana

7. Could you hand me the load tasking—I don't mind being evaluated three times in one day. (Under his breath)—Come a little closer and I'll bop you between your little beady evaluator's eyes.
George S. Colona, PSC 1, Box 23293, APO San Francisco, California

8. No need to hurry, guys—we passed the max allowable time for loading 5 minutes ago.
Major Ralph C. Mayton, Jr., 12814 Brockwell Road, Prince George, Virginia

9. Two outside loops . . . a figure eight . . . now an Immelmann with a 4-point roll . . .
Ron Graves, OC-ALC/MAQCP, Tinker AFB, Oklahoma

10. And to think, the number of times I've done this task and you headquarter's folks noticed a comma missing from the checklist! Thanks.
George S. Colona, PSC 1, Box 23293, APO San Francisco, California

FRAUDULENT HONORABLE MENTION EXPOSED

The handwritten honorable mention naming Byron Q Lackluster as recipient number 11 which was added in the margin of the Oct '90 issue was a fraud. Someone sneakily inserted it at the printers after our final press check. We regret this embarrassing incident. (Investigation report to follow—watch out Lackluster.)



F/RF-4

LT COL PETER H. N. SCHALLER-KALIDE, GAF
Directorate of Aerospace Safety

■ After having the best year ever in FY89, the F-4 community saw FY90 turn out to be one of the worst—with 12 Class A mishaps and 1 Class B mishap. This gives us a Class A mishap rate of 7.80 per 100,000 flying hours for both aircraft, “Fs” and “RFs” taking their share with seven and five mishaps respectively.

What were the problems? Is there any trend noticeable? The first question is answered pretty easily by just going through some of those mishap files.

Ops Mishaps

Low altitude air-to-air work led to the death of two Phantom crews in two different missions. During defensive reaction turns at low altitude, the mishap crews met their end.

Here the question arises: What were the duties of each crewmember during this turn, and what were they really doing? One thing is for sure, neither one was clearing the flightpath. You guys have a big advantage over the single seaters—you are two in one aircraft. Make sure you use it! Get organized about what you are doing. Think about organizing your priorities. Life is so beautiful, especially with YOU around.

This next mishap is something for you F-4 drivers to seriously think about; and should be taken into account in planning, briefing, and executing your future missions. What happened?

A two-ship was lined up for formation takeoff—a little wide, with

each aircraft in the middle of its half of the runway. During the takeoff, no. 2 tried to close in, goofed it, overcorrected, skidded, and ran into the weeds. Okay up to this point. This has been done before. Even a nose gear collapsing on an aircraft and damaging it is not a too problematic thing. But here something else happened, and not for the first time with the F-4.

Part of the nose gear penetrated the front cockpit floor and pushed the pilot's seat up the rails, initiating an uncommanded and out-of-envelope ejection sequence. This resulted in the WSO being catapulted out of his cockpit, causing severe injuries on impact. The pilot was lucky his system did not fire.

There have been seven instances in which the crew either had their ejection sequence interfered with or an out-of-sequence ejection initiated. One crewmember was fatally injured as a result of a nose gear actuator penetration of the front cock-



pit initiating an out-of-sequence ejection.

Next, a completely unnecessary mishap. A crew got short on fuel, emergency landed steep and hot on a 3,500-foot strip, and guess what? They did not make it. After landing long, they could not come to a stop within the remaining distance. They were lucky—just the aircraft got beat up. Flight planning with *all* the necessary information (in this case, headwinds) is not just for kicks.

Another mishap happened when an RF-4 crew experienced an engine overheat warning light, shut down the engine, and returned to base. On short final, the aircraft appeared to go out of control, and the aircrew successfully ejected.

Let's have a closer look at this one. You all are familiar with the problem "Fire/Overtemperature Light" in F-4 aircraft. If it's valid or false, they all have to be treated the same which, in terms of the book, says, land *as soon as possible*.

Everything went fine until the decision was made to let no. 2 land first because lead was going to take the approach end barrier. The mishap pilot (MP) became distracted by hydraulic problems on final, got into the jet wash or wing vortices of the leading no. 2, and was in trouble.

So, if you are in trouble—in this case, in serious trouble (a fire light following engine shutdown is serious trouble)—don't be nice to others who are in good shape and should have gas enough to make the alternate. Get all the help you can get and let them clear your way down to safety. This politeness only cost the taxpayers a good aircraft, and, luckily, not the lives of the crew.

Another Class A ops mishap was an air-to-air weapons instructor training mission. Everything was briefed and talked over. The first two setups went fine. During the third engagement, it happened. They lost sight of each other, did not call or knock it off, and two aircraft were lost and one crew died.

What happened was, the aircraft collided and went out of control. Doesn't it say somewhere in those regulations: When you lose sight of the other one, call for "Knock it off" and turn away from the position you saw him last. Never leave it to your luck that you might see him again in time. But who am I telling this to? We never do or did this . . . or have we?

Log Mishaps

Another F-4 mishap occurred when a nozzle flap seal was lost in flight and the engine caught on fire, could not be extinguished, and the crew successfully ejected. Little things can cause big problems. In this case, a bolt that holds the nozzle flap in place became loose, got out of position, and the flap displaced to such a degree the seal could depart its position. Deflected afterburner exhaust gases then did their job and set the bird on fire. No chance for the crew to recover the F-4. Maintenance had some stakes in here.

This one is another logistics factor mishap. The aircraft gave the crew some additionally challenging uncommanded rolls. Five of those

continued



were given at an altitude where the crew could recover them. The sixth, and last, happened on short final. Luckily, the aircraft's attitude was favorable for a successful ejection. The aileron power control cylinder was the troublemaker.

Undetermined Mishaps

We lost an aircraft and one crew-member while practicing advanced handling characteristics when the aircraft went out of control in a defensive reaction turn and was not recovered. The initiation of the ejection was too late for the pilot's ejection sequence to function properly, and he hit the ground still in his seat.

Let's look at this mishap a little closer. The out-of-control situation happened after initiating a defensive reaction turn at an altitude of about 11,500 feet MSL. Why the aircraft went out of control we don't have any clue, only speculations, but why the pilot got killed is pretty clear—the EJECTION was too late!

Why? Doesn't the book say minimum ejection altitude in an uncontrolled situation is 10,000 feet AGL. In this case, the uncontrolled ejection altitude was 12,000 feet MSL.

So, when those guys' aircraft went out of control, there should have been only one decision: BAIL OUT!

Why did they eject that late? Were they tensed up, channelized, overtaken, stressed? One thing is pretty obvious: The crew coordination was not the best. So, for your benefit, keep in mind: Always stay ahead of a situation, do the correct procedures, and, when it's getting tight, save your butt—by not messing around with a messed up aircraft—get out of there. I know this is hard language, but we want you alive to continue to fly and be with us, telling war stories at the bar.

The last mishap I want to discuss with you occurred during a low level (700 to 1,000 feet AGL) tactical turn. The MP experienced a right hard-over rudder. The MP climbed out of the low altitude structure and returned to home base for a planned landing using approach end arresting gear. At touchdown, the aircraft drifted right, the hook missed the cable, and the aircraft departed the runway. Shortly after runway departure, the mishap weapon system operator initiated an MP-commanded dual sequenced ejection and landed uninjured. The

front cockpit (FCP) canopy fired, but the FCP ejection sequence was interrupted. The MA and MP continued tracking through grassy terrain until coming to a stop. The MP shut down both engines and emergency ground-egressed the aircraft uninjured.

This is the story. And there are some open questions which I believe should be answered.

Number 1 question I can imagine you want an answer to, is:

Why did the hook miss the cable?

Okay, this is the old known problem with F-4s taking the BAK 12/14 Barrier. One day it works, the next day it doesn't, especially when the aircraft is not lined up perpendicular or is off center with the cable. So, don't get surprised and behind, prepare yourself, and be ready any time you have to deal with this situation.

Number 2 question is of much more interest to you pilots flying the Phantom:

Why didn't the dual sequenced ejection work as advertised? (Do we really have a zero/zero system, and/or are there any limitations?)

The answers are yes, we have a zero/zero system, and no, there are

no limitations. This particular case was a *one-time shot*, a single case. This is the information I can give you.

But what you should keep in mind and make a briefing item on is: Whenever you are going to depart the runway and the decision is made to bail out, don't rely on a dual sequenced (by whoever initiated it) ejection, but pull your own ejection handle. Doesn't this sound familiar? Yes, you have read it in the fighter pilot's bible, the Dash-1, in the part where it tells you something about runway departure.

If the crew had done their homework and had followed the Dash-1 and made it a part of their briefing, the MP wouldn't have ridden out this ground tour, but pulled his own firing handle as advertised, bypassing the sequencing mode.

Now remember my second question at the start of this article: **Is there any trend noticeable?** The answer is **yes**, there is a *correctable* trend noticeable. Read on.

Crew Coordination

You should have found out this already yourself while reading through those mishaps. Put more emphasis on communicating among each other, divide the duties,

and trust your partner! You are a crew, and mission accomplishment to full success can only be done by you as a crew.

Safety Issues

There are additional problems you have to deal with in your day-to-day flying and I in my daily reading of the reports.

No. 1 is the still-occurring, erroneous fire/overheat lights, and no. 2 is the uncommanded ejections when the nose gear collapses on you.

False Fire/Overheat Lights

The fire/overheat light problems should be solved hopefully soon with the release of TCTO 1548/1549 (right/left engine), dated 20 April 1990 (compliance due by next engine change). Content of the TCTO: Remove the connector at the bulkhead (major source of false indication) and change out the wiring to the detecting loops.

You see, something is cooking, and as we say in Germany: "Gut Ding, will Weile haben" which means in your tongue "Good things take time," and the problem of false fire/overheat lights will be (hopefully) pretty soon of historical character. If you want more details on

this subject, read the article "The Second Fire Warning Light . . ." in *Flying Safety*, August 1990.

Uncommanded Ejections After Nose Gear Collapse

This is a very serious problem. Imagine you are sitting fat, dumb, and happy (please excuse the language) in your aircraft, and while taking off or landing, you get off the runway into the weeds, the nose gear collapses, parts of it penetrate the front cockpit floor, and boom—there goes the rear seat guy, uncommanded, not prepared, and worse, in out-of-envelope conditions of the ejection seat. Major injuries or death are inevitable. Nice outlook, isn't it?

My advice is if you go off the runway, eject before the nose gear collapses, don't rely on a dual-sequenced ejection, and pull your own handle and give yourself a chance.

Summary

In January 1990, the F-4 fleet flew its 10,000,000th flying hour—a tremendous number of hours. Congratulations! You did a great job.

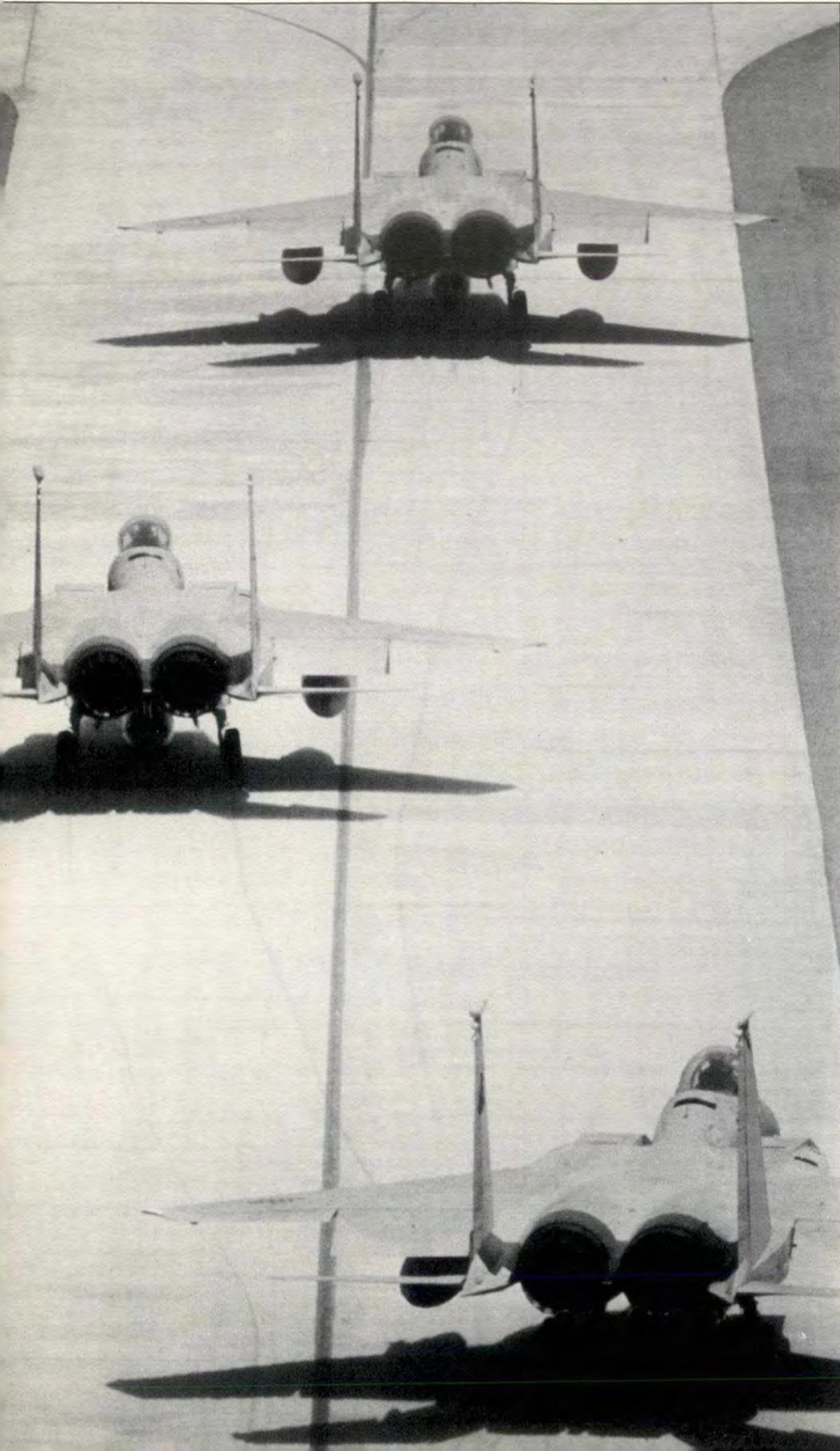
During this time, there have been good and there have been bad years for the F-4 community. FY90 was one of the worst—12 mishaps including 11 aircraft and 9 crewmember losses occurred in this period. As we look at them, some were completely unnecessary and avoidable. The deaths of seven crewmembers hurts most.

I hope this report will help you to do better, or different, to be prepared and ahead, or to do whatever else is necessary to be called a professional fighter pilot. Let's cut down on those "dumb," unnecessary mishaps. The real problems give us trouble enough and take their toll—they still need all of our attention.

The Bird is old and will be phased out not too far in the future. The Phantom still has some bugs you have to live with to the very end of it's era, so fly it safely, and may all your landings be one you guys can walk away from. "Hals und Beinbruch"—your concerned Action Officer at AFISC. ■



F-15 Eagle Mishap Review



MAJOR GRAHAM A. LARKE, CAF
Directorate of Aerospace Safety

■ FY90 was "one of the best ever" for the Air Force. But with seven Class A mishaps, seven destroyed aircraft, five fatalities, and six Class B mishaps, it was not an especially good year for the Eagle community. In the nearly 200,000 hours flown, this gave us a 3.11 Class A rate. The fighter/attack rate, in comparison, was 3.48.

Statistics for weapons systems are broken down into ops, log, and environmental. FY90 figures, when compared to the previous 2 years, looked like this:

	FY88	FY89	FY90
OPS	1	4	5
LOG	0	1	2
ENV	0	0	0
<hr/>			
TOTALS	1	5	7

FY88 was the best year ever for the Eagle. As you can see, the ops factor has been high during the past 2 years. AFISC analysts had forecast four class A's (collision with ground [CWG], engine, hydraulic, and other).

Let's take a closer look at the FY90 statistics. They look like this compared to FY88 and FY89:

	FY88	FY89	FY90
CWG	1	2	3
Midair			1
Loss of Control	1		1
Engine			2
Structure Failure	1		
TOTALS	1	4	7

Collision With Ground

Collision with the ground has now claimed more Eagles than any other ops mishap, as evidenced last year. Unfortunately, CWG almost always results in the death of all crewmembers aboard that aircraft.



What are we doing wrong? Let's look at two FY90 mishaps and see if there are any lessons to be learned.

On the first, the mishap aircraft departed on a functional check flight (FCF). After completing some checks in the military operating area (MOA), the mishap pilot (MP) started a mach run as part of the profile prior to RTB. During the mach run, the MP was cleared to the airport from the MOA, asked to slow to 300 kts and descend to 14,000 feet MSL; then subsequently cleared to 7,000 feet. The MP, uncertain of his cleared altitude, queried ATC with "confirm cleared to 2,000 feet MSL." While attempting to verify the cleared altitude, the MP continued his descent, and the aircraft impacted a mountain, in the weather, at 3,000 feet MSL.

Did the MP know his minimum safe altitude for the approach? He had been flying out of the base for over 2 years. Why did he continue to descend when uncertain of the clearance? We will never know the real reason and can only come up with "most probable" reasons.

Without question, this mishap could have been prevented. Pilots flying in mountainous terrain, in

the weather, must adhere strictly to minimum safe altitudes. This is a basic instrument procedure. We all know of the inherent danger while flying in the vicinity of "cumulus granite" clouds.

The second CWG mishap occurred during a 2 v 2 dissimilar air combat tactics mission against two F-16s. Prior to the fight, the two F-15s had done two G-awareness turns. During the first engagement, no. 2 misjudged his attack on one of the F-16s and began a turn reversal. As the MP began the turn, the flight lead directed the MP to leave the fight and re-enter.

During the high-G turn, the MP most probably did not perform an adequate anti-G straining maneuver and lost consciousness. The aircraft continued in a right roll, and the nose began to fall. The mishap aircraft impacted the water. There was no attempt to eject.

The MP was not centrifuge trained, nor had he flown a high-G sortie in 8 days. This mishap obviously could have been prevented by a proper anti-G straining maneuver—a routine procedure for a fighter pilot. Was he ready for it? The key here is ANTICIPATION.

Loss of Control

Loss of control is right behind CWG in terms of ops mishap causes. Some might say loss of control is just a part of doing air-to-air business. But this is just not so. If you know your jet and its limitations, you should never encounter a loss of control situation. Let's look at the one experienced in FY90.

The mission was a two-ship BFM continuation training sortie with the MP acting as no. 2. The MP rolled into a left slice using 135 degrees of bank angle and flew a tight, nose low defensive turn.

To keep sight of the attacker, the MP aggressively stepped on the left rudder. This rudder input sounded the departure warning tone momentarily and established a significant yaw rate. The MP aggressively transitioned from a 6- to 7-G nose low left turn with left rudder to a right nose high reversal with full right rudder, full right aft stick. The aircraft departed and entered a spin to the right.

Clearly, the MP's fangs were out. He went beyond the limits of the Eagle, and it reacted predictably by departing controlled flight and entering a spin. Was this preventable?

continued

F-15 Eagle Mishap Review continued

I think it was.

Remember, a departure should not be encountered below 30 units AOA at any altitude, airspeed, or loading. Above 30 units, however, the presence of external stores or asymmetry increases the departure susceptibility. Additionally, there is an area of instability in the Eagle's flight regime (generally between 40-44 units AOA) when there is sideslip—and abrupt stick or rudder inputs can cause a departure and subsequent spin if not properly countered.

"Smoothly neutralizing the controls at the first indication of . . . departure will normally recover the aircraft to controlled flight quickly."

Midair Collision

We continue to run into other aircraft—unfortunately, more often than not, with someone in the same flight. The one midair this year involved a 14-ship defensive package. Due to breakdowns in communication, both mishap pilots and their flight leads were unaware of the other flight's location or intentions. Both flights converged on the same target group at the same time. In a near head-on pass, the canopy and windscreen of one aircraft impacted the right stabilator of the other. One of the mishap pilots was fatally injured, and the other was able to RTB with substantial damage to the right stabilator.



Channelized attention and distraction were probable factors in this mishap. This air-to-air scenario is one of the most demanding and requires sharing time both in and out of the cockpit. Too much devotion to your radar can be dangerous in a high-threat scenario such as this one. You also must think about your tactical formation position, the possibility of acquiring a visual on the bandit(s), and last but not least, you need to clear your flightpath.

Logistics Mishaps

We experienced two Class A log-related mishaps in FY90 (both engine related). On the first one, as the MP pushed both throttles up to mil power, he heard two explosions and felt the aircraft shudder. The second stage fan disk most probably failed and explosively "liberated" 90 percent of the fan rotating hardware. The parts damaged the flight controls, electrics, and fuel systems resulting in the loss of aircraft control, flameout of the remaining engine, and a catastrophic fire.

On the other mishap, just after the MP selected AB, the fourth stage engine fan turbine (fourth stage disk) failed due to fatigue. The liberated turbine blades fractured the engine containment band, penetrated the center engine bay bulkhead, and leaking fuel ignited in both engine bays. In both mishaps, the pilots experienced uncommanded flight control inputs and multiple systems failures culminating in catastrophic engine fires. Both pilots analyzed the situation while attempting to regain control and ejected at the appropriate time.

Class B Review

There were six Class B mishaps in FY90. Only luck kept some of these mishaps from being tragedies. Four of the mishaps were engine related (fourth stage compressor blade, spacer failure between second and third stage fan disk, AB burnthrough, and engine fire). Fortunately, two of these mishaps occurred on the takeoff roll, and the crews were able to abort/ground egress. Had they happened in flight we could well have had two more Class A mishaps.

Another Class B was due to a wing attach bolt being improperly fitted causing structural damage to the aft wing root. And finally, we had an inadvertent AIM-9 launch causing major damage to the left horizontal stabilator, both vertical stabs, both engines, and left flap and wing tip. This one could have been real serious, and we were extremely fortunate to recover the mishap aircraft.

Class Cs, HAPs, and HATRs

In reviewing the Class C mishaps, high accident potential (HAP), and hazardous air traffic reports (HATR), there are several worth mentioning because of their mishap potential. We had a lot of stall stagnation and AB burn-through reports last year.

The importance of catching problems when they occur and handling the situation properly is the key until planned fixes are incorporated into the Eagle fleet. Of all the bird strikes in FY90, two were large turkey vultures striking the airframe. You can well imagine the results if either had struck the canopy, and subsequently, the pilot.

Finally, we were, indeed, fortunate on two of the five HATRs. On one, an Eagle pilot was cleared for an overhead pattern, and in the break, had to take evasive action for a helicopter. The tower controller thought the helicopter was at 3,000 feet versus 2,000 feet (pattern altitude). In the other, the MP was directed to make a 360 degree turn from the base leg, and during the turn, found himself pointed at another aircraft (co-altitude) performing an instrument approach to land. Again, had the MP not been alert and taken evasive action, we could well have had two more midairs.

Beagle Quirks

For the most part, the F-15E is just another Eagle. Other than being plagued with a bunch of avionics snags which one could expect with a new model, the Beagle has the same problems of the other Eagle models. There is one exception, however. MK 82s have problems coming off the shoulder station causing damage to the



horizontal stab.

Other Concerns

There are two rather disturbing concerns from the FY90 reports that have mishap potential. The first is the number of pilots involved in physiological incidents who have experienced hypoxia. We know the Eagle has cabin pressure and oxygen regulator problems. Therefore, requirement for the climb check and inclusion of cabin pressure and oxygen on the ops checks is critical.

The other disturbing factor is the number of Eagle pilots involved in G-LOC incidents where the mishap pilot didn't eat breakfast prior to the mishap flight. I am not a doctor, but I do know the importance of having an adequate blood sugar level in the body before subjecting it to 9 Gs. There are other ways of los-

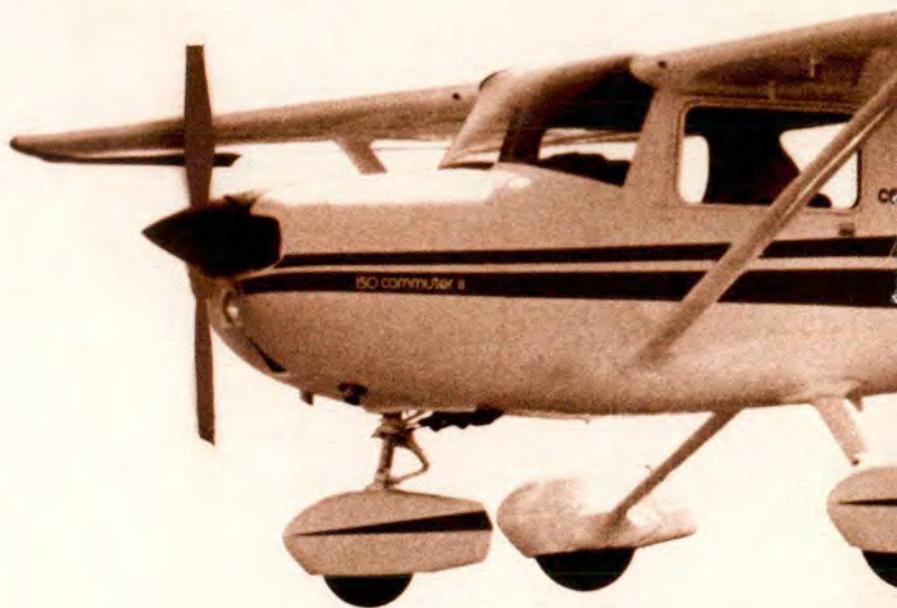
ing a few pounds, guys. Try exercise, for one.

Summary

In summary, although FY90 was a great year for the Air Force, it wasn't the greatest for the Eagle community. Our ops mishaps are more than double the log mishaps, and we still seem to be making the same old mistakes of running into each other, running into the ground, and losing control of the jet in our air-to-air engagements.

Finally, the mishap forecast for FY91 predicts a reduction in the number of mishaps for the Eagle community. Can we achieve this prediction? I think so, and I also think you are capable of better than that. There's the challenge. Now check six, fly safe, and get out there and do it. ■

EPITAPH FOR THE CARELESS



DOROTHY SCHUL
Editorial Assistant

The pilot was practicing emergency landings in a Cessna 150. It was the week before he was to receive his private pilot's license. It was a beautiful June afternoon—clear sky, no crosswind—a perfect day for flying. He was making his sixth simulated emergency landing when it happened.

While approaching the threshold on final, the prop suddenly stopped. He put the nose down, touched down at about 80 mph, and when he had slowed enough, headed for the grass to get out of the way of a twin-engine Cessna behind him.

There had been no time to at-

tempt a restart in the air. The pilot was glad he hadn't even bothered with it because when he tried it on the ground, it wouldn't start. After the first try, he saw why. The fuel mixture knob, right next to the throttle, was out. This had, in effect, shut off fuel to the engine and caused it to stop. Embarrassed? You bet.

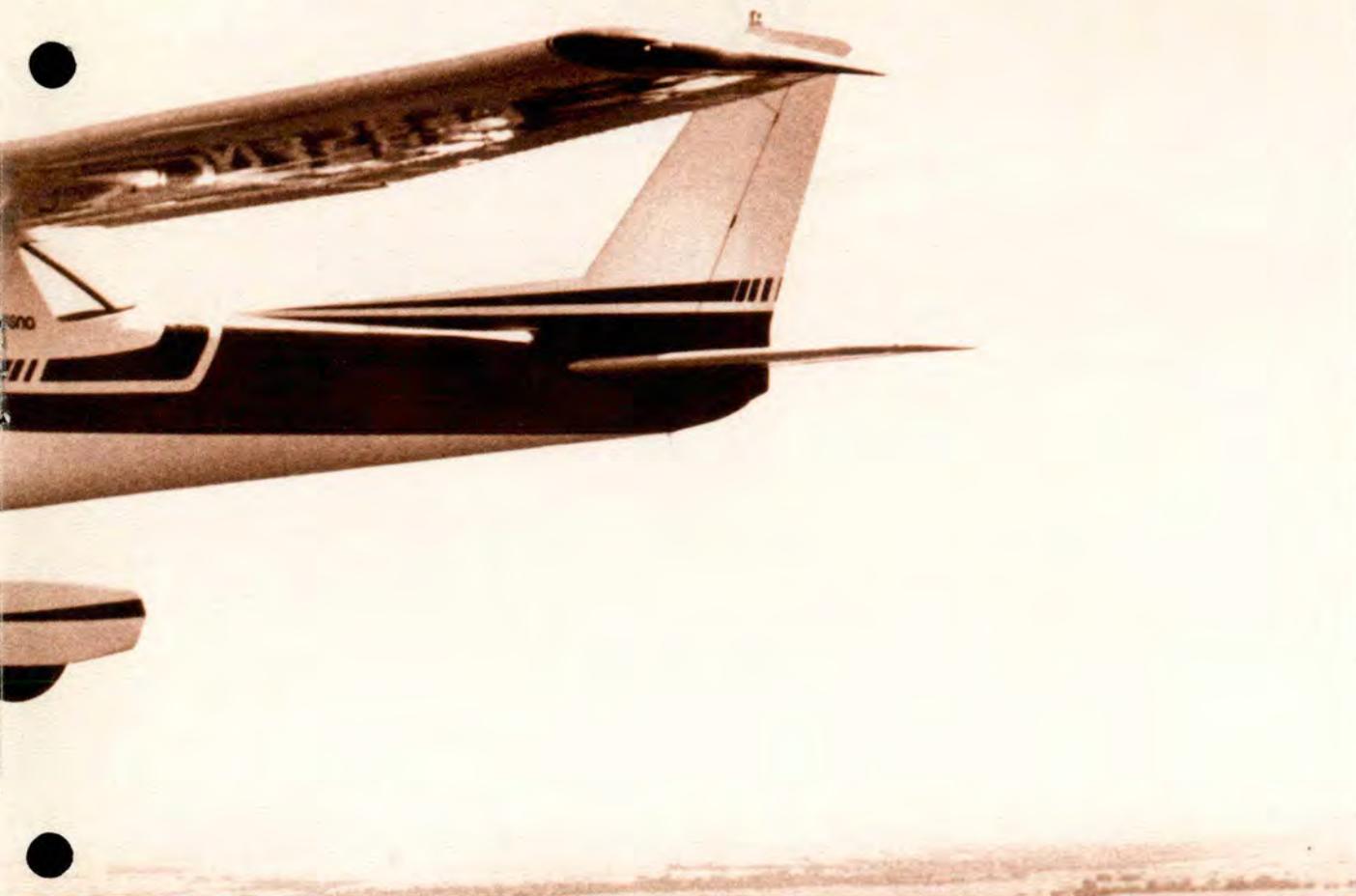
Proficiency can bring about complacency, even in low-time pilots. He had become so confident he didn't bother to look when he pulled the throttle knob back on final. Instead of getting the throttle, he had grabbed the fuel mixture knob and pulled it all the way out. He was concentrating on other things and didn't even notice the different feel of the knob.

He had heard stories about other pilots making dumb mistakes he would *never* make. But suddenly, there he was. It was an . . .

■ The narrative stated “. . . The pilot failed to ensure the mission was accurately planned. The crew took off unaware they would be approaching an emergency fuel state. A low fuel level was finally recognized about 2 hours into the mission. Following indecisions on diverting, the mishap pilot flew an indirect route and descended early. The aircraft ultimately ran out of fuel, crashed 1 mile short of the runway, and was destroyed.”

Another narrative read “. . . An instructor pilot and student were on a spin demonstration flight. The instructor pilot violated regulations by not descending to verify cloud tops in the area prior to the spin. Both pilots became disoriented during the attempted spin recovery in the clouds. The crewmembers ejected successfully.”

What do these mishaps have in common? **Complacency** was a con-



tributing factor cited in both instances.

Complacency Means . . .

But before talking about complacency, it needs to be defined. Is complacency some convenient catchall label which makes the investigator's job easier when identifying causal factors? Perhaps you have your own opinion of the definition based on past experiences and thought processes.

To most of us, complacency means a feeling of quiet pleasure or security—perhaps being satisfied with your merits and situation while unaware of some potential danger or defect—maybe even smug satisfaction with an existing situation or condition. Some interesting words show up here. *Security*, which we think of as freedom from danger, and *satisfaction*, to be content with the existing situation

or conditions.

However, a safety investigator's point of view is quite difficult. Complacency could be a state of reduced conscious attention due to an attitude of *overconfidence* or *overmotivation*.

The "Just Another Routine Mission" Syndrome

An aircrew's perception of a mission largely influences their attitude toward that mission. If the mission is perceived as interesting, demanding, or challenging, chances are good the crew will prepare themselves accordingly. There will be proper personal and physical preparation, thorough mission planning, professional briefing, and alert and responsible execution. But if the perception is otherwise, the effect on crew attitude can produce some bad results—complacency being one of them!

In the hierarchy of embarrassing human errors to the professional aircrew member, certainly errors of carelessness must be at the top of the list. Carelessness translates into a lack of concern, caring, involvement, professionalism, assertiveness, and control. And carelessness is the unforgivable sin.

All of those involved in the investigation, analysis, and prevention of aircraft mishaps, including, of course, crewmembers and supervisors, should be aware of the effects of mission perception on crew attitude, and of crew attitude on planning. Piece-of-cake perceptions can lead to careless and complacent behavior.

Epitaph

"Complacency? Me? Never happen. I'm too good at what I do. Period."

Wouldn't that make a great epitaph on a headstone? ■



F-16

GOOD AND LUCKY!

Twenty-one Class A mishaps seems like a bunch when we only had 13 last year, but as recently as FY88, we had 22. If you're good and lucky, we'll beat this sobering projection. Remember, you can help make your luck with hard, smart work.

LT COL DAVID M. BURNETT
Directorate of Aerospace Safety

■ FY90 was the best year ever for the F-16. We had projected 21 Class A flight mishaps during the year. Instead, outstanding flying, painstaking maintenance, and superb logistics and engineering efforts cut our actual mishaps by more than a third. Phenomenal!

Still, during this recordbreaking year, we suffered 13 crashes, losing 7 lives and 15 jets, for an annual rate of 3.2 Class A flight mishaps per 100,000 flying hours. To cut these tragic losses further during the coming year will require your continued vigilance and best efforts—and not a little luck.

Collision With The Ground

During FY90, we had three collision with the ground (CWG) mishaps. CWG has been the most common and deadly type of opera-

tions mishap in the F-16, accounting for over a quarter of the 131 Class A flight mishaps we've had since the Falcon first flew in 1975. Twenty-eight of the 30 pilots involved in these mishaps died, including those below.

One CWG crash involved an F-16D where the back seater's G-suit inflated and pushed against the side-stick controller. The front seater probably did not recognize the source of the problem and wasn't able to overcome the effects of the stick interference. The resultant right roll to a nose-low attitude and crash killed both men without an ejection attempt.

You may have noticed that stick interference is now a mandatory two-seat briefing item. Further, an engineering evaluation is now under way to come up with the best way to minimize the potential for unintentional stick inputs in both the single-seat and two-seat models.

Another CWG mishap involved a pilot attempting to make several fire control nav panel (FCNP) key-strokes while completing a tactical turn at the low level route start point and descending to the 300-foot minimum altitude. He must have focused his attention on some-

CWG has been the most common and deadly type of operations mishap in the F-16 . . .

thing other than "priority one" for low level ops (AVOID THE GROUND) for too long.

As a result, he hit the ground, halfway through the turn, in an 11-degree descent without so much as a pullout attempt. He set himself up for this mishap by using a complex timing technique, allowing maintenance red balls to distract him from getting the FCNP set up prior to takeoff and attempting to do too many things at once as he crossed the low level start point.

Doublechecking you're really ready to go after you encounter ground ops turbulence, and simplifying your start low-level techniques will help you keep out of this trap.

Another CWG mishap occurred during a dry, night radar low level attack. The jet impacted at a shallow angle at high speed and with high engine rpm, without an ejection attempt. A lot of questions still remain unanswered.

While these three tragedies represent intolerable losses, we avoided several similar crashes we had predicted and had every reason to expect. We avoided them because you paid attention to G-induced loss of consciousness (GLC) and weather-related spatial disorientation (SDO) problems which hit us hard in previous years. Good work!

Midair Collisions

We had three midair collisions in FY90, making it one of the year's two most common operations mishaps. Two of the midairs were between F-16s during air combat

training (ACT), costing the life of one pilot and the loss of four Vipers. The other was between an F-16 and a civilian glider, which was destroyed, killing its pilot.

ACT

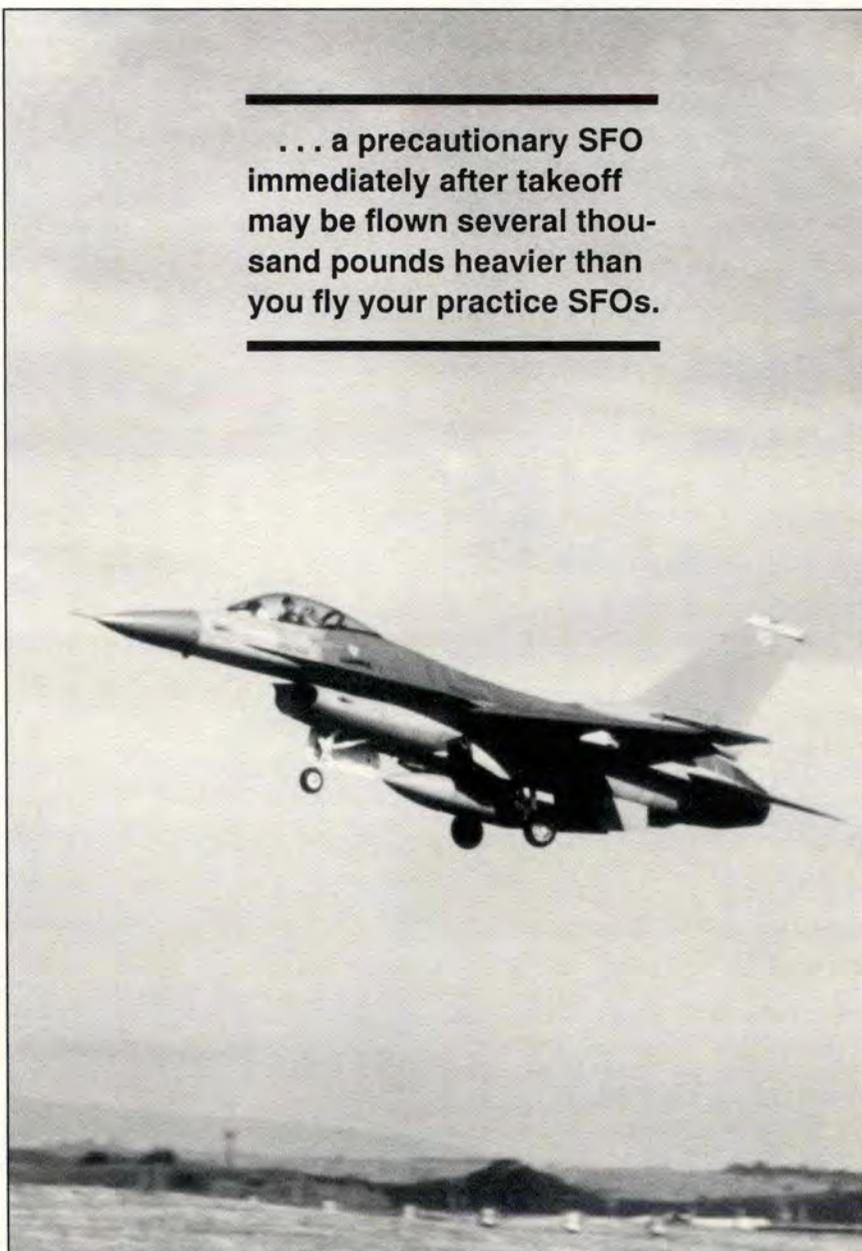
Flight discipline, training rule adherence, engaged or supporting contract maintenance, and clear, concise comm will prevent almost all midairs during ACT, including the two described here.

One occurred after a wingman went "blind" during an in-place turn to head back toward a bandit after overflying him at a no-joy

continued

F-16 Class A Mishap Statistics FYs 90-91			
Category	Proj	Actual	Proj
	FY 90	FY 90	FY 91
Engine	7	6	7
Collision with Ground	5	3	4
Midair Collision	2	3	3
Out of Control	2	0	1
Environment/Weather	1	0	1
Takeoff/Landing	2	0	2
Pilot-Induced Flameout	1	0	1
Aircraft Fuel System	1	0	2
Other	0	1	0
Total	21	13	21

. . . a precautionary SFO immediately after takeoff may be flown several thousand pounds heavier than you fly your practice SFOs.



F-16 Good and Lucky continued

merge. The wingman wasn't having a good day, and the flight lead, after getting a lock on the bandit, had to ask the wingman if he was still visual. Following the wingman's "blind" call, the flight lead gave him a snap vector to the fight as he merged with the bandit, gaining a slight advantage, but unable to get a shot. The wingman got a lock and pressed toward the merge, gaining a tally but still blind on his leader. He didn't take a max range shot into his leader's fight for a quick kill. Instead, he attempted to make a belly entry on the bandit, into the heart of the engaged fighter's exclusive use zone.

He apparently assumed the

If you don't think this can happen to you, you may not be paying enough attention to what your upgrading wingmen are doing . . .

flight lead was defensive or neutral, and not a factor in the bandit's vulnerable cone, since he still didn't see him as he converted on the bandit. They collided belly to belly behind the bandit, the jets came apart, and only the flight lead survived the subsequent ejections.

If you don't think this can happen to you, you may not be paying enough attention to what your upgrading wingmen are doing when they go for a role change from supporting to engaged fighter during air combat maneuvering. There are times when flying the jet and moving the switches require so much of a new guy's (or even a rusty old head's) attention that he can lose



Pilots of F-16s have one of the "best seats in the house." But only as long as throwing switches has a lower priority than collision avoidance.

sight of his collision avoidance responsibilities.

The other midair took place during ACT with a briefed target aircraft maneuvering limit of a single, 180-degree turn following a tactical intercept. During the mishap engagement, the target aircraft exceeded the briefed limits, but neither pilot knocked it off. Subsequent maneuvering resulted in a head-on pass with the fighter maintaining a left turn across the nose of the target to "remain predictable."

The other pilot attempted to clear to the right resulting in a mirror image movement as they bore down on each other. Last-ditch maneuvers were unsuccessful in preventing the midair.

Glider

The only non-ACT midair of the year involved an F-16 leading a two-ship in tactical formation while cruising at VFR hemispheric altitude (5,500 feet MSL) and a small civilian glider riding thermal currents. The F-16 pilot was doing all the right things, but the glider presented such a small cross-section that it was virtually invisible until it was too late.

It's doubtful the glider pilot saw the F-16 coming, and he was killed when the F-16 sliced his wing off and he spun in.

Other Operations Mishaps

One operations mishap we were

surprised to avoid during the year was a pilot-induced control loss. This is a particular problem in the early F-16A/B with its "small tail." It can still happen to the F16C/D, but is a bit harder to get into and a bit easier to get out of due to the "big tail" (which is also installed on Block 15 A/B models).

Terminating your maneuvering and executing an unloaded roll to the nearest horizon for an inverted pulldown has been good enough procedure to avoid most departures. Those of you who didn't unload and roll got to ride through a self-recovery or had to pitch rock out of a deep stall. The new departure/deep stall recovery video (demand a viewing if you haven't seen it—AAVS PIN 608512) apparently helped those who needed it to recover successfully.

Another common type of operations mishap we managed to avoid was a takeoff or landing mishap. Takeoff mishaps are usually the result of delayed abort decisions or failure to put the hook down soon enough. Landing mishaps often involve weather or night, which require precise instrument flying and a clear understanding of how to

There has never been a case of frozen fuel in the F-16, and this was not the first . . .

smoothly transition to visual references and accurately identify the touchdown zone.

Correct terminology will help turn off the sequenced flasher lights, turn on the runway end identifier lights, or adjust the approach or runway lights when you want them adjusted to facilitate your approach. The other common type of landing mishap involves the simulated flameout pattern (SFO). Failing to use the increased tech order speeds at higher gross weights can result in a square corner as you try to break your descent for the flare.

Another factor to consider is that a precautionary SFO immediately after takeoff, even after you've jettisoned the stores, may be flown at a gross weight several thousand pounds heavier than you fly your practice SFOs. Increased altitude and speed will be required for pattern entry, and the nose will not

... pilot-induced control loss ... can still happen to the F-16C/D, but is a bit harder to get into and a bit easier to get out of ...

come around the corner or flare for landing nearly as well as it did at lighter weight. Don't forget you also have to get the jet on the ground and stopped—go to the hook early if an unarrested stop is not assured.

An operations mishap bullet that only winged us (causing Class B and C mishaps only) was pilot-induced flameout. We had more than one pilot this year who either mismanaged his fuel, left the air refueling door open, or failed to detect a



A "loaded up" Falcon and aggressive maneuvering could lead to pilot-induced control loss. Unload and roll is still the best recovery.

fuel transfer system malfunction resulting in a flameout landing.

One pilot displayed a shocking lack of knowledge of the aircraft fuel system and cruise management modes available in the avionics and ended up having to land gear up to make the runway. The problem started when he left the refueling door open after coming off the hot pits prior to takeoff. He then made totalizer only fuel checks throughout the mission, didn't correctly interpret a bingo warning well above bingo fuel, and only realized he had a problem when a low fuel caution light came on.

He then blew what could have been a powered landing by not following home mode cues to get the most from the barely adequate internal fuel remaining. Instead, he misinterpreted slow transfer once the refueling door was closed as frozen fuel. He then descended to very low altitude at high speed in an attempt to thaw the suspected frozen fuel in the external tank.

There has never been a case of frozen fuel in the F-16, and this was not the first (fuel additives and fuel transfer plumbing design have avoided this potential). The final blow was the pilot had left his alternate flaps switch in extend and was unable to reach the runway due to the extra drag they caused during the flameout descent.

I know you can do better with a bit of diligence, but enough F-16 pi-

lots have pooched this in the past that a trapped fuel caution or warning system will eventually be retrofit to the jet, giving you a heads up when internal fuel decreases below a certain preset level and fuel still remains in the external tanks.

The only other Class A operations mishap during FY90 was a result of a pilot failing to restart his engine after shutting it down due to a compressor stall. The single most important mistake he made was going JFS start 2 at around FL 230, well above the JFS envelope. The JFS didn't run, and the pilot's erratic airspeed control allowed the

... if you have to know one subject cold in the F-16, it's detecting and handling engine problems.

rpm to bleed off to virtually nothing. Without 12 percent rpm, the JFS bottles couldn't recharge. The pilot was unsure of the altitude required for a spoolup start, but suspected he didn't have enough, so he tried for a max range glide to a divert field, getting within 3 miles before he ran out of altitude and had to eject.

As we'll discuss below, if you have to know one subject cold in the F-16, it's detecting and handling engine problems.

continued

F-16 Good and Lucky continued

Logistics Means Engines

Engine-related problems have accounted for every F-16 logistics factor mishap since 1985. Ongoing engineering improvements have consistently improved the reliability and performance of F-16 engines over the years, making it the safest single engine fighter of all time.

However, when you fly around 400,000 hours annually, there will be plenty of flameouts, compressor stalls, oil problems, blade failures, nozzle burnthroughs, and fuel leaks to provide a stern challenge to a random sampling of our pilots. This cost us five jets last year, but every pilot with an insoluble engine problem and no reasonable chance of landing had the good sense to get out of the jet in time. More than twice that many pilots were able to either regain usable thrust and limp home, or, in several cases, glide in safely for flameout landings.

An even larger number of our maintenance troops, both engine specialists and crew chiefs, through their painstaking and stubborn application of installation, checkout, and servicing criteria, were able to deny their pilots similar in-flight challenges.

F100-PW-200

One F100 engine mishap during the year followed some poor maintenance practices. Rags were used during an afterburner flameholder replacement to prevent loose parts from FODing out the engine. The rags were forgotten once the flameholder replacement was complete. The senior technician who did the work got a junior technician to sign the work off so he could sign off the required inspection.

This misdocumentation allowed the jet to fly without an independ-

... misdocumentation allowed the jet to fly without an independent check on the work of the senior technician.



No jet flies without the teamwork between maintainers and pilots.

ent check on the work of the senior technician. The rags disrupted the afterburner airflow, resulting in a severe burnthrough and fire, and the jet was destroyed on impact following the pilot's late (below 200 feet AGL), but successful, ejection.

Another F100 engine mishap was connected to a unified fuel control silicone contamination from an unknown origin. The gas generator wash filter clogged, restricting fuel pressure available to the rear compressor variable vane (RCVV) servo. This allowed the RCVVs to open, causing a compressor stall, which the mishap pilots recovered by retarding the throttle to idle and turning the EEC off. A subsequent stall in the weather on dogleg to final resulted in a rollback to below idle without sufficient altitude for a BUC restart. The crew made a successful dual ejection, and the aircraft was destroyed by the ensuing crash and fire.

Another F100 engine mishap followed a fatigue failure of a third stage compressor blade lug which liberated the blade and caused engine failure and fire. The mishap

pilot ejected successfully, and the aircraft was destroyed. This is a known failure mode, but the root cause is not known. Engineers are currently assessing the effectiveness of known improvements and inspection techniques in preventing this type of failure.

The remaining F100 engine mishap was the result of an internal fan failure during a low level. The reasons and the exact failure mode are under study, but the pilot observable indications are typical and worth remembering. After a loud bang which knocked the pilot's feet off the rudder pedals, the pilot saw the rpm unwinding through 30 per-

Several pilots were able to successfully recover F100 equipped jets from thrust loss situations by turning the EEC off.

cent and the FTIT rising out of limits. The pilot jettisoned his ordinance during the zoom, but his



A strict adherence to checklist procedures prevents the lion's share of mishaps.



BUC start attempt overtemped immediately when he went to idle. Unable to regain usable thrust or glide to a suitable field, the pilot ejected.

Several pilots were able to successfully recover F100 equipped jets from thrust loss and auto-accel situations by turning the EEC off. Several more deselected afterburner after being informed they were on fire, preventing nozzle fires from spreading or causing thrust loss due to more severe nozzle damage.

One pilot, who had a nozzle fire while flying a separate vectors intercept, didn't know there had been one or that it had gone out after he canceled afterburner. His first clue was low thrust when he pushed it up to mil a little later. Unsure of the cause, he got as far as BUC, which didn't give sufficient thrust to maintain level flight (due to the severe nozzle damage) before settling for electronic engine control off, which produced just enough thrust to limp home.

Another pair of pilots in a D model lost both hydraulics systems shortly after a quick landing at an

emergency field for a fire at the top of the nozzle (the fire had damaged the hydraulic lines near the rudder integrated servo actuator). Some pilots were able to successfully restart engines following flameouts or stalls/stagnations. Others were able to safely recover from stuck throttle situations by shutting off the fuel master at high key and flying flame-out patterns.

All in all, it's amazing how good and lucky we were! Would you have been ready?

F110-GE-100

One F110 engine mishap during the year was the result of a faulty engine overhaul. Seventy-two high pressure turbine blade seals plus the aft blade retainer seal wire were omitted during depot engine buildup, resulting in inadequate vibrational damping and premature fatigue failure of a turbine blade. The ensuing catastrophic engine failure resulted in a successful pilot-initiated ejection. Since this mishap, the buildup and inspection proce-

dures at the overhaul facility have improved considerably.

The only other F110 engine mishap during the year occurred when a pilot selected full afterburner during a slow speed fight. When he did, fuel leaking from an afterburner fuel line connection in the engine bay ignited after leaking out into the afterburner plume. The fire then propagated forward into the engine bay itself, giving the pilot a fire light and erratic fuel quantity indications due to burned wiring. The fire then spread into the base of the vertical tail, damaging the flight control and hydraulic systems and causing an uncommanded roll on instrument final to land. The pilot ejected successfully.

This crash involved one of several fuel leaks in this afterburner fuel line during the year, a few of which resulted in engine bay fires. These leaks were the result of faulty parts, a weak design, difficult maintenance access, and inadequate installation and torquing procedures.

... the last ghost has apparently been chased out of the closet on this one.

A series of subsequent engine TCTOs was required to turn this trend around, and some problems have recurred, but the last ghost has apparently been chased out of the closet on this one.

Other engineering efforts are under way to ensure fire doesn't propagate from the afterburner area into the engine bay. Airflow through the engine bay was thought to be sufficient to prevent this, but this is apparently not true at high AOA and low airspeed.

Predicting the Future

Now that you know what happened last year, you can start preparing for the problems ahead. Other than minor variations, FY91 is predicted to look a lot like FY90 ■



General Donald J. Kutyna, CINCNORAD and USCINCSpace, provided this year's keynote address. He presented an overview of many interesting facets of the space command's mission.

AFISC Hosts Worldwide Safety Conference

Major General Alexander K. Davidson, Commander, Air Force Inspection and Safety Center (AFISC), hosted the USAF Worldwide Safety Conference, 5-9 November 1990. The theme of this year's conference, "Training—The Key to Human Error Reduction and Mishap Prevention," provided the specific area of concern for the major commands and separate operating agencies to address. The conference also provided participants a wide range of subjects of critical interest and a great opportunity for information exchange.



"Safety is a command business...it is the actual result of doing your mission as smartly as you can," said Lt Gen Bradley C. Hosmer, The Inspector General, OSAF.

The Flight Safety Seminar attendees discussed many critical issues of flight safety. These included the use of HUD as a primary flight reference and the Air Force's current Human Factors Training Program.



Write A Dumb Caption Contest Thing



By now, almost everyone is aware of the continuing hassles the United Organization of Dumb Caption Writers of America have been laying on us. We all know they're just miffed at having their so-called professionally written captions beaten by you, our loyal and creative readers. You'd think that, by now, this group would be starting to wake up and smell the coffee. But, noooooo! They're still determined to prove that only qualified and trained professionals with years of experience are capable of sustaining the pace of creative genius over the long haul. They're calling you people "flashes in the pan" and "one-shot hotshots without the brains, guts, or stamina to go the distance." Zowie, folks, are they getting nasty, or what? But don't you just love it when they get mad and their little lips quiver?

Well, we think there's no sense in even attempting to answer them when they get like this. The only way to respond is to do your thing as we know you can do it and beat them at their own game. This is your moment to confront them with reality and, in doing so, perchance win the legendary goal of goals, your very own CHEAP LITTLE PRIZE. Think how magnificent that will sound in your next letter to mom. Don't delay . . . do it now!

Write your caption(s) on a slip of paper and tape it on a photocopy of this page. DO NOT SEND US THE MAGAZINE PAGE. Use balloon captions for any person in the photo and/or use a caption under the picture. Entries will be judged by a panel of dumb humor experts in February 1991 whose decisions, though sometimes questionable, are relatively final, subject only to lobbyists, special interest groups, properly submitted bribes (ask us for our Big Bribe Application forms to expedite the processing time), or other pressures too numerous to mention.

Send your entries to "Dumb Caption Contest Thing" • *Flying Safety Magazine* • HQ AFISC/SEPP • Norton AFB, CA 92409-7001



F-111

COL ROBERT F. WENDROCK, JR.
Directorate of Aerospace Safety

■ Overall, the Aardvark has not had as good a year as we had hoped, but is right on track with what we predicted. We've had four Class A's compared to three last year. Within these stats, there is some good news. The EF-111A maintained their enviable record of never having had a Class A mishap (or Class B for that matter). Congratulations to all of you!

The F-111A and FB-111A each had a mishap-free year in spite of intense flying and distracting turbulence caused by deactivating squadrons, placing aircraft in the boneyard, and converting a model (FB-111A) to a different aircraft (F-111G), as well as sending it to a different MAJCOM. The bad news is both the F-111D and F-111F lost one aircraft each. Both appear to be logistical mishaps.

The F-111E is the most unfortunate this year. Two aircraft lost and one aircrew paying the ultimate sacrifice bears a heavy price. Over 6 years have passed since the "E" model lost a jet and almost 10 years since a crew was lost. Those are both enviable records, especially considering the tough European environment most "E" models fly in. Unfortunately, both F-111Es were operator mishaps.

All F-111 ejection attempts were successful, although on landing, the capsule continues to cause back injuries to the aircrews. I will discuss a possible fix to this problem a little later on.

FY90 Mishaps

We were well into our second quarter of the fiscal year before we lost our first F-111. It happened to young men I considered to be friends. They are no longer with us. It's sobering how personal mishaps can become when you know the people involved.

In this case, as in most cases, we didn't expect it to happen to experienced aviators, old heads in the business. But it did, and it can, in a heartbeat. This crew was flying a night entry (actually late dusk) to an overwater range. Shortly after rolling out on final, the aircraft impacted the water, fatally injuring the crew. Only after the mishap did we find out there was a misunderstanding throughout the wing regarding night range entry procedures. For one, or a combination of reasons, we may never really know, the mishap AC failed to do the one thing that was more important than anything else. He failed to avoid the ground (water in this case).

Those of us who have flown in low visibility or limited horizon areas, especially over water, know to check our flight instruments to ascertain what the jet is really doing. This crew did, too, but for some reason on this night, they channelized on something else that in the overall scheme of things was not really important. Can it happen to me? To you? I hope you said a healthy "Yes!" Not fearful, but healthy.

Our second mishap, while losing a valuable national asset, had a hap-

pier ending for the crew. This aircraft was no. 2 of a two-ship formation which formed part of a 10-ship airfield attack package. Sounds like fun, doesn't it? At the completion of a simulated TOSS delivery, the aircrew felt an explosion followed by moderate to severe aircraft vibrations and numerous warning and caution lights. Shortly after the crew climbed, accomplished their checklist items, and shut down the right engine, the flight lead reported the aircraft to



Most emergencies in the F-111 can be dealt with quickly, resulting in a routine landing...if the checklist is followed as written.

The F-111 fleet has seen an interesting year, with some aircraft headed to the boneyard, some aircraft converted to a different model, and some aircraft transferred to another command,

be on fire and directed an ejection. The ejection was successful, although the crew sustained some injuries during the capsule landing.

One or more of the first stage fan blades had separated from the right engine disk causing catastrophic engine failure rupturing the fan case. The liberated blades punctured fuel tanks resulting in a fire and explosion. The timely reaction of the crew, and especially the flight lead, ensured we had a safe ending to a harrowing mission.

There have been 21 incidents of fan case penetrations in the TF-30 engine since 1965. It would cost at least \$56 million to fix this problem

and would add approximately 520 pounds to the aircraft. At this time, a fix appears unlikely. The F-111 system program manager (SPM) predicts five uncontained fan incidents and two aircraft losses to this fan containment problem between now and the year 2010.

The third mishap was unfortunate and unnecessary. The mishap F-111E was no. 2 of an eight-ship redeployment package from a deployed location. After rejoin to fingertip formation on the flight lead, the WSO noted the INS had frozen, quickly followed by large amounts of smoke emanating from underneath the navigation computer unit. Attempting to deal with this problem, the AC smartly moved to a route position while the crew accomplished the smoke and fumes checklist.

Unfortunately, the AC did more than this checklist calls for and turned off all the dampers. This resulted in a heavyweight F-111 flying at a reasonably high altitude (FL190) and low airspeed (300 KIAS to rejoin the gaggle) without any dampers. Those who have been in similar flight regimes with the dampers off know this takes concentration and coordination. Subsequently, the AC opened the ground check panel and turned off the central air data computer. The crew lost control of the aircraft and successfully ejected. The AC sustained back injuries on capsule landing.

What should have been a relatively easy emergency to handle turned into a catastrophe. Once the crew went to 100 percent oxygen and turned off the NCU, the emergency was basically over.

There appears to be a trend developing in the F-111 community to turn off all dampers at any abnormal indication of, or concern with, the flight controls. As far as I know at this time, according to the

continued



F-111

continued

Dash-1, only a lightning strike requires all dampers to be turned off. The ground check panel is just that, a ground check panel to be opened on the ground. Without dampers and CADC, the crew lost roll command augmentation, beta reducer, alpha limiter, all stall warning devices (horn, light, pedal shaker), and had inaccurate AOA instrument readings which drifted slowly from their last position. These are all things the pilot needed at this critical time! There was nothing wrong with them. The crew just made them unavailable in this case.

Bottom line—let's use the checklist as written. It's worked well for lots of years. If it's wrong, let's get it changed. This mishap didn't need to happen. Fortunately, the crew survived to fly and fight again.

The final mishap in FY90 occurred in an F-111D. The mishap crew was a stan/eval crew giving an initial tactical checkride. Everything was normal until the low level.

After repositioning from the left to right side of lead, the mishap aircraft abruptly rolled right. After a second unscheduled roll maneuver, and in a 45- to 90-degree-per-second right roll, the crew initiated ejection. Fortunately, by the time

the capsule separated, the ejection parameters were more favorably aligned. Still, even in the low altitude, high airspeed arena with high roll rates and some bank on the aircraft, the F-111 escape system worked as advertised and was able to safely egress the crew. Unfortunately, both crewmembers suffered significant back injuries. The right roll was probably caused by failure of the generator control unit (GCU) to isolate a malfunctioning left generator. This resulted in a partial loss or disruption of electrical power to the flight control computers. Past failures have caused similar rolling maneuvers.

In this case, the crew made the right decision to leave the aircraft. Being at low altitude, they had very little time to analyze the problem and take any corrective action. It appears the new digital flight controls will solve this problem. In the meantime, shutting off the left engine first during your final ground shutdown may allow us to verify normal operation of the GCU. You will see more on that in the future, I'm sure.

In the F-111 community, there appears to be a lack of verbatim knowledge on the proper Dash-1 steps to counter unscheduled roll

and pitch maneuvers. As you know, these are not BOLD FACE, but per the Dash 1, must be accomplished immediately to control the aircraft. And to do them immediately, you must know the steps. There may be no time to open the checklist. By the way, turning the dampers off is not one of the steps and would have surely put this aircraft out of control and maybe out of the ejection envelope had they been turned off.

Safety Concerns

The number one safety concern for the F-111 from the AFISC perspective, and I think from most of our F-111 reader's perspective, is finding a way to decrease the Gs generated when the capsule touches down. Over the years, we have looked at several options from energy absorbing seats like the Nighthawk helicopter to triple canopy parachutes like the space capsules. None of them have worked satisfactorily.

Now, I am happy to report a fix may be on the way, and quickly, too. This summer, a safety mod summit was held at extremely high levels (and I'm not talking about field elevations) to figure out a way to get safety mods done more quickly.

The F-111 SPM informs me the new, 85-foot parachute will be the test case for the new safety mod procedures. He has already secured some funds for test development

Great airplanes, supported and maintained by great people, are ready to fly one of the greatest missions in the Air Force.



and capsule air drops at China Lake. His goal—listen to this—is to have the last F-111 modified with the new descent rate reducing chute in only 18 months. Now before you jump up and shout, this is only a goal and is dependent on successful testing and funding. However, it's certainly a step in the right direction. I'm excited about it.

Although the F-111 history is almost equally divided between logistic and operator mishaps (56 log, 55 ops, 13 other since 1967), our concentration here has been primarily on operations. I believe we can attack the operator mishaps through education, training, and when that fails, aircraft systems which will provide the crew with

F-111s are meeting the challenges at deployment in support of Operation Desert Shield with no loss of mission effectiveness.



warnings that they are quickly getting themselves in trouble even before the crew perceives a problem.

Education on human factor issues is starting to be developed in ATC at UFT, and in other MAJCOMs. Future crews will know far more about themselves, the things motivating us to press beyond our limits, and the arenas in the flying game that can get us into trouble. Add on RTU, CT, FL, SEFE, EP, IP/IWSO, flight commander, and squadron commander training in human factor issues; and you can see the aircrew of the future will be better prepared to recognize and deal with human factor problems.

But that's in the future. Today, we constantly need to evaluate our training programs, from academic to simulator to flying, to ensure we are teaching those basic flying skills and aircrew knowledge which guarantee we lose as few aircraft as possible to operator errors while at the same time keeping the gung ho, professional aviator who makes us so combat effective.

An area we have seen lately, which is not unique to the F-111, is an apparent lack of use or misuse of the rudder. We have seen this problem surface in reports on a KC-135, RF-4C, AT-38, and at least one F-111 where the proper use of rudder would have prevented the aircraft from departing controlled flight. If you learned to fly with your feet on

the floor somewhere in your flying training, you are courting trouble.

On the logistics side, we hope to soon see strobe lights on the F-111, at least the European models. I know this is good news for USAFE where visibility problems are a way of life. This is not a bird hazard issue, but a see-and-be-seen issue. McClellan AFB, California, is working hard to make the ground collision avoidance system (GCAS) in the digital flight control F-111 work well. Not all models of F-111s will get digital flight controls, but those which do will have a GCAS that could be the backup that saves lives. I wish the crew on the F-111E who flew into the water had had a young lady's voice saying "pull up, pull up." It may have been the last thing that would have caused the crew to pull up now and ask questions later.

Finally, turbulence in the F-111 community, as well as the Air Force in general, is a way of life. From deployments to the Middle East, to taking great looking and great flying airplanes to the boneyard, to shutting down squadrons and wings, to closing bases, these are turbulent times. All of us must be sensitive to the effects this has on our crews: Aircrews, maintenance crews, and support crews.

The F-111 is a great airplane with a great mission flown, maintained, and supported by great people. Lets keep it that way. Fly safe, but fly. ■



CROSS-COUNTRY NOTES

REX RILEY
Directorate of Aerospace Safety

■ Congratulations to Hickam AFB, Hawaii, and Kelly AFB, Texas, which are new additions to the coveted Rex Riley Transient Services Award list following the latest series of evaluations. Interestingly enough, both of these bases had just recently implemented an Air Force program called "Prime Knight."

This is a test being conducted at 11 bases which seeks to provide "meals, wheels, and keys" to transient aircrew members in an expeditious manner. The goal is to reduce the time spent waiting for crew transportation and billeting arrangements and provide good food service on arrival and departure. Both Kelly and Hickam have done an excellent job implementing this program and meeting its objec-

tives.

A note to crewmembers—the key to getting the services you want under the Prime Knight program is to provide the destination base's billeting and base ops with *advance notice* of your date and time of arrival, copy of crew orders, and length of stay. If you show up unannounced, services should still be good, but transportation and quarters might take a little longer.

Cross-Country Notes

Hickam AFB, HI Rex visited Hickam and found the people to be very supportive. A contract for quarters at a downtown hotel awaited him at base ops eliminating a billeting stop. The crew bus on and off base was as requested throughout his stay. Rex's only complaint was a self-induced mild case of sunburn. Overall, it was a

very pleasant, but too short, stay in paradise.

Kelly AFB, TX Rex found outstanding service in almost every area related to transient aircrews. The Prime Knight coordinator at Kelly has put together the most complete arrival package (loaded with lots of useful information) Rex has ever seen provided to a transient crew. If advance notice has been provided, contract quarters are already assigned and available at base ops. Transportation is provided direct to quarters. Transient Alert goes out of their way to provide prompt, efficient servicing of all different kinds of aircraft. Base ops was extremely well laid out and easy to use.

Randolph AFB, TX Randolph provides an excellent stopover for transient crews whether they are spending the night or just looking



THE
REX RILEY

Transient Services Award

LIST OF BASES*

Loring AFB ME	Kirtland AFB NM	Williams AFB AZ
McClellan AFB CA	Buckley ANGB CO	Westover AFB MA
Maxwell AFB AL	RAF Mildenhall UK	Eglin AFB FL
Scott AFB IL	Wright-Patterson AFB OH	RAF Bentwaters UK
McChord AFB WA	Pope AFB NC	RAF Upper Heyford UK
Myrtle Beach AFB SC	Dover AFB DE	Andersen AFB GU
Mather AFB CA	Griffiss AFB NY	Holloman AFB NM
Lajes Field PO	KI Sawyer AFB MI	Dyess AFB TX
Sheppard AFB TX	Reese AFB TX	Aviano AB IT
March AFB CA	Vance AFB OK	Bitburg AB GE
Grierson AFB IN	Laughlin AFB TX	Keesler AFB MS
Cannon AFB NM	Minot AFB ND	Howard AFB PM
Randolph AFB TX	Vandenberg AFB CA	George AFB CA
Robins AFB GA	Andrews AFB MD	Peterson AFB CO
Seymour Johnson AFB NC	Plattsburgh AFB NY	Clark AB RP
Elmendorf AFB AK	McDill AFB FL	Moody AFB GA
Shaw AFB SC	Columbus AFB MS	Rhein-Main AB GE
Little Rock AFB AR	Patrick AFB FL	RAF Lakenheath UK
Offutt AFB NE	Wurtsmith AFB MI	Zaragoza AB SP
		Torrejon AB SP

*Rex Riley list arranged in order of award date.

for a quick turnaround. Although their facilities (runway, parking, etc.) limit them primarily to trainer and fighter-type aircraft, aircrews who choose to visit the San Antonio area can expect a warm welcome at Randolph.

Grissom AFB, IN Rex evaluated all services at Grissom as well above average, but singled out billeting as outstanding. The staff was highly motivated and able to solve minor problems very effectively. Added amenities provided that extra touch, like the recent availability of VCR tapes and players. Folks in transient alert were knowledgeable and very safety oriented.

Robins AFB, GA One of Rex's favorites. Robins provides some of the best service east of the Mississippi. Fast, friendly, experienced people operate their contracted transient alert facility. They take pride in their work and provide unbeatable service. Base ops was well maintained and organized in spite of some major renovation taking place in the dispatch, weather, and aircrew lounge area.

Review of recent aircrew questionnaires submitted to base ops unanimously gave Robins high marks for providing quality transient aircrew services. Rex encourages you to take advantage of Robins' good ol' southern hospitality; and while you are there, make sure you visit their fantastic air museum located on base. ■

Luke AFB	AZ
Eaker AFB	AR
Bergstrom AFB	TX
Davis-Monthan AFB	AZ
Zweibrucken AB	GE
Hahn AB	GE
Kunsan AB	KOR
Ramstein AB	GE
Johnston Atoll	JQ
Wake Island	WQ
RAF Alconbury	UK
Hurlburt Fld	FL
Carswell AFB	TX
Altus AFB	OK
Grand Forks AFB	ND
Fairchild AFB	WA
Mountain Home AFB	ID
Barksdale AFB	LA
Hickam AFB	HI
Kelly AFB	TX

MAINTENANCE MATTERS



FROM THE FIELD

Caster Bearings

■ As the Wing FOD monitor, I search through the findings of the daily FOD walk looking for trends and clues to the FO's origin. About a week ago, I found several ball bearings among the day's harvest. When three more turned up the following day, I contacted the squadron FOD monitors and we began a search for the source of these potentially damaging steel

balls. The source of the bearings turned out to be casters used on locally manufactured tool box dollies. An inspection of these dollies showed almost all were several years old, and their casters were in a sad state of repair. We replaced the dollies and now use casters with sealed bearings. We have since had a bearing-free flightline.

Looking through the past 2 years of FOD reports we did not find any that could positively be traced to ball bearings. But when you consider about 10 percent of all FODs are attributed to "an undetermined metal object," it is probable caster bearings could be an underlying cause for many of these.



GOX Hazard

Most maintenance folks, especially those involved in servicing aircraft, are familiar with the hazards of combining LOX with any petroleum product. But because the results are usually less spectacular, the hazards of mixing gaseous oxygen (GOX) and petroleum products have gained much less notoriety. Yet, the potential for fire and explosion is just as great. Here's an example.

A technician, getting ready to service an aircraft, was unpleasantly surprised when a foot-long flame shot out of the weep hole in the regulator of a GOX servicing cart. As he stepped out of the way, the flame extinguished, and the specialists quickly shut the

valve. Investigators found a black, sooty substance around the regulator's weep hole.

Maintenance records indicated the regulator had recently been installed. At some time (probably during the valve's installation), the valve was contaminated by some kind of oil or grease. When the valve was opened, the combination of GOX and the petroleum substance resulted in the unexpected flame.

Remember, it doesn't take much contamination to cause a fire or explosion, so be sure the work area, including your hands and clothing, are free of oil, grease, and other petroleum products before working around GOX. ■



In the air



On the ground



PREPARE...cold weather is here!