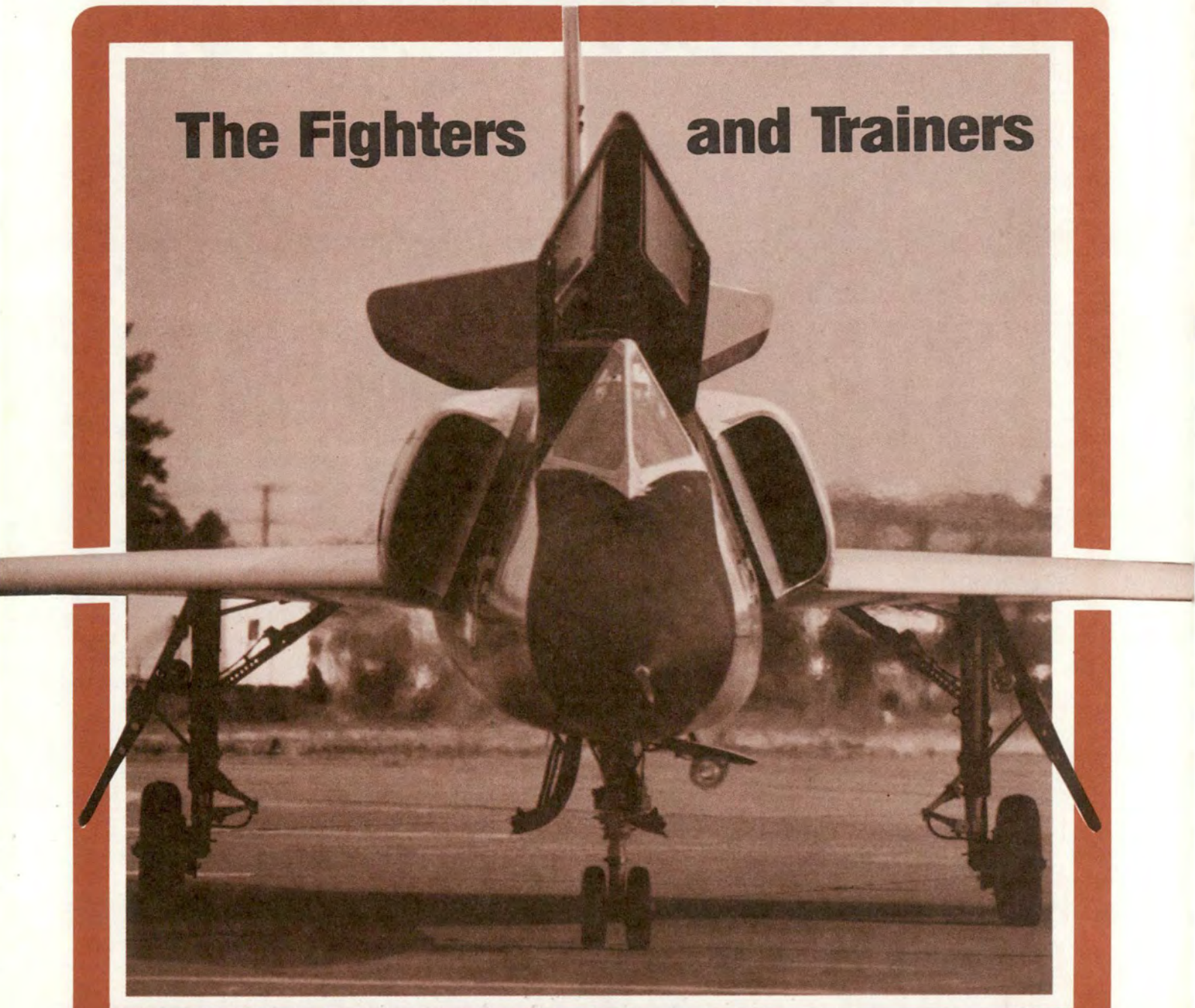
# flying

SAFETY

MARCH 1986

**SPECIAL ISSUE**

**Mishap Review and Forecast**



## The Fighters and Trainers


# THERE I WAS

## A Second Chance

■ On a recent night, I experienced something I'll never forget. I lived the last few seconds of my life. At least it's what I thought was happening. I did almost everything wrong on a night approach in the weather. Everything wrong, that is, but kill myself, which I was sure I had done.

I've chosen not to sign this. The weather was bad enough no one on the ground saw what I did on short final, and I've decided to leave it that way. I do feel some obligation to put this down on paper. Maybe someone, some night, might benefit from having read this.

Since I've remained anonymous, I do owe the reader a quick profile. Suffice it to say I was highly qualified to fly that approach. I am an "old head" with many hours, most of it in fighters. I'm experienced and current in the fighter I fly now. I've had a tour in Europe and have had many approaches in the worst of weather. Enough said.

I took off on a night sortie. We'd had a lot of snow recently, but the runway was clear and the weather was OK. An hour later when I returned, they were calling it a 1,000-foot ceiling and 4 miles visibility in light snow. It would prove to be much worse than that.

I entered the weather from above and began taking vectors for an ILS fullstop. I wasn't being very careful about head movements while doing checks, and I soon had a case of the "leans." No sweat, I'd been there before, just concentrate harder on the gauges, and press on. I dropped the gear and as the landing light came on, I became conscious of the heavy snowfall. The glare from my landing light and strobe was terrible. I did nothing about it and continued.

I began having problems on the approach. My vertigo had progressed to the point where I was losing the battle of maintaining orientation. I had tried concentrating harder, but I was flying an atrocious approach and my corrections were getting larger. I should have gone

continued on page 2

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# flying

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## SPECIAL ISSUE

The USAF flight safety success story continues. The 1985 flight Class A mishap rate is the lowest ever.

The fighter/attack community established an overall Class A record low rate of 3.01 with an operations record low rate of 2.0. In this issue, we take a close look at how we did in our fighter, attack, and trainer aircraft.

We will cover the heavies in April.

### SPECIAL FEATURES



### REGULAR FEATURES



DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

# THERE I WAS

## A Second Chance continued

around then. My pitch was varying ±5° and my bank ±30° as I made unreasonable attempts to get the approach under control. I knew I was in trouble, yet I was trying to "lick the problem" instead of taking the smart way out.

Somewhere, about 300 feet and a mile out, I saw the overrun lights. They seemed suspended in a black space and confusing through the HUD symbology. I later learned the runway had several inches of snow on it and was indistinguishable from the terrain. I should have gotten back on the gauges, but I tried to make those threshold lights (which were rolling) level.

Then in the snow, I lost sight of the lights. An alarm went off in my head (finally), and I looked at my ADI. I realized I was going in. I was sure enough of it that I thought of my family and dying. I slammed the throttle to AB and did the only good flying I did all night. I got the wings level and started to pull out of a severe unusual attitude.

I stared in horror at the altimeter and saw it go through field elevation. In fact, I distinctly saw it stop at 20 feet below field elevation before reversing. My errors were not over. I still was letting my spatial disorientation rule over good instrument flying. The stall warning came on, and I saw 110 knots and dropping with the nose about 60° nose high. I thought "ejection" as I pushed the nose forward, but my 2,500 feet of altitude made me hesitate. I left the gear down, the AB in, got the airspeed under control, and climbed for clear sky. I knew one thing I wanted was to get out of the weather. I broke out at 9,000 feet, and I can tell you the stars never looked so good. I got my head straight and began to think. I guess this is really the point of all this, sharing some of my thoughts.

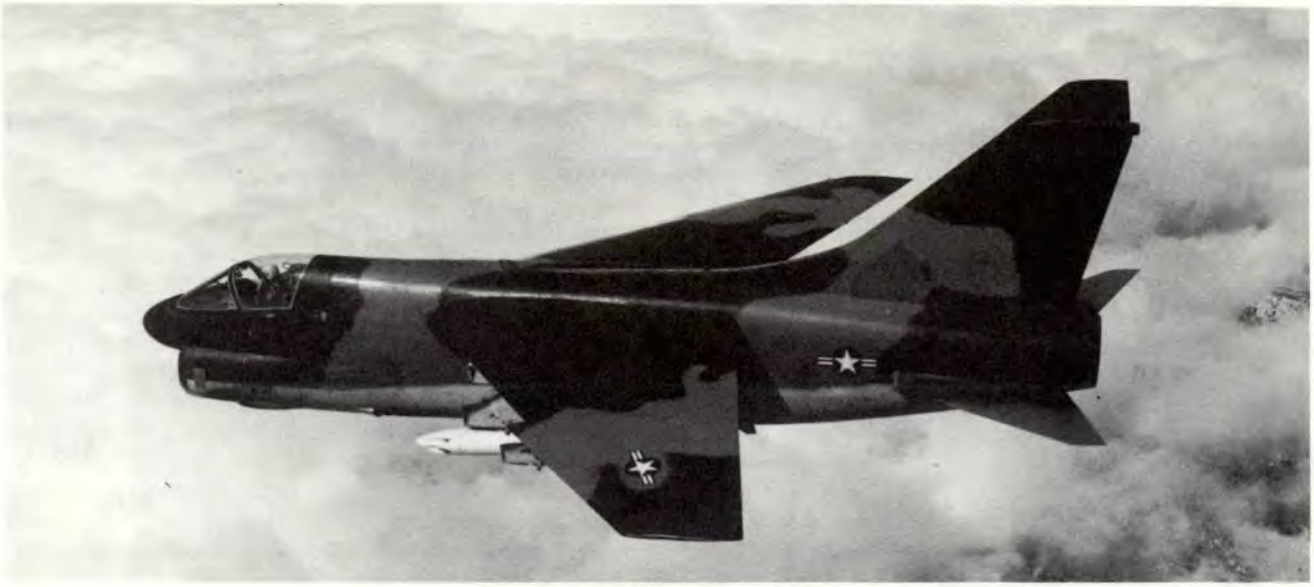
I came up with a plan. I had more than enough gas to divert. That alone was reassuring. I resolved to attempt a good controlled approach down to my minimums, and if I didn't have a good feeling for the runway environment (more than lights in space), I'd go low approach and divert. I also resolved to low approach immediately if I had similar problems maintaining my equilibrium.

I then began to think of everything I could do to improve the odds. I stayed above the weather until the "leans" were gone. When I did descend into the clouds, I made an effort to feel for the switches, minimize head movements, and lessen the onset of vertigo. I decided to turn off both my strobe and my landing light. My HUD lighting was poor (fuzzy) so I turned it off and limited my cross-check to round dials. I requested a PAR in the hopes I could smooth out my approach and avoid chasing "yellow bars" like I'd foolishly done on the previous approach. I normally prefer an ILS in the weather, but tonight a change was in order.

I forced myself to make small, "intelligent" corrections, taking my time correcting in the right directions until I had what I wanted. I knew the weather was around 300 and 1 mile, so I stayed on instruments until 300 feet before looking up. I picked up the lights and then, because the background was so bad, I continued flying instruments and now included a visual cross-check versus transitioning to mostly visual.

I can tell you I've never felt a better touchdown. The runway felt great, even covered in snow. I located the hook (just in case) but I never needed it. As I pulled off, I saw my altimeter was slightly in error. It read 20 feet below field elevation.

The "armchair" fliers will have a good time with this one, starting with my even attempting a second approach. The point of it all, at least for me, is a grim reminder that you're never above the basics. When the weather is bad, even the most experienced of us need to drag up all the little tidbits we hear in instrument ground school, at refresher training, and even at the bar. You have to review what you know, and then do it. They don't teach you things like turning off your landing lights and strobes. You're the one flying the machine, and if in fog or snow they're distracting you, get rid of them. Lastly, "field environment" may not be good enough; never give up on the instruments just because the field is in sight. Work on your basic instruments as if its the most critical skill you must have — because it is! ■



# A-7

**LT COL DOUGLAS M. CARSON**
Directorate of Aerospace Safety

■ The A-7 is an all-weather attack aircraft which entered the USAF inventory in 1968. Approximately 1,000 A-7 aircraft are still in service worldwide, and it remains one of the finest attack airplanes in the world after two decades of service. That is an impressive achievement in an era of rapidly advancing technology. Various models are in use by the USAF, Navy, and the Air Forces of Greece and Portugal.

In Southeast Asia, USAF and Navy A-7s racked up an impressive combat record by flying over 100,000 combat sorties and delivering over 200,000 tons of ordnance, with a reliability of over 95 percent. More recently in Grenada, the timely response and surgical precision of Navy A-7s were credited with shortening the conflict and saving American lives.

The USAF has 388 D and K models in service, mainly with the Air National Guard. Our fleet flies about 80,000 hours per year and reached 1,291,000 hours by the end of 1985.

We have experienced 86 Class A mishaps with the A-7 from the first mishap in 1970 through the end of 1985, which has yielded a cumulative Class A mishap rate of 6.66. These 86 mishaps resulted in the destruction of 86 aircraft and the loss of 36 lives. This mishap rate compares favorably with other USAF fighter/attack aircraft, with the A-7 tied for the fifth lowest destroyed rate out of the 14 fighter/attack aircraft listed in Figure 1.

continued

**Figure 1**

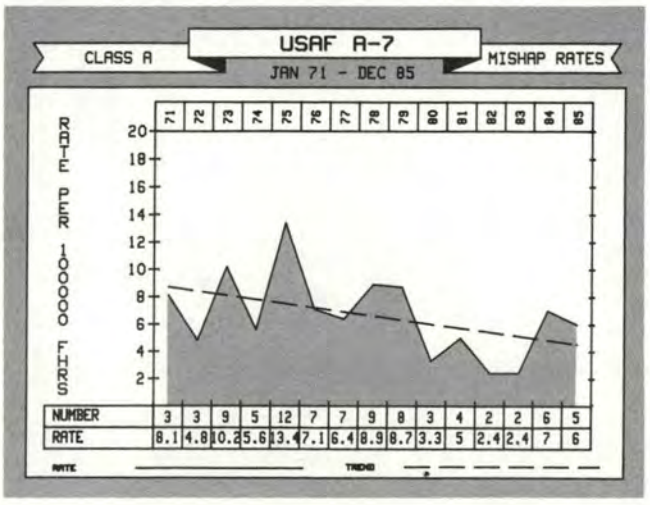
**Fighter/Attack Destroyed Rates**
FLIGHT MISHAPS ONLY
as of 31 OCT 85

**Ranked By Lifetime Destroyed Rates**

| Aircraft | Total Hours | Number Destroyed | Destroyed Rate |
|---|---|---|---|
| A-10 | 1,321,895 | 47 | 3.6 |
| F-15 | 1,132,320 | 41 | 3.6 |
| A-37 | 616,615 | 28 | 4.5 |
| F-4* | 8,891,625 | 461 | 5.2 |
| F-111 | 1,171,629 | 78 | 6.7 |
| A-7* | 1,279,763 | 86 | 6.7 |
| F-106 | 1,573,064 | 112 | 7.1 |
| F-16 | 733,663 | 53 | 7.2 |
| F-5 | 366,276 | 32 | 8.7 |
| F-101 | 1,993,445 | 194 | 9.7 |
| F-102 | 2,606,799 | 259 | 9.9 |
| F-105 | 1,665,921 | 259 | 15.5 |
| F-100 | 5,470,617 | 889 | 16.3 |
| F-104 | 643,684 | 162 | 25.2 |

*USAF ONLY

**Figure 2**



# A-7 continued

This mishap record is especially noteworthy for two reasons. First, the A-7 is a single-engine aircraft. Note that all the fighter/attack aircraft with lower rates are twin-engine aircraft. Secondly, the A-7 is a ground attack aircraft and continually operates in the demanding low-level environment where a high number of mishaps historically occur.

Figure 2 shows the Class A mishap rates, trend, and number of mishaps each year for the last 15 years. The solid line shows the annual rates, and the dashed line indicates the trend. The blocks at the bottom give the actual number of mishaps and rate for each year. This is the "big picture," and the overall trend is good, but to make it more meaningful, let's break it down into operations-related and logistics-related mishaps and then discuss last year's mishaps in more detail.

There have been a total of 50 operations-related mishaps through the end of 1985. Two categories accounted for three-fourths of all ops-related mishaps. *Collision with the ground*, the largest single category, produced sobering statistics: 19 destroyed aircraft and 18 fatalities. The second largest category, *loss of control*, was responsible for the loss of 18 aircraft and 12 lives. Five midair collisions claimed seven aircraft and two lives. Miscellaneous causes accounted for the six remaining aircraft losses. Figure 3 shows the operations-related mishaps and trend from 1971 through 1985.

Now, let's look at Class A mishaps which were attributed to logistics. Logistics-related mishaps accounted for 36 destroyed aircraft but only 4 fatalities (Figure 4).

The TF-41 engine has been the single biggest problem we've had with the A-7. Twenty aircraft were lost along with many other close calls. Early engine fixes started in the mid-seventies are about 98-percent complete.

In recent years, most engine failures were due to second-stage high pressure turbine-2 failures. The fix is a new turbine wheel/blade design which is being retrofitted into engines in the form of High Pressure Turbine Extended Life Program (HELP) kits. All aircraft should have HELP kit engines installed by late summer, and all remaining engines should have the kits by December.

Now, let's look at 1985. During this year, the A-7 fleet experienced 5 Class A mishaps which gave us a 1985 rate of 5.89. All five aircraft were destroyed and one pilot was killed. Two were operations related and three were logistics related.

The first ops mishap involved an aircraft on a low-level route following an air-to-ground training mission on a range. Approximately 5 miles prior to the last checkpoint, the mishap pilot experienced a loss of thrust and noticed several caution lights illuminate. He immediately began a climb, deployed the RAT, and accomplished boldface items for airstart. The airstart attempt was unsuccessful. Approaching 1,000 feet AGL, he zoomed his aircraft and successfully ejected. The aircraft was destroyed on impact. The investigation revealed the fuel master handle was in the "off" position.

In the second mishap, the mishap aircraft was lead of a two-ship surface attack mission to a range neither pilot had ever flown. Everything progressed normally until the second bombing pass. The mishap pilot pulled off from an LALD pass and rolled into a right turn. He evidently channelized his attention from his flightpath because, after approximately 150 degrees of turn, the aircraft impacted a ridge about 350 feet below the crest. The aircraft was destroyed and the pilot was fatally injured.

Two of the logistics-related mishaps involved the engine. In one incident, the mishap aircraft was lead of a four-ship flight on a low-level surface attack mission. Shortly after entering the range complex, the mishap pilot experienced a loss of engine thrust. Attempts to regain thrust were unsuccessful, and the pilot ejected successfully. The aircraft crashed on the range and was

Figure 3

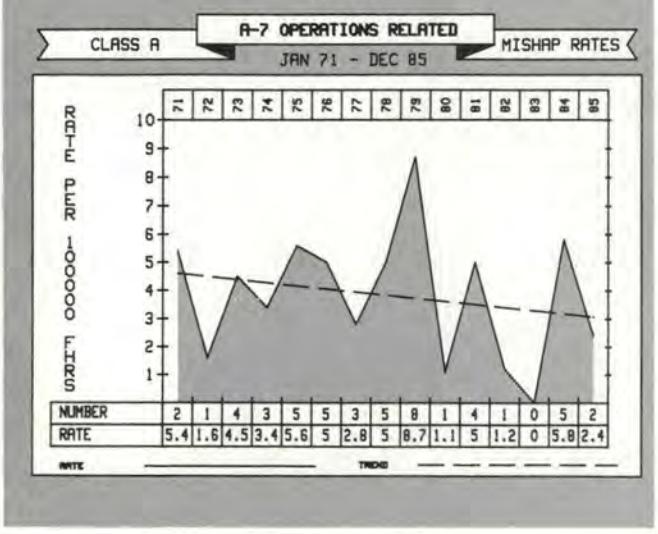
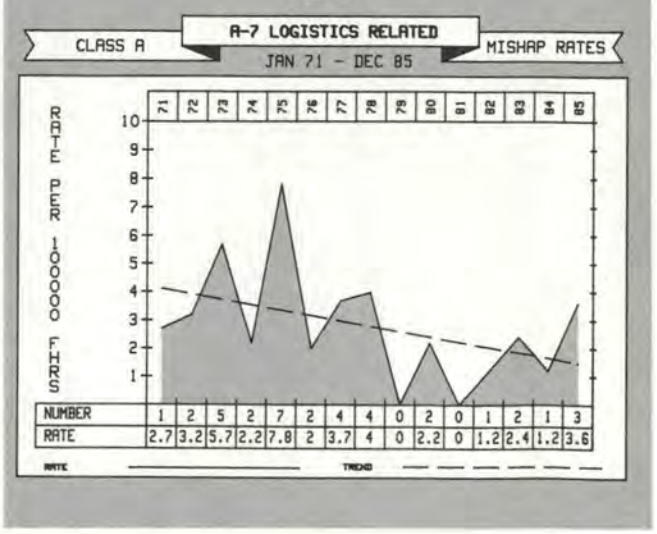



Figure 4



destroyed. Investigation revealed a catastrophic failure of a second stage high pressure turbine blade caused the engine failure.

In the second instance, the mishap aircraft returned to base following a functional check flight. After rolling out on downwind, the engine flamed out. The pilot turned the aircraft toward a less populated area and attempted an airstart which was unsuccessful. He then pointed the aircraft at an open area and ejected successfully at 400 feet AGL. The aircraft impacted in a field, penetrated a narrow wooded area, and struck a house. Two civilians in the house were fatally injured. The cause of the flameout could not be determined.

The remaining logistics-related mishap involved flight controls. Approximately 7 minutes after takeoff, passing 10,000 feet, the pilot of the mishap aircraft experienced uncommanded aileron inputs. He informed the flight lead, declared an emergency, and turned off the AFCS. The aircraft immediately made several rapid aileron rolls to the right. The pilot turned the AFCS back on and re-engaged the control augmentation. During the attempt to counter the aileron rolls, the aircraft departed controlled flight in a tumbling motion. The mishap pilot realized the aircraft was uncontrollable and initiated a successful ejection. The aircraft impacted in a near-vertical attitude and was destroyed. Investigation attributed the mishap to a failure of the roll feel isolation servo control valve.

There were also two Class B mishaps in 1985. One was operations related and the other was logistics related.

The ops mishap involved an aircraft scheduled as No. 2 on a flight of two at a deployed location. Weather on the range was unsuitable for the mission, so the flight returned to base. The flight configured for landing and two took spacing on lead for a straight-in approach. The flight then made a 360-degree turn on final due to aircraft on the runway. During the turn, two raised his gear and left his flaps down. After rolling out on final, he concentrated on acquiring lead and . . . you guessed it! He failed to extend the gear. Fifty feet above the runway, the mishap pilot heard the RSO tell him to go around and applied full throttle, but the aircraft contacted the runway. The pilot shut the engine off, and the aircraft skidded to a stop 6,000 feet down the runway. He then egressed the aircraft uninjured. This was a classic human error: A nonstandard approach interrupted by an unplanned event broke an otherwise adequate habit pattern.

A number of years ago, I initiated an additional personal check of "gear, flaps, and hydraulic pressure" on short final *for every approach* to ensure I had everything available for a normal landing. I did it until it became a habit. Over a 21-year flying career, this procedure only came in handy two times; once during an FCF in a fighter when I was in a situation which involved multiple emergencies, and once in a civilian light twin on an FAA flight check which involved a simulated emergency. In both cases, my normal checklist pattern was broken, but my personal "habit" caught the deficiency. If you want to establish your own personal check, I only have one recommendation: Please make sure you do it on *every* approach you fly from now on!

The log-related Class B mishap aircraft was No. 4 of a four-ship flight on a low-level navigation leg when the mishap pilot noticed utility (PC-2) hydraulic pressure fluctuations followed by failure of the system. He climbed to a higher altitude, declared an emergency, diverted to a briefed emergency airfield, and accomplished all checklist procedures. The pilot flew a 3-mile straight-in approach and touched down 935 feet short of the BAK-14 for a planned engagement. The engagement initially appeared normal, but immediately after cable engagement, the aircraft yawed hard right and departed the runway. The landing gear failed, and the pilot successfully ground-egressed after the aircraft came to rest. An improper clamp installation on one side of the barrier caused the system to fail.

That's a brief rundown of the 1985 mishap experience for the USAF A-7 fleet. At the beginning of 1985, the Air Force Inspection and Safety Center (AFISC) predicted three Class A mishaps for that year, two ops-related and one log-related. There were two ops mishaps as predicted but, unfortunately, we had three log-related mishaps rather than the one engine failure which was forecast.

The future looks good for the A-7. Average structural life remaining is in excess of 8,000 flight hours, and that could be doubled by employing a structural life tracking, inspection, and maintenance program. Even without major updates, the A-7 can remain in service beyond the year 2000. Engine modifications should be completed in 1986, which will drastically lower the probability of an engine-related aircraft loss.

The AFISC prediction for 1986 is three Class A mishaps; two ops-related and one log-related, which will result in three destroyed aircraft and one fatality. The ops mishaps will likely be one loss of control and one collision with the ground (fatal). The log mishap will be engine related.

Like I've said before, this a prediction, not a goal! You have the ability to prove me wrong, especially about the fatality. Fly safe! ■

# A-10

**MAJOR KENNETH M. SPURLOCK**
Directorate of Aerospace Safety

■ The A-10A Thunderbolt II has just completed its 11th year of flying since the first production flight in March 1975 and is now flown by 7 active wings, 2 test wings (Elgin AFB, Florida, and Edwards AFB, California), 5 Air National Guard units, and 4 Air Force Reserve units. Fairchild Republic delivered the last production aircraft in March 1984.

The A-10 has the best operational mission capable (MC) record in the USAF fighter/attack community. For example. the 23 TFW's "Flying Tigers" achieved an Air Force record of 93.1 percent MC rate in 1985. As of 31 December 1985, A-10 units had accumulated 1,350,000 hours of flying time with a cumulative Class A rate of 3.55, the best ever for USAF attack aircraft.

The A-10 mishap record is a remarkable achievement considering the low altitude, high threat environment flown in by A-10 pilots. However, the mishap rate accounts for the loss of 47 aircraft and 24 pilots, or a loss of nearly 2 squadrons of aircraft and a squadron of pilots.

**A-10 CLASS A MISHAPS**

| CATEGORY | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | CUM |
|---|---|---|---|---|---|---|---|---|---|---|
| OPERATIONS RELATED | | | | | | | | | | |
| Control loss | 1 | 1 | 1 | | 1 | 2 | 1 | 2 | | 9 |
| Col w/grnd | | | 2 | 2 | 1 | | | | 2 | 7 |
| Range | 1 | 2 | 1 | | 2 | | 3 | 1 | | 10 |
| Midair collision | | 1 | | 1 | | | 2 | 1 | 1 | 6 |
| Landing (pilot) | | 1 | | | | 1 | | | | 2 |
| Flameouts (pilots) | | | | | | 1 | | | | 1 |
| Ops Other | | | | 1 | | | | | 1 | 2 |
| LOGISTICS RELATED | | | | | | | | | | |
| Flameouts | | 1 | 1 | | | | | | | 2 |
| Flight controls | | | 1 | | 1 | | | | | 2 |
| Engine failure | | 1 | | | | | | 2 | | 3 |
| Fire (hydraulic) | | | 1 | | | | | | | 1 |
| Log other | | | | | | | 1 | | | 1 |
| UNDETERMINED | | | | | | | | | | |
| | | | 1 | 1 | | | | | | 2 |
| TOTAL | 2 | 7 | 8 | 5 | 5 | 4 | 7 | 6 | 4 | 48 |

The figure gives a quick overview of all A-10 Class A mishaps.

Comparing annual mishap rates, 1985 was even more successful than 1984 with 4 Class A mishaps resulting in a 1.7 rate compared to a 2.7 rate in 1984. The four aircraft destroyed in 1985 resulted in two fatalities. A synopsis of 1985 mishaps follows.

- The pilot of an A-10 attempted to weather abort in a canyon, and the aircraft impacted the canyon wall. One fatal.
- A midair occurred during a cross-turn at low altitude. One aircraft was destroyed with the pilot successfully ejecting. The second aircraft was damaged but successfully recovered.
- A collision with the ground occurred during a low altitude tactical navigation mission. Possible pilot incapacitation. One fatal.
- The aircraft struck a power line while avoiding birds. During landing approach, the pilot lost control while maneuvering for a straight in. The pilot successfully ejected.

All of the 1985 Class A mishaps are operations related. The business of flying low level and delivering ordnance is inherently risky. While the A-10 community can be proud of its overall safety record, there is much room for improvement. Each pilot must stay totally involved, aware, and alert on every mission to prevent future mishaps.

Some areas the TAF is working to reduce operations mishaps are: (1) Increasing emphasis on physical conditioning and G-tolerance training to prevent G-induced loss-of-consciousness mishaps; (2) developing a ground collision avoidance system which should be available to A-10 users by 1987 (this system has a radar altimeter and voice warning capability); and (3) developing USAF initiatives to provide better range facilities to enhance safety and proficiency.

There were no logistics-related mishaps in 1985. The low number of logistics mishaps in the history of the A-10 is due greatly to its design and the outstanding support provided by the entire A-10 logistics community. From the system manager to the crew chief, everyone is pulling together to keep the "Hogs" flying safely. But, don't let your guard down. There is always room for improvement in mishap reduction.

Two Class B mishaps occurred in 1985: A midair with a glider (operations) and an engine fan separation (logistics). The number of future fan separations will be reduced by a modification strengthening the No. 1 bearing housing and enlarging the carbon seal. Flying alert with good visual scan techniques will preclude any more midairs.

Class C mishaps, other than bird strikes, were reduced again this year. Engine problems continue as the leading cause of Class C mishap reporting. The Hot Section Life Improvement (HSLI) and Turbine Engine Monitoring System (TEMS) installations, starting in 1986, will reduce the number of in-flight engine shutdowns.

Reportable fuel foam fires have increased since November 1985 with 16 fires reported. Fourteen fires were in Alaska and two at Grissom AFB, Indiana. Although the problem doesn't seem as likely in the warmer areas, the fuel foam fire possibility is always with us. Two new foams, which will hopefully lead to an adequate solution to this long enduring problem, will be tested in 1986 in Alaska.

Overall, it has been an excellent safety year for the USAF and the A-10 community. Modifications in 1986 should continue to enhance the safety of the A-10. However, our biggest problem remains *people*. Every person, whether pilot or maintainer, must rededicate themselves to excellence.

The 1986 forecast tells us five aircraft will be lost because of mishaps. Of the five, four will be operator error and one will be logistics. Only *you* can prevent the human factor mishaps. What are you doing to preserve our combat capability? ■

# A/T-37

**LT COL HORST K. KRONENWETT, GAF**
Directorate of Aerospace Safety

■ For the A/T-37, it was again a very successful year; its operators, maintainers, supervisors, and support people did a fine job in keeping their airplane at a low Class A mishap rate. Two Class A mishaps destroyed one aircraft of each model in 1985.

The A-37 community lost one airplane and its crew when they crashed into trees on a shoreline, breaking the zero Class A mishap forecast. The T-37 had the single Class A mishap as predicted.

Now, let's review a few statistics and the 1985 mishaps.

## T-37

The T-37 fleet has flown about 9.5 million hours, maintaining an average of 350,000 flying hours per year since it entered service in the 1950s. Including this year's mishap, the T-37 has an overall mishap rate of 1.3 per 100,000 flying hours. There are still 647 T-37s in the inventory for undergraduate pilot/navigator training at 8 US bases for the USAF and NATO countries. In 1985, the T-37 fleet logged 315,008 flying hours, flying nearly as much as the T-38 (365,017) and the F-4 (345,292). This flying time amounts to 9 percent of 1985's total USAF annual flying time. One Class A mishap occurred in 1985, which provided a mishap rate of 0.3 compared to a USAF overall rate of 1.49. Congratulations to all. It took a lot of effort at all levels and in all branches to achieve this goal.

In contrast to the preceding 2 years' ops mishaps, 1985's mishap was logistics-related, involving a navigator contact/spin training mission. The IP stated that during spin recovery, "when the stick was abruptly applied full forward, the aircraft did not respond." After the trainee called passing 10,000 feet MSL, the IP commanded bailout. Both ejected without injury.

The aircraft impacted in a left spin. Investigations revealed the down-elevator control cable had separated about 9.75 inches from its forward attach point in the stick well area. Subsequent microscopic examination showed interior corrosion and swelling of the carbon steel control cable which weakened it. Evidence indicated the cable failed prior to impact of the aircraft. It was

determined the cable broke when the stick was applied for spin recovery, so the pilot could not attain elevator nose-down deflection with stick actuation.

An inspection of all T-37s showed one more aircraft with this same cable deterioration. A recent TO change, initiated by the mishap board, includes a periodic cable inspection until all T-37 cables are eventually brought up to A-37 configuration standards replacing the carbon steel with stainless steel cables.

No Class Bs occurred in 1985. Numerous Class Cs and HAPs were reported. Most of them dealt with engine flameouts during engine start, taxi, and in flight. The System Safety Group addressed this problem, and steps already have been taken to alleviate it. However, we will still have the flameout problem which is characteristic of the T-37: Airframe air-inlet/engine/fuel control combination make it super sensitive to rapid changes in throttle movement, thus inducing flameouts. So, be easy on the throttles and attitude changes in critical parts of the flight envelope.

Other major reported Class C items are physiological incidents (colds, airsickness, GLC). We have been flying jet aircraft for over 27 years in training and still we encounter too many of these mishaps. Let's be prepared, flying only when fully physically fit, and do the proper L-1 straining maneuver. The new fighters especially demand you strain properly — otherwise you easily might become a Class A statistic. The successor to the T-37 will not arrive in the near future, so you will still have to live quite some time with the old "TWEET." Keep on doing the excellent job you have done in 1985.

## A-37

For 2 years, this airplane flew without a Class A or B mishap. Unfortunately, in 1985, a Class A mishap occurred. With 25,993 flying hours in 1985, the A-37's mishap rate was 3.6, placing it comfortably in the group with the F-106 (3.6) and the T-33 (4.2). The A-37 inventory consists of 118 aircraft. The fleet has flown 640,205 hours since it entered the Air Force inventory.

The 1985 Class A mishap occurred at a deployed location in Central America where some ANG fliers were on a routine range mission. The mishap aircraft was No. 2 of a three-ship on a low-level to an air-to-ground range. In a turn, the flight descended through the minimum altitude. The mishap aircraft flew through trees along the beach. Upon contact with the trees at 250 KIAS during a 60 degree-bank left turn, the aircraft snapped immediately to a near-inverted position and experienced structural damage and loss of thrust from both engines. The aircraft then rolled back to a wings level nose-low attitude. Just prior to impact with the water, the nose was observed to come up. Time from the impact to water entry was estimated to be 2 to 3 seconds. There was no attempt to eject!

No Class Bs occurred in 1985.

Many of the Class Cs were flameouts at high altitude during air refueling and at high angles of attack. The System Program Manager (SPM) is trying hard to solve the problems with the J-85 engine. However, we still will have to live with a critical engine/airframe air-inlet combination, which will continue to make flameouts likely. Remember this and fly accordingly. A lot of technical improvements are on the way through the SPM.

All these improvements, however, cannot prevent mishaps like the one described above. The SPM will do his best to make sure you have a safe airplane. If you work just as hard to ensure you are just as safe, we can go through the year with no Class As. ■

# F/RF-4

**LT COL HORST K. KRONENWETT, GAF**
Directorate of Aerospace Safety

■ The F/RF-4 is entering its 22d service year with over 1,600 aircraft. About 50 percent of the aircraft are flown by Air National Guard and Air Force Reserve units. Since its arrival in 1964, the F/RF-4 has accumulated over 8.9 million flying hours.

As the Air Force overall Class A mishap rate hit a record low of 1.49, the F/RF-4 also emerged with its lowest rate ever of 2.9. Because everybody was paying attention, our first Class A mishap occurred on 22 March 1985 — after 112 days without a mishap! The downward trend of Class A mishaps is shown in Figure 1.

The F/RF-4 fleet flew 345,292 hours in 1985, over 28 percent of the total fighter force or 9.9 percent of the entire Air Force.

Compliments to all "Phantom" operators, maintainers, supervisors, and support people — you really beat the goal for 1985 and met the challenge "to repeat your previous performance and to better the forecaster's prediction."

In 4 consecutive years, annual losses have remained below the forecast. In 1985, 12 mishaps were predicted, 10 occurred with 9 aircraft destroyed. Compared to the previous year, you have saved the Air Force 2 more aircraft or decreased the losses by over 15 percent and saved millions of tax dollars. Analyzing the 1985 Class A mishap, there is, however, room for improvement.

In the logistics area, 1985 proved to be a super year: Five Class A mishaps were predicted versus two actual (Figure 2). The logistics-related rate was 0.6 in 1985 versus 1.4 in 1984. This is even a greater achievement if you consider the age of the weapons system, the extent of flying time, and the five very different models.

One log mishap resulted from an ACM mission where the aircraft experienced fire on the right engine during an extension maneuver. As the aircraft pitched up uncontrolled and the right fire light illuminated, the crew ejected safely. The aircraft crashed into deep water and was

**Figure 1**

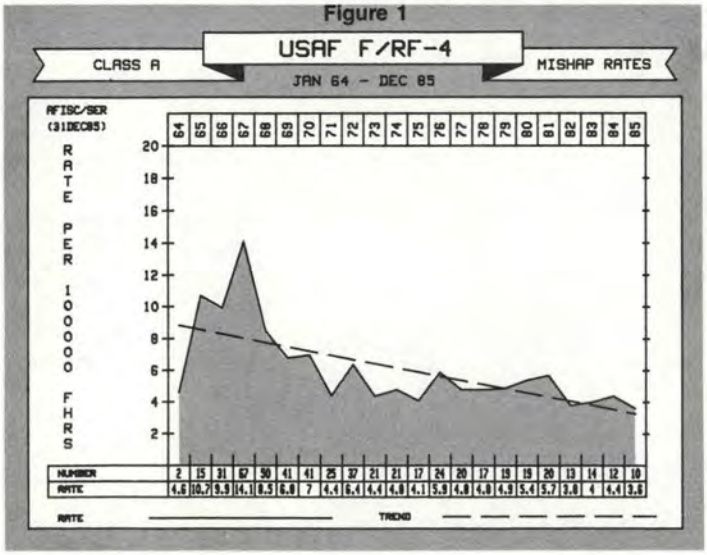


**Figure 2**

**Logistics Factor Mishaps**

| | 1983 | 1984 | 1985 |
|---|---|---|---|
| Engine | 1 | 1 | 1 |
| Fuel System | 1 | 2 | 1 |
| Electrical | 1 | 0 | 0 |
| Landing Gear | 0 | 1 | 0 |
| Misc/Undetermined | 0 | 1 | 0 |
| | 3 | 5 | 2 |

**Figure 3**

**Operations Factor Mishaps**

| | 1983 | 1984 | 1985 |
|---|---|---|---|
| Loss of Control | 4 | 3 | 2 |
| Collision W/Ground (Nonrange) | 1 | 1 | 2 |
| Collision W/Ground (Range) | 0 | 0 | 1 |
| Midair Collision | 2 | 2 | 1 |
| Fuel Starvation | 1 | 0 | 0 |
| Landing | 0 | 1 | 1 |
| | 8 | 7 | 7 |

not recovered. The investigation revealed the time-required inspection of the afterburner assembly was exceeded due to inadequate logistics management, insufficient technical data where ABs were tracked by time for inspection, and engines by sorties. It took submission of 12 AFTO Form 22s to correct identified technical data deficiencies. A possible afterburner nozzle flap seal burn-through was assumed to have caused the fire.

The other log mishap occurred right after gear retraction on takeoff when the tower told the crew their aircraft was on fire. After the fire lights illuminated and the crew verified outside fire, they ejected safely. The investigation is still in progress. However, a fuel cap found on the runway right after the mishap, with no signs of the cap being on the centerline tank at impact, led to the conclusion the cap must have fallen off during takeoff roll. Fuel subsequently entered the engine bay through the auxiliary air door, fueling the fire. The Crew Chief did not perform a leak and transfer check according to the tech order which required a check of the fuel cap — the only means that would have revealed the fuel cap was not secure. Also, the aircrew checklist did not require a check of the fuel cap. A change to the aircrew checklist was distributed. Both log mishaps were preventable had there been compliance with existing orders. This log mishap was preventable had there been a safety-minded look for what else might be loose in addition to items annotated explicitly in the TOs.

Still, the F-4 mishap rate is dominated by operations-related mishaps. In 1985, the F/RF-4 was forecast to sustain 6 ops — we had 7 (Figure 3). This relates to an overall operations rate of 2.0 compared to a 0.6 log rate. That should make us think. Even though we had a very good year, the ops rate has leveled off for 4 years while the log rate is steadily declining. We must improve. We have to get the human factors under control.

Operations mishaps for 1985 include:

- Two mishaps were caused by loss of control. The first mishap occurred 10 minutes after takeoff during DBFM with an F-5. After disengaging, the aircraft departed twice before the crew ejected. The other mishap occurred during a low-altitude radar approach to an airfield when the pilot, recognizing a civilian light aircraft directly in front of him, pulled back on the stick so violently the aircraft departed, and the crew had to eject due to the low altitude.
- Three mishaps resulted in collisions with the ground. In one instance, the aircraft flew into the ground after turning off from the target. The two others involved flight discipline breakdown. During the second mishap, an attacking Baron collided with a ridgeline while performing a conversion turn on two defenders. The third mishap was caused as No. 4 barrel rolled around No. 3 in a tactical turn during a low-level mission and hit the ground. These two mishaps should remind us of the saying "mishaps don't just happen, they are made."

One mishap was the result of a poorly led formation landing during an instrument approach with weather conditions at minima. The lead had not led a formation landing for 117 days and was out of currency according to existing directives. He continued the approach through adverse weather with excessive sink rate below safe go-around altitude. The WSO didn't call 100 feet above Decision Height (DH). At DH, the flight lead started a missed approach since the runway environment was not in sight. During the missed approach, flight lead struck the ILS far field monitor and perimeter fence sustaining substantial damage. He landed at the alternate. The wingman's aircraft touched down short of the runway and sustained major damage, sliding to a stop near the runway. The nose gear collapsed initiating the WSO ejection; the front seat pilot was extracted from his cockpit when his personal parachute deployed. Both crewmembers were injured during ejection/extraction. Again, manmade!

- One mishap aircraft collided on landing roll at night with a civilian Beechcraft holding in position at

continued

# F/RF-4 continued

an intersection in the center of the landing runway. On impact, both aircraft were engulfed in flames due to explosion. The civilian pilot was killed, but the F-4 crew ground egressed uninjured. Both aircraft were destroyed. The civilian tower controller had cleared the Beech on the runway to hold and had forgotten about it when he cleared the RF-4C 10 minutes later to land. The civilian pilot remained on the runway an inordinate length of time without querying the local controller on his departure status. He could have prevented this mishap had he communicated. That one the Air Force driver could not avoid.

■ One Class A mishap remained undetermined. During a night intercept visual reattack, the mishap aircraft crashed into the sea. No survivors were found. The most likely cause was spatial disorientation.

The F/RF-4 fleet experienced 5 Class B mishaps.

■ One derived from an afterburner nozzle flap burn through with damage to the tail section.

■ Two mishaps were caused by loss of the ALQ-119 pod in flight damaging an engine, left wing, and external tank.

■ One mishap was the result of a gear-up landing of an RF-4C out of an overhead pattern; supervisors in the mobile and in the control tower were tied up with an IFE inbound to the field.

■ The fifth Class B mishap could easily have been a Class A had it not been for the superior airmanship of the aircrew and cool aircraft handling by the pilot.

An RF-4C experienced rear cockpit electrical fire with subsequent complete electrical failure while flying a low level between cloud layers. The crew conversed with each other by handing written notes back and forth. After the pilot was able to see the ground through a hole in the clouds, he descended and made a planned emergency gear-up landing on a civilian field rather than giving up the aircraft and ejecting. He decided on the gear-up landing since he judged the runway length to be about 3,000 feet. Weather conditions at time of landing were about 600 feet broken, 2 to 5 miles in fog. Since the centerline tank could not be jettisoned due to the complete electrical failure, residual fuel ignited on landing and burnt the left fuselage side of the aircraft causing Class B damage. The electrical fire which initiated this mishap sequence was caused by a shorted cannonplug through which all three aircraft power sources (main generators, emergency generator, and battery) are routed. The crew ground egressed uninjured.

■ The sixth mishap was the result of a left main gear strut failure during taxiing.

All Class C and HAP reports in 1985 reflected continuing problems as in the past years — engine compressor stalls/flameouts at high AOAs, FOD, and fuel system and flight control malfunctions. Analyzing these reports and finding solutions and funding to reduce possible hazards that might lead to Class As are the lasting concern of your AFISC action officer and system program manager. So, submit reports by all means, and do them properly.

Problem areas that were worked and may possibly become reality are:

■ An extended fire/overheat loop and fire/overheat voice warning.

■ The nose gear actuator will be modified to prevent it from entering the cockpit and thus initiating inadvertent ejection during landing mishaps, as we repeated on one of 1985's Class A mishaps.

■ Low altitude proximity and canopy locked voice warning systems should eventually curb these mishaps.

■ The single-piece windscreen, an old issue over the years, is being readdressed. We haven't got it yet but we are working on it. Three F-4Es in the ANG are currently conducting user suitability testing with excellent results.

Since you F/RF-4 people did so well in driving the 1985 mishap figures to a record low (and repeatedly beat previous predictions), there is no reason why you shouldn't be able to avoid some of the mishaps I have described in this article. I challenge you to beat the Class A mishap prediction for 1986 — 6 operations, 4 logistics. Let's fly prepared and with a cool head. Look around and be safety minded — that should do it! ■

# F-5

**MAJOR BOB MULVIHILL, CF**
Directorate of Aerospace Safety

■ The F-5 has been in the USAF inventory since 1963. The approximately 100 F-5s now in service are the mainstay of the USAF's aggressor squadrons and are flown in TAC, USAFE, and PACAF. TAC also uses them to train new aggressor pilots and foreign F-5 pilots.

It's my pleasure to report the F-5 had a superb year in 1985. Not one life was lost and no aircraft were destroyed. In fact, there were no Class B mishaps either. F-5 pilots, maintainers, and their respective supervisors can be justifiably proud of their accomplishment. In 1985, no other USAF fighter can claim a zero Class A and B mishap record.

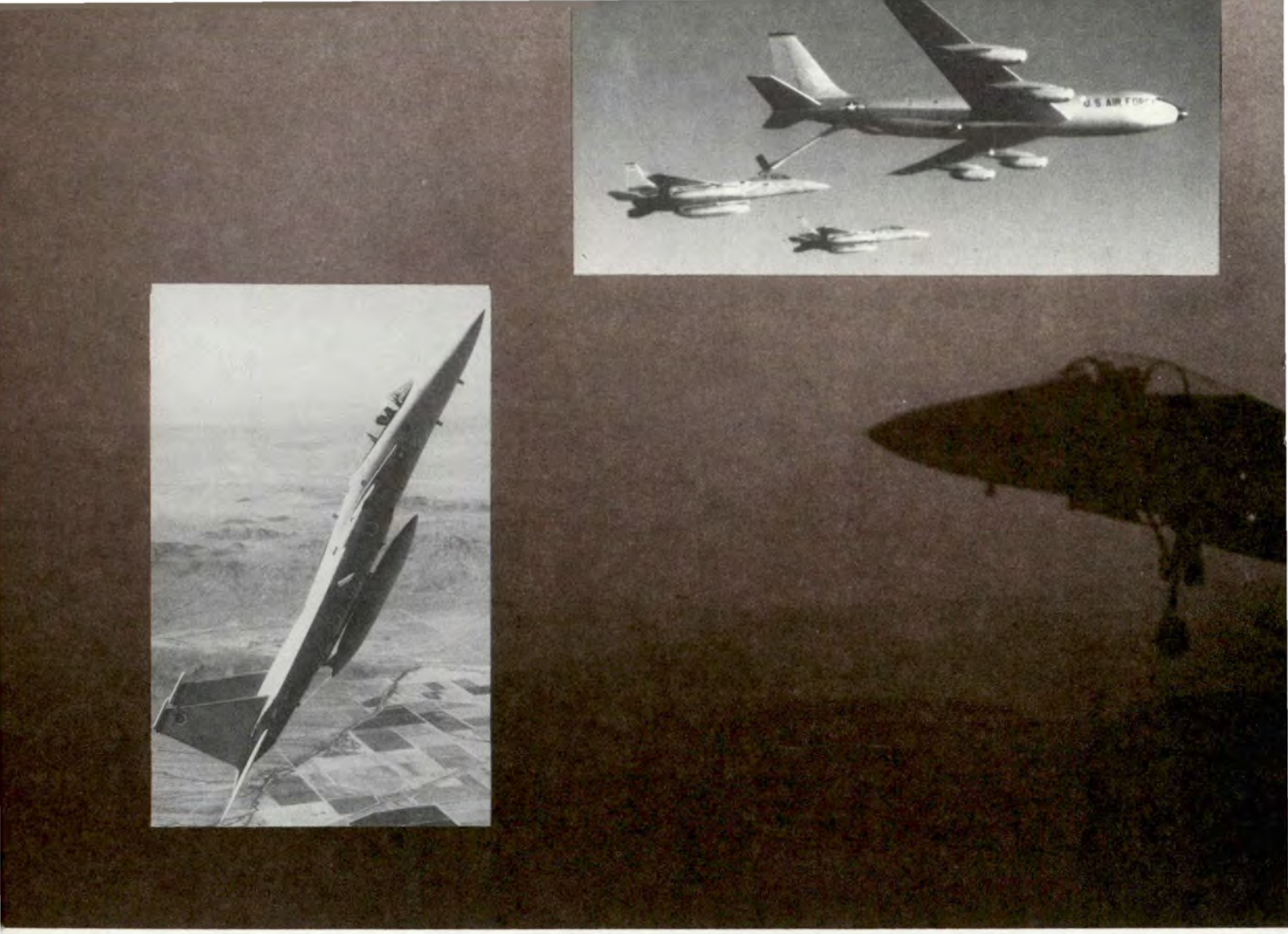
Experience has shown us that just about the time we begin to feel confident enough to brag of our accomplishments, fate raises its ugly head and humbles us. The perfect record in 1985 didn't happen by accident. It was the result of hard work and diligent attention to detail by all those who contributed to F-5 operations. We can't afford to let down our guard because as sure as we become complacent, we'll have another mishap. In 1986, we lost one F-5 before January had passed. Fortunately, the pilot ejected safely.

The F-5 has flown over 370,000 hours in the USAF and has experienced 33 Class A mishaps. In 1985, the F-5's perfect record brought the lifetime Class A rate down from 9.4 to 8.6 per 100,000 hours. Combining 1984 and 1985 gives a Class A mishap rate of 3.47 which is much more reasonable than the lifetime rate and demonstrates the F-5 is capable of holding its own when compared to the rest of the TAF. We need to continue working to achieve the 0.0 rate we experienced in 1985 again!

Of the 33 historical total Class A mishaps, 2 out of 3 were ops-factor mishaps with out of control and collision with the ground being the major players. This indicates mishap prevention by the operators can do the most to lower the mishap rate. Pilots and their supervisors have to be constantly on the lookout for the signs that indicate an increased risk. Mishaps that have occurred in the past and in other weapons systems indicated there are several common conditions that show themselves over and over again. Last minute changes in a mission, delayed takeoff, deployments, complacency, undernourishment, and fatigue are some of the warning signs we have to watch for. When any of these elements are present, just being aware goes a long way in preventing them from escalating into a serious mishap.

In 1985, as in the past, single-engine flameouts make up the largest percentage of Class C mishap reports. The flameout rate of the F-5E/F J85-21 engine is very high, and the trend line shows an increase. When most flameouts are investigated, it's normally found they were preventable. Common causes are throttle, throttle stops, MFCs, and IGVs being out of rig. To try to reverse this trend, a flameout conference was held in January 1986, and we hope solutions coming out of that meeting will do the job of reducing flameouts. In the meantime, pilots are going to have to keep up their expertise in engine relights and single-engine recoveries.

In my article last year, I urged all F-5 pilots to work towards a perfect Class A record in 1985, and you all came through. Perhaps my error was not challenging you for a longer period, like 1986 and beyond. It's a bit late to ask for a perfect record in 1986, but let's make the rest of 1986 and 1987 mishap free. That way we will lose no F-5 pilot, and you'll all be here to read my article next year. ■



# F-15

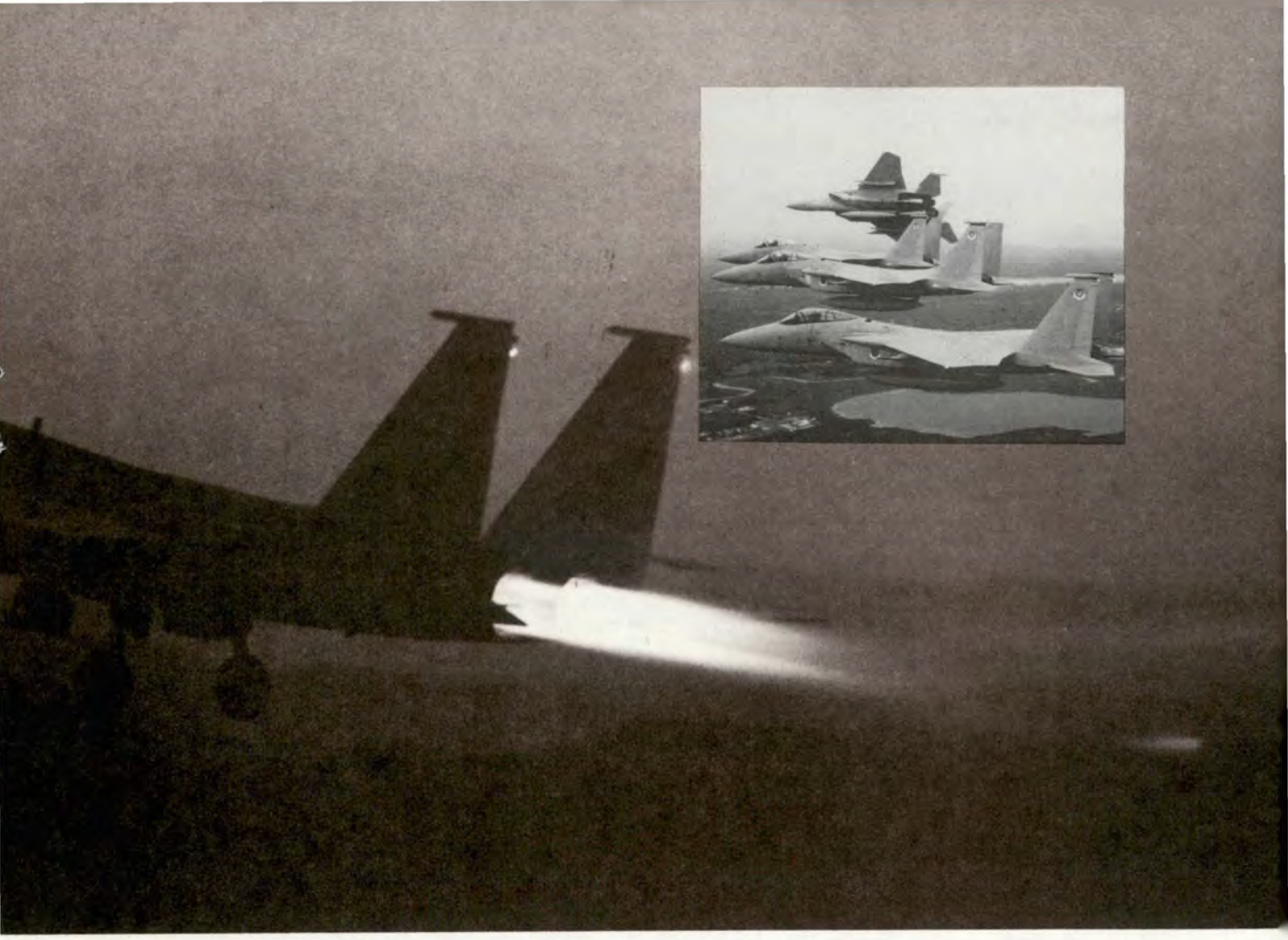
**MAJOR MICHAEL J. KAYE**
Directorate of Aerospace Safety

■ The USAF possesses approximately 730 F-15 aircraft which are flown in 6 commands by 19 different units. McDonnell Douglas is the prime contractor for the aircraft, and 36 new C/D models were delivered to the Air Force in 1985. F-15s destroyed in flight and ground mishaps since the aircraft became operational in 1974 include 29 A models, 5 B models, 10 C models, and 1 D model. From 1974 through 1978, logistics accounted for 11 out of 15 Class A flight mishaps. In contrast to this, from the beginning of 1979 through 1985, operations accounted for 19 out of 29 Class A flight mishaps with pilot-induced loss of control the major problem.

From a safety standpoint, 1985 was a disappointing year for the F-15 community. Four Class As were forecast for this period, however, five occurred — two were logistics related and three were operations related.

The first mishap in 1985 occurred during a defensive counter air mission conducted over water. The mission was uneventful until 2 minutes prior to return to base when the flight lead gave the mishap pilot a visual signal for a left 180-degree tactical turn. At the completion of the turn, the mishap aircraft rolled out in trail at 7 o'clock and 2,000 feet low relative to lead. From this point, for an undetermined reason, the pilot violated his minimum altitude restriction of 1,000 feet AGL and impacted the water. The pilot made no attempt to eject, and the aircraft was destroyed on impact.

The second mishap occurred shortly after takeoff from a remote NORAD alert base. The aircraft was configured with a full complement of missiles and 3 full 600-gallon ex-



ternal tanks. After an afterburner takeoff, the aircraft was observed overflying the runway at approximately 600 knots and 100 feet AGL. The pilot initiated an abrupt climb over the runway, and the aircraft suddenly and violently broke up, was engulfed in flames, and fell into a major adjoining river. It was determined the mishap resulted from a pilot-induced over-G which caused catastrophic in-flight structural breakup.

Another mishap resulted in substantial aircraft damage following a utility hydraulic system failure. During recovery, the pilot extended the landing gear using the emergency landing gear extension system and all three gear confirmed down and locked. The pilot attempted an approach-end barrier engagement, but upon touchdown, weak overcenter springs allowed the right main landing gear to collapse, and the aircraft departed the runway prior to engaging the approach-end barrier. The pilot was uninjured and egressed the aircraft successfully.

The fourth mishap involved an engine explosion and fire due to a catastrophic failure of the left engine second stage compressor air seal. Following a military power takeoff, as the mishap pilot was rejoining on lead, he felt the airframe shudder and heard a loud noise from the aft section of the aircraft. The airframe mounted accessory drive fire light and both engine fire lights illuminated in rapid succession, followed by a noticeable decrease in thrust. The pilot altered course toward land, and as the flight leader closed to a chase position on the mishap aircraft, he saw an explosion with parts and flames exiting the top of the fuselage. Fire rapidly engulfed the entire top of the aft fuselage, and the pilot ejected successfully as he crossed a shoreline.

The final mishap involved loss of control during a handling qualities demonstration. During a full aft stick accelerated stall entry at approximately 240 knots, the aircraft departed controlled flight when full right rudder was abruptly applied. The aircraft immediately entered a right upright spin which quickly transitioned into a flat spin. The aircraft did not respond to antispin controls, and both aircrew ejected successfully. The mishap is under investigation at this writing.

The year 1985 was also an active year for Class B mishaps. Although only two mishaps were forecast, five occurred — two being logistics related and three operations related. The first incident occurred when a weakened area in the engine dif-

continued

fuser case failed causing significant fire damage to the aircraft. The second mishap involved a runway departure when the pilot lost situational awareness and failed to recognize an excessive ground speed until it was not possible to slow to a safe turnoff speed. The third Class B resulted when the pilot became spatially disoriented over water during a VFR engagement and pulled 12.4 Gs to recover the aircraft. The final mishap occurred when the left main wheel separated from the landing gear assembly during a touch-and-go landing. Shortly after touchdown during the full stop landing, the left gear strut snagged an arresting cable, and the aircraft departed the runway.

The following were principal F-15 safety concerns in 1985.

■ **Wing Transfer Pump Failures.** Lateral internal wing fuel asymmetry resulting from inoperative wing transfer pumps has been considered causal in two F-15 loss-of-control Class A mishaps. Due to controversy associated with these mishaps, a fix for the problem received varying support. Recently, however, three well documented loss-of-control incidents have occurred as a direct result of wing transfer pump failures, and two aircraft narrowly escaped destruction.

In response to F-15 System Safety Group action items, MCAIR submitted an advance change study notice to the F-15 System Program Office concerning a cockpit warning of wing transfer pump failures. An engineering change proposal (ECP) now exists to provide a transfer pump failure warning for the developing F-15E and a retrofit for all F-15A through D models.

■ **Stabilator Actuator Input Arms.** Input arms have failed on four occasions, and one of these failures resulted in the loss of an aircraft. A two-part solution was developed in 1984 which eliminates the problem. TCTO 871 has been completed involving the installation of a new antirotational clevis and summing lever weight removal. The remaining fix is included in TCTO 895 and involves an input arm made from a different alloy and a self-centering mechanism. Production hardware deliveries were received in August 1985, and a complete retrofit is scheduled to begin in May of this year.

■ **Augmentor Burnthrough.** Since the beginning of 1980, the F-15 fleet has experienced 3 Class B mishaps and approximately 60 Class C or HAP incidents due to augmentor burnthroughs. Presently, there are two major efforts underway to correct this problem. The current aircraft configuration does not include fire detection circuitry in the afterburner section, and a new ECP has been developed to provide this protection. The second effort involves an accelerated agumentor improvement program known as "Eagle 100." This project will be accomplished at field level by contractor teams. It started in February of this year and will take 18 months to complete.

■ **Main Landing Gear Overcenter Springs.** The main landing gear collapsed on two occasions in 1985 resulting in major aircraft damage. In both cases, the mishap aircraft had experienced utility hydraulic failure, and the gear overcenter springs failed to maintain a gear locked condition at touchdown. The problem was traced to inadequate spring strength and resulted in the temporary grounding of approximately 6 percent of the F-15 fleet late last year. Spring tension tests were completed on all aircraft, and weak springs were identified. These springs will be replaced early this year with stronger, redesigned springs which should eliminate this problem.

The 1985 F-15 Class A mishap rate of 2.8 was the highest since 1981 and significantly higher than the 1984 rate of 1.7. In practical terms, 1985 represents the loss of a five-ship of Eagles and two pilots. Operations-related mishaps continued to play a major part in the total safety picture, and we need to concentrate our efforts in this area to reduce the overall mishap rate. Let's all — operators and maintainers — strive to make 1986 the safest ever for the Eagle. ■

# F-16

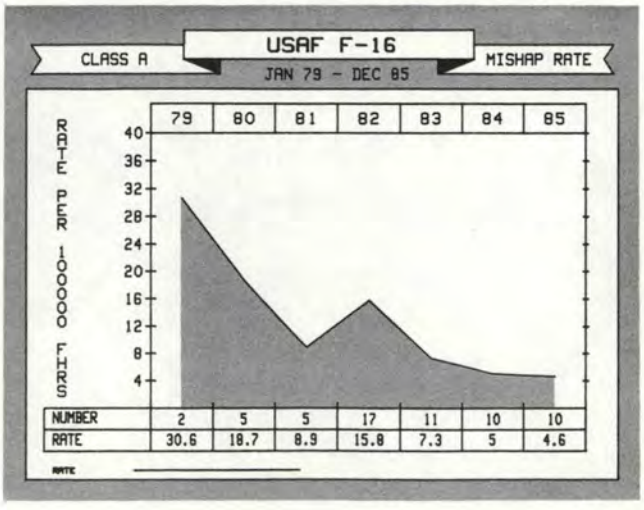
**F-16 SAFETY TASK FORCE**
Directorate of Aerospace Safety

■ The downward trend of the F-16 Class A mishap rate continued in 1985. Although the number of Class A mishaps in 1984 and 1985 remained the same, a flying hour increase for 1985 resulted in a mishap rate of 4.7 in 1985, the lowest ever for the F-16. (See Figure.)

In 1985, four mishaps had logistics as the cause. Six mishaps had operations factors as the cause. Combining the two areas resulted in the overall 1985 mishap total of 10.

The following is a breakdown of these 10 mishaps:

- Six operations factor Class As.
  - Four collision with the ground.
  - One G-induced loss of consciousness.
  - Two spatial disorientation.
  - One loss of altitude awareness.
  - One loss of control.
  - One midair (two F-16s lost).
- Four logistics factor Class As.
  - Three engine.
  - One AOA probe icing/loss of control.




While we have done reasonably well overall, it is imperative we keep sight of the most important factor in mishaps, the loss of our friends and fellow pilots. In 1985, five of the six operations factor mishaps resulted in pilot fatalities.

In 1985, we continued a trend started in 1983 with operations factor mishaps first equaling and now outnumbering the logistics factor mishaps. This trend indicates the need for increased effort in the operations factor area if we are to improve our record in 1986.

## Logistics Factor Mishaps

At this point, it may be valuable to look at our 1985 mishaps, identify their cause factors, and outline the steps being taken to solve the problems.

We will start by covering the logistics factor mishaps. The breakout of the malfunctions shows the following:

- A fuel line leak in the PF3 sensing line leading to flameout from fuel starvation and no relight

continued

capability in UFC. (Delay in initiating a BUC start resulted in insufficient time to complete the start.)

- AOA probe heat failure with subsequent dual probe icing and aircraft loss of control.
- Misaligned rear compressor variable vane (RCVV) leading to extensive compressor blade damage and engine failure.
- A fatigue crack initiated in a first stage balance weight hole most likely due to a mismanufactured balance weight leading to a catastrophic failure of the first stage disk.

Two of the three engine mishaps were due to problems which had not previously occurred. The two new problems, PF3 sensing line leak and the balance weight-induced fatigue crack, were considered isolated failures with possible design, quality control, and inspection procedure involvement. In the third mishap, a field level TCTO on the RCVVs was found to have the potential to result in misalignment. A new TCTO was issued to inspect all modified engines for misalignment. Due to errors made in identifying and documenting inspected engines, the mishap engine escaped inspection. Technical order procedures must be followed precisely at all times to prevent human errors from causing a logistic factor mishap.

As we have seen, the use of improper or inadequate procedures can cause mishaps just as much as design problems. In the case of the disk failure, the fatigue crack was not detected during a depot 1800 cycle inspection, and the disk was returned to service. Inspection procedures in effect then were inadequate to detect the crack.

To correct these problems, new manufacturing quality control procedures have been initiated. Additionally, new depot inspection techniques have been implemented which are capable of identifying much smaller cracks than previous methods. Changes have also been made to simplify pilots' procedures to deal with low altitude engine malfunctions. The procedures now require the use of BUC for low altitude engine failures. This will reduce confusion when exact failure modes are difficult to identify.

In the case of the AOA probe icing, it was not conclusively established what caused the probe heat failure. This aircraft had not been modified by the TCTO which reduces the potential of single point failure of right and left heating circuits. Whatever the cause of probe heat failure (circuit failure or circuit breakers left out inadvertently), the end result of probe icing was aircraft pitch-under and loss of control.

Aircraft are now modified so the reset function of the altimeter is tied to the right AOA probe heat circuit breaker (inability to reset the altimeter tells the pilot the circuit breaker is out). A program is also currently underway to provide a caution/test circuit which gives the pilot the capability to monitor proper heater circuit operation.

### Operations Factor Mishaps

Clearly, a significant portion of our mishap record for 1985 was in the area of operations. The following is a breakout of the six operations factor mishaps by cause category:

- Four collision with ground.
- One G-induced loss of consciousness (GLC).
- Two spatial disorientation (SDO).
- One loss of altitude awareness.
- One pilot-induced loss of control.
- One midair (two F-16s destroyed in one Class A mishap.)

With the exception of the loss of control and the midair, all of the other F-16 operations factor mishaps in 1985 involved GLC, SDO, or loss of situational/altitude awareness. This continues a trend started in 1983 when GLC and SDO became key mishap causes in the F-16.

GLC has been an issue now for several years. Much effort has been taken to improve G-suit connectors, aircraft flow valves, and pilot knowledge and awareness of the problem. Research has shown the most significant factor involved in overcoming GLC is a timely and properly executed straining maneuver. Centrifuge programs are currently underway to train pilots to perform straining maneuvers. In the

final analysis, it is up to each pilot to know his capabilities each day and to train himself to anticipate and perform a proper straining maneuver each and every time it is required.

Spatial disorientation has, of course, been a factor ever since men started flying at night or in weather. Unfortunately, knowing a phenomenon exists and training in how to combat and overcome the problem does not always ensure success in critical situations. One of the givens in a single-seat aircraft is there is only one person who can ensure the aircraft is properly flown. Distractions, task prioritization, task saturation, and channelized attention all have the effect of slowing down or even stopping the instrument crosscheck at critical junctures in a mission. When allowed to continue too long, they can lead the pilot to fly the aircraft into an unrecoverable position.

The loss-of-control mishap points out once again there are flight regimes where the pilot can exceed the flight control limiters and put the F-16 out of control. Although the temptation is great for a pilot to continue recovery attempts from a self-induced loss of control below 10,000 feet, we must discipline ourselves to follow established guidance to eject.

Our midair occurred when two aircraft in tactical formation reacted to a bandit during low level ingress. While maintaining tally on the bandit, both pilots lost visual contact with each other. The flight geometry was such the aircraft collided after the lead directed defensive reaction termination and rolled out. Unfortunately, the wingman missed the terminate call and, still without a visual, continued the turn. Failure to monitor the position of other flight members, predict flightpath vectors, and provide positive direction for flightpath deconfliction were all factors in this mishap. The rear cockpit pilot in the B model involved in this midair received a fatal head injury during the ejection. Studies and tests are underway in improvements to the canopy removal system to provide for better canopy separation during ejection attempts under all conditions.

### Outlook for 1986

Looking ahead to 1986, there may be some benefit in attempting to anticipate those areas where our mishap problems might be. There is no way to know in advance exactly what might happen in the future. However, using what we have learned from past mishaps and looking at areas that can have a significant impact on mishap potential can give us an idea of what we might expect. Careful preplanning of responses to emergency situations may result in a successful recovery of the aircraft or a successful ejection in a critical situation.

- Logistic Factors
  - Engine. Historically, the engine has been the most significant cause of logistics mishaps in the F-16. Several modification programs were completed in 1985. Replacement of the knife-edge seals will continue for several more years. All pilot actions in response to engine malfunctions are critical and usually time sensitive and therefore must be carefully preplanned.
  - Leading edge flap system.
  - Landing gear, brakes, and tailhook.
  - Electrical system including wire bundle chafing.
- Operations Factors
  - Judgment: Supervision as well as flying.
  - Mission preparation: Suitability of the mission based on pilot capabilities as well as the mission planning.
  - Human factors: Task prioritization, task saturation, channelized attention, overcommitment, pressing, fatigue, spatial disorientation, and G-induced loss of consciousness.
  - Landing: Transitioning from IMC to VMC. Misinterpretation of available cues and jetwash behind another aircraft.

## ■ Summary

There is every reason to expect 1986 will be an even better year than 1985. Our modification programs will continue to upgrade more aircraft and engines to reduce past logistics problems. Self discipline, physical conditioning, proper rest, and good judgment, combined with proper planning, are the keys to significantly reduce operations factor mishaps. Each of us has a personal stake in reducing the number of mishaps and a direct responsibility for accomplishing the goal of improving the record we set in 1985. ■


# F-106

**MAJOR BOB MULVIHILL, CF**
Directorate of Aerospace Safety

■ As 1985 came to a close, the F-106 aircraft moved one year closer to retirement with a good, but not a great year. As in 1984, only one aircraft was lost this year to an ops-factor mishap. On the positive side, no lives were lost, and there were no logistic mishaps. There were also no Class B mishaps.

The 1985 mishap occurred during a night intercept mission. The mishap pilot was attempting a visual identification intercept of another F-106. On an earlier intercept, the pilot had identified a radar steering malfunction and decided to do a second intercept to evaluate the radar. When established in the stern with radar and visual contact with the target aircraft, he began to take notes on the malfunction. Shortly after, he lost sight of the target, so he broke off the intercept.

In the breakaway maneuver, the two aircraft crossed wings. The target aircraft, minus 5 feet of right wing, was successfully recovered by the shaken and surprised, but otherwise uninjured target pilot. The mishap aircraft sustained considerably more damage, and when the pilot recognized he couldn't control it, he ejected.

This was not a "new" mishap. In the 1970s, during a NORAD night exercise, a Canadian Voodoo cut off about 3 feet of wing (including the tip tank) of a USAF B-57. Both aircraft were recovered successfully.

In both cases, the mishaps occurred on clear nights during stern attacks. Both pilots did not realize they had a good deal of overtake on their target and both thought they had adequate vertical separation. Both had inadvertently climbed out of their altitude block into the target's.

The lessons learned are obvious, and it's amazing everyone survived to tell about their experiences. Someone up there must like interceptor pilots. Hopefully, the rest of us can learn from their experience that no matter how current or experienced you are, a few seconds of distraction or channelized attention can result in a hair-raising, if not deadly, experience.

Several Class Cs and HAPs in 1985 were hair-raising enough. Had it not been for the skill of the pilots involved (and possibly a fair measure of luck), they might have turned into Class A mishaps. There were two reported cases of trapped fuel, and in both cases, there was a suitable airfield nearby where the pilots were able to recover successfully. One of these pilots had his engine flame out on short final but had enough momentum to complete the landing successfully.

There was one case of a serious electrical fire in the nose wheel well of a B model and one case of an uncommanded ram air turbine extension. Again, the pilots involved were able to recover safely. There were two cases of false fire warning lights reminding us we should check for further indications of fire when we get a fire light.

The F-106 is not getting any younger, but it remains a reliable aircraft, and the pilots who are flying it now have plenty of experience. The combination of a mature weapons system and seasoned pilots presents a unique opportunity to fly mishap free in 1986 and beyond. The record of 23 mishap-free months established in 1981, 1982, and 1983 still stands, and since the 1985 mishap happened early in the year, we now have another streak going. Let's keep it going. The F-106 has served its country long and well and deserves to retire without any more Class A mishaps. ■

# "Delta Dart" Closes Out

**PEGGY E. HODGE**
Assistant Editor

The F-106, built by General Dynamics, was designed to incorporate the state-of-the-art technology in airframe, engine, avionics, and weapons systems.

■ The last F-106, or "Delta Dart" as it's sometimes called, left McClellan AFB, California, 18 January 1986. For 25 years, the Sacramento Air Logistics Center at the base maintained the F-106. The closeout marked the end of an era for many who had worked on the aircraft and the culmination of a very long and successful maintenance program.

Originally called the "1954 Ultimate Interceptor," it grew out of the Convair delta wing XF-92A — an American application of Germany's wartime theories and preliminary testing. The aircraft, which was built by the Convair Division of General Dynamics at the San Diego plant in 1956-1959, was designed to incorporate the state-of-the-art technology in airframe, engine, avionics, and weapons systems. The first test flights were done in 1957. A total of 340 aircraft were built at a cost of $4.7 million per plane.

History shows us the F-106 set many firsts.

■ The F-106 was the first, and for many years the only, Air Force fighter with a programmable, digital fire control system computer.

■ In March 1960, the F-106 "flew itself" in the first fully automated flight going nonstop across the continent from California to Florida. Flying time for the plane was 3 hours, 12 minutes. Flying time for the pilot was 5 minutes.

■ In addition, this 2,500-mile flight was the longest ever made by any fighter aircraft without refueling.

■ The Dart also set a world speed record for single-engine planes over a 15-25 kilometer course which still stands today.

■ In December 1959, Major Joseph Rogers established a new world speed record of 1,525.95 mph — that's 2.4 MACH — at Edwards AFB, California, beating the old record by 129 mph set in an F-104 Starfighter in 1958. The record also exceeded the Soviet's speed record of 1,483 mph set in their E-266 delta wing fighter in 1959.

Because it was designed to be an all-weather aircraft, the Dart was used in several tests involving adverse weather conditions.

The F-106 is currently used by NASA at Langley AFB, Virginia, in flights into thunderstorms to test the effects of lightning strikes on aircraft systems.

The F-106 has proven to be a high-stepping performer and in the last 10 years has attained levels of maintainability unthinkable in the 1960s. F-106s are now projected to serve with air defense units under the command of First Air Force (TAC) through 1988. ■

"The F-106 has proven to be a high-stepping performer and, in the last 10 years, has attained levels of maintainability unthinkable in the 1960s."

# F/FB/EF-111

**MAJOR STEPHEN H. PENDRY**
Directorate of Aerospace Safety

■ The F-111 was first delivered to the USAF in 1966 by General Dynamics, Fort Worth Division. A total of 562 aircraft had been delivered by contract termination.

In its early years of service, the "Aardvark" (a pet name assigned by aircrews since it is the only fighter-designated aircraft in the inventory that has never been officially named) was ridiculed, maligned, and otherwise downtrodden. Remember the terms "McNamara's Folly" and "General Dynamics' Edsel?"

More importantly, though, throughout its 20 years in USAF's inventory, it has served as a reliable workhorse in the arena of night, all-weather, low level conventional attack (A,D,E,F models); strategic bombardment (FB-111A); and most recently, electronic countermeasures (EF-111A).

I'm sure all you "Vark" drivers and maintainers will share a little twinge of pride when you realize your efforts produced 80,927 hours of flying with the enviable Class A mishap rate of zero for 1985. Your once maligned workhorse has proved itself to be the safest fighter/bomber in the USAF inventory in 1985. (The F-5 had zero Class As but flew only 28,500 hours.)

This success story can continue if all of us in the F-111 community maintain the level of awareness and dedication shown in the past year. A part of that dedication will be to press hard to resolve the following primary safety concerns:

■ **Terrain Following Radar (TFR).** The Blue Ribbon Panel formed in January 1983 (after the two 1982 losses attributed to TFR problems) was disbanded in November 1985. The panel closed out over 55 action items which greatly enhanced the safety of TFR operations through education, technical order changes, and hardware improvements. The efforts of the Blue Ribbon Panel did not solve all the TFR problems, but will definitely help bridge the gap until those problems can be permanently solved by the Avionics Modernization Program and the Digital Flight Control Modification. In the meantime, continued emphasis on thorough TF checks, tech order compliance, and professional flying will be your keys to success.

■ **Crew Module Ejection Injuries.** F-111 aircrews have experienced a 30-percent back injury rate during successful ejections. Dynamic impact tests of an energy-absorbing seat proved infeasible, so testing is currently underway on a replacement for the crew module main parachute. The single chute now used will be replaced by a triple-chute cluster which will reduce the module descent rate from approximately 32 fps to approximately 25 fps. Since this mod is still in the R&D phase, it is difficult to forecast a definite operational date.

■ **Pacer 30 Program.** As a result of major technical deficiencies in the TF-30 engine, the Pacer 30 Program was established to increase its reliability and durability by incorporation of approximately 40 engineering changes. Over 250 modified engines are in the field, and initial indications are that the Pacer 30 modifications are producing effective results.

This 1985 success story clearly reflects the hard work and safety awareness of every F/FB/EF-111 operator and maintainer in the Air Force. A Class A rate of zero in a fighter/attack type aircraft is an "awesome" accomplishment. The F-111 community makes it even more so, considering its unique mission of night TFR low level. I applaud your efforts and urge you to maintain your positive safety attitude and professionalism. ■

# T-33

**MAJOR BOB MULVIHILL, CF**
Directorate of Aerospace Safety


■ The T-33 has been in the USAF inventory since 1949 and is still going strong. In 1984, the T-33 achieved a significant success; a perfect safety record. For the first year ever, not one T-33 pilot or aircraft was lost. In 1985, people had barely changed their calendars and got used to putting 1985 on their checks when the T-33 mishap record took a disastrous blow. By the 15th of January, 1 pilot had been lost and 2 T-Birds were destroyed in Class A mishaps.

The first mishap occurred during a solo night cross-country mission. The aircraft had required an engine change at an away base, and the pilot who happened to be TDY at that base, was assigned to ferry it home. Since he was an FCF pilot, he would be able to carry out the FCF required after the engine change. The work took longer than expected, and severe weather was forecast to be moving in that evening. After a trim run, there was very little daylight left to conduct the FCF. An abbreviated FCF was carried out, and the aircraft was landed 1 minute before official sunset after only 17 minutes of flight.

While the aircraft was being serviced, the pilot went to Base Ops, called his home base, and got permission from the DO to conduct one leg of the return mission. At this point, he was cautioned by the DO not to push crew rest. The pilot then checked the weather, carried out his mission planning, and proceeded to the aircraft. With the assistance of a fellow pilot and the crew chief's flashlight, he carried out the preflight and strapped in. Approximately 1½ hours after he had landed from the FCF, he started his engine for the first leg of his long trip home.

About 22 minutes after takeoff, the pilot reported he was going to have to return to the base which he had just departed. He gave no reason. Four minutes later, after he had turned around, changed altitude, and carried out a squawk change, all radar and radio contact was lost. The next day the wreckage was found in a remote area by the state police; the aircraft had impacted at a near vertical angle at high speed. There had been no ejection.

In most mishaps, the final outcome is normally the result of a series of factors or events which build on each other to produce the end result. Take away or alter any one of these and the outcome probably would be different. Let's look at some of the elements that went into this mishap:

- The pilot was given an unusual tasking.
- Severe weather was forecast.
- Once the engine work was completed, there was insufficient daylight to carry out a proper FCF.
- The mission was to be carried out solo and at night.
- The pilot had limited night flying experience.
- The pilot didn't have a flashlight.
- The T-33 has an antiquated attitude reference system with no backup attitude indicator.
- An aircraft malfunction caused the pilot to turn back.
- Finally, the pilot was probably tired, undernourished, and very frustrated.

We don't know what the element was that ultimately caused the pilot to lose control of his aircraft. It might have been a serious aircraft

continued

malfunction or it might have been something as simple as becoming distracted while thumbing through his approach plates. Any one of the elements is innocuous enough, but combined, they spell disaster.

With 20/20 hindsight, we can ask why a normally professional pilot would not wait and carry out a complete FCF and would go night flying without a flashlight? But given the same circumstances, how many of us might have done the same thing as this pilot? What we have to realize is that when under pressure, whether self-imposed or not, we tend to ignore the red flags we should be noticing. The first step in preventing our human weaknesses from doing us in is recognizing all of us possess those weaknesses. Once we accept this, we should be able to recognize the danger signs, mentally step back, objectively assess the situation, and then make the correct decision. When in doubt, we should always act on the side of safety.

Within days, disaster struck again. The second mishap involved an aircraft departing controlled flight during extended trail. The out-of-control mode was a very disorienting out-of-control spin, or tumble. In this case, the pilots experienced disorientation, and all their attempts to recover were in vain. When they realized they were below 10,000 feet AGL, the pilot initiated a command ejection. The rear seat pilot sustained a broken elbow when his arm hit the canopy rail during the ejection. This was a function of the aircraft gyrations, his body position, and the fact he didn't initiate the ejection.

In this mishap, as in the first, there were a number of elements which should have alerted the crew they were at risk.

- The pilot was highly motivated and an experienced T-33 pilot, but he had worked voluntarily for 12 straight days. In addition, he hadn't had a meal since the previous evening, and his earlier mission had been delayed so he had too little time prior to the briefing to get something to eat.
- During the mission brief, the mishap pilot didn't specifically brief what formation work was to be carried out.
- The aircrew were attempting to take off 30 minutes early to take advantage of available daylight. (Sound familiar?)

Whenever you find yourself not doing the things you would normally do because you are in a rush, chances are the risk of a mishap increases significantly. An aircraft commander is responsible for the safe conduct of his flight, and if that means delaying or even canceling the flight, he has to have the foresight and maturity to do it. In addition, he has to have the fortitude to take the flak when questioned why he was late getting off. Few commanders or DOs will get on your

case if you delay for reasons of flight safety, provided you don't start making it an habitual excuse.

Whenever we have a serious mishap, the first thing people tend to do is suggest hardware changes to the aircraft to preclude a similar occurrence. Considering the age of the T-33, it's easy to suggest modifications that might have helped prevent the 1985 mishaps. We could start by replacing the aircraft completely. We could put in an autopilot. We could replace the attitude indicator or put in a standby attitude indicator. The other approach is to attack the problem from a people perspective and see what we can do to improve the situation through better training, better information, or more restrictive rules.

Both methods have their advantages, but they also have drawbacks. Hardware improvements are expensive and take time to develop. In an old aircraft due to retire in a couple of years, this may not be practical. The age-old solution of briefing the troops is effective, at least for awhile, but only has a finite life. Eventually, we start seeing the same old mishaps when the corporate memory is lost. In the 50s and 60s, T-33s flew a lot more hours so tumbling a T-33 was not an unusual occurrence. T-33 pilots were well aware of the phenomenon. Because it has happened far less in the 70s and 80s, the problem has had much less exposure. While sometimes necessary and appropriate, restrictions tend to hinder the mission.

In 1985, there were three major recommendations made as a result of the two mishaps. The first called for replacing the T-33 J-8 attitude indicator with a more modern attitude reference system. Everyone agreed it was a good idea, and a suitable attitude indicator and standby were quickly identified. However, the project has been placed on hold because of the long lead time required for such a modification. (The last T-33 would be only 6 months from retirement before the first modification took place.) On the positive side, an existing standby attitude indicator is being considered and may receive approval.

Reference the second 1985 mishap, the same fate befell the project to provide some type of upper limb restraint to preclude elbow injuries. The adoption of horse collar life preservers in lieu of the underarm type promises to reduce elbow injuries during ejection. Procurement of the horse collar life preservers should be completed by April 1986.

While we're on a positive note, it would be remiss not to mention the superb job two crews and a solo FCF pilot did in returning three T-33s with engine problems to terra firma without injury to themselves or the aircraft. All three instances were well handled, and successful forced landing patterns were carried out.

There were no reported Class Bs in 1985. In the Class C arena, physiological incidents and engine problems were the most commonly reported, pointing the direction pilots need to concentrate on when considering possible emergency scenarios.

Given the T-33 will be retired by 1989, it's highly unlikely any major modifications will be even considered, so the onus of preventing mishaps has to fall with the operators. T-33 pilots have to be constantly aware of the aircraft's (as well as their own) limitations. The T-33 is a relatively reliable aircraft and, with its long service life, it's unlikely any "new" mishaps will occur in the future. For all of 1984 and 11 months of 1985, T-33 pilots and maintainers have demonstrated they can maintain mishap-free operations. Let's work to make 1986, and the rest of the T-33's service life, completely safe. ■


# T-38

**MAJOR JIM TOTHACER**
Directorate of Aerospace Safety

■ After a somewhat distressing start in 1985, the T-38 came on strong to finish the year with the second lowest Class A mishap rate in its history. All of us who fly, maintain, or otherwise contribute to the T-38 can be justifiably proud of this year's accomplishments.

Since its introduction more than 25 years ago, the T-38 has experienced a total of 170 Class A mishaps through 1985. These mishaps have resulted in the destruction of 163 aircraft and the loss of 69 aircrew. With almost 9 million hours flown, this translates to a Class A mishap rate of 1.9 per 100,000 flying hours, a remarkable achievement given the training/experience environment.

The total number of operations-related mishaps is almost double that of logistics-related mishaps. Of the 170 total Class A mishaps, 102 qualify as ops-related compared to 55 log-related mishaps. The remaining 13 mishaps are classified as undetermined or miscellaneous.

In 1985, we experienced 2 Class A mishaps in the T-38. One was operations related, the other was miscellaneous (bird strike). These two mishaps caused the destruction of two aircraft and the loss of two aircrew members. A brief review of the 1985 Class A mishaps follows.

■ The mishap aircraft was scheduled as a single-ship, dual, contact training sortie. Following a rolling takeoff, the aircrew accomplished a closed pattern for a heavyweight touch-and-go landing. The aircraft stalled in the final turn, entered an extremely nose-low attitude, and crashed short of the approach end of the runway. Both crewmembers initiated ejection out of the envelope and were killed when ground impact interrupted the ejection sequence. Investigation revealed a number of factors may have put the aircrew "behind the power curve." These included poor nutrition, lack of recent flying time, acceptance of a clearance requiring an unplanned/unbriefed maneuver, and unexpected wind conditions in the traffic pattern. All, or some of these, may have acted in combination to set the stage for the crew to fail to extend the gear on downwind, become preoccupied in the final turn with the gear warning horn, allow the airspeed to dissipate, and lose control of the aircraft. This was a tragic loss that could have been avoided.

■ The other mishap occurred on departure leg of a touch-and-go landing on a dual contact training sortie. The aircraft encountered a flock of birds at approximately 300 feet AGL. Bird ingestion caused both engines to compressor stall and lose thrust, and the aircrew could not clear the engines. With airspeed and altitude decreasing, the instructor pilot commanded bailout. Both crewmembers ejected successfully with no injuries.

As I said at the beginning of this article, the T-38 community came on strong to finish the year in grand fashion. The old cliche, "you're not getting older, you're getting better," seems to have been made for the T-38. However, don't let aircraft reliability translate into pilot complacency. The T-38 has proven itself to be a friend, but we operate it everyday in the unforgiving environment of high-performance flying. Don't be fooled — *you* are the weakest link. You're only human.

We had a great 1985. Let's do even better in '86. ■

# Safety Warrior

# There I Was...(Or Was I?)

This month's Safety Warrior article was written in 1948. Even though our equipment and ATC procedures have improved tremendously since then, there are still some good lessons to be learned. We see some of the same problems today such as complacency, failure to properly identify navigation aids, get-home-itis, etc. I'm sure you can see some applicable safety lessons. — Ed.

**MAJOR CHARLES H. McCONNELL**

■ I had just been called back on active duty. The "outside" had been kind enough to me, but like many other World War II pilots, the little flying I did in the Reserve served only to whet my appetite to get back in the big leagues. As I said before, the outside world had been kind to me. A good job, a house, a new car, and the finest wife in the world. I gave up the job, sold the house, kept the car and the wife, and reported as per telegram to Mitchel AFB.

At Mitchel, the men in white gave me everything but a saliva test.

"For an old man (I'll be 30 this month), you're in fair to middlin' shape," they said.

Two weeks later I found a home. My boss, a lieutenant colonel, introduced me to the "mahogany bomber" which I was to "fly" 8 hours a day 5 days a week.

"This," I said to myself, "is not for me."

I walked into the colonel's office like a lion for what turned out to be a heart-to-heart talk. He did the talking, and I did the listening. I came out like a sheep — which had been fleeced.

I guess he felt sorry for me because 5 minutes after our (or should I say his) talk, he came out to my desk and told me there was a trip to the west coast and that if I wanted to go as copilot, I could.

In less time than it takes to dump the contents of those "in" and "out" baskets into that big double drawer on the lower right side of the mahogany bomber, I was gone.

The flight to the coast was just another trip to the pilot. He was bored stiff. But to me it was as thrilling as my first solo in a PT. I even got a big kick out of making position reports. My navigation was, at the start of the trip, a wee bit ragged. By the time we passed the Mississippi, I started to get the hang of the E6B and began hitting the ETAs on the head.

The thought passed through my mind that this was a much nicer way to make a living than peddling insurance policies from door to door.

continued

# There I Was (Or Was I?) continued

A few minutes later, I was to wish that I was back on the ground policy peddling — or for that matter peddling anything — just so long as it was on the ground. We went full bore into the granddaddy of all thunderstorms. Don't ask me why. We had seen this one from about 30 miles back. I guess I figured we would go around it. Still feeling like a kid with a new toy, and for some reason a bit reluctant, I just sat there and never said a word.

Two minutes through the roll cloud I became a roving commentator.

"Say, maybe it's none of my business, but aren't we on a CFR clearance?" "VFR" was the reply.

That made me mad. "VFR or CFR" I retorted, "I'm getting a change in flight plan."

"We'll be out of this in a few minutes. Keep your shirt on" he replied. And sure enough, in a few minutes we broke out into the clear again.

This fellow, we'll call him Captain Smith, was reported to be a good pilot. I had checked on that item before we left home. But he was careless. I had felt that all the way along the route. There were the little mistakes he made on the Form 23, the fast taxiing, and the hasty pretakeoff check, the low turn out of traffic, and now the flight through the cumulobumpus on a VFR clearance.

This boy, I thought to myself, will stand some watching.

That night we RONd at Barksdale. We got a room together in the BOQ and shot the breeze for a while. Smith was really a character. I wanted to get on the subject of flying IFR on a VFR but found myself to be just a good listener. And Smith could really tell a story.

The remainder of the trip to the coast was uneventful.

"Coast-to-coast in 2 days sure does beat house-to-house for life," I mused to myself as we taxied to the ramp at March AFB.

Coming back, we flew direct to Fort Worth. Flight Service recommended that we return to Mitchel via Tulsa, St. Louis, Dayton, and Washington because of a terrific squall line lying between Dallas and Shreveport. One look at the pilot reports, and we decided that we hadn't lost anything at Shreveport so it was off to Scott via Tulsa.

The trip to Scott was VFR.

The forecaster at Scott was very pessimistic about the weather into Washington. Since we were both tired, I recommended a sack in the BOQ.

"No guts?" was Smitty's reply to my recommendation.

"If you want to go all the way to Mitchel," I replied, "it's OK with me."

We started down the runway just as the sun was dropping behind the horizon.

I made a position report to Wright-Patterson Airways. They advised scattered thunderstorms with most of the area en route covered with stratocumulus clouds. We changed to IFR. We were given 9,000 feet by ATC. For one hour after passing Dayton, we were in and out of cumulus clouds. The radio compass needle was very erratic. Static made the identification of any station absolutely impossible. We tried to work an aural null but could not identify the station because of static. We flew several different headings which led me to believe that Smitty wasn't too sure of where we were — other than over North America.

Then it happened. Smith had been trying to locate a station on the compass. The needle settled down and held to 45° on the radio compass indicator. I looked at the magnetic compass. It read 180°. I switched my jackbox to compass position and heard nothing but static.

In a very few minutes, the needle swung around indicating that we had passed over the station. Smith picked up the mike and called Pulaski Radio. I began to feel a little easier about the whole thing when I switched to VHF and listened to Smith's position report.

As he hung up the mike and started to descend to 3,000 feet as instructed by ATC, I reached across and switched him over to interphone.

"You've got a good set of ears," I said. "I couldn't make out that station identification to save my hide."

"Neither could I," he replied, "but I think we're over Pulaski."

"You think!" I screamed.

That was all I needed. I picked up the mike and called Pulaski. I told them that we were uncertain of our position and requested permission to remain at 9,000 until we reached Richmond.

By the time we got back to 9,000, Pulaski informed us that we could stay at 9,000. They had no other aircraft reported in the area.

Smith had given our estimated time en route from Pulaski to Richmond as 1:10. Two hours and five minutes later we reached Richmond. We had been holding a heading of 100° from what Smith had assumed to be Pulaski. From Richmond on into Mitchel, the weather was VFR.

When we landed, I retraced our flightpath from Richmond on the reciprocal of 100° and found that we had been over Huntington, West Virginia, at the time Smith started his descent to 3,000 feet. Pulaski is 180 miles from Richmond. Huntington is 300 miles west of Richmond, and Richmond is about 100 miles east of the mountains. If we had descended to 3,000 feet at Huntington, we would have flown most of that 300 miles 2,000 feet under ground. Courtesy *Flying Safety*, Aug 1948. ■



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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 Accident Prevention Program.*

MAJOR

## David A. Crowther

**439th Tactical Airlift Wing**
**Westover Air Force Base, Massachusetts**

■ On 19 February 1985, Major Crowther was on a mission a bit different from most cross-country flights in that his C-130 aircraft was full of gas and cargo placing the takeoff weight at a heavy 151,000 pounds — only slightly less than the 155,000-pound maximum operating limit. After takeoff, at 200 feet AGL, a loud bang was heard followed immediately by a violent yaw to the right. There was a massive fuel leak from the right external tank and a loss of thrust on the No. 4 engine. Major Crowther promptly directed the copilot to feather No. 4 as he simultaneously fed in left rudder and left aileron to combat the right turning movement of the aircraft. As the airspeed slowly increased, Major Crowther climbed to traffic pattern altitude avoiding overflying nearby homes as JP-4 gushed out of the right external tank. The spacer between the No. 2 and No. 3 turbine wheels had disintegrated. Parts of the turbine spacer exited the engine at both the 9 o'clock and 12 o'clock positions. The pieces exiting at 9 o'clock ruptured the inboard clamshell door and punctured the right external fuel tank. The pieces exiting at 12 o'clock inflicted extensive damage in the horse collar area rupturing the heat shield, bleed air duct, fire warning loop, and melting the electrical harnesses. Debris continued rearward through the turbine damaging it beyond repair. The tailpipe was blown off the engine, and it landed on the runway. Hot debris blown by the right crosswind caused a grass fire on the left side of the runway. Major Crowther landed with fuel still streaming out of the right external tank. Immediately after touchdown, he feathered the No. 3 engine to eliminate an ignition source for the streaming fuel. He then placed the No. 2 engine in reverse and turned off onto the nearest taxiway where the fire department was waiting to foam down the leaking fuel tank. There was no fire, and there were no injuries. Major Crowther's professionalism and immediate actions at a critical stage of flight resulted in the safe recovery of a valuable aircraft. WELL DONE! ■

# USAF SAFETY AWARDS

## THE SECRETARY OF THE AIR FORCE
### SAFETY AWARD

### PACIFIC AIR FORCES

The well defined and highly effective mishap prevention program of the Pacific Air Forces reflected strong command support and supervisory involvement and resulted in outstanding safety accomplishments. The command achieved a zero Class A aircraft mishap rate, a feat unprecedented in US Air Force history for a large fighter command, and for the third consecutive year did not experience a single aircraft mishap fatality.

These achievements, compiled while flying more than 95,000 hours performing realistic combat training missions in high performance fighter aircraft and participating in some of the largest operational exercises in the world, attest to the highest degree of professionalism among pilots, aircrew, and support personnel.

Achievements in ground and weapons safety were also impressive. Ground mishap fatalities and military and civilian injuries were all lower than the previous years. Additionally, explosives and air launched missile mishaps were also significantly lower than the previous year.

### AIR FORCE COMMUNICATIONS COMMAND

The Air Force Communications Command's sustained record of 21 years without a single Class A aircraft mishap and 7 years without a Class B mishap, while performing flight facility and communications evaluation missions for the Air Force, is a remarkable accomplishment.

Ground safety accomplishments were also impressive and attest to an effectively-managed ground safety program. Ground mishap fatalities were reduced more than 60 percent from the 1984 level to the second lowest number of fatalities in the history of the command.

These achievements reflect strong command emphasis and supervisory involvement in safety management.

## THE MAJOR GENERAL
## BENJAMIN D. FOULOIS
### MEMORIAL AWARD

### TACTICAL AIR COMMAND

The Tactical Air Command achieved the fewest number of Class A aircraft mishaps and the lowest Class A mishap rate in its long and illustrious history during 1985 and sustained a downward rate trend for the seventh consecutive year. The 1985 Class A rate of 2.06 mishaps for each 100,000 flying hours was nearly 35 percent lower than the previous record low of 1974. The number of Class A aircraft mishaps was reduced to 16 compared to 23 the previous year.

This impressive achievement was compiled while flying more than 727,300 hours and participating in numerous exercises, special missions, and deployments. More than 80 percent of the hours flown were in high-performance fighter/attack aircraft.

The command's outstanding flight safety record testifies to safe mission accomplishment, strong command support and leadership, and the highest degree of professionalism among pilots, aircrews, and all other members of the command.