flying

SAFETY

FEBRUARY 1985

What Happened In 1984

What's Right With The Simulator?

If You Could See What I Saw

The Return of Rex Riley

BIRDS AND THE C-5

THERE I WAS

■ It's been 12 years, but I'll never forget the scare of my life in the KC-135 — and it could happen again. As a brand new aircraft commander, I was sent to U-Tapao to join the Young Tiger Task Force. I wasn't exactly a new guy with over 1,000 hours in a C-130 and two years in-and-out of SEA. So, although I never was a copilot in the tanker and just moved right in as the AC in the 135, it was no sweat. I knew all about flying "in-country."

On a night refueling mission, we went up to play "Anchor Bingo." The newest tanker flew in high and then let down in the anchor as others offloaded to minimum fuel and headed for home. Sometimes it could take a couple of hours on a slow night, and it was boring!

I had an experienced navigator and boom operator, but the copilot was "right off the turnip truck." After flying several of these sorties, I knew the action wouldn't start until we got low, so I left the "co" in charge of the store and went back to take a refresher course on navigation.

Now there I was, struggling with the APN-69 when I heard those terrifying words: "Ace, I'm at max power, and we're still losing altitude!" *That* will get your undivided attention! Immediately, I reverted from nav trainee to aircraft commander and jumped in the left seat. Sure enough, the throttles were at max, the firewall even, and we really were losing altitude.

I pushed the nose over and started a large descending spiral. This gave me some time to get a grasp on the situation. Guess what? The "co" had made a small error. He had opened up the wing fuel drain valves to move gas aft for the offload and promptly forgot them. Now we were in trouble!

The CG of the plane was well past any limits Boeing had prescribed. I was up to my ________ in alligators and all because I wanted to play navigator! The Dash 1 says "permanent set" may occur if the aft body tank is overfilled, and we had overfilled by a bunch.

I changed the fuel configuration, called "Tanker Charlie," and got some great advice. He told me to establish landing attitude at FL 200 and see what the trim setting was. Sure enough, the built-in safety system worked, and we had a normal aircraft configuration.

We came back to U-Tapao and made a typical, scared-to-death, cheated-the-grim-reaper landing. The "Tanker Charlie" met me at the plane where I told "the whole truth, nothing but the truth, etc." He had a free shot. Go ahead and show the world how smart he is and how stupid I am. But no, he explained to me about being an aircraft commander and my responsibilities.

It was wise and serious counsel; something I never forgot. I am a better pilot and a lot better officer today because this lieutenant colonel (later a brigadier general) took the time to help an errant young knight.

So, what are the lessons?

- Who is in charge?
- What are your responsibilities?
- When you make an error, how do you handle it?
- How do you keep this from happening again?

As a brand new squadron commander, I try hard to impress on my young aviators the importance of officership, leadership, and responsibility. Failing to understand this can sometimes be fatal, but in my case I lived to fight another day.

Two things I remember are to keep in mind what my job is and to never forget we all make mistakes. So, let's minimize the mistakes and accentuate the responsibilities. The Air Force will be better for it and so will the people that work with us. ■

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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What Happened In 1984

1984 was a good year — the second best in Air Force safety history. But we can do better. Here are summaries of the 1984 mishaps to show us the way. There is still work to be done.

LT COL DOUG CARSON
Directorate of Aerospace Safety

■ The 1984 US Air Force aircraft Class A flight mishap rate was 1.77, the second lowest in history. The most significant rate decrease occurred in our fighter/attack aircraft. The 1984 fighter/attack Class A mishap rate of 3.6 was the lowest in USAF history. This continued the positive downward trend from the previous record years: 1980 — 5.53, 1981 — 4.96, 1982 — 4.81, 1983 — 3.94. Fighter and attack aircraft account for the majority of aircraft mishaps and the highest dollar losses in the Air Force, so the five consecutive years of decreasing rates represent the major success of the entire USAF flight safety effort.

But there is still work to be done. In 1984, 57 aircraft were destroyed in 62 Class A mishaps. There were 79 fatalities. The cost of Class A mishaps went up 6 percent ($23 million) from 1983. This increase reflects the higher costs for our newer weapons systems.

Causes

Forty-one of the 62 mishaps in 1984 were operations related. This is 66 percent of the total. There were 20 logistics-related mishaps which are 32 percent of the total. One mishap was classified as "other." Half the mishaps resulted in fatalities.

Seventy percent of the operations mishaps can be placed in two categories — loss of control and collision with the ground. Pilot-induced loss of control accounted for 9 mishaps, and 20 resulted from controlled flight into the terrain. Almost twice as many collision-with-the-ground mishaps occurred off range (13) as did on air-to-ground ranges (7). There were 5 midair collisions, and the remaining 8 operations-related mishaps occurred during landing or takeoff.

Three-quarters of the logistics-related mishaps were attributed to engine problems. Two landing gear failures, two fuel system problems, and one flight control malfunction make up the remaining one-quarter.

The Mishaps

In order to find workable solutions to our mishap problems, we have to focus our attention on the mishaps and their causes. Over the next few months, project officers from the Flight Safety Division here at the Inspection and Safety Center will address specific problems for each of their weapons systems. But first in this article, we will provide summary descriptions of all the Class A flight mishaps for 1984. This will hopefully give you another perspective on the mishap scene as we see it here at AFISC. There are no individual causes here, nor are the mishaps identified. The mishaps have been grouped by mishap type and the lessons to be learned in most cases are fairly obvious. So, without belaboring the point, here is what happened in 1984.

Pilot Induced Control Loss

■ The mission was a two-ship BFM sortie. The mishap pilot started an attack from a perch position at 150-200 knots by pushing over to 15 degrees nose low, and rolling into 60 degrees of left bank. While maneuvering at 200-250 KIAS, at 15,000 feet, and high AOA, the aircraft departed controlled flight. It entered a left, 720-degree rolling departure. The pilot apparently attempted recovery, but the aircraft entered a right descending turn from which the pilot did not recover.

■ The mishap aircraft was Number 2 of a two-ship RTU syllabus basic-fighter-maneuvers mission. The mishap crew failed to terminate the third engagement when multiple ROE criteria were approached. The mishap aircraft departed controlled flight and entered a flat spin to the left. The pilot and WSO ejected without sustaining injuries. The aircraft impacted the water and sank.

■ The mishap aircraft was a single F-4 paired with an F-5 aggressor on a dissimilar basic-fighter-maneuvers training mission. During the second engagement, the mishap pilot misapplied the flight controls in his attempt to roll out of the right turn and failed to adequately unload the aircraft. The mishap aircraft departed from controlled flight at an altitude from which recovery was not possible. The crew ejected with the WSO sustaining minimal injuries. The aircraft was destroyed on ground impact.

■ The aircraft was on a DACT mission, 2v4 against a flight of A-7s. The mishap pilot relied primarily on the AOA aural tone for high AOA indications during head out of the cockpit maneuvering. During the first engagement, the mishap pilot flew the aircraft to an inverted nose high, low speed condition. Depending on the aural tone for cues to flight control inputs, the pilot unloaded and initiated a roll reversal with ailerons and rudder. During the reversal, the pilot increased pitch until he exceeded the stall AOA. The aircraft departed controlled flight, and the crew were unable to recover.

■ While on a routine air combat training mission, an aggressor pilot began a defense pullup. During the maneuver the pilot generated a pitch rate which drove the aircraft through the stall to a critical angle of attack. The aircraft departed directly into a flat spin. Antispin controls were not effective and the pilot ejected.

■ The mishap aircraft was configured with a centerline tank which reduced lateral stability. During a BFM engagement, the pilot attempted to transition from a right bank pursuit turn to a lag maneuver by decreasing right and aft stick displacement. Through inertial coupling, the angle of attack and sideslip increased until the aircraft departed controlled flight rolling rapidly left through inverted to a nose-low attitude. The pilot did not recognize the existing out of control condition and attempted to raise the nose with aft stick. The increased AOA, combined with the yaw rate and sideslip already present caused the aircraft to enter a left spin. The pilot was unable to recover and ejected.

■ The weather conditions for the maneuvering area up to 14,000 feet offered very few visual cues. There was a solid undercast with tops at about 12,000 feet. An F-15 pilot initiated a maneuver which resulted in a low airspeed nose high attitude. The aircraft stalled, and as the nose began to fall, the pilot moved the stick to neutral and released the controls. When the aircraft pitched past a vertical dive, the pilot lost his outside visual cues and became spatially disoriented. The aircraft tucked to an inverted attitude and may have performed one or more uncommanded rolls or other post stall gyrations. The pilot was unable to recover the aircraft, and after it had entered the weather and he saw 10,000 feet on the altimeter, the pilot ejected.

■ The mishap aircraft departed home base as lead of a two-ship on a fighter weapons instructor course surface attack mission. The crew was performing a hard left banked defensive maneuver when the aircraft rapidly increased angle of attack and departed controlled flight. The aircrew initiated the ejection sequence, but the ejection module impacted the ground before sufficient time had elapsed for full parachute deployment, and the aircrew members were fatally injured. The aircraft impacted the ground and was destroyed.

■ The mishap crew was scheduled for a Stan/Eval spin demonstration mission. The mission progressed normally through the first two planned maneuvers. A slow recovery control input during a spin prevention demonstration by the pilot caused the evaluator to direct a second attempt. The pilot tried again and the aircraft entered a stabilized accelerated spin. The evaluator took control of the aircraft and initiated recovery. During dive recovery, after the spinning had stopped, the aircraft entered the clouds. The crew became disoriented, determined that recovery was not possible, and ejected successfully.

continued

Forty-one of the 62 1984 Class A mishaps were operations related. Two categories, collision with the ground and loss of control, account for 70 percent of the ops-related mishaps.

■ The flight was planned to familiarize two new instructors with soaring competition flying and cross-country procedures. After about 6 hours of flight, the pilot attempted a landing in an open field. During the turn to final, the aircraft stalled and crashed in a 60-degree nosedown attitude.

Collision With Ground (Nonrange)

■ The mission was scheduled as a 2V1 DACBT with an alternate mission of 1V1 BFM/DBFM. The original flight lead aborted on the ground, so the two remaining flight members took off for a DBFM (fighter vs attack) mission. During the second engagement, the fighter crew last saw the attack aircraft as it crossed their 6 o'clock 1,500-2,000 feet back, going high-to-low. The mishap aircraft was 20-30 degrees nose low, with 90- to 120-degrees of bank. Both aircraft were in a right 2-3 G turn at 200 to 250 knots. The flight lead/instructor in the fighter terminated the engagement with a knock-it-off call which he repeated when the mishap aircraft did not acknowledge. The mishap aircraft continued to descend and the pilot ejected outside the envelope.

■ A flight of three fighters completed a routine night surface attack sortie through all the planned events. During a safing pass, just prior to rejoin for recovery, No. 2 struck the ground. The aircraft was destroyed and the pilot fatally injured.

■ The aircraft departed home base on an 8.9-hour routine, low level training mission. During the descent to terrain avoidance altitude, the copilot perceived a possible failure of the radar altimeter which distracted the pilot and navigator teams and led to a faster-than-planned descent rate. This placed the aircraft at an altitude below rising terrain. The pilot saw the terrain and took evasive action; however, the right wing of the aircraft struck the ground. The aircraft crashed approximately 4 hours and 15 minutes into the flight.

■ The mishap aircraft was flying a single-ship adverse weather aerial delivery system training mission during a multinational exercise. The mishap crew aborted the first drop, and during the second attempt the mishap aircraft struck a mesa while descending on the final run-in to the drop zone. The aircraft was destroyed on impact. All crewmembers and passengers were fatally injured.

■ The mishap aircraft was flying a single-ship, night, low level radar training mission. While awaiting clearance from Air Traffic Control to climb out of the low level structure, the mishap pilot failed to maintain an altitude sufficient to clear the terrain, and struck a ridgeline. The aircraft was destroyed. There was no attempt to eject, and both crewmembers were fatally injured.

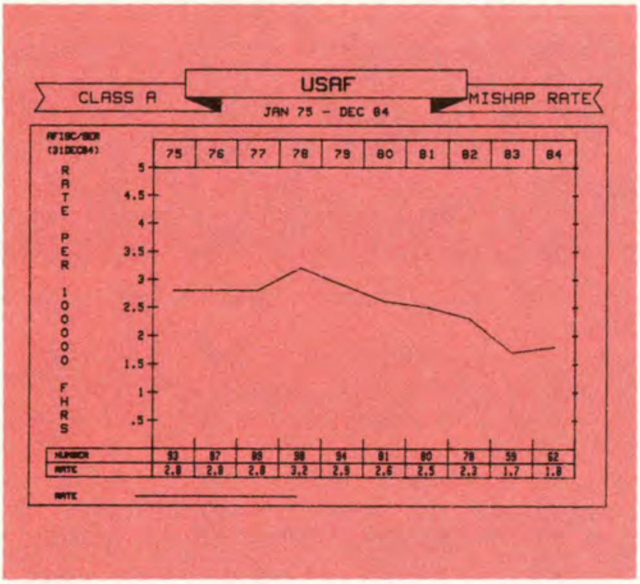
■ During a BFM sortie, the pilot entered a deep slicing right turn. It appears that the rapid onset and sustained high G induced loss of consciousness for the pilot. The aircraft continued uncontrolled in a very nose low attitude and impacted the ground after 180 degrees of turn. The pilot made no attempt to eject.

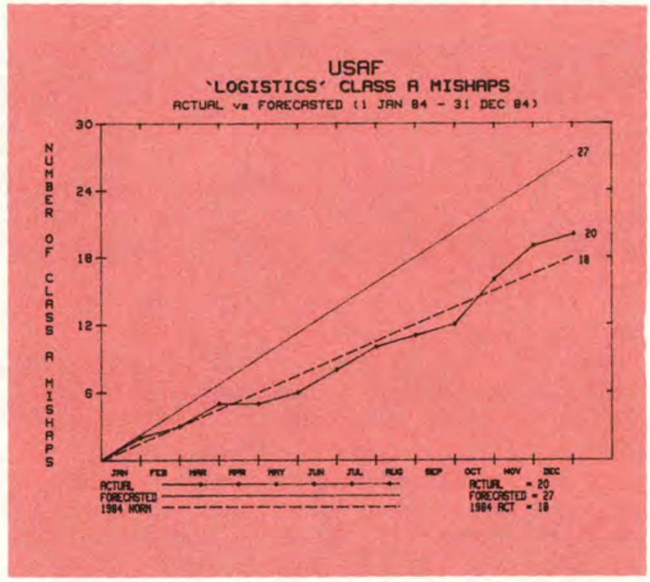
■ The mission was briefed as a routine intercept training sortie. The mishap pilot did not obtain the latest weather for the operating area nor did he brief an alternate mission consistent with the anticipated weather in the area. After entering the operating area, the mishap pilot descended in IMC below minimum safe altitude. He continued past the assigned reference point on a heading toward the wingman. The pilot entered a steep descending turn from which he did not recover. Whether due to spatial disorientation or an attempt to maintain/attain VMC, is unknown. The aircraft struck the ground and was destroyed. There were no attempts to eject.

■ Two fighters were on an annual instrument evaluation mission. The examinee had been briefed to lead the flight in a formation takeoff. Following an uneventful takeoff, the examinee did not establish an effective instrument cross-check prior to entering IMC. He became spatially disoriented and entered a nose low unusual attitude. The flight examiner on the wing failed to recognize the problem and did not direct a recovery. The examinee did not use appropriate recovery procedures. The flight came out of the clouds in a dive and rolling to the left. One aircraft struck some trees during recovery, but remained flyable. The other struck the ground and was destroyed.

■ The mishap pilot was No. 2 in a flight of two on a basic-fighter-maneuvers training mission. Mission duration was scheduled for 1.1 hours. The mishap pilot performed a rapid, high G turn of approximately 90 degrees and most likely became incapacitated due to G-induced loss of consciousness. The aircraft continued in a shallow wings level descent during which the mishap pilot failed to respond to three "knock-it-off" calls, and the aircraft crashed in mountainous terrain approximately 30 minutes after takeoff. The aircraft impacted the ground and was destroyed, and the pilot was fatally injured.

■ The mishap pilot was No. 1 in a flight of two on a basic-fighter-maneuvers training mission. Mission duration was scheduled for 1.1 hours. While looking over his shoulder, the mishap pilot initiated a 4 G left defensive turn. After three seconds, he increased to a minimum of eight Gs for an additional 3 seconds or more. The mishap pilot apparently exceeded his G tolerance and experienced a sudden loss of consciousness. The aircraft entered a steep, high-speed dive from





which the mishap pilot made no attempt to recover or eject. The aircraft crashed approximately 20 minutes after takeoff, fatally injuring the pilot.

■ Two fighter aircraft departed base on a low level nav mission. While the aircraft was level at 6,000 feet, Center lost contact with No. 2. Police reported a crash seven miles southeast of base. The ejection was successful, but the pilot was fatally injured.

■ The aircraft and crew were scheduled for a night low level mission. The IP had not flown at night for almost 5 months. After about 20 minutes of low level, the crew initiated a climb for reasons unknown. During the climb, the aircraft entered an unusual attitude from which the crew did not recover.

■ The mishap aircraft was on a night over-water missile test range support mission. After approximately 1 hour and 30 minutes of flight, the pilot initiated a low pass over the target for identification. The forward speed decreased to zero, and the aircraft struck the water and sank.

■ A flight of two helicopters was on a low level mission in mountainous terrain. The flight encountered rapidly deteriorating weather, but the flight lead elected to continue the flight. When that became impossible, the pilot attempted a route abort and climb. In the rejoin and climb, the helicopters almost collided. The evasive maneuver by one of the aircraft placed it on a collision course with the rapidly rising terrain. The other aircraft was able to avoid ground impact with an abrupt evasive maneuver.

Collision With Ground (Range)

■ The mishap aircraft crashed during a range mission. No further information is available.

■ The pilot was scheduled to lead a two-ship

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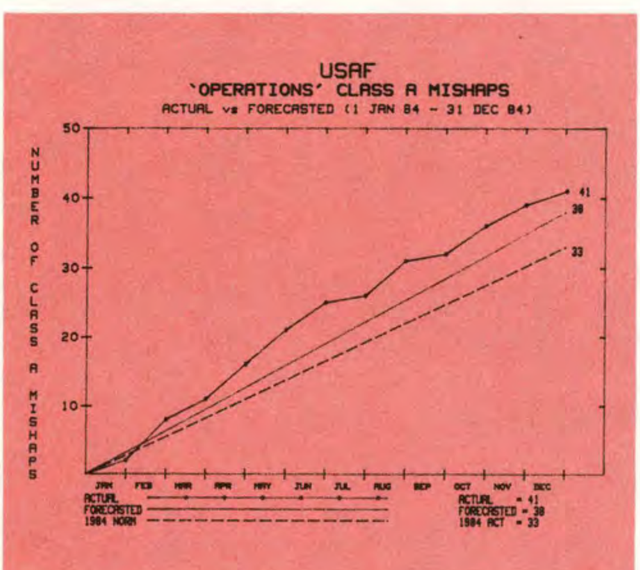

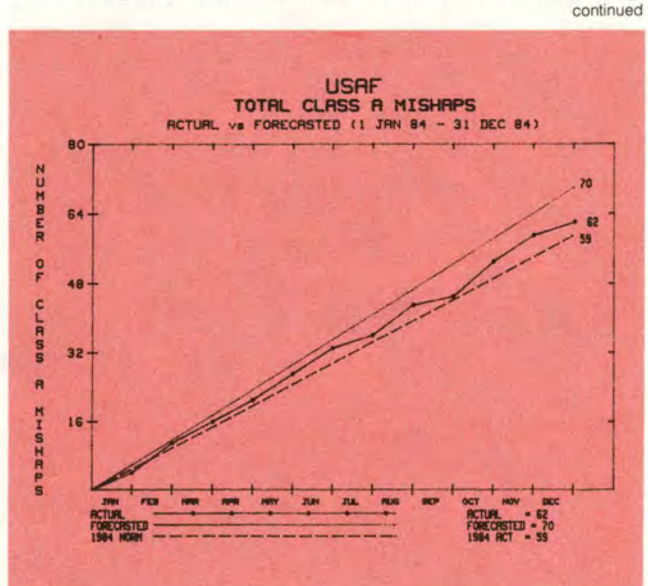

What Happened In 1984 continued

squadron surge surface attack mission on an overwater range. He had not flown for 35 days and was in the last month of eligibility for a tactical check. On the range, the pilot initiated a pullup for a low angle popup delivery from a point well inside the normal pullup point and flew the aircraft to an apex altitude well below normal. The pilot did not abort the attack and initiated recovery too late to be successful. The pilot did not eject, and the aircraft was destroyed on impact.

■ While leading a surface attack mission at 500 feet AGL, the mishap pilot failed to visually acquire the planned target after completing the run-in from the IP. The pilot initiated a climbing right turn from approximately 500 feet AGL to egress from the area and return to the IP. After turning approximately 90 degrees with 20-or-30 degrees of right bank, the aircraft bank angle began to increase, and the aircraft began to descend. The bank angle slowly increased to more than 90-degrees, and the pitch attitude dropped to 30 degrees nose low. No recovery or ejection was attempted, and the aircraft was destroyed on ground impact.

■ The mishap aircraft was No. 3 in a four-ship formation scheduled for a day surface attack tactics mission. The mission was normal through the controlled range portion. Then the flight split up, with the mishap pilot leading his element low level to an uncontrolled range. During the second attack at the new range, the pilot initiated his popup attack too close to the target to achieve briefed delivery parameters. The pilot did not abort the maneuver and flew the aircraft to a position from which he could not recover. The aircraft struck the ground during the recovery attempt and was destroyed.

■ The mishap aircraft was lead of a two ship night surface attack mission. The mishap flight accomplished seven night practice intercepts without incident. Upon range entry, the flight separated for visual laydown deliveries. After the first pass, the mishap aircraft crashed during the turn off target. The aircraft was destroyed. The mishap pilot made no attempt to eject and was fatally injured.

Midair Collisions

■ A flight of two was scheduled for a low level mission to a weapons range. The flight departed home base and entered a commonly used low level route in a tactical formation, with the wingman 45-degrees back and 5,000 feet right of lead. During the low level, the lead aircraft collided with a small civilian aircraft. The light plane was destroyed, and the military aircraft was able to return to base for landing.

■ A helicopter pilot was on his first solo flight. Tower personnel gave an Air Force crew in a "C" type aircraft clearance to land with the helicopter on base leg and advised the helicopter of traffic. The helicopter pilot took no evasive action to the traffic advisory. The mishap aircraft was on final approach when it collided with the helicopter on base leg for landing on another runway. The helicopter pilot was fatally injured. The transport was damaged and the crew sustained minor injuries but were able to land safely.

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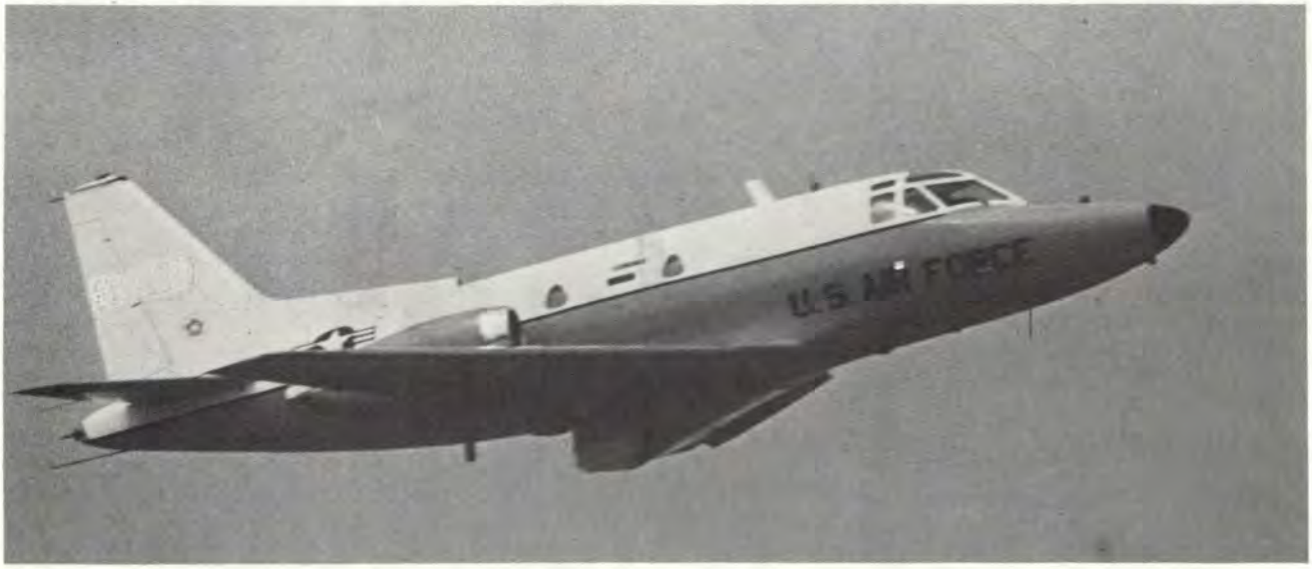

What's Right With The Simulator?

All photos taken by 1Lt Edward G. Worley.

LAWRENCE M. DANNER
System Safety Engineer
Pratt and Whitney

■ Many of you in the F-16 community already know why this "engineer" is well qualified to discuss the benefits of simulator training. For the rest of the world I will use my former title: Captain. I am, to the best of my knowledge, the only F-16 pilot to be confronted with a low altitude engine failure . . . twice!

The first mishap occurred on July 23, 1980, during a 10° low angle bomb pass. The engine stagnated when the throttle was advanced due to an internal problem that also precluded a successful airstart with either the primary or the backup fuel control (BUC). The ensuing ejection was, however, very successful!

The second mishap occurred on January 13, 1984 (yes, it was also a Friday). This mishap occurred during a weather penetration at 6,800 feet AGL. The BUC airstart and ensuing aircraft recovery were successful. These two mishaps have allowed me an insight into emergency procedures (EP) training that is unique.

At the time of the first mishap, I had about 18 hours of FP time in the F-16, and the only simulator was at the Human Resources Lab, Williams AFB, Arizona. My total simulator experience was about five hours; spent doing ground starts, take-offs and landings, flying instruments, and floundering through a myriad of avionics checks and programming.

There was almost no EP training at all. We did have a cockpit familiarization trainer (you sit on an inverted trash can and play with unconnected switches) but no interactive trainer in which to practice EP. My high time IP in the pit (he had about 130 hours FP/IP in the F-16) provided much airborne direction during this mishap.

The second mishap, although of a higher "pucker factor" due to occurrence in IMC, was relatively *easy* compared to the first mishap. Why?

continued

What's Right With The Simulator? continued

Let me first discuss some "human reaction" problems, then proceed to my own learning curve as a pilot between those mishaps.

The reactions I had during the first mishap were:

- My thought processes momentarily "froze" when I saw the tachometer that indicated a stagnated engine. My mind did not comprehend the full ramification of the situation nor produce the corrective actions. After what seemed to be a period of one or two minutes, Don (the IP in the pit of my B Model) told me to "punch the tanks off," and my mind started to function again. I blew the external tanks off the aircraft. Based on the fact that the tanks landed only 6,000 feet beyond the target, this period of time was, in reality, only a very few seconds!

- As my mind unfroze, and I comprehended that all was not well, I entered a mental state that can aptly be described as "mental detachment." I knew where I was and what was happening and could activate the controls; however, I felt as though I was watching the entire episode on the television.

My attention was very channelized. Two hours after the mishap, I could vividly recall all the rpm indications but could not recall any indications from the final turbine inlet temperature gauge located immediately below the tachometer. The IP had exactly the same reaction. The only other instrument that I can vividly recall is the altimeter. I was very concerned about how far above the bailout altitude I was.

- Temporal distortion was the order of the day. I felt that the incident took five to six minutes to transpire. The safety investigation board concluded from analysis of the range tapes and our flightpath that we actually bailed out about 85-90 seconds after the engine rolled back. When I depressed the emergency stores release button, I watched the stores display disappear, the jettison display appear and flash twice, then "plus" signs appear for the stations with stores. I turned my head in time to watch the left wing tank start to separate from the aircraft. These actions (button down to store release) seemed to take about as long as it takes to read the description; the Dash 34 says it takes one-half second! During the ejection, I thought it took several seconds for my seat to fire after the canopy was jettisoned. I was becoming concerned that the seat would not work. When the seat finally fired (all of .8 seconds after canopy jettison), I knew that all was getting better, and my time sense returned to normal. I also lost my sense of "mental detachment" at that point.

- Adrenalin is a wonderful thing. At man-seat separation (accomplished by the personal parachute opening), I still had a firm grip upon the ejection handle. So firm was my grip that I broke the 900-pound test cable that connects the handle to the seat. I suffered no injuries whatsoever from this obviously super-normal tug and, to date, I am still the only person known to have broken this cable.

So, what can we say about all these reactions? You cannot trust your senses during any event that is perceived as "life threatening," and normal human reactions are totally wrong for flying airplanes. This is due in part to the human entity being designed to move around at about three mph as propelled by his legs. His reaction is one of "fight or flight." The fight reaction causes your arm to pick up a stone or spear and hurl it with great vigor at the threat, or take a club or sword in hand and use it to beat your foe severely about the head and shoulders. Your instinctive arm and hand reactions are not very efficient at moving little switches and making smooth, sensitive inputs to the flight controls. The flight reaction is great if you can get up on your feet and run like hell. It's not so great if all you can do is flutter the rudder pedals (which provides no additional thrust) or shove (usually far too hard) on the toe brakes.

Adrenalin is very helpful if trying to outrun an enraged bear. In an aircraft, it can cause the pilot to physically break the very controls that may be essential for correcting or controlling the problem.

Temporal distortion can be great for a man running through the forest at 15 to 20 mph. It helps him to avoid limbs and roots that could trip him during his flight from danger. During aerial flight, it can be deadly when it sets in, and the pilot thinks things are getting better because the aircraft gyrations appear to slow down (see Lt Col Doug Carson's article "Temporal Distor-

"After investigating a mishap which involved an engine failure and an unsuccessful BUC airstart attempt, I decided to do all my engine starts on the ground in BUC to become as familiar with BUC operations as possible.

By looking on sim time as an opportunity, I developed very precise sets of responses to problems. These responses were what saved me and the airplane when I had my second "opportunity to excel."

tions" in the March, 1982, issue of *Flying Safety* magazine).

Mental detachment does not seem to affect your capacity to cope, but it does prevent you from feeling pain (which could be quite distracting), so this phenomenon is useful in any stress situation.

These are only a few of the reactions that can occur when placed under stress, but they are representative of what many a pilot has gone through when the world turned brown around him.

About one and one-half years after my first mishap, we got our simulator. It flies reasonably close to the jet and allows a good spread of simulations throughout the spectrum of tactical and emergency problems. Thus started the occasional trips to the sim to test for frustration level; one multiple emergency followed by another for an hour and a half.

In April of 1982, I came back from leave and was informed to keep my bags packed. I started "Safety Puke" school a week later. Shortly after returning from Norton, I began to learn more than I ever wanted to know about the internal workings of the F100-PW-200 engine. The culmination of that education occurred in November and December of 1983 when I had the opportunity to investigate a Class A mishap resulting from an engine failure and an unsuccessful BUC airstart attempt. Because of this experience, I decided to do all my engine starts on the ground in BUC to become as familiar with BUC operation as possible. The next time I went to the "container" for "harassment," I took a critical look at how the BUC worked in the sim and compared this to my "real airplane" experience. Mostly, I confirmed the fact that the software was "messed up." Secondarily, I began to notice some small things, fine details about my own procedures and techniques that could be improved, even after three and one-half years in the F-16.

That experience has led me to develop some very definite ideas about simulators in general and EP training in particular. These ideas were quite different from the "What-do-you-mean-I-just-lost-my-sortie-to-go-fly-the-!!!?-SIM!?" attitude that I had seen many people display. (I must admit to having had the same thought more than once!)

December and January being what they are at good old Hill by the Sea, I got to visit the container several times during the next four weeks and approached these trips as opportunities, instead of punishment for making the scheduling gods mad. I was now instilling into my mind very precise sets of responses designed to cope with problems — responses refined much beyond rote accomplishment of the critical actions procedures.

So, when "Friday the 13th" rolled around, I had armed myself with the best information available and had successfully modified my "fight or flight" response mechanism into the proper reactions to cope with the loss of *the* engine, in the weather, over the lake, in the middle of January.

The pressure of Stan/Eval testing will provide an adequate level of systems knowledge. But it is up to you to make simulator training effective, to instill those responses necessary to cope with a major emergency readily, and not totally lose your cool. If you go to the simulator with the attitude it is worthless, then the time spent will be wasted. If you take the attitude of learning as much as possible, then it will be a time well spent.

Check six. There's an IFE sneaking up on you! ■

If You Could See What I Saw

CAPTAIN CROSBY RUFF
912 AREFS
Robins AFB, GA

■ After the incident and the flight were over, while shuffling through the post-mission paperwork, I said to myself, "that experience was worth a million dollars." I was wrong. It was worth more like ten million — minimum, and that only includes the cost of the hardware which could have plummeted from the sky. Along with it could have been 13 crewmembers; six on one aircraft, seven on the other, all of which would have come to rest in the downtown area of a population center of over 150,000 people.

I'm more than delighted to prematurely offer you the "happy ending." If it were otherwise, I wouldn't be the one telling you about it.

To set the scene: It was to be a night two-ship MITO. All crewmembers were on time for the 1600 briefing. The only substitute crewmember on the lead ship was the pilot. The Number two crew had a pilot who was back on a crew after several years as a staff officer, a new copilot, a new navigator, an experienced boom operator, and an IP.

The lead pilot as MITO briefing officer spoke informally from in front of the lecturn. Although his 6'6" frame was a towering presence, a noisy air conditioning fan soon overwhelmed his voice. The weather data had changed from the previous briefing, so I began refiguring the takeoff data during the inaudible portion of the briefing. The forecast winds were clearly favoring the nonoptimum runway, so the MITO fan procedures for that runway were briefed.

After the briefing, both crews boarded the bus for their airplanes. Both planes seemed to take turns having maintenance problems, everything from generators to a bad fuel gauge. But finally, all maintenance actions were completed, and the MITO was approved and ready to roll one hour late.

In the meantime, the winds had decided to fool the forecaster. Now, takeoff was on the opposite runway, without any briefed fan headings or cell positions for the radar departure. Several crewmembers on both crews considered clarifying fan headings over the radio. But silence, for the sake of good radio discipline, won out.

All conditions on the ground were good for a MITO up to 2,000 feet AGL where a forecast scattered deck had become more like over-

cast in the hour delay. Both airplanes were lightweight. The lead ship had 70,000 pounds dry. Number 2 had 75,000 pounds dry. The temperature was 60 degrees, pressure altitude barely above sea level, and the wind had finally settled to a predictable 20-30 degree quartering right headwind at 6-8 knots — ideal conditions for a MITO.

Both cockpits came alive as we were cleared for takeoff. Radio checks and checklists completed, up came the power, and within seconds, two KC-135's were rolling down the runway.

The call to departure control was delayed until passing 1,500 feet to be sure that Number 2 was "in." Shortly thereafter, Lead entered the clouds. Aside from difficulty reaching Number 2 on interplane frequency, all seemed to be going well from Lead's point of view. The second aircraft was 5,000 pounds heavier and 16.4 seconds behind lead on takeoff roll. That, along with an operating radar and a wake turbulence fan off runway heading should make for an uneventful, enjoyable MITO cell departure, right? Maybe not!

Number 2 was late checking in on interplane because the frequency had to be manually set into the radio (it had been incorrectly set in the preset channels). Just after they checked in, Lead advised that he was starting a right turn to heading 090. Two acknowledged this call. During this turn, the lead copilot (from now on referred to as I) kept looking out the window, while the pilot stayed on instruments flying the plane. Why I was looking out into the gray, formless murk (we were still in the clouds with darkness approaching) instead of working the after takeoff checklist, I can't say. I do know that our crew and the other crew all thought that Number 2 was behind us.

The evening and clouds combined to give a spectrum of gray from brilliant, almost pure white straight ahead in the beams of the landing lights, to increasingly darker shades out the side windows. Despite the instrument conditions, I continued to scan in front of us and to our right while the pilot continued the instrument departure and climb. After all, we were in a MARSA situation.

All of a sudden, the darker gray out the right side began to grow brighter and brighter in a sort of blanket glow as if daylight had abruptly returned. My first impression was that we were approaching some form of bright ground lights.

continued

If You Could See What I Saw continued

We were still climbing, weren't we? A quick scan of the instruments confirmed pitch and bank to be normal.

Suddenly, that blanket of brightness became a beam of bright light, moving rapidly from 2 o'clock toward 1 o'clock and climbing through our flightpath. That had barely registered on my consciousness when the outline of a KC-135 loomed out of the veil of clouds. It was well lighted by landing lights, position lights, cockpit lights, and even our own landing lights reflecting off the shiny new gray-green paint. The vision of 175,000 pounds and 280 knots of mass preparing to momentarily occupy the same airspace we occupied didn't give me the most remote chance to slap the pilot's arm, point, key the radio or intercom, or even to yell, "Look out!" I just grabbed the yoke and abruptly pulled with both hands, full aft elevator, all the way to my lap.

With our abundant airspeed and light weight, the aircraft reacted immediately and responsively. It felt like we were passengers on a roller coaster that had started a high G ride from the bottom up. I wasn't sure that we could avoid a collision; the time for reaction was so short. I wasn't sure my evasive maneuver was the right one, but it was the only option we had. For a second during the pull, I wondered what it would feel like to broadside an object the size of a KC-135 at 280 knots and 3,000 feet off the ground.

As we continued our 2.5 G, 3,500 foot vertical ride, I realized that we had escaped the broadside, but had we clipped a wing or tail? Theirs or ours? I must have held full aft elevator for two or three seconds although the pilot later had to describe to me what 30 degrees nose high looks like on the ADI. I do remember how the angle of attack indicator looked, floating above 1.0 (stall) and hovering around .9 for the longest time as the yoke shook from the buffeting airplane. In a daze, I remember the pilot coming back on the controls, smoothly but quickly pushing the nose over in a near zero-G condition. I stayed on the controls and assisted in regaining a flyable platform.

About then, departure control requested that we hold at 6000 block 7000. We were already above that block and listening to a recording of my response to that call is quite an experience for me. I have a recording of the entire departure, compliments of RAPCON.

"Roger, sir, we just about had a midair with our number two guy — he's continuing northbound at this time and we're in a turn to. . . ." It ended with "to" and had progressed from my contrived, calm cool voice to an out-of-breath mental "ram dump" when blood pressure, adrenalin, shock, and anguish all hit me at once. The pilot had masterfully executed the near-perfect recovery and, after hearing the voices of the crew in the other plane over the radio, I decided the best thing to do was keep myself occupied with pulling switches and valves and running the familiar routine of the after takeoff/climb checklist.

You might wonder what the other crewmembers were doing during this maneuver. First, the other guys, Number 2, missed all the fun. They made no attempt at an evasive maneuver. In fact, they did not see us until the last possible second. And only then, despite three sets of eyeballs searching for lead in the soup, did the pilot catch an instantaneous flash of our lights moving from 10 o'clock low to 9 o'clock and out of sight. After a few pertinent expletives, the copilot craned his neck to 4 o'clock high in time to see an "acrobatic" KC-135. His only comment was, "That was Lead!"

For some comic relief, consider the poor navs and boom operators on our aircraft. Four of the five told me later that they were convinced they were going to die. The crew boom operator had just unstrapped and turned to walk aft when he found himself face down on the

Unfortunately, no one foresaw the "big picture" scenario starting to emerge, and that led to a set of circumstances which almost spelled catastrophe.

floor. When the instructor boom felt the same G forces pulling him from his seat in the cargo bay, he unstrapped and ran back to the parachutes. By then, the positive Gs had given way to near weightlessness causing him to glide the last 15 or 20 feet barely touching the floor. It had sounded to him as though we had indeed hit something, although the sounds he heard were those of the cargo and equipment in back responding to the maneuver. In no time he had a chute on and, knowing how close to the ground we were, stood poised by the aft hatch ready to go. You can guess the ribbing he took when he later came forward with the parachute still firmly strapped to his body. The navigators were not so active but just as terrified. The spare nav was on one of his first flights since initial training at Castle. The staff instructor nav said repeatedly for the remainder of the flight, "I'm never gonna fly with you guys again."

How close did we come? The precise distance airframe to airframe will never be known. My pilot who saw it only during the evasive maneuver as they were going under, and by us to the left, estimated that they passed within 200 feet. He related afterwards that he could not only hear their engines, but also feel the vibration as we pulled up and over.

Both aircraft had similar landing times so we were able to debrief the incident shortly after landing. The IP on board the second aircraft said that he was looking straight ahead expecting to see us pass in front of them. The navigator had the radar on pencil beam, again looking straight ahead. But we weren't there.

A lot of things contributed to this near-miss once they turned to their fan heading — a rapid cut off, bad spacing, bad timing, bad visibility, and a short radio-out period while they sorted out the frequency problem. To complicate matters, departure control instructed the flight immediately after takeoff to turn right on course. Not knowing where two was and, not wanting to make it too difficult for their maneuvering, Lead requested to delay making the turn. We wound up flying runway heading roughly six or eight miles from the runway before turning. This allowed the aircraft to be perfectly positioned for a textbook-perfect turning rejoin over the city. Unfortunately, neither of the crews knew about it.

". . . I just don't like to think about the consequences if I had been a second later in pulling up."

What did departure control see or say about all this? I talked at great length with our controllers after the incident. I also studied tapes and visited RAPCON on several occasions. They were watching us, but, we were MARSA and supposedly maintaining our own clearance. It wasn't their job to interfere. And they're right, I just don't like to think about the consequences if I had been a second later in pulling up.

The picture should be clear by now. Count the ways the near-miss could have been avoided. The interesting part is that although there were numerous mistakes and errors of judgment by many of the players throughout the sequence, none of them were truly gross, blatant, or serious enough to stand out and trigger a response which could have broken the sequence. When individuals did observe errors, they failed to mention them, thinking the error too insignificant to be of interest to anyone. That is understandable. Unfortunately, no one foresaw the "big picture" scenario which was starting to emerge and which led to a set of circumstances which almost spelled catastrophe.

We don't always have an abundant set of options to take us out of holes. This is especially true if we operate in the "press" mode — the "we'll handle any problems once we get airborne" attitude doesn't give us much time to consider options.

This "war story" ends with the same moral as most others. There is no substitute for adequate preparation and good crew coordination. Not all problems can be anticipated, but those that are, even minor abnormalities, should be handled before they become big problems. Murphy's out there waiting for you. If he can stack several little problems against you all at once, it has a multiplier effect and can seriously reduce your ability to react safely. This is especially true of midairs, and the potential for one has never been greater. I know you would be a believer "if you could see what I saw." ■

BIRD STRIKE HAZARD TO THE C-5A

CAPTAIN RICHARD T. LASKI
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■ Aircraft have collided with birds almost from the beginning of aviation. The first human life lost in an accident caused by a bird occurred in 1912. Since then, at various intervals, serious damage and loss of life has occurred in both military and civil aviation. But because these incidents occurred infrequently, they were considered isolated and forgotten.

In the past, this has been the case for the C-5A. However, this situation changed dramatically early in 1983. The spark that triggered this initiative was a catastrophic bird strike experienced by a C-5 when it flew through a flock of snow geese in January. As a result, the Commander-In-Chief of the Military Airlift Command (MAC) directed development of a Bird Strike Avoidance System for Dover AFB.

By focusing on a specific airdrome, Dover AFB, and the C-5A, this article will review the current bird strike hazard to the Air Force's wide-bodied transport aircraft. Next, the use of traditional methods of dealing with the large bird population on and around Dover AFB will be evaluated. The use of radar at Dover AFB as a bird strike hazard reduction method will also be analyzed.

A bird strike "hazard" has been defined as "the exposure of aircraft to increased risk of danger of a bird strike beyond the low probability of a random bird strike." This definition acknowledges that the possibility of a bird strike always exists when an aircraft is in the bird's domain.

The size of the aircraft is one factor of this increased risk of bird strike. The larger the aircraft, the more likely it is to have a bird strike.

The C-5 has averaged 45.2 bird strikes per 100,000 hours. The Boeing 747, another wide-bodied aircraft of similar size, has 10 bird strikes per 10,000 hours compared to 1.5 bird strikes per 10,000 hours for the Boeing 707.

Figure 1 shows the C-5 bird strike statistics for the past four years.

Figure 1
C-5 Bird Strike Data

	'81	'82	'83	'84
Total Bird Strikes	15	37	50	5
Class B Bird Strikes	0	1	2	0

For the C-5, damage from bird strikes occurs most frequently in the engine, radome, and leading edges of the wing. By the end of 1983, bird strikes accounted for 8 of the 18 Class B mishaps the C-5 has experienced in its history. All of these Class B mishaps have involved damage to the engines.

In view of this fact, a look at the bird ingestion hazard to the C-5's engines, the General Electric TF39, is warranted. There has been no study of the bird ingestion hazard to the TF39 engine specifically. However, the FAA has conducted a study on bird ingestions into large, high bypass ratio turbine aircraft engines similar to the TF39. The following figure summarizes the results of this study.

The data in Figure 2 reveals that the highest percentages of bird ingestions occur during the takeoff and climb phase in all categories. Also, the approach and landing phases of flight has a nearly constant percentage across all three cat-

In a period of 3 months, bird strikes damaged 10 TF39 engines. In two cases, all four engines on one aircraft were seriously damaged in the same mishap.

egories of engine ingestions. One more thing that can be seen from the data is that multiple bird ingestions per engine occur in a significantly high percentage of the engine failure events.

The following narratives describe the series of bird strikes that occurred at Dover AFB in late 1982 and early 1983. It points out the extent of the bird strike hazard at Dover AFB and to aircraft like the C-5.

Figure 2
Bird Ingestion Summary
High Bypass Ratio Turbofan Engine

	Total Ingestions (289 Events)		Damaging (188 Events)		Engine Failure (17 Events)	
Takeoff/Climb	124	(43%)	105	(56%)	13	(75%)
Approach/Landing	81	(28%)	40	(21%)	4	(25%)
Multiple Bird Ingestions Per Engine	13	(5%)	11	(6%)	8	(47%)

■ It was not a good morning for flying, 500 feet overcast, three miles vis with fog, as the C-5A pilot eased his machine down out of the clouds on ILS final. Suddenly, the air turned black as hundreds of blackbirds swarmed up directly in front of his craft. The aircraft shuddered under the numerous impacts, but completed an otherwise uneventful missed approach and full stop landing. All four TF39 engines had to be changed, making this a Class B mishap. It was the end of November, and the blackbirds were supposed to have already gone south.

■ It was a strange night for flying, clear and cold and black as the inside of an ink bottle as another C-5A maneuvered at MDA toward the landing runway. Suddenly, the air turned white as nearly a hundred snow geese swarmed into the landing light cone directly in front of the aircraft. The aircrew felt multiple impacts. Number 3 engine caught fire and had to be shut down. Thankfully, the fire went out, and the landing was completed uneventfully. One TF39 engine had to be replaced, one required extensive repair, and two flap panels had to be sent to depot for reconstruction, making this a Class B mishap. It was early January, and the snow geese were supposed to have already gone south.

■ It was a lousy day for flying, indefinite ceiling, 100 feet, sky obscured, and visibility one-fourth mile with fog. The C-5A pilot was glued to the gauges as he eased his heavyweight machine off the runway and up into the weather. A few seconds later, the aircraft shuddered under the impacts of over 60 unforeseen and undetected snow geese. Number 2 engine indicated overheat and was retarded to idle. After a few minutes, Number 4 engine caught fire and had to be shut down. Thanks to the skill of the crew, the aircraft and the 53 souls on board were returned safely. Four more TF39 engines were damaged — another Class B mishap. It was late January, and the snow geese were supposed to have already gone south.

continued

BIRD STRIKE HAZARD TO THE C-5A continued

These mishaps serve to point out the results of the bird hazard in and around the Dover AFB area. But what is the extent of this hazard? In February 1983, a bird aircraft strike hazard (BASH) working group converged on Dover AFB to find the answer to this question. They started by analyzing the bird population hazard. They found that Dover AFB is located in the Atlantic flyway through which millions of birds migrate each year. Several national, state, and private wildlife areas and refuges are also nearby. Three of these areas, Bombay Hook National Wildlife Refuge, Little Creek Wildlife Area, and the Logan Lane tract of the Little Creek Wildlife Area, are located either within or adjacent to the confines of the Dover AFB local flying area. Nine other areas within a 30-mile radius result in a very large acreage of wildlife habitat.

This large area of protected habitat has, in recent years, been enhanced by the environmental actions of the State of Delaware to control the salt water mosquito population. A result of this program has been the construction of over 6,000 acres of manmade lakes. A by-product of this construction has been the use of these areas by waterfowl, especially geese. Thus, an abundant food supply, mild winters, and an improved habitat have contributed to ever-increasing numbers of wintering waterfowl. Resident wintering waterfowl populations reach as high as 150,000.

This large number of birds has developed a daily pattern which creates periods of intensified bird strike potential. The BASH Working Group reported that early each morning huge flocks of snow geese leave the refuges and fly west and southwest as much as 40 miles to spend the day feeding. They return to the refuges each evening around sunset. More specifically, these peak movement periods generally occur during the periods of dawn, plus two hours and sunset, plus or minus one hour. Many of these flocks pass through the Dover traffic pattern and over the base at altitudes between 100 and 3,000 feet. On days with low ceilings and reduced visibilities, however, the geese may tend to be active throughout the day with many more remaining in the immediate vicinity to feed.

In the past, there had been a relatively minor hazard associated with the bird migration and a low probability of aircraft and birds encountering each other in the Dover AFB area. Now a major flying safety hazard had developed. This hazard was the result of the constant movement of large numbers of waterfowl in the immediate vicinity of the airbase from October through April each year.

Possible Solutions

Because of the situation described above, the BASH Working Group was tasked to find a solution to the bird strike hazard problem. The preferred solution to the problem was to reduce the number of birds that have come to winter in the Dover AFB area. The most effective way to get rid of the birds is to change or get rid of the things that attract them to the area around the airdrome. This is known as "habitat modification," and is a slow, long-term process that requires great expense, planning, and coordination, but is the best way known to reduce bird strike hazards.

Another method that has been used in the past to control the bird hazard is the use of pyrotechnics and/or bioacoustics to scare the birds away. Pyrotechnics is the use of cartridges fired from a 12-gauge shotgun to disperse the birds.

Bioacoustics, on the other hand, involves the use of taped distress calls of the species of the bird to be dispersed. The idea is to strike fear into the birds by making them think that one of their flock is in trouble.

One other method that was proposed as a solution was the use of a ground-based radar system to warn aviators as they arrive or depart Dover AFB. This system would provide real-time information to the aircrews on the status of bird activity for their flightpath. This was a new idea to MAC and to the Air Force. However, it is not a new idea on dealing with a bird strike hazard, for it had been proposed as early as 1969 at the World Conference on Bird Hazards to Aircraft in Kingston, Canada.

Analysis of Solutions

The first method of bird strike reduction mentioned above is to modify the environment in and around the runway to discourage the birds from landing in the area. At Dover, this solution is the most difficult to accomplish since it involves reversing actions already taken by the State of Delaware to increase the area's attractiveness to

waterfowl. Another problem the base has in effecting any "habitat modification" is that the current easements possessed by the base specifically exclude the right to control agriculture in the easement zones. This solution is, therefore, infeasible as a short-term solution to the problem.

The second method offered as a solution to the Dover AFB problem, pyrotechnics and bioacoustics, is also infeasible as a short-term solution. The BASH Working Group determined that these are ineffective in the Dover AFB area due to the fact that the geese do not land on the base but instead fly over the base at several hundred feet. Also, any dispersal efforts would have no effect at all on birds passing through flight corridors beyond the confines of the base itself.

This left radar as the most viable method of dealing with the bird hazard. To implement this method, a comprehensive test program was established. The scope of this test program involved three phases. Phase one was the study of available radar systems to document each system's capabilities. The next phase was an evaluation of the operational implementation of the bird strike advisory system. The final phase was to determine the program's objectives, procure the necessary equipment, and refine the operational procedures.

The radar that was initially chosen to test the feasibility of using radar for the detection of bird activity was the TPN-18A, a mobile radar unit that the Army uses for ground controlled approaches. This system was deployed to Dover AFB

continued

BIRD STRIKE HAZARD TO THE C-5A continued

in March of 1983 for evaluation as a "birdwatch" radar. It became readily apparent that the TPN-18A possessed several limitations in providing real-time information to aircraft in the Dover area. These limitations include:

- The TPN-18A lacks a moving target indicator feature. This caused the first five miles of radar coverage to be blanked out by ground clutter.
- This radar could not cancel precipitation returns, which means that bird targets could not be acquired in cloud formations.
- The radar displayed a screening effect due to the low position of the antenna. Because of tree lines, parked aircraft, and hangars, no returns were available in the northeast to northwest quadrants.
- The TPN-18A could not detect flocks of less than 30 to 40 birds. Thus, it could detect levels of bird activity, but it could not provide any real-time information to aircrews on specific flocks of geese.

In April, the bird activity decreased to normal levels, and the test program was terminated. To prepare for the fall migration, other radar systems were sought for inclusion in the test. Three other radars were chosen to be evaluated along with the TPN-18A. These radar consisted of a Raytheon X-Band marine radar mounted on a van, a Raytheon S-Band marine radar mounted on a USAF step van, and the AN/APN-20 air traffic control radar that was being used at Dover AFB.

As fall approached, the bird activity began to increase; and on October 24, 1983, the Birdwatch Program was reimplemented. The candidate radars were tested and evaluated. The Raytheon units were found to be ineffective in providing the service required for bird strike reduction. The X-Band unit could only provide close-in coverage out to a range of one to three miles. The S-Band radar displayed the same deficiencies as the TPN-18A.

The AN/APN-20 was found to be far superior to any of the other systems. It could detect groups of five or more geese within one and one-half miles of the antenna. Also, with some of its sophisticated circuitry, it eliminated or lessened the drawbacks of the other systems.

Besides the discovery that the AN/APN-20 was the most capable radar for the birdwatch task, the test program also resulted in a better understanding of the total problem. The extent of the risk became more apparent because the possibility of a catastrophic bird strike still existed. It became evident that a constant interface between all elements of the Bird Hazard Reduction Program was necessary if real-time information was to be provided to aircraft in the Dover area. These elements include air traffic controllers, aircrews, and the birdwatch personnel. At the present time, no aircraft is allowed to arrive, depart, or fly in the Dover AFB area without receiving bird movement information from the birdwatch controller.

Conclusions And Recommendations

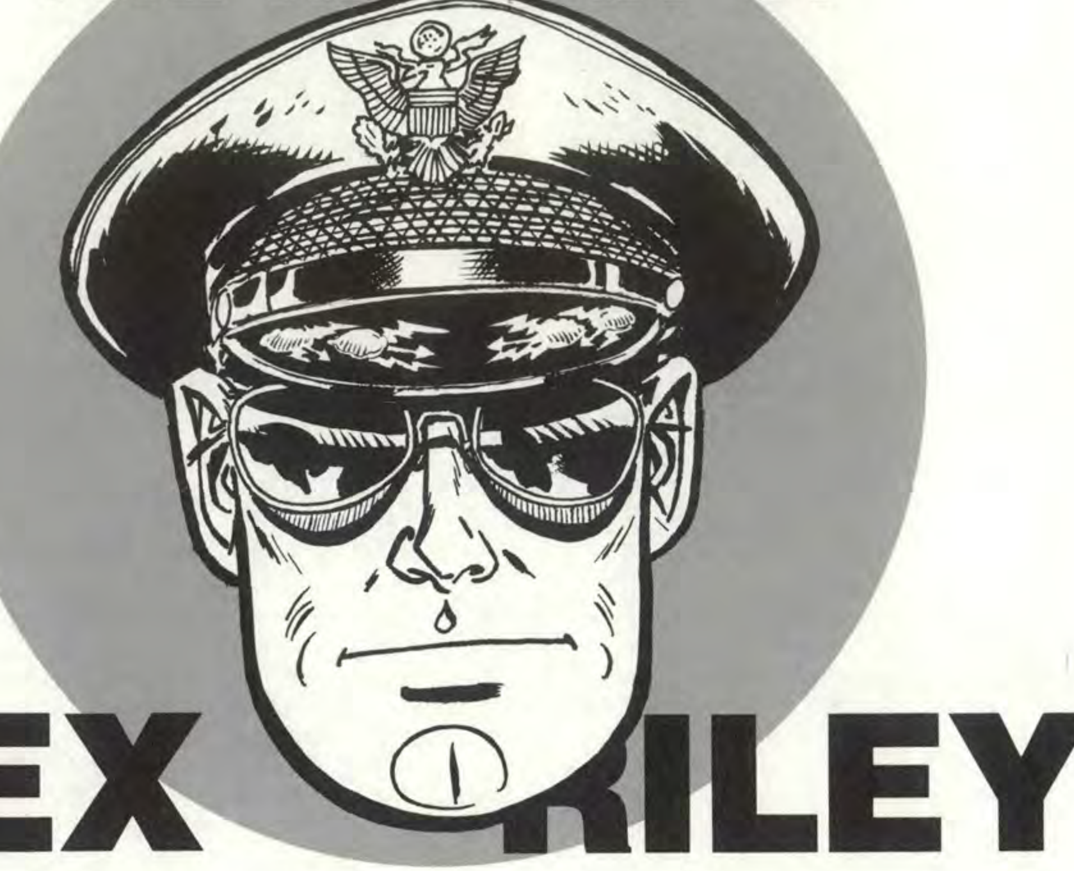
Since the installation of the Bird Strike Avoidance System at Dover AFB, the possibility of a catastrophic bird strike similar to the one in January, 1983, has been significantly reduced. However, a substantial risk still exists. During the 1983-1984 migratory season, there were only five minor C-5 bird strikes reported in the Dover AFB area.

The system in place at Dover AFB has some drawbacks. These drawbacks stem from the lack of altitude information of the bird movements. This leads to an overload of information that has to be interpreted by the birdwatch controller. All this information is passed on to the aircrews who have to verify by visually sighting the birds to determine if they are a hazard. The result has been a desensitization on the part of the aircrews when they receive up to 30 calls on a single approach.

What is needed to advance this system is a three dimensional, computer tracking radar system that would provide target altitude information with the circuitry required to overcome the deficiencies of the current radar. The BASH Working Group has estimated that the developmental effort for this advanced system will take five years to complete, and the cost would be $35-50 million.

All things considered, the birdwatch system that has been developed at Dover AFB has gone far in reducing the bird strike hazard to the C-5 and other aircraft that transit the base. This program has great potential for bird strike reduction at other military bases as well as civilian airfields. The cost of developing an advanced birdwatch radar to improve the current system is a bargain compared to the cost of the loss of a single C-5. ■

THE RETURN OF REX RILEY



MAJOR J.J. LAWRENCE
Directorate of Aerospace Safety

■ After a 14-month absence from the C-141 flightline, I found myself once again staring at a multigreen, ugly, but strangely alluring Starlifter. Flying requalification is never the most comforting of pastimes, and I admit to some degree of apprehension about flying the heavies after over a 15-month sojourn from the cockpit.

While we waited for some minor maintenance problems to be worked, I struck up a conversation with one of the recent UPT graduate copilots on this particular local training flight. It went something like this.

"Well, Lieutenant, how do you like flying the heavies?"

"Real fine, Major Lawrence. Good airplane and a good mission. I bet you're glad to be back in the cockpit again."

"I certainly am, even if it's only part-time, as an attached weeny."

"What do you do in real life, Major?"

"I work across the road at the Air Force Inspection and Safety Center, in the Safety Education Division as the Editor of the *Air Force Safety Journal*."

"How does being an editor get you a flying billet?" "Well, it usually doesn't. But that's only half my job. The rest of my time is spent managing the Rex Riley Award Program. In fact, I am now Rex Riley."

"Wrecks Wheely, heck, that name does sound familiar. And you give out awards. How does managing a motorcycle safety award program win you a flying position?

The main trouble with generation gaps is that they are so darn sneaky. I found it remarkable that a person in the Air Force had never heard of Lieutenant Colonel Rex Riley. Rex Riley, the embodiment of the Air Force Safety Program — Mr. Mission Accomplishment — the guiding light to all flight-suited airplane operators on how to do the job and do it right.

My generation grew up with Rex Riley. As a second lieutenant in Southeast Asia, I remember posters of Rex advocating safety as synonymous with mission success. He was the clear, acknowledged spokesperson for the Air Force safety conscience. I remember his feature in *Flying Safety* and *Maintenance* magazines. I've seen his service award certificates in countless Base Operations, Transient Services Centers, and Billeting Offices. And now, I am him. What do you mean you don't know who Rex Riley is?

That encounter made me think and start to ask questions. To my personal chagrin, few officers under the rank of captain and few enlisted people under the rank of staff sergeant knew what I was talking about when I brought up the subject. The older folks (who's old out there, not me!) pretty much unanimously recalled him with fond memories.

Well, this article is for the "new-

continued

THE RETURN OF REX RILEY continued

bys" out there who don't know the story of Rex Riley and for the people who are curious as to where the program stands today.

Rex Riley is a fictitious character who first appeared in the Air Force in September of 1947, showing up with the rank of major. A Captain Richard Grant conceived the concept while serving as a staff illustrator for the Air Force Safety Directorate, which was then located at Langley AFB, Virginia. He and his successor, Sgt Steven Hotch, created most of the original Rex Riley safety theme posters.

In 1950, the Directorate of Flight Safety Research moved to Norton AFB, California, and expanded its activities in accident prevention. Major Rex Riley's prestige, recognition, and fame as an investigator developed into an Air Force institution. As one present day illustrator here at the Center put it, "Rex was our Air Force answer to Smokey the Bear. He epitomized the entire Air Force safety effort."

Old files are jammed full with letters from the field, letters from many aspects of the Air Force mission, addressed directly to Rex Riley. These letters identified areas that detracted from mishap prevention in all disciplines. The Center followed up on these letters and was instrumental in correcting countless deficiencies.

It's difficult to measure the mishap prevention success of such an effort, but intuitively, the benefit of this type focal point for grassroots identification of safety hazards is obvious. The identification with Rex Riley as a living, breathing entity was astonishing. Phone calls to Rex came on a daily basis. Foreign military personnel transiting Norton AFB even went out of their way to visit the Inspection and Safety Center to personally meet the famous World War II hero and present-day safety investigator, Rex Riley. Current factual safety information, combined with Rex's flightline experience, enabled the editors and artists to maintain an uncanny realism and accuracy in the safety poster and magazine illustration campaigns.

Rex safety posters flooded the Air Force and touched upon every area of mishap prevention.

In 1958, Major Riley was promoted to lieutenant colonel, and the 1960's were Rex's heyday. He appeared monthly in *Aerospace Safety* magazine (today's *Flying Safety*) in a series of "Rex Says" articles highlighting problems in the field and establishing the Center's opinion on how these hazards could be eliminated. The feature was similar in format and context to today's *Maintenance* magazine's "Tech Topics." Rex safety posters flooded the Air Force and touched upon every conceivable area of mishap prevention — from ground safety to rocket safety.

The January 1963 issue of this magazine's forerunner, *Aerospace Accident and Maintenance Review,* introduced Rex's new area of concern, transient services. Up to that point in time, the *Review* identified airfields renowned for their excellent support for transient crews through the "Adventures In Good Transient Maintenance" feature, centering on the exploits of a humorous pair of characters known as Lieutenant Duncan and Technical Sergeant Heinz.

The move to use Rex Riley as the symbol of excellence in transient services was designed to add credibility and distinction to the recognition program. It also signaled a shift in view of the Air Force. Good service from RAPCON to Departure Control for visiting crews was now identified as an integral part of the overall USAF mishap prevention effort. In addition to identifying hazards, Rex started passing out "attaboys" for doing things right.

The Rex Riley Transient Services Awards Program and Rex Riley safety theme campaigns continued through 1974. At that time, the decision was made to retire Rex from active duty and replace him with a young Captain, Mark Hunter, USAF Safety Officer, as the spokesman for the safety program. Captain Hunter, dark mustached, and a Vietnam veteran, was intended to have greater appeal to the young, expanded Air Force population which developed as a result of the war years. Rex Riley was retained as the namesake and symbol for excellence in transient services.

The Mark Hunter theme never really caught on. Perhaps the Center underestimated the new Air Force's desire to cling to tradition. Whatever the reason, Mark Hunter was just never fully accepted in the field as a replacement for Rex Riley. With Rex gone and a lack of support for Mark Hunter, the idea of a central characterization and symbol for safety also waned. Since the mid-seventies, Rex has been out of the general mishap prevention effort.

The Rex Riley Transient Services Award Program, however, thrived throughout the mid- and late-seventies under the energetic management of a series of editors here at the Center. The symbol of Rex Riley was still synonymous with excellence in transient services. The Rex Riley award remained a highly desired recognition for transient service organizations, Base Operations, Billeting Offices, and other crew support agencies. Rex Riley publicity included a monthly feature in *Flying Safety* magazine in the form of "Cross-Country Notes" and a quarterly feature in *Maintenance* magazine identifying award recipients.

"The January 1963 issue of this magazine's forerunner, *Aerospace Accident and Maintenance Review*, introduced Rex's new area of concern, transient services."

Well, what's happened lately? How come that young copilot out on the C-141 flightline did not know what I was talking about when I brought up the subject of Rex Riley?

"To accompany the revival of the Transient Services Award Program, we plan to slowly reintroduce Rex Riley into the realm of general mishap prevention."


THE
REX RILEY
Transient Services Award

We are proud that the quality of service provided by our organization to visiting aircrews contributed to this installation's receiving the Rex Riley Transient Service Award.

Recently, the Rex Riley Program has fallen upon some tough times. Specifically, lack of flying support for the Rex Riley evaluator has resulted in no aerospace vehicle with which to conduct inspections. Without inspections, the awards list was basically frozen and publicity became rather sparse. In general, the Rex Riley Program had gone into suspended animation status.

That situation, however, is about to change. First, the Military Airlift Command has approved my requalification in the C-141 and authorized me auxiliary crewmember status on other MAC aircraft. Additionally, I have recruited a fighter pilot cohort, one Major Terry Lutz, from our System Safety and Engineering Division to also conduct Rex Riley evaluations in the F-4 aircraft. The third leg of this Rex Riley triad will be Major Jim Tothacer, of our Flight Safety Division, doing his thing in the T-38. That means that Rex is, as Willie Nelson would say, "on the road again."

To accompany the revival of the Transient Services Award Program, we plan to slowly reintroduce Rex Riley into the realm of general mishap prevention. With signals of appropriate acceptance from the audiences of our safety periodicals, we hope to rebuild Rex Riley into a visible, viable, and respected symbol for the voice of safety in day-to-day Air Force operations. We are convinced that safety is a by-product of the successful operation. And soon, with a little luck and some hard work, the next time Rex announces himself on a flightline, there will be no identity crisis.

Transient aircrews can always find a sympathetic ear and maybe even a solution or two for transient service problems encountered on the line. Also, your words on some really exceptional service provided could get a base an early opportunity for a Rex Riley visit. If you have some news — pro or con — we are anxious to hear from you.

Write to: Lt Col Rex Riley, c/o Major J.J. Lawrence, HQ AFISC/SEDJ, Norton AFB CA 92409-7001, or call: AUTOVON 876-2113, or commercial (714) 382-2113 (not collect, please). ■

What Happened In 1984 continued from page 6

■ The mishap aircraft departed home base as Nos. 5 and 6 of the first cell of an overseas deployment. As they approached their destination, the mishap cell was intercepted by two host nation aircraft from the destination base. The cell leader did not reposition the cell into an approved weather penetration formation nor separate for the briefed single-ship approaches. The cell was not stabilized in seldom flown six-ship vic formation prior to entry into an exceptionally dense cumulus cloud. Crews lost visual references in the clouds, and Nos. 5 and 6 collided while executing an unpracticed six-ship lost wingman procedure. Both aircrews ejected successfully.

■ During a 4v3 DACT mission, the first mishap element committed against the second mishap element. The attacking Flight Lead had visually acquired the target element and descended into their block. His wingman followed, but did not have a tally on the target. Due to varying tactics, both attackers locked on to the target wingman while the target lead had trouble acquiring the mishap attacker. No one in either flight saw the collision potential until too late. The target flight lead collided with the attacking wingman. All crews ejected successfully, but one pilot drowned. Both aircraft were lost at sea.

■ During a rejoin from tactical formation, the student pilot in the No. 4 aircraft got too far forward and too high on No. 3. The No. 4 IP did not correct this mistake. The IP in No. 3 was not monitoring the position of his wingman and during the rejoin, made an abrupt turn reversal to avoid an overshoot on the lead element. The No. 4 IP did not initiate an overshoot, but attempted to stay inside 3's turn. The aircraft collided, and both aircraft were destroyed.

Flight Controls

■ The mishap aircraft departed home base as No. 2 in a flight of 2 for an ACBT mission. Eight minutes after takeoff, and while passing 15,000 feet in a climb, the pilot felt a small uncommanded aileron input. Shortly thereafter, passing approximately 18,000 feet, uncommanded aileron inputs of increasing intensity occurred. The aircraft became uncontrollable and the pilot ejected.

■ After about 25 minutes of flight, failure of a component in the horizontal stabilizer of a fighter led to loss of the tail section and the aircraft. The crew ejected successfully.

Landing Gear Failures

■ The aircraft preflight was uneventful except for a hydraulic leak on the left aft gear. The leak was determined to be within limits, and the aircraft started the takeoff. At about 6,000 feet remaining and about 147 knots, the crew felt the nose of the aircraft begin to settle. The pilot tried to get airborne, but the aircraft was too far below the unstick speed of 157 knots. The pilot initiated an abort at about 145 knots. The substantially damaged aircraft came to rest past the end of the overrun. The crew egressed without injury.

■ The mishap aircraft was No. 2 in a six-ship package participating in a composite tactical training mission. On landing, the mishap aircraft departed the runway, the nose gear collapsed, the pilot weapon systems operator (PWSO) was inadvertently ejected, and the aircraft flipped over on its back. The PWSO sustained minimal injuries as a result of the ejection, and the pilot received major injuries in the crash. The aircraft was damaged beyond economical repair.

Aircraft Fuel Systems

■ The aircraft was configured with a centerline tank for the proposed mission. On takeoff, fuel leaking from the tank was ignited by the afterburners. As the takeoff continued, the tank pressurized, increasing the intensity of the fire. Fuel and flames were drawn into the engine bays through the aux air doors. The pilot jettisoned the centerline tank, removing the fuel source. Low grade fires continued to burn in both engine bays. The ingestion of flames and hot gasses from the fires in the engine bays led to compressor stalls on both engines. When flying airspeed and altitude could not be maintained, the crew ejected.

■ The mishap aircraft was on a drug enforcement support mission. After an intermediate stop, the mishap aircraft departed for a night, overwater return. The mishap pilot reported to the mission commander via radio that he was having problems and, subsequently, that they had dual engine failure. The aircraft crashed into the sea and sank.

Engine Failures

■ The mishap aircraft departed home base as No. 2 in a scheduled two-ship night ground attack range mission. Fifteen minutes after takeoff, while climbing through FL200, the aircraft experienced compressor stalls and high EGT. The pilot declared an emergency and turned toward home. The compressor stalls increased in severity, and the engine lost thrust. The flight leader observed sparks and flames coming from the mishap aircraft. The pilot then heard a loud explosion and felt a complete loss of thrust from the engine. He ejected successfully.

■ After level-off at FL270, the pilot noticed oil pressure fluctuations of 20-30 psi on the right engine. After declaring an emergency and deciding to land, the pilot made an emergency descent at idle power with full speed brakes. The pilot noticed low oil pressure on the right engine and shut it down, but did not accomplish single-engine landing procedures. The speed brakes remained fully extended. The aircraft was not capable of single-engine flight in the existing configuration. The pilot was unable to recover and ejected successfully.

■ While holding at 4,500 feet MSL for a range, the pilot noticed low oil pressure (45 psi) with fluctuations of 4-5 psi on the right engine. The pilot ran the throttle to max without change in the oil pressure, so he retarded the throttle to idle. One of the wingmen noticed puffs of smoke coming from the aircraft and asked the pilot if he was OK. The pilot then heard a muffled explosion, felt a jolt, and saw the left engine ITT high. He shut down the left engine. The wingmen called that the aircraft was on fire and that they saw pieces falling off. The pilot initiated bold face procedures. Then, there was another explosion and jolt. Shortly thereafter, the pilot felt the controls stiffen, the aircraft rolled left and pitched down. As the bank angle approached 90 degrees, the wingmen told the Lead several times to eject, which he did successfully.

■ Shortly after takeoff, the No. 4 engine of a transport failed and engine debris penetrated the cargo compartment, starting an onboard fire. The aircraft entered a right banked turn, descended, and impacted the ground in an unpopulated area. The aircraft was destroyed, and all personnel on board were killed.

■ The mishap aircraft was an exercise evaluation team chase sortie scheduled to evaluate a low level strike mission during a local exercise. After joining to a line abreast position while egressing the target area, the pilot of the lead aircraft observed the mishap aircraft on fire. The mishap aircrew confirmed the fire and performed a dual sequenced ejection. The pilot sustained major injuries, and the WSO sustained minor injuries during the ejection and parachute landing. The aircraft was destroyed on impact.

continued

What Happened In 1984 continued

■ During a BFM mission, the aircraft departed controlled flight after a severe engine failure apparently damaged the flight controls. Despite all his efforts, the pilot determined the aircraft was unflyable and the crew ejected.

■ During the cruise segment of a night cross-country mission, an F-16 experienced fuel problems and subsequent engine flameout. Attempts to restart the engine were unsuccessful, and the pilot ejected without injury.

■ During an intercept, one of the members of the second element observed flames coming from the mishap aircraft. He advised the mishap pilot who confirmed the fire and ejected. Later, investigators determined that the fire was the result of an AB nozzle burn-through.

■ The mishap aircraft was No. 4 in a four-ship RTU syllabus surface attack mission. Following range work, the flight proceeded to a civilian airfield for practice simulated flame out (SFO) approaches. As the mishap pilot began his go-around from the SFO, the engine failed. The mishap pilot ejected without sustaining injury and the aircraft was destroyed on ground impact.

■ The mishap aircraft departed as No. 2 in a flight of 2 en route to training air space on a routine radar training mission. The mission duration was scheduled for 1.7 hours. Approximately 49 minutes after takeoff, the pilot declared an emergency for hydraulic failure and smoke in the cockpit. The pilot subsequently ejected and the aircraft was destroyed.

■ Shortly after gear retraction, the pilot of a recce aircraft felt a jolt. The aircraft began to buffet, then the nose pitched down as the tail broke off. The pilot attempted to recover, but was unable. At approximately 20-degrees nosedown attitude, the pilot heard an advisory to bail out. Realizing that the aircraft was out of control, the pilot ejected.

Birdstrikes

■ The mishap aircraft was on a final run-in for a low angle drogue delivery when a bird struck the aircraft on the nose, shattering the radome. The crew started a climbing left turn and ejected. The aircraft impacted in an unpopulated area and was destroyed.

Pilot Induced Landing Accidents

■ The mishap aircraft was on a scheduled channel mission to an overseas base. Approximately 50 NM from destination, the mishap crew encountered generator problems which led to the shut down of the No. 4 engine. The mishap crew declared an emergency and flew a precision approach to the destination airport. The crew executed a missed approach due to

weather, subsequently sighted the runway, and received permission for an opposite direction visual approach. During the landing, the mishap aircraft departed the runway and sustained major damage. The pilot sustained minor injuries, and the other crewmembers were not injured.

■ The mishap aircraft completed a PAR approach left of course and above glidepath. The pilot, intent to land, failed to go around when a safe landing was not possible. He continued the approach to an area marked for taxi and takeoff only. He saw the runway, maneuvered the aircraft to the right for alignment, and overshot the runway. In an effort to complete the landing in the remaining runway, the pilot made an excessive control input, and the aircraft touched down at an excessive sink rate. The aircraft sustained major damage from the landing and post impact fires. The crew and passengers egressed successfully.

■ The mishap aircraft was No. 2 of a two-ship low level attack training mission. The mishap aircraft failed to maintain proper formation position and on landing, touched down with the right main gear 7.5 feet off the surface of the defined runway. The aircraft continued farther right, and the left main gear struck the BAK-13 deck sheave, shearing upon impact. The aircraft became uncontrollable, and the aircrew ejected. The pilot sustained minimal injuries, the WSO sustained major injuries, and the aircraft sustained major damage.

■ About 45 minutes after takeoff, the pilot of a fighter declared an emergency with the base control tower due to a critical low fuel state. During the landing, after the aircraft had touched down at high speed, the drag chute failed and the left main brake malfunctioned. The aircraft departed the runway overrun and came to rest in a drainage ditch. The crew egressed without injury although the aircraft sustained major structural damage.

■ The mishap aircraft was No. 3 of a four-ship surface attack mission. The flight departed the range early in response to a SOF-directed divert fuel requirement and returned home to fly instrument low approaches until reaching a compatible landing weight. During the subsequent full stop landing, an excessive sink rate was established, the left main landing gear failed, and the aircraft departed the runway sustaining severe damage.

The mishap pilot egressed with minor injuries.

■ While attempting to initiate a go-around from a circling approach in a trainer, the pilot overshot final, and the aircraft entered a regime of low power and high AOA from which recovery was impossible. The aircraft struck the ground and was destroyed.

Pilot Induced Takeoff Accidents

■ The mission was a cross-country navigation flight. On takeoff from an intermediate stop, as the aircraft became airborne the pilot raised the gear handle. The aircraft began settling back to the runway. The pilot tried to lower the gear, but the fuselage contacted the runway. Both crewmembers ejected successfully; the aircraft departed the side of the runway and was destroyed.

■ The aircraft was on an out and back to a local civilian airfield. After takeoff for the return flight, the mishap aircraft climbed to approximately 400-500 feet AGL. The left wing dropped abruptly, the aircraft rotated one and one-half revolutions, and crashed. The aircraft was destroyed on ground impact, and both crewmembers sustained fatal injuries.

Propellers

■ During a two ship rejoin, the lead aircraft experienced a tail rotor separation. The crew made a right turning autorotation into a field. The aircraft was substantially damaged during landing.

■ Approximately 38 minutes after takeoff, the rear propeller hub of an O-2A failed, and the propeller struck the left tail boom severing it. The failures led to loss of control of the aircraft and a crash. ■

The Shape Of Things To Come

PEGGY E. HODGE
Assistant Editor

■ Technological advances currently being researched and developed are carving a more efficient, more controllable, and safer aircraft. Many technological advances are being made to enhance aircraft materials, aircraft structures, and cockpit design. The Air Force is always interested in technological programs that will make the military pilot's job less complex, more efficient, and safer. One such program underway at the Aeronautical Systems Division's (ASD) Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, is the mission adaptive wing.

The mission adaptive wing, constructed by Boeing Military Aircraft Company, Seattle, Washington, will demonstrate the use of smooth variable camber technology. Unlike conventional wings, there are no flaps, slats, ailerons, or spoilers to break the smooth contour of the wing surfaces. The wing uses internal mechanisms to change its shape during flight, enhancing aircraft performance. Advanced design variable camber mechanisms, coupled to digital flight control computers and other sensors, regulate the contour of the flexible composite fiberglass material, which forms the leading and trailing edges of the wing.

Changing the shape of the wing enables the pilot to achieve more efficient aerodynamic flow for all flight conditions. A conventional wing is most efficient at only one altitude, speed, and aircraft weight. So, for a combat mission, different wing shapes are desirable for subsonic flight, transonic maneuver, and supersonic flight.

The wing will feature improved payload/range, better maneuverability, greater fuel efficiency, and improved handling qualities.

Flying safety is enhanced by both the design and structure of the wing. First of all, researchers have designed backup systems in the wing. There are four computers on board the aircraft — two digital computers and two analog computers. If the two digital computers should fail, there are two analog computers to back up the wing to keep it operational.

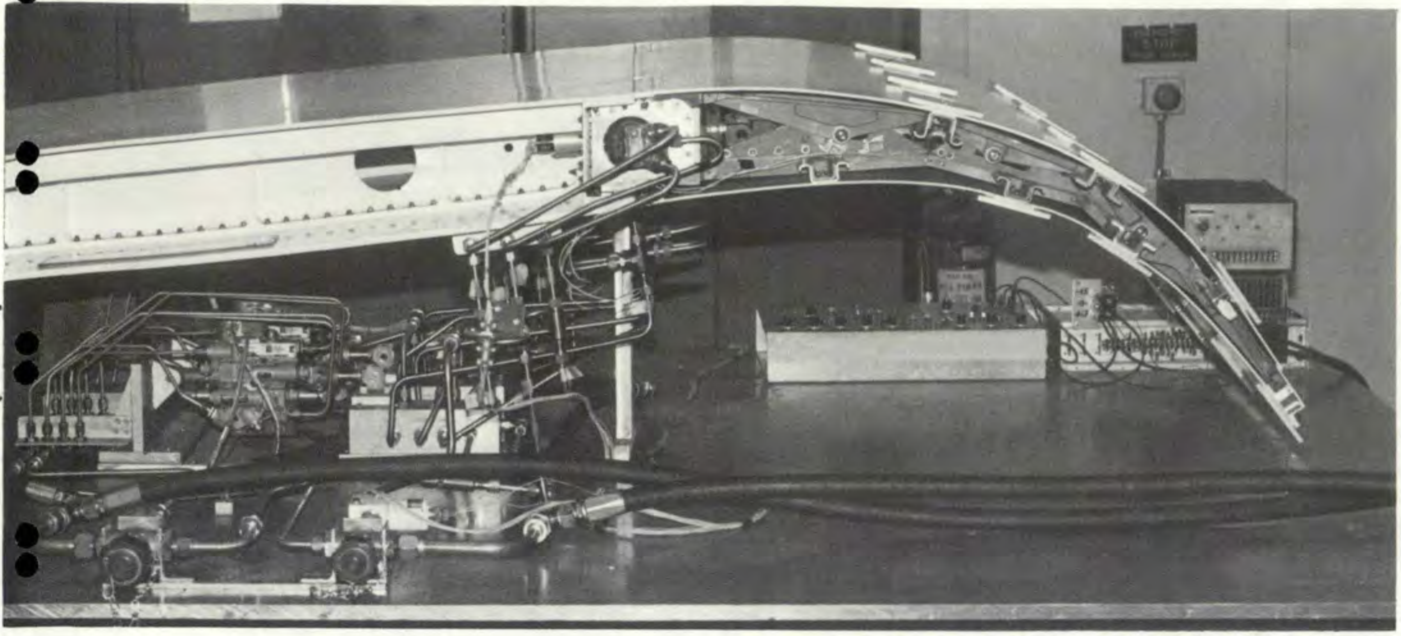
Also, the wing is designed with a power drive unit (PDU) on either end of the control surfaces. These are joined by a shaft that goes along the leading edge. If one of the PDUs should fail, the other PDU will continue to make the whole surface operate.

Further, each PDU is operated by a different hydraulic system, so if one hydraulic system fails, the other system can operate the surface.

Safety unique to the wing is the continuous fastening of the upper surface and the trailing edges. Because of this, the wing is more survivable than the conventional wing. Normally, leading and trailing edges are hinged. If one of the hinges jams or breaks, the surface of the wing, and possibly even the aircraft, may be lost. The mission adaptive wing is fastened continually all the way along the leading and trailing edge. There are no breaks — it is one piece of material. If one link should come loose, the wing will still remain operational.

This smooth surface also allows for increased efficiency and controllability. Due to the fact that this wing is completely faired at all times, the pilot does have the ability to move its surfaces. When the surfaces are moved, airflow separations do *not* occur that could cause problems in terms of controllability and performance.

Various modes designed for the mission adaptive wing further enhance flying safety. Most interesting is the maneuver camber control mode. As an aircraft goes to higher and higher G flight conditions, the wings may have a tendency to break off. Usually what limits the G level on an aircraft is the wing. If the aircraft is designed as an eight-G aircraft, it's the wing that sets that eight-G limit. The part of the aircraft that has the most force

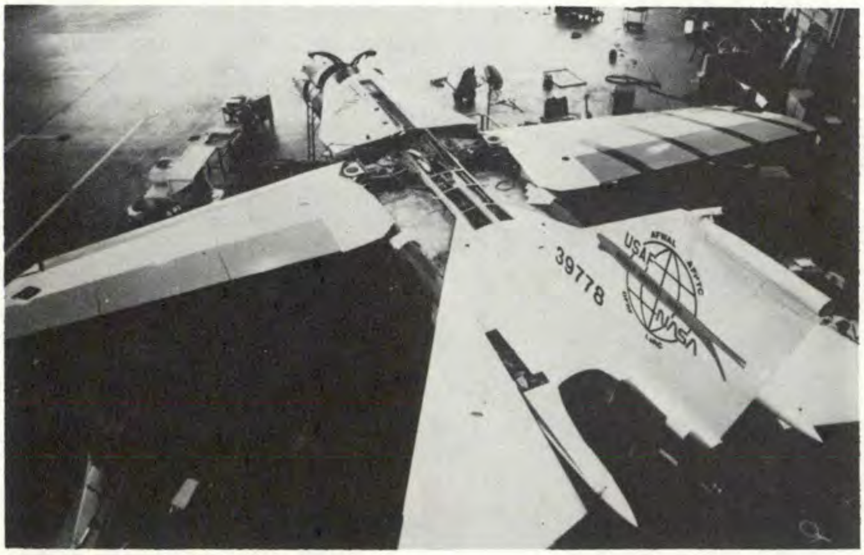


exerted on it at that condition is the wing. With the maneuver camber control, pilots can adjust the pressure distribution from the wing root to the wing tip in such a fashion that a specific G limit may be increased. Researchers have estimated this increase may be about one and a half Gs on a normal fighter.

The cruise camber control mode is designed so that the pilot can get the lowest drag with the wing/aircraft combination. While cruising at a specific altitude, the pilot sets the power setting, punches the autopilot for constant altitude, and punches the cruise camber control button. This allows the wing to vary its shape to give the minimum drag and maximum velocity. Once it can no longer increase the velocity, shape will stabilize.

Since an aircraft continues to burn fuel, the wing may be checked periodically to see if the air foil is the correct shape. If, at this point, it can increase velocity by changing shape — it will start hunting for the shape which gives the maximum velocity. This gives the aircraft peak velocity and minimum drag so the maximum efficiency can be obtained. Researchers at ASD predict this is going to be a unique device from the standpoint of not only research purposes, but also for potential application to operational aircraft.

"What this new design means for the Air Force is a more reliable, more maneuverable, and safer wing."



As the pilot goes to higher and higher Gs, the maneuver enhancement gust alleviation mode gets rid of the instantaneous loss of lift that occurs when the pilot first goes into a high-G mode. As soon as the pilot pulls back on the stick, there will be no delay. It will build up to the G level desired in a predetermined buildup fashion. By immediately deflecting the wing to give the immediate G-pulling capability as the aircraft pitches up, the wing washes its surfaces out. This capability, especially in low level maneuvering, could possibly mean the difference between crashing and not crashing.

What this new design means for the Air Force is a more reliable, more maneuverable, and safer wing. In March of this year, the wing is scheduled to begin a two-year flight test program on the Advanced Fighter Technology Integration (AFTI)/F-111 at Edwards AFB, California. It is one of the many ongoing projects designed to automate and perfect our aircraft and its systems while increasing our efficiency and safety. ■

UNITED STATES AIR FORCE

Well Done Award

Presented for

outstanding airmanship

and professional

performance during

a hazardous situation

and for a

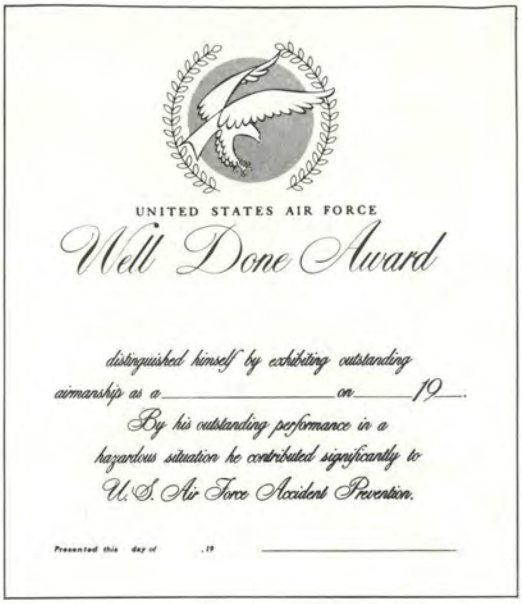
significant contribution

to the

United States Air Force

Accident Prevention

Program.



UNITED STATES AIR FORCE

Well Done Award

distinguished himself by exhibiting outstanding airmanship as a ______________ on ______ 19___. By his outstanding performance in a hazardous situation he contributed significantly to U.S. Air Force Accident Prevention.

Presented this day of , 19 ______________________

■ Do you know someone who has done a really outstanding job either as an aircrewmember or in a direct aircrew support role in preventing or mitigating a flight mishap? If so, they may be eligible for an Air Force Well Done Award.

The Director of Aerospace Safety selects individuals for the award from nominations submitted by the major commands. The individual nominated should have displayed skill, ingenuity, or proficiency above that normally expected of an individual with similar background or experience. The incident which generated the action must not be the result of fault, neglect, or error on the part of the nominee.

If you know of a potential nominee, contact your unit FSO. The unit needs to prepare a package which gives a description of the event as well as the vital statistics on the individual or individuals. More than one member of a crew can be nominated, but those nominated should have truly contributed to the handling of the incident. Merely having your name on the flight orders is not sufficient.

When writing the narrative, give as much detail (unclassified) as possible. This is the only information the review committee has on which to base their decisions. Sketchy, vague, or poorly written narratives make it very difficult to honestly evaluate the nomination.

A picture is to be included with the package. This is a continuing problem area. *Flying Safety* is an Air Force publication, so the pictures must reflect Air Force standards. Before you send a picture, ask yourself, "Would I want my wife, girl friend, mother, or wing commander to see me looking like this?"

Another problem is timeliness. All too often, AFISC receives nominations which are so old they qualify as historical records. While we understand that sometimes circumstances intervene, it should not be too difficult to get the nomination to AFISC within six months.

An individual selected for a Well Done Award will receive an award certificate and be authorized to wear the Air Force Recognition Ribbon. In addition, an account of the occurrence and the picture are published in *Flying Safety* magazine.

The Well Done Award is a good way to recognize outstanding performance in support of flying safety. There are a lot of very skilled people out there doing a super job. We would like to hear about them. If you have any questions about the procedures for a Well Done nomination, check AFR 900-26, para 55, or call *Flying Safety* magazine, AUTOVON 876-2633. ■

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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.

CAPTAIN
Kenneth D. Holder

CAPTAIN
Dennis M. Annen

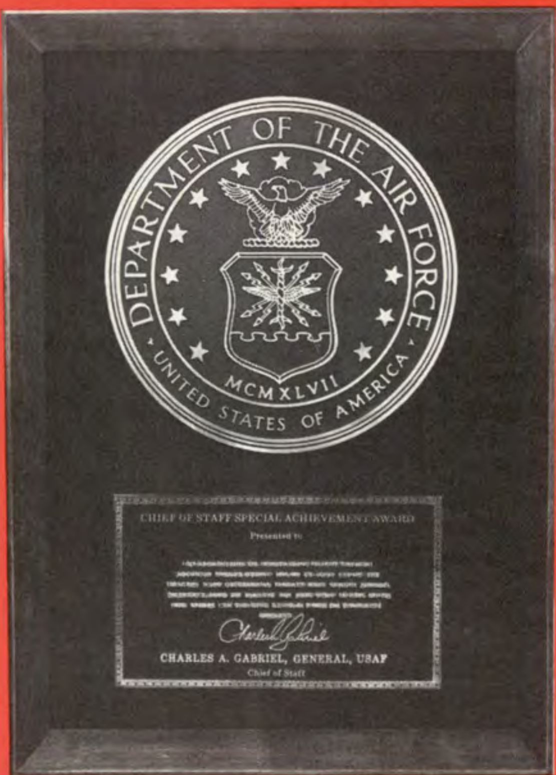
48th Tactical Fighter Wing

■ On 31 March 1984, Captains Holder and Annen, flying in an F-111F, recovered from an emergency situation which has never been encountered in the F-111. Within 10 minutes after takeoff, the right engine developed a moderate compressor stall which continued even when the right throttle was retarded to idle. While Captain Holder started a turn back towards RAF Leuchars, Captain Annen positioned the right engine inlet spike forward in an attempt to clear the compressor stall. The stall cleared, and proper thrust was regained at all throttle settings. As a precaution, the aircraft was slowed and fully configured for landing. While leveling at 3,000 feet AGL and positioned 2.5 miles south of the field, the right engine developed another, more severe compressor stall, followed by a *left* engine compressor stall. Captain Annen positioned the left engine inlet spike forward while rechecking the position of the right spike. Both engines continued to compressor stall and surge, with engine EPRs indicating 1.00 to 1.10, and both engine spike lights illuminated. Within seconds, the left engine failed internally, and the Control Tower reported a trailing fireball twice the size of the aircraft. Because loss of aircraft control was very possible, Captain Holder elected to turn away from the populated areas and attempt an approach over the sea. Although reducing the risk to civilians, this meant landing opposite normal traffic direction with a 25-knot tailwind and marginal visibility on final. Simultaneously, Captain Annen began dumping fuel to reduce gross weight. Captain Holder set both throttles at 85-percent rpm to ensure sufficient hydraulic power for the flight controls and obtain any residual thrust without risking further failure. With marginal visibility on final and no TACAN DME, Captain Annen continued to call out altitudes and cross-checked the radar for range to the runway. Both engines continued to compressor stall, produced little to no thrust, and surged throughout the approach. Captain Holder continually "worked" the delicate balance of airspeed and altitude to establish the best flightpath for the no power approach and accomplished a successful power off landing 200 feet down the runway. Multiple component failures in both engine inlet spike systems resulted in the loss of thrust to both engines, as well as internal failure of the left engine compressor section. The superior airmanship and outstanding crew coordination displayed by Captains Holder and Annen in successfully handling this emergency prevented possible loss of life and loss of the aircraft. WELL DONE! ■

SAFETY AWARDS

THE CHIEF OF STAFF

SPECIAL ACHIEVEMENT AWARD



AIR NATIONAL GUARD

During 1984, the Air National Guard equaled the second lowest number of Class A aircraft mishaps and mishap rate in its history. For the fourth consecutive year, the Air National Guard has sustained a Class A aircraft mishap rate below 2.8. For three of those years the rate was below 2.0. The Guard flew nearly 425,000 hours in 15 different types of aircraft performing a variety of missions including tactical airlift, tactical air support, tactical reconnaissance, fighter interceptor, rescue, and air refueling. More than 63 percent of the total hours flown were in fighter/attack aircraft. These achievements attest to safe operational and maintenance effectiveness, strong leadership, and a high degree of professionalism among all members of the command.

THE AIR RESERVE

For the fourth consecutive year, the Air Force Reserve experienced only one Class A aircraft mishap. The Reserve also has not had a single Class B aircraft mishap for two years. This sustained record of safe mission accomplishment was achieved while flying more than 137,000 hours in 11 different types of aircraft, including some of the oldest and newest in the Air Force inventory. More than 47,000 hours were flown in fighter/attack aircraft. The command performed a demanding and varied mission and participated in numerous exercises, special missions, and deployments. The Air Force Reserve also won this award for flight safety accomplishments in 1983 and is the first command ever to win the award two consecutive years. This achievement reflects strong leadership, professionalism of aircrews and dedication by all members of the command.

STRATEGIC AIR COMMAND

The Strategic Air Command had the fewest ground mishap fatalities in its history during 1984. The 29 fatalities experienced were nearly 45 percent lower than the previous year and 27 percent below the former all-time low of 40 fatalities the command had in 1982. The command has a population of nearly 120,000 people, most of whom are military personnel. Military injuries and Air Force motor vehicle mishaps were nearly 20 percent lower than the previous year. The command's emphasis on motorcycle safety training, safety belt usage, and preventing driving after drinking contributed significantly to these outstanding accomplishments and attests to strong command leadership and supervisory involvement at all levels of command.

UNITED STATES AIR FORCES IN EUROPE

The weapons load crews of the United States Air Forces in Europe regularly handle, upload and download the widest variety and largest quantity of munitions of any command in the United States Air Force. While operating in a tactical environment, stressed by the ever-present threat of terrorist attack, frequent alerts, and extremes of weather, these hard-working professionals have compiled an amazing safety record. Even with numerous realistic operational readiness inspections, tactical evaluations, and sortie surge missions, the command has not experienced a single Class A or Class B munitions mishap for 7 consecutive years. At the same time, the quantity of munitions stored in the European theater has more than doubled. This record attained while performing a diverse and demanding mission involving a wide variety of aircraft and missile systems, conventional and nuclear, indicates dedication to high standards of performance by commanders, supervisors, munitions personnel, safety staffs, and all members of the command. The United States Air Forces in Europe is the first command to be recognized by award of The Chief of Staff Special Achievement Award for weapons safety accomplishments.