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flying SAFETY

1998 Mishap Review

Our 55th Year

Flying Safety

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

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A MESSAGE FROM THE CHIEF OF SAFETY

MAJ GEN FRANCIS C. GIDEON, JR.
Chief of Safety, USAF

Like most of you, I was taught that one of the fundamental characteristics of effective communication is getting to the point up front. Here it is—*FY98 was our Air Force's safest year ever.* A salute and tip of the hat to *every single one of you* for performing so brilliantly, despite an unrelenting Ops Tempo.

Our more astute readers probably recognize that what typically comes after any "Well Done" is an exhortation to do even better. And here it is. *Stay focused in all activities—whether on-duty or off-duty. The life you save may be your own.* Even though FY98 was our safest year ever, here are some sobering numbers for you to consider: *21 people died* in flight and other on-duty mishaps; *49 people died* in off-duty mishaps; 20 aircraft were *destroyed;* and total property losses ran into the *hundreds of millions of dollars.*

And as we enter January and the New Year, a note of caution. In the nineties, our mishap rate for January is *double* the December average. If you saw the December issue of *Flying Safety* and read the article "What's Wrong With January?" then you understand what I'm talking about. If you haven't read it, please do so. It will give you valuable insight into what we've learned about this phenomenon. The article appears on page 5 of the December 1998 issue, and it's also available for viewing on the Air Force Safety Center website at http://www-afsc.saia.af.mil/magazine/htdocs/index.html.

Our Chief of Staff, General Ryan, ascribed the record of the past year to sound use of three things—leadership, accountability, and ORM—and I heartily agree. Here are some excerpts from his 19 October 1998 message to the field:

"The people I meet and the aircraft and facilities I see on visits to our bases are clear testimony that our leadership is focused on both flying and working safely. We must continue to choose the right leaders who ensure that every person sets and maintains high standards, both in the air and on the ground.

"Additionally, our 'operations-related' mishaps were down in FY98 because of your efforts. Commanders, supervisors, and aviators are accepting responsibility for effective, safe operations. I believe the vast potential of our Air Force's great future relies on every person accepting accountability for effective and safe operations.

"Finally, we are beginning to reap the rewards of incorporating risk management into our daily tasks. Daily risk management increases every Air Force member's situational awareness and provides valuable clues that enhance our ability to decide when to 'knock it off.' It is not always an easy decision, but one that becomes clearer when grounded in sound risk assessment principles.

"For leaders, successful risk management begins with knowing your people, your equipment, and the pressures, including Ops and Pers Tempos that contribute to potentially dangerous situations. For individuals, it is knowing yourself, your challenges, your limitations, and the risks involved in our daily activities. Every Air Force team member has my total commitment and support should they make the decision to 'knock it off.'"

It's human nature to believe that mishaps only happen to "the other guy." But remember that every person who died, was injured, or was operating an aircraft or wheeled vehicle that was destroyed in FY98 believed the same thing.

As you prepare for work each day, remember that risk is inherent in everything you do, and one of your duties is to minimize risk to yourself and your coworkers. If you see someone commit an unsafe act—or about to commit an unsafe act—then stop him. Likewise, as you prepare to engage in recreational activities in your off-duty time—whether it's a family outing or a cross-country run—think before you act. Do it for yourself. Do it for your loved ones. Do it for your country.

Best wishes for a prosperous and safe New Year! ✈

Official USAF Photo

MAJ PAT KOSTRZEWA
HQ AFSC/SEFF

The year was 1958. The Cold War was in full swing. Bombers and tankers began sitting nuclear alert. The *Flying Safety* magazine had pinup girls, cartoons named "Rex Riley—Aircraft Accident Investigator," and they used black-and-white illustrations instead of photos.

There were a total of 98 major (equivalent to today's Class A mishap) bomber mishaps with 182 lives lost. Total bomber flying hours that year were 1,275,630. This translates into a mishap rate of 7.68 major mishaps per 100,000 flying hours. Bombers in those days included the B-45, B-47, B-52, B-57, B-58, B-66, QB-17, B-25, B-26, B-29, B-36, and the B-50. The slogan for flight safety that year was "Eight's the rate for '58." The overall goal was a major mishap rate of 8 per 100,000 hours. Although we failed to meet the goal that year, the overall USAF mishap rate of 10.4 was, at the time, the lowest the USAF had ever recorded.

Fast forward 40 years. The Cold War is a topic in history books. The only crewmembers around who even remember sitting alert are reaching field grade status. No more pinup girls, no more Rex Riley, and color photos are printed by 3-year-olds on home computers. We suffered a single bomber Class A, and there were no lives lost. Bombers (B-1, B-2, and B-52) flew just under 55,000 hours in FY98—just over 4 percent of the bomber hours in 1958. This translates to a bomber Class A mishap rate of 1.82. A successful year? Yes, but read on anyway.

B-52 Recap

The trusty BUFF had another snoozer year, which is a good thing, in terms of mishaps. Eleven Class Cs and one Class B resulted from all that were reported. Of these 12 mishaps, 10 were physiological mishaps or bird strikes. The Class B was a bird strike and is currently under investigation. The remaining two were a fuel leak and a lightning strike. This is almost a carbon copy of 1997. Press on! Whatever you're doing is working.

B-1 Recap

Class As

For the second consecutive year, the B-1 recorded a Class A mishap. This was after three consecutive prior years without a Class A. In this year's Class A, the unlucky IP ran the Emergency Engine Shutdown checklist after a No. 3 ADS (Auxiliary Drive System) light. When he pressed the No. 3 fire pushbutton switch on the FWEP (Fire Warning Extinguisher Panel), a short occurred across the FWEP circuit board. The resulting circuit board damage sent an electrical signal from the FWEP that closed the fuel shutoff valves on engines 1, 2, and 4. In addition to this, the circuit board damage also caused the fire warning lights on 1, 2, and 4 to illuminate and, just for good measure, produced smoke in the cockpit. The obvious result of all this was an incapacitated plane. The crew made a timely decision to eject, and, thankfully, they suffered only minor injuries. Work is already in progress to prevent this malfunction from occurring again.

Class Bs

Engine Damage. After exiting low level, the No. 3 engine high vibration light illuminated, and the engine was shut down. The mishap crew declared an emergency and landed uneventfully. During post-flight inspection, holes were found in the left side of the No. 3 engine case and cowling adjacent to the high-pressure turbine. According to the Part I Hardware Condition Assessment, the entire stage one low-pressure turbine nozzle exited through the combustion case. Further, the stage one low-pressure turbine nozzle support failed by stress rupture and had the appearance of excessive heat exposure. Refer to the Safety Investigation Board's final

Message (DTG 021600ZMar98) for further details.

Brake Fire. Shortly after level-off, the MA experienced an electrical bus 1 failure. On landing roll, three inboard tires failed, and a brake hydraulic line on the right main landing gear strut was damaged. The damaged brake line caused hydraulic fluid to spray on the landing gear area. A fire ensued and was extinguished by the fire department. The mishap crew egressed uneventfully. Refer to the Safety Investigation Board's Final Message (DTG 201354ZJan98) for further details.

Class Cs

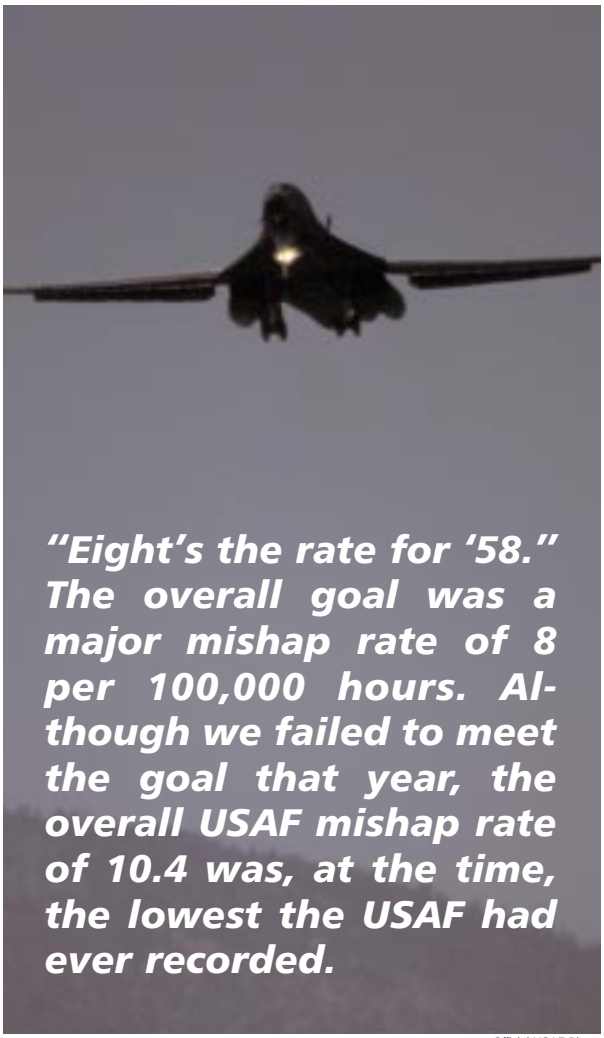
The remaining mishaps (9 Class Cs) were significantly down in number compared to last year (28 Class Cs). There were three shattered windscreens, two bird strikes, one wing sweep malfunction, one high-speed abort/brake fire, one engine damage/ice ingestion, and one electrical malfunction. There were also two HAPs (High Accident Potential) reported. Both HAPs were related to flight controls.

Summary

Of the 2 Class Bs, 9 Class Cs, and 2 HAPs, there were 6 that could have easily turned into Class A mishaps. ***If you fly a B-1, you need to read and understand the Safety Investigation Board's Final Message from these mishaps.*** The date time groups of the Class B messages are listed above. The others are 081049ZJan98, 101928Z Jan98, and 261453Feb98. If you cannot get a copy of these messages locally, contact me, and I will make sure your Wing Safety office gets a copy ASAP.

Conclusion

The B-1, like most modern aircraft, is a complicated piece of machinery, and it doesn't care what rank or experience level is on board. It will challenge both equally, and there is no technology on board to substitute for good judgment, crew coordination, and system knowledge.



"Eight's the rate for '58." The overall goal was a major mishap rate of 8 per 100,000 hours. Although we failed to meet the goal that year, the overall USAF mishap rate of 10.4 was, at the time, the lowest the USAF had ever recorded.

Official USAF Photo

Words of Wisdom

A successful year? Absolutely! Better than 1958? You betcha! Then why the heck did I compare it to 1958? Because as far apart as the 2 years are, some of the problems they had in 1958 are problems that continue to plague us today. The weakest link in the chain is the individual—individuals in the aircraft, individuals working on the aircraft, and individuals in a supervisory position. Read the following quote from Maj Gen Caldara in the January 1958 issue of *Flying Safety,* and see if you think it still applies today.

"Those of you who are in command or operational positions will recognize the fact that there is no control over the individual who deliberately goes out and tries to clobber himself. He may do this because of ignorance, bullheadedness, overconfidence, or as is too often the case, lack of command supervision and interest—and this is where you come in.

"There is no irreducible minimum number of accidents.

"Flying safety must be inherent in every operation—from its inception to its completion—if it is to be a sound and efficient operation. As far as I'm concerned, Flying Safety Officers (FSO), utilized properly, are just the string around the finger to remind everyone how necessary it is to conserve our combat capability. The FSO is not someone in some remote office at a base, wing, or numbered Air Force headquarters. The individual operator, whether it be you or someone who works for you, has to be his own FSO. You have to ensure—as a commander—that you support this. If you do not, all the FSOs in the world, all the programs, and all the money we spend won't prevent a single mishap.

"Our mission is to conserve the combat capabilities of the Air Force. The only way we can do it is to have every pilot, every member of the Air Force do everything that is supposed to be done—as it is supposed to be done and when it is supposed to be done. If we do this, flying is inherently safe. If we don't do it, it is not. It's just that simple."

Best wishes for a safe and happy New Year. ✈

B-2 FY98

USAF Photo by SMSgt Rose Reynolds

LT COL DAN STANTON
HQ AFSC/SEFO
CAPT TONY MONETTI
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Good news—again! For the ninth straight year there have been no Class A or Class B mishaps, and despite logging the highest number of flying hours ever, there were only four Class C mishaps, same as last year. Approximately 37 percent more hours were flown in FY98 than FY97.

Like last year, there were two ice FOD mishaps and one bird strike mishap. The bird strike caused wing leading edge damage, and the ice ingestion affected three engines. The fourth Class C involved hard FOD (engine damage). There were no lightning strike Class C mishaps this year—a continued improvement from previous years.

Equally as impressive as the safety record was the list of "first-evers" for the 509th Bomb Wing at Whiteman AFB, Missouri. The Wing earned an overall "Excellent" rating from HQ/ ACC on its first NORI with the Weapon Safety shop receiving an "ACC Superior Performance Award." Well done!

Eight B-2 aircraft and crews participated in the very first "Beast Walk," an exercise nuclear alert in which the bombers responded using quick engine start and taxi procedures. The stealth bomber's Global Power warfighting capabilities were further enhanced by the development of quick turn, hot pit refueling procedures.

Especially exciting was the successful drop of four new deep-penetrating Joint Direct Attack Munitions (JDAM-109) against buried targets at the White Sands range in New Mexico. Every bomb was on target—all shacks!

Last, but not least, three Whiteman B-2 crews and aircraft forward deployed twice to Andersen AFB, Guam, with over 250 support personnel to conduct live conventional weapons training. The bombers dropped the first operational maximum load of Mk-82 500-pound bombs. The 40,000 pounds of live conventional weapons were targeted against a tiny island, 600 feet wide by 2,400 feet long, in the Farralon Range. Once again, all bombs on target!

Without trying to sound cliché, it was another great year for the B-2. Great strides were taken to expand nuclear and conventional warfighting capabilities, and it was all done safely. Keep up the good work! ✈

C-141 STARLIFTER & C-5 GALAXY FY98

Official USAF Photo

MAJ BILL WALKOWIAK
HQ AFSC/SEFF

The C-141 fleet is much smaller than in previous years. First delivered in 1963, the Starlifter is now in the waning years of its life cycle. I am a tanker driver, but I managed to get five landings in a C-141A at Wright-Patterson about 7 years ago. I was really impressed. I remember lots of power, and the descent capability was eye-watering.

This year the C-141s flew 105,000 hours. The fleet hasn't flown fewer hours per year since 1965. Of course, there are fewer airframes, so it doesn't translate to less flying for the flightcrews. Individual crew dogs are deployed as much as ever.

The crew experience level has never been lower. In 1985, when I started flying heavies in the Air Force, flight commanders were majors, and chiefs of Stan/Eval were lieutenant colonels. Recently, I've seen Stan/Eval pilots who weren't even instructors. Of course, they can't give check rides, but they can process the paperwork, and the staff guy can give the checks. So believe me, there is a lack of experience these days.

A few more facts and concerns: In 1998 there are 145 fewer flying C-141s than in 1992. In the past 15 years, AMC (or MAC) has shrunk from 39 enroute locations overseas and almost 18,000 crewmembers to 13 bases and 4,100 crewmembers. C-17s are not replacing C-141s very fast and will never replace them all. With so few airlifters, a mishap on any one hurts the fleet greatly. At this writing, the "Free Willy" C-17 Class A is just being investigated, the second landing Class A already for the C-17 airframe. Maintenance and maintainability issues crop up more at the beginning and end of an airplane's life cycle. Also, as a plane receives upgrades (C-model?), some things are new while others remain old. This can lead to a weird set of problems. I've seen this with C-135 wiring harnesses. Brand-new avionics are hooked up to 43-year-old wires.

As far as C-5s go, the flying hours remain about the same. Last year the fleet flew 66,500. The two previous years were 62,400 and 67,500 respectively. The old C-5 Galaxy is getting a little long in the tooth as well. The great news is that last year there were no C-5 Class A or B mishaps. Since being fully fielded, that has happened only in 1973 and 1988. Good job, all you Galaxy crews! Let's keep it up! Know your systems well, and be prepared for the hard ones, hydraulic failures, multiple engine losses, etc.

The emphasis is to support "global reach, global power." We show a national presence worldwide—do the mission and do more with less. As a result, ops tempo is a concern. I think this is also AMC's "Year of the Family" (YOFAM). My point is that it's harder than ever for commanders, schedulers, and crews to serve all their masters.

There should clearly be an emphasis on stopping a mission due to safety concerns during peacetime. The natural tendency to support the customer and make the schedule work is really all for naught if we lose the plane or crew. Preserving these aircraft and crews directly supports the Air Force mission. Let's face it, folks, we don't replace them when we lose them. Our capability is diminished. In a peacetime environment, despite real-

continued on next page

USAF Photo by MSgt Perry J. Heimer

world contingencies, the country and our flightcrews deserve a strong emphasis on preserving resources as well as realistic and timely training.

I'll highlight two mishaps that occurred this past year. The first example is a C-5 Class C mishap. This one caused quite a bit of interoffice e-mail at the HQ USAF Safety Center.

C-5 Class C

A C-5 had an in-transit nose landing gear indication and landed at its intended Army airfield destination without incident. MCI 11-205 requires the next flight be to the nearest base with suitable repair capability. The nearest base was about 130 miles away, and the aircraft commander requested the closest suitable airfield but was overridden. Due to various reasons, a waiver was given to get the plane to fly all the way, over 2,000 miles, to its next mission support base. In the end, through miscommunication and an improper set of priorities along the chain of command, everyone thought it was okay to have the crew fly thousands of miles with the gear down. Nobody could think of a good reason for the flight restriction, so it was waived.

Once in the air, a pin that was known to be a problem worked loose from the kneel select arm, and vibration liberated a 4- by 8-foot section of the lower part of the aircraft. That big hunk of metal damaged more of the underside of the C-5 on its way out.

That was the extent of the damage in this case, but what if it had hit a school bus or someone on the ground? The point being, Class Cs are usually just Class As with less bad luck. Is the mission flow that important? I don't think so.

Here is the bottom line: Whenever you use an airplane in a nonstandard configuration or for a mission not normally flown, you should have loud warning horns going off in your head. Events such as nonstandard formation, flights with gear down, flights with an engine inoperative, low levels, air shows, flight into places you've never been, or any "firsts" should make you stop and think about the risks. Ask for help from more experienced people, take your time, do it right, or don't do it. Apply Operational Risk Management, whether your unit has a formal program or not.

C-141 Class A

The C-141 world had one Class A mishap this year. Luckily, it resulted in no injuries, and the crew did an outstanding job. The sortie was a deployment to an airshow in Montreal. On the way, the crew did instrument approach work at Bangor IAP, Maine.

Prior to initial takeoff, the aircraft ingested a small metallic foreign object into the No. 2 engine, cracking a first-stage fan blade. A fatigue crack started and grew during each big throttle push up (takeoff, go-around, etc.). Finally, during a practice missed approach at Bangor, the blade separated and did extensive damage to the No. 2 engine. It shelled out. Lots of parts were found 6,600 feet short of the runway. Flying parts from the No. 2 engine then did damage to the No. 1 engine, the underside of the wing, and fuselage. The crew performed a three-engine visual full stop. They deplaned a scanner. Extensive engine damage on both left-side engines was discovered. The crew shut down the remaining engines and safely egressed the aircraft.

I imagine that the No. 1 engine would not have lasted very long if the flight had been continued. I've personally known a crew, with a squadron commander aboard, who flew from a transition base, over mountains, to get to the home field for repairs. Imagine the outcome if that occurred in this case. A review of the cockpit voice recordings reveals that this crew briefly discussed flying on to a base with maintenance capability.

Bottom line: Take FOD walks seriously! Get out there yourself and help the maintenance troops on occasion. Keep thrust as low as possible when you taxi. If you have any doubts about FOD, deplane a scanner on the hammerhead, especially in third world "FOD havens." If you suspect engine damage in flight, remember your Dash One procedures and definitely reduce thrust as much as practical, and don't touch the throttle unless absolutely necessary. Finally, believe it's possible to lose more than one engine. Practice it in the simulator. Know

USAF Photo by A1C Greg L. Davis

what systems you lose and what systems work more slowly.

Both the C-141 and C-5 had a handful of near misses and bird strikes this year. The tendency is to hit more birds in all seasons but summer. In summer, damaging bird strikes are fewest. There is a rise in mishaps in January too. I would guess that some of it is catching up from the holiday season and lack of proficiency during that time of year. Also, maintenance is much more difficult in the winter months.

Career Versus the Human Perspective

On a recent mishap investigation board, I met a captain who is a presidential advance team member, a wing staffer, and volunteers for many additional duties. He had flown only a handful of times this year. What is going on here? I couldn't stop thinking about this guy and how much I was like him 10 years go.

So, here is my view on your life in the Air Force as a crewmember, how it fits in the safety arena, and the value of having a "life" beyond your Air Force career. Let's try to remember that if we are pilots in a flying billet that our most important and primary job in the Air Force is to be an expert in our aircraft and our mission. Even as a staff officer, if you are not expert and proficient when you fly, you're dangerous, and you'll destroy your credibility. Anyway, from my short time at the Safety Center, I've already seen how preventable most mishaps are and how tragic even a small lapse of attention can become.

A note about career management and leadership for flightcrew. If you do lots of additional duties and work more hours than the next guy, you and the Air Force are probably not better off. You are more likely to burn out yourself and burn out your family. You probably aren't the most valuable member of the team if you and your family aren't relatively happy. If you're that way, everything seems a little grim. People feel threatened by you, and there will be a competitive rift between you and everyone else. You won't put people at ease around you, and they won't follow you with their hearts.

People "want" to work hard for a good leader. That is the power of leadership. A group works synergistically around good leadership. (Synergy means that the sum of the individuals creates something greater than each individual alone.) I've seen this. I've been flying in squadrons for 14 years, seen 12 wing commanders and 16 squadron commanders. I've seen a lot of leadership styles. The best ones still had time for a drink with the guys on Fridays and soccer practice for the kids twice a week. We got "excellent" on ORIs, and they didn't need "mandatory" functions because everyone wanted to attend. Those types made O-6 and stars just like the others, but they were more well-rounded, wiser, and took time to smell the roses. The "workaholics" were respected but not loved, and the atmosphere was rather antiseptic in the squadron. We still did okay, but it didn't click like the others.

So, here's my point. Don't work 16 hours a day regularly. Save that for ORIs and deployments. Do study your aircraft, but also spend time away from work. Round out your life and you will be able to concentrate and focus. You'll fly better and fly safer when you do.✈

C-130/C-17 FY98

USAF Photo by MSgt Perry J. Heimer

MAJ ROGER WILLIAMS JR.
HQ AFSC/SEFF

C-130

The C-130 Broad Area Review report is on the streets. If you didn't read the Broad Area Review's summary in the October 1998 *Flying Safety* magazine, you can read the whole report by downloading it from the Air Force Safety Center's Web page at http:// www-afsc.saia.af.mil.

A great year for the "Herk." Congratulations! No Class As or Bs this year. We didn't invent any new ways to hurt ourselves. However, we did have 18 Class C mishaps, 6 HAPs, 7 physiological incidents, and 5 FOD-related mishaps. Total cost: $1.1 million. This year, the C-130 community accumulated over 294,000 hours of flying, with 14.7 million total since it became operational in the late fifties. Cumulative Class A mishap rate: 0.97. There were no trends noted in the Class C mishaps that occurred. Here are summaries of a few of the "attention getter" Class Cs. If you need more information, see your local safety officer.

During an FCF sortie, a C-130 aircrew selected the No. 2 engine to shut down IAW the FCF regulations. The engine shut down normally, but when the crew began an in-flight restart, the engine began to rotate. But before lightoff, the propeller, without pilot input, went back to the feather position. The start sequence was immediately aborted, and another in-flight restart of the No. 2 engine was attempted. This time the propeller never moved from the feather position. No further attempt was made to restart No. 2.

As the crew was in a descent to home station, the No. 3 throttle started an uncommanded move towards flight idle. No. 3 was shut down IAW the Dash One, and the crew performed an uneventful two-engine, no-flap landing. The problem with the No. 2 was caused by a faulty valve housing, and the movement of the No. 3 throttle was due to material failure.

Another eye-opening prop malfunction occurred during a low-level when the crew experienced a sudden onset of severe vibration and noise. The crew had difficulty communicating due to the noise and reading engine instruments due to the vibration. All engine instruments showed normal indications. The pilot initiated a climb and directed the loadmaster to visually scan the engines while he attempted to isolate the vibration using the throttles and condition levers. Approximately 1 minute after the vibration began, the crew noticed the No. 1 engine oil pressure fluctuating 10 to 20 PSI. At the same time, the loadmaster noticed the No. 1 engine nacelle oscillating up and down approximately 10 inches. The pilot directed an emergency shutdown of the No. 1 engine.

As the prop was feathered, the vibration and noise quickly ceased. After the prop stopped rotation, the loadmaster reported that three of the blades had gone to the feather position, but one blade was still 90 degrees to the wind stream. The pilot stated that once the prop stopped, the aerodynamic effect of the flat blade was not noticeable. The bearing of the No. 1 blade on the No. 1 prop had failed.

This next one sounds like one of the simulator profiles. The crew was performing Maximum Effort landings to a taxiway landing zone. The LZ is a marked section of taxiway parallel to the runway and is 3,000 feet long and 60 feet wide. There is a 300-foot "overrun" at the departure end. The pilot touched down in the prescribed zone, on speed, and on centerline. Everything else was normal until the pilot moved the throttles back towards the ground idle range. At this point, the aircraft began to drift to the left which the pilot countered with increased right brake. All engine instruments appeared normal. The pilot, who has previously experienced a low-pitch stop failure, believed that the left drift was being caused by a malfunction of the left tires and/or brakes and reapplied maximum reverse power. He continued to counter the left drift with nosewheel steering and right brake application. At approximately 1,500 feet down the LZ, the right main gear crossed centerline, and the aircraft continued to the left until it came to rest in a soft, grassy area, approximately 2,000 feet from the touchdown point. An internal failure within the No. 4 prop valve housing assembly caused the prop to go to a forward blade angle greater than that called for by the throttle position.

C-17

The C-17 flew nearly twice the amount of hours that it did last year: 46,365 hours for FY98. Total hours flown since becoming operational: 113,112 hours. There was one Class A mishap, one Class C, and one FOD-related mishap. Total cost: $1.3 million. Cumulative Class A mishap rate: 2.65.

The Class A occurred while transporting Keiko, the killer whale, to Vestmannaejyar Island, Iceland. The approach into Vestmannaejyar was during VMC conditions. The mishap pilot flying the aircraft planned a 5.0-degree short austere airfield approach to the runway. The pilot hand-flew the final approach on speed, on centerline, and with the appropriate crosswind controls applied for the 19-knot crosswind component. The aircraft touched down in the correct attitude (right wing low), well within the aircraft's vertical velocity operational envelope and 184 feet from the approach end of the runway. The aircraft came to a full stop 2,000 feet from the departure end of the runway. Tower informed the crew that it appeared they blew a tire on touchdown. The crew chief deplaned, and after inspection, informed the crew they had damage to the right main landing gear. The spud on the forward portion of the forward right main landing gear trunnion failed.

The only Class C was caused by a bird. The aircraft profile consisted of low-level operating between 500 feet and 1,500 feet AGL. Sometime during the profile, the aircraft received a bird impact on the radome causing over $80,000 worth of damage. The crew didn't see the bird or feel the impact.

In conclusion, 1998 was a banner year for the Air Force. We either beat or tied safety records. Keep up the great work, and remember—if you're not taking an active role in the safety process, DO! Let your safety shop know when you notice anything that's "not quite right." YOU are the eyes and ears of the safety officer. Fly Safe!✈

USAF Photo by A1C Thomas A. Anhalt

The -135 and KC-10 World

LT COL BRUCE LUJAN
AFSC/SEFF

I've been here at the Safety Center a year and a half, and I'm happy to report that keeping an eye on the KC-10, and all models of the -135, hasn't been a terribly exciting additional duty. In the mishap prevention business, excitement is bad. Looking over the small number of things that went wrong in FY98, I have to say you should be proud, and I'm happy. I was an operations officer in a tanker squadron for over a year. I know how much of a team effort it takes to maintain old airplanes and equipment, fill a schedule, train and prepare crews, and deploy all over the world passing needed gas to receivers (and delivering cargo too). There are lots of moving parts, chances for error, and challenges to overcome. Thanks for doing a great job and keeping it safe!

KC-10

The KC-10 community "scored" a practically mishap-free year. You had no Class A or B mishaps! There were only nine Class Cs. One was a crosswind landing that drifted right far enough to take out a few runway lights. On No. 2, a set of upper tailcone platform or "patio" doors were damaged when they opened inflight. On No. 3, an undetected wheelwell fire followed an inflight check of the Air Driven Generator. No. 4 was a deer strike during a touch-and-go. Nos. 5 and 6 were bird strikes, and No. 7 was tire failure on a main landing gear during takeoff roll.

The other two involved wing air refueling pod (WARP) problems. One drogue impacted the wing during retraction because it was unstable, most likely due to damage from a receiver. The second one involved a sine wave that developed because of poor retraction response and left the basket behind on the receiver's probe.

We also had four other reportable mishaps, including two bird strikes, a HAP involving inboard slats failing to retract after landing, and one physiological incident involving headache symptoms and a "shooting pain."

To KC-10 people: Keep up the good work, and pay particular attention to your personal limits when you're performing any new maneuver or procedure. Always remember rule No. 1: FLY THE AIRPLANE FIRST. Be sure someone's getting "Job One" done when stuff's happening, and read the other articles from crew airplanes to see what lessons you can learn from them.

-135s

The -135 community made me proud as well. You had only one Class A mishap with no Class Bs. Congrats on a job well done. The Class A happened when a stress corrosion crack worked its way through a main landing gear drag brace. The drag brace failed during landing, the main landing gear collapsed into the fuselage, the aircraft settled onto the Nos. 3 and 4 engines, and the No. 3 engine caught fire. The aircraft slid to a stop on the runway, and all passengers and crew egressed without injury.

There were 32 Class C and other reportable mishaps. These ran the gamut from a physiological incident involving hypoxia, through bird strikes, lightning strikes, fuel leaks, hydraulic leaks with fire, tire failures, fore flaps falling off, an engine pod scraping the runway, receivers hurting booms, and booms hurting receivers.

We also had potential for Class A mishaps with an air refueling pump that wouldn't stop running, stabilizer trim malfunctions, initial buffet from ice on wings and a high speed abort. If any of those don't sound familiar, and you're a tanker driver, drive on over to your wing safety office and review the mishap messages they have on file. "Knowledge is good," and it could save your rear end someday.

As a former Castle IP, I feel duty bound to point out that pod scraping is almost always the result of overcontrolling to avoid a scrape on one side and dragging the pods on the other side. Remember the old saying: "Mo (momentum) lives on the tanker." Once you get it going in one direction at slow airspeeds, it's hard to stop because your flight controls are less effective.

The scariest mishap in my eyes was a stab trim malfunction. With a few more knots, the jet would have rotated without flying airspeed in spite of pilot's efforts to keep it on the ground.

I just want to encourage everyone to keep looking things over as your crew rolls down the runway, and speak up on intercom when things don't look right. I remember convincing one aircraft commander to abort for engine problems without saying anything on the intercom as a young copilot. He said my "wild eyes, pointing at the engine instruments, and screaming across the cockpit" were his clues that something was wrong. I learned using the intercom would have helped a lot, and it might have avoided hot brakes had the abort started sooner.

To wrap things up for the -135 gang, first read the last paragraph of the KC-10 piece, then think about these three phrases that hung in the hallway at CFIC for years.

FLY THE AIRCRAFT FIRST.
AIRSPEED IS YOUR PAL.
TRIM IS A WONDERFUL THING.

(If you need them explained, find an "old SAC person.")

Keep up the good work flying old airplanes safely, and take some time to pat your maintainers and logistics folks on the back. They're doing an awesome job keeping your jet safe to fly. ✈

E-3 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY77	0	0.00	0	0.00	0	0.00	0	0	981	981
CY78	0	0.00	0	0.00	0	0.00	0	0	4,939	5,920
CY79	0	0.00	0	0.00	0	0.00	0	0	10,304	16,224
CY80	0	0.00	0	0.00	0	0.00	0	0	15,453	31,677
CY81	0	0.00	0	0.00	0	0.00	0	0	24,389	56,066
CY82	0	0.00	0	0.00	0	0.00	0	0	27,430	83,496
CY83	0	0.00	1	3.36	0	0.00	0	0	29,737	113,233
CY84	0	0.00	0	0.00	0	0.00	0	0	30,159	143,392
CY85	0	0.00	1	3.38	0	0.00	0	0	29,628	173,020
CY86	0	0.00	0	0.00	0	0.00	0	0	28,701	201,721
TY87	0	0.00	0	0.00	0	0.00	0	0	23,302	225,023
FY88	0	0.00	0	0.00	0	0.00	0	0	29,005	254,028
FY89	0	0.00	0	0.00	0	0.00	0	0	22,886	276,914
FY90	0	0.00	0	0.00	0	0.00	0	0	26,141	303,055
FY91	0	0.00	0	0.00	0	0.00	0	0	32,343	335,398
FY92	0	0.00	0	0.00	0	0.00	0	0	33,329	368,727
FY93	0	0.00	0	0.00	0	0.00	0	0	27,782	396,509
FY94	0	0.00	0	0.00	0	0.00	0	0	24,381	420,890
FY95	1	3.90	0	0.00	1	3.90	2	22	25,612	446,502
FY96	0	0.00	0	0.00	0	0.00	0	0	25,430	471,932
FY97	0	0.00	0	0.00	0	0.00	0	0	21,752	493,684
FY98	0	0.00	0	0.00	0	0.00	0	0	20,132	513,816
LIFETIME	1	0.19	2	0.39	1	0.19	2	22	513,816	
5 YR AVG	0.2	0.85	0.0	0.00	0.2	0.85	0.4	4.4	23,461.4	
10 YR AVG	0.1	0.38	0.0	0.00	0.1	0.38	0.2	2.2	25,978.8	

E-4... Statistics

E-4 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY75	0	0.00	0	0.00	0	0.00	0	0	1,274	1,274
CY76	0	0.00	0	0.00	0	0.00	0	0	1,741	3,015
CY77	0	0.00	0	0.00	0	0.00	0	0	1,683	4,698
CY78	0	0.00	0	0.00	0	0.00	0	0	2,109	6,807
CY79	0	0.00	0	0.00	0	0.00	0	0	1,904	8,711
CY80	0	0.00	0	0.00	0	0.00	0	0	2,274	10,985
CY81	0	0.00	0	0.00	0	0.00	0	0	2,144	13,129
CY82	0	0.00	0	0.00	0	0.00	0	0	1,743	14,872
CY83	0	0.00	0	0.00	0	0.00	0	0	1,449	16,321
CY84	0	0.00	0	0.00	0	0.00	0	0	1,457	17,778
CY85	0	0.00	0	0.00	0	0.00	0	0	1,518	19,296
CY86	0	0.00	0	0.00	0	0.00	0	0	1,812	21,108
TY87	0	0.00	0	0.00	0	0.00	0	0	1,380	22,488
FY88	1	56.82	0	0.00	0	0.00	0	0	1,760	24,248
FY89	0	0.00	0	0.00	0	0.00	0	0	1,839	26,087
FY90	0	0.00	0	0.00	0	0.00	0	0	1,908	27,995
FY91	0	0.00	0	0.00	0	0.00	0	0	1,822	29,817
FY92	0	0.00	1	58.28	0	0.00	0	0	1,716	31,533
FY93	0	0.00	1	74.96	0	0.00	0	0	1,334	32,867
FY94	0	0.00	0	0.00	0	0.00	0	0	1,587	34,454
FY95	0	0.00	0	0.00	0	0.00	0	0	1,697	36,151
FY96	0	0.00	0	0.00	0	0.00	0	0	1,401	37,552
FY97	0	0.00	0	0.00	0	0.00	0	0	1,310	38,862
FY98	0	0.00	0	0.00	0	0.00	0	0	1,360	40,222
LIFETIME	1	2.49	2	4.97	0	0.00	0	0	40,222	
5 YR AVG	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.0	1,471.0	
10 YR AVG	0.0	0.00	0.2	12.52	0.0	0.00	0.0	0.0	1,597.4	

KC-10 History

YEAR	#	CLASS A RATE	#	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY81	0	0.00	0	0.00	0	0.00	0	0	2,054	2,054
CY82	0	0.00	0	0.00	0	0.00	0	0	7,018	9,072
CY83	0	0.00	0	0.00	0	0.00	0	0	12,831	21,903
CY84	0	0.00	1	5.12	0	0.00	0	0	19,534	41,437
CY85	0	0.00	0	0.00	0	0.00	0	0	24,617	66,054
CY86	0	0.00	0	0.00	0	0.00	0	0	32,572	98,626
TY87	0	0.00	2	6.68	0	0.00	0	0	29,952	128,578
FY88	0	0.00	0	0.00	0	0.00	0	0	43,558	172,136
FY89	0	0.00	0	0.00	0	0.00	0	0	47,350	219,486
FY90	0	0.00	0	0.00	0	0.00	0	0	51,490	270,976
FY91	1	1.46	1	1.46	0	0.00	0	0	68,668	339,644
FY92	1	2.31	1	2.31	0	0.00	0	0	43,253	382,897
FY93	0	0.00	0	0.00	0	0.00	0	0	54,266	437,163
FY94	0	0.00	0	0.00	0	0.00	0	0	52,289	489,452
FY95	0	0.00	0	0.00	0	0.00	0	0	43,381	532,833
FY96	2	3.87	0	0.00	0	0.00	0	0	51,725	584,558
FY97	0	0.00	0	0.00	0	0.00	0	0	50,181	634,739
FY98	0	0.00	0	0.00	0	0.00	0	0	47,895	682,634
LIFETIME	4	0.59	5	0.73	0	0.00	0	0	682,634	
5 YR AVG	0.4	0.81	0.0	0.00	0.0	0.00	0.0	0.0	49,094.2	
10 YR AVG	0.4	0.78	0.2	0.39	0.0	0.00	0.0	0.0	51,049.8	

C-21 History

YEAR	#	CLASS A RATE	#	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY84	0	0.00	0	0.00	0	0.00	0	0	9,478	9,478
CY85	0	0.00	0	0.00	0	0.00	0	0	44,555	54,033
CY86	0	0.00	0	0.00	0	0.00	0	0	54,134	108,167
TY87	1	2.32	0	0.00	1	2.32	2	2	43,145	151,312
FY88	0	0.00	0	0.00	0	0.00	0	0	56,076	207,388
FY89	0	0.00	0	0.00	0	0.00	0	0	59,607	266,995
FY90	0	0.00	0	0.00	0	0.00	0	0	54,535	321,530
FY91	0	0.00	0	0.00	0	0.00	0	0	54,923	376,453
FY92	0	0.00	0	0.00	0	0.00	0	0	47,603	424,056
FY93	0	0.00	0	0.00	0	0.00	0	0	48,421	472,477
FY94	0	0.00	0	0.00	0	0.00	0	0	47,336	519,813
FY95	1	2.13	0	0.00	1	2.13	2	7	47,020	566,833
FY96	0	0.00	0	0.00	0	0.00	0	0	46,239	613,072
FY97	0	0.00	0	0.00	0	0.00	0	0	44,743	659,815
FY98	0	0.00	0	0.00	0	0.00	0	0	45,395	705,210
LIFETIME	2	0.28	0	0.00	2	0.28	4	9	705,210	
5 YR AVG	0.2	0.43	0.0	0.00	0.2	0.43	0.4	1.4	46,546.6	
10 YR AVG	0.1	0.20	0.0	0.00	0.1	0.20	0.2	0.7	49,782.2	

KC-10 & C-21... Statistics

C-130... Statistics

C-130 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY55	1	2173.91	0	0.00	0	0.00	0	0	46	46
CY56	1	186.22	0	0.00	0	0.00	0	0	537	583
CY57	0	0.00	0	0.00	0	0.00	0	0	22,633	23,216
CY58	4	5.04	1	1.26	1	1.26	2	6	79,290	102,506
CY59	4	3.98	1	1.00	1	1.00	1	10	100,457	202,963
CY60	1	0.82	0	0.00	0	0.00	0	0	121,844	324,807
CY61	4	2.79	0	0.00	1	0.70	0	0	143,363	468,170
CY62	6	3.42	6	3.42	3	1.71	8	33	175,479	643,649
CY63	2	0.79	3	1.18	1	0.39	0	0	254,331	897,980
CY64	4	0.94	3	0.71	1	0.24	0	1	424,034	1,322,014
CY65	9	1.62	6	1.08	5	0.90	9	25	554,079	1,876,093
CY66	16	2.20	11	1.51	6	0.83	8	23	727,191	2,603,284
CY67	13	1.98	12	1.83	9	1.37	5	78	656,986	3,260,270
CY68	11	1.85	6	1.01	6	1.01	0	8	593,976	3,854,246
CY69	8	1.49	7	1.30	4	0.74	9	35	537,126	4,391,372
CY70	3	0.60	4	0.79	3	0.60	8	60	504,113	4,895,485
CY71	2	0.41	5	1.03	1	0.21	3	10	487,137	5,382,622
CY72	7	1.46	4	0.83	5	1.04	12	29	480,989	5,863,611
CY73	1	0.25	4	1.00	1	0.25	3	7	399,605	6,263,216
CY74	5	1.39	3	0.83	3	0.83	4	12	360,549	6,623,765
CY75	3	0.82	1	0.27	2	0.55	3	8	365,181	6,988,946
CY76	0	0.00	1	0.30	0	0.00	0	0	336,592	7,325,538
CY77	1	0.30	12	3.59	0	0.00	0	1	334,524	7,660,062
CY78	7	2.01	37	10.63	5	1.44	11	29	348,168	8,008,230
CY79	0	0.00	1	0.28	0	0.00	0	0	360,806	8,369,036
CY80	2	0.56	0	0.00	2	0.56	4	22	354,589	8,723,625
CY81	4	1.09	2	0.54	3	0.81	4	39	368,433	9,092,058
CY82	2	0.53	1	0.27	2	0.53	8	34	376,261	9,468,319
CY83	1	0.27	1	0.27	1	0.27	2	6	376,939	9,845,258
CY84	3	0.80	1	0.27	1	0.27	3	18	374,577	10,219,835
CY85	3	0.79	2	0.52	3	0.79	5	27	381,929	10,601,764
CY86	2	0.54	0	0.00	2	0.54	3	14	367,186	10,968,950
TY87	1	0.36	3	1.09	1	0.36	1	5	274,706	11,243,656
FY88	2	0.58	0	0.00	1	0.29	2	6	344,160	11,587,816
FY89	1	0.29	0	0.00	1	0.29	0	1	339,149	11,926,965
FY90	0	0.00	0	0.00	0	0.00	0	0	325,201	12,252,166
FY91	0	0.00	0	0.00	0	0.00	0	0	401,615	12,653,781
FY92	2	0.63	0	0.00	2	0.63	8	24	315,952	12,969,733
FY93	1	0.33	0	0.00	1	0.33	2	6	300,157	13,269,890
FY94	1	0.36	1	0.36	1	0.36	0	8	279,923	13,549,813
FY95	1	0.35	1	0.35	1	0.35	2	6	282,864	13,832,677
FY96	1	0.34	1	0.34	1	0.34	2	9	294,075	14,126,752
FY97	2	0.70	1	0.36	2	0.73	2	13	275,756	14,402,508
FY98	0	0.00	0	0.00	0	0.00	0	0	280,159	14,682,667
LIFETIME	142	0.97	142	0.97	83	0.57	134	613	14,682,667	
5 YR AVG	1.0	0.35	0.8	0.28	1.0	0.35	1.2	7.2	282,555.4	
10 YR AVG	0.9	0.29	0.4	0.13	0.9	0.29	1.6	6.7	309,485.1	

C-12 History

YEAR	#	CLASS A RATE	#	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY75	0	0.00	0	0.00	0	0.00	0	0	435	435
CY76	0	0.00	0	0.00	0	0.00	0	0	3,146	3,581
CY77	0	0.00	0	0.00	0	0.00	0	0	7,017	10,598
CY78	0	0.00	0	0.00	0	0.00	0	0	6,651	17,249
CY79	1	23.36	1	23.36	1	23.36	2	5	4,280	21,529
CY80	0	0.00	0	0.00	0	0.00	0	0	4,484	26,013
CY81	0	0.00	0	0.00	0	0.00	0	0	5,978	31,991
CY82	0	0.00	0	0.00	0	0.00	0	0	6,094	38,085
CY83	0	0.00	0	0.00	0	0.00	0	0	3,665	41,750
CY84	1	11.05	0	0.00	0	0.00	0	1	9,046	50,796
CY85	0	0.00	0	0.00	0	0.00	0	0	29,222	80,018
CY86	0	0.00	0	0.00	0	0.00	0	0	33,674	113,692
TY87	0	0.00	0	0.00	0	0.00	0	0	25,413	139,105
FY88	0	0.00	0	0.00	0	0.00	0	0	33,018	172,123
FY89	0	0.00	0	0.00	0	0.00	0	0	37,707	209,830
FY90	0	0.00	0	0.00	0	0.00	0	0	34,928	244,758
FY91	0	0.00	0	0.00	0	0.00	0	0	34,944	279,702
FY92	0	0.00	0	0.00	0	0.00	0	0	28,893	308,595
FY93	0	0.00	0	0.00	0	0.00	0	0	27,099	335,694
FY94	0	0.00	0	0.00	0	0.00	0	0	16,500	352,194
FY95	0	0.00	0	0.00	0	0.00	0	0	21,461	373,655
FY96	0	0.00	0	0.00	0	0.00	0	0	4,740	378,395
FY97	0	0.00	0	0.00	0	0.00	0	0	4,728	383,123
FY98	0	0.00	0	0.00	0	0.00	0	0	5,641	388,764
LIFETIME	2	0.51	1	0.26	1	0.26	2	6	388,764	
5 YR AVG	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.0	10,614.0	
10 YR AVG	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.0	21,664.1	

C-17 History

YEAR	#	CLASS A RATE	#	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
FY91	0	0.00	0	0.00	0	0.00	0	0	8	8
FY92	0	0.00	0	0.00	0	0.00	0	0	539	547
FY93	0	0.00	0	0.00	0	0.00	0	0	1,252	1,799
FY94	0	0.00	0	0.00	0	0.00	0	0	4,454	6,253
FY95	0	0.00	0	0.00	0	0.00	0	0	12,968	19,221
FY96	1	4.75	1	4.75	0	0.00	0	0	21,050	40,271
FY97	1	3.78	1	3.78	0	0.00	0	0	26,486	66,757
FY98	1	2.40	0	0.00	0	0.00	0	0	41,695	108,452
LIFETIME	3	2.77	2	1.84	0	0.00	0	0	108,452	
5 YR AVG	0.6	2.81	0.4	1.88	0.0	0.00	0.0	0.0	21,330.6	

C-12 & C-17... Statistics

C-141... Statistics

C-141 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY64	0	0.00	0	0.00	0	0.00	0	0	2,469	2,469
CY65	0	0.00	0	0.00	0	0.00	0	0	35,316	37,785
CY66	1	0.53	0	0.00	0	0.00	0	0	189,246	227,031
CY67	4	0.87	1	0.22	2	0.43	3	12	461,704	688,735
CY68	0	0.00	4	0.59	0	0.00	0	0	672,627	1,361,362
CY69	0	0.00	1	0.16	0	0.00	0	0	642,291	2,003,653
CY70	1	0.16	2	0.33	0	0.00	0	0	612,518	2,616,171
CY71	1	0.20	0	0.00	0	0.00	0	0	487,929	3,104,100
CY72	0	0.00	2	0.42	0	0.00	0	0	471,440	3,575,540
CY73	2	0.55	0	0.00	1	0.28	3	24	362,532	3,938,072
CY74	2	0.70	0	0.00	1	0.35	3	7	286,377	4,224,449
CY75	4	1.27	0	0.00	1	0.32	3	16	314,771	4,539,220
CY76	3	1.07	2	0.71	2	0.71	7	41	281,622	4,820,842
CY77	2	0.67	5	1.67	0	0.00	0	0	299,191	5,120,033
CY78	1	0.35	4	1.42	0	0.00	0	0	282,594	5,402,627
CY79	3	1.03	4	1.37	1	0.34	0	0	291,223	5,693,850
CY80	1	0.36	0	0.00	1	0.36	2	13	281,411	5,975,261
CY81	1	0.34	1	0.34	0	0.00	0	0	290,389	6,265,650
CY82	1	0.35	0	0.00	1	0.35	2	9	284,675	6,550,325
CY83	0	0.00	2	0.68	0	0.00	0	0	294,531	6,844,856
CY84	1	0.35	0	0.00	1	0.35	3	9	286,443	7,131,299
CY85	0	0.00	0	0.00	0	0.00	0	0	293,380	7,424,679
CY86	1	0.35	0	0.00	0	0.00	0	0	288,339	7,713,018
TY87	1	0.45	0	0.00	0	0.00	0	0	220,161	7,933,179
FY88	0	0.00	0	0.00	0	0.00	0	0	264,201	8,197,380
FY89	1	0.36	0	0.00	1	0.36	2	8	276,770	8,474,150
FY90	0	0.00	0	0.00	0	0.00	0	0	304,106	8,778,256
FY91	0	0.00	0	0.00	0	0.00	0	0	442,406	9,220,662
FY92	0	0.00	0	0.00	0	0.00	0	0	226,312	9,446,974
FY93	1	0.49	0	0.00	2	0.98	4	13	203,264	9,650,238
FY94	0	0.00	0	0.00	1	0.78	0	0	127,938	9,778,176
FY95	0	0.00	0	0.00	0	0.00	0	0	157,059	9,935,235
FY96	0	0.00	0	0.00	0	0.00	0	0	146,417	10,081,652
FY97	1	0.83	1	0.83	1	0.83	2	9	121,043	10,202,695
FY98	1	0.97	0	0.00	0	0.00	0	0	102,627	10,305,322
LIFETIME	34	0.33	29	0.28	16	0.16	34	161	10,305,322	
5 YR AVG	0.4	0.31	0.2	0.15	0.4	0.31	0.4	1.8	131,016.8	
10 YR AVG	0.3	0.13	0.1	0.04	0.5	0.22	0.8	3.0	226,951.6	

C-135 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY57	0	0.00	0	0.00	0	0.00	0	0	4,497	4,497
CY58	3	6.94	2	4.63	2	4.63	7	20	43,204	47,701
CY59	3	2.53	1	0.84	2	1.69	4	8	118,426	166,127
CY60	3	1.94	2	1.29	5	3.23	3	9	154,579	320,706
CY61	2	0.99	0	0.00	0	0.00	0	0	201,263	521,969
CY62	5	1.78	5	1.78	5	1.78	13	60	280,695	802,664
CY63	3	0.89	0	0.00	4	1.19	7	21	336,771	1,139,435
CY64	1	0.26	2	0.52	2	0.52	2	83	385,681	1,525,116
CY65	4	1.00	0	0.00	5	1.25	11	126	400,572	1,925,688
CY66	2	0.44	1	0.22	3	0.67	6	21	449,445	2,375,133
CY67	2	0.48	3	0.71	2	0.48	4	10	419,651	2,794,784
CY68	6	1.19	2	0.40	5	1.00	15	43	502,467	3,297,251
CY69	5	1.16	3	0.69	4	0.93	4	23	431,849	3,729,100
CY70	1	0.27	1	0.27	0	0.00	0	0	376,930	4,106,030
CY71	2	0.54	1	0.27	2	0.54	7	29	372,410	4,478,440
CY72	4	0.91	3	0.68	1	0.23	3	5	438,029	4,916,469
CY73	4	1.21	1	0.30	1	0.30	2	3	329,410	5,245,879
CY74	2	0.67	2	0.67	1	0.34	1	2	296,320	5,542,199
CY75	1	0.38	3	1.13	1	0.38	2	4	266,522	5,808,721
CY76	2	0.77	0	0.00	2	0.77	11	22	259,785	6,068,506
CY77	2	0.76	33	12.58	2	0.76	2	20	262,304	6,330,810
CY78	0	0.00	34	12.51	0	0.00	0	0	271,819	6,602,629
CY79	3	1.11	6	2.23	1	0.37	3	5	269,432	6,872,061
CY80	1	0.39	2	0.78	0	0.00	0	0	256,761	7,128,822
CY81	3	1.16	2	0.77	2	0.77	3	27	259,602	7,388,424
CY82	2	0.77	0	0.00	2	0.77	6	33	260,007	7,648,431
CY83	0	0.00	0	0.00	0	0.00	0	0	258,777	7,907,208
CY84	0	0.00	3	1.15	0	0.00	0	0	261,112	8,168,320
CY85	2	0.77	0	0.00	2	0.77	5	10	260,908	8,429,228
CY86	1	0.39	0	0.00	1	0.39	2	4	256,743	8,685,971
TY87	2	1.02	0	0.00	2	1.02	3	7	196,423	8,882,394
FY88	0	0.00	1	0.39	0	0.00	0	0	254,973	9,137,367
FY89	3	1.14	1	0.38	2	0.76	4	26	263,910	9,401,277
FY90	1	0.37	0	0.00	1	0.37	2	4	270,624	9,671,901
FY91	1	0.34	0	0.00	0	0.00	0	0	298,070	9,969,971
FY92	1	0.39	0	0.00	1	0.39	0	0	255,073	10,225,044
FY93	0	0.00	1	0.41	0	0.00	0	0	245,711	10,470,755
FY94	0	0.00	0	0.00	0	0.00	0	0	219,206	10,689,961
FY95	0	0.00	1	0.45	0	0.00	0	0	219,880	10,909,841
FY96	0	0.00	1	0.46	0	0.00	0	0	215,105	11,124,946
FY97	0	0.00	3	1.41	0	0.00	0	0	212,070	11,337,016
FY98	1	0.48	0	0.00	0	0.00	0	0	208,958	11,545,974
LIFETIME	78	0.68	120	1.04	63	0.55	132	625	11,545,974	
5 YR AVG	0.2	0.09	1.0	0.47	0.0	0.00	0.0	0.0	215,043.8	
10 YR AVG	0.7	0.29	0.7	0.29	0.4	0.17	0.6	3.0	240,860.7	

C-135... Statistics

C-5... Statistics

C-5 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY68	0	0.00	0	0.00	0	0.00	0	0	24	24
CY69	0	0.00	0	0.00	0	0.00	0	0	472	496
CY70	2	20.66	0	0.00	1	10.33	0	0	9,680	10,176
CY71	1	4.05	0	0.00	0	0.00	0	0	24,699	34,875
CY72	0	0.00	1	2.14	0	0.00	0	0	46,735	81,610
CY73	0	0.00	0	0.00	0	0.00	0	0	49,656	131,266
CY74	2	3.98	3	5.97	1	1.99	0	0	50,263	181,529
CY75	1	2.19	0	0.00	1	2.19	2	155	45,601	227,130
CY76	1	2.44	0	0.00	0	0.00	0	0	40,946	268,076
CY77	0	0.00	3	6.09	0	0.00	0	0	49,289	317,365
CY78	1	2.02	5	10.09	0	0.00	0	0	49,543	366,908
CY79	0	0.00	2	4.04	0	0.00	0	0	49,477	416,385
CY80	1	1.94	3	5.81	0	0.00	0	0	51,594	467,979
CY81	0	0.00	1	1.85	0	0.00	0	0	53,969	521,948
CY82	1	1.95	2	3.89	0	0.00	0	0	51,374	573,322
CY83	2	3.59	2	3.59	0	0.00	0	0	55,681	629,003
CY84	0	0.00	3	5.06	0	0.00	0	0	59,260	688,263
CY85	0	0.00	1	1.67	0	0.00	0	0	59,967	748,230
CY86	1	1.65	0	0.00	0	0.00	0	0	60,516	808,746
TY87	0	0.00	1	1.68	0	0.00	0	0	59,544	868,290
FY88	0	0.00	0	0.00	0	0.00	0	0	56,958	925,248
FY89	1	1.55	0	0.00	0	0.00	0	0	64,346	989,594
FY90	1	1.13	0	0.00	1	1.13	3	13	88,390	1,077,984
FY91	0	0.00	1	0.60	0	0.00	0	0	166,676	1,244,660
FY92	0	0.00	1	1.51	0	0.00	0	0	66,324	1,310,984
FY93	0	0.00	2	2.55	0	0.00	0	0	78,319	1,389,303
FY94	0	0.00	4	5.49	0	0.00	0	0	72,899	1,462,202
FY95	0	0.00	1	1.55	0	0.00	0	0	64,608	1,526,810
FY96	0	0.00	0	0.00	0	0.00	0	0	67,499	1,594,309
FY97	0	0.00	1	1.58	0	0.00	0	0	63,120	1,657,429
FY98	0	0.00	0	0.00	0	0.00	0	0	64,088	1,721,517
LIFETIME	15	0.87	37	2.15	4	0.23	5	168	1,721,517	
5 YR AVG	0.0	0.00	1.2	1.81	0.0	0.00	0.0	0.0	66,442.8	
10 YR AVG	0.2	0.25	1.0	1.26	0.1	0.13	0.3	1.3	79,626.9	

C-9 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY68	0	0.00	0	0.00	0	0.00	0	0	2,184	2,184
CY69	0	0.00	0	0.00	0	0.00	0	0	14,158	16,342
CY70	0	0.00	0	0.00	0	0.00	0	0	21,448	37,790
CY71	1	5.09	0	0.00	1	5.09	3	3	19,644	57,434
CY72	0	0.00	0	0.00	0	0.00	0	0	27,434	84,868
CY73	0	0.00	0	0.00	0	0.00	0	0	29,342	114,210
CY74	0	0.00	0	0.00	0	0.00	0	0	25,835	140,045
CY75	0	0.00	0	0.00	0	0.00	0	0	27,732	167,777
CY76	0	0.00	0	0.00	0	0.00	0	0	28,141	195,918
CY77	0	0.00	0	0.00	0	0.00	0	0	28,908	224,826
CY78	0	0.00	0	0.00	0	0.00	0	0	28,817	253,643
CY79	1	3.49	0	0.00	0	0.00	0	0	28,633	282,276
CY80	0	0.00	1	3.56	0	0.00	0	0	28,061	310,337
CY81	0	0.00	0	0.00	0	0.00	0	0	27,730	338,067
CY82	0	0.00	0	0.00	0	0.00	0	0	28,417	366,484
CY83	0	0.00	0	0.00	0	0.00	0	0	29,450	395,934
CY84	0	0.00	0	0.00	0	0.00	0	0	29,326	425,260
CY85	0	0.00	0	0.00	0	0.00	0	0	29,821	455,081
CY86	0	0.00	0	0.00	0	0.00	0	0	27,851	482,932
TY87	0	0.00	0	0.00	0	0.00	0	0	21,676	504,608
FY88	0	0.00	0	0.00	0	0.00	0	0	28,914	533,522
FY89	0	0.00	0	0.00	0	0.00	0	0	28,730	562,252
FY90	0	0.00	0	0.00	0	0.00	0	0	28,610	590,862
FY91	0	0.00	0	0.00	0	0.00	0	0	26,728	617,590
FY92	0	0.00	0	0.00	0	0.00	0	0	27,260	644,850
FY93	0	0.00	0	0.00	0	0.00	0	0	26,072	670,922
FY94	0	0.00	0	0.00	0	0.00	0	0	25,087	696,009
FY95	0	0.00	1	3.83	0	0.00	0	0	26,119	722,128
FY96	0	0.00	0	0.00	0	0.00	0	0	24,602	746,730
FY97	0	0.00	0	0.00	0	0.00	0	0	23,260	769,990
FY98	0	0.00	0	0.00	0	0.00	0	0	21,200	791,190
LIFETIME	2	0.25	2	0.25	1	0.13	3	3	791,190	
5 YR AVG	0.0	0.00	0.2	0.83	0.0	0.00	0.0	0.0	24,053.6	
10 YR AVG	0.0	0.00	0.1	0.38	0.0	0.00	0.0	0.0	26,508.2	

C-9... Statistics

C-20 & B-1... Statistics

C-20 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY83	0	0.00	0	0.00	0	0.00	0	0	501	501
CY84	0	0.00	0	0.00	0	0.00	0	0	2,478	2,979
CY85	0	0.00	0	0.00	0	0.00	0	0	2,647	5,626
CY86	0	0.00	0	0.00	0	0.00	0	0	2,831	8,457
TY87	0	0.00	0	0.00	0	0.00	0	0	4,013	12,470
FY88	0	0.00	0	0.00	0	0.00	0	0	8,192	20,662
FY89	0	0.00	0	0.00	0	0.00	0	0	8,454	29,116
FY90	0	0.00	0	0.00	0	0.00	0	0	8,495	37,611
FY91	0	0.00	0	0.00	0	0.00	0	0	8,244	45,855
FY92	0	0.00	0	0.00	0	0.00	0	0	6,994	52,849
FY93	0	0.00	0	0.00	0	0.00	0	0	6,046	58,895
FY94	0	0.00	0	0.00	0	0.00	0	0	6,617	65,512
FY95	0	0.00	0	0.00	0	0.00	0	0	6,472	71,984
FY96	0	0.00	0	0.00	0	0.00	0	0	6,403	78,387
FY97	0	0.00	0	0.00	0	0.00	0	0	6,380	84,266
FY98	0	0.00	0	0.00	0	0.00	0	0	6,804	91,571
LIFETIME	0	0.00	0	0.00	0	0.00	0	0	91,571	
5 YR AVG	0	0.00	0	0.00	0	0.00	0	0	6,535	
10 YR AVG	0	0.00	0	0.00	0	0.00	0	0	7,091	

B-1 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY84	0	0.00	1	512.82	0	0.00	0	0	195	195
CY85	0	0.00	1	184.16	0	0.00	0	0	543	738
CY86	0	0.00	0	0.00	0	0.00	0	0	2,676	3,414
TY87	1	11.96	2	23.93	1	11.96	2	3	8,359	11,773
FY88	0	0.00	1	5.08	0	0.00	0	0	19,701	31,474
FY89	2	7.66	0	0.00	2	7.66	0	0	26,100	57,574
FY90	1	3.74	1	3.74	0	0.00	0	0	26,705	84,279
FY91	2	8.56	0	0.00	0	0.00	0	0	23,355	107,634
FY92	3	11.12	0	0.00	0	0.00	0	0	26,970	134,604
FY93	1	3.31	1	3.31	1	3.31	2	4	30,179	164,783
FY94	0	0.00	1	3.40	0	0.00	0	0	29,383	194,166
FY95	0	0.00	3	10.80	0	0.00	0	0	27,781	221,947
FY96	0	0.00	1	3.79	0	0.00	0	0	26,371	248,318
FY97	1	4.03	3	12.10	1	4.03	2	4	24,803	273,121
FY98	1	4.11	2	8.23	1	4.11	0	0	24,310	297,431
LIFETIME	12	4.03	17	5.72	6	2.02	6	11	297,431	
5 YR AVG	0.4	1.51	2.0	7.54	0.4	1.51	0.4	0.8	26,529.6	
10 YR AVG	1.1	4.14	1.2	4.51	0.5	1.88	0.4	0.8	26,595.7	

B-52 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY55	0	0.00	0	0.00	0	0.00	0	0	4,979	4,979
CY56	4	26.92	0	0.00	3	20.19	5	19	14,860	19,839
CY57	6	10.17	0	0.00	3	5.09	7	16	58,971	78,810
CY58	8	6.50	0	0.00	6	4.88	12	41	123,030	201,840
CY59	5	2.19	1	0.44	3	1.32	1	4	227,973	429,813
CY60	4	1.50	2	0.75	4	1.50	3	8	267,331	697,144
CY61	6	1.77	0	0.00	6	1.77	5	25	338,662	1,035,806
CY62	1	0.25	8	1.98	0	0.00	0	0	403,043	1,438,849
CY63	4	0.98	7	1.71	3	0.73	5	18	408,239	1,847,088
CY64	5	1.22	8	1.95	3	0.73	2	10	409,382	2,256,470
CY65	1	0.25	6	1.51	2	0.50	3	8	397,405	2,653,875
CY66	3	0.74	3	0.74	2	0.50	3	12	403,037	3,056,912
CY67	6	1.66	4	1.11	5	1.38	6	21	361,754	3,418,666
CY68	6	1.54	4	1.03	6	1.54	6	15	389,843	3,808,509
CY69	9	2.97	4	1.32	8	2.64	13	33	302,949	4,111,458
CY70	1	0.43	5	2.17	1	0.43	0	0	230,746	4,342,204
CY71	1	0.47	2	0.94	1	0.47	2	9	212,003	4,554,207
CY72	5	1.44	8	2.31	4	1.16	4	14	346,021	4,900,228
CY73	2	0.93	4	1.85	1	0.46	0	0	216,165	5,116,393
CY74	3	1.88	7	4.39	3	1.88	4	12	159,563	5,275,956
CY75	1	0.71	5	3.54	1	0.71	1	3	141,204	5,417,160
CY76	0	0.00	5	3.64	0	0.00	0	0	137,469	5,554,629
CY77	1	0.74	32	23.75	1	0.74	3	8	134,722	5,689,351
CY78	1	0.75	33	24.80	1	0.75	2	5	133,038	5,822,389
CY79	1	0.75	3	2.25	0	0.00	0	0	133,234	5,955,623
CY80	1	0.77	1	0.77	0	0.00	0	0	130,405	6,086,028
CY81	1	0.75	7	5.24	1	0.75	2	8	133,677	6,219,705
CY82	2	1.64	0	0.00	2	1.64	3	9	122,121	6,341,826
CY83	1	0.95	0	0.00	1	0.95	3	7	104,866	6,446,692
CY84	2	1.92	1	0.96	1	0.96	1	2	103,933	6,550,625
CY85	0	0.00	0	0.00	0	0.00	0	0	105,566	6,656,191
CY86	0	0.00	0	0.00	0	0.00	0	0	102,381	6,758,572
TY87	0	0.00	1	1.25	0	0.00	0	0	80,014	6,838,586
FY88	2	2.04	0	0.00	1	1.02	0	1	98,004	6,936,590
FY89	1	0.99	0	0.00	1	0.99	0	0	100,516	7,037,106
FY90	0	0.00	0	0.00	0	0.00	0	0	91,037	7,128,143
FY91	1	1.09	0	0.00	1	1.09	0	3	91,454	7,219,597
FY92	0	0.00	0	0.00	0	0.00	0	0	69,056	7,288,653
FY93	0	0.00	1	1.88	0	0.00	0	0	53,293	7,341,946
FY94	1	3.11	1	3.11	1	3.11	4	0	32,146	7,374,092
FY95	1	4.13	1	4.13	0	0.00	0	0	24,223	7,398,315
FY96	0	0.00	0	0.00	0	0.00	0	0	25,506	7,423,821
FY97	0	0.00	1	4.29	0	0.00	0	0	23,297	7,447,118
FY98	0	0.00	0	0.00	0	0.00	0	0	23,190	7,470,308
LIFETIME	97	1.30	165	2.21	76	1.02	100	311	7,470,308	
5 YR AVG	0.4	1.56	0.6	2.34	0.2	0.00	0.8	0.0	25,672.4	
10 YR AVG	0.4	0.75	0.4	0.75	0.3	0.56	0.4	0.3	53,371.8	

B-52... Statistics

A-10 & F-117... Statistics

A-10 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY72	0	0.00	0	0.00	0	0.00	0	0	32	32
CY73	0	0.00	0	0.00	0	0.00	0	0	124	156
CY74	0	0.00	0	0.00	0	0.00	0	0	403	560
CY75	0	0.00	0	0.00	0	0.00	0	0	936	1,496
CY76	0	0.00	0	0.00	0	0.00	0	0	3,678	5,174
CY77	2	11.96	4	23.92	2	11.96	1	2	16,722	21,896
CY78	7	15.72	16	35.92	5	11.23	2	2	44,538	66,434
CY79	8	9.24	2	2.31	8	9.24	4	4	86,544	152,977
CY80	5	3.84	4	3.07	6	4.61	4	4	130,159	283,136
CY81	5	2.86	9	5.15	5	2.86	4	4	174,924	458,060
CY82	4	1.82	1	0.46	3	1.37	0	0	219,349	677,409
CY83	7	3.10	0	0.00	9	3.98	4	4	226,129	903,538
CY84	6	2.68	1	0.45	5	2.23	3	4	224,058	1,127,596
CY85	4	1.78	2	0.89	4	1.78	2	2	224,133	1,351,729
CY86	3	1.37	2	0.91	4	1.82	1	1	219,334	1,571,063
TY87	5	2.92	1	0.58	5	2.92	5	5	171,089	1,742,152
FY88	3	1.37	2	0.92	3	1.37	1	1	218,289	1,960,441
FY89	7	3.03	0	0.00	7	3.03	3	8	230,655	2,191,096
FY90	3	1.35	0	0.00	3	1.35	3	3	222,399	2,414,974
FY91	2	0.88	0	0.00	3	1.31	2	2	228,273	2,641,768
FY92	3	1.79	0	0.00	3	1.79	1	1	167,648	2,809,416
FY93	2	1.74	0	0.00	2	1.74	1	1	115,064	2,924,480
FY94	4	3.35	0	0.00	5	4.19	1	1	119,329	3,043,809
FY95	2	1.69	1	0.84	2	1.69	1	1	118,602	3,162,411
FY96	2	1.63	0	0.00	2	1.63	1	1	122,953	3,285,364
FY97	3	2.40	1	0.80	3	2.40	2	2	125,100	3,410,464
FY98	1	0.79	0	0.00	1	0.79	0	0	126,417	3,536,881
LIFETIME	88	2.49	46	1.30	90	2.54	46	53	3,536,881	
5 YR AVG	2.4	1.96	0.4	0.33	2.6	2.12	1.0	1.0	122,480.2	
10 YR AVG	2.9	1.84	0.2	0.13	3.1	1.97	1.5	2.0	157,644.0	

F-117 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
FY91	0	0.00	0	0.00	0	0.00	0	0	17,875	17,875
FY92	1	8.71	0	0.00	1	8.71	0	0	11,481	29,356
FY93	0	0.00	2	15.95	0	0.00	0	0	12,538	41,894
FY94	0	0.00	0	0.00	0	0.00	0	0	12,136	54,030
FY95	2	15.62	0	0.00	1	7.81	1	1	12,804	66,834
FY96	0	0.00	1	7.59	0	0.00	0	0	13,171	80,005
FY97	3	23.69	0	0.00	1	7.90	0	0	12,661	92,666
FY98	0	0.00	0	0.00	0	0.00	0	0	12,730	105,396
LIFETIME	6	5.69	3	2.85	3	2.85	1	1	105,396	
5 YR AVG	1.0	7.87	0.2	1.57	0.4	3.15	0.2	0.2	12,700.4	

F-111 History

F-111... Statistics

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY65	0	0.00	0	0.00	0	0.00	0	0	272	272
CY66	0	0.00	0	0.00	0	0.00	0	0	1,342	1,614
CY67	2	53.60	0	0.00	2	53.60	1	1	3,731	5,345
CY68	5	36.14	4	28.91	5	36.14	0	0	13,837	19,182
CY69	8	25.97	0	0.00	4	12.98	4	4	30,806	49,988
CY70	0	0.00	0	0.00	0	0.00	0	0	10,933	60,921
CY71	2	4.03	3	6.04	2	4.03	2	2	49,673	110,594
CY72	5	6.68	3	4.01	5	6.68	4	4	74,797	185,391
CY73	10	11.39	2	2.28	8	9.11	4	6	87,774	273,165
CY74	3	3.57	2	2.38	2	2.38	2	3	83,957	357,122
CY75	7	8.82	1	1.26	6	7.56	1	2	79,393	436,515
CY76	8	12.75	0	0.00	5	7.97	0	0	62,750	499,265
CY77	7	9.51	12	16.30	7	9.51	4	8	73,628	572,893
CY78	3	4.72	7	11.02	2	3.15	1	2	63,537	636,430
CY79	13	17.11	11	14.48	10	13.16	6	10	75,989	712,419
CY80	4	5.45	6	8.17	4	5.45	4	10	73,431	785,850
CY81	3	3.86	12	15.45	1	1.29	0	0	77,648	863,498
CY82	10	12.68	0	0.00	9	11.41	2	4	78,890	942,388
CY83	3	3.76	1	1.25	3	3.76	1	2	79,755	1,022,143
CY84	3	3.80	1	1.27	3	3.80	3	4	78,973	1,101,116
CY85	0	0.00	1	1.24	0	0.00	0	0	80,870	1,181,986
CY86	0	0.00	1	1.19	0	0.00	0	0	83,921	1,265,907
TY87	3	4.66	0	0.00	3	4.66	1	2	64,344	1,330,251
FY88	3	3.58	2	2.39	3	3.58	3	4	83,686	1,413,937
FY89	2	2.32	0	0.00	2	2.32	1	2	86,262	1,500,199
FY90	5	5.86	0	0.00	4	4.69	1	2	85,357	1,585,556
FY91	1	1.13	7	7.89	1	1.13	1	2	88,710	1,674,266
FY92	2	2.82	1	1.41	2	2.82	1	2	71,029	1,745,295
FY93	1	2.18	0	0.00	1	2.18	0	0	45,924	1,791,219
FY94	0	0.00	1	3.31	0	0.00	0	0	30,180	1,821,399
FY95	1	3.33	3	9.99	1	3.33	0	0	30,016	1,851,415
FY96	1	6.84	0	0.00	1	6.84	0	0	14,617	1,865,760
FY97	0	0.00	0	0.00	0	0.00	0	0	7,262	1,873,294
FY98	0	0.00	0	0.00	0	0.00	0	0	3,172	1,876,466
LIFETIME	115	6.13	81	4.32	96	5.12	47	76	1,876,466	
5 YR AVG	0.4	2.35	0.8	4.69	0.4	2.35	0.0	0.0	17,049.4	
10 YR AVG	1.3	2.81	1.2	2.59	1.2	2.59	0.4	0.8	46,252.9	

F-15 & T-3... Statistics

F-15 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROY A/C	DESTROY RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY72	0	0.00	0	0.00	0	0.00	0	0	25	25
CY73	0	0.00	0	0.00	0	0.00	0	0	826	851
CY74	0	0.00	2	94.79	0	0.00	0	0	2,110	2,961
CY75	1	22.02	0	0.00	1	22.02	0	0	4,541	7,502
CY76	0	0.00	0	0.00	0	0.00	0	0	17,803	25,305
CY77	6	14.16	15	35.40	2	4.72	1	2	42,369	67,674
CY78	8	11.59	30	43.46	7	10.14	1	1	69,023	136,697
CY79	5	5.16	15	15.47	5	5.16	3	3	96,959	233,656
CY80	5	4.57	20	18.30	3	2.74	2	2	109,309	342,965
CY81	5	3.78	4	3.02	6	4.54	5	6	132,291	475,256
CY82	3	1.96	4	2.61	4	2.61	2	2	153,369	628,625
CY83	4	2.36	5	2.95	6	3.54	1	1	169,438	798,063
CY84	3	1.71	2	1.14	4	2.28	1	2	175,515	973,578
CY85	5	2.70	5	2.70	4	2.16	2	2	185,324	1,158,902
CY86	7	3.53	5	2.52	8	4.04	4	4	198,095	1,356,997
TY87	3	1.94	0	0.00	3	1.94	2	2	154,821	1,511,818
FY88	1	0.50	3	1.49	2	0.99	0	0	201,099	1,712,917
FY89	5	2.33	0	0.00	4	1.86	2	2	214,592	1,927,509
FY90	7	3.08	6	2.64	7	3.08	4	5	227,617	2,155,126
FY91	3	1.09	2	0.72	3	1.09	0	0	276,393	2,431,519
FY92	5	2.26	2	0.91	5	2.26	2	3	220,866	2,652,385
FY93	3	1.38	5	2.30	3	1.38	0	0	217,547	2,869,932
FY94	4	1.90	3	1.43	4	1.90	1	1	210,241	3,080,173
FY95	4	1.94	5	2.42	3	1.45	1	2	206,649	3,286,822
FY96	4	1.99	2	1.00	3	1.49	0	0	200,766	3,487,588
FY97	3	1.56	5	2.60	2	1.04	0	0	192,081	3,679,669
FY98	3	1.61	2	1.07	5	2.68	0	0	186,588	3,866,257
LIFETIME	97	2.51	142	3.67	94	2.43	34	40	3,866,257	
5 YR AVG	3.6	1.81	3.4	1.71	3.4	1.71	0.4	0.6	199,265.0	
10 YR AVG	4.1	1.90	3.2	1.49	3.9	1.81	1.0	1.3	215,334.0	

T-3 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
FY94	0	0.00	0	0.00	0	0.00	0	0	2,663	2,663
FY95	1	4.34	0	0.00	1	4.34	1	2	23,062	25,725
FY96	1	3.30	0	0.00	1	3.30	1	2	30,337	56,062
FY97	1	3.08	0	0.00	1	3.08	1	2	27,044	83,106
FY98	0	0.00	0	0.00	0	0.00	0	0	1	83,107
LIFETIME	3	3.61	0	0.00	3	3.61	3	6	83,107	
5 YR AVG	0.6	3.61	0.0	0.00	0.6	3.61	0.6	1.2	16621.4	

F-16 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY75	1	621.12	0	0.00	0	0.00	0	0	161	161
CY76	1	442.48	0	0.00	0	0.00	0	0	226	387
CY77	0	0.00	0	0.00	0	0.00	0	0	856	1,243
CY78	0	0.00	0	0.00	0	0.00	0	0	1,402	2,645
CY79	2	30.64	0	0.00	2	30.64	0	0	6,527	9,172
CY80	5	18.65	2	7.46	4	14.92	0	0	26,803	35,975
CY81	5	8.86	0	0.00	4	7.09	1	1	56,423	92,398
CY82	17	15.83	0	0.00	16	14.90	4	4	107,389	199,787
CY83	11	7.30	0	0.00	9	5.97	5	6	150,728	350,515
CY84	10	5.01	0	0.00	9	4.51	6	6	199,761	550,276
CY85	10	4.55	0	0.00	11	5.01	5	5	219,647	769,923
CY86	11	4.32	2	0.79	11	4.32	3	3	254,491	1,024,414
TY87	8	3.43	4	1.71	9	3.85	3	3	233,560	1,257,974
FY88	23	6.80	5	1.48	20	5.92	6	8	338,039	1,596,013
FY89	14	3.63	1	0.26	14	3.63	3	3	385,179	1,981,192
FY90	13	3.19	4	0.98	14	3.43	4	7	408,078	2,389,270
FY91	21	4.55	1	0.22	21	4.55	5	5	461,451	2,850,721
FY92	18	4.04	1	0.22	18	4.04	8	9	445,201	3,295,922
FY93	18	4.15	2	0.46	18	4.15	4	5	433,960	3,729,882
FY94	17	4.00	2	0.50	15	3.75	3	27	400,484	4,130,366
FY95	9	2.33	2	0.52	9	2.33	1	1	386,445	4,516,811
FY96	8	2.14	5	1.34	7	1.87	0	1	374,530	4,891,341
FY97	11	3.00	1	0.27	10	2.72	1	1	367,045	5,258,386
FY98	14	3.85	1	0.28	12	3.30	4	6	363,527	5,621,913
LIFETIME	246	4.38	33	0.59	233	4.14	66	101	5,621,913	
5 YR AVG	11.6	3.07	2.2	0.58	10.6	2.80	1.8	7.2	378,406.2	
10 YR AVG	14.2	3.53	2.0	0.50	13.8	3.43	3.3	6.5	402,590.0	

T-1 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
FY92	0	0.00	0	0.00	0	0.00	0	0	1	1
FY93	0	0.00	0	0.00	0	0.00	0	0	18,063	18,064
FY94	0	0.00	0	0.00	0	0.00	0	0	32,304	50,368
FY95	0	0.00	0	0.00	0	0.00	0	0	41,055	91,423
FY96	0	0.00	0	0.00	0	0.00	0	0	48,186	139,609
FY97	0	0.00	0	0.00	0	0.00	0	0	58,420	198,029
FY98	0	0.00	0	0.00	0	0.00	0	0	78,857	276,886
LIFETIME	0	0.00	0	0.00	0	0.00	0	0	276,886	
5 YR AVG	0	0.00	0	0.00	0	0.00	0	0	51,764.4	

T-37 History

T-37... Statistics

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY56	1	149.25	0	0.00	0	0.00	0	0	670	670
CY57	1	14.90	0	0.00	1	14.90	0	0	6,713	7,383
CY58	5	8.79	2	3.51	3	5.27	0	3	56,908	64,291
CY59	14	9.23	2	1.32	14	9.23	0	4	151,713	216,004
CY60	8	3.17	2	0.79	7	2.77	0	5	252,361	468,365
CY61	9	4.08	3	1.36	7	3.18	1	2	220,362	688,727
CY62	14	4.70	2	0.67	15	5.04	3	7	297,765	986,492
CY63	5	1.53	3	0.92	5	1.53	3	6	326,348	1,312,840
CY64	8	2.11	4	1.06	7	1.85	1	5	378,410	1,691,250
CY65	7	1.99	1	0.28	8	2.27	3	7	351,848	2,043,098
CY66	2	0.53	0	0.00	3	0.80	1	1	376,716	2,419,814
CY67	4	0.99	0	0.00	4	0.99	2	4	405,880	2,825,694
CY68	4	0.92	0	0.00	4	0.92	0	1	433,597	3,259,291
CY69	9	1.79	1	0.20	10	1.99	5	11	502,492	3,761,783
CY70	5	0.99	0	0.00	5	0.99	1	4	503,447	4,265,230
CY71	2	0.43	1	0.22	3	0.65	0	0	463,844	4,729,074
CY72	4	0.91	1	0.23	5	1.14	1	2	439,929	5,169,003
CY73	3	0.71	1	0.24	2	0.47	1	2	422,721	5,591,724
CY74	1	0.33	1	0.33	1	0.33	0	1	305,106	5,896,830
CY75	1	0.33	1	0.33	1	0.33	1	1	301,353	6,198,183
CY76	2	0.70	4	1.41	2	0.70	0	0	284,548	6,482,731
CY77	1	0.38	0	0.00	1	0.38	0	0	263,718	6,746,449
CY78	3	1.16	2	0.78	3	1.16	0	0	257,599	7,004,048
CY79	1	0.34	0	0.00	1	0.34	0	0	295,890	7,299,938
CY80	4	1.42	0	0.00	4	1.42	0	3	282,066	7,582,004
CY81	2	0.68	0	0.00	2	0.68	0	1	295,614	7,877,618
CY82	2	0.63	0	0.00	1	0.31	1	2	318,348	8,195,966
CY83	1	0.30	0	0.00	1	0.30	0	1	328,836	8,524,802
CY84	1	0.31	0	0.00	1	0.31	0	0	320,175	8,844,977
CY85	1	0.32	0	0.00	1	0.32	0	0	312,805	9,157,782
CY86	1	0.32	0	0.00	1	0.32	0	0	312,587	9,470,369
TY87	0	0.00	0	0.00	0	0.00	0	0	240,762	9,711,131
FY88	1	0.31	0	0.00	1	0.31	0	0	318,268	10,029,399
FY89	1	0.32	0	0.00	1	0.32	0	0	314,105	10,343,504
FY90	0	0.00	0	0.00	0	0.00	0	0	306,885	10,650,389
FY91	0	0.00	0	0.00	0	0.00	0	0	279,593	10,929,982
FY92	2	0.85	0	0.00	3	1.28	2	2	234,830	11,164,812
FY93	1	0.56	0	0.00	1	0.56	0	0	179,933	11,344,745
FY94	0	0.00	0	0.00	0	0.00	0	0	151,651	11,496,396
FY95	1	0.74	0	0.00	1	0.74	0	0	134,425	11,630,821
FY96	0	0.00	0	0.00	0	0.00	0	0	144,079	11,774,230
FY97	1	0.62	0	0.00	1	0.63	0	0	159,826	11,934,726
FY98	0	0.00	0	0.00	0	0.00	0	0	184,604	12,119,330
LIFETIME	133	1.10	31	0.26	131	1.08	26	75	12,119,330	
5 YR AVG	0.4	0.26	0.0	0.00	0.4	0.26	0.0	0.0	154,917.0	
10 YR AV	0.6	0.29	0.0	0.00	0.7	0.33	0.2	0.2	208,993.1	

T-38 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY60	0	0.00	0	0.00	0	0.00	0	0	974	974
CY61	0	0.00	0	0.00	0	0.00	0	0	5,386	6,360
CY62	3	7.15	1	2.38	3	7.15	0	1	41,945	48,305
CY63	5	4.63	3	2.78	4	3.70	1	3	108,106	156,411
CY64	6	2.87	3	1.43	6	2.87	1	2	209,285	365,696
CY65	10	3.83	2	0.77	10	3.83	4	7	260,961	626,657
CY66	13	3.63	2	0.56	10	2.79	3	5	358,001	984,658
CY67	13	2.91	1	0.22	13	2.91	3	8	447,443	1,432,101
CY68	10	1.98	1	0.20	9	1.78	5	10	504,977	1,937,078
CY69	9	1.55	5	0.86	7	1.21	3	5	579,768	2,516,846
CY70	17	2.81	1	0.17	17	2.81	7	12	605,430	3,122,276
CY71	7	1.22	2	0.35	5	0.87	4	7	571,569	3,693,845
CY72	9	1.68	1	0.19	10	1.87	2	5	535,538	4,229,383
CY73	7	1.49	1	0.21	5	1.07	2	3	468,761	4,698,144
CY74	9	2.24	0	0.00	9	2.24	6	10	402,336	5,100,480
CY75	1	0.26	1	0.26	1	0.26	0	0	378,955	5,479,435
CY76	8	2.52	2	0.63	8	2.52	4	9	317,300	5,796,735
CY77	8	2.37	17	5.04	8	2.37	5	6	337,071	6,133,806
CY78	7	2.25	23	7.40	7	2.25	1	4	310,702	6,444,508
CY79	5	1.51	3	0.91	4	1.21	0	0	330,325	6,774,833
CY80	4	1.19	4	1.19	4	1.19	2	4	335,813	7,110,646
CY81	6	1.77	1	0.29	6	1.77	3	3	338,986	7,449,632
CY82	3	0.83	0	0.00	6	1.66	5	5	362,514	7,812,146
CY83	5	1.36	2	0.54	5	1.36	1	3	367,891	8,180,037
CY84	3	0.80	3	0.80	4	1.07	3	5	373,825	8,553,862
CY85	2	0.55	3	0.83	2	0.55	1	2	362,845	8,916,707
CY86	4	1.14	1	0.29	4	1.14	2	3	349,457	9,266,164
TY87	2	0.75	1	0.37	3	1.12	3	6	267,009	9,533,173
FY88	2	0.57	2	0.57	2	0.57	1	1	351,132	9,884,305
FY89	2	0.54	1	0.27	2	0.54	2	2	370,026	10,254,331
FY90	2	0.55	2	0.55	2	0.55	0	0	361,878	10,616,209
FY91	1	0.30	0	0.00	1	0.30	0	2	337,134	10,953,343
FY92	1	0.38	0	0.00	0	0.00	1	1	265,369	11,218,712
FY93	3	1.33	0	0.00	3	1.33	0	0	225,105	11,443,817
FY94	0	0.00	0	0.00	0	0.00	0	0	194,161	11,637,978
FY95	1	0.63	0	0.00	1	0.63	0	0	158,422	11,796,400
FY96	1	0.75	0	0.00	1	0.75	0	0	133,959	11,930,359
FY97	0	0.00	0	0.00	0	0.00	0	0	135,015	12,065,374
FY98	0	0.00	1	0.81	1	0.81	0	0	123,241	12,188,615
LIFETIME	189	1.55	90	0.74	183	1.50	75	134	12,188,615	
5 YR AVG	0.4	0.27	0.2	0.13	0.6	0.40	0.0	0.0	148,959.6	
10 YR AVG	1.1	0.48	0.4	0.17	1.1	0.48	0.3	0.5	230,431.0	

T-38... Statistics

T-41 History

T-41... Statistics

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY64	0	0.00	0	0.00	0	0.00	0	0	114	114
CY65	0	0.00	0	0.00	0	0.00	0	0	64	178
CY66	0	N/A	0	N/A	0	N/A	0	0	0	178
CY67	1	101.52	0	0.00	0	0.00	0	0	985	1,163
CY68	2	8.51	2	8.51	1	4.25	0	0	23,502	24,665
CY69	3	12.89	0	0.00	0	0.00	0	0	23,271	47,936
CY70	0	0.00	1	4.78	0	0.00	0	0	20,940	68,876
CY71	0	0.00	1	5.13	0	0.00	0	0	19,475	88,351
CY72	0	0.00	0	0.00	0	0.00	1	2	17,589	105,940
CY73	1	5.28	1	5.28	1	5.28	0	0	18,950	124,890
CY74	0	0.00	0	0.00	0	0.00	0	0	17,188	142,078
CY75	0	0.00	0	0.00	0	0.00	0	0	17,984	160,062
CY76	0	0.00	0	0.00	0	0.00	0	0	18,488	178,550
CY77	0	0.00	0	0.00	0	0.00	0	0	17,083	195,633
CY78	0	0.00	0	0.00	0	0.00	0	0	18,368	214,001
CY79	0	0.00	0	0.00	0	0.00	0	0	16,992	230,993
CY80	1	5.84	0	0.00	1	5.84	0	0	17,124	248,117
CY81	1	5.86	0	0.00	1	5.86	0	0	17,076	265,193
CY82	0	0.00	0	0.00	0	0.00	0	0	16,040	281,233
CY83	0	0.00	0	0.00	0	0.00	0	0	20,898	302,131
CY84	0	0.00	0	0.00	0	0.00	0	0	20,523	322,654
CY85	0	0.00	0	0.00	0	0.00	0	0	34,731	357,385
CY86	0	0.00	0	0.00	0	0.00	0	0	33,349	390,734
TY87	0	0.00	0	0.00	0	0.00	0	0	28,752	419,486
FY88	0	0.00	0	0.00	0	0.00	0	0	35,228	454,714
FY89	0	0.00	0	0.00	0	0.00	0	0	33,592	488,306
FY90	0	0.00	0	0.00	0	0.00	0	0	30,742	519,048
FY91	0	0.00	0	0.00	0	0.00	0	0	24,172	543,220
FY92	0	0.00	0	0.00	0	0.00	0	0	26,293	569,513
FY93	0	0.00	0	0.00	0	0.00	0	0	23,755	593,268
FY94	0	0.00	0	0.00	0	0.00	0	0	17,881	611,149
FY95	0	0.00	0	0.00	0	0.00	0	0	578	611,727
FY96	0	0.00	0	0.00	0	0.00	0	0	671	612,398
FY97	0	0.00	0	0.00	0	0.00	0	0	622	613,020
FY98	0	0.00	0	0.00	0	0.00	0	0	736	613,756
LIFETIME	9	1.47	5	0.81	4	0.65	1	2	613,756	
5 YR AVG	0	0.00	0	0.00	0.0	0.00	0	0	4,098	
10 YR AVG	0	0.00	0	0.00	0.0	0.00	0	0	15,904	

T-43 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY74	0	0.00	0	0.00	0	0.00	0	0	10,481	10,481
CY75	0	0.00	0	0.00	0	0.00	0	0	15,855	26,336
CY76	0	0.00	1	7.73	0	0.00	0	0	12,931	39,267
CY77	0	0.00	3	20.34	0	0.00	0	0	14,749	54,016
CY78	0	0.00	1	7.34	0	0.00	0	0	13,624	67,640
CY79	0	0.00	0	0.00	0	0.00	0	0	15,396	83,036
CY80	0	0.00	1	5.77	0	0.00	0	0	17,338	100,374
CY81	0	0.00	0	0.00	0	0.00	0	0	17,259	117,633
CY82	0	0.00	0	0.00	0	0.00	0	0	17,809	135,442
CY83	0	0.00	0	0.00	0	0.00	0	0	17,252	152,694
CY84	0	0.00	0	0.00	0	0.00	0	0	16,473	169,167
CY85	0	0.00	0	0.00	0	0.00	0	0	15,820	184,987
CY86	0	0.00	0	0.00	0	0.00	0	0	16,049	201,036
TY87	0	0.00	0	0.00	0	0.00	0	0	12,166	213,202
FY88	0	0.00	0	0.00	0	0.00	0	0	13,806	227,008
FY89	0	0.00	0	0.00	0	0.00	0	0	14,589	241,597
FY90	0	0.00	0	0.00	0	0.00	0	0	14,370	255,967
FY91	0	0.00	0	0.00	0	0.00	0	0	13,296	269,263
FY92	0	0.00	0	0.00	0	0.00	0	0	11,005	280,268
FY93	0	0.00	0	0.00	0	0.00	0	0	9,179	289,447
FY94	0	0.00	0	0.00	0	0.00	0	0	7,069	296,516
FY95	0	0.00	0	0.00	0	0.00	0	0	7,917	304,433
FY96	1	14.28	0	0.00	1	14.28	2	23	7,003	311,436
FY97	0	0.00	0	0.00	0	0.00	0	0	6,496	317,932
FY98	0	0.00	0	0.00	0	0.00	0	0	4,866	322,798
LIFETIME	1	0.31	6	1.86	1	0.31	2	23	322,798	
5 YR AVG	0	3.00	0	0.00	0	3.00	0	5	6,670	
10 YR AVG	0	0.82	0	0.00	0	0.82	0	2	12,176	

H-60 History

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY82	0	0.00	0	0.00	0	0.00	0	0	112	112
CY83	0	0.00	0	0.00	0	0.00	0	0	3,147	3,259
CY84	0	0.00	0	0.00	0	0.00	0	0	4,132	7,391
CY85	0	0.00	0	0.00	0	0.00	0	0	2,992	10,383
CY86	0	0.00	0	0.00	0	0.00	0	0	3,955	14,338
TY87	1	44.42	0	0.00	1	44.42	2	4	2,251	16,589
FY88	0	0.00	0	0.00	0	0.00	0	0	4,216	20,805
FY89	0	0.00	0	0.00	0	0.00	0	0	5,591	26,396
FY90	0	0.00	0	0.00	0	0.00	0	0	7,849	34,245
FY91	1	6.85	0	0.00	0	0.00	0	0	14,594	48,839
FY92	1	5.15	0	0.00	1	5.15	0	1	19,401	68,240
FY93	1	4.37	0	0.00	1	4.37	1	12	22,871	91,111
FY94	2	8.25	1	4.13	1	4.13	0	0	24,229	115,340
FY95	1	3.75	1	3.75	1	3.75	2	5	26,666	142,006
FY96	0	0.00	0	0.00	0	0.00	0	0	27,809	169,815
FY97	0	0.00	0	0.00	0	0.00	0	0	26,009	195,824
FY98	1	3.76	0	0.00	2	7.53	4	12	26,572	222,396
LIFETIME	8	3.60	2	0.90	7	3.15	9	34	222,396	
5 YR AVG	0.8	3.05	0.4	1.52	0.6	2.29	0.6	3.4	26,257.0	
10 YR AVG	0.7	3.47	0.2	0.99	0.6	2.98	0.7	3.0	20,159.1	

T-43 & H-60... Statistics

H-53 History

H-53... Statistics

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY66	0	0.00	0	0.00	0	0.00	0	0	22	22
CY67	0	0.00	0	0.00	0	0.00	0	0	1,517	1,539
CY68	0	0.00	0	0.00	0	0.00	0	0	5,272	6,811
CY69	2	21.66	0	0.00	1	10.83	2	3	9,232	16,043
CY70	0	0.00	0	0.00	0	0.00	0	0	13,922	29,965
CY71	1	4.87	0	0.00	1	4.87	0	0	20,528	50,493
CY72	0	0.00	0	0.00	0	0.00	0	0	23,299	73,792
CY73	2	10.94	1	5.47	1	5.47	0	0	18,279	92,071
CY74	0	0.00	0	0.00	0	0.00	0	0	16,439	108,510
CY75	3	18.81	0	0.00	3	18.81	6	43	15,947	124,457
CY76	1	7.01	0	0.00	1	7.01	2	4	14,261	138,718
CY77	2	13.08	4	26.16	2	13.08	0	1	15,292	154,010
CY78	0	0.00	6	40.16	0	0.00	0	0	14,942	168,952
CY79	1	8.05	0	0.00	1	8.05	2	3	12,429	181,381
CY80	2	15.90	0	0.00	1	7.95	0	1	12,578	193,959
CY81	2	14.38	0	0.00	1	7.19	3	6	13,912	207,871
CY82	1	7.43	0	0.00	1	7.43	3	4	13,452	221,323
CY83	0	0.00	2	14.49	0	0.00	0	0	13,805	235,128
CY84	2	14.53	0	0.00	2	14.53	2	6	13,762	248,890
CY85	1	8.56	0	0.00	1	8.56	3	7	11,687	260,577
CY86	2	16.39	1	8.19	2	16.39	1	1	12,205	272,782
TY87	1	11.20	0	0.00	0	0.00	0	1	8,925	281,707
FY88	0	0.00	0	0.00	0	0.00	0	0	10,804	292,511
FY89	1	9.57	0	0.00	0	0.00	0	0	10,453	302,964
FY90	0	0.00	0	0.00	0	0.00	0	0	12,223	315,187
FY91	0	0.00	1	8.63	0	0.00	0	0	11,594	326,781
FY92	0	0.00	0	0.00	0	0.00	0	0	12,238	339,019
FY93	0	0.00	0	0.00	0	0.00	0	0	12,019	351,038
FY94	0	0.00	0	0.00	0	0.00	0	0	12,106	363,144
FY95	1	8.43	1	8.43	1	8.43	0	0	11,857	375,001
FY96	1	7.44	0	0.00	0	0.00	0	0	13,436	388,415
FY97	0	0.00	0	0.00	0	0.00	0	0	12,522	400,959
FY98	0	0.00	0	0.00	0	0.00	0	0	14,024	414,983
LIFETIME	26	6.27	16	3.86	19	4.58	24	80	414,983	
5 YR AVG	0.4	0.00	0.2	0.00	0.2	0.00	0.0	0.0	12,388.0	
10 YR AVG	0.3	0.00	0.2	0.00	0.1	0.00	0.0	0.0	11,925.2	

UH-1 History

UH-1... Statistics

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY71	0	0.00	0	0.00	0	0.00	0	0	15,900	15,900
CY72	3	14.22	0	0.00	2	9.48	1	3	21,097	36,997
CY73	0	0.00	0	0.00	0	0.00	0	0	20,026	57,023
CY74	1	5.18	0	0.00	1	5.18	0	2	19,315	76,338
CY75	0	0.00	1	4.51	0	0.00	0	0	22,197	98,535
CY76	0	0.00	0	0.00	0	0.00	0	0	12,896	111,431
CY77	0	0.00	0	0.00	0	0.00	0	0	19,729	131,160
CY78	1	4.19	2	8.39	1	4.19	0	0	23,838	154,998
CY79	0	0.00	0	0.00	0	0.00	0	0	24,703	179,701
CY80	1	4.34	0	0.00	1	4.34	0	0	23,041	202,742
CY81	0	0.00	0	0.00	0	0.00	0	0	24,385	227,127
CY82	0	0.00	1	4.07	0	0.00	0	0	24,547	251,674
CY83	0	0.00	0	0.00	0	0.00	0	0	24,978	276,652
CY84	1	4.02	0	0.00	1	4.02	2	5	24,846	301,498
CY85	0	0.00	0	0.00	0	0.00	0	0	46,977	348,475
CY86	1	2.17	0	0.00	1	2.17	2	5	46,101	394,576
TY87	0	0.00	0	0.00	0	0.00	0	0	32,895	427,471
FY88	0	0.00	0	0.00	0	0.00	0	0	30,774	458,245
FY89	0	0.00	0	0.00	0	0.00	0	0	31,253	489,498
FY90	0	0.00	0	0.00	0	0.00	0	0	30,704	520,202
FY91	1	3.32	1	3.32	1	3.32	1	2	30,087	550,289
FY92	2	7.21	0	0.00	2	7.21	3	7	27,729	578,018
FY93	0	0.00	0	0.00	0	0.00	0	0	25,945	603,963
FY94	1	4.15	1	4.15	1	4.15	0	0	24,099	628,062
FY95	1	4.60	0	0.00	1	4.60	0	0	21,761	649,823
FY96	1	4.73	0	0.00	1	4.73	0	0	21,141	670,964
FY97	0	0.00	0	0.00	0	0.00	0	0	20,725	691,689
FY98	1	5.15	0	0.00	1	5.15	0	0	19,412	711,101
LIFETIME	15	2.11	6	0.84	14	1.97	9	24	711,101	
5 YR AVG	0.8	3.73	0.2	0.93	0.8	3.73	0.0	0.0	21,427.6	
10 YR AVG	0.7	2.77	0.2	0.79	0.7	2.77	0.4	0.9	25,285.6	

U-2 History

U-2... Statistics

YEAR	CLASS A #	CLASS A RATE	CLASS B #	CLASS B RATE	DESTROYED A/C	DESTROYED RATE	FATAL PILOT	ALL	HOURS	CUM HRS
CY63	0	0.00	0	0.00	0	0.00	0	0	0	0
CY64	1	0.00	0	0.00	1	0.00	1	1	0	0
CY65	0	0.00	0	0.00	0	0.00	0	0	0	0
CY66	0	0.00	0	0.00	0	0.00	0	0	0	0
CY67	2	0.00	0	0.00	2	0.00	0	0	0	0
CY68	1	0.00	0	0.00	1	0.00	0	0	0	0
CY69	0	0.00	0	0.00	0	0.00	0	0	0	0
CY70	0	0.00	0	0.00	0	0.00	0	0	4,413	4,413
CY71	0	0.00	0	0.00	0	0.00	0	0	4,241	8,654
CY72	2	25.87	0	0.00	1	12.93	1	1	7,732	16,386
CY73	1	9.33	0	0.00	0	0.00	0	0	10,718	27,104
CY74	0	0.00	0	0.00	0	0.00	0	0	11,425	38,529
CY75	3	27.80	1	9.27	3	27.80	0	0	10,791	49,320
CY76	0	0.00	0	0.00	0	0.00	0	0	8,717	58,037
CY77	0	0.00	0	0.00	0	0.00	0	0	9,395	67,432
CY78	1	11.19	0	0.00	1	11.19	1	5	8,934	76,366
CY79	0	0.00	0	0.00	0	0.00	0	0	10,128	86,494
CY80	2	19.84	0	0.00	1	9.92	0	0	10,080	96,574
CY81	1	9.79	0	0.00	1	9.79	0	0	10,211	106,785
CY82	0	0.00	0	0.00	0	0.00	0	0	10,131	116,916
CY83	0	0.00	0	0.00	0	0.00	0	0	12,555	129,471
CY84	2	15.09	0	0.00	2	15.09	0	0	13,257	142,728
CY85	1	8.48	0	0.00	1	8.48	0	0	11,788	154,516
CY86	0	0.00	0	0.00	0	0.00	0	0	13,954	168,470
TY87	0	0.00	0	0.00	0	0.00	0	0	16,786	185,256
FY88	0	0.00	0	0.00	0	0.00	0	0	16,730	201,986
FY89	0	0.00	0	0.00	0	0.00	0	0	17,620	219,606
FY90	1	5.56	0	0.00	1	5.56	0	0	18,001	237,607
FY91	0	0.00	0	0.00	0	0.00	0	0	19,820	257,427
FY92	1	6.03	0	0.00	1	6.03	1	1	16,597	274,024
FY93	0	0.00	0	0.00	0	0.00	0	0	18,085	292,109
FY94	2	12.79	0	0.00	2	12.79	1	1	15,643	307,752
FY95	1	5.64	0	0.00	1	5.64	1	1	17,726	325,478
FY96	2	12.11	0	0.00	1	6.05	1	2	16,518	341,996
FY97	1	8.34	0	0.00	0	0.00	0	0	11,991	353,987
FY98	0	0.00	0	0.00	0	0.00	0	0	11,417	365,404
LIFETIME	25	6.84	1	0.27	20	5.47	7	12	365,404	
5 YR AVG	1.2	8.19	0.0	0.00	0.8	5.46	0.6	0.8	14,659.0	
10 YR AVG	0.8	4.90	0.0	0.00	0.6	3.67	0.4	0.5	16,341.8	

USAF Photo by SSgt Steve Thurow

LT COL JEFF THOMAS
HQ AFSC/SEFF

In FY98, the trainer community experienced one Class A mishap, the loss of an AT-38 and its aircrew in a midair collision with an F-16 on a photo chase mission. The loss of one "T-" in FY98 represents a two-way tie with FY91 for the second best trainer year on record, with only FY94 better with zero Class A mishaps.

Additionally, for the first time since FY90, there was a Class B mishap in the "white jet" community involving a T-38 which landed gear up following a failure of the left main landing gear to extend.

The reported Class C mishaps in FY98 continued various trends noted in previous years. Except for some minor variations, FY98 mirrored FY97 (which mirrored FY96) in the trainer community. If you had the opportunity to read last year's trainer review, you may note some plagiarism in this year's review culled directly from last year's pages (like this sentence!).

T-37

In FY98, the T-37 community experienced no Class A mishaps, for an obvious rate of 0.00. This is the sixth time since the Tweet went operational in the late 1950s for this accomplishment. After some early teething problems resulted in rates hovering between four and nine mishaps per 100,000 hours, the Tweet has settled down to enjoy rates of less than 1.0 almost consistently since FY66, and a rate of 0.00 five times in the decade of the nineties. That's a real testament to those who fly and maintain an aircraft the Air Force first accepted into the inventory in December 1956!

Since the late 1950s, the T-37 has been involved in 133 Class A mishaps for a lifetime rate of 1.10 per 100,000 flying hours. The 133 Class A mishaps resulted in 131 aircraft destroyed and 75 fatalities. Since 1980, the rate of operator-caused Class A mishaps has exceeded logistics-caused mishaps approximately three to one, with operator-induced loss of control as the leading cause factor. In fact, a logistics-related T-37 Class A mishap hasn't occurred since the late 1980s.

Recent operator-induced mishaps include a midair while flying formation, collision with the ground while performing an unauthorized "air show," loss of control after a trim malfunction, loss of control following an unsuccessful unusual attitude recovery, and striking a raised approach-end barrier at night. From this listing, it appears the T-37 "weak link" might be the control stick actuator (i.e., pilot).

Now that's not to say that the Tweet is a faultless mechanical wonder. While highlighting the recent historical trend of operator-caused Tweet Class A mishaps, you should be aware the T-37 has some "idiosyncrasies" that require aircrew and maintainers to be vigilant.

Certain themes continue to recur in Class C mishap reports. In FY98, as in previous years, the majority of T-37 Class C mishaps involved engine problems. Engine flameouts and intentional shutdowns for various reasons (stuck RPM, engine rollback, vibration, surges, etc.) were the majority of cause factors highlighted in reports. The majority of engine shutdowns resulted from oil pressure problems, but following a close second were shutdowns related to fire/overheat warning indications.

As stated last year, historically, flameouts have been caused by operator techniques, material failures, and invariably, aging components. While maintenance folks are working hard to resolve the flameout issue, when material factors aren't involved, duplication of exact flight parameters (rate of throttle movement, pitch attitude, OAT, etc.) which existed at the time of the flameout make troubleshooting a difficult undertaking at best.

While no single cause factor has been pinpointed for the flameouts, several issues are being worked to reduce their probability. Testing of modified Main Fuel Controls (MFC) discussed in last year's trainer review article which will increase fuel flow settings at idle power is complete. Installation of modified MFCs has begun at Vance AFB with full-scale fleet retrofit being funding dependent. AETC doesn't necessarily believe this new

continued on next page

MFC will solve ***ALL*** T-37 flameout problems, but will go a long way to alleviate flameouts during the descent phase of flight.

Additionally, the use of JP-8 + 100 fuel in the J-69 may reduce the buildup of carbon deposits in the engines allowing a "cleaner burn." And although no "explainable" correlation can be drawn, engine flameouts also seem to increase in the winter months, so use caution as the temperatures begin to drop.

Engine problems and the Tweet seem inseparable. Thirty years ago, the T-37 *Aircraft Accident Summary* for 1968, published by the Directorate of Aerospace Safety, stated "…during 1968… the most common causes of incidents were false fire warning lights, oil system problems and number two bearing failures." As was the case 30 years ago, these problems continue to beguile the Tweet.

I said it last year (and in '96), and I'll say it again this year: The situationally aware aviator would be particularly sharp when it comes to possible engine and associated system malfunctions, as well as proficient in single-engine procedures.

As far as operator issues involving the "volkswagonous subsonicous" are concerned, physiological incidents involving GLOC far outweighed all other reportables, with inadequate anti-G straining maneuvers by student pilots leading the way. Historically, 80 percent of all Air Force GLOCs occur in the T-37, so keep in mind that the benign-appearing Tweet has teeth that can put you to "sleep." In fact, in the 20-year period of 1975-1996, 398 GLOCs were reported in the T-37.

Although not a major operator category (compared to GLOCs), landing mishaps involving instructor pilots was an undesirable trend in FY98. A gear-up landing, a hard landing, two T-37s colliding during a formation landing, and a near gear-up landing by a student dual with an instructor all involved instructor pilots and had no similar occurrences involving student pilots.

Still, all in all, an admirable year for crews flying a 40-plus-year-old airplane that will soldier on for a few more years until JPATS is ready to take the torch. Keep up the good work!

T-38

"Sometime in 1961 the Air Force will have a supersonic trainer, the Talon T-38. With its durability of engines and other systems, it has many built-in safety features of interest to Air Force pilots." So started the June 1959 article in *Flying Safety* magazine introducing the T-38 to the Air Force community. The article went on to state that "…the Air Force has the eventual successor to the venerable and trusty T-33." And a safe successor…in the almost 35 years since the first pilot training class earned their wings flying the T-38, the Talon has flown over 12 million hours with an impressive overall lifetime mishap rate of 1.55 Class A mishaps per 100,000 flying hours.

Compare that with the T-33's lifetime rate of 13.71 (and 2,357 Class A mishaps!) and you can see that safety in the advanced jet trainer community has definitely come a long way. As stated in the FY96 review, what makes the T-38's mishap rate even more impressive is that at the time of the Talon's introduction, the Air Force estimated the T-38's loss rate would be 12 aircraft per 100,000 flying hours.

USAF Photo by SSgt Steve Thurow

In FY98, the T-38 fleet logged approximately 123,000 hours and experienced one Class A mishap. As mentioned in the opening paragraph, the one trainer Class A mishap in FY98 involved an AT-38 flying photo chase on a test mission evaluating the separation characteristics of practice bombs from the weapons bays of a B-1B. According to the AFI 51-503 accident report, the mishap aircraft and an F-16B departed as a two-ship formation to join on the B-1. During the sortie, the F-16 was positioned 50 to 100 feet on the right side of the B-1 with the T-38 on the left side in approximately the same chase position. At mission completion, the B-1 cleared the two aircraft to leave the formation. The T-38 started a shallow left turn to leave the formation while the F-16 began a left turn to cross under the bomber. During the turn, the F-16 aggressively maneuvered (by increasing his rate of turn from 2 to 7 Gs) to avoid birds and struck the T-38, which was in a continuous 20- to 30-degree left bank, with its left wing tip, fatally injuring the aircrew in the T-38.

The one Class B mishap in the Talon community involved a T-38 which landed gear up following all attempts to extend the left main landing gear using both normal and emergency methods. Post-flight inspection revealed binding components in the gear up-lock assembly. Maintenance supervision made two changes to local procedures to alleviate the likely recurrence of the situation and recommended all units flying T-38s incorporate the same procedures.

Although historically, operator-caused mishaps have outnumbered logistics-related mishaps almost two to one, recent experience has shown a change in the trend to reflect an increasing number of Class A mishaps due to compressor rotor problems (FY93/95) and bird strikes

(FY92/93x2), with the last operator-related Class A mishap prior to FY98's occurring in FY91 when an IP and SP were fatally injured during a stall recovery performed after a touch-and-go landing.

To mitigate the former risk, the T-38 community is exploring the possibility of redesigning the disk or compressor, with an implementation date, if approved, of approximately 2001. Additionally, AETC is exploring the possibility of a complete J-85 modernization to improve reliability and maintainability with implementation slated at approximately the same time the T-38C comes on line.

The bird strike hazard has been reduced by acquisition of a new polycarbonate laminate bird-resistant windscreen rated to 400 knots for a 4-pound bird as compared to the older windscreens' 210-knot/4-pound limitation. This new windscreen demonstrated its worth in FY97 when a T-38, flying a low-level at approximately 500 feet AGL and 350 knots, impacted a bird on the windscreen which withstood the collision and allowed safe recovery of the Talon and its occupants.

In FY98, the windscreen again proved its worth when a solo student leading a formation during RTB, passing 6,000 feet at 300 knots, struck a large, raptor-type bird. The bird impacted the mishap aircraft at the bottom center of the windscreen (which deflected inward 1 to 2 inches) and then was deflected over the top of the aircraft.

Like the T-37, the T-38 also has a recurring Class C mishap trend—engines. Of the reported Class C/HAP events in FY98, most involved engine flameouts and engine shutdowns for reasons which included false fire lights, loss of oil pressure, failed gear box, etc. Also like the T-37, the T-38 Aircraft Accident Summary for 1968 stated "the most common cause of incidents was power failure of the J-85 engine."

T-38 aviators know the J-85 has always been touchy when operated near the edge of the envelope, and as the engine ages and tolerances increase, will probably become more irritable. Like the T-37, J-85 flameouts have historically been related to operator technique, material factors, and component age. And like J-69 flameout troubleshooting, when material factors aren't involved, duplication of exact flight parameters which existed at the time of the flameout make troubleshooting to find the exact cause a difficult undertaking. Operator techniques like monitoring throttle movements when near the edge of the envelope and paying attention to critical factors like OAT may help reduce the rate of unintentional single-engine operations.

Like the T-37, the smart Talon operator should pay close attention to engines and their related systems while maintaining *proficiency*, not just *currency*, in single-engine procedures.

T-1

Hard to believe it's been 9 years since HQ USAF announced the selection of a modified Beechjet 400A as the tanker-transport training aircraft, 7 years since the Air Force accepted the first production T-1A at the now-defunct Reese AFB, and 6 years since the first SUPT class started training in the "Jayhawk." In that time period, a lot has transpired around the world, but one thing has remained constant—the T-1's Class A and B mishap rates have stayed at 0.00 since the aircraft's introduction. As implied by the last sentence, in FY98, the T-1 experienced another stellar year with no Class A or B mishaps. In fact, the T-1 is the safest "T dash" aircraft through its first 8 operational years. To date, the Jayhawk has logged over 200,000 hours without a Class A or B mishap. By comparison, the T-41 experienced its first Class A mishap during its fourth year of operation, the T-39 during its second year of operation, and the T-42 experienced its first Class B mishap during its third year of operation.

Approximately 11 Class C/HAP mishaps were recorded by the T-1 fleet in FY98, approximately matching the combined totals for FY96 and FY97. Unlike the "mature" T-37 and T-38 which have years of historical data available for review and trending, the T-1 hasn't seemed to develop any incident "trends" during its short service life. As in FY 96 and FY97, the majority of incidents involved engine problems. Four involved intentional shutdowns in flight (one for high TIT, two for oil pressure problems, one for a stuck throttle). Two incidents involved flameouts, both during engine start. Unlike FY96, however, none of the engine incidents involved inadvertent shutdowns. Two bird strikes damaged Jayhawks in FY98 with one occurring on a low-level resulting in damage to the radome. The other involved an undetected bird ingestion into the No. 1 engine during takeoff from an outbase with the aircraft safely recovering to the home drome.

Modifications currently underway on the T-1 include the installation of a fully integrated GPS into the Flight Management System (FMS). The GPS mod is in progress at Laughlin AFB with fleet-wide completion scheduled at Columbus AFB in FY00. As stated in last year's trainer review article, integration of GPS will result in the highly automated T-1 becoming even more computerized.

Due to the high degree of computerization present in the Jayhawk, the potential for "automation confusion" exists when you've called up a function that doesn't look familiar or you're not too proficient with. According to a recent study, the four most commonly asked questions on the highly automated flight deck are: "What is it doing?" "Why is it doing that?" "What will it do next?" and "How did it get into that mode?"

Remember, automation has not changed the fundamentals of airmanship; fly the aircraft first! Don't let all cockpit crewmembers (jumpseat included) be "heads down" trying to resolve some unintelligible display or trying to figure out how to program/reprogram the Flight Management System. "One pilot handles the FMS, the other handles the aircraft" needs continuing emphasis during briefings and training due to the potential for the above highlighted automation dilemmas. ✈

HELICOPTERS

USAF Photo by SSgt Steve Thurow

LT COL JAY JOHNSON
HQ AFSC/SEFO

As I write this end-of-the-year article for the third year, I look back and the statistics show a slow, but steady, increase in injury and death, as opposed to "just" damaging aircraft and equipment. If this sounds alarming, it is. Mishaps in FY98 included the tragic midair at Nellis, the deaths of two pararescuemen while parachuting, and a disabling hand injury to a flight engineer during hoist training. Although no one was seriously injured in the UH-1N Class A at Fairchild, they were incredibly lucky. I guess Andrew (from "Touched by an Angel") was TDY that day.

The Nellis midair boiled down to pilot error. Sounds simple, but as with most things that sound or look simple on the surface, there were underlying causes that can't be discussed in this forum. If you are (and you most assuredly should be) interested, please read the final message or give me a call, and I'll be more than happy to discuss it with you.

The UH-1N mishap was a total breakdown in crew coordination. It should and does hurt to read this mishap report. I'm sure that hundreds of crews have been in like situations and come away relatively unharmed. Probably scared for a period of time, but no real damage done. The problem with the latter is that the young crewmembers don't hear about the narrow escapes from poor decision-making. Throw in a couple of Class Cs that were minutes from becoming similar disasters—like the MH-53 with the loss of oil pressure 70 NM over the ocean—and maybe it's time that we, as a community, reflect on how we're doing business.

Let's break down what we're doing into three categories.

- **Things We Can't Control.**
- **Things We Have Limited Control Over.**
- **Things We Directly Control.**

CAN'T CONTROL. National Command Authority taskings, such as Northern and Southern Watch, are driving OPS and PERS Tempos. MAJCOM taskings, and wing and squadron must-dos, also drive us. All of these are generally out of our control. And since we can't turn off the taskings, we must be aware of the consequences.

The increased number of TDYs is causing major stress in many areas. Training opportunities aren't as good in the deployed locations, making it harder to remain proficient in-theater and adding that much more to the plate when you're at home. **Awareness** is the key. Awareness will make it easier for you and your crew to assess the dangers and make the right decisions in the aircraft.

Your personal life is much, much trickier. You can't control when children get sick, your spouse breaks a bone, your mutual fund crashes, or your family pet dies. You can't rely on the crew or the squadron to be aware of the stress occurring in your private life. You, and you alone, must take the responsibility to call the knock-it-off when personal stress puts you and your crew at risk.

LIMITED CONTROL. An individual has limited control over day-to-day activities like completing required ground training, scheduling flights, family activities, off-duty education, and the like. All of these "limited control" activities take planning in your part. Your lack of planning in any or all of these activities will cause undue stress and undermine your ability to cope with the mission. Regardless of the reason, it's not wrong to "just say no" to flying on a day you're not up to the task. The true professional can take the good-natured ribbing because he or she knows that leaders and peers will respect the decision. Why, you ask? Because if you're a *professional,* people will know that *you make decisions based on what's right, not what's expedient.*

DIRECT CONTROL. There are many "things" that you have direct control over. Some are small and seem insignificant, but have great impact on you. Setting high personal and professional standards is one area over which you have direct control. Just knowing 85 percent

is a minimum standard. Knowing the Bold Face is a minimum. A professional knows the *aircraft*. This includes knowing sections 2, 3, and 5 cold, no questions. Know all of the numbers by heart. A professional knows his or her stuff, not just Red and Green arcs. A real pro knows the *why* behind the Bold Face. A true professional calls the knock-it-off *before* anything gets dangerous. You never know when that knowledge will save your life.

Think back over your flying career (be it long or short), and remember the crewmembers who made the biggest impact on the way you fly. I'll bet they met the criteria listed above. You old heads need to provide the professional example to the young men and women just starting out—it's called mentoring!! If it's been a while since you've been in the books, crack 'em now and crack 'em often. Be the flier that the inexperienced try to emulate.

You young crewmembers need to strive for the highest standards. Ask the tough questions. Don't be satisfied with "We've always done it that way." More people have died thinking this than I'd care to list. Be inquisitive about your aircraft, the mission, and the why's of your chosen career. Set personal standards also. Be fit. Act and look like the professional you are. Expect others to meet high standards. Don't be afraid to demand that others know their job. You're not being a jerk or an obsessive-compulsive when you set those expectations. No one would ever set low expectations for their children, would they? So don't feel guilty about setting high expectations for the people you fly with. You'll be glad you did.

Demanding the best from yourself and others will help to ensure that your loved ones will never have to see the "blue steely" roll up the driveway and the commander and chaplain start that long and lonely walk up to the front door to announce that YOU won't be coming home that night or any other night. That little scenario, in itself, should be enough to motivate anyone to do the right things.

A happy end-of-year article? Not really. For many others and me who lost good friends this year, FY98 wasn't a happy year. Please think about the way we do business. If you have questions about the tactics we are using, or why everyone has to be "qualified" on goggles, or why do we need as many people on the DRD for SWA, ask the questions. You may not like the answers, but at least ask the questions.

I'll leave you with one last thought. How many of you know someone who shouldn't be at a set of controls or operating the systems in the back of the aircraft? If you do, do me and the Air Force a favor. Let the DO or CC know about them. Do them the favor of getting them out of a career field they shouldn't be in. I guarantee you'll feel better for doing the right thing.

Hope to see you all next year. Good luck, God Speed, and Fly Safe. ✈

U-2 FY98 YEAR IN REVIEW

MAJ JON GUERTIN
9 RW/SEF
Beale AFB, California

The U-2 program has reversed its mishap trend of recent years. FY98 is the first Class A mishap-free year since FY93. There were no Class Bs and Cs. Over 2 years have passed since the loss of an aircraft and pilot. The majority of significant recommendations from the previous mishaps are well on the way to being implemented.

Over the past year, HQ ACC contracted for an independent "Graybeard Panel" review of U-2 operations and maintenance practices. Numerous recommendations from this review are being incorporated today. In addition, Warner Robins-Air Logistics Center, the 9th Reconnaissance Wing (9RW), and the Reconnaissance Program Office at Aeronautical Systems Center are aggressively pursuing platform upgrades that include a comprehensive cockpit upgrade known as RAMP (Reconnaissance Avionics Modernization Program). The combined efforts of all these organizations will ensure the aircraft is viable well into the next century.

The F118-GE-101 engine is now mounted in all aircraft. It is proving a reliable replacement to the J-75 with only one uncommanded in-flight shutdown since its addition to the fleet. Upgrade of the aircraft's electrical system is on the horizon, with the greater power requirements of increasingly sophisticated sensor suites. An angle-of-attack indicator system is also scheduled to be added to the aircraft within the next 12 months.

The U-2 aircraft and its operations and maintenance personnel continue to serve at deployed locations around the globe. Roughly one-third of the program's pilots and maintenance personnel and nearly half of its aircraft are deployed to these worldwide locations at any one time. Unified Commanders-in- Chief employ the U-2 and its myriad of sensors to meet a variety of theater and national-level taskings. Unique elements of the program, such as high-speed chase cars on the runway as the aircraft is landing and long-duration sorties in the full pressure suit, make unusual demands on the pilots, maintenance, and support teams. Typically, operations around the world are delivering a high number of sorties and intelligence products with a very small number of highly motivated people.

The U-2 is a true "National Asset," which must remain viable for at least the next 25 years. However, the likelihood of producing more airframes is very low. With no new airframes and many one-of-a-kind sensor packages, the challenge for the foreseeable future is one of aggressively applying ORM to this platform and its support elements in the collection and dissemination of intelligence information. ✈

A-10 FY98

USAF Photo by SSgt Andrew N. Dunaway, II

MAJ KURT SALADANA (CAF)
A-10 Action Officer
HQ AFSC/SEFF

Good year! Very good year! Almost a great year! The best year on record! One Class A and no Class Bs. The men and women maintaining and operating the A-10 are to be congratulated on their efforts.

Of course, the year was not without problems. The one Class A shouldn't have happened. There is a misperception that the A-10 is really just a big "Tweet" and its stall characteristics are benign. This may be true, but—and it's a big but—there are times when the aircraft can wrap itself up in the blink of an eye.

Because the GAU-8 forced the designers to offset the nose-gear and gear door to the right, the aircraft has a tendency to yaw to the right. This is further aggravated by the placement and design of the Pave Penny pylon. Although not noticeable in most flight regimes, this yawing tendency is a factor in a fully developed landing attitude stall.

According to the Dash One, yaw-roll coupling is a rapid exchange of AOA for sideslip and, for the A-10, angles of attack of 20 degrees or more converted to sideslip (through cross controlling) will result in a departure. In a fully developed landing attitude stall, the right yaw tendency causes right wing drop. If the pilot attempts to maintain altitude with back stick pressure and hold the wing up with opposite aileron, the stick is going to be pretty close to full aft and left within a few heartbeats.

The Dash One, Chapter 6 discussion of post-stall gyrations (PSG) states that full aileron or crossed controls maintained for at least 2 seconds after stall will produce the sideslip necessary for a PSG. The aircraft can be recovered from a PSG, but to do so efficiently, the stick must be brought forward far enough to physically break the stall.

Other factual data from the year's only Class A shows the formation entering a practice stall maneuver below their minimum briefed recovery altitude. Even a "Super-Tweet" needs altitude to recover. The Dash One states that from less than 1,000 feet to as much as 8,000 feet is required to recover from a PSG.

The A-10 has no natural pre-stall warning—buffet is a post-stall indication. Steady and chopped AOA tones and stick shaker were added to warn the pilot of an impending stall. The Transition Manual used in the A-10 community does not state in bold letters on its cover that "Compliance is Mandatory." Maybe that's why the statement "Recover on the first indication of stall (chopped tone, stick shaker, or buffet)" has been interpreted by some IPs as a recommendation or technique.

For the most part, stalls are to be avoided. Sure, there are some people out there flying airshows who work them into their routine, but the average fighter/attack driver is in a world of hurt if he or she really needs to stall the aircraft for some tactical reason. Following this reasoning, stalls are bad things, and they should be

avoided. The A-10 has systems incorporated to warn the pilot of an impending stall.

HEED THESE WARNINGS FOR THEY ARE JUST AND RIGHTEOUS!

Don't put your aircraft or your students into the regime where it can depart. This Class A wasn't the only time this has happened to the A-10, and the pilots involved in the other incidents were just as surprised as this year's A-10 nylon let-down champion. Happily, either by good luck or by good management, the others had enough air under them to limit the damage to a briefs/panties Class C.

Although there were no Class Bs in FY98, there was a gear-up landing that came close ($194,056/$200,000). You don't hear it anymore, but there was a saying common to both the civil and military aviation communities: "There are two types of pilots—those who *have* forgotten to put their gear down once in their career and those who *will* forget to put their gear down once in their career!" Nobody intentionally lands gear up in a perfectly serviceable aircraft.

Without looking at the mishap report of this year's gear-up, the armchair quarterbacks would probably come real close to nailing down the cause if they said breakdown in habit pattern for some reason such as an interruption in the normal sequence, due to distraction or channelization. As a matter of fact, you can pull the report from every unintentional gear-up in aviation history and, with some differences in the wording, the aforementioned causes will be there.

This knowledge will not prevent the next gear-up, but perhaps it can be delayed indefinitely if instructor and check pilots emphasize repeating checklist steps after an interruption as a way of automatically forcing the pilot back into a set habit pattern.

Of the Class Cs, many involved the loss of an engine and could easily have become Class As. The A-10 is a forgiving airframe, but one of the well-known "gotchas" is getting slow during single-engine operations. Of the 90 A-10s destroyed in mishaps, 9 of them resulted from a single-engine failure. Seven of these were because the stick actuator either let the airspeed get too low or didn't get the speed brakes closed. The other two involved bad emergency analysis or failure to follow CAPs. With the engines located back in the airflow off of the wings, and the need to get the job done down where the air is thick and bumpy, anything that hits or comes off of the airframe has a good chance of going through an engine—just look at the number of engine-related Class Cs each year.

The absence of single-engine failure as a cause in Class As for over 4 years is a success story for the operators of the A-10. Either you're getting lucky or you're getting better. If it's the former, well, you can't beat luck, and you shouldn't look a gift horse in the mouth. If it's the latter, then the whole system of how we report and learn from mishaps appears to be working.

It isn't possible to identify how or where the operators got better. It may have been a result of the enlightening prose of previous A-10 action officers from the Safety Center. Perhaps it was a reaction to words from Command level. It may be due to the hard work at the various wing safety offices. It's just as possible the training squadrons decided extra time spent discussing and practicing single-engine handling and CAPs would be worth the effort. Probably all of these agencies played a role in getting the word out about why a mishap happened.

The A-10 is a forgiving airframe, but one of the well-known "gotchas" is getting slow during single-engine operations.

USAF Photo by SSgt Andrew N. Dunaway, II

The real reason pilots changed how they fly is probably a lot more basic. In all likelihood, a group of pilots were talking shop over a cool one at the end of a Friday's flying and got into the discussion of "so and so's" hamfisted handling of an engine failure that ended up in the loss of a perfectly good, if not aesthetically pleasing, aircraft. It's always enlightening to discover how much information comes from these leaning-on-the-bar, both-hands-talking-as-fast-as-they-can, Friday-at-the-Club debriefs. For a reason aviation psychologists can probably explain, real good things, real bad things, real silly things, and real stupid things stick in memory longer than anything else. When somebody prangs a plane and the reason falls into one of the former four categories, we remember the details.

By learning from someone else's mistakes/experiences, A-10 pilots have consciously or unconsciously flagged single-engine ops as something that is no big deal if done correctly, but a flight regime that can turn ugly in a heartbeat. As a result, this particular reason for Class As has not recently been a factor. And hopefully, the hard work and attention to detail will continue to improve all aspects of A-10 flight safety without compromising combat readiness.

It was a good year. Let's make sure FY99 is just as good. Keep doing what you are doing! ✈

Official USAF Photo

LT COL KEN BURKE
HQ AFSC/SEF

Fiscal year 98 saw three F-15 Class A flight mishaps in which two Eagles were destroyed. This represents a 1.58 Class A mishap rate (per 100,000 hours). The overall Air Force Class A rate was an excellent 1.14, 24 mishaps.

Lifetime (since 1972), we've experienced 97 F-15 Class As, at a 2.51 rate, with almost 4 million hours. Ninety of these involved A/B/C/D models for a 2.66 rate, while seven were F-15Es for a 1.45 rate. No other fighter/attack aircraft has a better safety record.

The three Class As involved one departure from controlled flight and two engine-related mishaps. There will be no review of these mishaps in this article due to the requirement to protect "privilege." I refer you to the mishaps' final message reports and the appropriate Memorandums of Final Evaluation (MOFE) to gain an in-depth view of the factors involved in each case.

Concerns

Areas I feel warrant your attention include controlled flight into terrain (CFIT), G-induced loss of consciousness (GLOC), midair collisions, takeoff emergencies, and flight leadership.

CFIT

The Eagle community hasn't specifically been plagued by the various ways to fly a good jet into the ground lately, but the always-present CFIT threat **HAS** claimed many of our fellow fighter pilots in other jets over the last several years. It's obvious we will continue to exploit tactical advantages of night combat flying. That brings the twin threats of spatial disorientation and misorientation with the terrain.

Night vision goggles can do wonderful things for fliers, but they **DO NOT** turn night into day. The folks who have been flying with "gogs" for years know this. They also know that being "qualified" on NVGs doesn't guarantee you're particularly good at using them. It takes practice to gain real experience. On the road to "experienced," you should first crawl, then walk, before you run. I suggest a review of the Class A mishap reports involving NVGs in the A-10 and F-16 communities during the last few years. Please benefit from their bloody lessons learned. Make sure you, as pilots and as supervisors/leaders, are not overextending your own capabilities, or those whom you are responsible for leading.

GLOC

GLOC is a potential threat on every mission. Your risk can be significantly increased by fatigue, dehydration, poor physical conditioning, improper anti-G straining technique, and with malfunctioning life support equipment. We don't go into a fight without a good game plan, complete with contingencies. Why then would anyone take off physically unprepared for the high-G environment?

If, at any point, you determine things just aren't working right today, that you're not your normal "G-monster" self, it's time to KIO and go home. You aren't going to do yourself, your wingman, or your kids any good trying to tough it out. More than one guy has told himself he was going to limit himself to "just 5 Gs." Next thing you know, the bandit shows up at six, or you get your first tallyho in a month, instincts and training kick in, the Gs come on, and you are off to la-la land and the mort locker.

The best course of action is prevention. Get your rest, stay ahead of the game with fluids, pump some iron a few times a week, and make sure your anti-G straining maneuver is *outstanding*. If your G-suit or other life support equipment isn't working at 100 percent efficiency, go home and get it fixed.

Need more motivation? Okay, you're on a real combat mission with a brand-new wingman (or me) and a MiG appears, but you need to VID. At the high aspect merge, you lay on a "bat turn." The next conscious awareness you have is through a deep, Weed-like haze where you hear your wingman claiming **HIS** kill after he shoots **YOUR** MiG off your tail. He then starts screaming for you to pull up from your near-vertical nose-low attitude. This time you survive, but back at the base, you land from a straight-in, while he does aileron rolls down initial in front of the whole squadron. Bottom line: GLOC is preventable, but it's your responsibility.

Midair Collisions

The fighter's mission routinely requires close-in maneuvering, be it air-to-air or surface attack. The opportunities for two or more jets to get too close together are many. But don't we have training rules to protect us? No, we have training rules to *help* us deconflict while we're concentrating on tactics and valid weapons training. It's always the flier's responsibility to clear his/her flight path (and, of course, six).

Okay, the threat is high, the TRs don't protect us, our craniums are on swivels, what's new about this? Nothing, but did you know that nearly half of all fighter midairs occur during the "admin" phases of flight, during such benign events as rejoins, refuelings, and formation landings? Frequently, the root problem can be traced to complacency or a breakdown in discipline. We all need to stay vigilant against complacency and possible lapses in discipline. Additionally, flight leads have the responsibility for ensuring their wingmen don't exceed their capabilities or the rules. Extra vigilance while No. 2 finishes that rejoin will someday save your life.

Takeoff Emergencies

Just how seriously do you take emergency procedures training? Do you really know your stuff? Do you have a game plan in case you lose thrust (or a tire, or flight controls) at 100 knots? Are you familiar with "maximum abort speed"?

Scenario: The computed max abort speed for your takeoff is 120 KIAS. You're on takeoff roll, picking up speed, when you hear a loud "pop" and detect a significant loss of thrust. "#$%&!" A quick look tells you both tachs are at 90 percent, the left nozzle is at 20 percent, the right is at 80 percent, and airspeed is increasing through 130 KIAS. Are you prepared to instantly execute your single-engine takeoff plan, or your high-speed abort plan? You probably have a choice, but you better have planned for it before now.

At max abort speed, a pilot can still stop within the remaining runway. The Dash One definition and charts include a 3 second "decision time," plus another 2 seconds to get on the binders while concurrently reducing thrust to idle. Three seconds isn't a lot of time to make a decision if you're unprepared. The problem here centers on what happens during the 3 seconds of "decision time." The charts assume the aircraft continues accelerating in mil, or max, meanwhile eating up "the remaining runway." At the end of those 3 seconds, you could easily have gained 30 to 50, maybe even 60, knots, well above max abort speed. Since the definition takes that into account, the max abort speed really isn't the highest speed at which you can *physically* begin a successful abort. That is closer to the other end of those 3 seconds.

So, in our scenario, when we recognized our speed to be above computed max abort speed, we might wrongly conclude we're too fast to abort and *had* to continue the takeoff. It's been suggested a more useful tool would be "refusal speed" that would remove the 3-second decision time and would be based on normal two-engine acceleration in mil or max. If incorporated, it essentially will be a "go" speed. The pilot/crew needs to know that below this speed an abort is possible. Above it, there's insufficient runway to abort, and you're committed to taking off. Two exceptions to this commitment come to my mind: dual engine problems and significant flight control malfunctions. In these cases, the pilot/crew will need to be prepared for barrier engagement and ejection.

Back to our original scenario. If the decision is made to continue, there should be no delay in selecting max thrust and accelerating toward SETOS. The term "Speed is Life" is just as applicable here as it is in the tactical arena. Of course, your game plan included stores jettison, as required. If the decision is to abort, don't waffle. Get on those binders hard. If you have just given up one of your precious few sorties due to an aircraft malfunction, be serious about getting stopped. We've all seen some regrettable results of mediocre aborts recently. The sum of this sermon is: "Know the procedures, and incorporate them into your game plan with a firm commitment to execute the plan when the situation presents."

Flight Leadership

How well are you **EARNING** that flight lead or IP pay? Going through the physical steps of planning, briefing, flying, and debriefing a mission isn't that hard. The true challenge is in applying judgment and making sound decisions. Mishap reports nearly always contain examples of poor judgment or decision-making. It's a piece of cake to criticize after there's bent metal, but would you have done things much differently?

Sometimes, however, we see incident reports with good leadership involved. There was a case recently where an FTU student experienced a problem with G-tolerance on a syllabus sortie. The IP decided there was nothing so compelling about the mission that they had to complete that sortie on that day. He wisely "instructed" his student back to a safe landing where the problem could be identified and corrected. The training was then properly accomplished on a subsequent day. *Good call!*

We ended FY98 with no fatalities for the third year in a row. Sadly, that streak ended early in FY99. I sincerely hope a new fatality-free era is beginning that will last even longer than the previous one. Commit yourselves to being 100 percent prepared to fly every mission—or don't fly it. ✈

F-16 FY98

LT COL BRUCE LUJAN
HQ AFSC/SEFF

Viper drivers: FY98 wasn't your worst year for mishaps, but it was your worst mishap rate since FY94. I'm not saying pilots or maintainers are more at fault, just that more mishaps are happening per 100,000 flying hours. It's bad news that the F-16 was involved in 14 out of the 24 Air Force Class A flight mishaps this year, but we're not seeing any common thread. Help us find the room for improvement. Your Class C engine failure reports tell me Viper pilots have saved aircraft in spite of some serious problems, and I'm sure lots of supervisors and maintainers made decisions and took actions that saved aircraft too. So let's keep working at it and save some more.

If you didn't notice already, I'm not the "F-16 guy," I'm his branch chief. We cut "DT" loose to attend training before he reports to Cannon AFB in January, and we're hoping to get a replacement if we can cut someone loose from a cockpit. If you're a fighter pilot and you can figure out how to get released, we need your expertise. But enough of the commercial—on with the show.

I've been here at the Safety Center a year and a half, and I've been out on two F-16 mishap boards. I also sit in the cube next to DT, so I've listened to at least 75 percent of the phone calls he has made. The bottom line is, armed with the mishap reports and my experience, I'm better qualified to write this than anyone I could find. I grouped the mishaps like our database categories. They're related to Operations, Logistics, Maintenance, Environment, or Undetermined (i.e., the process isn't finished yet). The facts below are taken from Part 1 of the mishap reports or the releasable AFI 51-503 report. If you want the root causes and the rest of the story, drive on over to your wing safety office. Make it a priority in your life to review the mishap messages, and pay attention during safety briefings to find nuggets of experience to keep you from running out of luck and becoming statistically more significant than you want to be. This is serious stuff.

Class A Operations-Related Mishaps

Midair collision with an AT-38B on a photography mission. The F-16B led an AT-38B as photo chase of a B-1B weapons release. The mishap element joined on the B-1 and completed four planned bomb runs with the T-38 on the left wing and the F-16 on the right. After the final run, the F-16 and T-38 collided during flight breakup. Both crewmembers in the T-38 were fatally injured, and the T-38 was destroyed. The F-16 suffered damage to the left wing, but the pilot was able to land successfully.

Midair collision during a 2 v 4 intercept sortie. The mishap occurred between two F-16CGs on the fourth engagement. RED AIR was in a 5-nautical-mile trail formation with a two-ship element in front and a two-ship in back. BLUE AIR committed as an element, and BLUE lead merged with the trailing element of RED AIR. After passing the leader of the RED AIR trail element and declaring him hostile, the flight lead of BLUE AIR collided with the RED AIR wingman. The RED aircraft became uncontrollable, and the pilot ejected safely. The BLUE aircraft landed safely with major damage to the right wing and fuselage.

Main landing gear failure on landing. The mishap pilot was No. 2 of a four-ship night surface attack mission. The flight was weather recalled for crosswinds, and the active runway was changed. The mishap aircraft (MA) experienced navigation system problems during the high TACAN approach, and the mishap pilot requested vectors for a visual straight-in. During the landing, the MA's left main gear collapsed, the pilot ejected safely, and the aircraft came to rest (largely intact) in the infield.

Pilot ejects over water at night. The mishap pilot (MP) was No. 2 of a four-ship of F-16C/Ds on a night vision goggle 3 syllabus upgrade sortie. The MA was originally the spare, but it was used after a no-start on the primary. Takeoff and refueling were uneventful. On the fifth intercept, the MP called "notching 360," and 13 seconds later made a "terminate" call and initiated ejection. An emergency locator transmitter (ELT) signal was heard continuously for 39 seconds. Search and Rescue operations began immediately with aircraft and ships and continued throughout the night. The MP's body was found the next morning.

Flight into terrain during night qualification training. The MP was No. 2 in a three-ship on a mission qualification training (MQT) LANTIRN surface attack tactics (SAT) mission. The profile included night air refueling and medium altitude surface attacks. The first pass was an uneventful 30-degree high-angle dive bomb using a bunt to final. The MA impacted the terrain during the second pass, a 30-degree high-angle dive bomb using a roll and pull to final. The MA was destroyed, and the MP was fatally injured.

High-speed abort followed by ejection. The MP was No. 2 in a four-ship of F-16CJs on a basic surface attack MQT sortie. During takeoff roll, the MP initiated an abort, and the aircraft continued down the runway and through the overrun. The MP ejected prior to the MA departing the prepared surface. The MA impacted lights and antennas off the end of the runway, caught fire, and was destroyed. The MP landed in the flames near the burning aircraft and was pulled out by off-duty local and USAF personnel. The MP suffered third-degree burns on 60 percent of his body and was transported to the burn center at Brooks Army Medical Hospital where he lingered for several weeks before passing away.

Flight into terrain during egress following surface attack. The MP was No. 3 of a four-ship day surface attack mission. They planned a dry first run with lead flying a

10-degree low-angle high-drag delivery and Nos. 2, 3, and 4 accomplishing low-altitude toss deliveries. Each element was briefed to action right and come off the target to the left. When the lead element actioned, the MP's element was 3.7 miles in trail. When the MP came off the target, he started a left descending turn. Shortly after beginning this turn, the MP initiated a 6-G maximum AOA left roll to approximately 140 degrees of left bank. Then, with the MA 40-degrees nose low, he began a right roll back to approximately 45 degrees left bank with the nose coming back to 26 degrees of dive. With little altitude to maneuver, he initiated ejection, but the ejection sequence was interrupted by ground impact.

Class A Logistics-Related Mishaps

Departure from controlled flight. The MA was lead of a two-ship on a basic fighter maneuvers (BFM) sortie. During the fourth engagement, the MA departed controlled flight and transitioned to an inverted deep stall with a counterclockwise spin. The mishap pilot executed a successful ejection, and the MA was destroyed.

Abnormal engine response and loss of thrust. The MA was an F-16CJ on its fourth flight of the day. The MP was flying a BFM continuation training sortie and experienced abnormal engine response during the first exercise. He couldn't maintain level flight with available thrust and was unable to regain normal engine operation. The MP ejected successfully at 3,000 feet above the water, approximately 30 miles off the coast, and was recovered by the U.S. Coast Guard. The MP was released from the hospital the next day with no injuries.

Loss of thrust. The MP departed as lead of a two-ship on a close air support/intercept flight lead upgrade sortie. Approximately 1 hour into the mission, the MP declared an emergency for engine failure and subsequently ejected. The MA impacted a quarter mile off the coast and was destroyed. The MP was rescued uninjured by a civilian fishing boat.

Class A Maintenance-Related Mishaps

Loss of thrust, pilot ejected. The MP was No. 2 of a four-ship low-altitude SAT mission. On the IP to target run at 1,200 feet AGL, the MP heard a bang and felt a loss of thrust, followed by high FTIT and lead notifying him of "flames coming out your back." The MP performed CAPs and attempted airstarts while heading towards the nearest divert field. The MP successfully ejected at approximately 1,700 feet AGL when he realized the closest airfield was not within gliding distance.

Uncommanded pitch-down after liftoff. Mishap sortie was a functional check flight and the first flight of the day. Within seconds after lifting off, the MA pitched down and impacted the runway. The MA slid for approximately 2,000 feet on the runway, and the pilot ejected successfully just before the MA departed the prepared surface and was destroyed.

Class A Undetermined and Miscellaneous Mishaps

G-induced loss of consciousness (GLOC). The mishap flight was a 2 v 2 fight-tank-fight scenario in a Military Operating Area (MOA). During the initial G-awareness exercise, the MP determined his G-suit and Pressure Breathing for G (PBG) system were not operating normally. He discussed this with the mishap IP and elected to continue the mission. They flew three engagements, refueled, and returned to the MOA. During the second post-tanker intercept, the MP flew to a high-aspect merge and executed an aggressive high-to-low conversion. He experienced a GLOC at approximately 18,000 feet in an inverted, approximately 70 degrees nose-low attitude, but recovered from the GLOC enough to attempt a high-speed dive recovery. He initiated an ejection before the aircraft impacted terrain and was destroyed. The MP survived life-threatening injuries as a result of the high-speed ejection and impact with the ground.

Bird strike to canopy. The MP was No. 2 in a two-ship SAT mission. The MA hit several American white pelicans while flying at approximately 820 feet with greater than 500 knots. At least one of these birds penetrated the canopy, and at least one entered the engine. The MP ejected and sustained major injuries, and the MA was totally destroyed.

Class Bs, Cs, and Others

There was only one Class B, when an augmenter nozzle departed the aircraft, and there were 66 Class C and other reportable mishaps. We had physiological incidents involving GLOC, hypoxia, and toxic fumes in the cockpit. We had departures from controlled flight, uncommanded pitchdown, accidental gun firing and fuel tank jettisoning, and even inadvertent throttle cutoff while activating the PM switch. We had lots of engine abnormalities, including an augmenter nozzle burnthrough and FOD to engines. We had our bird strikes, lightning strikes, and even ventral fins falling off. Then there were the nose landing gear failures, anti-skid failures, and a right main landing gear seized in the up position. There was a broken BAK-12 cable that damaged an ECM pod, and wind and turbulence during landing leading to scraped wings (yikes!), scraped afterburners, and speed brakes, and even landings that were hard enough to damage the horizontal tail. Lots of mishaps, and quite a few that could have easily developed into Class As. Again, if any of these don't sound familiar, spend a few days in your safety office reading the messages to pump up your experience level.

Always remember Rule No. 1. FLY THE AIRPLANE FIRST, and be sure you're getting job one done when stuff's happening. Other than that, hang on to this magazine, and read the other articles to learn from the experiences in other weapons systems. Stay in the books, or get back into them if you've been out for a while, so you'll know what to expect if different things go wrong. There's no substitute for knowing about the airplane you're flying, and that applies to everyone from the newest wingman to the crustiest old pilot around. Leaders: Work to be the kind of pilot you want your new flight leads to be. Let's manage the risks involved and get the mission done as safely as possible. ✈

F-117 FY98

USAF Photo by SSgt Andrew N. Dunaway, II

MAJ BILL WALKOWIAK
HQ AFSC/SEFF

Congratulations to the F-117 community for an outstanding safety year! There were no Class A or B mishaps in FY98. The F-117 Nighthawk also went over the 100,000-flight-hour mark totaling over 105,000 hours to date.

The overall Class A rate for the fleet is 5.69 per 100,000 hours, about twice the average fighter rate. An aircraft that is relatively new usually has growing pains and a higher mishap rate at the beginning of its life cycle. Plus, this aircraft usually operates at night, which is inherently riskier.

The main issue I will cover this year is extended deployment legs and the effects of cumulative fatigue on performance. I strongly urge you to check out NASA's Fatigue Countermeasures Program web site at http://olias.arc.nasa.gov/zteam/home-page.html. It presents a very comprehensive archive of information on in-flight human performance as it relates to fatigue.

Okay, I'm a tanker pilot. Hmmm, what to write about with credibility? I spent many a long moment thinking of this project and how to attack it. Sure, I can get the statistics and mishap summaries from our computer folks. I decided instead to call the 49th Fighter Wing at Holloman AFB. The safety office put me in touch with some "Black Jet" pilots, and we kicked around this idea: long deployment legs. Hey! There ***is*** something I can relate to. I've done nonstop flights from Edwards AFB to Ascension Island. I've even done some 13-hour unrefueled legs. I'm used to flying all night, seeing the sun set and then rise again.

Okay, so what's the hazard? Well, although the back-and-forth threats against Iraq seem to be politically agile and effective, they take a toll on our crews. Our F-117 crews are at a heightened state of readiness at all times. Recent deployments and re-deployments to the desert are testament to the high capabilities of our ground and flight crews and their equipment.

However, these deployment missions often contain an increased amount of risk. Long-haul flying is different than training in that it is relatively benign or boring. One Black Jet pilot told me he had been on an 18.2-hour leg that included 17 in-flight refuelings. He said the flying was easy, and he and the other pilots were in-theater and ready to fly combat missions only 24 hours later. When a crewmember tells you he/she is rested and ready to go, you must consider the source. Pilots are highly motivated. They are not usually the best judges of their own level of alertness. From an article on the aforementioned web site:

"An important phenomenon, highly relevant to operational environments, is that there is a discrepancy between the subjective report of sleepiness/alertness and physiological measures. In general, individuals will report higher levels of alertness than indicated by physiological measures. Data from an international study of flightcrews had an example where the highest subjective rating of alertness occurred at a time when physiologically, the individual was falling asleep within 6 minutes (an indicator of severe sleepiness)."[1]

The fact that we are deploying using long air-refueled legs remains, and so we must do our best to prepare ourselves. Before the mission, it's imperative to live a healthy and fit lifestyle. In fact, it's our duty to do so. Furthermore, as the mission day nears, we must adjust our sleep and wake cycles to best fit our mission. Get an excellent night's sleep at least one night prior. The flight surgeon can, and normally will, prescribe an effective sleep aid prior to very long missions.

We all know there are a lot of pressures before heading out the door. There is a need to do this or that around the house, prepare or pay the bills, get someone to watch the dog, etc. These are in addition to the mission preparation. The excitement is high, and most people have a little trouble laying down and sleeping 8 hours the night before. So, the pharmacological sleep aid is a good and

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safe idea.

Despite the best preparation, the typical Air Force pilot walks around in a sleep-deprived state. In general, we need 8 hours a night for top performance, and most of us don't get that. There are rare exceptions, and we all think we are exceptions—"I operate fine on 6 hours of sleep, always have."

Stimulants, taken to increase alertness during flight, are currently not in favor but have been used successfully in the past. However, the fact remains that the human body requires sleep both physiologically and psychologically. Extending the normal operating range of the human body pharmacologically is temporary and has negative consequences. Although the person is alert, there is still an increase in errors. Also, statistics show that mishaps increase as time on duty increases. At between 9 and 16 hours of duty time, the rate of human performance-related mishaps increases *threefold*.[2]

Operating at night also increases the risks many times. These statistics are based on years of study of long-haul truck drivers and locomotive operators, as well as B-747 crews. To think about it, to ferry an aircraft is quite a bit like driving an 18-wheeler. There are hours of boredom and tedium. Yet you have to stay awake enough to remain on the road (or avoid running into the tanker). So these studies have merit relative to the "fighter drag" mission.

It also takes a while to get back to "normal"—at least 48 hours for sleep deprivation and 1 day for each 1.5 to 2 time zones for circadian rhythm resynchronization. The truth is you wouldn't skip eating to have more time, but you would skip sleep. Both are vital requirements to good performance. The bottom line is that the individual crewmember has a duty to be as fit and ready for duty as possible.

How sharp are you at the end of a long deployment flight? Let's say you arranged your sleep patterns, got a good 9 hours of sleep the night before, flew a perfect mission, and are on final approach. What is your alertness state? We know from research that you feel better than you actually are. Another excerpt from the Fatigue Countermeasures Program web site puts it in perspective:

"Another approach to providing relative estimates for risk or the role of fatigue will be to provide an accepted metric for comparison. For example, a recent study determined an equivalency between sleep loss and blood alcohol concentration. Using a standard performance test in both sleep loss and alcohol consumption conditions, investigators could provide a blood alcohol concentration metric to compare results from the sleep loss condition. Results demonstrated that after 17 hours of continuous wakefulness, cognitive psychomotor performance decreased to a level equivalent to a blood alcohol concentration of 0.05 percent. After 24 hours of continuous wakefulness, performance was approximately equal to a blood alcohol concentration of 0.10 percent. This approach provides a metric already accepted in other safety domains and allows some comparison for fatigue equivalency."[3]

Or you could say, "How about a couple of shots and an ILS?" Sounds ridiculous, but it's about the same thing after a very long sortie.

The methods available to combat this long-term fatigue and the associated reduction in flight safety are found at many levels. The national leadership must keep the use of these extended deployment legs as force multipliers and shows-of-force to as few as is necessary. Higher headquarters must set and enforce strict crew rest policies, both pre- and post-mission. Squadron leadership must relieve the appropriate flight and maintenance crews of duty long enough before the mission to provide adequate rest. And, most importantly, the individual must consider it imperative to minimize the risks associated with normal human limitations. This is done by exercising regularly, ensuring adequate sleep and nutrition, and being an expert in the aircraft's systems, missions, and tactics. And finally, a culture must be created in each unit that is attuned to the proper preparations required for these fatiguing missions.

I have flown many long-haul missions and find that there is a difference in time compression that is worthy of note. In the usual fighter training mission, the pilot activity is fast and furious. I was recently given the opportunity to see this first-hand, by riding in the "trunk" of an F-16D block 50. The training was impressively compacted. There was not a wasted minute during the entire 2.9 hours.

The opposite is true during a 16-plus-hour aircraft ferry flight. The mission events spread out. The danger I find is that you relax and slow down. No one can remain supremely alert the entire mission. This is a normal consequence of this type of flying. There are a few periods of increased activity—like formation rejoins, air refueling, instrument flight, and landing. The long lulls in between those events are like switching gears. The times of increased risk are during the changes.

It's important to plan and anticipate the times of increased workload and get psychologically "pumped up" for them. Do some isometrics, deep breathing, review checklists, and, basically, wake up. The danger is in droning into the compression times in your relaxed state. On the other end of the crunch point, the danger time is right afterwards. You tend to relax a lot. I remember falling asleep once. The air refueling onload was completed, our position report was made, and we had 7 hours of over-ocean cruising to our destination. It's important to anticipate that reaction as well.

So, in conclusion, take even these long and boring flights seriously, read and heed a lot of the professional reports in the NASA-Ames web site, and we will increase the effectiveness and lethality of our bombing operations from the F-117 platform. ✈

[1]Rosekind, M. R., & Neri, D. F., Dinges, D. F. (1997). "From Laboratory to Flightdeck: Promoting Operational Alertness" *The Royal Aeronautical Society* (pp. 7.1-7.14). London: The Royal Aeronautical Society.
[2]Ibid.
[3]Ibid.

LT GEN GORDON A. BLAKE
AIRCRAFT SAVE AWARD

3RD QUARTER, CY98

SSgt Robert Garmendia (Tower, Local Controller), 47th Operations Support Squadron, Laughlin AFB, Texas. During a normal day at Laughlin AFB, Sgt Garmendia taxied a flight of two T-38s into position on the runway and instructed the pilot to hold. He then approved a flight of three T-38s to cross the active runway. He noticed the T-38s who had been instructed to hold start their departure roll. Local immediately checked the progress of the departure end crossing operation and knew they would not be clear. Without hesitation, he instructed the departure traffic to abort takeoff after the flight was 1,000 feet down the runway and into afterburners. SSgt Garmendia's situational awareness averted a potential hazardous situation, possibly saving five lives and more than $2.2 million of Air Force assets.

TSgt Gene A. Costello (Tower, Local Controller), Det 1, 24th Wing, Soto Cano AB, Honduras. TSgt Costello reported early to work and received a briefing from the Honduran controller. The Honduran controller told him there was a flight of three T-27s taxiing to the runway for departure. TSgt Costello acknowledged the briefing and continued with the tower's opening checklist. While checking the airfield status, he overhead the Honduran controller clear the flight of T-27s for takeoff. TSgt Costello looked up from his checklist, noticed a vehicle on the runway, and immediately instructed the Honduran controller to cancel takeoff clearance. TSgt Costello's attention to detail and awareness of his surrounding environment prevented a possible Class A mishap.

Mr. Albert W. Suchcicki (Tower, Flight Data/Ground Controller), 439th Operations Support Squadron, Westover ARB, Massachusetts. The local controller issued a landing clearance that included a "Check wheels down" call to a PA-32. The pilot reported his position at 4 mile final. The controller advised the pilot that he was not in sight, but to continue. Mr. Suchcicki finally saw the aircraft over the numbers with no gear down and immediately told the local controller, "No gear! Send him around!" Mr. Suchcicki's alertness prevented major damage to the aircraft and possibly saved the pilot's life.

MSgt Gary Ryckman (Tower, Local Controller), 258th Air Traffic Control Squadron, ANG, Johnstown, Pennsylvania. MSgt Ryckman cleared an M20J for landing and instructed the pilot to "Check wheels down." The pilot acknowledged the local's transmission. After seeing the aircraft's gear was still up, he repeated to the pilot, "Check wheels down." Again, the pilot acknowledged the gear check. Finally, after realizing the pilot still had his gear retracted, MSgt Ryckman sent the aircraft around on short final to the runway. The pilot brought the aircraft back around and landed without incident. It was later discovered there was a faulty light indicating to the pilot the gear was extended, when in reality it wasn't. MSgt Ryckman's aggressive actions and attention to detail prevented up to $100,000 damage to the aircraft and prevented the pilot from possible injury or loss of life.