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FY 2003 Year in Review
How did we do?

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MESSAGE From the Chief of Safety

A SUMMARY OF USAF FLIGHT MISHAPS IN FY03

The Air Force's flying safety record improved slightly in FY03 compared to FY02. While we successfully supported Operations ENDURING FREEDOM, IRAQI FREEDOM and NOBLE EAGLE, we reduced the Class A Flight mishap rate 9 percent from the spike in FY02. That said significant challenges remain as contingency operations and training the force continue to stress operations and personnel tempo. As you know, Secretary Rumsfeld challenged each Service to reduce mishaps by 50 percent over the next two years. Given that in this timeframe, the numbers/types of aircraft, manning levels, and technologies are essentially fixed, the key to reducing the AF mishap rate lies in more effective risk management in all facets of our demanding operations.

The AF closed out FY03 having flown over 2.23 million hours, approximately 130,000 hours less than in FY02. In FY02 we had 35 Class A flight mishaps—the highest since 1994. FY03 saw 31 Class A flight mishaps and 22 destroyed aircraft—three more than FY02. For reference, the 10-year average for Class A flight mishaps is 29.2 and destroyed aircraft is 22.9. The AF had seven Class A flight mishaps in FY03 during AOR contingency operations as compared to 12 last year.

As we mature, our thinking about flight safety as a key component of resource protection and operational readiness and review FY03, two things are apparent. The human cost of losing 10 lives in flight mishaps is not acceptable and destroying 22 aircraft is not sustainable over the long-term. Therefore, we have to explore all areas where we can improve. Seven of 10 fatalities were controlled flight into terrain (CFIT) mishaps, six occurred on a single HH-60G during night refueling in the AOR, another was an F-16 CFIT. Of the remaining three fatalities, two were the result of midair collisions (A-10, F-16) and one was a T-38 runway departure that ended in an uncommanded, unsuccessful ejection. In the first six months alone, we had five midair collisions, resulting in six lost aircraft and the previously mentioned two fatalities. To improve in these areas requires more focused leadership, the "right" oversight, and ORM.

"Ops-related" mishaps—those involving operational processes or human factors issues—continue to drive flight mishap statistics. In FY03 the AF did not lose any aircraft to direct enemy action; 18 of 31 Class A mishaps (58 percent) were Ops-related, and resulted in 10 aviation fatalities. Therefore, it is fundamental to stress that the pilot, flight lead, aircraft commander, supervisor, DO, squadron commander, etc., have decision authority over the amount of risk we accept during training or routine operations; with smart risk assessment and an unwillingness to accept unnecessary risk we can prevent mishaps. Supervisors, crews, pilots and maintainers must call "Knock it off" whenever risks are climbing to a point where questionable decisions get made. We can always come back tomorrow or next week to get that all-important IP upgrade completed, or to fill that low-level training square when undue risk is present. Risk management must become a priority at every level, for every person on every mission.

The seven months I spent on the Space Shuttle Columbia investigation gave me a different lens to view the Air Force aviation safety program. In some ways I like what I see in comparison, but in other areas I find the Air Force has many of the same organizational and safety deficits that NASA did. We need to aggressively attack the "front end" of mishaps and focus more effort on mishap prevention, and hopefully, less on mishap investigations. The Safety Center is going to take great care to focus not only on the widget that broke or the pilot error in mishaps, but more on the organizational structure and safety culture of the units involved. In many cases these issues underlie the real causes of our mishaps. The Columbia Board found the organizational shortfalls in NASA were just as causal as the technical failure. We in the Air Force must look for, identify and root out blind spots—they are out there! The tough part is finding them—that's why they are blind spots. Nobody sees them until it's too late.

While you continue the outstanding service to America and our Air Force, realize that safety is a force multiplier. We have a great deal to be proud of as professional airmen serving the greatest country in the world. Godspeed, and fly safe! ★★

Kenneth W. Hess, Major General, Chief of Safety

USAF Photo

F-16

MAJ GREGORY R. "CHAIRMAN" NEWMAN
HQ AFSC/SEFF

The majority of this year's Class As were ops-related.

After an outstanding FY02, the mishap rate for the Viper this year was less than stellar. There were 12 Class A mishaps in FY03 compared to only seven last year (11 of those 12 were rate producers). In all, we lost 10 F-16s, damaged five more, and lost two fellow brethren in fatal mishaps. Compared with last year's rate of 1.90, this year's F-16 mishap rate was 3.22. Although not as good as last year, the Viper community still fared better than the lifetime mishap rate of 4.19 and the 10-year average of 3.32. One thing of note, however, was that the majority of this year's Class As were ops-related. Additionally, most involved human factors of one type or another. Let's have a look at some of the specifics from each mishap and see what we can learn from them.

Class A Mishaps

The following is a summary of this year's Class A mishaps: two midairs, four controlled flights into terrain (CFIT), two bird strikes, one fuel starvation, one ground collision, and two catastrophic engine failures. (This information comes from AIB reports unless otherwise indicated.)

• F-16CG midair. During a 4v4 Air Combat Tactics mission as part of an Instructor Pilot Upgrade (IPUG) sortie, Mishap Pilot 1 (MP1) and MP2 collided. The mishap occurred on the second sortie of a planned pit-and-go. The mishap engagement began after an element swap for armament considerations. MP1 (#1) and MP2 (#4) left their Combat Air Patrol as a four-ship. After MP1 directed the wingmen to target their respective groups, MP2 took a simulated missile shot. Without looking to see where MP2 was, MP1 directed and executed a non-clearing turn into his wingman. At that moment, MP2 began a turn into MP1 to reposition to the other side of the formation. Approximately three seconds prior to impact, MP2 recognized he was on a collision course with Mishap Aircraft 1 (MA1) and abruptly pushed forward on the control stick in a last ditch effort to fly under MA1. The two aircraft impacted left wing to left wing at approximately 32,000 feet MSL. Both aircraft were destroyed in the collision. MP1 initiated a successful ejection. MP2 sustained fatal injuries.

• F-16CG midair. The mishap aircraft were flying as the second element of a four-ship (#3 and #4) night vision goggle syllabus upgrade sortie. During the return to base (RTB) on a night radar-assisted trail recovery, #4 (MP2) channelized his attention on a failed vertical velocity indicator. He ceased all remaining crosscheck procedures required to maintain his formation position and

obtained an undetected 100-knot closure on #3 (MP1). Failing to recognize the closure until just prior to impact, MP2 collided with the lead aircraft (MA1), passing underneath and slightly to the left. After a brief discussion, MP1 assumed that a close pass rather than a midair collision occurred and normal recovery procedures were continued to uneventful full stop landings. Impact damage to both aircraft was identified by the ground recovery crew in the dearm area and the mishap aircraft were shut down.

• F-16C CFIT. The MA was participating in a four-ship opposed Surface Attack Tactics (SAT) training mission. The Mishap Flight's plan was to simulate the delivery of Laser Guided Bombs. During a defensive reaction to Red Air, the MA impacted the ground and was destroyed. The MP made no attempt at ejection and was fatally injured. The primary cause of the mishap was determined to be the MP's loss of situational awareness (SA), resulting from channelized attention and a visual illusion caused by unusual environmental conditions. On the day of the mishap, the white salt flat covering the range was covered by two to three inches of clear, calm water, which created a mirror-like image between the ground and the sky. This mirror effect diffused the horizon, giving the illusion that there was unlimited maneuvering space, when in fact, the MA was operating perilously close to the ground.

• F-16C CFIT. The mishap sortie was briefed and flown as a defensive Basic Flight Maneuvers IPUG with the upgradee on defense. After several uneventful sets, the MP started a 3,000 feet set. Shortly after the fights on call, the MP initiated ejection prior to impacting the water. Ejection was successful and the MP was rescued, treated and released.

• F-16C CFIT. The MA was number six of a six-ship air demonstration. The MP performed the Afterburner Takeoff and Maximum Climb to Split-S maneuver. During the climb, the MP initiated a roll to inverted and began a limiter pull for the Split-S portion of the maneuver. Prior to completion of the Split-S, the MP initiated a successful low altitude ejection.

• F-16B CFIT. While flying a practice straight-in simulated flameout (SFO) approach and landing at an auxiliary field, the MA clipped power lines short of the intended runway. The MA safely returned to home station. The investigation is on-going.

• F-16CG Birdstrike. The MA was number two of a continuation training night 2v2 tactical intercept sortie. Shortly after takeoff, the MP reported seeing a grayish object flash in front of him followed by a loud bang and an apparent fire in front of his aircraft. The MP then experienced severe deceleration. The pilot initiated emergency procedures for an engine fire by raising the nose of his aircraft and depressing the "stores jettison" button to release his external fuel tanks. The MP then moved his throttle to assess engine response. After assessing the engine was not responding to his throttle inputs, the MP decided the MA was no longer capable of sustained flight and initiated ejection. The MP ejected approximately twelve seconds after liftoff. Results of the engine analysis were consistent with damage caused by ingestion of a large bird. Additionally, multiple duck remains were found on the runway following the mishap.

• F-16C Birdstrike. The mishap sortie was planned and flown as a four-ship surface attack ride. On return to base, the MP and his student pilot flew an SFO at an auxiliary field. During climbout after the SFO, the MP observed a large bird pass directly beneath the MA. The MP heard a loud bang and grinding noise, could not maintain a safe altitude and airspeed, and initiated ejection. The MA was destroyed on ground impact. The MP received minor injuries and was released.

• F-16CG Fuel Starvation. The mishap sortie was flown as a two-ship AOR contingency mission. After the flight's second air refueling, the MP failed to notice a trapped fuel condition developing. Completing their scheduled vulnerability period, the mishap flight proceeded to the tanker for a third air refueling. Just prior to receiving fuel, the MP noticed the fuel low lights were illuminated and the MA flamed out shortly thereafter. No airstarts were attempted due to the MP's recognition of the fuel starvation condition. The MP initiated a successful ejection and was recovered. The MA was destroyed on ground impact.

The primary cause of the mishap was determined to be the MP's loss of situational awareness.

• F-16CG Ground Collision. (This mishap was not rate producing.) During taxi-back after an uneventful AOR contingency mission, the MP recognized a loss of nose wheel steering and a B-system hydraulic failure. Unaware of the proper actions to take, the MP failed to stop the MA in a timely manner and continued to taxi to the parking ramp. Upon reaching the parking area, the MP realized he had no brakes and no means of steering the MA. Just prior to impact with a parked and fully combat-loaded F-16, the MP shut down the MA's engine. Several munitions were burned in the ensuing collision. The MP emergency ground egressed the MA uninjured. Two aircraft and several munitions were badly damaged.

• F-16CG Engine. The mishap sortie was briefed and flown as direct support for a Close Air Support mission. On the ingress for a low altitude delivery, the MP heard a loud bang and felt severe vibrations as the MA decelerated. The MP immediately zoomed the MA and turned toward the nearest emergency airfield. Airstart attempts were unsuccessful, and after the MP's wingman confirmed a fire, the MP initiated a successful ejection. The MA was destroyed on ground impact. The MP received minor injuries in the ejection.

• F-16C Engine. The mishap sortie was briefed and flown as an opposed 4v2 SAT mission. The MP was number two of the four-ship. At medium altitude, the MP heard a loud "pop." This was followed by the illumination of the engine firelight, and another member of the formation confirmed a fire. When cockpit and external signs of a fire continued, the MP initiated a successful ejection. The MA was destroyed on ground impact. The MP received only minor injuries during the ejection.

A "common thread" would be task misprioritization and channelized attention.

Class B Mishaps

The F-16 fleet experienced a total of seven Class B mishaps in FY03, but I will only comment on two (most of the others are not flight or flight-related).

• F-16CJ. The mishap flight was deployed as part of an Air Expeditionary Wing. After an uneventful five-hour sortie, the mishap flight entered Instrument Meteorological Conditions (IMC) while returning to base. While in IMC conditions, both aircraft encountered hail and lightning, and both aircraft sustained significant hail damage to their munitions, pods and radomes. Both aircraft landed uneventfully, were repaired by maintenance and returned to service.

• F-16CG. The mishap sortie was briefed and flown as a two-ship Airborne Forward Air Control Close Air Support mission. On the "last pass" the MP fired rockets at the target. During the MA's recovery, the MP heard a loud bang and observed indications of an engine stall. An emergency was declared and the MP turned toward the nearest emergency airfield. Enroute, the engine failed, but was successfully restarted. The MP successfully accomplished a straight-in SFO at the emergency airfield.

Lessons Learned

There are a couple of lessons I think we can glean from this year's mishaps. First, "Trust, but verify." Just because something is briefed, doesn't mean that it's being executed or flown that way by every member of the flight. A case in point is the midairs. The Viper community experienced two midairs this year. One resulted in a fatality and two destroyed aircraft. Both were Class As. Every midair (read that again!) occurred between aircraft in the same element! If a "common thread" could be drawn between these mishaps it would be task misprioritization and channelized attention. These two factors were specifically cited in both accidents. Additionally, a breakdown in basic formation responsibilities seems to be an underlying thread in each of these mishaps. Remember, back to UPT…AVIATE, NAVIGATE, AND COMMUNICATE! If you're doing anything else, before that first task is "in the bag," you're wrong. Targeting and sorting with your skull in the radar is great, but you must stay visual and stay in the briefed formation position first! (Remember: V.F.R. = visual, formation, radar.) Going "blind" and immediately calling it, taking actions to lag away from the last known position of your flight member, etc., are all critical to effective and safe training.

The second lesson learned is the ground has a Pk approaching zero. We experienced four CFIT mishaps this year. The good news is that only one of these resulted in a fatality. Whether

on an air-to-ground sortie or doing BFM, we always need to keep SA on the ground and our altitude. Use the capabilities of the Viper wisely. Set ALOW, CARA and PGCAS altitude warnings that make sense. This can only help to increase your altitude SA. Leaving the PGCAS altitude set at the "default" setting of 50 feet doesn't do a bit of good. Brief and then debrief any altitude deviations, and never assume your buddy is aware of where the floor is.

The third lesson learned is the often time-critical nature of an immediate game plan for an engine failure. Know where your emergency and alternate divert fields are located at all times along your route of flight. Practice in the simulator to drive home the procedures for the different engine malfunctions that can occur…so when it happens, your actions are second nature! If not for the quick thinking of the MP with the engine problem on range (see second Class B mishap above), the Viper community could easily have had an additional Class A.

Finally, some food for thought. We continue to crash jets and kill pilots…and we're not doing it in new and unusual ways. I hate to harp on the "basics," but after sifting through the mishap data above, I think you'd agree that many of these mishaps were preventable. Crawl, walk, run…doing step 1 before step 2…proper mission planning…monitoring your wingman, etc.

Bottom line is that we need to reduce risks at every step possible. Flight leads, IPs and squadron supervisors need to ask whether a mission's events need to be at the 9-G level--maybe the 5-G level will work today, and help better solidify basic capabilities. All these things constitute *basic airmanship*. Leaning forward to get the best possible training out of every bit of JP-8 is something we all do. I do it, too. But maybe, as a community, we need to step back and reexamine what we're doing from time to time. Are we planning a LOWAT, opposed SAT mission with all the bells and whistles because it's fun (which it is), or because we really see a need to train that way? Is that how we've been fighting in our recent conflicts? If not, why are we still training that way? Shouldn't our training mirror the way we plan to fight? Doing a night rope-a-dope NVG 4vX air-to-air mission…are we training that way because we can, or because we really need to in order to counter a real threat?

Additionally, I know as a fighter pilot, none of us wants to be the weak link. We all want to "look good in the shower," but when do we call a KIO? Some of the missions we fly require a high degree of proficiency *and* currency. How many of us can really say, "I'm ready to take this jet to the limit today." IPs, flight leads and wingmen alike need to plan their training to the lowest common denominator in the flight. That means not doing varsity-level tactics with a wingman just out of the RTU, or with an RPI-8 pilot whose currency could be better, or with a squadron member who just came off an extended DNIF or leave period.

Although not as good as last year, the Viper community can take pride in a mishap rate that still fared better than the "lifetime" and "ten-year average" mishap rates. We can do better, though. Many of the mishaps in the Viper community, and in the AF at large this year, were tied to human factors. Sound tactics are the foundation to safe flying operations. Come up with a good plan, brief it well, and then follow that up with verifying, *in-flight*, that what you briefed is actually being executed. "Trust, but verify." With a few additions, the Viper community can look forward to a great FY04!

We all want to "look good in the shower," but when do we call a KIO?

F-16

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	11	3.22	6	1.75	11	3.22	2	2	341,995
5 YR AVG	11.6	3.33	5.8	1.66	10.8	3.10	2.4	2.8	348,675.4
10 YR AVG	11.6	3.20	4.9	1.35	11.0	3.03	2.2	5.0	362,508.0
LIFETIME CY75-FY03	304	4.13	72	0.98	290	3.94	77	114	7,354,962

USAF Photo

Bombers

MAJ DAN "RCR" BAKER
HQ AFSC/SEFF

The single common thread between the majority of all the mishaps this past year was engines.

The bomber community experienced a mediocre safety record this past year. Compared to last year, all three weapons systems' Class C events increased by two to four times. Both the B-1 and B-52 Class B rates were greater for FY03 than their five- and ten-year averages, and the B-1 experienced one Class A flight mishap. Fortunately, this did not involve the loss of an aircraft or the loss of life. While not tracked as a flight statistic, a B-52 was involved in a Class A flight-related mishap that resulted in the loss of a US Marine aviator, injuries to 10 others and two Marine helicopters destroyed.

The single common thread between the majority of all the mishaps this past year was engines. Five of the seven Class B mishaps were engine-related. Additionally, nearly all the B-52 Class C mishaps were engine-related. While the loss of a single engine in-flight does not usually raise too much attention on any of these aircraft, the numbers of reportable mishaps add up to big dollars for the Air Force. Sometimes the loss of a single engine could be a precursor to a more serious chain of events. The loss of the B-1 at Diego Garcia two years ago is a prime example. A strange sequence of events stemming from the shutdown of a single engine led to the eventual ejection by the aircrew and loss of the aircraft. Operators, maintainers and depot personnel all need to realize the loss of an engine for a simple and inexpensive problem could lead to a much worse situation.

B-1B

The B-1s experienced a single Class A flight mishap last year. During an operational sortie a GBU-31 JDAM released improperly from the aft weapons bay. At release, the forward hook release failed to open due to sheared rivets within the hook release assembly. The momentum of the weapon caused it to release improperly and cause damage to the inside of the aft bay, the CRL and the aft weapons bay spoiler. The AIB determined the rivets were sheared when the mishap weapon was loaded on the CRL in an "un-level" position. This placed excessive force on the rivets, causing them to shear.

Class Bs

• During a stateside continuation-training sortie, an aircrew performed a high-speed abort during takeoff. According to Central Integrated Test System (CITS) data, the Master Caution light, VSD "Data," "AOA 1" and "CADC 1" caution lights illuminated at approximately 171 KIAS, shortly after the mishap aircraft had begun to rotate. The mishap crew initiated an abort and brought the aircraft to a stop in the runway hammerhead. Subsequently, heat from the brakes caused extensive damage to the lower landing gear assembly, to include all main brakes, tires and wheels.

• During an operational sortie, the mishap crew shut down the number two engine for EGT spikes. Inspection of the engine revealed the fifth stage flapper valve of the bleed air manifold had liberated, allowing ninth stage bleed air to re-enter the engine, causing an overheat condition and compressor stall. Non-privileged analysis of the recovered fifth stage flapper valve indicated a critical safety wire may have been installed incorrectly.

• (This is a different mishap than the one outlined above, but very similar circumstances.) During an operational sortie, the mishap crew shut down the number two engine for EGT spikes. Inspection of the engine revealed the fifth stage flapper valve of the bleed air manifold had liberated, allowing 9th stage bleed air to re-enter the engine, causing an overheat condition and compressor stall. Non-privileged analysis of the recovered fifth stage flapper valve indicated a critical safety wire to have worn through

• Approximately nine hours into a scheduled 11.5-hour combat sortie, the number four engine experienced a compressor stall, with EGT exceeding 1000 degrees C. The crew shut down the engine and returned to base.

• After a continuation training sortie, Foreign Object Damage (FOD) was discovered to the number three engine. Investigators discovered several screws missing from the number three engine boundary layer seals. Two screws matching the type used to install the panel were found on the runway. Analysis of a screw recovered from the mishap engine revealed it matched the ones found on the runway. These screws were determined to be the improper screw for this application, being too short to properly engage the nut plate.

Class Cs and Class Es

The B-1 community experienced 15 Class C flight mishaps. These included four FOD, three dropped objects, two birdstrikes, and six single occurrence events. There were 46 Class E events. These included 44 in-flight engine shutdowns (12 ADS, eight Oil Indications, eight Compressor Stall, four Vib Hi, three CSD, one OWF – Bleed Air, eight misc.) and two Smoke and Fumes.

B-2

The B-2 community had a good year with only two Class B, four Class C and no Class E mishaps.

Class Bs

• An aircrew on an operational mission shutdown the number four engine for vibration and low oil pressure. Teardown of the engine revealed the frame oil supply tube had cracked, resulting in a loss of oil.

• During a local training sortie, the MA aft nose landing gear door pushrod failed during landing gear extension. As a result, the gear door was unrestrained in the wind stream, which caused damage to the door and fuselage. The aircrew landed the aircraft uneventfully after assessing the situation.

Class Cs

• During a local training sortie, an aircrew experienced the loss of hydraulic systems one and four due to a failed cryofit fitting in the right wheel well. After landing, a fire developed on the right main landing gear when hydraulic fluid contacted hot brakes. Fire department personnel extinguished the fire.

• Sometime after takeoff, a 4″x8″ piece of the number two engine exhaust duct liner broke off and struck two upper exhaust lip tiles. The damage was discovered post-flight.

• During air refueling on an Initial Qualification sortie, contact between the refueling boom and the B-2 refueling receptacle resulted in damage to the A/R receptacle and boom ice shield.

• Aircraft tiles were found missing and damaged post-flight.

The B-2 community had a good year

B-52

The B-52 community had a good year in regards to flight mishaps, with no Class A or B mishaps, seven Class Cs, and 19 Class Es. Unfortunately, there was one Class A flight-related mishap.

Class A, Flight-related

• A B-52 crew was conducting a training mission from a deployed location. The mission involved release of weapons on a non-US range in the AOR. The bombing activities were being observed by a group of US Marine and Navy personnel. On the first live pass, the mishap crew released nine M117 unguided

This mishap is filled with lessons learned which can be applied throughout the CAF.

munitions, which subsequently impacted near the ground forces location. One Marine helicopter pilot was killed, ten others were injured and two Marine CH-53E helicopters were destroyed.

This mishap is filled with lessons learned which can be applied throughout the CAF. It is available through safety reporting channels and should be presented to all AF units that employ air-to-ground munitions.

Class Cs

- Engine FOD from an undetermined source.
- Fourth stage engine fan blade liberated in-flight, causing internal damage to the engine. The aircrew safely recovered the aircraft.
- FOD from an undetermined source caused fatigue in a fourth stage fan blade, which eventually failed due to fatigue.
- An engine main bearing failed, causing the oil to over-temp and damage the engine.
- Constant speed drive failed, resulting in illumination of GEN 1 caution light. Aircrew shut down the engine and returned to base.
- An engine fire occurred on takeoff when a critical mounting bracket failed. The aircrew aborted the takeoff and successfully shut down and egressed the aircraft.
- During air refueling with a KC-135, the receiver aircraft impacted the refueling boom, damaging the ice shield.

Class Es

The B-52 community experienced 23 Class E events last year. These included 19 propulsion events (12 oil, three fuel, three electric, one fire indication), two smoke and fumes, one loss of control in-flight and one physiological event.

B-1

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	5.61	6	33.68	0	0.00	0	0	17,814
5 YR AVG	0.4	1.72	5.8	24.97	0.2	0.86	0.0	0.0	23,231.8
10 YR AVG	0.4	1.61	3.9	15.71	0.3	1.21	0.2	0.4	24,824.1
LIFETIME CY84-FY03	14	3.39	46	11.14	7	1.69	6	11	413,024

B-2

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	2	32.83	0	0.00	0	0	6,092
5 YR AVG	0	0.00	1	13.92	0	0.00	0	0	5,746
10 YR AVG	0	0.00	1	11.85	0	0.00	0	0	4,218
LIFETIME FY90-FY03	0	0.00	5	11.55	0	0.00	0	0	43,298

B-52

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	1	4.56	0	0.00	0	0	21,934
5 YR AVG	0.0	0.00	3.6	14.89	0.0	0.00	0.0	0.0	24,172.0
10 YR AVG	0.2	0.80	2.1	8.44	0.1	0.40	0.4	0.0	24,888.4
LIFETIME CY55-FY03	97	1.28	183	2.41	76	1.00	100	311	7,590,830

F-15

USAF Photo

MAJOR (CAF) JASON "DUKE" SMITH
HQ AFSC/SEFF

Yet another busy year is in the books, and it's time to look at how the Eagle community fared in terms of safety. The benchmark we most commonly refer to first is the Class A mishap rate. The F-15A-E experienced four "rate producing" Class A mishaps this year, for a rate of 2.18 mishaps per 100,000 flying hours. This is down slightly from 2.57 last year, which is certainly a positive trend, especially in light of having carried out significant combat operations. *(Editor's Note: The FY02 rate changed from 2.65 to 2.57 due to flying hours that changed after the rate was initially reported.)* Also, two of the four mishaps were "dollar only" Class As where damage exceeded $1M, but the aircraft was not destroyed. Let's take a closer look at the Class A mishaps.

Class A Mishaps

• During an Air Combat Maneuvering (ACM) training sortie, two F-15Cs collided while maneuvering visually against another "Bandit" aircraft. The Accident Investigation Board (AIB) found the pilot who had been designated as the "supporting fighter" misjudged his leader's geometry, and failed to deconflict his flight path while maneuvering against the Bandit. The resulting collision rendered the supporting fighter's jet uncontrollable, but the pilot ejected successfully. The pilot of the other aircraft was able to land safely. Obviously, the outcome of this mishap could have been much worse.

• During a Basic Fighter Maneuvers (BFM) sortie, and while performing a reposition maneuver from an offensive setup, an F-15E departed controlled flight and entered a spin. The crew was unable to recover and ejected safely. It was discovered that the mechanical input shaft to the right stabilator actuator had disconnected due to a lock nut coming off. The AIB determined the lock nut came off due to improper depot-level repair during the last overhaul. Depot personnel had failed to install the required cotter key that prevents the nut from backing off. When the input shaft to the stabilator disconnected, it resulted in the right stabilator traveling to and remaining at twenty-five degrees trailing edge up, precipitating the departure. As the aircraft departed controlled flight, radome imperfections from a previous repair then played a role in causing the spin. The radome repair was found to not be in accordance with required specifications.

• An F-15C experienced major engine damage due to oil starvation. The AIB found that an improperly installed chip detector fell out prior to or shortly after takeoff. A check valve that should have prevented oil from leaking out of the opening failed, and an oil leak developed. The low oil pressure warning light

The Class A mishap rate is down slightly from 2.57 last year.

came on just as the number three engine bearing failed. The pilot shut the engine down and recovered uneventfully.

• An F-15E experienced extensive engine damage when a piece of the second stage stator liberated. The fan, compressor and turbine sections were damaged, but the crew recovered safely.

Class B Mishaps

There were 10 Class B mishaps, seven of which were engine-related. The engine mishaps included several Foreign Object (FO) ingestions, a damaged heat exchanger, afterburner burn through, and a bird ingestion. In another (ground ops) incident, a person receiving an incentive flight inadvertently jettisoned the canopy. There were also two Class B mishaps involving landing gear problems. In one of these, a rigid link on an F-15E failed, which prevented the main landing gear wheel from aligning with the direction of travel when the gear was extended. There were normal "down and locked" indications prior to landing. After touchdown the jet pulled slightly to one side, but was controllable. The crew managed to stop the aircraft on the runway, and safely egress. The landing gear was extensively damaged. A fusible link has been developed to replace the current failure-prone, rigid link. Operational testing of the new link is underway.

Loss of control inflight stands out with 30 reported events.

In the other landing gear mishap, an F-15C experienced a Utility A hydraulic failure. After the landing gear was extended using the emergency gear lowering system, the gear indicated "down and locked." Immediately after touchdown, howerver, the left main gear collapsed and the aircraft began to veer to the left. The aircraft successfully engaged the approach end cable, but still departed the prepared surface beyond the cable. The aircraft remained upright and came to rest on the left wingtip, left horizontal stabilator, left external wing fuel tank, centerline external fuel tank, nose gear, and right main landing gear. The pilot shut the engines down and ground egressed uninjured. The gear collapse was attributed to the jury links unlocking just prior to touchdown. Inadequate downside hydraulic pressure on the landing gear following an emergency gear extension was determined to be a factor.

Other Issues

Several other issues were highlighted in other mishaps throughout the year. There were 10 Class C mishaps where horizontal stabilator leading edges departed in flight. While this has been an ongoing problem attributed to water intrusion and age, we are also seeing the new leading edge structures that were designed to combat the aforementioned problem starting to come off at an alarming rate. The new leading edge assembly is referred to as the "Gridlock" system, and four out of 10 of the lost leading edges in FY03 involved the new Gridlock assembly.

Another issue that warrants discussion here is the issue of brakes locking during takeoff. There were three cases where this occurred in FY03, and all involved the F-15E. By way of background, the F-15E's parking brake system was originally designed so the parking brake would automatically disengage when the throttles were moved out of idle. From Aug 99 to Feb 02, however, there were five Class C mishaps where F-15Es landed with locked brakes. It was determined that the automatic nature of the parking brake release system was to blame. The fix was TCTO #1F-15E-780, which modified the brake hold circuitry in the parking brake system such that the parking brake could only be manually disengaged. Since the TCTO was completed, there have been no "landing with locked brakes" mishaps, but three "locked brakes on takeoff" Class C mishaps have occurred. Coincidence, perhaps? That doesn't seem likely, but depot investigators have not yet been able to conclusively determine why the failures are occurring.

Loss of control inflight events also stand out with 30 reported Class E events. In a large number of the events, mis-rigging was found to be the cause. As the jets get along in age, it seems that rigging sensitivities increase. It would seem reasonable to say that checking rigging tolerances more frequently may prevent some of these occurrences.

F-15Es also experienced a number of "loss of displays" events. Most of these were found to be Multi-Purpose Display Processor (MPDP) and Central Computer (CC) problems. The Suite 5 Advanced Display Core Processor Upgrade is envisioned as

a solution to the problem, but it may be some time before sufficient funding facilitates this upgrade.

Lessons Learned

So, what do we take away from the FY03 occurrences? Well, as is so often the case, there are few new lessons from which to learn. After having operated since 1999 without a midair collision, once again we've proven that two objects cannot occupy the same space at the same time. Clearing one's flight path must be the primary cockpit tasking, but there are certainly other tasks demanding attention as well. To be an effective fighter pilot you must be able to juggle a number of tasks, but if your "bucket" gets too full, the item that simply can't be dropped is clearing your flight path. Continuing this line of thought, while there's no denying the long-standing contract that says wingmen must miss leads, this does not completely absolve leads from also ensuring deconfliction in the dynamic maneuvering environment.

Engine problems continue to occur, and there's no reason to think this will change anytime soon. As stated last year, sound systems knowledge and being well-versed in emergency procedures can have a very positive effect on the end result of an engine problem. Be ready to deal with the event when it happens airborne by preparing on the ground at one "G" and zero knots beforehand.

On the subject of the Gridlock issue, although only a Class C mishap usually results when one lets go, it is simply unacceptable for pieces to be falling off of airplanes. A vertical stabilator leading edge coming off at high speed led to a fatal loss of control mishap just last year. While that may have been an isolated case, it's only a matter of time before more serious damage occurs, either in an incident similar to last year's tragic one, or by another jet hitting/ingesting the object, or even by someone on the ground being in the wrong place at the wrong time. The F-15 Program Office is currently working on mitigation efforts, and by the time this article is published, there should be a plan in place.

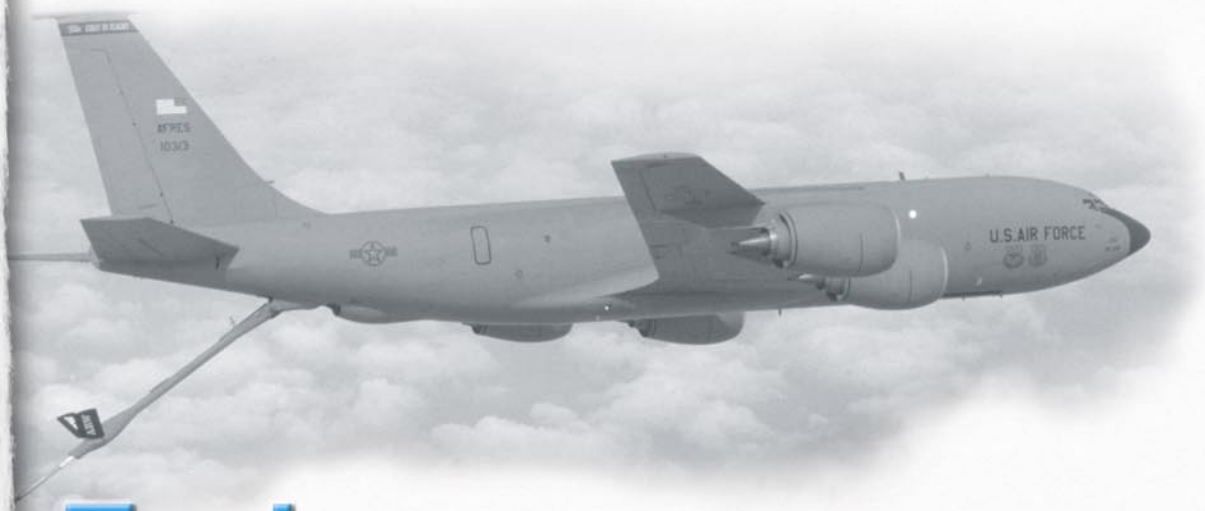
Where design deficiencies have been identified, the issues must be doggedly pursued until resolution is achieved. Many issues take time to resolve, but the responsible agencies must keep pushing for results. In some cases, it may be the HQ AFSC that needs to provide a helping nudge, or maybe it's the Program Office that needs to treat certain issues with an increased sense of urgency. Safety personnel at all levels can help by first conducting solid, well-documented safety investigations that determine root cause, and then by continuing to display an interest in seeing that recommended corrective actions are carried out within a reasonable timeframe. Call your NAF, MAJCOM safety office or the HQ AFSC if you've seen no response on a recommendation you submitted a year or more ago.

That wraps up another year of Eagle operations from the safety perspective. All in all, not a bad year but there's always room for improvement. That room for improvement is exactly what the SECDEF is targeting by calling for a 50 percent reduction in mishaps by May 2005. This goal is achievable, but it will take some "outside the box" thinking to be successful. Personnel at all levels must take up the challenge, because everyone can make a difference. Keep the Bogeys splashing and the ordnance raining on the bad guys, and get yourself home safely for tea and medals!

Once again we've proven that two objects cannot occupy the same space at the same time.

F-15

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	4	2.18	11	5.99	2	1.09	0	0	183,740
5 YR AVG	4.2	2.26	13.0	6.98	2.6	1.40	0.8	1.0	186,154.8
10 YR AVG	3.9	2.02	8.5	4.41	2.7	1.40	0.6	0.8	192,871.5
LIFETIME CY72-FY03	118	2.46	210	4.38	104	2.17	38	45	4,798,647



Tankers

USAF Photo

MAJ ROBERT ROUKEMA
HQ AFSC/SEFF

"Experience is a hard teacher because she gives the test first, the lesson afterwards."

Most of you probably don't need to be told that theater operations present a high potential for catastrophe, but even when on home station training missions, it's important to keep up your vigilance. Do what you can to be prepared for the unexpected. "Experience is a hard teacher because she gives the test first, the lesson afterwards." Here's a summary of experience gained in the C/KC-135 and KC-10 communities.

There were no accidents that resulted in loss of life or aircraft this past year. (OK, a large turkey gave his life, but he won't figure into the statistics.) There was one Class A involving that turkey, one KC-135 flight-related Class A, and there was one KC-10 engine confined Class A.

C/KC-135

The C/KC-135 community had one Class A Flight mishap and one Class A Flight-Related mishap. I'll also discuss the seven Class Bs, then summarize the 25 Class Cs, 74 reported Class Es and one HAP.

• On landing during reverse thrust operation (high RPM), a KC-135E ingested a large turkey into the number two engine with collateral damage to the strut, the number one engine and main flaps. This was kind of unusual since it occurred at night, and turkeys generally roost at night.

• When hydraulic pressure was applied during preflight, the KC-135's nose gear retracted, causing significant damage to the aircraft. Maintenance had been performed in the cockpit that required the repositioning of the gear handle. Neither the maintainers nor the aircrew returned the handle to the proper position prior to the application of hydraulic power.

Class Bs

Of the seven Class Bs, five involved engines, one involved the main landing gear, and one ground event resulted in Class B damage.

• Planning for a max gross weight takeoff, a KC-135 crew requested the longer runway. With the takeoff clearance, tower advised the crew their takeoff would be over a raised barrier. Unable to accept the takeoff over the barrier, the crew requested and received clearance to do a 180-degree turn and move to another runway. About 30 degrees through the turn, the upper torsion link of the left-hand main landing gear (LH MLG) failed. After about 105 degrees of the turn, the aircraft came to a stop with the LH MLG facing roughly 90 degrees from its proper position.

• On climbout, passing FL260, the crew heard a loud bang followed by severe vibration and yaw as the num-

ber three engine spooled back. The crew adjusted gross weight and returned to base for an uneventful three-engine landing. Damage occurred to the number three turbine wheel blades.

• On takeoff roll, at approximately 80 knots, the mishap crew experienced four to five loud bangs, a loss of thrust and loss of oil pressure in the number one engine. Tower reported flames exiting the rear of the engine. The crew aborted the takeoff, shut down the engine and taxied back to parking. Damage was confined to the number one engine.

• During engine start, the number two engine exhaust gas temperature (EGT) peaked at 680 degrees Celsius and did not roll back as quickly as normal. The number two EGT remained higher than the other engines but was still within limits. During climbout and cruise, the crew observed a series of abnormal indications, including slight vibrations, higher than normal EGT, and throttle position higher than normal for the power setting required. The crew elected to abort, adjust their gross weight, and return to base. Postflight inspection by maintenance identified metal particles in the tailcone section, and a borescope inspection revealed fractured and separated seventh and eighth stage compressor blades. Engineers at OC-ALC determined that delamination within the aft stator assembly caused this mishap.

• On engine start, the crew noticed oil pressure was slow to show a positive indication in the number two engine and a higher than normal EGT. Ambient air temperature was 95 degrees Fahrenheit, and there was a ten-knot tailwind. All other indications were normal. On climb-out, the EGT indicated 1080 degrees Celsius with an EGT light. The pilot initiated the precautionary engine shutdown checklist, and retarded the throttle to idle in an attempt to cool the engine. After approximately one minute, the crew heard a loud explosion followed by severe vibration. The pilot moved the throttle to cutoff. The crew scanned the engine, adjusted gross weight, made an uneventful three-engine landing and taxied to parking. Postflight and borescope inspections revealed extensive damage to the turbine section and heat damage to the left fan duct cowling.

• During cruise, the mishap crew heard a muffled bang and felt a vibration followed by a high EGT on the number one engine. The crew shut down the engine and made an uneventful three-engine landing. Maintenance discovered metal shavings and chunks in the tail cone. Maintenance is still waiting for the borescope analysis.

• There was also a ground event of interest that resulted in Class B damage. While performing an operational leak check of the air-refueling boom, the boom nozzle and recoil assembly separated from the inner tube, causing extensive damage to the boom. Several weeks prior to the mishap, the retract flow regulator had been reinstalled backwards after an inochronal inspection. This caused the boom to retract faster than normal resulting in the eventual failure of 24 shear rivets connecting the shock absorber recoil assembly and inner structural tube assembly. There was additional damage to the ice shield.

In addition to these Class As and Bs there were a number of Class Cs. Given the mission and history of the KC-135, many could be expected. There were several failures of the Air Cycle Machine, a couple of lightning strikes, a couple of problems with the Multi-point Refueling System pods, and a few electric and hydraulic problems.

So this article doesn't get too tedious, I'll simply say there were 36 system/component failures resulting in Class E damage, including 15 engine events. What may get your attention are the HATRs. There were quite a few Near Mid-Air Collisions (NMAC) and Traffic Collision Avoidance System resolution advisories. Most of these were in the theater of operations in or en route to the air refueling tracks. In half of those, both involved aircraft that were operating in accordance with all the special instructions, air tasking orders and directives. We've seen similar numbers in the KC-10 reports.

What may get your attention are the HATRs.

KC-10s

The KC-10 community also had a good year with only one engine-related Class A and two Class Bs. I'll also talk about the Class Cs and Es.

• Class A. The mishap crew was near the end of an eight hour mission. Responding to unusual engine noise and intermittent low N1 gauge readings, the crew accomplished the compressor stall

checklist and landed without incident. General Electric and Boeing representatives examined the engine and concluded the damage in the High Pressure Compressor (HPC) section was caused by impact from a titanium fastner.

• Class B. During a local pattern training sortie on final approach in landing configuration, the crew witnessed several birds pass off the left side of the aircraft. The crew reported a thump, a slight shudder and a momentary engine vibration. All engine indications remained normal, but the crew noted a smell of "scorched poultry." The IP retarded the throttle in the flare and did not use the reverse thrusters on the number one engine. Postflight inspection revealed feathers and blood splatters on the spinner cone and acoustical panels. Final assessment showed damage to over 292 blades in the compressor stages consistent with bird ingestion.

• Class B. Passing 11,000 feet as lead of a three-ship formation-training sortie, the crew felt a vibration and heard a loud noise. Number two in the formation notified the crew that something had departed the aircraft from the area of the number two engine. The crew declared an IFE and returned to base without a controllability check due to concerns of structural failure. Landing was uneventful and the crew shut down the aircraft on the taxiway on the advice of the fire department. Postflight inspection showed a missing number two right-hand fan cowling, a badly damaged left-hand fan cowling, damage to the right inboard elevator and damage to the boom flight controls.

The KC-10 Class Cs consisted of one birdstrike, one brute force disconnect with an erratic receiver, and damage to engine acoustical panels due to icing.

HATRs in the KC-10 mirrored the KC-135 events. There were 16 NMACs, 11 in the theater. Only four of those suggested non-compliance with the SPINS. There were also three additional events that may have resulted in an NMAC. One of these events was an ATC-directed turn, another where ATC direction was not heard or complied with, and one event where the use of Night Vision Goggles during closure for refueling nearly caused a midair collision.

President Theodore Roosevelt said, "It is not the critic who counts, nor the man who points out how the strong man stumbles, or where the doer of deeds could have done better. The credit belongs to the man who is actually in the arena." Credit to all the operators and maintainers who throughout FY03 have met the challenges of passin' gas safely during high ops tempo and war. Few critics could complain about the safety record over the last few years of the KC-135s and KC-10s. So, keep your head up, eyes out, and the rubber side down. N. K. A. W. T. G….N! ✈

Keep your head up, eyes out, and the rubber side down.

KC-10

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	1.91	2	3.82	0	0.00	0	0	52,367
5 YR AVG	0.8	1.42	2.4	4.27	0.0	0.00	0.0	0.0	56,258.2
10 YR AVG	0.6	1.14	1.3	2.46	0.0	0.00	0.0	0.0	52,767.6
LIFETIME CY81-FY03	8	0.83	18	1.87	0	0.00	0.0	0.0	964,839

C-135

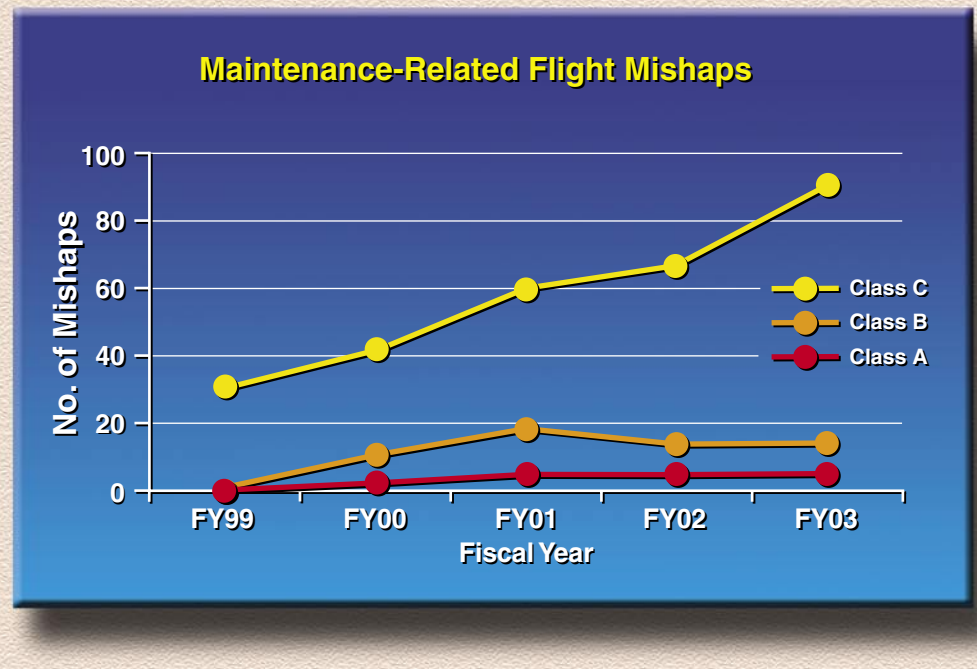
Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	0.48	5	2.39	0	0.00	0	0	209,565
5 YR AVG	0.4	0.20	3.4	1.67	0.2	0.10	0.4	0.8	203,789.8
10 YR AVG	0.3	0.14	2.4	1.14	0.1	0.05	0.2	0.4	209,640.1
LIFETIME CY75-FY03	80	0.64	139	1.11	64	0.51	134	629	12,567,156

Note: Numbers are for all C-135 variants except the E-3 and E-8.

Maintenance

CAPT MICHAEL SHETLER
HQ AFSC/SEFM
CMSGT JEFF MOENING
HQ AFSC/SEMM

Well, fellow maintainers, it wasn't a bad year, but wasn't a very good year either. The fortunate thing is we didn't kill anyone this year. However, we did do a lot of damage to aircraft and injured a lot of hard-working maintainers. What exactly did we do last year? Let's start with the damage to aircraft.



Class A Mishaps

If you look at the chart of maintenance-related flight mishaps, you can see we have leveled off on the Class A mishaps and are doing a little better on the Class B mishaps, but the Class C rates are *climbing higher and higher every year*. Is it due to inattention to detail, less experience, lack of training or lack of supervision? Let's start by looking at the six Class A mishaps. All Class A data comes from Accident Investigation Board reports.

• F100 Engine Damage During Test Cell Run—During repair of the engine's core module, the engine specialist(s) incorrectly installed the seventh stage compressor lock ring and eighth, ninth, and 11th stage compressor blade locks. The IPI did not detect the incorrect installation.

• FOD Left In RQ-1 Oil Crankcase During MX—MX personnel left foreign objects, pushrod tube o-rings, in the engine crankcase, resulting in an oil leak and in-flight fire. The UAV was destroyed on ground impact.

• KC-135 Nose Landing Gear Collapsed During Ground Ops—MX raised the landing gear lever to facilitate other MX and, by intentionally not using tech data, failed to ensure the landing gear lever was returned to the down position. Two workers failed to document all maintenance actions in the 781 series forms.

• MH-53 Mass Balance Bracket/Weight Separated And Struck Main Rotor Blades—MX failed to comply with T.O. guidance and installed the incorrect bolts securing the mass balance bracket.

• F-15 Right Stab Actuator Missing Cotter Pin—Depot-level maintenance failed to install a cotter pin during right stabilator actuator overhaul, and

the right stabilator actuator mechanical input shaft disconnected during flight resulting in loss of control. The crew ejected and the aircraft was destroyed.

• C-20 Engine Fire During Post-MX Engine Run—MX personnel mis-rigged the engine fuel cock to the full open position with the flight deck fuel cock lever in the full closed position.

Class B Mishaps

We looked at the most expensive mishaps; now let's take a look at the Class B mishaps.

• F-15 Damaged Heat Exchanger—The PC1 hydraulic feed line failed after takeoff, resulting in a hairline crack that allowed atomized hydraulic mist to fill the compartments. The atomized hydraulic mist was ignited by bleed air components in the compartment and triggered a subsonic flash explosion that caused structural damage. The line damage consisted of a single dent and scratches across the dent.

• F-16 Aircraft Jumped Chocks And Came To Rest On Right Wing—MX prepared the aircraft and was granted approval for an engine run on a packed snow and ice-covered apron.

• F-119 Engine FOD—FO was introduced into the aircraft structure during the assembly process. During an engine run the FO damaged the first, second and third stages of the fan.

• TF-64 Engine Oil Seal Failed—The bolts for the encased oil seal were incorrectly safety-wired, resulting in the improper seating of the engine seal onto the oil tube. The engine was shut down in-flight for severe vibrations.

• F-15 Ingested Crew Chief's Headset Mouthpiece—The crew chief moved forward to the number two heat exchanger directly inboard of the number two engine intake, and the engine ingested the headset mouthpiece, damaging all 13 stages.

• F-15 Engine FOD—Sometime during the disassembly or reassembly of the diffuser ramp actuator rod end, a washer was dropped into the diffuser ramp assembly. It was not recovered and was later ingested into the engine.

• KC-10 Engine Cowling Separated From Aircraft—During climbout, the fan cowl to pylon attaching bolt backed out, and the resultant overpressure caused the fan cowl to depart the aircraft, impacting the right elevator and right-side boom rudder assembly.

• C-40 Contacted and Damaged Rudder of a C-37 During Tow Operations.

• C-5 Left Horizontal Stab Struck Tail of a 747 Aircraft During Taxi—A 747 was parked approximately 37 feet short of a painted nose gear box resulting in the tail of the aircraft extending into the clear taxi zone for the C-5.

• B-1B Severe Engine FOD from Aircraft Fastener—Following replacement of the engine boundary layer seals, the lower outboard dry bay panel was installed with multiple fasteners of incorrect length.

• A-10 Severe Engine Damage During Engine Run—A loose panel in front of the intake was ingested during the engine run.

• F-110 Compressor Stall During Break-In Run Damaged HPT—The engine core speed was overshot and the turbine temperature exceeded the maximum limit of 1716 degrees Fahrenheit. The digital engine control sensed the over temperature and started to reduce fuel, causing the engine to stall.

(Editors Note: If you want the full story on the Class B mishaps see your wing safety office.)

Class C Mishaps

The Class C mishaps are too numerous to list in our limited space, but your wing safety office can help you do any research you need. The main themes we saw in the Class C mishaps this year were inattention to detail, lack of supervision, inadequate training, failure to follow established procedures and failure to follow tech data. We are maintenance professionals who are responsible for lives and a lot of high-priced inventory every day. Supervisors, both senior and mid-level, need to take the extra effort to deal with the lack of experience we seem to have on the flightline. The mishaps are preventable and take precious resources away from our mission.

Now that you can see the underlying cause of the mishaps, what is your analysis of what we could have done to prevent the loss of aircraft and extreme cost to the Air Force? To us it seems fairly simple. Follow the tech data, use proper maintenance practices and pay attention to detail and the mishaps

We are maintenance professionals who are responsible for lives.

won't happen. Doesn't seem too much to ask, does it? Secretary Rumsfeld has charged the services with reducing mishaps by 50 percent in two years, as we are a world-class organization. If we don't follow the rules created to keep us and the aircraft safe, then we will never reduce the mishaps. What are you going to do to bring your unit up to world-class status on safety?

Ground Mishaps

Well, let's talk a little bit about what happens on the flightline that contributed to our ground mishaps. We know here in our little cubicles that we are using hindsight from your mishap reports, but they do lead us to a few conclusions that as career maintainers, we don't like. The number of mishaps are on the rise and a few of the trends are repeats from last year, but we have a couple of new ones.

• Back injuries continue to be a problem for maintainers. Here are a few of the causes of lost work time by high-priced maintainers: lifting a fuel tank by himself, picking up heavy avionics components, a strained back installing C-130 leading edges and a strained back hooking up a tow bar. Every unit needs to ensure their people are trained on proper lifting techniques, and every individual needs to ensure they ask for help when the part is heavy.

• Towing incidents are always on the list and rising. Some examples include towing a B-1 into a hangar tail access door, and a TR-1 wingtip striking a parked truck. Towing is a very routine task at most locations, so people can easily get complacent. All supervisors need to ensure their people are looking for the unexpected during the routine tasks.

• Body parts being caught in areas where they shouldn't be. The number of fingers lost, heads opened up, injured feet and falls from aircraft continue to cause lost work time for our limited resource of qualified maintainers. A new trend that we picked up on this year was the number of injuries from wearing jewelry on the flightline. Fingers keep coming off, literally, from rings being caught on aircraft parts, vehicle parts and in one case a latrine door. How do we prevent injuries of this type? The simple answer is for maintainers to not wear jewelry on the flightline IAW AFOSH standards. Maintainers need to apply situational awareness, just like our aircrews do to keep us from injuring ourselves.

• FOD to engines and aircraft. This is always on the mishap list, and in our opinion, it's the most preventable mishap we have. If we follow the book and clean up after ourselves, FOD will not be a problem. FO has been the cause of major accidents and a lot of smaller incidents. We have to hold ourselves to a higher standard to prevent these incidents from occurring. Supervisors: FOD incidents are something you can really make an impact on. Ensure your unit is FOD free.

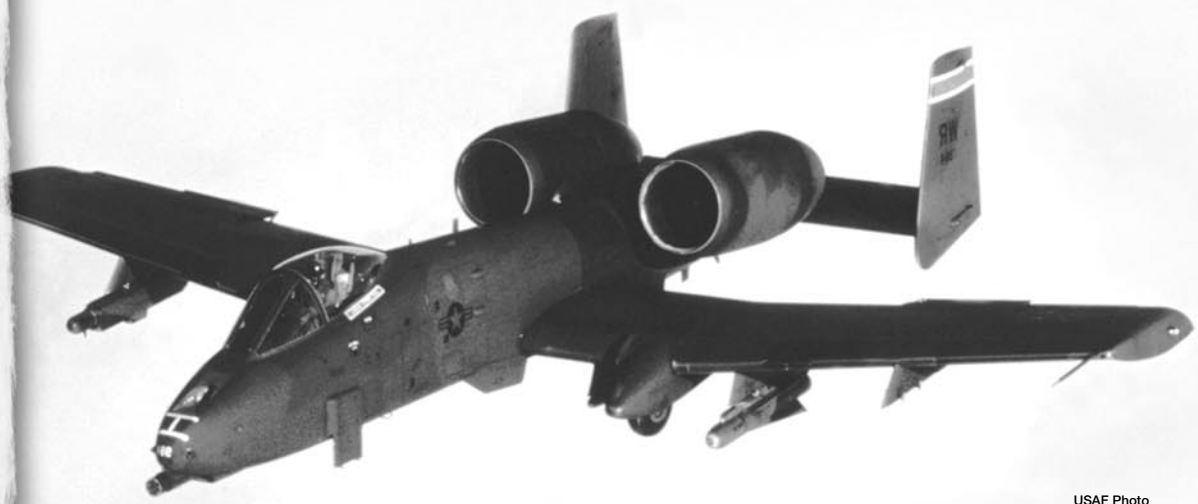
• Eye injuries due to chemicals. Washing aircraft and using chemicals is part of our job and will continue to be one of the dreaded tasks. Everyone, supervisors and workers, needs to ensure our maintainers have the proper individual protective equipment available and wear it while performing the task.

• Failure to follow tech data resulting in damage to equipment. This one we saved for last, as following tech data and all safety requirements is the "Number One" way to prevent mishaps. There isn't much that hasn't been said about this before, so we won't repeat it, but if senior leaders down to airmen follow the books and ensure compliance, our mishap rate will take a nosedive.

Summary

We think all of the above can be attributed to human factors in maintenance. The key will be how you and the Air Force are going to change our safety culture, and put safety and quality to work into our everyday activities. Looking at the above mishaps and the recaps from the different aircraft (which every maintainer should read, not just their particular MDS), we were our own worst enemy. We created extra work for overworked people, cost millions in damaged parts and lost an unknown amount of mission capability to preventable mistakes. We'll end this year's article just like last year's. Be safe out there maintainers, and remember: Fix the aircraft like your life depends on it. Because your life and someone else's life does depend on it. Look for an article on the Class C mishaps and human factors in maintenance in a future issue of *Flying Safety*.

Following tech data and all safety requirements is the "Number One" way to prevent mishaps.



USAF Photo

A-10

Familiarity should not lead to complacency.

LT COL MICHAEL BAUMGART, GAF
HQ AFSC/SEFF

As we look over the year of flight in the A-10, we come away with the feeling that this homely "Warthog" has continued to do its specialized mission like no other aircraft in the AF inventory. The fact that this fighter/attack/bomber has over 30 years of service could very easily lead to an overwhelming sense of familiarity, but as we all know, familiarity should not lead to complacency…especially with safety on the line.

Overall, the safety record of the A-10 for FY03 yielded one Class A, nine Class Bs, 19 Class Cs, and multiple Class E mishaps. These numbers, by themselves, lead one to believe that this was a successful year all around. But the very fact that we had two midair collisions, one Class A with a loss of life and two lost aircraft, and one Class B midair, illustrates that we only just avoided additional loss of life and aircraft. Furthermore, with a look at FY02 statistics, there's a twofold increase in the number of midair mishaps in FY03, and this is certainly not the direction we want to go.

Class A Mishap

The one A-10 Class A mishap in FY03 resulted in one pilot fatality and two destroyed aircraft.

The mission was a four-ship low-altitude Air Interdiction sortie supporting the German Air Force's Weapons School large force training mission. On departure, mishap pilot one (flight lead) and mishap pilot two

had a midair collision. After impact, mishap pilot one successfully ejected and was rescued by SAR forces, treated and released. Mishap pilot two was fatally injured upon ground impact.

Class B Mishaps

The A-10 experienced nine Class B mishaps in FY03. It means we are twice above the 10-year average. (The 10-year average is 3.1)

• The mishap aircraft experienced a number one engine compressor stall. The mishap pilot heard a pop and observed rising Inter-Turbine Temperature (ITT) and decaying engine RPM. The mishap pilot retarded the throttle, but could not clear the stall. The mishap pilot shut down the number one engine and recovered the aircraft uneventfully.

• The mishap pilot briefed and flew a Basic Surface Attack and a Combat Search and Rescue Training Mission. The flight and landing were uneventful with no anomalies. After engine shutdown, severe damage was found to the right engine fan blades. The mishap engine was borescoped and Foreign Object Damage (FOD) was found to multiple stages of the compressor section.

• The mishap aircraft was on a Basic Fighter Maneuver mission. After several maneuvers, the mishap aircraft experienced a Master Caution for an engine hot light, followed by a low RPM indication on the left engine. After a successful left engine shutdown, the mishap pilot returned to base for an uneventful single-engine approach and landing.

• The mishap aircraft was an air spare for a deployment sortie. During back taxi for takeoff on the active runway, the mishap aircraft experienced a fatigue failure of the right main landing gear. The mishap pilot performed an uneventful ground egress.

• The mission was briefed as a Targeting Pod update sortie. During part of their mission, the mishap aircraft collided. Following the collision, the flight rejoined, did a battle damage check and proceeded toward their home base. The flight completed a controllability check on both mishap aircraft, and landed uneventfully.

• An A-10 had just completed a phase inspection and was scheduled for after-phase engine runs. The aircraft engine had abnormal ITT and fuel flow fluctuations during a maximum power engine run. After ten seconds at maximum power, there was a loud bang that shook the jet. An emergency engine shutdown was performed. The engine sustained severe damage.

• The mishap aircraft was conducting a single-ship advanced handling characteristics sortie. During maneuvering, the mishap engine failed, causing a non-recoverable inflight shutdown. The mishap aircraft was recovered at the home station using a single-engine approach.

• The aircraft experienced engine trouble enroute to the working area. The pilot shut down the engine and returned to base uneventfully. The mishap engine is under investigation at the depot.

• The mishap aircraft was conducting a single-ship basic surface sortie. After sortie recovery, the mishap pilot performed an aircraft inspection prior to debrief, and he discovered a hole at the number two engine outer cowl.

Lessons Learned

On every mission and during every briefing, we need to emphasize the pilots' responsibilities to clear their respective flight paths and keep their formation contracts, as well as underscore overall formation discipline. ✈

We need to emphasize the pilots' responsibilities to clear their respective flight paths.

A-10

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	0.83	7	5.80	2	1.66	1	1	120,784
5 YR AVG	1.8	1.55	7.0	6.01	1.8	1.55	0.8	0.8	116,395.4
10 YR AVG	2.1	1.76	3.7	3.10	2.2	1.85	0.9	0.9	119,208.0
LIFETIME CY72-FY03	97	2.36	81	1.97	99	2.40	50	57	4,116,560

Engines

FY03 ENGINE-RELATED MISHAP SUMMARY

A GOOD TREND CONTINUES.

BILL BRADFORD
RICH GREENWOOD
JOHN MAYNARD
HQ AFSC/SEFE

(Information in this article came from Accident Investigation Boards and/or Part 1 of Safety Investigation Board Reports. None of this material was derived from privileged communications.)

This year continued a good trend in engine-related mishaps in the USAF. As you may remember, last year we had the lowest percentage of destroyed aircraft from engine failures for any of the last 20 years, 12 percent. This year the percentage went up slightly, to 13.6 percent (see Figure 1), the total number of engine-related destroyed aircraft (three) remained the same. They were all in single-engine aircraft and only one of the three was from a previously known failure mode.

While having new failure modes is not a good thing, repeat failures are a sign current risk mitigation processes are either inadequate, or we are accepting operation with higher risk in certain areas for increased combat readiness.

In addition to the three destroyed aircraft, there were three engine-related dollar value Class As, (one of which was on a test cell). This brings the total of engine-related Class A mishaps for FY03 to six versus 10 for last year, a very definite improvement we can all be proud of. In addition, both last year and this year had one Class A FOD mishap on a KC-10A engine. Also, our fine-feathered friends brought down two F-16s this year from bird strikes to the engine, along with a dollar value Class A to

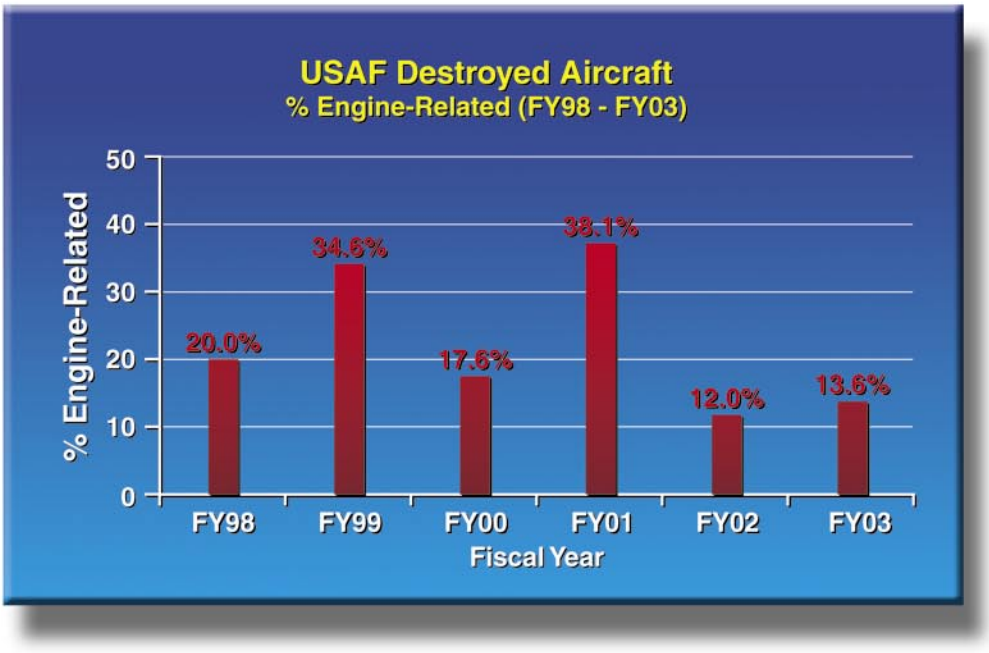


Figure 1

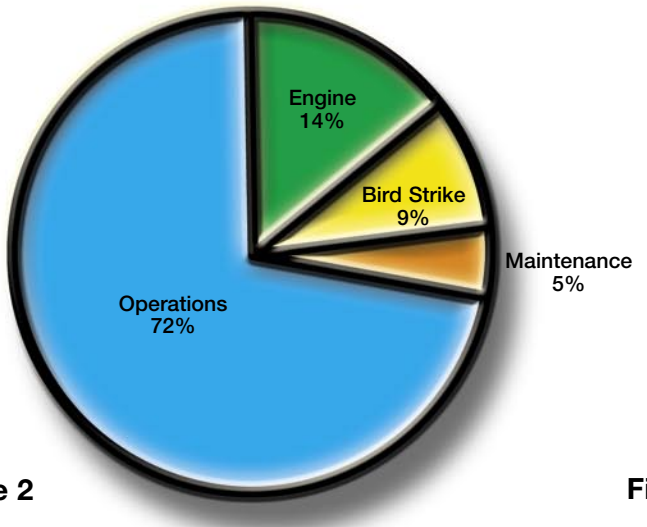


Figure 2

FY03 Destroyed Aircraft–All

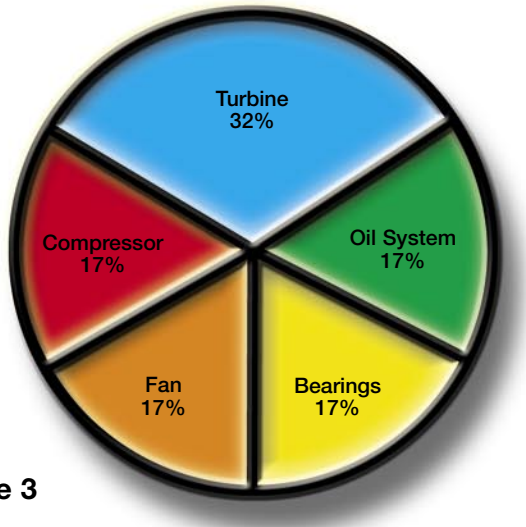


Figure 3

FY03 Engine-Related Class A Mishaps By Engine Section

a KC-135E engine, which is much worse than last year's single bird strike dollar value Class A on an F/A-22. So, while the total number of engine-related Class As went from 10 to six, we did not make much progress on the prevention of FOD or bird strike Class As.

How the engine community stacked up versus others for causes of destroyed aircraft is shown in Figure 2.

The large share of operations-induced destroyed aircraft is consistent with previous years (60 percent in FY02 and 47 percent in FY01). Again, the bird strikes are conspicuous this year also.

Looking at our six engine-related Class As this year by engine section (see Figure 3), it shows the normal trend of turbines being the largest driver of destroyed aircraft (two mishaps). In fact, for the previous 10 fiscal years, a recent study by HQ ASFC/SEFE showed that, for Class A and Class B mishaps combined, the turbine area is consistently one of the highest dollar value component drivers in the engine community (see Figure 4). Bearing failures run a close second.

The Fighter Factor

This same study also looked at which MDSs had the highest dollar costs (again, from Class A and B mishaps) due to engine-related mishaps over the previous 10 fiscal years. While it is not surprising that the F-16 came out the highest, its margin over the other MDSs is a little disturbing. It is an order of magnitude above the next closest, the F-15, (see Figure 5) and 30 times higher than the next closest operational manned aircraft, the A-10A.

The chart originally printed in this location contained erroneous data. Please refer to the Errata in the March 04 edition of Flying Safety magazine for the corrected version.

Figure 4

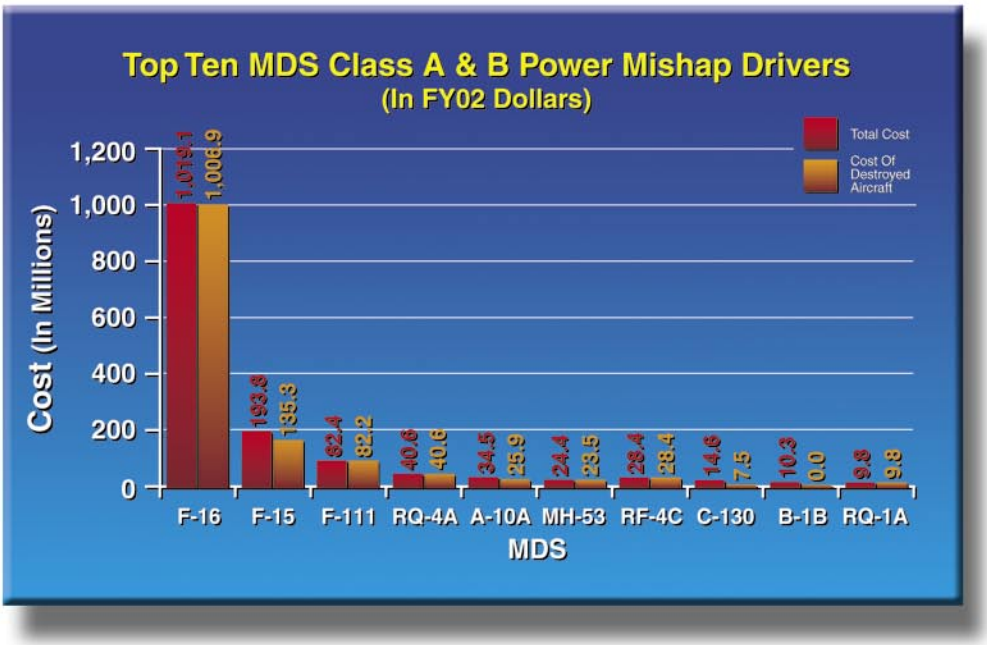


Figure 5

That being said, let's see how the F-15s and F-16s did this year.

F-16 Engine-Related Destroyed Aircraft Statistics						
Fiscal Year	FY01		FY02		FY03	
Engine	Aircraft Losses	FY01 Rate	Aircraft Losses	FY02 Rate	Aircraft Losses	FY03 Rate
F100-PW-200	0	0.00	0	0.00	0	0.00
F100-PW-220	0	1.72	0	0.00	2	1.69
F100-PW-229	0	0.00	0	0.00	0	0.00
F110-GE-100	4	2.76	1	0.61	0	0.00
F110-GE-129	1	1.77	1	1.87	0	0.00
All Engines	7	2.08	2	0.55	2	0.47

Table 1

Table 1 shows the F-16 engine-related destroyed aircraft and rates for the last three fiscal years by engine model. While there was no improvement over last year in total number of engine-related mishaps, it is certainly better than FY01. Figure 6 also compares F-16 engine-related mishaps to total F-16 mishaps. From this perspective, FY03 shows the lowest percentage of engine-related to overall F-16 Class A mishaps in the last five fiscal years.

F100-PW-200/220/229

The two engine-related destroyed aircraft in the F-16 fleet this year were both F100-PW-220-powered and both from turbine mishaps, though for different reasons.

In the first mishap, an F-16C departed as number two of a two-ship close air support training mission. Approximately one hour and 44 minutes into the sortie the MP reported an engine problem and subsequently successfully ejected. The SIB determined that one fourth stage turbine blade failed, causing significant damage to the low-pressure turbine and non-recoverable engine stagnation.

The one suspect fourth stage turbine blade failed due to fatigue. Although the radius portion of the blade from which the fatigue emanated was missing, examination of other fourth stage blades in the mishap engine showed a consistent under-minimum radius at the same location the fatigue originated in the suspect blade.

An on-wing recurring Eddy Current inspection has been developed to inspect fourth stage turbine blades for initial indications of crack formation. The blade manufacturing process has been re-engineered and new blade procurement has begun in an effort to quickly retrofit the fleet.

In the second instance, an F-16C departed on a planned and briefed six-ship surface attack tactic (SAT) sortie. Shortly into the mission the pilot reported an engine problem and fire indications. The in-flight fire was confirmed by one of the other aircraft. The MP successfully ejected and the aircraft impacted the ground and was destroyed. The root cause of the engine failure is still under investigation but appeared to originate in the high-pressure turbine area.

F110-GE-100/129

There were no engine-related Class A mishaps, either from destroyed aircraft or costs, in the USAF F110-powered F-16 fleet for FY03. What a great tribute to the entire F110-GE-100/-129 engine community. When you look at what transpired over the last year, which included OPERATION IRAQI FREEDOM, the demand we put on these engines was enormous. The maintainers are commended for their tireless dedication to detail during engine assembly and the performance of meticulous engine inspections ensuring a safe aircraft for mission accomplishment. Congratulations are also in order for Oklahoma Air Logistics Center and General Electric Aircraft

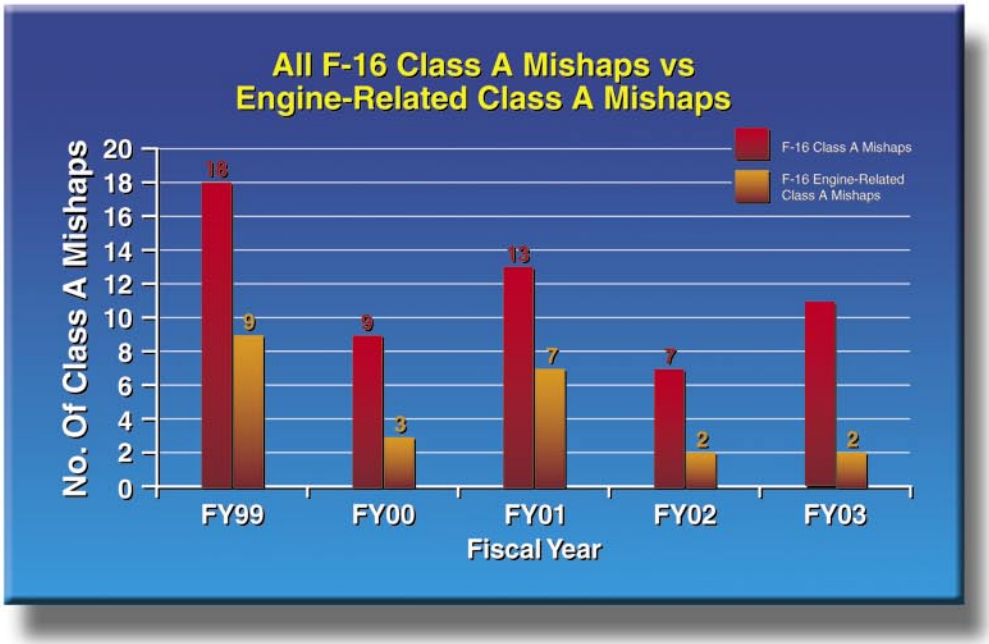


Figure 6

Engines for risk management efforts and quality workmanship. In last year's end-of-year review, we put out a challenge to all of you to strive for a Class A zero mishap rate in FY03. Well, you did it, knowing that the F-16 is normally the leader in the number of USAF engine-related mishaps. This year's achievement speaks highly for the dedication and professionalism of everyone involved.

F-15 Engine-Related Destroyed Aircraft Statistics						
Fiscal Year	FY01		FY02		FY03	
Engine	Aircraft Losses	FY01 Rate	Aircraft Losses	FY02 Rate	Aircraft Losses	FY03 Rate
F100-PW-100	0	0.00	0	0.00	0	0.00
F100-PW-220	0	0.00	0	0.00	0	0.00
F100-PW-229	0	0.00	0	0.00	0	0.00
All Engines	0	0.00	0	0.00	0	0.00

Table 2

F100-PW-100/220/229

Table 2 shows the F-15 again had no engine-related destroyed aircraft for FY03; however, there were three dollar-value Class A mishaps, two of which were rate producing, while the third occurred in a test cell. Figure 7 shows how the F-15 Class A engine-related mishaps stack up against the total F-15 Class A mishaps for the last five fiscal years.

Shortly after takeoff on a training flight, an F-15C with an F100-PW-220 experienced a number one engine seizure. The mishap pilot shut down the engine and returned to base. Investigation disclosed that the chip detector for the number four bearing had been improperly installed. Prior to, or shortly after takeoff, the chip detector became dislodged. The self-sealing mechanism of the chip detector also failed, resulting in a major oil leak, damage to the main engine bearings and engine seizure. There is no conclusive evidence as to why the detector leaked; however, the manufacturer is pursuing a re-design effort to improve the self-sealing mechanism. Tech Order changes have also been made which will give better guidance to correct chip detector installation.

Another in-flight incident occurred on an F-15E with an F100-PW-229 engine. While descending from base to final on a bombing range, the engine incurred a compressor stall followed by severe vibration. The crew aborted the mission, placed the throttle to idle and returned to base. Subsequent investigation revealed extensive fan and compressor damage from the second stage rearward through the 13th stage compressor due to a second stage fan stator failure. There have been previous instances in the fleet of second stage fan stator fractures; however, this is the first that has resulted in Class A damage costs. Prior to the mishap, a TCTO had been issued to replace all second stators vanes in the F-15 fleet by December 2003. However, the TCTO had not yet been performed on the mishap engine.

In the non-rate producing incident, the engine was in a test cell undergoing normal engine testing prior to aircraft installation. During the engine run, the engine suffered a compressor stall. The test cell team performed the proper emergency actions and terminated the engine run. Subsequent investigation showed extensive internal damage to the compressor. The AIB determined the engine's ninth stage compressor blade locks had been installed incorrectly during the engine rebuild. This incorrect installation allowed three ninth stage blades to liberate during the test run, resulting in the compressor stall and subsequent damage to the mishap engine. The AIB also determined the engine's eighth and 11th stage blade locks and the seventh stage blade snap ring were also installed incorrectly. Shop practices, T.O. changes, and IPI inspection revisions were undertaken to prevent future mishaps of this type.

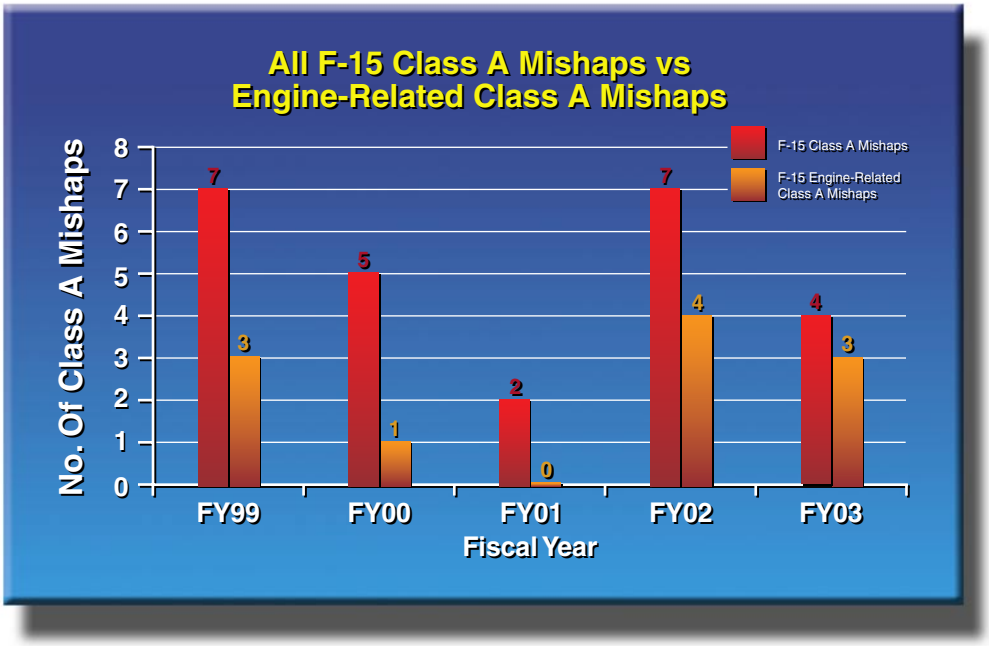


Figure 7

F-118-GE-101

There was also an engine-related destroyed aircraft, which was not in the fighter community this year.

This U-2/F-118-GE-101 engine-related mishap occurred during a routine mission. Approximately five hours into the mission, the aircraft experienced a loss of thrust and excessive vibrations, accompanied by decreasing engine rpm. Restart attempts of the mishap engine were unsuccessful. The mishap pilot successfully ejected and the aircraft impacted the ground approximately five miles from base and was destroyed.

Subsequent teardown, analysis and laboratory investigation revealed a number four main engine bearing had seized, resulting in turbine damage and thrust loss. The F-118-GE-101 engine utilizes the same number four bearing as the F-110-GE-100/-129. The Air Force has experienced a number of events in the F-110 fleet due to this bearing. Current fielded risk mitigation efforts are an accelerated plan to acquisition and field Scanning Electron Microscope Electron Dispersive Spectroscopy X-Ray (SEM/EDX) machines, which is complete, along with a better Master Chip Detector (MCD). Post-flight procedures have also been modified to improve the ability to detect bearing deterioration. Both the SEM/EDX and MCD have proven effective on the F-110 program for improving bearing spall detection prior to catastrophic engine failure. Additional initiatives in process to improve bearing life and chip detection capability are a material change to M50NiL and an improved chip migration number four bearing nut.

Another U-2/F-118-GE-101 engine-related event that warrants discussion occurred during a routine mission. While at altitude, the pilot experienced an engine flameout. After the approximate 45-minute descent to the restart envelope at 25,000 feet, the pilot properly initiated the engine restart procedures and re-established engine operation. The engine was restarted and operated in secondary engine control (SEC) mode, and a successful landing was accomplished. Subsequent investigation found a foreign object in the engine Main Engine Control (MEC) that caused the initial flameout. The point we would like to make is to follow the flight manual procedure on your restart attempts. If time and circumstances permit, by all means, continue trying to restart your engine. Many times slight changes in altitude, configuration, airspeed, temperature and redundant engine control features will affect your engine, allowing you to have a successful restart.

FOD

The single FOD Class A incident in FY03 occurred on a KC-10A with an F-103-GE-101 engine. Approximately 7.5 hours in the mission the number two engine suffered a compressor stall. The crew put the throttle at idle and recovered the aircraft uneventfully. Extensive damage to the high-pressure compressor section of the mishap engine was noted. A Failure Analysis and Service Technology (FAST) test was performed and it was determined one high pressure compressor blade was impacted by a titanium fastener, which created a stress concentration that led to a subsequent failure. No titanium fasteners are used in the engine and no missing fasteners were noted on the airframe. The ultimate source of the foreign object could not be identified.

Summary

In summary, Air Force wide it was a pretty good year for engine-related mishaps, but there is definitely room for improvement. Quality lapses and maintenance errors are areas that require continuous improvement, along with detailed inspections and aggressive risk mitigation efforts for known problems. We hope next year's article will be very short and sweet.

LETTER to the Editor

A Well Done award in the December issue of *Flying Safety*, page 31, had inaccurate information regarding the Vandenberg Fire Department's response to an F-15E high-speed abort, with resulting fire and damage to the landing gear. First, I want to give MSgt Mallory all the credit in the world...his quick and decisive efforts most assuredly minimized something that could have been very serious. I just want to correct something that inappropriately brings a degree of discredit to our agency. The award write-up inaccurately stated that fire crews did not respond to the emergency in an expedient manner, nor did the fire trucks that did respond have the proper extinguishing agent. Both of these statements are false and the corrections are as follows: On 4 November 2002, while firefighters were standing in front of their station (Flightline Crash Station) watching the remaining Air Show aircraft depart, they witnessed an F-15E aircraft attempt to takeoff. During its takeoff, they observed smoke and flames from underneath the aircraft as the F-15E aborted at high speed. Firefighters immediately ran to their "Crash" vehicles, donned their gear and initiated an emergency response. Trucks were moving before the "primary crash line" had even been activated. Fire crews contacted the tower to get clearance onto the active runway while responding. It was MSgt Mallory and a transient alert vehicle, pulling a 150-lb. Halon flightline fire extinguisher that were much closer to the aircraft on a parallel taxiway, that were first on-scene and extinguished the fire. The aircrew debugged the plane and were quickly driven from the scene in the transient alert vehicle as fire crews pulled up to the aircraft. Because fire crews did not know the exact nature of the emergency and MSgt Mallory also did not have all the details, the aircrew had to be immediately brought back out to the scene and fill in the abort details to emergency crews. All fire response vehicles had the appropriate water and foam firefighting agents and were standing by in case of re-ignition. Thanks for the opportunity to "right a wrong."

Mark Farias, Chief
Fire and Emergency Services
Vandenberg AFB, CA

Others

The aicraft on the following pages are not covered in the regular articles. These aircraft have small number dynamics and have had successful safety years. If you need more information on any of the aircraft please contact the HQ Air Force Safety Center, and we will be glad to help with your safety efforts.

C-9

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	2	9.29	0	0.00	0	0	21,517
5 YR AVG	0.2	0.97	0.8	3.89	0.0	0.00	0.0	0.0	20,572.0
10 YR AVG	0.1	0.45	0.6	2.69	0.0	0.00	0.0	0.0	22,328.9
LIFETIME CY68-FY03	3	0.34	7	0.78	1	0.11	3	3	894,211

C-12

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	0	0.00	0	0.00	0	0	4,357
5 YR AVG	0.0	0.00	0.2	4.99	0.0	0.00	0.0	0.0	4,004.6
10 YR AVG	0.0	0.00	0.1	1.37	0.0	0.00	0.0	0.0	7,311.1
LIFETIME CY75-FY03	2	0.49	2	0.49	1	0.24	2	6	408,805

C-20

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	1	15.70	0	0.00	0	0	6,371
5 YR AVG	0.0	0.00	0.4	6.76	0.0	0.00	0.0	0.0	5,915.4
10 YR AVG	0.0	0.00	0.2	3.20	0.0	0.00	0.0	0.0	6,246.6
LIFETIME CY83-FY03	0	0.00	2	1.65	0	0.00	0	0	121,361

C-21

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	0	0.00	0	0.00	0	0	50,005
5 YR AVG	0.2	0.41	0.6	1.24	0.2	0.41	0.4	0.4	48,379.6
10 YR AVG	0.2	0.42	0.4	0.84	0.2	0.42	0.4	1.0	47,446.7
LIFETIME CY84-FY03	3	0.32	4	0.42	3	0.32	6	12	946,944

E-4

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	1	58.48	0	0.00	0	0	1,710
5 YR AVG	0.2	13.07	0.6	39.21	0.0	0.00	0.0	0.0	1,530.4
10 YR AVG	0.2	13.32	0.3	19.99	0.0	0.00	0.0	0.0	1,501.0
LIFETIME CY75-FY03	3	6.27	5	10.44	0	0.00	0	0	47,877

F-22

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	1	18.81	0	0.00	0	0	5,315
LIFETIME CY02-FY03	1	13.20	1	13.20	0	0.00	0	0	7,578

F-117

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	0	0.00	0	0.00	0	0	13,403
5 YR AVG	0.2	1.48	0.4	2.97	0.0	0.00	0.0	0.0	13,480.0
10 YR AVG	0.6	4.59	0.3	2.30	0.2	1.53	0.1	0.1	13,064.2
LIFETIME FY91-FY03	7	4.06	5	2.90	3	1.74	1	1	172,536

T-41

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	0	0.00	0	0.00	0	0	750
5 YR AVG	0	0.00	0	0.00	0	0.00	0	0	860
10 YR AVG	0	0.0	0	0.00	0	0.00	0	0	2,489
LIFETIME CY82-FY03	9	1.46	5	0.81	4	0.65	1	2	618,153

T-43

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	0	0.00	0	0.00	0	0	4,647
5 YR AVG	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.0	5,010.6
10 YR AVG	0.1	1.27	0.0	0.00	0.1	1.27	0.2	3.5	7,858.8
LIFETIME CY74-FY03	1	0.29	6	1.77	1	0.29	2	35	347,851

Cargo

USAF Photo

MAJOR JOHN "JAY" GUETERSLOH
HQ AFSC/SEFF

This year we continued to see the high ops tempo we have seen over the last few years. Operations in Iraq and Afghanistan have kept the airlift community busy. You have done a great job of flying safe; however, the news is not all good. There were still a total of 52 reportable Class A, B, and C mishaps. The good news is no one was killed.

We only experienced two Class A mishaps, both in the C-17.

The first Class A took place when the mishap aircraft landed in the construction zone of an operational runway at a classified location. That's right, they were doing concrete repair on the west half of the runway while they were conducting aircraft operations on the east half. For a variety of reasons the mishap crew was unaware that half the width of the runway was unavailable. By the time they realized there was a problem with the runway, they were committed to landing. The aircraft's two left main gear rolled through the excavation area, sustaining damage to the wheel assemblies and tires. The Accident Investigation Board (AIB) determined the crew did not have situational awareness of the runway condition because they did not check NOTAMs, the runway markings were not sufficiently prominent, approach and tower controllers did not advise the crew of the runway condition, and the tactics briefing and associated materials given to the crew suggested the full runway was available. The Air Force has had similar mishaps in the past, and this one highlights the need to use extreme caution when operating at austere locations.

The other Class A mishap was not a flight mishap and therefore, did not contribute to the Class A mishap rate, but it is worth looking at nonetheless. The event took place while the aircraft was being backed up. A hydraulic line in the thrust reverser broke. Hydraulic fluid spilled onto the hot engine and caught fire. The crew shut down the engine and emergency egressed, and the fire department extinguished the fire.

The airlift community had several engine-related mishaps this year. The C-17 had a Class B and three Class C engine mishaps in addition to the Class A above. The C-141 had two Class B and three Class C engine-related mishaps and the C-5 had two Class Cs. In the C-141, four of the engine mishaps were due to either blades or stators failing. The other was due to a failure of a bleed air valve. The Class B in the C-17 also involved a failed stator, and all three Class Cs experienced damage to engine cowls during reverser operations. As for the C-5, one had to shut down an engine when a bearing failed, and another had a fire during a maintenance engine run.

FOD and BASH continue to cause damage to aircraft. Four (one Class B and three Class C) FOD incidents cost the USAF $719,000. Three of the mishaps were of the engine-ingested-something category, and the fourth was another case of landing gear damaged at an austere location. FOD mishaps are probably the most preventable mishaps, therefore we must all work to prevent them.

Birds and weather took their toll on the strategic airlifters, too. A C-141 had hail damage, and lightning damaged a C-5. There were six bird strikes across the fleet, all causing Class C damage.

In the C-5 there were eight other Class C mishaps. Two were the result of an APU fire or overheat. One was hot brakes, and two others were related to landing gear. Two were the result of damage to flaps and slats and the last was missing panels on the vertical stabilizer discovered after flight.

The C-17 had three more landing gear-related mishaps this year. In the first, a Class B, a right

main trunnion and torque arm were discovered damaged in post flight. A fatigue crack had propagated until it could no longer support the normal loads on the gear. In one Class C, a blown number 10 tire caused damage to the right inboard main landing gear door and mechanical linkage. In the other, a system malfunction sent an electronic signal to the parking brake on relay which closed the anti-skid return shutoff valve, disabling the entire anti-skid system. Without anti-skid, eleven tires failed. The twelfth tire failed while the aircraft was being towed clear of the runway.

In the C-141, for an unknown reason, a nose wheel was cocked when the aircraft landed. Unfortunately, the crew was not able to keep the aircraft on the runway. Fortunately, it only resulted in Class C damage and no one was injured.

Ground ops have accounted for their share of mishaps this year, too. Jet blast from a C-17 caused Class C damage to another aircraft. A C-5 struck a parked aircraft while taxiing, causing Class B damage, and another C-5 was damaged when it was struck by a maintenance stand. In four cases, we managed to damage aircraft or cargo while loading or unloading, all resulting in damage greater than $20,000. In another case, a C-5's nose gear was damaged during maintenance operations because the T.O. guidance was not clear.

We have been fortunate that none of the mishaps discussed up to this point have resulted in someone getting hurt. Unfortunately, three crewmembers in three separate incidents ended up in a hospital with broken limbs. Icy conditions on ladders and ramps were responsible for two. The third crewmember broke his arm when he tripped on a communications cord while coming down a ladder.

The big picture this year looks a lot like last year. We didn't kill anyone and we didn't destroy any airframes, but we still had more mishaps than we should have. Some, such as engine failures, can be fixed with engineering solutions. Others, however, such as FOD, require the diligence of every aircrew and maintainer out there. Follow the AFIs and T.O.s, and use your risk management so next year's article can be kept to one paragraph. Fly safe!

C-5

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	2	2.36	0	0.00	0	0	84,688
5 YR AVG	0.2	0.29	2.0	2.87	0.0	0.00	0.0	0.0	69,661.0
10 YR AVG	0.3	0.44	2.1	3.08	0.0	0.00	0.0	0.0	68,093.7
LIFETIME CY68-FY03	18	0.87	52	2.51	4	0.19	5	168	2,070,240

C-17

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	2	1.57	10	7.87	0	0.00	0	0	127,121
5 YR AVG	0.8	0.92	5.4	6.23	0.0	0.00	0.0	0.0	86,634.0
10 YR AVG	0.7	1.29	3.0	5.55	0.0	0.00	0.0	0.0	54,075.2
LIFETIME FY91-FY03	7	1.29	30	5.53	0	0.00	0	0	542,551

C-141

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	2	5.30	0	0.00	0	0	37,754
5 YR AVG	0.0	0.00	3.2	5.52	0.0	0.00	0.0	0.0	57,963.2
10 YR AVG	0.2	0.21	2.6	2.75	0.1	0.11	0.2	0.9	94,519.0
LIFETIME CY64-FY03	34	0.32	54	0.51	15	0.14	34	161	10,595,428

USAF Photo

RECCE

MAJ JOHN "JAY" GUETERSLOH
HQ AFSC/SEFF

There has been a steady increase in the Class C reports.

It has been a couple of years since the Recce aircraft have gotten much attention in the end-of-year review. I wish I could say that it was because there has been nothing to report. But that's not true. We need to remain vigilant, just like everyone else. I applaud you for your efforts. Much of what you do operationally goes unnoticed by most of the Air Force, but the information you provide is vital to the United States. And you do it with a very limited number of aircraft and crews.

RC-135

Congratulations to the RC-135 community on another year with no Class A or B mishaps. In fact, for the last 10 years, there have been no Class A mishaps and only one Class B, a TF-33 engine failure.

The news is not all good. Over the last three years there has been a steady increase in the Class C reports. In FY01 we had just one Class C. In FY02 there were two. And this year, you guessed it, three Class C mishaps. All but one of the Class Cs were in the powerplant category, and all of them with the TF-33 engine. Hopefully, as the rest of the fleet gets the new engines, we will see a drop in the number of Class C mishaps.

The other Class C this past year occurred when an Airborne Systems Engineer was troubleshooting a problem with one of the reconnaissance collection systems. The metal tip of a connector touched a relay with 400 volt, 20 amp power for another system. No one was hurt in this incident, but it managed to do $54,000 worth of damage.

There were a total of five Class E reports in FY03. One was a HATR, resulting from a TCAS resolution advisory between an RC-135 and a KC-135 in the Operation SOUTHERN WATCH AOR. There was also an uncommanded thrust reverser deployment in flight, and smoke and fumes from the pressurization system.

The last two Class Es for this year are part of a trend. In the last three years there have been six ear and sinus blocks. I understand the desire to get the mission done, I understand that sometimes you are one deep in a crew position, and I salute you for your dedication, but what often seems like just a little congestion can turn into a serious

problem. Ear and sinus problems can lead to some long term DNIFs and lots of lost missions if you are one deep.

U-2

Unfortunately for the U-2, we had a Class A this year. The aircraft was on a high altitude reconnaissance mission when the pilot heard a loud "chug" from the engine, followed by rapid engine deceleration and moderate airframe vibrations. The pilot glided the aircraft to the vicinity of the recovery base in the attempt to do a flameout landing. At approximately 22,000 feet, the aircraft entered Instrument Meteorological Conditions. Following an unsuccessful airstart attempt, the pilot noticed that standby airspeed indicator had failed and that the aircraft was unresponsive. The pilot ejected, sustaining back injuries. The aircraft impacted a populated area, injuring three civilians and damaging several civilian structures and heavy equipment. The primary cause of the engine failure was the failure of the number four bearing in the engine. The failure of the airspeed indicator was the result of icing in the pitot-static system.

There were no Class B incidents this year, but there were two Class C mishaps. The first was a ground-handling incident when electrical components were damaged by a defective jumper cable. The other was a physiological incident. Fourteen hours after landing following a high-altitude sortie, the pilot experienced symptoms of the Bends. He was treated in a hyperbaric chamber and placed on quarters for three days. Investigation revealed that there was a leak in the oxygen system.

In addition to the Class C mentioned above, there was one Class E physiological incident. The circumstances were almost identical and the cause was also traced to a leak in the oxygen system.

Trim problems are a trend this year. There were four Class E reports of trim incidents (last year there were only two Class Es, total). There was one case of runaway aileron trim caused by frayed wires in the switch. Of more concern are the three cases of runaway stab trim. All were traced to stab trim selector valves sticking in either the nose up or nose down position. The valve in question is a 2400-hour time change item; however, in these three cases the part failed at 27 hours, 139 hours and 355 hours, respectively. Deficiency reports have been submitted on the valves to find out why they are failing so early.

That about wraps things up for this year. Continue to practice sound ORM and fly safe. We need each and every one of you to continue to do the mission.

Ear and sinus problems can lead to some long term DNIFs.

U-2

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	6.61	0	0.00	1	6.61	0	0	15,118
5 YR AVG	0.8	6.36	0.0	0.00	0.2	1.59	0.0	0.0	12,571.0
10 YR AVG	1.0	7.37	0.0	0.00	0.5	3.68	0.3	0.4	13,577.4
LIFETIME CY63-FY03	29	6.78	1	0.23	21	4.91	7	12	427,883

C-135

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	0.48	5	2.39	0	0.00	0	0	209,565
5 YR AVG	0.4	0.20	3.4	1.67	0.2	0.10	0.4	0.8	203,789.8
10 YR AVG	0.3	0.14	2.4	1.14	0.1	0.05	0.2	0.4	209,640.1
LIFETIME CY57-FY03	80	0.64	139	1.11	64	0.51	134	629	12,567,156

Note: Numbers are for all C-135 variants except the E-3 and E-8.

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AWACS/JSTARS 707 Variants

LT COL DAMON K. BOOTH
HQ AFSC/SEFM
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E-8

The E-8 JSTARS (Joint Surveillance and Target Attack Radar System) had zero Class A or Class B mishaps. Hurrah!! For the year the JSTARS experienced five Class C mishaps and two Class E events. A summary of the five Class Cs follows; three of these mishaps are FOD-related and two involved hot brakes with subsequent tire deflations.

Class C Mishaps

• After a continuation training sortie, maintenance discovered foreign object damage (FOD) to several first and second stage blades on the number four engine during post flight inspection.

• During the 7.9-hour mission, a single screw liberated from the number one nose cowl and was ingested through the auxiliary inlet doors, damaging three stages of the compressor section.

• During a post-flight inspection following a local proficiency mission, FOD damage to several compressor blades was discovered as a result of rivets and the anti-ice port screen being ingested into the engine.

• During takeoff for a combat sortie, the pilot aborted the takeoff due to engine exhaust gas temperature (EGT) exceeding limits. After clearing the runway, the crew referenced the brake energy charts and determined it was safe to taxi back to parking. During the taxi back to parking, the fuse plugs melted and deflated two tires.

• Upon landing following a 12-hour operational mission, the MC experienced a high frequency vibration from the right side of the aircraft after touchdown, with smoke observed from tower personnel. Prior to takeoff, the crew had significant ground delays that required a 45-minute taxi time. During the prolonged ground time, the brakes became extremely hot and fused together after takeoff. It was only after successfully completing the mission that this became apparent during the landing roll.

The E-8C JSTARS experienced two Class E events in FYO3. One of these was a false engine fire indication and the other was a Hazardous Air Traffic Report (HATR).

• Approximately four hours into a test mission, the number two engine fire light illuminated. There were no other indications of a fire or overheat. The MC shut down the number two engine IAW the flight manual and attempted to discharge the primary and alternate fire bottles due to continued fire indications following the engine shutdown. Once again, the engine fire light remained illuminated. The flight crew returned to home station and landed uneventfully. Post flight inspection revealed no fire or overheat damage to the engine.

• During a local training mission, an E-8 experienced a near-midair collision with a general aviation Mooney flying VFR. The E-8 was operating under IFR and the Mooney was operating under

VFR with both aircraft participating in Terminal Radar Service Area (TRSA) services. Both had visual with one another and 500 foot separation, but for an unknown reason the Mooney descended until their paths crossed, resulting in a near-hit that required evasive actions by the crew. Aerospace basics 101, "See and Avoid," saved this crew from a potential disaster.

Overall, FY03 was a safe year for the JSTARs community. With increased emphases and guidance on use of brakes during ground operations and better attention to detail in fighting FOD, FY04 could be a banner year.

E-3

The one E-3 Class B event occurred on initial takeoff to a higher headquarters surveillance mission. However, the sequence of events began when a non-compliant cadmium nut was installed on the 16th stage high temperature channel V-band coupling clamp on the number three engine. This nut, most likely installed during engine overhaul, was not intended to withstand the high bleed air temperatures that routinely exceed 500°F. The cadmium plating came in contact with the T-bolt retaining strap, resulting in liquid metal embrittlement of the T-bolt retaining strap and ultimately leading to its failure. Just after takeoff, the T-bolt failed, allowing the clamp to open, and the 16th stage aft bleed air duct separated from the right-hand bleed air duct. Bleed air blowing in the pylon floor ignited the wire insulation, resulting in a fire and fusing for the fire detection wiring. The aircrew recovered the aircraft, and egress was successful after some minor delays.

Class C Mishaps

There were two Class C events.

- The first occurred during a ground operational check of repairs done to correct an out of alignment condition of the left inboard fillet flap cove lip door. The ground observer failed to verify the wing areas and flap action paths were clear of personnel, work stands, tools and other equipment in accordance with wing tech orders. When the 40-degree flap position was selected, the left inboard trailing edge flap struck a roll-around tool box.
- The other Class C event was damage consistent with metallic FOD. Maintenance personnel discovered the damage upon post-flight inspection. They found numerous nicks on eight of the first stage fan blades, and they also found inlet guide vane case damage. The FOD was ingested sometime after engine start, but the crew reported no abnormalities with the engine or aircraft during the mission.

Class E Mishaps

There were several system/component failures reported as Class E events. Quite a few resulted in smoke and fumes in the cockpit. Of the 18 smoke and fumes events, six were attributed to the forward or aft forced-air cooling fan, and four were attributed to electrical wiring or equipment. Other sources include the ACM, the air conditioning unit, and a failed water separator. In three smoke and fume events, the cause could not be determined.

Other Class E reported events include an autopilot failure, a bleed air reset control failure resulting in engine compressor stalls, and a fuel icing light that occurred due to a failed fuel filter or pressure differential switch. ✈

E-3

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	1	4.40	0	0.0	0	0	22,721
5 YR AVG	0.0	0.00	0.6	2.70	0.0	0.00	0.0	0.0	22,218.8
10 YR AVG	0.1	0.44	0.3	1.31	0.1	0.44	0.2	2.4	22,922.9
LIFETIME CY77-FY03	1	0.16	5	0.80	1	0.16	2	24	625,738

E-8

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	0	0.00	0	0.00	0	0	9,012
5 YR AVG	0.2	3.37	0.2	3.37	0.0	0.00	0.0	0.0	5,930.2
10 YR AVG	0.1	2.88	0.1	2.88	0.0	0.00	0.0	0.0	3,467.1
LIFETIME FY91-FY03	1	2.74	1	2.74	0	0.00	0	0	36,513

Trainers

USAF Photo

MAJ CHRIS FROESCHNER, T-1/T-43
MAJ JASON SMITH, CAF, T-6
MAJ BILL RESNIK, T-37/T-38
HQ AFSC/SEFF

FY03 was not a good year in the trainer world.

Overall, FY03 was not a good year in the trainer world. We had a fatality during a T-38 mishap and pilots escaped serious injury during both a T-37 midair and a T-38 stall on final approach. We also had our first T-1 Class A mishap since it entered the inventory in 1992. Fortunately, in this mishap there were no fatalities or injuries. This article will talk about these mishaps and trends for all USAF trainers to include the T-1, T-6, T-37, T-38 and T-43. *(Mishap summaries were derived from AIB reports.)*

T-1

The T-1 Jayhawk suffered its first Class A mishap this year. This breaks a Class A-free streak that started at the T-1's inception in 1992. In keeping with a sound safety history and in spite of the one Class A, the T-1 had no Class Bs and only six Class Cs.

• Runway Departure During Landing.

The Jayhawk's first Class A occurred on a night landing to a 6500-foot wet runway with thunderstorms in the area. The mishap crew received clearance for an ILS approach and subsequently tuned the localizer frequency, but failed to tune the TACAN required for the approach. This created a loss of situational awareness for the crew. They reported an 11-mile final, when in fact they were only four miles from the runway, which resulted in an extremely high and steep final. With glide slope at full deflection high, the crew abandoned the ILS for a visual approach. As a result of the short, high final approach, the mishap aircraft touched down 2600 feet past the threshold, eight knots fast, and with the throttles above idle. The high airspeed and above-idle power setting created a sufficient amount of lift that did not compress the gear struts enough to activate the weight-on-wheels squat switch, which in turn prevented speed brake deployment and effective anti-skid braking on the wet runway. The lack of weight-on-wheels condition lasted for nine seconds, causing the aircraft

to travel an additional 1800 feet down the runway. With 2100 feet remaining, the crew was able to apply emergency braking that locked the wheels, resulting in skidding and viscous hydroplaning. The aircraft departed the paved surface at 54 knots, the right main landing gear became airborne and the left wing tip struck the ground. The rapid deceleration caused by the wing tip digging into the ground caused a collapse of the right main and nose landing gear and rotated the aircraft 135 degrees counter-clockwise. In spite of extensive damage to the aircraft, no injuries were sustained during the mishap.

This mishap serves to remind all of us to use ORM at every stage of a flight, from flight planning to post flight, double-check all navigation references needed to fly an approach, and lean to the side of caution when the picture doesn't quite look right.

The T-1 Jayhawk had no Class Bs and only six Class Cs, three of which involved bird strikes. Of the three bird strikes, two were at municipal airfields that did not have a formal BASH program. Something to keep in mind is that the Aviation Hazard Advisory System (AHAS) does not include most civilian airfields. Extra vigilance should be used in going to these airfields in order to assess the situation. A simple call to the tower can go a long way to mitigate bird strike risks. The remaining three Class Cs involved a tire failure on landing, a runaway elevator trim (the top T-1 issue with the T-1 System Program Office (SPO) and cause of another Class E this year), and FOD damage to the number two engine due to ingestion of a loose cowl rivet.

To round out a review of the T-1 during FY03, the Jayhawk had 26 Class Es. The highest Class E rates were for smoke and fumes (11 total) and five reported near-midair collisions.

T-6

As the T-6 continues to be brought online as the primary USAF basic trainer, it also continues to avoid the safety spotlight, at least in terms of being involved in Class A mishaps. With no Class As in the last two years (knock on wood), the T-6 is well on its way to establishing an enviable safety record. There are, however, still some safety issues that have come to light as a result of lesser classes of mishaps. These issues need to be addressed in order for a stellar safety record to become a reality.

The only Class B mishap in FY03 occurred following a routine spin recovery. A chip-light indication was observed, followed by low oil pressure warnings. The crew shut the engine down when vibrations and abnormal noises were noted, and performed a successful emergency landing pattern under challenging conditions, thereby preventing a Class A mishap.

Following this, and a similar mishap in FY01, the design of the oil system is under scrutiny. The engine lubrication system has proven to be sensitive to operation at or near zero "G" flight regimes. Risk control measures are currently being evaluated.

In one of four Class C mishaps, a gear-up landing was carried out after a main landing gear door pushrod assembly failed. A similar mishap occurred in FY01, prompting the development of a stronger pushrod assembly, but the modification had not yet been carried out on the mishap aircraft.

Attitude Heading Reference System (AHRS) failures continue to be an issue with three occurrences noted this year. In response to a deficiency report submitted on an AHRS failure, we now have some answers and a plan that will hopefully alleviate the problem. It was determined that defective date codes on certain chips in the AHRS were the cause of approximately 70 percent of the failures. In terms of corrective actions, the vendor has purged the stock of suspect components. Future AHRS units will be manufactured with new chips, and field units will receive new components when parts are returned for repair. The SPO will continue to monitor failure rates to validate the corrective actions.

Use ORM at every stage of a flight, from flight.

T-37

The T-37 continues to be crucial in training our future pilots, even with the T-6 flying continuing to grow and T-37 flying slowing down. We had one Class A in FY03, the same as last year, no Class Bs again this year, and the Class Cs continue their downward trend with 11 in FY03 as compared to 14 in FY02. You may think the Class C reduction is a result of fewer flying hours, but from

FY02 to FY03 there was an 11 percent reduction in Class C mishaps with only a 3 percent reduction in flying hours. Fortunately, the one T-37 Class A in FY03 didn't result in any fatalities. One aircraft was destroyed and one aircraft received substantial damage after a midair collision during a formation-training sortie.

• Midair Collision. Two T-37s collided during a syllabus formation-training sortie while executing a breakout. Mishap Aircraft 2 (MA2) broke out of the formation, but Mishap Aircraft 1 (MA1) was unaware of this. MA2 was on MA1's left wing, and this limited Mishap Instructor Pilot 1's (MIP1's) ability to monitor his wingman due to cross-cockpit visibility. At the point MA2 broke out, MA1 was still increasing his left bank, continuing a lazy 8 maneuver. This, in addition to Mishap Student Pilot 2 (MSP2) executing a gentle breakaway with no significant power change, kept the two aircraft in close proximity. Neither crew had sight of the other and after approximately 70 degrees of turn, MIP2, believing he had achieved adequate separation from MA1, directed MSP2 to roll out of bank to look for lead. This roll out, combined with MA1's continued descent and decreasing bank, resulted in their collision. Following the collision MIP2 and MSP2 initiated a successful ejection, while MA1 returned to base and performed a gear up landing.

Instructors must make sure their students are ready to fly.

The Class Cs in FY03 consisted of eight engine problems, one gear up landing, one nose gear collapse after a pilot-induced oscillation on landing, and one where a headset cord was ingested into an engine. The only repeated engine problem in the Class Cs was a Tee-Bolt failure. In addition to these two Tee-Bolt failures, there were five others resulting in Class E events. The attempts to fix this continuing problem by increasing the torque at which the bolts are installed has yet to work, and a new solution needs to be found.

There were 133 Class E events. They included 42 smoke and fume incidents, 32 physiological incidents, 30 engine-related incidents (five were the Tee-Bolt failures mentioned earlier), 21 HATRs, and five flight-control related. In addition, there were eight other miscellaneous Class E events, as well. The HATRs in FY03 included eight near-midair collisions (NMAC), five incidents of airspace infringement by civilian or other military aircraft, and eight incidents on runways such as runway incursions or taking off without clearance.

The most disturbing trend in FY03 was the increase in G-induced Loss of Consciousness incidents in the Tweet. There were 26 in FY03 as compared to 17 in FY02. Twenty-one of these were due to improper Anti-G Straining Maneuvers (AGSM). Pilots must be physically ready (i.e., properly hydrated and rested) and mentally prepared (i.e., know their procedures) before flying. Instructors must make sure their students are ready to fly and monitor them during all training missions to ensure proper AGSMs are being done.

T-38

Engine problems continued to plague the T-38 with 67 incidents in FY03. One resulted in a Class B and 12 resulted in Class C mishaps. The rest were Class E events and the performance of the crews during all of these incidents helped keep these problems from escalating into more serious mishaps.

The two T-38 Class A mishaps in FY03 were from an abort during a no-flap touch-and-go, and a stall on final during a cross-country training mission. The abort during the no-flap touch-and-go resulted in one pilot fatality.

• Runway Departure During Abort. While executing the go-around during a no-flap touch-and-go, the left main tire failed. The crew elected to abort and called for the barrier. An aerobrake was initiated and the aircraft shifted from slightly left to slightly right of the runway centerline. Subsequently, the right main tire blew. Nearing 2000 feet from the end of the runway, the crew determined they would not stop within the runway remaining and locked their shoulder harnesses in anticipation of engaging the BAK-15 barrier. The combined effects of strong winds, reduced rudder authority, and friction from the dragging right main wheel caused the aircraft to continue drifting right during the last 1000 feet of roll out. Despite full left rudder deflection, differential braking, and intermittent use of nose wheel steering, the pilot could not regain directional control. The aircraft departed the concrete portion of the runway at

approximately 80 knots and continued over the asphalt portion of the overrun. The right main gear dropped off the hard surface into the dirt just before impact with the BAK-15 support stanchion and concrete mounting pad. The force of the impact ripped through the left side of the aircraft nose, front cockpit and engine intake, initiating an involuntary ejection for the front seat pilot. Safe ejection parameters did not exist and the front seat pilot was fatally injured.

• Ground Impact on Final Approach. The mishap aircraft was number two in a two-ship formation of T-38s on a navigation/instrument proficiency cross-country training mission. Before entering their aircraft to depart on the mishap sortie, both pilots knew that MP2 did not have the required instrument approach plates for the next three planned sorties, but neither made an effort to obtain them. Nearing their destination, the local cloud ceiling was found to be much lower than expected. MP1 and MP2 elected to have MP2 drag on final approach below the weather. MP1 directed the drag approximately two miles from the runway threshold at an altitude of approximately 500 feet above runway elevation. MP2 permitted his airspeed to decrease to a point that the MA stalled. As MP2 attempted to recover from the stall, the MA impacted several large trees, and MP2 subsequently initiated a successful ejection.

The one Class B in FY03 resulted from a first stage compressor blade failure due to high cycle fatigue. This failure led to a seized engine. Kudos to the crew on their great performance of an alternate gear extension and heavyweight single-engine straight-in approach and landing.

There were 26 Class Cs in FY03 of which 11 were engine-related, 11 were bird strikes, two were foreign object damage incidents, one was due to a cracked multifunction display, and one was due to the loss of a rear canopy during a student solo formation flight. Nine of the birdstrikes were in the pattern, so we need to be aware of bird activity around the airfield and ensure we report it to Air Traffic Control, the Supervisor of Flying or Runway Supervisory Unit Controller as appropriate.

There were 116 Class E events in FY03. They included 56 engine-related incidents, 28 HATRs, 17 smoke and fume incidents, nine flight control-related events, and three physiological incidents. In addition, there were three other miscellaneous Class E events. The engine events included eight compressor stalls or flameouts for unknown reasons and five from flying in the region of increased susceptibility for stalls and flameouts. The HATRs in FY03 included nine NMACs, one airspace infringement incident, and 15 incidents on runways, such as runway incursions or taking off without clearance.

T-43

The T-43 experienced another fine year with zero Class A, B, or C mishaps. The navigator trainer, in service since 1973, did have three Class E events in FY03, one for electrical fumes in the aircraft, and two for TACAN final conflicts at their home station, Randolph AFB, TX. These two class E events are important to stress and should be highlighted to the flying community. For a while during the year, the ILS approach to 14L at Randolph AFB was NOTAMed out of service. During this time, many pilots were using the TACAN approach to 14L. It caused controller confusion and had the potential for cross-traffic problems. The problem, which still exists, is that the TACAN 14L final approach course intercepts the ILS approach course at the 10-to 12-mile range from the field. This is due to the fact that the Randolph TACAN is located east of runway 14L and the TACAN approach must meet the TERPS criteria, which says the final course must cross the extended runway centerline at or prior to the runway threshold. If that last statement confuses you, don't worry: It confused me, too! Draw it out, and you will see it much more clearly. The base is well aware of the potential problem, and a NOTAM for Randolph has been released which restricts the TACAN approach from use when the airfield is VFR. The OSS squadron at Randolph is working a change, but it is definitely noteworthy and something for crews to be aware of if they are flying into Randolph.

Lessons Learned

Human factors issues continue to be a key player in our major mishaps. Mechanical issues are causing many problems, but they aren't the driving

Human factors issues continue to be a key player in our major mishaps.

Don't cut corners.

factor in most major mishaps these days. Two big lessons learned this year, just like most years, are:

1. Don't cut corners, and;
2. Make sure you're prepared both mentally and physically before flying.

We've all been there. You're in a hurry to get going on your next sortie and you feel you can't take the time to relax a few minutes. You feel the pressure (mostly self-induced) to step on time. Taking off five or ten minutes late because you needed to drink a bottle of water and eat something before your second (or third) sortie of the day won't compromise the mission. Additionally, knowing how you should react during time-critical situations, such as pattern work or on a low level, is the key to actually handling abnormal occurrences appropriately. Taking the time to fully flight-plan and make sure all the squares are completely filled may cost you a little time, but might save you from a mishap. Don't be in a rush to get out the door, because a poorly prepared pilot or poorly planned mission (training or combat) will leave you in a place you're wishing you weren't.

T-1

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	1.00	0	0.00	0	0.00	0	0	100,439
5 YR AVG	0.2	0.20	1.2	1.20	0.0	0.00	0.0	0.0	100,294.0
10 YR AVG	0.1	0.13	0.6	0.77	0.0	0.00	0.0	0.0	77,811.6
LIFETIME FY92-FY03	1	0.13	6	0.77	0	0.00	0	0	778,117

T-6

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	3	6.12	0	0.00	0	0	48,996
LIFETIME FY00-FY03	1	1.19	4	4.75	1	1.19	0	0	84,215

T-37

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	0.58	0	0.00	1	0.58	0	0	173,630
5 YR AVG	0.8	0.41	0.0	0.00	0.8	0.41	0.2	0.6	194,184.6
10 YR AVG	0.6	0.34	0.0	0.00	0.6	0.34	0.1	0.3	174,484.4
LIFETIME CY75-FY03	137	1.05	31	0.24	135	1.03	27	78	13,089,589

T-38

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	2	1.40	1	0.70	2	1.40	1	1	142,724
5 YR AVG	0.8	0.56	0.8	0.56	1.0	0.69	0.2	0.4	144,134.8
10 YR AVG	0.6	0.40	0.5	0.34	0.8	0.54	0.1	0.2	148,367.5
LIFETIME CY60-FY03	193	1.49	94	0.73	188	1.45	76	136	12,927,492

UAVs

USAF Photo

LT COL MICHAEL BAUMGART, GAF
HQ AFSC/SEFF

In FY03, the Air Force experienced five Class A, zero Class B, two Class C, and six Class E Unmanned Aerial Vehicle (UAV) flight mishaps. The breakdown of these mishaps is as follows: the RQ-1 (Predator) had two Class As, one Class C, and four Class E flight mishaps; the RQ-4 (Global Hawk) had only one Class E mishap; and the QF-4 had two Class A "un-manned" aerial vehicle mishaps, and one Class A, one Class C, and one Class E "manned" aerial vehicle mishaps.

Although the Predator, Global Hawk, and the QF-4 are considered UAVs, the QF-4 platform may fly as a "manned" aircraft. Here is a short description of the five Class A mishaps.

• The mishap UAV was scheduled to be flown by three separated crews on the day of the mishap. The mishap crew was the second of the three crews. The mishap UAV took off under control of the first flight crew and was flown to the test and training range. The mishap crew changed out with the previous crew. The mishap pilot took over the controls of the mishap UAV at 10,000 feet MSL in the test and training range. The mishap pilot called for the descent checklist, initiated descent, and checked the emergency lost link profile. The mishap pilot flew a circular pattern during descent to remain in the area while setting up for an approach back to the pattern at the home airfield. The mishap pilot put the gear down and started the gear bump down check. While the mishap crew completed the gear bump down procedure, the UAV descended behind terrain blocking the signal from the Ground Control Station transmitter. The mishap UAV impacted the ridgeline in a climbing left-hand turn and was destroyed.

• The mishap UAV was scheduled for a functional check flight after an engine change. During climbout, the mishap UAV began to burn and became uncontrollable. The aircraft impacted the ground, continued to burn, and was totally destroyed. There were no injuries and no reported property damage.

• The mishap sortie was planned as a manned QF-4 System Acceptance Flight Evaluation. This flight was used to evaluate performance, interface, and operation of drone conversion and interaction with the Gulf Range Control System. Aircraft preflight, engine start, and ground checks were normal. The drone was given a go-ahead for automatic takeoff. During the automatic takeoff, the drone became uncontrollable and the mishap pilot took over aircraft control. Unfortunately, the drone still departed the prepared surface. The mishap aircraft's nose wheel failed, allowing the forward fuselage to contact the ground. The mishap aircraft was damaged beyond economical repair. The mishap pilot ground egressed uninjured.

• The mishap flight was planned as a live QF-4 mission to White Sands Missile Range. The mishap sortie included preflight, departure and missile profile that were unremarkable. The mishap drone was not damaged during the profile and therefore, was returned to base under an automatic landing profile. On final approach, the mishap drone was configured to land, with hook, gear and flaps extended. At 1000 feet above ground level, the mishap drone became uncontrollable, pitched nose-down, impacted the ground and was destroyed.

• The mishap flight was planned as a single-ship unmanned QF-4 support mission for a missile test launch profile. Shortly after takeoff, the mishap drone experienced a loss of carrier, rendering the drone uncontrollable. The mishap drone began the programmed loss of carrier profile and was destroyed by the ground-based Flight Termination System.

RQ-1

Year	Class A		Class B		Destroyed		Hours
	No.	Rate	No.	Rate	A/C	Rate	
FY03	5	71.59	0	0.00	4	57.27	6,984
5 YR AVG	3.2	47.67	0.4	5.96	2.8	41.71	6,712.9
LIFETIME FY97-FY03	18	46.77	2	5.20	16	41.57	38,486.7

RQ-4

Year	Class A		Class B		Destroyed		Hours
	No.	Rate	No.	Rate	A/C	Rate	
FY03	0	0.00	0	0.00	0	0.00	1,305
LIFETIME FY00-FY03	2	80.03	0	0.00	2	80.03	2,499

Helicopters

USAF Photo

LT COL DOUG TRACY
HQ AFSC/SEFM

Prior to briefing the FY03 helicopter mishap statistics, during the 2003 USAF World-wide Rotary-Wing Conference, in Sep 03, a senior officer asked if FY03's statistics were better than FY02. Yes, the raw numbers of Class A mishaps in FY 03 were less than in FY02, four versus nine. However, with the exception of FY02, the four mishaps in FY03 were still the most since FY87. Additionally, the FY02 mishaps resulted in no fatalities, but we were not so fortunate this past year when six of our friends perished in their H-60 while on a civil humanitarian mission. With this in mind, I'll let you be the judge as to whether FY03 was a better year than FY02.

Mishaps are grouped either as Operational-related, Logistics/Maintenance-related or Miscellaneous. During FY02 all nine Class A mishaps were Operational-related. However, of the four FY03 mishaps, two were Operational-related and the other two were Logistics/Maintenance-related.

The first Operational-related Class A mishap occurred during the terminal operations phase of flight and involved an MH-53 on a night vision goggle (NVG), formation sortie. The mishap crew encountered brown-out conditions on landing. While attempting to land, the mishap pilot overcorrected for aircraft right drift in a hover, and the left main gear struck the ground and the aircraft rolled left striking the ground with the rotor blades.

The other Operational-related mishap involved an HH-60 crew on NVGs responding to a humanitarian recovery of injured civilians. The crew struck terrain while conducting mid-air refueling operations resulting in all six crewmembers being fatality injured.

The two Logistics/Maintenance-related mishaps both involved MH-53s. The first mishap concerned a known deficiency in the aircraft's free-castoring nose landing system. When the aircraft's nose landing gear touched down in soft sand, with the aircraft having about 6 knots of forward speed, the nose landing wheels rotated 90 degrees to the direction of aircraft movement. The nose landing gear strut buckled, resulting in the nose landing gear collapsing and damaging the flight controls. The damaged flight controls then allowed the rotor blades to strike the ground. The MH-53 has a history of nose gear collapses, however, this incident was the first time a collapse resulted in Class A damage. The four previous incidents since 1998 have been Class B and C mishaps. Had corrective action been taken following those previous mishaps to "beef-up" and/or redesign the nose landing gear it is likely this mishap might not have occurred.

The second MH-53 Logistics/Maintenance-related mishap also involved a known deficiency that had gone uncorrected. Three months prior to this Class A mishap, a Class C mishap occurred where another MH-53 slung a Mass Balance Bracket. Due to administrative deficiencies this condition was not corrected prior to the second mishap. This second mishap resulted in Class A damage when the aircraft slung a Mass Balance Bracket just prior to landing. The difference between the Class C and A mishaps was that in the Class A the Mass Balance Bracket struck the Main Rotor Hub and blades resulting in extensive damage. The Accident Investigation Board determined maintenance personnel failed to follow technical order guidance when installing the Mass Balance Bracket.

All four of these mishaps were preventable had people with the authority taken action to mitigate the hazards. In the case of the Operations-Related mishaps, the aircrews could have taken actions to mitigate their hazards. With regards to the Logistics-Related mishaps, personnel need to ensure known weapons systems deficiencies are corrected.

With regards to Class B, C, and E mishaps/events, the table below depicts the number of occurrences of each mishap class for each weapons system in FY03:

	Class B	Class C	Class E
H-1	0	1	3
H-53	3	14	6
H-60	0	11	16
Total	3	26	25

In analyzing the H-1 mishaps it is difficult to extract trend information due the small number (good thing) of mishaps. The H-53 had a total of 23 Class B, C and E mishaps. Ten of these mishaps involved the powerplant and five of these were FOD related. With regards to the H-60, the one item that stands out is the fact that there were 16 Class E incidents and eight of those involved flight controls. Specifically, one unit reported six incidents of uncommanded flight control inputs.

Since Sep 2001, the operational demands place upon the Rescue and Special Operations forces have pushed capabilities of the aircraft and crews near the limit. Lessons learned over this period highlight the need for improved engine performance at high-altitude. Also better systems are needed to aid aircrews during restricted visibility landings (brown and white-out), e.g., improved hover couplers. Additionally, improvements need to continue in night vision devices and systems to improve aircrew visual acuity and situational awareness in low ambient illumination conditions.

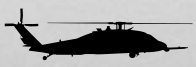
Collectively, helicopter aircrew and maintainers are a group of extremely motivated professionals who thrive on successfully accomplishing their demanding missions. However, mission and unit cultures support the incurrence of excessive risk, particular on humanitarian rescue and recovery missions. Effective Operational Risk Management (ORM) tools must be exercised prior to accepting missions and reevaluated throughout mission execution. Before commanders and aircrew can effectively accomplish an ORM assessment, they must receive accurate information from command and control elements—this is not always happening. Once ORM is assessed, does the benefits of the mission outweigh the risk to Air Force personnel and equipment? If not, don't go! With the loss of personnel and equipment we lose combat capability—is the mission worth the loss? Regulatory discipline also continues to be a problem. COMPLIANCE IS MANDATORY, it's not optional. With the writing of this article we have already lost five of our friends in FY04. Please fly safe!

H-1

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	0	0.00	0	0.00	0	0	19,901
5 YR AVG	0.4	2.05	0.0	0.00	0.4	2.05	0.0	0.0	19,514.6
10 YR AVG	0.6	2.93	0.1	0.49	0.6	2.93	0.0	0.0	20,507.7
LIFETIME FY91-FY03	54	3.32	14	0.86	40	2.46	21	52	1,626,861

H-53

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	4	20.86	1	5.21	1	5.21	0	0	19,178
5 YR AVG	2.2	15.06	1.8	12.32	0.6	4.11	0.0	0.2	14,608.2
10 YR AVG	1.3	9.46	0.9	6.55	0.4	2.91	0.0	0.1	13,736.2
LIFETIME FY91-FY03	37	7.58	24	4.91	22	4.50	24	81	488,400



H-60

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	1	3.58	0	0.00	1	3.58	2	6	27,920
5 YR AVG	1.0	3.79	0.2	0.76	0.4	1.51	0.4	1.2	26,404.0
10 YR AVG	0.9	3.43	0.3	1.14	0.6	2.28	0.8	2.3	26,274.2
LIFETIME FY91-FY03	13	3.67	3	0.85	9	2.54	11	40	353,853

C-130

USAF Photo

MAJ CHRISTOPHER P. FROESCHNER
HQ AFSC/SEFF

While the C-130 technically had a Class A free year, an HC-130P was directly involved in an HH-60 Helicopter Class A that caused the death of six aviators. In FY03, the C-130 experienced 16 Class B mishaps, one more than FY02 and the highest number of Class Bs in the past five years. Of the Class B mishaps, three were due to first stage turbine blade failure, three were due to fourth stage turbine wheel failures, three were due to FOD, and the remaining were single occurrences that included compressor rotor failure, prop flux, low oil and torque flux, flying through severe turbulence and a bird strike. There were 76 Class C mishaps, with the biggest culprits being FOD damage (17 mishaps), first stage turbine blade failures (16 mishaps), and flights into thunderstorms, lightning, wind shear and hail (seven Class C mishaps).

The Herc community did a great job of reporting Class E mishaps, as we had over 400 Class Es reported. We had 292 Class Es under the propulsion category, including engine shutdowns, prop low oil lights, and low oil quantities to the engines. Five Class Es were flight control related, including two uncommanded elevator inputs, a sheared flap jackscrew, loss of rudder control, and a failed rudder trim switch. A total of 77 Class Es were reported under the miscellaneous heading, including 57 incidents requiring smoke and fumes elimination, two physiological incidents, and two losses of pitot static instrumentation. With that wrap-up of the numbers, I would like to draw attention to the HH-60 Class A, and some selected Class Bs which have provided us some important lessons to share with the community.

HH-60 Class A Involving HC-130P Tanker

All information comes from the Accident Investigation Board (AIB). This incident occurred when two HH-60s launched from a Forward Operating Base for an urgent medical evacuation mission. The mission occurred at night with minimal moon illumination, using NVGs in marginal weather with a line of thunderstorms and low clouds over the route of flight causing decreased visual cues. Takeoff and departure were uneventful and although air refueling was planned for after the MEDEVAC pickup, the lead helicopter aircraft commander made an inflight decision to refuel prior to pickup. Join-up with the tanker was uneventful, and the lead helicopter successfully engaged the left refueling drogue on the third attempt for a contact. The number two helicopter was positioned in the observation position (just outside the tanker's wingtip but no more than approximately two rotor disks away from the tanker) when the tanker signaled for an upcoming turn due to poor weather on the last ten miles of the air-refueling track. During the turn, the number two helicopter momentarily flew through a cloud. The lead helicopter had an inadvertent disconnect, moved away from the tanker's power enhancing drafting effect, abruptly lost altitude and impacted the rising terrain. The aircraft was destroyed and all six crewmembers were fatally injured.

While the AIB did not come up with a primary cause of this accident, it concluded three areas were contributors: mission altitude above ground level (AGL), night operations in zero moon illumination and the limited maneuver afforded at high altitude.

• First, the HC-130P tanker was 350 feet above the terrain, as measured by radar altimeter, when the required altitude was no lower than 500 feet AGL.

The rolling nature of the terrain made it difficult to precisely gauge adequate altitude clearance and the HC-130P is not equipped with any terrain avoidance or terrain following equipment. The crew maintains terrain clearance by visual observation, radar altimeter crosscheck and basic onboard radar.

• Second, this mission was conducted at night with zero moon illumination, only marginal starlight and cultural lighting. The AIB concluded this limited illumination reduced night vision goggle effectiveness and led to disorientation and loss of situational awareness.

• Third, the terrain's high altitude (approximately 9000 feet above sea level) combined with the tanker's 30-degree bank and climbing turn, restricted the helicopter's aerodynamic performance, making it difficult to maintain the helicopter in the refueling contact position.

Class B—Severe Turbulence Encounter

A C-130H3 crew, with an APN 241 Low Power Color Radar (LPCR) was over water and enroute to the United States. The forecast they received indicated a one to two percent chance of severe thunderstorms with tops reaching 45,000 feet, with hail, severe turbulence, icing, heavy precipitation, lightning and wind shear to accompany the storms. The crew was cruising at medium altitude and paralleling a line of thunderstorms. The crew planned and executed a deviation from course in order to stay clear of the weather. With passengers returning to their seats, the aircraft encountered severe turbulence. While the aircraft was unaffected, there were extensive injuries to passengers and crew, many of which required hospitalization. The crew declared an emergency and landed ASAP.

Class B—First Stage Turbine Failure

There were several incidents of first stage turbine failure recorded this year, and most of them read the same. In fact, this has occurred over 30 times in the past two years, with three Class Bs and 16 Class Cs this year alone. The signature footprint of this incident involves the aircraft shaking, which is shortly followed by a loud bang. In some instances, an abrupt yaw is felt as well as the loss of engine thrust. Engine RPM typically raises and then drops. Oftentimes, a generator out light, engine oil pressure going to zero, and a decreasing Turbine Inlet Temperature (TIT) follows. The crew shut the engine down and returned to base, where it was determined that a first stage turbine blade had failed, initiating the mishap sequence. Thankfully, the mighty Hercules has four fans of freedom, and losing one of them is not a catastrophic event. Typically, crews declare an emergency and land at the nearest available airport.

It is a well-known fact that T56-A-7 first stage turbine blades, on engines currently in service, are prone to stress rupture as a result of high cycle fatigue prior to their designated life cycle limits. The shroud at the tip of the first stage blades has multiplied these physical stresses. The shroud has been redesigned into a "Z" shroud that alleviates the high frequency vibration seen with the previous design. The redesigned blades were available for field installation in March 2002, and of the 1,370 T-56-A-7s in the inventory, 417 (40 percent of the fleet) have been retrofitted with the new "Z" shroud to date. The estimated fleet-wide completion date for the refit is the third quarter of FY06.

Class B—Fourth Stage Turbine Wheel Lug Failures

There have been over half a dozen Class Bs associated with fourth stage lug failures of engine turbine wheels since 2000. Like the first stage failures described above, each fourth stage lug failure has a similar footprint that begins with erratic engine fluctuations that is usually followed by fire or overheat conditions that lead to engine shutdowns. In some cases, parts of the engine actually depart the aircraft, including the tailpipe, rear support and scavenge pump. One of the problems with fires caused by fourth stage failure is that, in some instances, the fire may be aft of the firewall and the thermal switch detectors, located outside the turbine casing and forward of the firewall, do not exceed the 700 degree activation limit required to indicate a turbine overheat condition. In these cases, using the fire bottles to extinguish the fire does not help, as the firewall prevents the agent from reaching the burning area. If the fire bottles are ineffective in extinguishing the engine fire, the next step, per Dash-1 recommendations, is to get clearance for an immediate decent and achieve maximum allowable airspeed in order to extinguish the flames.

T56-A-7B fourth stage turbine wheel failures are a known and documented manufacturer defect of non-conforming serrations (fir tree) on the turbine wheel and an oversize blade condition. The defect causes uneven loading on the fourth stage turbine wheel lugs, and over time a crack will form at the bottom serration and propagate across the wheel lug, causing an abnormal load condition on the two adjacent wheel lugs. High centrifugal force and heat weakens the metal, and instantaneous failure occurs, causing the blades and lugs to exit the engine casing. To remedy the problem, in October 2002 inspections at depot maintenance were accelerated by increasing the rate of rotor depot returns from 12 per month to 30 per month. As of the writing of this article, 774 of 1370 rotors, or 56 percent of the fleet, have been inspected. To mitigate the Class A risk of catastrophic turbine failure, the San Antonio Air Logistics Center advocated the installation of energy absorption rings around the turbine. Incorporation of the "Z" shroud first stage

turbine blade replacement has been combined with the fourth stage wheel failure corrective action plan.

The C-130J

The C-130J model, the newest Herc on the block, continued its excellent record of zero Class A mishaps in its short history. In addition to no Class As, this year the J-model reported zero Class Bs or Cs and only four Class Es. The first Class E involved a ground taxi collision with a tree while deviating off taxi centerline for proper clearance from a contractor truck that was unreported in cautions or advisories at the airfield. The second Class E involved a failed APU start during taxi to park that caused an excessive current draw on the essential DC bus, resulting in a temporary loss of flight display information. The third Class E involved a bird strike that caused propeller damage that was repaired under warranty, and the fourth Class E involved a near-midair collision with a Cessna that had been cleared to the same place and altitude as the C-130J.

There are no new mishaps out there, only repeats of the past lessons learned.

Lessons Learned

This year saw a much safer record for the C-130, but lessons learned from the past continue to be the lessons we need to carry with us into the future. Remember, there are no new mishaps out there, only repeats of the past lessons learned. When flying contingency missions, an increase in the acceptable level of risk is a given. That said, we need to guard against the mindset that "no risk is too great" to successfully complete a high priority mission. Contingency missions require high levels of risk management and constant ORM assessment, both on the ground and in the air. Real world missions result in high levels of mission press. We need to make sure high levels of planning, adherence to procedures, and enroute decisions that err to the side of safety go with those missions. That same level of care needs to be taken not just in the high press missions, but in the routine ones as well. Realize that in some instances equipment may not always give us the advisories we expect. We need to keep our helmets on a swivel, and watch for that traffic out there, not always expecting our systems to provide perfect situational awareness. Controllers can make mistakes, and it is up to us to catch those mistakes and keep ourselves safe.

While AFI 11-2C-130V3 offers us guidance for thunderstorm avoidance, we need to remember this guidance is not the be-all/end-all for decisions on avoiding hazardous weather. It is important to remember that the visible thunderstorm cloud is only a portion of a turbulent system whose updrafts and downdrafts can cause severe turbulence up to 20 miles from the severe thunderstorms. Weather avoidance is not a problem germane to the C-130 world.

At the HQ AFSC we have noticed a significant trend of flight into thunderstorms across the entire aviation community in the last several months. In addition to the Class B mishap described above, there have been no less than 13 Class C mishaps involving flight into thunderstorms from 1 May 03 -12 Sep 03. Together, these mishaps have cost the Air Force $729,698. By comparison, there were six such mishaps for the same period last year with $160,960 in damage. That's a *100 percent increase* in mishaps and a *350 percent increase* in damage costs due to flying through weather that should have been avoided in the first place. This indicates we need to work harder at learning to better use our available resources, including onboard radar, air traffic controller weather advisory systems and any other resources in order to avoid nasty weather.

I wish you all a safe flying future and Godspeed to your next destination!

C-130

Year	Class A		Class B		Destroyed		Fatal Pilot	All	Hours
	No.	Rate	No.	Rate	A/C	Rate			
FY03	0	0.00	13	4.44	0	0.00	0	0	292,689
5 YR AVG	1.0	0.35	11.6	4.02	0.4	0.14	0.4	3.2	288,251.6
10 YR AVG	1.0	0.35	6.4	2.23	0.7	0.24	0.8	5.2	286,499.3
LIFETIME CY55-FY03	147	0.91	202	1.25	85	0.53	136	629	16,134,883

FY04 Flight Mishaps (Oct 03-Jan 04)

6 Class A Mishaps
5 Fatalities
3 Aircraft Destroyed

FY03 Flight Mishaps (Oct 02-Jan 03)

7 Class A Mishaps
3 Fatalities
7 Aircraft Destroyed

05 Oct		A C-17 experienced internal engine damage.
09 Oct		A KC-135E experienced a #3 engine fire.
14 Oct	✈	A T-38 crashed during takeoff.
17 Nov		A KC-10 experienced a destroyed engine.
18 Nov	✈	An A-10 crashed during a training mission.
23 Nov	✈	An MH-53 crashed during a mission. Five fatalities.

- A Class A mishap is defined as one where there is loss of life, injury resulting in permanent total disability, destruction of an AF aircraft, and/or property damage/loss exceeding $1 million.
- These Class A mishap descriptions have been sanitized to protect privilege.
- Unless otherwise stated, all crewmembers successfully ejected/egressed from their aircraft.
- Reflects only USAF military fatalities.
- "✈" Denotes a destroyed aircraft.
- "✶" Denotes a Class A mishap that is of the "non-rate producer" variety. Per AFI 91-204 criteria, only those mishaps categorized as "Flight Mishaps" are used in determining overall Flight Mishap Rates. Non-rate producers include the Class A "Flight-Related," "Flight-Unmanned Vehicle," and "Ground" mishaps that are shown here for information purposes.
- Flight and ground safety statistics are updated frequently and may be viewed at the following web address: http://afsafety.kirtland.af.mil/AFSC/RDBMS/Flight/stats/statspage.html.
- **Current as of 16 Jan 04**.

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