flying

SAFETY FEBRUARY 1989

SPECIAL ISSUE 1988 MISHAP REVIEW

The HEAVIES

THERE I WAS

■ THERE I WAS . . . on final, after going night cross-country in a Cessna 152 to give my son a week with the grandparents. My son was years from a pilot's license, but was as enchanted with flying as I was and knew most of the basics. I had just received my license and was, in my IP's words, "as current as I would ever be." The night was clear, and the lights of the small town and airport were beautiful. But then came trouble.

A mile out, the panel lights failed. I gave my pocket flashlight to my son to light the instruments and checked the breakers. Nothing. No sweat — small problem — let's proceed as usual. However, in the process, I had set up high and long and would need to go around. Check for traffic — none. Just firewall the throttle, raise the 152's colossal flaps, and go around. Wrong! I proceeded with full throttle, reached over to the right side of the panel, pushed up the electric flap switch, and nothing happened. And, with those big flaps all the way down, we were only a couple of knots above stall.

Lucky for me that my IP taught more than just the book! He threw in a lot of "hangar flying" stories of philosophy and experience. He taught recovery from the approach-to-landing stall, but always said that was the one never to get into. He stressed that when many inexperienced pilots get in a jam close to the ground, their instinctive reaction is to start pulling back on the yoke, and the rest is history.

I was past the end of the runway, still 50 feet above ground level, and with my mind made up that I was *not* going to stall. A little back pressure was letting me gain some altitude without bleeding any airspeed, and I was talking my son through where and what to light with the flashlight. I routinely recycled the flap switch, but no luck. I was pretty sure that the 50 feet, plus what I was gaining, would get me over everything in the airport area, but I certainly couldn't bank those square corners in the pattern.

That trip around the pattern was undoubtedly the longest I've ever had, but was otherwise uneventful. If you always thought that the flying basics were all that really mattered in the time with the IP, and that all that stuff about how other pilots augured in was just small talk, think again. It sure helped me, because THERE I WAS . . . ■

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SPECIAL ISSUE

We experienced another great year in 1988! We had 55 Class A mishaps in FY88 and for the fifth year in a row, our Class A mishap rate remained below 1.8. Our heavy aircraft had a good year overall — the C-5, C-141, C/KC-135, and E-3 enjoyed a Class A mishap-free year, while the helicopters had their best year since 1983.

In this issue, we take a look at how we did in FY88 in our heavy aircraft and helicopters. Next month, we will look at the trainers and observation aircraft.

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DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, OSAF

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B-1B

MAJOR MILTON H. WADDELL
Directorate of Aerospace Safety

■ The delivery of Ship 100 to McConnell AFB, Kansas, highlighted the absolute beginning of a new era in the Strategic Air Command (SAC). As CINCSAC decreed 1988 the "Year of the ALERT Force," it was only fitting McConnell AFB, the fourth and final B-1B base, attained their initial operational capability (IOC) status in June. McConnell AFB joins Dyess AFB, Texas, Grand Forks AFB, North Dakota, and Ellsworth AFB, South Dakota, as the homes of the B-1B.

The Air Force possesses 97 B-1Bs, and since 1984, it has flown 31,459 hours. Figure 1 shows the Class A rates since 1984. The B-1B Class A historical rate is 3.2 (one Class A in 1987). In FY88, there were no Class A mishaps (figure 1). For FY88, there was 1 Class B, 32 Class Cs, and the HAPS totaled 8.

Safety Concerns

There are several B-1B safety concerns, including static discharges, FOD reduction and prevention, and the vane electrical heating system (VEHS). People performing maintenance in the engine nacelle are susceptible to electrostatic discharge from the aircraft. Procedures and precautions are being developed to eliminate the discharge.

FOD is a problem. Figure 2 shows the seven major categories of FOD on a percentage basis. For those who have followed this problem, it is no surprise the unknown category doubles any other. There is a concern over migration paths in the aircraft in which debris can get to un-

Fig 1. Class A Mishap Rate
1984 - 1988

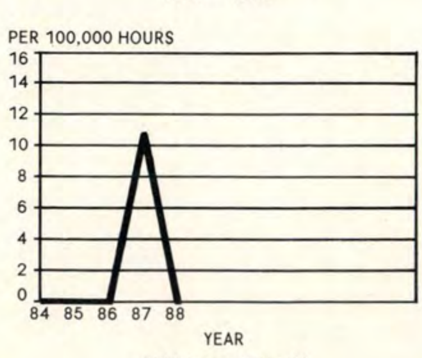
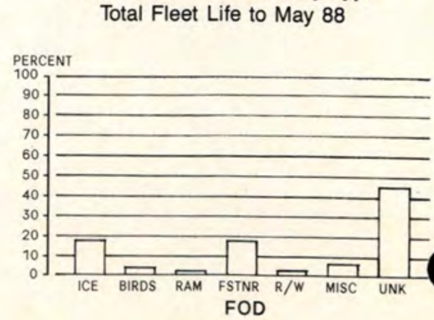


Fig 2. B-1B/F-101 FOD By Type
Total Fleet Life to May 88



screened drain holes forward of the intakes, resulting in engine FOD. Prevention programs are well underway and improving.

The VEHS provides anti-icing for the radar cross-section vanes in the engine inlet ducts. The VEHS does not keep the vanes completely free from ice accumulations that can cause FOD. Extensive testing is being conducted at Arnold Air Station, Tennessee, and at the Aeronautical Systems Division, Wright-Patterson AFB, Ohio, to eliminate this problem.

Major Interests

So what are some of the major interests in the B-1 world? The bird strike vulnerability reduction modification was complete in December 1988. This modification protects all "soft spots" on the aircraft, and all 97 B-1Bs can now descend back into the low-level regime.

Next, the stability enhancement function/stall inhibitor system (SEF/SIS) modification allows safe aircraft operation in an expanded angle-of-attack envelope, and the SIS automatically inhibits the aircraft from exceeding the expanded angle-of-attack limit, which is beyond the aerodynamic neutral stability point. SEF is an expansion of SIS. This modification is still being tested at Edwards AFB, California, and the release date is unknown.

Terrain following is improving day by day. The crews are flying at lower altitudes in the hard and soft ride modes. Complete release is still pending.

Third, ALC at Tinker AFB, Oklahoma, accepted the F101 engine program management responsibility transfer on 1 October 1988. Additionally, the transfer of the whole B-1B program to OC-ALC was January 1989.

The Air Force Operational Test and Evaluation Center is diligently conducting weapons testing. They are testing with different configurations of SRAM, ALCM, and gravity weapons. Also, successful major avionics tests were conducted while flying over the "pond" to and from Guam and while TDY there.

Finally, the initial crew force training is complete, and training is now conducted to fill fallout (crewmembers going PCS). Bases are already conducting local pilot upgrades (to aircraft commanders). The quality of crew training is outstanding as evidenced by Dyess, Grand Forks, and Ellsworth passing their ORIs. Static displays are conducted at other-than-SAC bases to "show off" and inform the world of the jet's capabilities. This is especially being accomplished at UPT bases.

The Challenge

Again this year, I will not put any predictions in this article because the ultimate goal is zero Class A mishaps. So my challenge is to all the aircrews, maintainers, supervisors, and all the other dedicated individuals involved. The challenge is the *B-1B*.

When terrain following, SEF/SIS, and other modifications are released or perfected, the aircraft will be able to reach its ultimate limits. Continue to study and learn the aircraft. Maintain and fly the jet like it is your most prized possession. MISSION CAPABILITY IS PARAMOUNT, BUT SAFETY GETS YOU HOME. ■

B-52

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Directorate of Aerospace Safety

■ In 1946, the US Army Air Corps established a requirement for an intercontinental heavy bomber. The first B-52 was delivered to SAC in 1955, and the last B-52 came off the production line in 1962. A total of 742 aircraft was manufactured, and now there are 166 G-models and 96 H-models still flying high and low altitude diverse missions.

The G-series aircraft was produced from October 1958 to March 1961. The H-series aircraft was produced from March 1961 to October 1962. As of September 1988, the B-52 (A-H models) had logged 6,893,613 hours. Figure 1 shows the flying hours of the G and H models from 1980 to 1988.

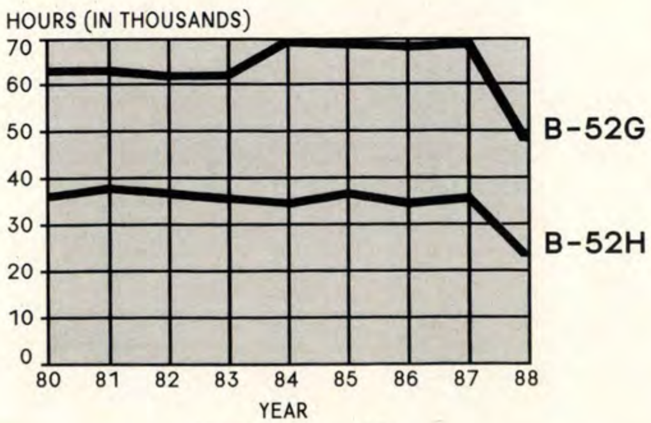
The B-52 has come a long way since 1946. It was first used as a high-altitude bomber. Today, B-52 missions include tactical environmental area denial and use of night vision goggles, delivery of ALCMs from a standoff mode or penetrating and attacking hardened targets using a mixture of ALCMs, SRAMs, and gravity weapons.

Additionally, B-52s can perform reconnaissance in the maritime/sealanes as well as control these lanes using HARPOON antiship missiles and mines. Finally, the B-52 is used as a combat crew trainer. The B-52's capability was demonstrated in a Bright Star exercise: B-52s flew from their bases in North Dakota to Egypt, delivered their weapons, and returned to their US bases nonstop.

Mishap History

As of 30 September 1988, B-52s had experienced 92 Class A mishaps, with 72 aircraft destroyed. The historical Class A mishap rate through 30 September 1988 is 1.33. Figure 2 shows the Class A rate over the last 10 years. During 1987, there were no Class A mishaps and only one Class B mishap. In 1988, there were two Class A mishaps and zero Class B mishaps. The two Class A mishaps were a B-52G which departed the runway after a high-speed abort and an inadvertent fatal ejection.

Figure 1. Flying Hours
1980 - 1988



1988 is as of Sep 88

Figure 2. Class A Mishap Rate
1978 - 1988

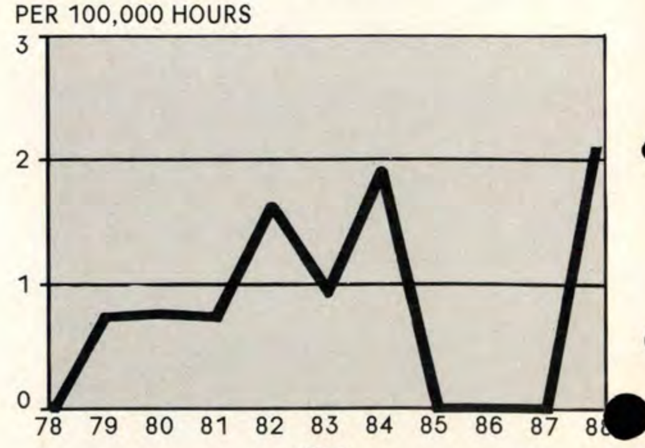


Figure 3.
1988 Mishap Statistics
As of 13 Oct 88

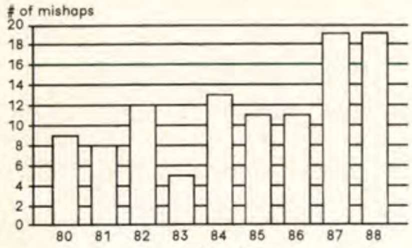
ACFT	A	B	C	HAP
B-52G	2	0	32	17
B-52H	0	0	12	3

Figure 4.
Class C and HAP Leaders
1988

Physiological	19
FOD	16
Ext TO Roll/Slow Accel	12
Bird Strikes	8

1988 is as of Sep 88

Figure 5.
Physiological Mishaps
1980 - 1988



1988 is as of Sep 88

Figure 3 depicts the overall 1988 B-52G and B-52H mishap statistics. Under the Class C and HAP categories, there are four areas of safety concerns (figure 4). Physiological mishaps are on the rise (figure 5). The major cause is flight crews self-diagnosing their illnesses and determining they can go fly or continue the mission. The majority of the FOD causes are unknown or undetermined.

Thirdly, the dreaded extended takeoff roll, accompanied with slow to accelerate, failure to obtain S-1, and high speed abort is BACK. Part of the problem seems to be the B-52's old brake system. SAC and AFLC are proposing a brake modification which would incorporate self-adjusters, wear indicators, and brake linings made of improved materials. This modification would greatly enhance safety, reduce maintenance man-hour requirements, and significantly improve brake reliability and maintainability.

Finally, as expected, the B-52 experienced the majority of its bird strikes during low level. Flight crews continue to perform all the appropriate low-level safety precautions (visors, see-and-avoid, etc.).

Ongoing Modifications

- Environmental Control System (ECS). This air-conditioning system increases cooling output volume 11 times that of the old system. The increased cooling capability aids in cooling the aircraft avionics system and adds to aircrew comfort. There are 189 aircraft complete, and fleet completion date is 1989.
- Strategic Radar Upgrade. This state-of-the-art, solid-state circuitry modification replaces the present B-52 vacuum tubes radar system. A total of 194 B-52 aircraft (98G and 96H) will be modified during programmed depot maintenance. Completion date is October 1991.
- AN/ASG-33 Defensive Fire Control System. Fifty-four G-model aircraft will be modified. It replaces line replacement units (LRU) within the AN/ASG-33 defensive fire control system with solid-state LRUs to improve system reliability and maintainability. It also modifies the gun turret drive system and weapon system feed to improve the ammunition fire-out reliability. Expect completion in September 1989.
- Digital Signal Processor — Forward Looking Infrared Receiver. This processor replaces the current analog signal processor with a digital unit offering improved sensitivity, automatic gain control, and no significant deterioration of the picture up to the point of total failure. There are 211 of 263 modified, and complete installation is projected for September 1989.
- Digital Automatic Flight Control System (Autopilot). All 263 aircraft will have this state-of-the-art digital equipment (ASW/49 Flight Control Set) installed. Completion date is September 1989.

Proposed Class IV Modifications

Proposed modifications are contained in program objective memorandum and are not approved by the configuration control board. Here is a list, hopefully, of things to come:

- AN/ALR-20A Band 4 Tuner Replacement
- AN/ALQ-20 Power Supply Replacement
- B-52G/H Re-engine Program
- Offensive Avionics System Computer Upgrade
- B-52 Brake Improvement Program
- Conventional Block Upgrade to the B-52 WST
- Instrument Landing System
- Flight Loads Data Recorder System
- Transformer Rectifier Unit
- Central Air Data Computer

Until last year, the B-52 community had 3 years free of Class A mishaps. As previously stated, last year we had two Class As, with one aircraft destroyed and one fatality. Flight crews are tasked to fly many new and different mission scenarios with various weapon configurations and with less flying time. To successfully complete each mission, many factors come into play, such as strong supervision, self-discipline, common sense, many hours of individual and crew study and mission planning, proper crew rest, superb crew coordination, etc. MISSION CAPABILITY IS PARAMOUNT, BUT SAFETY GETS YOU HOME. ■

C-5/C-141

MAJOR ROBERT D. VANDERHOEVEN
Directorate of Aerospace Safety

Figure 1.
C-5 Mishaps (1979-1988)

CY	A	B	C	HAP	TOTAL
79	0	2	26	21	49
80	1	3	26	23	53
81	0	1	20	15	36
82	1	2	31	14	48
83	2	2	28	18	50
84	0	2	24	16	42
85	0	1	25	19	45
86	1	0	18	8	27
FY	A	B	C	HAP	TOTAL
87*	0	1	16	18	35
88	0	0	15	10	25

*1 Jan 87 to 30 Sep 87

Figure 2.
C-141 Mishaps (1979-1988)

CY	A	B	C	HAP	TOTAL
79	3	4	90	103	200
80	1	0	109	123	233
81	1	1	73	66	141
82	1	0	66	74	141
83	0	2	77	73	152
84	1	0	73	49	123
85	0	0	84	55	139
86	1	0	42	39	82
FY	A	B	C	HAP	TOTAL
87*	1	0	20	53	74
88	0	0	31	44	75

*1 Jan 87 to 30 Sep 87

■ FY88 was a resounding success for all personnel and agencies concerned with the maintenance and operation of the Military Airlift Command's strategic airlift aircraft. Confronted with not only expanded airlift roles, but exceedingly demanding missions, C-5 and C-141 aircrews experienced no Class A or Class B flight mishaps. Additionally, these dedicated professionals reduced the number of reportable mishaps from the previous "lows" established during FY86 (C-5) and FY87 (C-141).

A comparison of mishap categories between the C-5 and C-141 shows a marked similarity between the two weapon systems. The only differences were with C-141 flight control malfunctions (which include spoiler asymmetries) and C-141 physiological incidents. Flight control malfunctions can be directly attributed to the differences in design and use of the spoiler systems.

Most physiological mishaps in C-141 aircraft can be attributed to the aircrew members' and passengers' close proximity to cargo. When car-

Figure 3.
C-5 Mishaps by Category (1984-1988)

	CY84	CY85	CY86	FY87*	FY88
Operations					
Physiological	1	0	0	2	1
Jet Blast	0	0	1	1	1
Other	1	0	4	6	3
Total	2	0	5	9	5
Logistics					
Cargo Spills	2	4	3	4	3
Landing Gear	14	14	6	2	3
Engines	8	5	2	2	3
Flight Control	3	3	3	4	3
Other	7	15	5	7	1
Total	34	41	19	19	13
Miscellaneous					
Bird Strikes	5	1	2	5	4
Weather	0	2	1	1	1
Other	1	1	0	1	2
Total	6	4	3	7	7

*1 Jan 87 to 30 Sep 87

go is not properly prepared for air shipment, a greater potential exists for people to be affected by noxious or toxic fumes.

While both aircraft attained an enviable mishap record for FY88, the period was not exempt from several safety concerns which culminated in command interest and action.

Of general concern for both the C-5 and C-141 weapon systems is the increased emphasis on low-level flight operations such as combat aircrew training (CAT), special operations employment (C-5) and special operations low-level (C-141) missions, and airdrop operations.

With the exception of the airdrop role, such mission profiles were not considered during either weapon system's initial structural design. So these aircraft were not specifically designed to withstand the additional loads imposed by low-level threat avoidance profiles. Typically, it is necessary to replace or reinforce the load-carrying structure of aircraft designed to operate in a high altitude, relatively "gust-free" environment when they are flown extensively in the low-level regimes. (The highly modified B-52 fleet is a good example.)

Consequently, wing, fuselage, and vertical tail lives are being reduced at a rate faster than previously programmed. HQ MAC/LGM and the respective air logistics centers are tracking critical control points and updating gust-environment criteria obtained from operational units to assess the extent of aircraft structural damage by low-level missions. With this data, an accurate assessment can be made to determine how much the structural service life has been reduced by low-level flight operations. This information will then be used to develop revised inspection criteria, identify required structural modifications, and ultimately address long-term weapon system safety concerns.

While low-level flight operations have been recognized as a "general" concern for both weapon systems, the C-5 and C-141 aircraft are confronted with some very specific and unique safety issues that are currently being worked by HQ MAC and their respective action agencies.

Figure 4.
C-141 Mishaps by Category (1984-1988)

	CY84	CY85	CY86	FY87*	FY88
Operations					
Physiological	5	15	17	9	8
Jet Blast	0	0	0	0	1
Other	18	23	11	17	7
Total	23	38	28	26	16
Logistics					
Cargo Spills	5	12	11	9	10
Landing Gear	7	3	1	5	7
Engines	12	26	6	4	4
Flight Control	14	12	8	18	22
Other	35	25	21	8	8
Total	73	78	47	44	51
Miscellaneous					
Bird Strikes	15	19	5	3	4
Weather	0	0	0	0	1
Other	12	4	2	1	3
Total	27	23	7	4	8

*1 Jan 87 to 30 Sep 87

C-5A/B Safety Action Items

The specific C-5A/B safety action items currently in progress are:

Smoke and Fume Elimination Tests After completing initial testing, the USAF Airlift Center pro-

continued

C-5/C-141 continued

posed three methods to enhance the effectiveness of current smoke and fume elimination procedures. They also determined that the smoke detectors currently in use on C-5 aircraft may not provide adequate warning of smoke in the aircraft. Future tests are planned to assess the proposed procedures and determine the suitability and adequacy of the smoke detection system.

Strobe Lights The installation of strobe lights was recently approved as a depot-level modification. A contract will be awarded in December 1989 for all A-model aircraft. Currently, B-model aircraft are being retrofitted with the strobe lights, while the last 16 C-5B aircraft will be manufactured with the light assemblies.

Improved Engine Pylons The installation of new engine pylon structures on A-model aircraft is programmed to begin in August 1989 and will begin to standardize the C-5 fleet. After all the A-model aircraft have been modified, a separate TCTO will be issued (pending approval of the engineering change proposal) to add optical fire detectors, move existing fire detectors and nitrogen tubing further down into the pylon, and increase the amount of protective insulation (thermal barrier).

C-141 Safety Action Items

Specific C-141 safety issues of the using command include:

Pressure Bulkheads In early 1985, an increasing number of structural cracks in the pressure bulkhead between fuselage stations (FS) 1398 and 1478 were identified. The cracks were located not only above the bulkhead cutouts in the web area, but also in support brackets, stiffeners, fasteners, and fittings. A structural failure in this area could result in the loss of an aircraft. While interim field-level repairs have been completed, a redesign effort is in progress. The first or initial design prototype was only 95-percent effective as FS 1398 still lacked sufficient strength. Consequently, a second redesign effort is being prototyped, with an estimated modification start date of March 1989.

Center Wing Repair Center wing cracks appeared in 1983 as the result of stress corrosion, pitting, and exfoliation over the years. Several aircraft were grounded for temporary repair. Warner Robins Air Logistics Center (WR-ALC) contracted for Lockheed to prototype a permanent repair. New panels and upper wing surface assemblies are now being procured. Lockheed is on contract to repair 20 aircraft per year until April 1991, when a program to replace the center wing boxes will begin.

Aileron Structural Modification WR-ALC completed a Class IVA safety modification in 1983 to strengthen the internal aileron structure. However, the modification did not provide the desired structural integrity, and Lockheed was subsequently contracted to design and prototype a stronger modification. This new "mod" is being installed during PDM and, as of April 1988, five aircraft had been completed. The entire fleet is programmed for completion by February 1992.

Strobe Lights As with the C-5, those C-141 aircraft painted in the European One paint scheme have a greater midair collision potential due to their decreased visibility to other aircraft. The modification to add strobe lights has been approved. While the modification schedule slipped several times due to engineering and contract delays, two aircraft have been completed, with fleet completion anticipated in October 1989.

Thrust Reverser System Several deficiencies have been noted with the engine thrust reverser system to include failure of the doors to lock, failure to open on demand, inadvertent actuation or opening in flight, and chafing of the pressure lines. While a number of TCTOs have been issued, they have failed to correct the problems. Subsequently, Lockheed conducted a study which recommended increased emphasis on proper thrust reverser rigging, monitoring of wear limits for latches and over center locks, and ultimately a redesign of the thrust reverser control valve actuation lever. Finally, HQ MAC has levied indepth inspection procedures for thrust reverser system components during minor and major isochronal inspections.

Vertical T-Tail Loads Recently, several aircraft have experienced vertical T-tail loads at or near design limit load (DLL) during low-level and air refueling operations. As a consequence, WR-ALC is working with Lockheed to develop a modification that will substantially strengthen the vertical spar of the T-tail. While all aircraft in the fleet will be modified, the first will be the SOLL II aircraft.

Spoiler Asymmetries Following the inordinate number of spoiler malfunctions on C-141 aircraft, a "Tiger Team" of WR-ALC engineers will respond to those asymmetry conditions not corrected by the asymmetry protection system (and not subsequently reset by the aircrew or maintenance). Pending a complete engineering analysis, units will continue to report all serious malfunctions and actual asymmetries as high accident potential (HAP) mishaps.

Landing Gear WR-ALC recently completed an alignment check of the entire gear system in response to several recurring gear problems. Currently, "old" main landing gear actuators are being identified for removal during depot rework. A product reliability and maintainability project was approved to redesign the main landing gear actuator cylinder using steel instead of aluminum. Finally, a modification conducted under TCTO 742 will strengthen the entire gear structure.

Combined Efforts

The laudatory mishap statistics and corresponding low mishap rates for both the C-5 and C-141 weapon systems are directly attributable to the unified efforts of maintenance and operations people and the system safety activities of the HQ MAC staff, and associated support agencies. These combined efforts have ultimately resulted in safe and successful mission accomplishment by the strategic airlift fleet. ■

C-130

MAJOR MARK E.S. MAYHEW
Directorate of Aerospace Safety

■ The Air Force workhorses — the C-130s, accomplishing very diverse missions, logged 343,280 hours in FY88, bringing their Air Force total to more than 11,668,185 flying hours. In this article, we'll look at last year's mishaps, the lessons learned, and safety improvement and modification programs for the C-130.

Before addressing these topics, I thank the safety staff at HQ MAC, the numbered air forces, and their subordinate units, as well as the individual unit safety officers in the field, for their assistance and support during my first year at AFISC.

Class A Mishaps

The C-130 fleet experienced three Class A mishaps in FY88 — two flight mishaps and one flight related. I've included the flight related in this article because of the valuable lessons learned. In one flight mishap, six crewmembers died when the aircraft crashed on final, possibly due to a rapid application of asymmetric power at a low airspeed during simulated engine-out work.

The other Class A flight mishap occurred at cruise altitude when the no. 3 propeller separated from the aircraft, causing significant damage to the no. 4 propeller, engine, and the right wing, but, fortunately, no injuries.

Finally, during a night formation personnel delivery mission, the no. 2 aircraft in an element entered the turbulence caused by the wingtip vortices of the preceding aircraft, resulting in directional and altitude control difficulties. During the recovery, the affected aircraft flew through the parachutes of three jumpers. Two of them successfully deployed their reserve parachutes and received no injuries. The third was fatally injured in the fall.

Class C and High Accident Potential Mishaps

With no Class B flight mishaps, we'll move on to the Class C and HAP mishaps. Of particular interest are mishaps involving four-engine power loss, physiological factors, lightning strikes, and inadvertent liferaft deployments.

Four-Engine Power Loss Following the trend that started in FY86, four-engine power loss mishaps continued to occur. In addition to publishing a TCTO, HQ AFLC is establishing a baseline of data for inspection of the no. 2 generator, developing a constant voltage transformer to control the input to the synchrophaser, and acquiring a new, solid-state synchrophaser. Installation of the constant voltage transformers should start in late 1988 or early 1989 and should reduce the number of occurrences, as well as the severity of those that continue to occur.

Physiological These mishaps maintained their downward trend with 18 reportable events. However, if we add the 12 Class C flight injuries, the number remains high. Many of the physiologicals resulted from crewmembers flying with a cold, making them avoidable mishaps. Similarly, many of the injuries took place because of poor communications within the crew or between the crew and passengers.

Lightning Almost by definition, the C-130's mission environment includes those areas most likely to experience lightning strikes. I could find no reason why we saw 10 lightning strikes last year compared to the one registered in FY87. The relative frequency of this phenomena and the fact that we fly at relatively low altitudes, often very close to the freezing level, require constant vigilance by the crew and supervisors.

Liferaft Deployments Finally, as in FY87, the fleet was plagued by a number of inadvertent liferaft deployments. Various reasons given by San Antonio ALC include CO_2 leakage due to exposure to low temperature at altitude and harmonic vibration common in the C-130. A new valve has been developed which helps reduce the number of occurrences. In the interim, the 616th Military Airlift Group at Elmendorf AFB, Alaska, has initiated a number of actions aimed at finding specific indicators of impending deployment, as well as reviewing rigging and inspection procedures.

C-130 Flight Mishap Summary

Category	FY86	FY87	FY88
Class A	2	1	2
Rate/100,000 hours	0.5	0.4	0.58
Destroyed	2	1	1
Fatalities	14	5	6
Class B	0	3	0
Rate/100,000 hours	0	1.1	0
Class C and HAP	134	127	148
Rate/100,000 hours	37	46	43
Significant Areas			
Bird Strikes	9	1	3
FOD	5	2	4
Physiological	21	19	18
Lightning Strikes	13	1	10
Foam Fire	4	7	1
Two Engine Shutdown	5	2	2
Malfunction	4	5	3
Three or Four Engine Power Loss	3	13	18
Liferaft Deployment	0	4	5

Lessons Learned

As with many lessons learned from a mishap, the cost paid is often very great. Hopefully, we can make the most of that information to prevent recurrences. continued

C-130 continued

Asymmetric Thrust An expanded explanation concerning the aircraft's response to asymmetric thrust, at or below air minimum control speeds, enhanced our understanding of the flight characteristics in that regime and the importance of proper aircrew actions when flying at those speeds.

Wake Turbulence Another case of an improved explanation of a phenomenon came from a mishap involving a formation personnel drop. Many of us had thought "prop wash" and wake turbulence were synonymous. In addition, few crewmembers may have had an adequate appreciation of the magnitude of the force generated by such turbulence and what might be required to recover from those effects.

Night Vision While the USAF C-130 community did not report any mishaps involving the use of night vision devices, their use is becoming more widespread as we better define our combat environment and enhance our survivability. This increased use, as well as the inherent risk of low-level night flight, demands a high degree of expertise on the part of the crews and vigilance by supervisors during operational and training missions.

To disseminate night vision-related information and, hopefully, avoid a repeat of some extremely costly mishaps, HQ AFISC has developed a night vision goggle AIG. Because of the large number of addresses that are not safety offices, we will not be able to use the AIG to release unsanitized mishap information. It will, however, provide an avenue for crosstell of significant interest items.

Safety Improvements

The structural and system modifications in progress should provide an ever safer C-130 fleet well into the 21st century. The outer-wing modification and replacement of carbon steel throttle cables with stainless steel ones mark the completion of a major safety improvement.

A number of additional initiatives are at various stages of development and fielding. With the increase in air traffic and the proven effectiveness of strobe lights in the see-and-avoid concept, we are all glad to see the trial installation for that contract underway in the C-130.

A program that has reduced operations-related mishaps for the airlines is a ground proximity warning system. The C-130 mishap history reveals at least 22 Class A flight mishaps involving collision with the ground. Furthermore, as mission profiles become more complex and intense (i.e., low level, at night, in bad weather, to a remote site), this modification may be even more critical, with individual crewmember tasks approaching the saturation point. Preliminary testing is ongoing and appears promising.

Another program to reduce operations mishaps, the Mission-Oriented Simulator Training/Aircrew Coordination Training Program, continues to grow and improve. Scenarios will expand, and the training schedule may change. To help reduce the number of cause-undetermined mishaps, continued emphasis has been placed on crash survivable cockpit voice recorders and flight data recorders.

The Future

The future of the C-130 includes a number of exciting modifications. Enhanced station keeping equipment and the self-contained navigation system will both aid and challenge crew coordination. The special operations community has the prospect of new systems with the Combat Talon II in testing and the AC-130U on design schedule.

The future also holds the possibility that personnel retention problems will continue. For crewmembers, as well as supervisors, the message is the same: Know the aircraft and the job; know the rules; know the people, their strengths and weaknesses; and having evaluated the risks and payoffs, safely accomplish the mission. ■

C/KC-135

MAJOR JAMES L. WALL
Directorate of Aerospace Safety

■ The 738 operational C/KC-135 aircraft fleet is 32 years old and has flown just over 9.1 million hours. Approximately 250,000 hours were flown during this 1 October 1987 to 30 September 1988 reporting period. This aircraft currently performs a variety of missions and, with ongoing modifications, it is believed this trusty warrior will now fly well past the beginning of the next century. This article will review selected C/KC-135 mishaps and list some modifications to the aircraft that are currently being considered.

FY88 marked the sixth year of Class A mishap-free flying since the first KC-135 was delivered to the Air Force in early 1957. In all, 59 C/KC-135s have been destroyed during 69 Class A mishaps. Figure 1 illustrates the overall mishap rate for C/KC-135 aircraft.

Figure 1
Flight Mishap History (1957-1988)

Total Flying Hours	9.1 Mil
Class A Mishaps/Rate	69/0.76
Destroyed Aircraft /Rate	59/0.65

Class B Mishap

Although there were no flight Class B mishaps, one ground Class B mishap occurred on alert after maintenance people repaired a part of the fuel saving advisory system (FSAS) fuel panel. During this repair, the gear handle was lifted out of the down and locked position and never returned. After hydraulic pressure was applied, the nose gear collapsed. This was not the first time this has happened. In fact, it was at least the fifth such occurrence.

One lesson learned from this mishap is that using the override trigger defeats the five fail-safe electrical switches that are installed to prevent gear retraction on the ground.

Class C and HAP Mishaps

Now, the good news. There were less Class C and high accident potential (HAP) mishaps reported in FY88 than in previous years. Unfortunately, I hear through the grapevine that one possible reason for this reduction is that some mishaps are not being reported, especially those that occur while TDY.

Two areas I am mostly concerned about are air refueling mishaps and loss of FSAS indications that prevent the crew from completing their missions. It will benefit all who fly the C/KC-135 to report instances, through safety, that they believe either created a hazard or caused some damage to the aircraft. It is then the unit commander's responsibility, with the safety staff, to adequately investigate and report the mishap. The bottom line is, if the

continued

C/KC-135

continued

problem isn't reported, it's probably not going to get fixed until it causes more serious damage.

Figure 2 shows a yearly comparison of four primary categories of mishaps. As can be seen, air refueling, bird strikes, and physiological mishaps are all down. However, mishaps involving engines, especially FOD related, are on the rise. During one particular mishap, all four engines were damaged by FOD.

Figure 2
Class C Comparison

Category	CY85	CY86*	FY87**	FY88
Air Refueling	30	18	16	13
Bird Strikes	18	14	11	10
Engines	11	17	7	23
Physiological	6	23	26	16

* 1986 figures reflect higher reporting criteria
**1987 figures reflect 9-month reporting year

Selected Mishaps

Poor Crew Coordination During this previous year, several crews were very lucky as the HAP mishaps they experienced could have easily become more serious. During two occasions, crew coordination broke down when fuel valves and pumps were incorrectly positioned. Each time, it resulted in loss of two engines — once during takeoff.

During another mishap, the crew became task saturated in the traffic pattern and forgot to lower the landing gear. In the flare, they realized their mistake and, during the go-around, scraped the bottom of the boom pod on the runway. Each of these mishaps was a result of poor crew coordination, lack of proper checklist discipline, and not conducting a proper safety check.

AR Mishaps Four of the C/KC-135 AR mishaps were the result of the boom coming into contact with other parts of the receiver besides the receptacle. One mishap resulted in a bent F-16 TACAN antenna. Another was a scratch in the F-16's canopy. Windscreens of a B-1 and a C-130 were damaged when struck by the boom. Two mishaps resulted in damage to the boom and the receiver's receptacle when binding occurred due to the receiver exceeding the AR envelope. The tanker was also struck by a B-52 and a C-5 while refueling. Boom operators must remember that, even during restricted comm AR, if the receiver is approaching a safety-of-flight limit, voice communication should be used.

Taxi Mishap One EC-135 crew was surprised when the vehicle they believed to be a follow-me vehicle proceeded close to several parked fighters, but the crew continued taxiing until they struck the tail of one of them. It was then they learned the follow-me vehicle was really a security police vehicle that was attempting to get out of the way of the taxiing aircraft!

Modifications

Several ongoing modifications to the C/KC-135 fleet include the re-engining with F-108 engines, continued installation of the FSAS fuel panel, and replacement of the MC-1 autopilot with a new digital system. Proposed modifications include an avionics modernization program which would add a digital color radar, dual INS, a mission computer system,and a VHF radio. Additional plans call for adding a hose/drogue pod to each wing.

In the future, a civilian firm will be testing their ground collision avoidance system (GCAS) on the KC-135. Throughout the -135's 32-year history, collision with the ground has resulted in approximately 20 Class A flight mishaps. Additional tests will be run to determine if a stall warning and wind shear warning devices can be incorporated with the GCAS system.

Safety Improvements

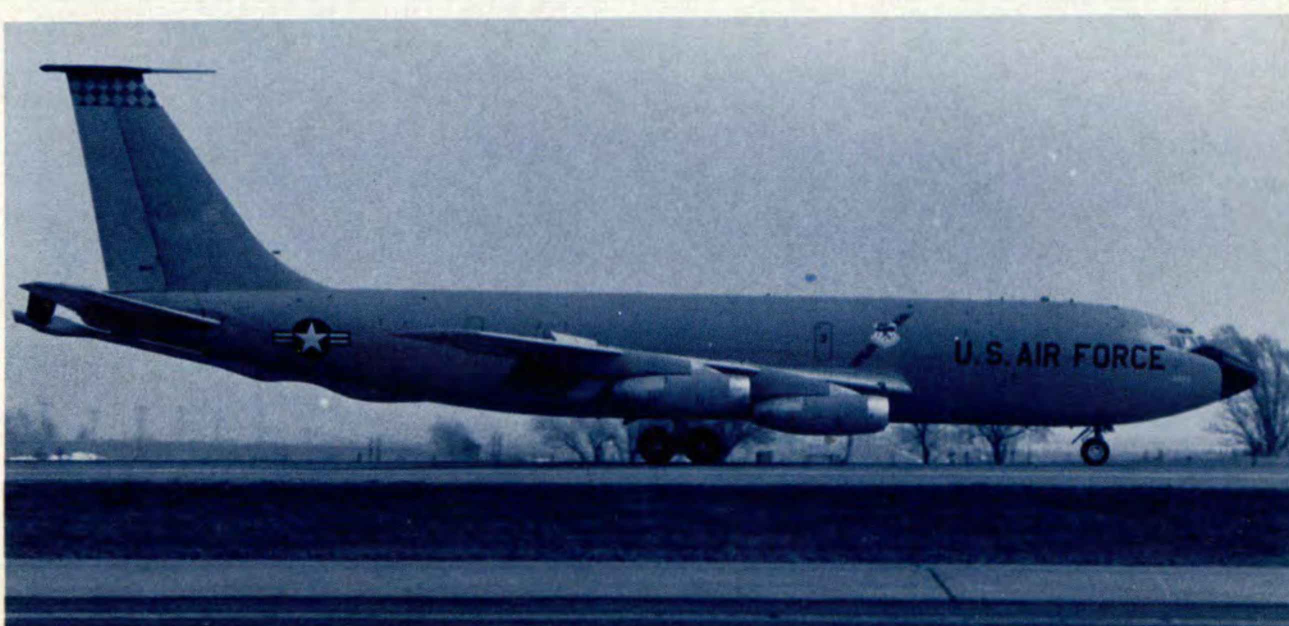
Since 1984, AFISC has been advocating the installation of smoke goggles on quick-don masks and emergency escape breathing devices (EEBD) on C/KC-135 aircraft. We were happy to see that SAC has installed both of these on their KC-135s and KC-10s. However, recent visits to several SAC bases highlighted yet another safety concern. Few crewmembers really knew where these devices were located and how to use them. Learning the proper location for quick use in an emergency might someday save someone's life.

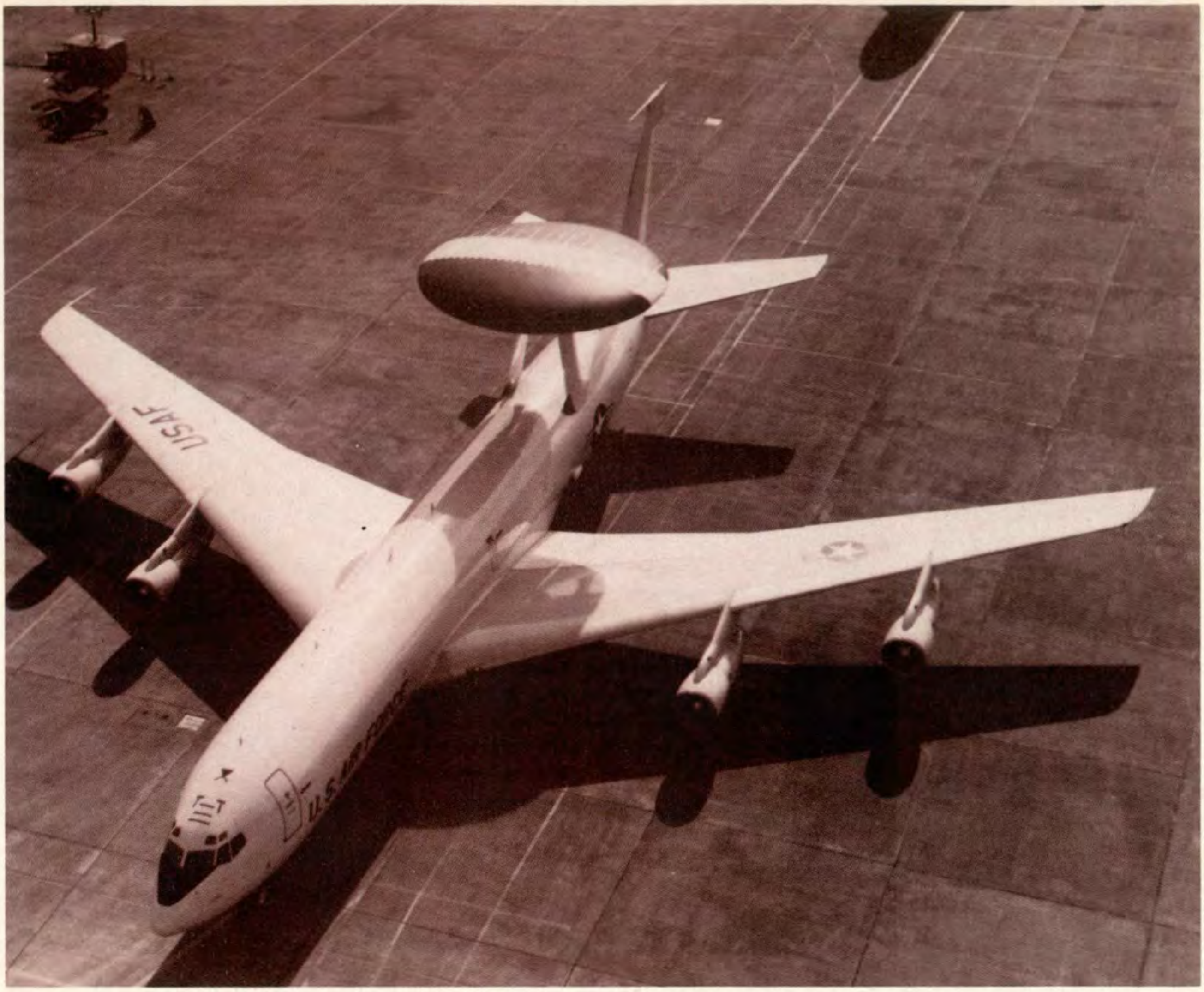
A recently completed MAC study of smoke and fume elimination procedures on a WC-135 aircraft reaffirmed our concern when the report revealed, "The current aircraft procedures used to clear the cabin of smoke and fumes are not adequate since the procedures allow cabin smoke to enter the cockpit." It was discovered that smoke in the cargo compartment is drawn into the cockpit by the forward outflow valve. Closing the cabin door has no significant effect in stopping the smoke.

Additionally, it was learned that "Without smoke goggles, crewmembers do not have adequate eye protection against aircraft smoke and fumes." Finally, "Stooping or crawling out of the aircraft increases visibility and provides additional breathing air near the cabin floor."

FY89 Challenge

As previously mentioned, several of our FY88 HAP mishaps could have become more serious. It is up to those that supervise and to those that fly to continue to realize that *safety* is important. If we continue to fly, then we will continue to have mishaps. But good judgment and an adherence to good safety practices can decrease the risk of you having one of those mishaps. ■





E-3

MAJOR JAMES L. WALL
Directorate of Aerospace Safety

■ Congratulations to the E-3 community for making 1988 another Class A mishap-free year. The 29,007 flight hours flown during FY88, added to previous years' totals, give the E-3 an impressive 255,000 hours of Class A mishap-free flying.

Additionally, there were no Class B mishaps. However, one category of Class C mishaps doubled — physiological. The figure gives a numerical comparison over the last 3 years for these mishaps.

	CY86	FY87*	FY88
Physiological	3	5	10

*Reporting period 1 Jan 87 to 30 Sep 87.

Analysis of these 10 physiological mishaps revealed that half were caused by crewmembers flying with a pre-existing illness (cold) and developing a sinus block. In every instance, the aircrew made the wise decision to terminate the mission and get the ailing individual to a flight surgeon. Next time you try to fly and believe that your little cold will be OK, remember your decision might result in an important mission being aborted.

Since a Class A mishap in CY84, AFISC has been advocating the installation of smoke goggles and emergency escape breathing devices (EEBD) aboard transport aircraft. MAC and SAC have already installed these lifesaving devices aboard some of their aircraft.

A recently completed MAC study of smoke and fume elimination procedures aboard a WC-135 stated, "Without smoke goggles, crewmembers do not have adequate eye protection against aircraft smoke and fumes." The EEBDs and smoke goggles are invaluable aids in getting out of a smoke-filled environment and could save someone's life. But this can't happen if they are not aboard the aircraft.

1989 Challenge

Even with the numerous physiological mishaps, the E-3 fleet has a good safety record. Keep up the good work! Make 1989 another mishap-free year. ■

KC-10

MAJOR JAMES L. WALL
Directorate of Aerospace Safety

■ The KC-10 fleet, now consisting of 58 aircraft, flew a total of 43,614 hours during the 1 October 1987 to 30 September 1988 reporting period. Added to the previous year's totals, the KC-10 now has flown an impressive 171,314 Class A mishap-free hours. Unfortunately, with the increase in flying time came an increase in the number of Class C and HAP mishaps. Additionally, there was one Class A ground mishap.

Ground Mishap

Due to the replacement of a fuel control unit, a full engine trim run was required. Gusty winds prevented using the normal area, and an alternate area was used. During the engine run, a large chunk of asphalt was dislodged from the ground and struck the aircraft's horizontal stabilizer, elevator, and rudder. This mishap highlighted the need for everyone to be aware of the potential dangers associated with jet blasts. KC-10 crewmembers and maintenance people should be cautious of engine runs, especially at locations away from home station.

There were no reported Class B flight mishaps; however, a previous year's Class C mishap was upgraded to a Class B when the final cost figures for FOD to a no. 2 engine were reported.

Class C and HAP Mishaps

Figure 1 gives a comparison of common Class C and HAP mishaps over the previous 3 years.

Figure 1
Class C and HAP Mishap Comparison

	CY86	FY87*	FY88
Air Refueling	7	2	4
Bird Strike	1	1	1
Cargo	0	2	2
FOD	0	1	2

*Reporting period 1 Jan 87 to 30 Sep 87

Description of Mishaps

The four air refueling mishaps consisted of the boom striking an F-16 TACAN antenna, a brute force disconnect with an RF-4C, damage to the UARRSI and FOD to no. 2 engine during refueling with a KC-135, and loss of the hose while refueling a Navy A-7.

One KC-10 was struck in the tail by a bird and another in the radome by lightning. There were two smoke and fume mishaps — one caused by a real fire in the right forward drop ceiling at station 476 and the second from turbine oil in the pneumatic system.

During the second mishap, the smoke detectors failed to activate. Recent discussions with OC-ALC at Tinker AFB, Oklahoma, revealed that the sensitivity is set to activate at 15-percent smoke density. At the present time, there is no plan to change this setting.

Only one physiological mishap occurred. This was during a seat swap when the pilot's shoulder was injured.

The first cargo spill was the result of an improperly installed vent line on a LOX cart. The second occurred while transporting a vehicle which leaked 3 to 5 gallons of gasoline from a fuel pump into the cargo compartment.

Safety Issues

Several proposals from the KC-10 fuel system safety improvement program review are already in progress. Additional fuel drains have been added to the underside of the KC-10, and the insulation blankets have been removed. Twelve other changes are currently being made to the fuel system.

After a civilian DC-10 aborted and failed to stop on the runway, a study was initiated to determine possible problems with the KC-10 brakes. The FAA recently imposed brake-wear limits on all DC/KC-10 aircraft. An ongoing study may result in new brake-wear limits for DC/KC-10 aircraft. Currently, the Air Force is getting 1,500 full-stop landings versus 750 for the civilians before a brake change.

Emergency escape breathing devices (EEBD) were recently installed on the KC-10. During a recent KC-10 base visit, I was surprised to discover how few crewmembers know their location on the aircraft. These were installed to save lives, but not knowing where they are might someday cost you your life.

An important element in the safety system is correcting possible hazardous conditions. To be corrected, the hazard must first be reported to the proper people. It may someday benefit not only you, but others who fly the KC-10 to have these little problems corrected. But that won't happen if the incident is not properly reported.

Again, congratulations on a mishap-free year to all those who fly and maintain the KC-10. ■

HELICOPTERS

MAJOR PHILLIP T. SIMPSON
Directorate of Aerospace Safety

■ The number of helicopters in the Air Force inventory dropped considerably last year as a result of the closure of several units. Even with all this turmoil, we still managed to have the best year since 1983. That year, there were no Class A mishaps and two Class B mishaps. It appeared 1988 was shaping up to be a mishap-free year, but we lost an H-3 in early September. The real tragedy of that mishap was the loss of six Air Force people.

The Last 10 Years

With the loss of only one helicopter, however, 1988 does rank as the second best year we've had in the last 10. We finished the year with a helicopter Class A mishap rate of 1.94, compared with the overall Air Force rate of 1.62.

While helicopter mishap rates may be somewhat useful for comparing one year to the next, they are generally of limited value. This is due to the relatively low number of hours that the helicopter force flies each year. From 1978 through 1987, the entire helicopter force averaged only 87,400 hours per year. With the mishap rate being based on 100,000 hours, one or two mishaps cause large fluctuations in that rate.

Mishap rates for each aircraft type demonstrate an even greater fluctuation than the overall rate. Figure 1 shows the rates for the H-1, H-3, and H-53 over the last 10 years. An H-53 rate of 16.0 in 1980 is the result of two Class A mishaps in only 12,500 hours of flying time for that year.

In 1988, the number of hours flown decreased by 41 percent, with a total of about 51,300 hours being flown (see figure 2). One reason for this decrease in flying hours is the reduced number of helicopters in the inventory. Several H-1 and H-3 units were closed, with the helicopters being transferred to other users or to the bone yard. This reduction was offset somewhat by the addition of several new H-60 and H-53 airframes.

Over the next few years, 34 more H-60 aircraft will be added to the inventory. These aircraft, along with the UH-60s we now have, will be modified to the MH-60G "Pave Hawk" configuration. Unmodified H-53 aircraft are slated for modification to the "Pave Low" configuration. Figure 3 is a current breakdown of our helicopter inventory.

1988 Mishap Summary

Class A Last year's Class A mishap involved a National Guard HH-3E participating in a desert training exercise. Near the conclu-

Figure 1
10 Year Comparison
Class A Mishaps

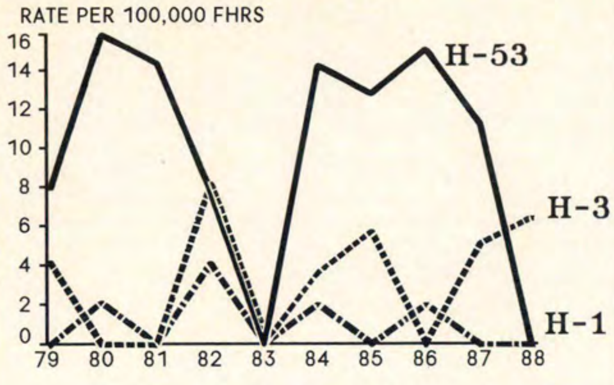
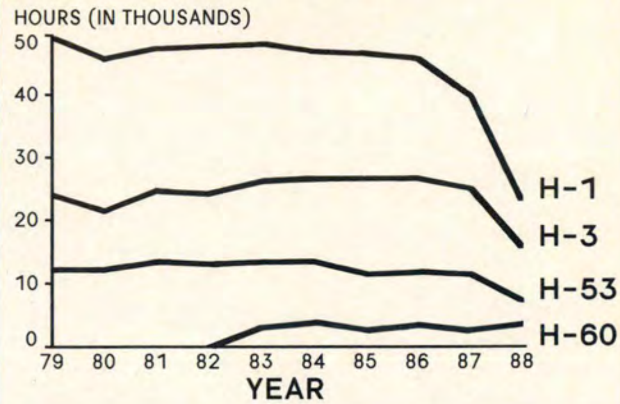


Figure 2
Flying Hours
As of 30 Sep 88



sion of the exercise, the aircraft impacted a ridge line, fatally injuring all six people on board. As of the writing of this article, the mishap investigation board has not yet published their final report detailing the circumstances of the mishap.

Figure 3
Helicopter Inventory
As of 30 Sep 1988

HH-1H	29	CH-53A	8
UH-1N	69	CH-53C	8
CH-3E	19	HH-53B	3
HH-3E	46	HH-53C	11
UH-60A	10	MH-53H	8
MH-60G	9	MH-53J	11

Total in Inventory = 231

Class Cs and HAPs The number of Class Cs and HAPs for 1988 was about average when compared to the last 10 years. This is a direct result of reductions in both flying hours and airframes. This year, 43 Class C mishaps and 28 HAPs were reported through helicopter safety channels. Figure 4 shows these totals by aircraft type. However, there seemed to be an unusually high number of engine-related mishaps.

Figure 5 shows engine mishaps accounted for almost 40 percent of the total number experienced, and this percentage is somewhat higher than in previous years. Of the 28 engine mishaps reported, 12 were flameouts (5 during flight), and 11 were shutdowns (7 during flight). Half of these were caused by material failure of some portion of the engine. The remainder were caused

continued

Helicopters

continued

by a number of things, including throttle rigging, loose fittings, missing seals, and chip lights.

Modifications

The ALCs are continuing their work to make improvements to the helicopter force. Their efforts in getting new seats into our aircraft are finally paying off. The H-60s we recently received have the Simula seat installed. Simula will also be providing the new armored, crash-survivable pilot's and copilot's seats to be installed on both the H-3 and H-53. Installation is scheduled to be completed by June 1989 for the H-3 and November 1989 for the H-53. The flight mechanics in both these helicopters will hopefully see their new seats sometime this year also. The seat is being designed to increase comfort and to improve the egress capability of the crew.

Figure 4
Mishap Totals
1988

ACFT	A	B	C	HAP
H-1	0	0	17	7
H-3	1	0	13	10
H-53	0	0	12	11
H-60	0	0	1	0
Total	1	0	43	28

Figure 5
Mishap Breakdown

	H-1	H-3	H-53	H-60
Engines	11	8	9	0
Fuel	3	0	0	0
Rotor	3	1	2	0
Drive	1	2	2	0
Flt Cont	0	3	1	0
FOD	4	1	1	0
Aircrew	1	2	2	1
Misc	1	6	6	0
Total	24	23	23	1

Contractor problems have continued to delay the installation of the fuel system modification in the H-1. The contractor's proposed schedule indicates that installation is to begin in late 1990 and be complete by mid-1991. The ALC has indicated the new HH-1H rescue hoist modification is now complete on all aircraft.

Summary

With the increase in the number of H-53 and H-60 airframes, it looks like we'll be doing some serious helicopter flying for years to come. While some of the more traditional helicopter missions are fading out, the special operations mission is alive and well and should be a great place to be.

Yet the helicopters of today and the missions they fly are becoming more complex and demanding. The increased use of night vision goggles, low-level flying, joint service operations, state-of-the-art equipment on 15-year-old airframes, and many other factors can add up to trouble if we aren't careful. But we know how to be careful, and we are capable of doing things the right way — the safe way. Let's do it.

The H-3 mishap last year was a tragedy not only for the families involved but also for all of us "Rotor Heads." We are a small community that has done great things for the Air Force in the past. We will continue to do more, but the cost of doing it cannot include the lives of our people. ■

MSGT WILLIAM L. FINCK
Directorate of Aerospace Safety

HATR Program

Objective

■ The purpose of the HATR program is to improve flight safety. Different bases take appropriate corrective action on individual HATRs, brief their pilots about the HATRs, and thereby improve flight safety. We in the Air Force Inspection and Safety Center (AFISC) would like to make everyone aware of the HATR program and decided to do it through this magazine.

The HATR summary will not supply you with any clear-cut answers, but it should give you information that will increase your awareness in problem areas. With this in mind, look at the data in this summary, read about some of the incidents, discuss them with other crewmembers, and have a safe flight.

This summary is presented in four parts: Total HATRs Quarterly Comparisons, General Classification, Non-Near Midair Collision (N-NMAC), and Near Midair Collision (NMAC) incidents.

**Chart 1.
Quarterly Comparison
Total HATRs**

Year	Apr	May	Jun	Total
1987	26	38	33	97
1988	24	26	30	80

Seventeen more HATRs were filed during the Apr-Jun 87 quarter than the Apr-Jun 88 quarter. The biggest difference showed up during the month of May, with approximately a 33-percent decrease in 1988. From the 1987 quarter, 5 HATRs are still under investigation, and 16 are still open from the 1988 quarter. These open HATRs are not included in the data that follows.

When a HATR investigation is completed and the final report is sent to AFISC, the incident is assigned a "classification" by AFISC's Air Traffic Control Branch (SEFA). It is then encoded and entered into the automated data file. The General HATR Classification chart shows the individual classifications and includes NMAC and N-NMAC.

Once the classification is assigned, it is determined if the incident is a NMAC or a N-NMAC. A NMAC is an unplanned event in which the aircrew took abrupt evasive action to avoid a midair collision, or would have taken such action if circumstances had allowed. All others are considered N-NMACs. Classifying is generally a fairly easy task. Take a look at the following incident and determine if it should be considered a NMAC or a N-NMAC:

■ A T-37 was cruising at 1,500 feet AGL on a student VFR low-level sortie when the IP noticed a twin-engine aircraft flying on his wing. The civilian aircraft was in the fingertip position 5 feet out. The pilot made a friendly wave and did not indicate in any manner that he needed assistance. He flew in formation with the T-37 for approximately 15 seconds, and then veered off to the east.

Non-Near Midair Collisions

The 1987 and 1988 classifications for N-NMAC are provided for you

continued

**Chart 2.
General HATR Classifications**

Classification	1987 Number	1987 Percent	1988 Number	1988 Percent
Controller error	16	17	7	11
Controller error/pilot deviation	3	3	0	0
Controller deviation	2	2	2	3
Controller deviation/pilot deviation	4	4	1	2
Controller deficiency	2	2	1	2
Pilot deviation — USAF	4	4	2	3
Pilot deviation — non-USAF	9	10	7	11
Pilot complaint	0	0	0	0
Failure to see and avoid	25	27	20	31
Flight procedures deficiency	0	0	0	0
Sightings	0	0	6	9
TRACALS deficiency	3	3	1	2
FLIP deficiency	1	1	0	0
Avionics deficiency	0	0	0	0
Runway intrusion	9	10	7	11
No hazard	6	7	5	8
Undetermined	0	0	0	0
Potential hazard	8	9	5	8
TOTAL	92	99*	64	101*

*Totals do not equal 100% due to rounding

Chart 3.
Non-NMAC Classifications

Classifications	Non-NMAC 1987 Number	Non-NMAC 1987 Percent	Non-NMAC 1988 Number	Non-NMAC 1988 Percent
ATC error:				
USAF	7	15	7	18
FAA	1	2	0	0
Host nation	2	4	0	0
Other DOD	1	2	0	0
Subtotal	11	23	7	18
Pilot deviation:				
USAF	0	0	1	3
Non-USAF	6	13	3	8
Subtotal	6	13	4	11
Controller deficiency	0	0	0	0
Controller deviation/pilot deviation	3	6	1	3
Failure to see and avoid	1	2	2	5
Controller error/pilot deviation	1	2	0	0
Avionics deficiency	0	0	0	0
FLIP deficiency	1	2	0	0
Flight procedures deficiency	0	0	0	0
Sightings	0	0	6	16
Pilot complaint/no hazard	6	13	5	13
Runway intrusion	9	19	7	18
TRACALS deficiency	3	6	1	3
Potential hazard	7	15	5	13
Undetermined	0	0	0	0
TOTALS	48	101*	38	100

*Total does not equal 100% due to rounding.

Chart 4.
NMAC Classifications

Classifications	NMAC 1987 Number	NMAC 1987 Percent	NMAC 1988 Number	NMAC 1988 Percent
ATC error:				
USAF	3	7	1	4
FAA	2	5	0	0
Host nation	2	5	0	0
Other DOD	0	0	0	0
Subtotal	7	17	1	4
Pilot deviation:				
USAF	4	9	1	4
Non-USAF	3	7	4	15
Subtotal	7	16	5	19
Controller deficiency	2	5	1	4
Controller deviation/pilot deviation	1	2	0	0
Failure to see and avoid	25	57	19	73
Controller error/pilot deviation	2	5	0	0
Avionics deficiency	0	0	0	0
FLIP deficiency	0	0	0	0
Flight procedures deficiency	0	0	0	0
Sightings	0	0	0	0
Pilot complaint/no hazard	0	0	0	0
Runway intrusion	0	0	0	0
TRACALS deficiency	0	0	0	0
Potential hazard	0	0	0	0
Undetermined	0	0	0	0
TOTALS	44	102*	26	100

*Total does not equal 100% due to rounding.

HATR Program

continued

to compare the figures. To give you an idea of what happened, here are brief summaries of a few of the 1988 N-NMAC incidents:

- An F-111 was departing a range westbound when the pilot spotted a light aircraft at his 12 o'clock position, southbound. The F-111 pilot indicated there was no threat of collision, but saw the light aircraft make a diving maneuver. The closest the two aircraft came was 1,000 feet. Both aircraft used the "see-and-avoid" concept to deconflict flightpaths.
- The RSU was working a T-41 in the pattern when they heard an unfamiliar aircraft overhead. The RSU crew spotted a civil twin aircraft on a perpendicular course headed toward the T-41 on the downwind leg. The T-41 was notified of the civil aircraft, saw it, and descended approximately 300 feet to ensure adequate separation.
- The Control Tower was working an F-5 on a 1-mile final. When the local controller turned from checking the F-5's gear back to the runway crossing area, he observed a blue Air Force station wagon approximately one-third of the way across the departure end of the runway. The F-5 was immediately sent around.

Near Midair Collision Classification

According to the chart, the majority of the NMAC are classified under the failure to see and avoid. Although not shown, most NMACs are during VMC; one aircraft is on an IFR flight plan, and the other aircraft is on a VFR flight plan, or has no flight plan at all. In some cases, the only thing separating NMAC from midair collisions is seconds or feet.

After we look at some incidents that have occurred during this quarter, we'll take a look at who is involved in NMACs, altitudes where they occur, and in what type of airspace they occur. But first, take a look at some incidents that were NMACs, think about them, and ask yourself, "Could this happen to me?"

■ A B-52 was flying at 3,000 feet MSL on IR 174 when its crew spotted a white-and-gold, single-engine general aviation aircraft. The civilian aircraft was at their 10 o'clock position and at coaltitude, crossing from left to right. The B-52 maneuvered left to avoid the other aircraft. The civilian aircraft may not have seen the B-52, as no change in its flightpath was noted. Miss distance — 0 feet vertical, 400 feet lateral.

■ A T-37 was in holding for a VOR approach and received approach clearance approximately 1 mile from the VOR. The crew was preparing for the outbound turn when they saw a small single-engine aircraft pass directly overhead. The T-37 did not have time to take any evasive action. Estimated distance between aircraft was 100 feet.

■ A T-38 was in a 300-knot military power climb through approximately 6,000 feet when a civil aircraft was spotted 500 feet ahead. The civil aircraft was directly in the T-38's flightpath and so close that the T-38 IP did not have time to take control. The student pilot (in the front cockpit) rapidly rolled and pushed over to avoid a midair collision. Estimated miss distance — 50 to 100 feet.

■ A B-1 was using terrain following radar procedures on IR 180 when the crew noticed a Cessna 172 type aircraft in their 12 o'clock position at approximately 400 feet AGL. The B-1 initiated a climb and estimated the miss distance at 200 feet vertical. Apparently, the light aircraft did not see the B-1.

■ An E-3 was being vectored in the radar pattern. As the aircraft was descending through 1,800 feet, the crew observed traffic at 12 o'clock and approximately 200 feet below them. An immediate pullup was initiated to avoid collision.

■ The lead of a flight of two F-16s visually detected a single engine Cessna on the nose, opposite direction, and approximately 100 feet higher than the flight. Lead directed the wingman to descend to miss the Cessna. The Cessna appeared not to see the F-16s. Miss distance — 100 feet for lead and 200 feet for the wingman.

Chart 5.
Aircraft Involved In NMACS

Type	Number	Percent
General aviation	21	81
Other USAF aircraft	2	8
Foreign military	2	8
Air carriers	1	4
Other Dept of Defense	0	0
Unknown	0	0
No USAF aircraft involved	0	0
Others	0	0
TOTALS	26	101*

*Total does not equal 100% due to rounding.

Chart 6.
Altitudes For NMACs

Altitude	Number	Percent
Below 1,500 AGL	4	15
1,500-2,999 AGL	8	31
3,000-7,499 feet	11	42
7,500-12,449 feet	3	12
12,500-17,999 feet	0	0
FL 180 and above	0	0
TOTAL	26	100

Where will the next USAF NMAC occur? Based on the data we have, it will occur during daylight hours in VMC. One of the two aircraft will be on an IFR flight plan, and the other will be on a VFR flight plan. At least one of the aircraft will be in level flight. It will take place in controlled airspace at or below 5,000 feet AGL.

Other Comments

If you wish to become more familiar with the HATR Program, please refer to AFR 127-3, Hazardous Air Traffic Report (HATR) Program. This 3-page regulation establishes the procedures for reporting and investigating NMACs and other air traffic conditions considered hazardous. For those who may not have immediate access to AFR 127-3, the following is just for you.

■ If you are involved in a reportable event, please let the air traffic control agency know you will file a HATR when you land. This advisory will alert the controller to the fact that an official report is being filed, and the control agency will ensure appropriate material is saved for the investigation of the incident.

■ Use any available means of communication to file the HATR as soon as possible (within 24 hours). If possible, use AF Form 651, Hazardous Air Traffic Report, to accomplish this task. It should be filed at the US Air Force base operations or safety office at the landing airport.

■ The safety office responsible for the investigation has a hard job that must be accomplished in a very short period of time. As a minimum, a preliminary HATR message must be sent out within 4 workdays after the occurrence.

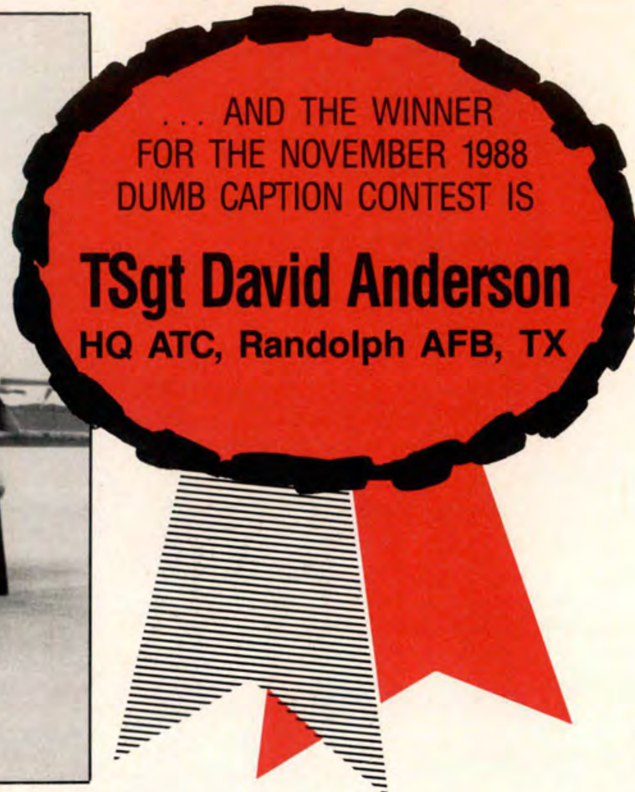
■ Final HATR reports should be completed within 120 days. However, if unable to complete this report, a supplemental report must be sent within 120 days indicating current status of investigation and estimated completion date. ■

Chart 7.
Airspace Where NMACs Occurred

Type	Number	Percent
Airport traffic area (ATA)-5 SM	3	12
Terminal radar service area (TRSA)	2	8
Terminal control area (TCA)	0	0
Controlled airspace — terminal	9	35
Uncontrolled airspace — terminal	1	4
Military training route (MTR)	7	27
Military operating area (MOA)	1	4
Restricted airspace	0	0
Positive controlled airspace (PCA)	0	0
Controlled airspace — en route	0	0
Uncontrolled airspace — en route	3	12
On airport	0	0
Airport radar service area	0	0
Unknown	0	0
Not reported	0	0
TOTAL	26	102*

*Total does not equal 100% due to rounding.

We Have A Winner!!



Opening the mail and reading the latest submissions to the dumb caption contest thing have now replaced the coffee break as the high point of our day. Our readers are obviously the most talented of any publication. It seems most of the people in AFISC want to be on the panels to select the winners. That way they can be sure they get to read all the entries. As usual, it was very difficult to select a winner, but we finally did. Congratulations, Sergeant Anderson. Your cheap little prize is in the mail.

The next 10 most popular captions are listed below in the honorable mention category. It appears you are having as much fun with this contest as we are. Keep those cards and letters coming!

Honorable Mentions

1. **William, working under pressure, is forced to hand-start his airplane.**
   Mike Shearer, Travis AFB, CA

2. **Wow! Here's a quarter . . . two dimes . . . a nickel; every time these guys go vertical, I make a fortune in loose change!**
   Sgt Jim (Chuck) Dearing, Howard AFB, Panama

3. **Space A ain't what it used to be!**
   Capt Martin Barche, Jr, Langley AFB, VA

4. **I hate it when the pilot light blows out!**
   SSgt Mark T. Anderson, Travis AFB, CA

5. **Let's see now, insert tab A into slot B.**
   Sgt Ron Cryderman, Hill AFB, UT

6. **If they could have done one thing right when they built this crate, it would have been to make the oil dipstick just a tad longer! But no . . .**
   MSgt Ed Bylicki, Mather AFB, CA

7. **OK, guys, who coated the intake with super glue?**
   Sgt Michael A. Kelly, Kadena AB, Japan

8. **Here, kitty, kitty.**
   SRA Vicki L. Murray, Sheppard AFB, TX
   TSgt Danny L. Blue, Mountain Home AFB, ID
   SRA James Wirbal, Loring AFB, ME

9. **OK, Fred! Hand me that new engine.**
   TSgt Danny L. Blue, Mountain Home AFB, ID

10. **Hey, Sarge, are you sure this is where the engine is supposed to be?**
    Doug Wood, Montreal, Canada

OPS TOPICS

Hot Mic

■ While setting up for intercepts, the F-4 WSO keyed the mic button for a simulated GCI transmission. After several seconds, the WSO's left hand became extremely hot.

He removed his hand from the throttle and noticed a bluish-green flame and white smoke coming from around the mic button. The smoke and flames soon stopped.

The fire was the result of electrical arcing from the switch because an insulating collar had slipped. The only aftereffect for the WSO was a small brown spot in the palm of his Nomex glove. If he had not been wearing gloves, he could have received a severe burn. Enough said.

Just Plain Hydroplaning

A flight of two F-4s made individual approaches to land. The ceiling was 500 feet with 1 mile visibility in rain showers. The first F-4 landed uneventfully on the wet runway.

The second pilot made a firm touchdown in a wings-level crab to compensate for a mild crosswind and deployed the drag chute (*left main tire began hydroplaning*). Approximately 1,000 feet later, the crew felt a bump (*left tire blew out*) and the aircraft began drifting left. Suspecting the crosswinds, the pilot jettisoned the drag chute.

The left drift increased rapidly, and the crew decided they had a blown tire. They executed the bold face procedures and used nosewheel steering to correct back to centerline. As the aircraft began to correct to the right, the rear started sliding to the left (*right main tire hydroplaning*).

The pilot then lost directional control (*right tire blew out*), and the aircraft rotated 170 degrees and came to a stop near the centerline. Both main gear wheels and torque tubes were damaged beyond repair, and the nose gear trunnion was cracked.

Be alert to the dangers of hydroplaning at all times when landing on a wet or slippery runway. It can happen when you least expect it.

Uncaged Eyeballs

The F-16 pilot was flying an ILS at the end of a night intercept mission. After passing the outer marker, he became distracted by the strobe light. He first attempted to turn off the strobe without looking at the switch.

Unable to locate the switch by feel, the pilot turned his head to find it. After turning the switch off, he returned his head to the forward position. He immediately experienced nystagmus (that's doctor talk for rapid, involuntary eye movement) and nausea.

He took proper action by initiating a climb and going totally on instruments until his symptoms disappeared. He was then able to fly another ILS to a full stop with no problems.

Be alert to the various forms of spatial disorientation. When you experience it, rely on your instruments until you get your head on straight again. ■

MAINTENANCE MATTERS

FLASHLIGHT FODS

■ Flashlights are causing thousands of dollars worth of damage to aircraft engines. How? By being left inside aircraft intakes after maintenance people perform required inspections. Let's look at three foreign object damage (FOD) mishaps where this was the case.

■ The first involved an F-16. Tasked to perform an engine run on a Falcon jet parked seven spots from his own, a crew chief grabbed a flashlight from his own tool box. He then walked to the jet needing the run, and completed the intake inspection.

After exiting the intake, he laid the flashlight down on the inside lip. He then returned to his tool box, retrieved his headset, walked back to the aircraft, and performed the engine run.

After he shut down the engine, the crew chief recalled leaving the flashlight in the intake. The post intake inspection revealed the flashlight had been ingested causing extensive damage to the engine. Total cost of repairs was $22,000.

■ Still another flashlight was ingested into the number 3 engine of a B-1B.

In preparation for a maintenance engine run, the crew chief used a flashlight from a maintenance cart instead of a composite toolkit (CTK) to accomplish a pre-run inspection.

While inspecting inlet number 3, his coworkers removed the ladder the crew chief was using and took it to another job. Knowing this, the crew chief jumped down safely, but he left the flashlight inside the inlet. Following a lunch break, the maintenance team ran the engines with no indication of damage or vibration. But a post run inspection revealed extensive damage to the

engine. Cost of repair work totaled $132,000.

■ The third FOD incident resulting from a flashlight left inside the inlet occurred to an F-4. Fatigued from wearing the chemical warfare ensemble throughout the day during an exercise, the crew chief inspected both intakes prior to his aircraft's third flight of the day.

After exiting the left inlet, he left the flashlight he was using behind. He also did not perform a complete tool and equipment inventory between the intake inspection and the engine start.

The aircrew arrived at the aircraft and completed the visual intake inspection during their walkaround preflight, but did not see the flashlight. (In followup tests with an identical flashlight in the intake, the flashlight was not visible.) Although the aircrew flew an uneventful sortie, a postflight inspection revealed extensive FOD damage totaling $27,000 to the left engine.

The flashlights in these three mishaps cost $6.50 each. Yet together, they bent and distorted engine rotor blades, stators, and cases to the tune of $183,000.

Consider the time required to remove, repair, and install each of the engines in these FOD mishaps. Then compare that figure to the amount of time required to FOD them — man-hours to microseconds. Each FOD occurred because someone failed to account for his or her flashlight.

There are other more important things we can be doing besides changing engines and reducing aircraft availability. Think about the results of these FOD mishaps whenever you are working on or around aircraft.

COMM CORDS & INLETS

After removing and replacing the water separator coalescer to correct an F-15 environmental system discrepancy, the specialist asked the crew chief to run the left engine.

To communicate with the crew chief in the cockpit, the specialist put on a headset attached to the comm cord going to the aircraft. He even secured the comm cord to his uniform with a large alligator-type clip.

With the left engine operating at idle, the specialist used a maintenance stand to climb onto the left wing. As he moved closer toward the fuselage to inspect an area just aft of the canopy, he unknowingly dragged the comm cord along the leading edge of the wing toward the left inlet.

Next he lay down on the wing to have a closer look at the access area. As he did this, he compressed the clip, releasing the cord from its attachment. When he stood up, the cord pulled away from his headset.

You can probably guess what happened next. The left engine received extensive damage after ingesting the connector, clip, and about 12 feet of the comm cord.

Unfortunately, similar scenarios happen all too frequently. Intercom cords and headsets must be kept away from close proximity to aircraft inlets with operating engines.

Think about the results of foreign object damage (FOD) whenever you are working on or around aircraft. Take the time to check the routing of the comm cord to prevent it from nearing an inlet. Doing so might prevent $40,000 mishaps such as this.

SMOKE GETS IN YOUR EYES

After removing an avionics computer on a C-5 Galaxy, an autopilot technician assigned to the swing shift inserted a piece of safety wire into the female receptacle of a cannon plug. This method of troubleshooting had become a common practice in the unit since the correct test leads were back-ordered through supply.

Although the technician found and repaired a broken wire, he could not ops check the system because of a higher priority tasking. He did place the appropriate "ops check requirement" in the aircraft forms.

The next morning, the day shift autopilot crew arrived at the plane to do the ops check. When they were unable to engage the pitch system after it was powered up, the crew went to the avionics bay to investigate. Surprised, they found the computer laying on the floor.

Unaware of the piece of safety wire in the cannon plug, one of the technicians reinstalled the computer and connected its cannon plug. This allowed the safety wire to come into contact with various connectors on the male cannon plug.

The crew re-energized the autopilot system, but the circuit breaker popped almost immediately. When a technician went back to the avionics bay, he saw smoke coming from the compartment. The crew shut down the system and declared a ground emergency. Only after disconnecting the cannon plug did the crew find the safety wire.

Since this incident, the unit has obtained the correct test probes needed for this type of maintenance. Has the use of safety wire to access cannon plug receptacles been a practice at your unit?

If so, supervisors may want to share this incident with their folks. More important, work through the supply channels to expedite getting the correct test equipment to include a proper assortment of test leads. And use the safety wire as it was intended — to secure hardware.

THEY HEARD A "POP"

Two egress technicians were dispatched to remove the aft seat bucket from an F-4. While removing the survival kit, the activation lanyard block was somehow pulled out of the seat sensor assembly.

Unaware that the actuator lanyard was misrouted, the technicians placed the kit on the aircraft intake. A few seconds later, they heard a "pop" and observed the seat kit had opened. Investigators found the actuator cart had been fired. The two technicians were not certain if the actuator lanyard was properly routed through the emergency release handle prior to starting their maintenance.

An improperly routed actuator lanyard exposes streamers and lanyard, which could become snagged and cause an inadvertent actuation. Although the exact sequence of events of this mishap could not be determined, the actuator was probably misrouted.

This organization briefed their egress folks to perform a thorough inspection of the egress system prior to performing any maintenance. Your unit might want to do the same. ■

UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Mishap Prevention Program.

CAPTAIN

Robert W. Dettbarn

35th Tactical Fighter Squadron

■ On 18 August 1987, Captain Dettbarn was no. 2 of a four-ship F-16 surface attack mission. While en route to the low level start point, Captain Dettbarn experienced a lack of engine response to throttle movement. He could advance the RPM but could not reduce it. He informed the flight lead of his condition and that the engine RPM was stuck at 85 percent.

Captain Dettbarn declared an emergency and turned toward home base. He made no other attempts to move the throttle until in a safe position to execute a flameout pattern. He orbited at high key altitude of 7,000 feet above the field, burning down fuel and attempting to regain control of the engine.

At this point, Capt Dettbarn determined that the throttle cable was broken. Since engine thrust was too high to permit landing, he would have to shut down the engine at 7,000 feet above the airfield prior to executing a flameout pattern. He also had plenty of altitude to maneuver the aircraft for ejection if his backup source of hydraulic pressure failed.

The weather compounded the problem since the visibility was 3 miles due to fog, and a scattered cloud deck covered a portion of the airfield. Captain Dettbarn could see part of the runway and performed a flawless flameout pattern through the weather. He touched down 1,500 feet down the runway and stopped the aircraft 3,000 feet before the departure end.

Captain Dettbarn's outstanding airmanship and professional skill, under extremely difficult circumstances, resulted in the safe recovery of a valuable aircraft. WELL DONE! ■

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UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Mishap Prevention Program.

CAPTAIN
David K. Freilinger

CAPTAIN
Robert E. Millay

380th Bombardment Wing
Plattsburgh AFB, New York

■ On 5 October 1987, Captain Freilinger, pilot, and Captain Millay, WSO, were flying an FB-111 on a low-level mission at 400 feet AGL when they hit a flock of birds. Captain Freilinger immediately initiated a climb and declared an emergency with ARTCC as Captain Millay determined a course to the nearest suitable airfield.

In the climbing turn, the right engine failed to respond to throttle movements, and excessive vibration forced the crew to shut it down. Captain Millay visually confirmed impact damage to the right wing root area and a serious fuel leak. Time became a critical factor as the fuel loss exceeded 60,000 pounds per hour.

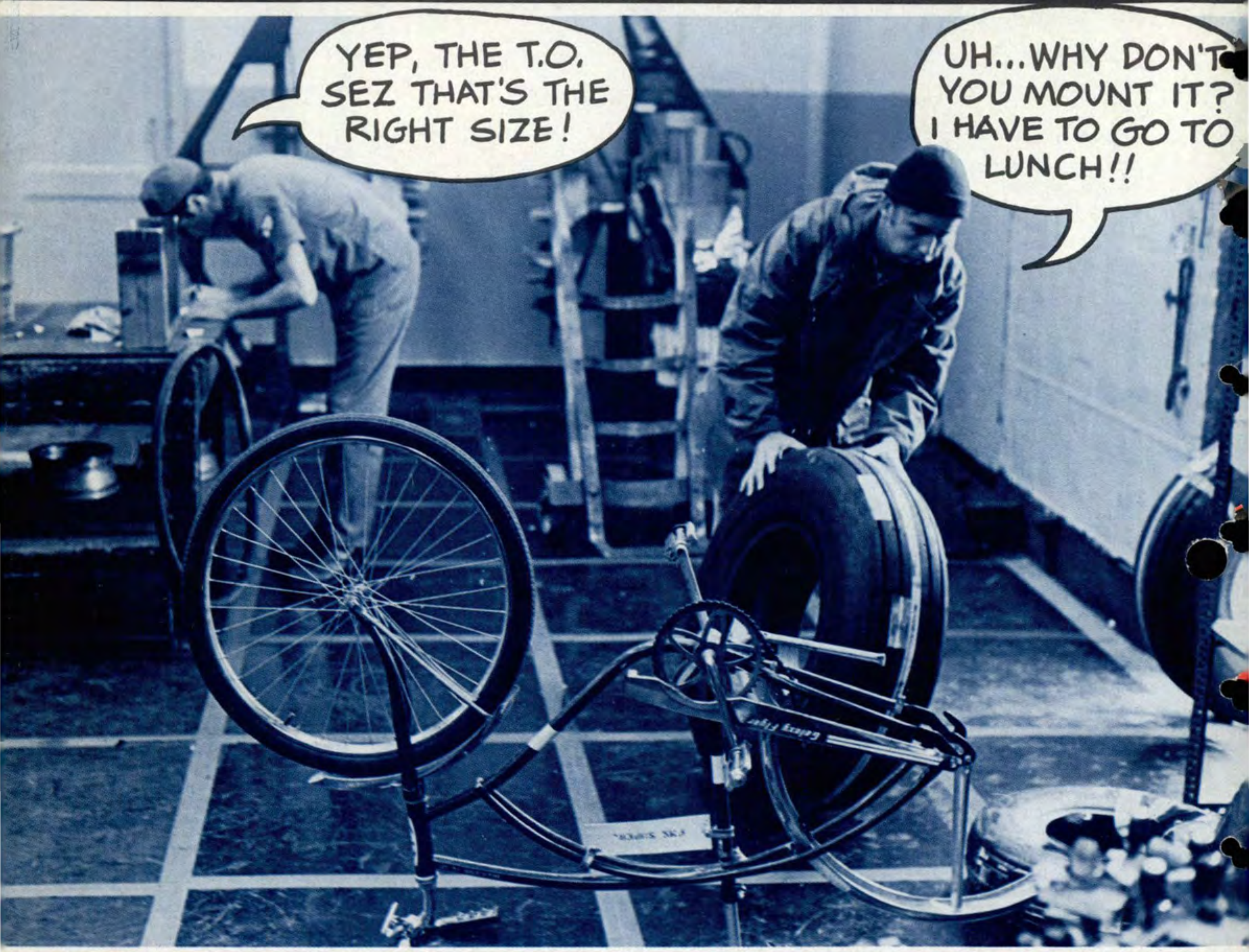
With the emergency field 23 minutes away, ejection would have been the only option had they been unable to reduce the loss. However, prompt execution of excessive fuel depletion procedures reduced the fuel loss to a more manageable 24,000 pounds per hour. The crew elected to land with flaps and slats up due to the damage, avoiding possible asymmetrical problems. They reviewed single-engine and no flap/slat emergency procedures and performed a controllability check.

During the visual approach, ground observers informed the crew that vaporized fuel totally engulfed the aircraft. Despite a final approach speed in excess of 190 KIAS, Captain Freilinger made a perfect touchdown within the first 500 feet.

With no arresting cable available, he used maximum aerodynamic braking followed by only light pedal pressure, avoiding the possibility of hot brakes igniting the leaking fuel. Postflight inspection revealed a 16-pound goose had hit the right wing root area, punctured the forward fuel tank, and disabled the right engine.

Captain Freilinger and Captain Millay's superior judgment, situational awareness, crew coordination, and indepth knowledge of emergency procedures prevented the loss of a valuable crew and Air Force aircraft. WELL DONE! ■

Write A Dumb Caption Contest Thing



Knock, Knock! "Who's there?" "Opportunity." Can you beat our dumb captions? If you send us the best ones, we'll send you our cheap little prize and also feature your captions in our May magazine. Can you afford to pass up such an opportunity?

Write your captions on a slip of paper and tape it on a photocopy of this page. DO NOT SEND US THE MAGAZINE PAGE. Use "balloon" captions for each person in the photo or use a caption under the entire page. You may also submit your captions on a plain piece of paper. Entries will be judged by a panel of experts on dumb humor on 20 March 1989. All decisions are relatively final.

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