Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

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Winter is shivering its way across many parts of the world where Army aviators fly. Extreme cold presents special challenges to safe flight operations—hazards that are more than inconvenient, hazards that can be deadly. As a result, it's good to review . . .

the COLD HARD FACTS

Icing can stop you cold

We Americans, more than any other group, depend heavily on ice for our creature comforts. If you don't believe it, try serving us a warm soda. But as fond as we are of ice, even in our water (to the amazement of Europeans), one place nobody wants it is on an aircraft. You don't have to know a lot about aerodynamics to know that an aircraft weighted down with ice isn't going to fly very well.

The more we know about where icing occurs and how it affects aircraft, the better equipped we'll be to avoid conditions where icing is a hazard.

Static electricity

During cold weather, static electricity can create serious problems, not only in flight, but also on the ground—particularly during refueling and rearming operations.

Static electricity can be generated in many ways, from brushing snow and ice from an aircraft to dragging steel grounding cables over the snow. During refueling and rearming operations, it is extremely important to ground the aircraft properly. In addition, personnel must always remember to touch a properly grounded surface to discharge static charges that have built up in their bodies.

As a further precaution during refueling operations, fuel nozzles should be fully inserted into the aircraft filler neck at all times.

Where icing occurs

Water droplets in the air may not turn into ice even when the temperature is below freezing. However, when an aircraft comes along and disturbs them, these droplets latch onto its surfaces and freeze. The funny thing is that icing isn't a big problem in extremely cold temperatures. Temperatures between 0°C and -40°C are most conducive to structural icing, but serious icing is rare in temperatures below -20°C. In addition, aircraft icing usually occurs in cumuliform or stratiform clouds from sea level to 15,000 feet, most often between 1500 and 6000 feet.

■ **Cumuliform clouds.** These billowy, heaped-up piles of clouds contain strong updrafts of air capable of supporting large drops of supercooled liquid moisture. When an aircraft flies into this type of moisture, the large drops hit it and spread out, forming a coating of clear, glazed ice. This type of ice accumulates rapidly, and its weight and the fact that it adheres firmly make it extremely hazardous to flight. It is encountered most frequently in temperatures from 0°C to -10°C.

■ **Stratiform clouds.** Droplets of supercooled moisture found in these horizontal layers of clouds are normally smaller in size and less numerous than those found in cumuliform clouds. When these drops strike an aircraft, they tend to freeze instantly, trapping large amounts of air between the drops and forming rime ice. Rime ice adheres less firmly than clear ice, but its rough surface reduces aerodynamic efficiency, and it is more likely to shed during flight. Rime ice is most frequently encountered when the temperature is between 0°C and -20°C.

Mountain flying

Aviators should be particularly alert for icing conditions when flying in mountainous regions. Upward air currents on the windward side of mountains support large water droplets. These currents, combined with the normal frontal lift as the frontal system crosses a mountain range, create hazardous icing zones, particularly above crests and on the windward side of ridges. This zone may extend to 4,000 feet above peaks and possibly higher when the air is unstable.

Frontal inversions

Icing in frontal inversions also can be rapid. Temperatures are normally colder at higher altitudes, but when air from a warm front rises above colder air, freezing rain may occur. Rain falling from the upper (warmer) layer into a colder layer is cooled to below freezing but remains liquid. The liquid freezes upon contact with the aircraft, and accumulation may be very rapid.

Frost

There's another type of ice in addition to those that form on aircraft during flight. Frost usually forms on aircraft while they are parked outside in cold weather. This deceptive form of ice affects the lift-drag ratio of the aircraft; therefore, all frost should be removed before takeoff. Also keep in mind that frost may also form when a cold-soaked aircraft descends from subzero temperatures into warmer, moist air.

EFFECTS OF ICE ON AIRCRAFT

Even small amounts of ice on the leading edges of an aircraft's wings affect lift and increase weight and drag. Helicopters, whose rotor disk is just another kind of wing that moves through the air at different speeds and varying angles of attack, are even more susceptible to the effects of icing than are fixed-wing aircraft. Light helicopters, because of their limited power and faster rotor systems, are the most susceptible of all to the effects of icing.

■ **Rotor blades.** Most helicopters will continue to operate satisfactorily (although performance will be degraded) even with quite severe airframe icing. However, ice accumulations on main and tail rotors have an immediate effect on the aircraft's airworthiness. Because the blade is continually moving, there are high random-vibration loads and increased rotor-profile drag. Increased power is required to maintain a given collective-pitch setting. Aircraft maneuverability and performance are restricted by accumulations of ice, and the chances of blade stall increase. The negative effects of ice on rotor blades are not normally as severe if the accumulation is uniform.

■ **Shedding of ice.** Symmetrical shedding of ice from the blades can reduce weight and restore more efficient configuration, but such shedding must be simultaneous and affect all rotor blades the same way. If ice is shed from only part of the rotors (asymmetrical shedding), it causes one blade to take up a different rotational plane from the others. The resulting imbalance within the rotor head causes vibration and feedback through the controls. In severe cases, it overstresses components such as pitch change links and possibly swash plates and scissor links. Vibration from asymmetrical shedding of ice from a helicopter with two blades is more critical than for aircraft with multiple rotors because the imbalance represents a larger percentage of the total rotor mass. The effects of vibration can be lessened by reducing forward airspeed to 60 to 70 knots. ***However, shaking the cyclic to induce shedding should not be attempted.*** This could place undue stress on the rotor system and make the imbalance worse.

■ **Engine icing.** Ice shed from rotors or other parts of the aircraft may be ingested into engines, causing damage to the compressor's first stage. This hazard is more significant in large, multi-engine aircraft. Except in extremely cold, heavy-icing conditions, or when the aircraft is maintaining a high forward airspeed, helicopters with engine anti-icing systems

should be able to operate without danger of buildup and ingestion of ice into engines. In extreme conditions, it may be necessary to reduce airspeed to allow the anti-icing systems to recover and cope with ice accretion. Air starvation may occur when air inlet screens have accumulated ice. Air inlet screens have sometimes been removed before flight into forecast icing conditions. Screens on some aircraft, however, are not to be removed. Consult the operators manual before attempting to remove air inlet screens.

■ **Other aircraft parts.** Sometimes ice forms in parts of aircraft where it isn't easily visible. This can happen both while the aircraft is parked and during flight. For example, when high-pressure hoses are used to wash aircraft, ice can form in hidden places and go undetected until it causes damage.

SUMMARY

Maintenance personnel and aircrews should take the following actions to minimize icing hazards:

■ Ensure maintenance safety annexes to unit SOPs address use of high-pressure hoses to wash aircraft.

■ Remove all snow and ice from aircraft before takeoff.

■ Use all necessary anti-ice/deice equipment.

■ Avoid flight in clouds when the outside air temperature is between 0°C and -20°C.

■ If ice is encountered, climb or descend to an altitude where the temperature is colder than -20°C or warmer than 0°C.

■ If freezing rain is encountered in flight, land as soon as possible. When it is not possible to land, aviators flying IFR should request a higher altitude; those flying VFR should initiate a climb and contact the nearest air traffic control for clearance. Freezing rain is usually the result of a warm air mass overriding a cold air mass. Therefore, climbing after encountering freezing rain will normally result in the aircraft entering warmer air.

■ Refer to the appropriate dash 10 for operator and maintenance procedures during cold-weather operations.

Landing in snow

Operation over snow-covered terrain is difficult, even for the most experienced aviator. And landing is especially tricky. Let's review.

When landing, pilots should never plan to terminate the approach to a hover, as disorientation can occur in the resulting snow cloud.

The initial position of an approach to snow is the same as any other approach. The primary difference is in the last 50 feet. Instead of making the normal deceleration below effective translational lift (ETL) airspeed, airspeed greater than ETL should be maintained until just before touchdown. This procedure keeps the helicopter in front of the snow cloud until touchdown, after which the aircraft will become engulfed in the snow cloud.

The approach angle during the last 50 feet deviates from the standard constant angle of descent. A slight leveling off is required to maintain airspeed. As the aircraft descends to an in-ground-effect altitude, blowing snow will develop to the rear of the aircraft. It is at this point that deceleration should begin to position the aircraft in a landing attitude. Once ground contact is made, torque should be reduced until the aircraft is firmly on the ground.

Weather minimums and forecasts

Army aviation missions don't change just because the weather does. But rapidly changing weather is a huge hazard to cold-weather flying. Weather minimums must be established early in planning any mission to prescribe the least acceptable weather in which a commander will permit a mission to be attempted. Up-to-date weather forecasts are mandatory; factors that must be considered include temperature, density altitude, wind speed and direction, icing, visibility, turbulence, and snow and ice conditions.

One reminder: Forecasters give icing intensity (trace, light, moderate, or severe) based on conditions as they affect fixed-wing aircraft. Rotation of helicopter rotor blades amplifies ice accumulation, so reported icing conditions will be more severe for helicopter operations.

One more reminder: Intensity of icing is very difficult to forecast. Most of our IFR-certified aircraft are capable of operating in at least light icing; however, you can't always be sure that's all you'll get. So, even if you do get a forecast of light ice, be prepared to deal with moderate or worse. And by the way, don't shop around for less icing in a forecast. It can be extremely exciting to find yourself IMC picking up a lot more ice than you ever thought really existed.

Reminder: Aircraft parts get cold too

None of us will ever forget the Challenger space shuttle that exploded shortly after launch in January 1986. Severe cold that had reached into normally warm Florida had reduced the resiliency of rubber O-rings on the right solid-rocket booster, paving the way for hot exhaust gases to escape. Despite all the science and technology involved, the Challenger fell victim to the effects of cold temperatures on a simple O-ring. Is it any wonder that we want to remind you that cold weather can have adverse effects on the aircraft you fly?

Air and hydraulic fluid leaks are amplified as the temperature plummets. Hydraulic cylinders and actuators may leak fluid because O-rings, seals, and gaskets are less pliable and become deformed at lower temperatures. In addition, ice crystals in hydraulic fluid may cut seal materials. Air leaks develop as seals and line connections contract at different rates.

Mechanical and hydraulic controls become sluggish in cold weather. Unauthorized lubricants that seemed to work properly in warm weather will stiffen up and cause bearings to require added force to move as the temperature decreases.

Moisture condensation causes water to accumulate in fuel tanks, especially in tanks that are not kept full. If the water freezes, it may close filters, fuel lines, and valves.

Hydraulic accumulator pressure differs with ambient temperature, and rotor damper vent valves have temperature restrictions. These and other factors make by-the-book maintenance and operation mandatory.

Many of the procedures dictated in maintenance and operators manuals were developed as the result of lessons learned the hard way. Therefore, when units move from a warm environment to a much colder one, it is important that all personnel carefully review manuals to ensure adjustments for the new environment are made. Simple actions such as wiping down exposed hydraulic pistons and thorough pre-heating of the aircraft help alleviate problems associated with extreme cold weather. Most manuals contain specific guidance on how to do these tasks to standard.

In addition to maintenance and operators manuals, TM 55-1500-204-23: *General Aircraft Maintenance Manual* is an excellent reference for cold-weather operations. Chapter 10 (Arctic, Desert, and Tropical Maintenance) outlines steps to prevent the adverse effects of cold weather.

The key to successfully dealing with the negative effects of extreme cold temperatures is planning and preparation. Knowing what should be done and having the equipment to do it are critical to safe cold-weather operations.

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AH-64 uncommanded flight-control inputs

The August 1998 issue of *Flightfax* contained a survey for AH-64 pilots who've encountered uncommanded flight control inputs. Completed survey forms were to be sent to Boeing for consolidation and study.

It is also important for all unit aviation safety officers to collect such AH-64 incidents as mishap data and forward through normal safety channels to the Army Safety Center. This will enable us to track incidents and identify trends involving uncommanded control inputs and possible backup control system (BUCS) discrepancies.

All AH-64-equipped units should collect data on all uncommanded flight control inputs. In addition to the Boeing survey, the information should be transmitted to the Safety Center using the AAAR (PRAM) worksheet. (Previous incidents where the information was not captured do not apply.)

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Attention Kiowa Warrior users: DES looks at Task 1053

DES evaluations of OH-58D(I) crewmembers during installation visits along with a string of incidents over the past several years have highlighted a serious problem in Warrior flight-crew training. Since the prohibition of touchdown autorotations, Task 1053: *Perform simulated engine failure at altitude (SEF/A)* is the only maneuver available to give crews limited training on emergencies requiring autorotation. However, errors during execution of Task 1053 can outweigh any training benefit gained from performing the maneuver. In the worst cases, errors result in aircraft damage and crew injury.

Recent changes to the task description restrict performance of the task to improved areas and assign responsibility for throttle increase to the SP/IP initiating the maneuver. However, these changes have not had a significant impact.

Incidents

Most serious is the high number of incidents during SEF/A training. These incidents are caused by failure of the IP/SP to ensure that operating rpm is restored prior to termination with power. Late or non-recognition of this situation has led to overtorques, loss of control, and hard landings.

Loss of training value

Improper initiation of the SEF/A (lowering the collective prior to throttle reduction) robs the pilot of the sensations of an engine failure (left yaw, rapid Nr decay, low Nr warning message and audio). It also prevents the IP/SP from properly evaluating the pilot's response to the SEF/A.

Termination with power through early application of collective to slowly decrease rate of descent results in a smooth, controlled termination. Unfortunately, it also eliminates any resemblance to the termination of a touchdown autorotation.

When done in accordance with the ATM description, the SEF/A is NOT a "smooth" maneuver. Deviation from proper execution in an attempt to "smooth out" the maneuver eliminates any training value from the maneuver. Proper initiation WILL result in a strong left yaw and rapid decay of Nr. Proper execution of the termination with power should result in a noticeable reduction in rate of descent during a discernible deceleration and collective application ("initial"). This termination may even result in Nr droop under some conditions.

Challenges

DES has observed that, due to high OPTEMPO in divisional units, far more training time is spent supporting the ground-maneuver mission than in past years. Combine this with critically curtailed flying-hour programs, and it is painfully obvious that individual crew training is suffering greatly. Opportunities for an IP/SP to take a unit aviator out and conduct nontactical base task training are practically nonexistent. The result is that most PC/PIs will see an SEF/A once a year during the APART. In addition, unit IP/SPs may conduct an SEF/A only during the APARTs they administer and during their own APART evaluation. This is not enough to maintain proficiency in the maneuver.

Solutions

The “easy” solution would be to substantially increase unit flying hours; this may or may not occur in a time of constrained resources. In the interim, however, measures can be taken to help eliminate this problem. The solution must be a combined effort of both command and unit trainers.

Unit commanders (from division down to unit) must re-allocate hours to individual training. This will come at the expense of division support, but the benefits will be better-trained aviators and fewer accidents. Secondly, unit IP/SPs must make an effort to increase the frequency of SEF/A training and ensure they are executing the maneuver to standard. This can be done simply by adding one or two trips around the pattern at the end of a tactical flight.

Conclusion

Technology has greatly increased the reliability of modern aircraft engines, but aircrews still face the possibility of forced landing and other autorotation situations. We must be confident in our ability to deal with these occurrences. That confidence will come only through proficiency, and the key to proficiency is experience.

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Extra ammo: Any gunbunny worth his salt would fire it all . . . right?

Any gun pilot will tell you that you never get enough ammunition to shoot. The tables in FM 1-140: *Helicopter Gunnery* never provide enough ammunition to enhance the high degree of weapons proficiency desired by the professional gun pilot.

Given a perfect world with unlimited resources, a gun pilot's dream is to have all the ammunition he could possibly fire. And, given all this ammunition, any gun pilot worth his salt would take maximum advantage of the situation and fire it all. Right?

Sometimes the opportunity does present itself to expend ammunition beyond the normal firing tables of annual qualification. Firepower demonstrations and CALFEXs occasionally give us the chance to expend a lot of ammunition within a short period of time. On even rarer occasions, excess ammunition is available from previous gunnery exercises.

With such a valuable resource, the prudent soldier matches training value and ammunition against range time and critical gunnery tasks. The tables in FM 1-140 provide a structured methodology for normal STRAC allocations, drawing maximum training value from minimum ammunition. Creative use of limited ammunition can further stretch scarce resources.

But, suppose we have the opportunity to shoot a significant amount of ammunition not programmed for annual gunnery? We have the chance to get additional training value. Although we have limited range time, the armament crew loads our aircraft. They, too, want a successful gunnery, defined as "all systems working properly and ammunition fired out." We want to fire it out; they want us to fire it out. It just plain makes sense. Right?

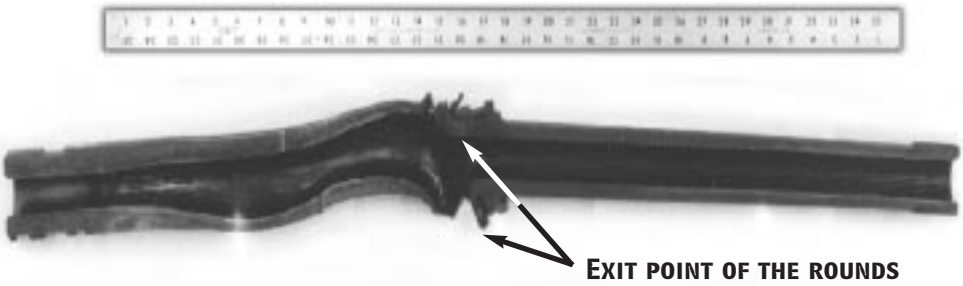
Let's look at the case of a crew who had just such an opportunity. It seemed perfectly acceptable to take on 990 rounds of 30mm, 20 rockets, and 3 Hellfire missiles to get through some critical gunnery tasks. Although they had been briefed that there would be 330 to 440 rounds per aircraft, additional unused ammunition was now available from a recent gunnery. Why not shoot it, get additional training, and save the armament crew the job of re-packing that ammunition?

Two aircraft had a total of 30 minutes to conduct the gunnery exercise. The burst limit switch was placed to 100 to allow maximum round expenditure. The guns were humming. Everything was progressing normally. However, disaster was just around the corner.

The gun ruptured, resulting in numerous rounds and large fragments penetrating the lower front fuselage, severing or damaging both mechanical and enhanced backup system (EBUCS) flight-control components. The aircraft descended out of control in a spiraling right turn until it hit the ground, resulting in extensive damage. The crew, fortunately, escaped injury.

Ask most Apache pilots what the gun duty cycle is, and you'll get the standard answer: "No more than six 50-round bursts with a 5-second pause between bursts, followed by a 10-minute cool-down period. For burst limits of other than 50, the gun duty cycle can be generalized as no more than 300 rounds within 60 seconds followed by a 10-minute

ROUNDS AND FRAGMENTS SPRAYED UNDERSIDE OF FRONT FUSELAGE.



THIS GUN BARREL RUPTURED, RESULTING, IN EFFECT, IN AN APACHE SHOOTING ITSELF IN THE FOOT.

cool-down period."

The key term is "cool-down period." But what exactly does that mean? If we fire 250 rounds in 60 seconds, do we require a cool-down? What about firing 400 rounds in 90 seconds? If we exceed the cycle, what happens? Does this reduce gun life? Will the gun jam?

The physics of the 30mm gun gives us the answer. Each round fired raises gun temperature 1.4°F to 3.5°F, depending on how many total rounds have been fired. (During periods of non-firing, the weapon cools at a rate of 1° per second.) Therefore, if we fire the gun to the maximum severe gun duty cycle, gun temperature will reach 1000°F.

Is there a point beyond the gun duty cycle at which the gun will fail? Obviously, the gun will eventually reach a point at which the temperature will cause a misfeed, a lodged round, or other catastrophic failure. Indications appear as round dispersion and sinking round impact, all as the barrel heats and distorts. During the mishap described above, the 30mm reached an estimated 1939°F.

Unlike some other weapons systems, there is no temperature sensor on the gun. And, during normal operations, the gun duty cycle will never be exceeded. Tactically, except for rare air-to-air engagements or some very unusual circumstances in a low-threat environment, we would seldom expend large amounts of 30mm at any given time. And, during peacetime operations, we barely have enough ammunition to complete our qualification tables. So why be concerned with the gun duty cycle? If it were ***that*** important, it would be listed as a warning, caution, or limitation. Right?

The fact is that the gun has limitations. The experts at Picatinny Arsenal and AMCOM are currently developing clear and quantifiable limits to be published in the appropriate sections of the operators manual. In the interim, Aviation Safety Action Message (ASAM) AH-64-99-ASAM-01 (011326Z Dec 98) recommends following the existing guidance with the warning: "Failure to adhere to the published gun duty cycle as described in the operators manual may cause a catastrophic failure to the 30mm gun, resulting in loss of aircraft, injury, or death."

We all want to fire all the ammunition we're allotted, but an old gunbunny worth his salt will learn the "why" behind the gun duty cycle and, accordingly, respect the limits.

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AN/AVS-7 HUD retrofit

Two retrofit efforts affecting the AN/AVS-7 heads-up display (HUD) are under way, and the project manager requests field assistance in completing the efforts.

The first is a retrofit of the SU-180/AVS-7 helmet display unit (HDU). This retrofit is required due to a manufacturing error and involves only some HDUs. Table 1 lists the serial numbers of HDUs that still need to be retrofitted. Units having AN/AVS-7 HDUs should check the serial numbers (located on the power supply calibration unit (PSCU)) to determine whether they are on the list. If so, units should contact the POC listed below for further instructions.

The second retrofit effort is based on ASAMs UH-60-97-ASAM-19 and CH-47-97-ASAM-10. These ASAMs directed inspection of AN/AVS-7 assets to find certain CV-4229/AVS-7 signal data converters (SDCs). Table 2 lists those that have not yet been returned for rework. Serial numbers located on the top of SDCs should be compared to the list, and any matches should be reported to the POC below for immediate resolution.

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Table 1. Serial numbers of AN/AVS-7 HDUs needing retrofit

000		300	400	600				2200
H00018	H00113	H00313	H00400	H00609	H00747		H02114	H02206
H00019	H00155	H00315	H00417	H00619	H00753	900	H02115	H02273
H00027	H00156	H00316	H00418	H00622	H00756	H00920	H02116	H02283
H00032	H00157	H00317	H00430	H00623	H00764	H00953	H02117	H02298
H00038	H00179	H00318	H00437	H00626	H00772		H02119	
H00039	H00180	H00333	H00438	H00629	H00779	2000	H02121	2300
H00040	200	H00339	H00455	H00637	H00784	H02005	H02122	H02300
H00045	H00222	H00350	H00474	H00642	H00787	H02006	H02126	H02301
H00060	H00230	H00353	H00484	H00647	H00793	H02018	H02130	H02302
H00062	H00231	H00360	H00491	H00669	H00794	H02028	H02137	H02309
H00074	H00234	H00371		H00678	H00799	H02040	H02141	H02314
H00075	H00245	H00372	500	H00687		H02068	H02150	H02341
H00078	H00255	H00373	H00513		800	H02070	H02151	H02343
H00081	H00256	H00377	H00516	700	H00806	H02072	H02152	
H00084	H00278	H00382	H00523	H00704	H00810	H02079	H02158	6000
H00085	H00283	H00384	H00546	H00716	H00812	H02080	H02162	H06009
H00088	H00289	H00387	H00565	H00718	H00813	H02094	H02165	H06011
	H00291	H00391	H00572	H00719	H00815	H02097	H02180	H06015
100	H00293	H00392	H00574	H00722	H00816		H02183	H06017
H00104	H00294	H00397	H00575	H00724	H00818	2100	H02186	H06020
H00105	H00299	H00398	H00579	H00726	H00820	H02102	H02190	H06027
H00106				H00735	H00887	H02105		
					H00891	H02113		

Table 2. Serial numbers of CV-4229/AVS-7 signal data converters needing retrofit

#	SDC SN	P/S CCA S/N#	DD250 Date
1	E00253	1358	05/30/97
2	E00374	1195	05/30/97
3	E01166	2352	12/20/96
4	E01171	2329	12/20/96
5	E01174	2304	12/20/96
6	E01175	2369	12/20/96
7	E01177	2320	01/31/97
8	E01180	2349	12/20/96
9	E01183	2344	12/20/96
10	E01184	2379	12/20/96
11	E01185	2343	12/20/96
12	E01187	2402	12/20/96
13	E01188	2299	12/20/96
14	E01189	2297	12/20/96
15	E01190	2296	01/28/97
16	E01191	2239	12/20/96
17	E01195	2337	12/20/96
18	E01196	2332	12/20/96
19	E01197	2335	01/31/97
20	E01199	2317	12/20/96
21	E01201	2340	12/20/96
22	E01206	2362	12/20/96
23	E01208	2371	01/31/97
24	E01209	2381	12/20/96
25	E01218	2380	12/20/96
26	E01219	2334	12/20/96
27	E01220	2383	12/20/96
28	E01223	2392	12/20/96
29	E01228	2350	12/20/96
30	E01232	2376	01/28/97
31	E01233	2386	12/20/96
32	E01238	2418	01/28/97
33	E01313	3054	04/28/97
34	E01461	2599	05/30/97
35	E01496	2668	05/30/97
36	E01599	2790	02/27/97
37	E01601	2794	02/28/97
38	E01615	2816	12/20/96
39	E01616	2787	04/28/97
40	E01617	2800	01/28/97
41	E01620	2786	01/28/97
42	E01622	2789	12/20/96
43	E01623	2805	12/20/96
44	E01625	2784	12/20/96
45	E01629	2815	12/20/96
46	E01632	2828	12/20/96
47	E01636	2831	12/20/96
48	E01637	2829	12/20/96
49	E01642	2783	01/31/97
50	E01647	2780	12/20/96
51	E01649	2833	01/28/97
52	E01650	2826	01/28/97
53	E01651	2821	12/20/96
54	E01666	3048	12/20/96
55	E01668	2836	12/20/96
56	E01669	2861	12/20/96
57	E01687	2913	12/20/96
58	E01696	2890	01/31/97
59	E01731	2976	04/30/97
60	E01734	2930	04/28/97
61	E01750	2852	01/28/97
62	E01762	2987	04/28/97
63	E01764	3024	04/28/97
64	E01765	2982	12/20/96
65	E01767	2989	12/20/96
66	E01771	3049	01/28/97
67	E01773	2947	12/20/96
68	E01774	2993	12/20/96
69	E01775	2971	12/20/96
70	E01781	2939	04/30/97
71	E01790	2969	04/30/97
72	E01793	2936	04/30/97
73	E01796	2996	04/30/97
74	E01805	3016	04/30/97
75	E01866	3058	04/30/97
76	E01878	3121	05/28/97
77	E01880	3116	04/28/97

P/S CCA S/Ns			
Item #		P/S Serial #	DD250 Date
1		3015	04/28/97
2		3243	04/28/97

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1

Class C

F series

■ Following two demonstrated hovering autorotations, PI initiated autorotation from hover. Upon contact with ground, aircraft again became airborne, at which time IP recovered and landed. Overtorque damage reported.

AH64

Class C

A series

■ Crew noted unusual popping noises during target engagement. Suspecting tree strike, crew monitored aircraft performance and instrument indications. Noting no deficiencies, crew continued mission. Upon mission completion and en route to assembly area, intermediate tail-rotor-gearbox temperature caution light came on. Aircraft landed at assembly area without further incident. Postflight inspection revealed damage to all main- and tail-rotor blades.

Class E

A series

■ On completion of first flight, No. 2 nose gearbox oil level could not be seen in sight gauge. Oil was found inside transmission area. Caused by deteriorated output seal.

■ During through-flight inspection, tail strut was found stoked. Tail-wheel strut was replaced.

■ Environmental-control unit (ECU) began to make loud grinding noise and surging sound during OGE hover. Aircraft was landed, and smoke and fumes began to fill cockpit. Doors were opened to ventilate, and aircraft was shut down. ECU turbine fan was replaced.

■ During flight onto aerial gunnery range at night, PI felt abnormal vibration and made precautionary landing. Maintenance pilot found abnormal rotor disk movement. Heading attitude reference system was replaced.

■ Aircraft had been in FARP on APU for 20 minutes when crew felt high-frequency vibration. After APU shutdown, inspection revealed transmission accessory gearbox input drive shaft seal was leaking and input clutch was locked. Cause of transmission lock-up is under investigation.

■ While conducting slope landings under NVS, pilot's helmet display unit (HDU) suddenly lost focus. Training was terminated, and aircraft returned unaided to home base without incident.

CH47

Class D

D series

■ During external load mission carrying M119 Howitzer, aircraft began vertical descent from high hover for landing. Descent was uneventful until approximately 5 feet, at which time aircraft rate of descent accelerated, accompanied by forward drift. Load contacted ground, was jettisoned, and consequently rolled over.

Class E

D series

■ No. 1 fire light came on during HIT check. No fire was visible and flight engineer reported no smoke from engine. PC performed emergency engine shutdown. Engine inspection found chaffed fire element loop near engine cowling.

OH58

Class D

D series

■ Aircraft was at OGE hover over tree during night live-fire with 2.75-inch rockets. IP in right seat directed PI to begin moving forward to engage targets. As PI hovered forward, both crewmembers became focused inside cockpit and did not notice their gradual loss of altitude. Just before aircraft settled into trees, IP noticed aircraft's close proximity to trees and took controls, stopping the descent with rapid collective application. Crew noted high torque and low rotor audio and visual warning on the MFD and landed without incident. Maintenance inspection found MFD and engine history of 132 percent for 1 second and three tail-rotor disk packs slightly spread. Main-rotor blades were not damaged. IAW OH-58-MIM-003, engine accessory gearbox was removed and sent to depot maintenance for technical inspection.

D(I) series

■ Tail rotor struck bush during landing from hover. Aircraft was moved then landed and inspected. Tail-rotor blade was dented.

■ During NOE flight, as PI initiated decelerating right turn, wind gust caught aircraft tail and aircraft began an uncommanded right spin. After attempting to arrest spin with left pedal, PI centered pedals to avoid overtorque condition. Spin rate increased, and aircraft completed three 360-degree revolutions. PI gradually reapplied left pedal, collective, and forward cyclic to arrest spin. Engine monitor showed mast torque at 123 percent for 1 second and engine torque at 117 percent for 0 second. Maintenance inspection revealed no damage.

Class E

A series

■ Engine N2 began to increase during cruise flight, and PI initiated emergency procedures for engine overspeed. PI landed aircraft on manual throttle without further incident. Month-old turbine governor was replaced.

C series

■ During shutdown, PC rolled throttle to idle position, but engine rpm remained at 100 percent. Aircrew alerted maintenance personnel, who found throttle linkage to N1 fuel control disconnected at fuel control. After shutting down aircraft, maintenance personnel found bolt and washer on engine deck; nut and cotter pin were not installed.

■ During touchdown phase of hovering autorotation, aircraft rocked forward excessively, allowing drive shaft to contact isolation mount. Aircraft was landed without further incident.

UH1

Class E
H series

■ Master caution light, but no segment light, came on during slope operations. Aircraft landed without further incident. Transponder was replaced.

■ Master caution came on during straight and level flight, and aircraft landed without incident. Voltage regulator and d.c. generator were replaced.

■ During cruise flight, bird struck battery compartment and windshield wiper. Aircraft landed without further incident.

■ During takeoff to hover, crew felt aircraft lurch and heard loud popping sound before discovering two tie-down chains still attached to rear tie-down points. Damage limited to one tie-down point and minor sheet metal damage.

■ During installation of tail-rotor assembly, mechanic failed to install cotter pin in retaining nut for tail-rotor control tab. TI failed to notice that cotter pin was missing. Retaining nut backed off during maintenance test flight, causing loss of tail-rotor control.

UH60

Class B
A series

■ Crew reported loss of power to No. 1 engine and executed forced landing. Aircraft landed hard on slope. Investigation under way.

■ Forced landing ended in hard landing after reported rotor underspeed on takeoff. Aircraft was equipped with ESSS and additional fuel. Investigation in progress.

Class C
L series

■ Blade tie-down had been left attached to one main-rotor blade and, upon engine runup, tie-down wrapped around tail-rotor assembly. Tail-rotor blade was replaced and antenna was damaged.

■ During shutdown, both engine power control levers (PCLs) were retarded to idle, and tgt decreased normally to 500°C. No. 2 engine then experienced a rapid rise in tgt to approximately 1000°C. Crew moved No. 2 PCL to off position and motored starter to reduce temperature reading. Maintenance inspection revealed faulty No. 2 engine cross bleed valve. Engine is being examined for damage.

■ Aircraft was set down in ditch 150 feet short of intended landing site during dust-landing training iteration. Landing gear and nose of aircraft were damaged.

■ During air-assault training, soldier fell 15 feet from aircraft to ground during takeoff. His injuries required 48 hours' hospitalization.

■ Main-rotor blades contacted small tree in LZ during infiltration training at night. All four main-rotor-blade tip caps were damaged.

Class E
A series

■ During maintenance test flight at cruise with degraded AFCS, transmission temperature reached 140° and smoke was detected in cabin. Transmission oil pressure was decreasing from 55 to 0 psi on landing. Upon shutdown, grinding noise was heard in cabin. Rotor blades came to a stop less than a minute after emergency engine shutdown. Smoke increased in cabin main transmission area. Cause not reported.

■ While conducting HIT check on No. 1 engine, No. 1 tgt was erratic, fluctuating ±80°. HIT check was then attempted on No. 2 engine with same results. Aircraft was shut down without further incident. Caused by failure of No. 1 engine history data recorder, which was replaced.

L series

■ Approximately 1 minute after bringing engine power control levers to idle, crew heard popping noise coming from No. 2 engine. Crew shut down engines. CP saw that No. 2 engine tgt peaked to just under 900°C. Maintenance suspects that popping noise was compressor stall resulting from cracked bleed air tube, which was replaced.

■ When crew brought engine power control levers back to idle during engine shutdown, APU failed, indicating an underspeed. Inspection found that fuel manifold was broken in half, causing the underspeed.

■ During simulated engine failure, master caution light came on with no associated capsule light. Roll-on landing was performed with parking brake set, resulting in damage to both main landing gear tires.

■ Stabilator failed during IFR cruise flight at 2200 feet and 120 knots. Pilot pressed auto-control reset button once, and stabilator returned to normal. Three minutes later, stabilator failed again and was again reset. Three minutes after that, stabilator failed for third time and was reset but failed again 30 seconds later. Crew manually controlled stabilator and landed without incident. Inspection revealed faulty No. 2 actuator; stabilator actuator was replaced.

C12

Class A
K series

■ Aircraft crashed, killing both crewmembers. Aircraft was destroyed in postcrash fire. Investigation is under way.

Class E
F series

■ Postflight inspection revealed that inboard right main tire was deflated and hanging on rim. No visible flat spot was noted and minimal braking had been used during landing. Maintenance concluded that prolonged flight at high altitude and freezing temperature with low air pressure in tires caused tire and rim to separate. Tire was replaced.

H series

■ While leveling off for cruise flight at FL220, aircraft failed to maintain scheduled pressurization. Aircraft returned to base without further incident. Maintenance inspection revealed faulty flow-control valve in right-side flow pack. Engine flow pack was replaced.

O5

Class E
DHC-7

■ During approach, No. 1 a.c. generator hot light came on. Generator was turned off, and normal landing made. Maintenance found moisture on No. 1 a.c. generator harness.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action message

AH-64-99-ASAM-01, 011326Z Dec 98, informational

During gunnery operations, an AH-64D experienced a catastrophic failure of the gun barrel. The suspected cause of the failure has been attributed to exceeding the duty cycle of the gun as described in the AH-64A/D operators manual. The purpose of this message is to emphasize to all AH-64A/D flight crewmembers the importance of observing the limits published in the operators manual and to add a warning that addresses the potential consequences of failure to follow published 30mm-gun duty cycle.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), chilton-hl@redstone.army.mil

UH-60-99-ASAM-03, 051849Z Nov 98, maintenance mandatory

As part of AMCOM's T700-series engine component improvement program, GE proposed a reduction in the service life limit of some rotating components in the T700-GE-700 engine. These recommendations are being evaluated as to the impact they would have on aviation customers. The purpose of this message is to direct reporting of specific data on the T700-GE-700 engine components listed in paragraph 7 of the message.

AMCOM contact: Mr. Ed Goad, DSN 897-2095 (256-313-2095), goad-er@redstone.army.mil

Safety-of-flight message

AH-1-99-SOF-02, 051442Z Nov 98, technical

During a fatigue test program, a swashplate anti-drive link assembly was found to contain cracks and other defects caused by the manufacturing process. The nature of the cracks and the environment that the part operates in could lead to a life reduction. The purpose of this message is to require a one-time inspection and removal of suspect swashplate anti-drive link assemblies manufactured by McGinty Machine (cage code 24543) installed on aircraft and from all stock.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), chilton-hl@redstone.army.mil

Maintenance-information messages

AH-64-99-MIM-01, 261620Z Oct 98

AH-64 APU clutch (P/N 3886200-1, NSN 2835-01-431-8327) was fielded recently. The purpose of this message is to provide removal, installation, and servicing procedures; 10-hour and 14-day inspection requirements; and phase-inspection requirements.

AMCOM contact: Mr. Ken Muzzo, DSN 897-4812 (256-313-4812), muzzo-kw@redstone.army.mil

AH-64-99-MIM-02, 231518Z Nov 98

Touch-up paint for the AH-64A TADS/PNVS boresight assembly was incorrectly identified in TM 1-1270-476-20. The purpose of this message is to provide correct information for obtaining the proper solar-absorbing coating required by technical publications.

AMCOM contact: Mr. Dennis Hediger, DSN 897-4913 (256-313-4913), hediger-dm@redstone.army.mil

POV fatality update through November

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY99	FY98
25	18

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WS • War Stories, CC • Crew Commo, SF • Shortfax

Class A Accidents through November

		Class A Flight Accidents		Army Military Fatalities	
		98	99	98	99
1ST QTR	October	2	1	0	0
	November	1	1	0	2
	December	2		2	
2D QTR	January	1		0	
	February	1		0	
	March	1		0	
3D QTR	April	0		0	
	May	1		0	
	June	2		4	
4TH QTR	July	1		0	
	August	0		0	
	September	0		0	
	TOTAL	12	2	6	2

U.S. ARMY SAFETY CENTER

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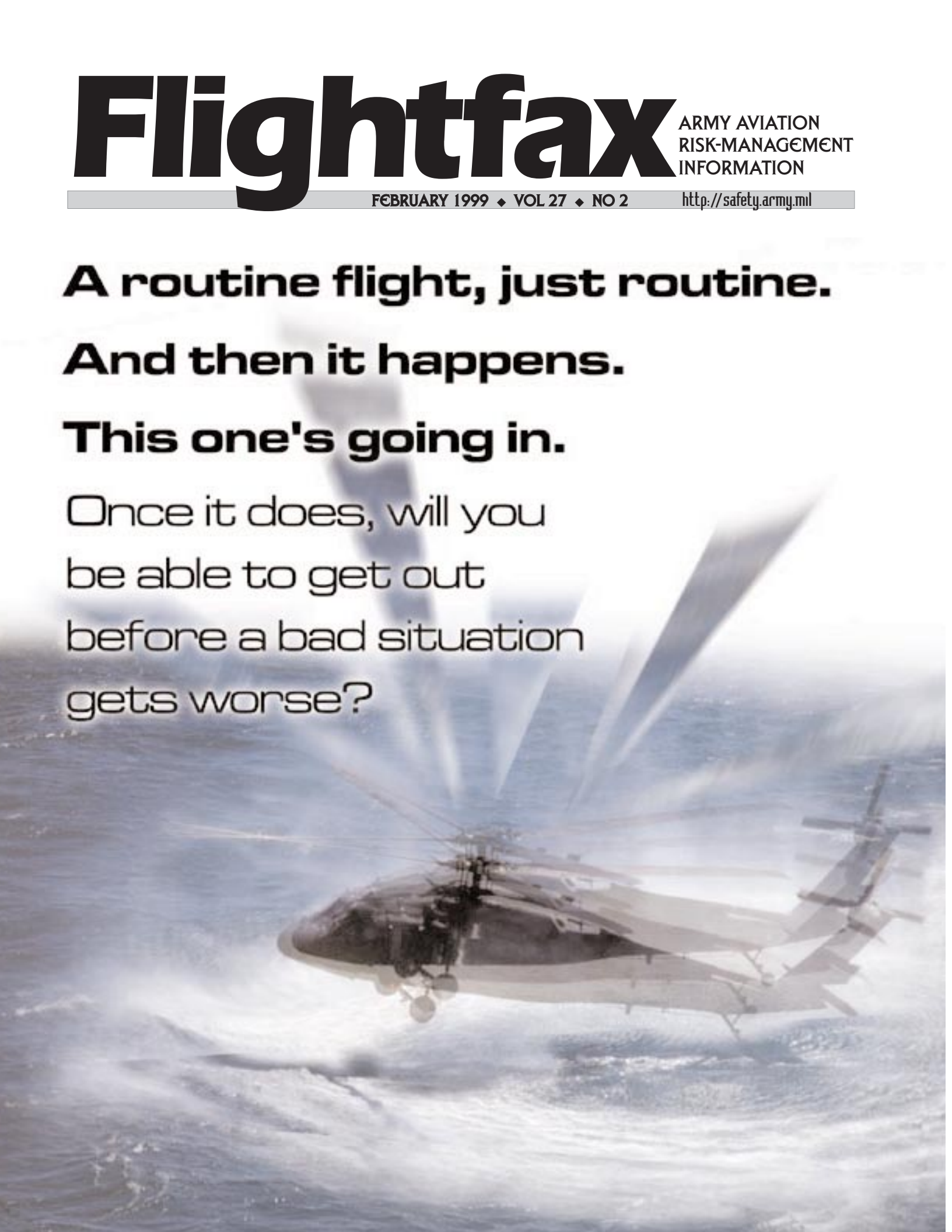
ARMY AVIATION
RISK-MANAGEMENT
INFORMATION

FEBRUARY 1999 ◆ VOL 27 ◆ NO 2 http://safety.army.mil



Training: The key to egress success

I'm still not sure exactly how it happened. The aircraft was performing perfectly, and the mission was going great. We'd even managed to get a couple of MILES kills on some OPFOR tanks. Then, suddenly, we were spinning out of control and descending rapidly through the trees. After a short but violent crash, the next thing I recall was looking over to make sure my copilot was okay. He appeared to be shaken—but okay.

Then, I smelled the fuel.

Despite my disorientation, I was cognizant enough to know we had to get out—and fast. If there were a fuel spill, there was a good chance that the aircraft was going to burn. And if the aircraft were going to burn, we had only a few precious moments to egress before we burned with it.

I reached down to unbuckle my shoulder harness and slipped out of the seat quicker than I could have ever imagined. I forgot to disconnect my ICS cord, but it broke away. As odd as it may sound, I was remembering our abbreviated crew briefing—we had agreed that "standard egress procedures" were in effect.

I slid out of the cockpit and, as I took my first step away from the aircraft, glanced back to make sure my copilot was exiting the aircraft. I felt helpless as I realized he was still fumbling with a handle that wasn't going to open the door. At that very instant, I saw a bright-orange flash from the middle of the aircraft.

I turned away from the explosion and was literally thrown away from the aircraft. I knew my copilot wasn't going to make it. He died despite not being injured in the crash. My copilot died because he couldn't get out of the aircraft even though the emergency-release was functioning properly. He died because he didn't remember his egress procedures.

This tragedy, fortunately, didn't really happen. It does, however, illustrate a point that, unfortunately, is all too often overlooked. Survival in a crash sometimes boils down to a matter of seconds. You may someday find yourself in a position where you don't have time to think about "standard egress procedures in effect." Your life may depend on your ability to act without thinking. It may depend on your training.

Now think about it. When's the last time you practiced egress procedures? Was it last month? Was it last year? Have you ever been in a unit that did any real training on how to rapidly exit the aircraft and what to do when you get out? How many times have you briefed "standard egress procedures in effect" without really thinking about what that means?

Emergency egress, although not found in chapter nine of your operator's manual, is one emergency procedure we cannot afford to ignore. When an aircraft is burning—or sinking, we'd better ***know*** what to do. We can't leave it to chance and "hope" we remember all the procedures. We can't afford to rely on mission briefings that are too generic to be of any use. We must plan egress training into our unit training (perhaps during safety stand-down days), and then test our ability to rapidly exit the aircraft.

Two videos that will help in emergency-egress training are available from installation film libraries or from the DAVIS web site at http://dodimagery.afis.osd.mil. Ask for—

- "From Out of the Fire," PIN 710754.
- "Flight Safety and Crash Survival," PIN 613660.

—MAJ Joe Blackburn, Aviation Systems & Investigation Division, DSN 558-9852 (334-255-9852), blackburj@safety-emh1.army.mil

Aviation crash-rescue video to be released

A new aviation crash-rescue video is in the final stages of production at the Army Safety Center. Taking each aviation system and going step-by-step through a rescue procedure, this video will familiarize aviation units and local fire and rescue departments with the basics—how to get into and out of aircraft through doors and emergency exits, what hazardous materials might be on board and where they are likely to be located, what's armed and how to disarm it, and how to correctly remove an unconscious pilot, crewmember, or passenger from the wreckage. The release of "Army Aviation Crash Rescue" (PIN 709717, TVT 20-1038) will be announced in *Flightfax*; watch for it. Upon release, the video will be available through local audiovisual facilities and from the DAVIS web site at http://dodimagery.afis.osd.mil.

Basic ditching techniques and procedures

Before you skip this article, thinking "Ditching? That doesn't apply to my unit's mission," think about this: Even if you don't *routinely* fly over open water, if you ever fly over any water—including lakes and rivers along your flight routes—you should keep yourself up to speed on the ditching techniques and procedures outlined in FM 20-151: *Aircraft Emergency Procedures Over Water.*

Ditching a helicopter should pose no serious problems since it can be landed with little or no ground speed and, therefore, negligible decelerative violence. However, without built-in flotation characteristics, the aircraft may sink rapidly, making timely egress a major challenge. Evacuation often cannot be started until rotors have come to a stop. In the meantime, cabin spaces are filling with water.

The following general recommendations are based on actual ditching experience in single-rotor helicopters without built-in flotation.

■ At or just before water contact, jettison doors, windows, and emergency exits without unstrapping. Premature jettison can endanger aircraft control.

■ Make a normal landing at zero ground speed into the wind and at minimum rate of sink. Avoid excessive tail flare; premature tail-rotor contact with the water may cause loss of antitorque control before the main fuselage settles in the water. If ditching under power, expect rotorwash to create substantial amounts of water spray, reducing visibility.

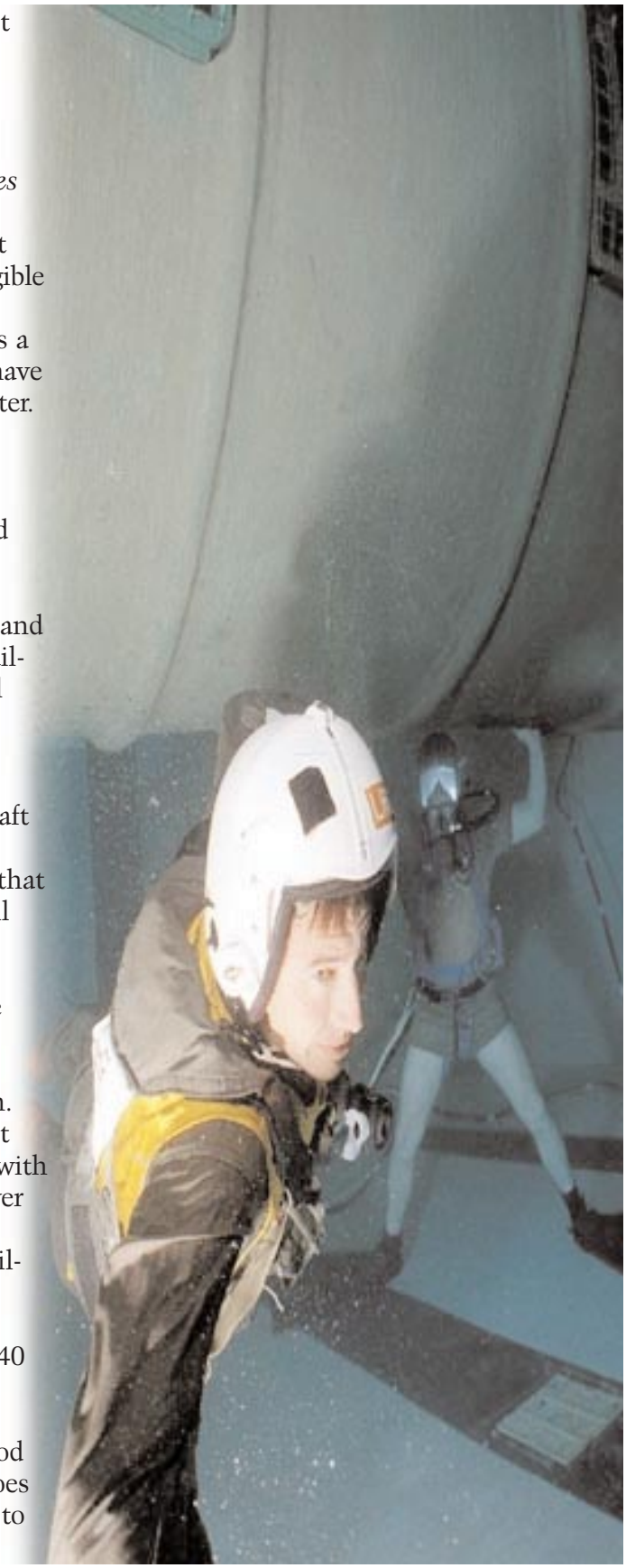
■ Apply main-rotor brake (when available), and keep the aircraft level while rotor rpm decays. As the fuselage settles in the water, keep pulling pitch until the aircraft shows a tendency to roll. At that time, apply cyclic in the same direction so that water contact will stop the main rotor without violent reaction or the chance of flipping the aircraft in the opposite direction. If one side of the aircraft offers a preferable exit opportunity, roll the aircraft in the opposite direction before effective rotor control is lost.

■ If you're ditching without power, remain strapped in (all occupants) until the main rotor has stopped and egress can begin. This will minimize disorientation with respect to the nearest exit regardless of aircraft attitude after submersion. If you're ditching with power, bring the aircraft to a hover, have all occupants egress, hover several hundred meters away from them, and ditch the aircraft.

Several videos on surviving in the water after ditching are available at installation film libraries and on the DAVIS web site at http://dodimagery.afis.osd.mil. Ask for—

■ "Seconds To Live—Underwater Egress Training," PIN 606040
■ "How To Survive In Water—Prepare To Ditch," PIN 30362
■ "Helicopter Emergency Egress," PIN 113273

We all hope it'll never happen to us. But just in case, it's a good idea to review these procedures frequently. And in the event it does become necessary to ditch an aircraft, we'll be prepared and able to respond effectively and proficiently.



RISK MANAGEMENT LESSONS LEARNED

WAR STORIES

Ditching at sea

It was a beautiful night to fly—at least 90 percent illumination and not a cloud to be seen. I was flying from the left seat of the OH-58D in the flight-lead position. We were an hour and a half into the mission and on our way back to the ship.

I was using the sight to locate the ship when I felt the helicopter yaw right. I looked over at my right-seater's display and saw the engine-out warning light—no big deal, except when you're at 30 feet and 80 knots over water.

I knew that, without a doubt, on this night we were going to get wet. I remember thinking, "This is going to hurt," as I reached for the floor mic switch. I made the radio call, but I don't think it got out.

We hit the water tail low. The tail boom broke off, pulled the fuselage a little higher, and then everything was dark and wet. Somewhere in the process, I got hit in the face and broke my nose. I don't think I was ever unconscious, but I certainly had my bell rung!

I started swimming, but I wasn't going anywhere. And I couldn't figure out why. Then I remembered my HEED (helicopter emergency egress device) bottle, put it in my mouth, cleared it, and took some air. Then I started swimming again, but I still didn't go anywhere. The air from the HEED had helped clear my head a little, and then I realized ***I was still strapped in!***

I reached down, pulled the release, and immediately started rising. I wasn't sure how deep I was, and knowing that I had been breathing compressed air, I didn't pull my life preserver right away. I had been under water almost 2 minutes (believe me, that can seem like a very long time), and I knew that my HEED bottle was almost empty. Then I broke the surface. What a feeling!

The first thing I did was look around for my right-seater. I located him and swam toward him. He had inflated his life preserver and was lying on the surface, but he wasn't moving. When I got to him, I started talking to him. He just handed me his radio and said, "I can't get this thing to work." I tried to call our sister aircraft with his radio, then I tried my own. I had so much water in my ears, I couldn't hear an answer. I knew I was bleeding and that there were "things" in the water that would find us soon if we didn't get out. The problem was, I didn't know how badly my right-seater was hurt.

I had to make a choice—wait for our ship, which was at least 10 miles away, or let our sister aircraft pick us up, which could cause further injury to the other pilot. We had been in the water 10 to 15 minutes, and after considering the risks of staying in that water, I decided we had to take the chance and get out. I signaled the other aircraft and saw them drop the ladders.

My right-seater reached for his extraction strap. Still not knowing how badly he was hurt, I stayed with him until he was hooked up. In the process, I missed my ladder. Our sister aircraft did a quick pattern and brought the ladder right to me. I hooked up, they pulled me up out of the water, and I settled in for the flight to the ship. The aircraft came to a hover over the flight deck, and we were lowered to it and unhooked. The solid surface of that flight deck had never felt so good.

Beyond any doubt, the fact that we both survived this accident was due to the right training. Without the HEED bottle and the training to use it, without the dunker course and the egress training that goes with it, without our unit's combat search and rescue training, and without crew and team training, I wouldn't be writing this story. Someone else who saw what happened would be telling it for me.

—excerpts from an article by CW2 David B. Whalen, in the May 1992 issue of *Flightfax*

HEED update

Today's constantly changing mission requirements place increased demands on Army aviators. They never know when they might have to fly an overwater mission. To mitigate the increased risk of overwater flight, the Army provides aviation life-support equipment (ALSE) for water survival. This equipment includes a life raft; life preservers (LPU-10, LPU-21, and the new LPU-34/P); and helicopter emergency egress devices (HEEDs) (SRU-36/P and, by FY00, SRU-40/P).

The HEED, known as "spare air" by the scuba community, is a self-contained underwater breathing apparatus. It's capable of providing 1 to 3 minutes of emergency breathing air depending on depth, water temperature, and the person using it.

HEED VERSIONS

The current version of the HEED, the SRU-36/P, consists of an aluminum alloy cylinder attached directly to a stainless steel regulator assembly with polycarbonate mouthpiece. It is 2 inches in diameter and just under 13.5 inches long, and it weighs 1.5 pounds fully charged to 1800 psi.

The new version of the HEED, the SRU-40/P, consists of an aluminum alloy cylinder attached to a first-stage regulator with pressure gauge, a 20-inch low-pressure rubber hose with twin swivel attachments, and a polycarbonate mouthpiece and second-stage regulator assembly. It is 2 inches in diameter and approximately 9 inches long, and it weighs 1.5 pounds fully charged to 3000 psi.

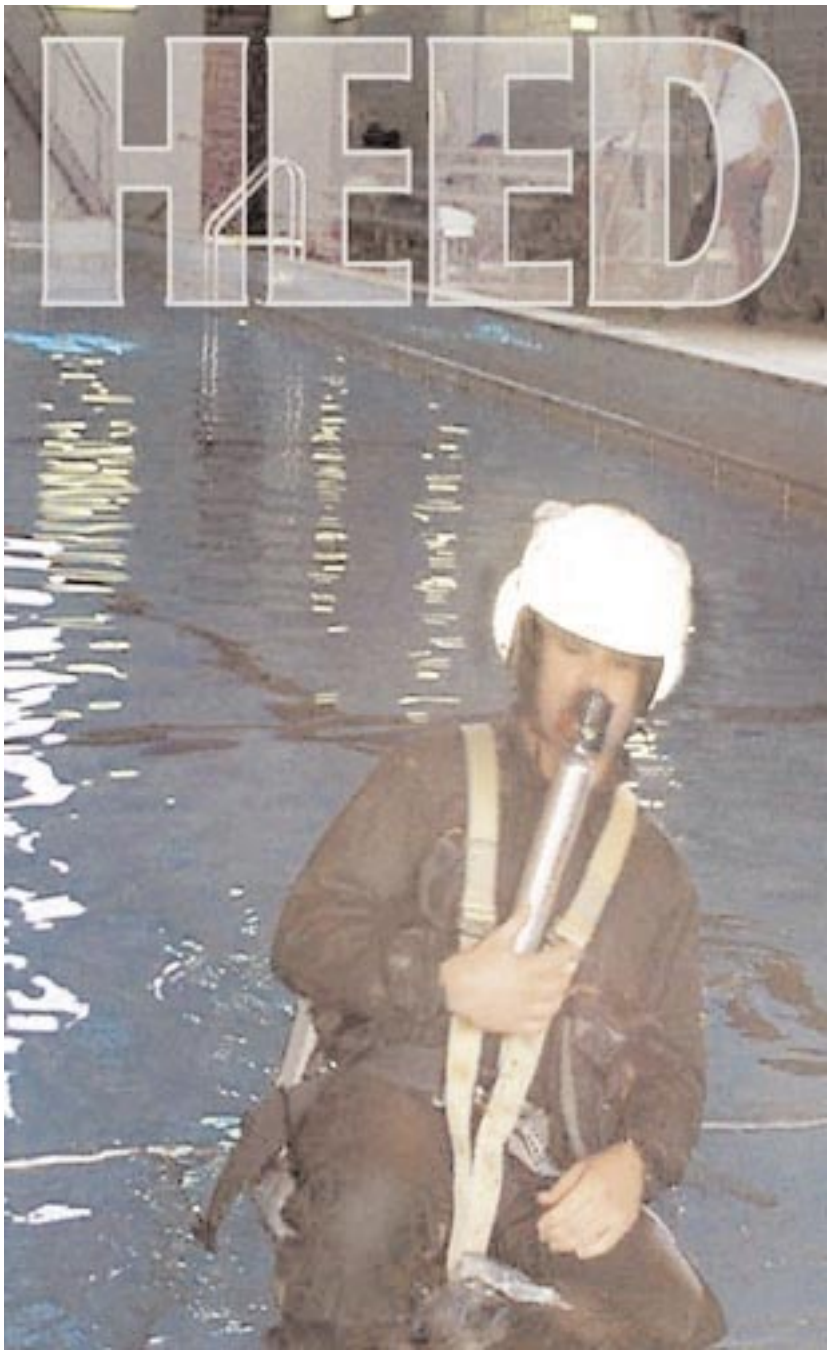
The Navy uses both versions, which yield identical quantities of breathing air. The Army currently uses only the SRU-36/P; the SRU-40/P is being evaluated for Army use.

HEED TRAINING

Units that have the HEED must ensure that users are properly trained to use the device. As any scuba diver will tell you, proper training means the difference between life and death in the use of underwater-breathing equipment. It's like flight training—you can learn only so much out of the book. You must have hands-on training to develop the required level of skill necessary to safely operate the equipment. Use of a HEED without adequate training could have serious consequences, including an air embolism or lung damage.

In a water-crash situation, users need to be trained to properly use the 1 to 3 minutes of breathable air in order to safely egress a submerged aircraft and swim to the surface.

During evaluation of the SRU-40/P HEED, it was determined that the current level of HEED training provided by the Army is



As any scuba diver will tell you, proper training means the difference between life and death in the use of underwater-breathing equipment.

inadequate to ensure that aircrewmembers can safely use the HEED to egress a helicopter.

In the past, the Navy has agreed to train Army personnel at Navy facilities. However, with reduced operational budgets, TDY costs associated with this training are becoming prohibitive. The special-operations community has possibly the only authorized HEED training program in the Army. The ALSE school at Fort Rucker currently provides a book course for HEED maintenance and training as part of the standard 5-week ALSE course curriculum.

In response to the dearth of HEED training in the Army, the SRU-40/P HEED Integrated Product Team (IPT) is developing a HEED training plan for the Army. The Navy is still willing to provide HEED training, so units that currently maintain HEED training via the Navy can continue to do so. Additionally, using special-ops and Navy training plans as a basis, the ALSE school is implementing a HEED training course that uses a shallow-water egress trainer (SWET) in a swimming pool. The SWET trainer is in place, and the school is in the early stages of developing the training program. One concept is to train ALSE technicians in HEED operation so they can go back to their units and implement a water training program. Such programs can be as simple as having aircrewmembers wear a flight suit and jump in a swimming pool and practice using the HEED in the water.

HEED MAINTENANCE

Another problem was discovered during SRU-40/P HEED evaluation. The Army doesn't have the capability to refill or top-off the HEED.

In response to this need, the SRU-40/P HEED IPT is evaluating a breathable-air compressor and the Navy's HEED refill station (CQU-10/P). Additionally, the IPT is evaluating the following maintenance concept. Units that have access to a local dive shop or a co-located Navy facility can refill their HEEDs at commercial or Navy facilities. Units that don't have such access, particularly OCONUS units, can set up organic support by putting a breathable-air compressor at the AVIM level and a HEED refill station at the AVUM level.

The HEED refill station consists of an air cylinder in an aluminum stand with pressure gauges, on/off valve, and air fill adapter. When the air cylinder in the refill station is incapable of refilling the HEED, it can be removed and taken to the AVIM compressor to be refilled. The AVIM could keep a small pool of filled air cylinders on hand. When the AVUM(s) bring in depleted air cylinders, they can immediately receive a filled air cylinder.

SUMMARY

Addressing these problems prior to fielding the SRU-40/P will resolve many of the current supportability problems associated with the HEED. In addition, the IPT is looking toward the future. The HEED is a component of the Air Warrior system. This ground work in the areas of training and support for the HEED will help pave the way for the introduction of Air Warrior to Army aviation. The Air Warrior system will be a mission-tailorable, integrated ensemble that will permit Army aircrewmembers to respond to contingencies over land or water.

—Mr. Al Dassonville, Project Director, Project Manager Soldier, Fort Belvoir, VA, DSN 654-1346 (703-704-1346), adasson@pmsoldier.belvoir.army.mil

HEED inspections

It's dark. You're under water. You're disoriented. Your helicopter is sinking.

This is not a good time to discover that your HEED doesn't work. It's part of your survival equipment—but it can't help you survive if it doesn't work.

To ensure it'll work when you need it, you should make it a practice to inspect your HEED before and after each flight.

Preflight

- Visually inspect the device for external damage.
- Inspect the mouthpiece assembly for security and cleanliness.
- Turn the ON/OFF valve to the ON position and check the device for operational charge. The indicator pin should be flush with or above the green notch.
- Manually purge the regulator by momentarily depressing the purge button. Air should be released from the regulator (indicated by a continuous audible hiss from the mouthpiece assembly).
- Ensure the HEED is properly secured to the SRU-21 survival vest.
- Return the HEED for replacement or repair if you find discrepancies.

Note: *The HEED should remain in the ON position during flight. The indicator pin must be flush with or above the green notch during flight.*

Postflight

- Check the pressure indicator to ensure that the pin is above the green notch.
- Turn the ON/OFF valve to the OFF position.
- Depress the purge button until the airflow stops.
- Inspect the device for external damage.
- Inspect the mouthpiece for cleanliness and security.
- Inspect the regulator for signs of salt air and water contamination and cleanliness.
- Return the HEED for replacement or repair if you find discrepancies.

And remember, any missing part following flight can be an FOD hazard. Even a small part from your HEED could lead to disastrous results if it finds its way into critical aircraft components or flight controls.

Neglecting your preflight and postflight inspections could lead to this lifesaving device failing you at a most critical time—when it's dark and you're under water and you're disoriented and your helicopter is sinking.

Make sure it doesn't happen to you.

Obstacle avoidance and aircraft acquisition

I'd like to share some observations I've made over my short 9-year Army aviation career as a Black Hawk driver. These points may appear to be small, but it's the small things that tend to get us.

Have you ever asked your copilot or crew chief to clear the aircraft prior to turning to their side? Of course you have. But how many times have you seen that person actually looking outside before replying, "Clear"?

I have noticed that some pilots and crew chiefs, including myself, sometimes give only lip service to clearing the aircraft. Usually it happens when we are burdened with a heavy cockpit workload and our situational awareness is less than optimal.

We owe it to ourselves, our crewmates, our passengers, and our families to prioritize cockpit duties and put aircraft clearance first. Take the time to scan the area that lies close in and then extend your scan to the horizon before announcing that it is safe to turn. This technique will ensure that the area will be free of hazards to your flight path.

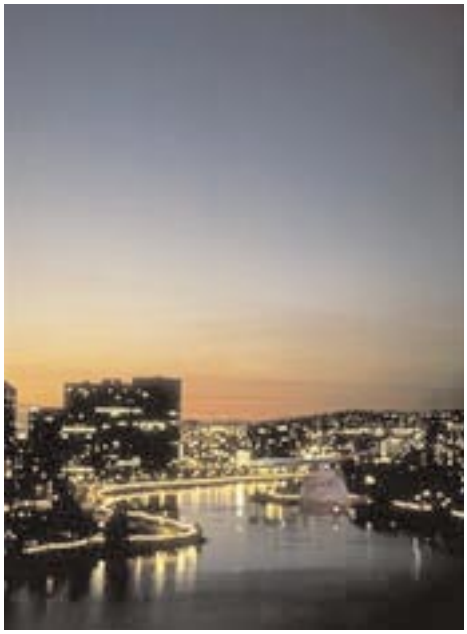
Another thing I've noticed is the difficulty crewmembers sometimes have in detecting other aircraft in flight. Usually movement across our field of view is the most noticeable indication that there is something out there. But did you know that two aircraft on a converging flight path, assuming both aircraft maintain a steady course and similar speed, will cause the position of the other aircraft to remain stationary on the pilot's windshield? This condition is worsened if the other aircraft is blocked from the pilot's sight by a windshield support column—or the copilot's map.

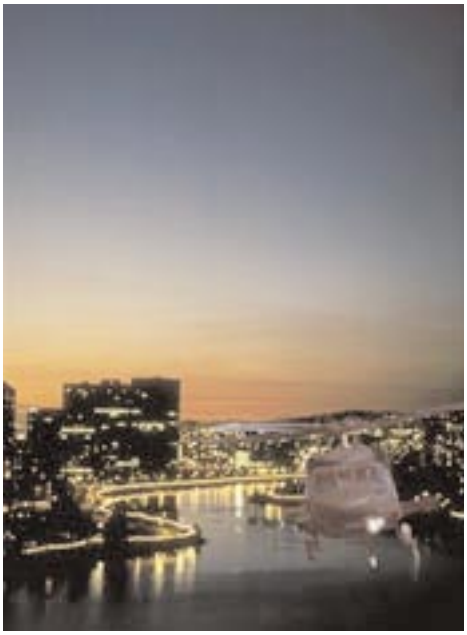
Aircraft converging head-on have similar problems; the approaching aircraft appears stationary when viewed through the windshield. The retinal image size, or the observed size of the object, will grow in relation to the speed at which the aircraft are converging. The faster the speed, the less time available to detect the other aircraft and avoid a collision.

Scanning is the best defense in both these situations. Frequent movement of the eyes keeps the most acute portion of the eye, the fovea, searching the skies for possible conflict. Movement of the head and body will also allow the crewmember to see around obstructions to sight—like that copilot's map!

We must always be looking for other aircraft and possible obstructions to our flight path. Remember that we are only as good as our last flight, and that flight could have been better.

—CW3 Scott C. Miller; D Company, 158th Aviation; CMR 408, Box 894; APO AE 09182; scmlam@aol.com





Y2K-compliant data system almost ready

Over the past 18 months, we at the Safety Center have been working hard to replace the accident database with a new system that is year-2000 (Y2K) compliant. Our primary focus is to improve your ability to get the information you need. The new system is expected to be operational by 2 February 1999. However, this will involve taking the old Safety Center database server (Army Safety Management Information System (ASMIS)) off-line and bringing the new database server on-line. The result is that, ***as of 2 February 1999, you no longer have access to the Safety Center database using the ASMIS Retrieval and Processing System (ARPS)***.

You will be able to access the new accident database through a series of user tools placed on the Risk Management Information System (RMIS) at:

http://rmis.army.mil.

These tools, which functionally represent known information requests to the Safety Center, will be located under a button called "Database." We realize that there will be additional information requirements not currently covered by this initial set of tools. As a result, your feedback is now more important than ever.

If you can't find what you need, have a good idea, have a problem with our web sites, or are totally confused, all you have to do is e-mail us at: **helpdesk@safety-emh1.army.mil** or call DSN 558-1390 (334-255-1390) and let us know what you need. Ms. Reta Dyson or Mr. Junior Kelley will try to find a solution to your problem.

If it's been a while since you visited us—or if you never have—it's time to take a look for yourself. The user tools should be completed by the time you read this, so pay us a visit at:

http://rmis.army.mil
or **http://safety.army.mil**

and keep up to date on what's happening in Army safety. If you have problems getting an RMIS password, contact Ms. Jewnita Clark at DSN 558-3889 (334-255-3889), **clarkj@safety-emh1.army.mil**.

Keep in touch. We're constantly updating our site so we can meet your needs and expectations.

We want to hear from you

Because the cost of accidents is paid in lives, dollars, and readiness, we cannot afford to learn every lesson first-hand; we must learn from each others' experience whenever we can and share what we know with each other.

Our No. 1 request from *Flightfax* readers is for more first-person and lessons-learned articles. And that's the idea behind "War Stories," a recurring feature in *Flightfax* (page 4). The purpose of this column is to provide a forum for the entire Army aviation community to learn from each others' experiences and to share how risk management works in real-world Army aviation operations.

"Crew Commo," another recurring feature in *Flightfax* (page 8), gives aircrews—and other aviation personnel, for that matter—an informal forum in which to communicate with each other. We hope to hear from all of you—including maintenance personnel—on issues regarding safety and risk management in Army aviation.

We make it easy to contribute. Just a couple of notes so that everybody understands the deal:

- Space in *Flightfax* is limited, so please be as brief and to the point as possible.
- We won't be publishing items that are submitted anonymously, but we will keep your identity confidential if you say so. It's the lesson, after all, that's important.
- If we edit your story for length or clarity, we'll get your approval before publishing the revised version.

That's pretty much it. You can contact us by—

- Phone: DSN 558-2676 (334-255-2676)
- Fax: DSN 558-9478/9528 (334-255-9478/9528)
- E-mail: flightfax@safety-emh1.army.mil
- Mail: Commander, U.S. Army Safety Center, ATTN: CSSC-OA (Flightfax), Bldg. 4905, 5th Ave., Fort Rucker, AL 36362-5363

Please let us know how we can serve you better; we truly want to know. And we look forward to working with you as you contribute to Army aviation safety through *Flightfax*.

—Sally A. Yohn, Editor, Flightfax, DSN 558-2676 (334-255-2676), yohns@safety-emh1.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1

Class E
F series

■ Upon touchdown from 3-foot hover, No. 2 hydraulic pressure light came on, followed by failure of pitch and roll SCAS. Caused by failure of hydraulic pressure switch.

■ During simulated engine failure at altitude, rotor and engine needles did not split. During autorotative descent, power returned to normal operational rpm, and aircraft landed without incident. Maintenance found that rotor rpm was not set for current environmental conditions and adjusted main-rotor pitch-change links.

AH64

Class C
A series

■ Crew heard squealing noise during low-level training. During descent for precautionary landing, crew noted smoke and "fire APU" master caution light came on. Crew activated APU fire pull handle, deactivated ECS, and landed without further incident. Inspection revealed separation of APU drive shaft from PTO drive clutch and APU drive shaft and associated APU component damage.

■ Damage to No. 2 main-rotor blade was discovered during preflight. Maintenance had been performed on aircraft 7 days earlier for replacement of No. 2 main-rotor blade and lead/lag-link bearing. It was determined that phenolic block and associated retaining/quick-release pins and tools installed between pitch housing and main-rotor hub to prevent blade droop during maintenance had not been removed. Aircraft had been flown on two missions before phenolic block and pins were discovered. Phenolic block was found wedged in rotor's pitch housing and was cracked where the second pin is normally inserted. Also found was apparent subsequent damage to No. 2 main-rotor blade.

Class E
A series

■ Crack was found in doppler antenna shroud during postflight inspection. Suspect that, during pinnacle landing, aircraft settled in soft earth and antenna shroud settled on top of rock.

■ Pressurized air became weak and shaft-driven compressor (SDC) caution light came on during approach to landing. Crew landed and, during shutdown, psi accessory pump caution light came on. Postflight inspection revealed that transmission oil level was zero, with oil pooling beneath aircraft. Maintenance replaced SDC.

■ Crew noticed uncommanded left yaw and smelled burning odor in cockpit during cruise flight. Crew executed immediate descent for landing at airfield. During approach, oil psi accessory caution light came on. Caused by SDC failure.

■ Fuel cap and panel were found missing during hot refueling. Suspecting that the refuel panel was left off during a previous refuel, crew conducted ramp search and discovered cap and panel at an adjacent refuel point. Inspection revealed no damage, and cap and panel were replaced.

■ Crew noticed burning odor during ground taxi, but there was no smoke, popped circuit breakers, or caution/warning lights. Aircraft returned to parking. During APU start for shutdown, shaft-driven compressor (SDC) caution warning light would not extinguish. Aircraft was shut down without incident, and SDC was replaced.

■ During runup, No. 1 generator caution/warning light illuminated. Generator could not be reset. Aircraft was shut down without incident, and generator was replaced.

CH47

Class C
D series

■ During slingload operations, rear hook failed to release slingloaded HMMWV after it was set down on ground. As aircraft continued to move forward, HMMWV was dragged until hook finally released. HMMWV was extensively damaged; no damage to aircraft.

Class E
D series

■ No. 1 engine fire light came on during runup. Maintenance replaced fire-sensing element, and aircraft was released for flight.

■ Combining transmission right-hand debris screen latch indicator tripped six times during traffic-pattern flight and would not reset the sixth time. Upon landing, maintenance cleaned debris screen and drained and flushed gearbox. Oil sample returned normal, and aircraft was released for flight.

OH58

Class A
D(I) series

■ Aircraft hit trees while crew was screening for ground elements during squadron exercise evaluation. Aircraft landed upright with extensive main- and tail-rotor and structural damage. Both crewmembers were injured. Investigation is under way.

Class E
C series

■ During IGE hover work at improved landing strip, aircraft was at 10 feet agl and 5 knots forward airspeed when crew spotted wire at eye level. Wire disappeared into upper WSPS, and crew immediately landed and shut down. Inspection revealed no damage.

■ During low-level flight, engine had compressor stall. Aircraft landed without incident.

D(I) series

■ Low oil pressure transmission caution message displayed during NVG flight. Caused by loose nut on oil return line at freewheeling unit.

■ During running fire of .50-caliber machinegun, copilot's chin bubble shattered.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

TH67

Class E
A series

■ During VMC approach to landing, bird dove and struck vertical fin. Aircraft continued approach to landing, and landed without further incident. Postflight inspection revealed damage to vertical fin.

■ Suspected compressor stall occurred during rpm recovery after hovering autorotation. Aircraft landed without incident. Maintenance could not duplicate on test flight.

UH1

Class E
H series

■ During takeoff, aircraft encountered flock of birds. Aircraft was landed and inspected for damage. Bird strikes were evident, but no damage was found.

■ Crew felt hydraulic stiffness in upper right quadrant during takeoff. Performance of emergency procedures momentarily returned control response, but then stiffness came back. Crew returned to home base, where maintenance replaced magnetic brake and adjusted rigging of lateral cyclic flight controls.

V series

■ During short final, crew chief smelled fuel odor when he opened passenger door to clear aircraft. Postflight inspection revealed fuel line between fuel cell and fuel manifold was seeping.

UH60

Class B
A series

■ Three main-rotor blades sustained damage beyond repair during NVG hoist medevac operation. Damage was discovered during daylight the following day. Cause not reported.

Class C
L series

■ MTP experienced rapidly decreasing oil pressure on No. 2 engine while in "fly" position and immediately initiated engine shutdown. Postflight inspection revealed that 5 to 6 quarts of oil had leaked from the No. 2 engine and spilled onto aircraft and parking pad. Damage was confined to No. 2 engine. Prior to incident, No. 2 engine hydro-mechanical unit had been replaced. Upon completion, retaining nuts had not been reinstalled on accessory gearbox shaft cover, nor had maintenance action been recorded on applicable forms.

Class E
A series

■ No. 2 engine failed as aircraft touched down during normal approach. Emergency shutdown was performed. G-axis and cross-bleed air tube on No. 2 engine were replaced.

■ During MTP training auto-rotation, No. 1 engine shut down after returned to fly. Engine was restarted in flight using APU, and aircraft landed without incident. Maintenance replaced No. 1 engine P3 hose and tube assembly.

■ During local orientation flight, No. 1 hydraulic pump failed. Hydraulic pump was replaced.

■ Aircraft struck large buzzard with the advancing half of a main-rotor blade during cruise flight. Aircraft continued about 10 miles to destination and landed without further incident. Damage was found to one main-rotor-blade tip cap.

■ During final approach, No. 2 engine developed unusual noise, followed by master caution and tgt indications in excess of 1000°C. Crew landed immediately and performed emergency shutdown of No. 2 engine. Suspect internal failure of No. 2 engine.

■ Just after takeoff, nose of aircraft pitched downward uncommanded. About 10 minutes later, while in IMC, aircraft began porpoising in pitch axis, and crew noted unusual aircraft vibration. When pilot attempted to correct porpoising by moving cyclic, cyclic would barely move. PC took controls and confirmed that cyclic was very stiff. He elected to descend to VMC and performed precautionary landing. Aircraft failed flight-control breakout check during postflight inspection. Maintenance suspected water/ice in flight control bearings. After swashplate and mixing unit were lubricated, flight controls operated normally.

■ Aircraft experienced unusual attitude inputs through the flight controls during cruise flight. Aircraft landed without incident. Maintenance could not duplicate condition, and aircraft was released for flight.

C12

Class E
D series

■ Nos. 1 and 2 avionics master circuit breakers tripped in cruise flight, resulting in loss of all navigation and communications capability. Circuit breakers would not reset. Crew was able to use dead reckoning to descend in VMC to first suitable airport, and landing was made without incident. Caused by faulty d.c. crowbar assembly.

F series

■ Crew heard loud crash during cruise flight and simultaneously noticed the pilot's inner windshield was shattered. After emergency landing at nearby airport, windshield was replaced.

■ While climbing through 23,000 feet with ice vanes extended and props at 1900 rpm, right engine emitted loud bang and failed. Flames were observed coming from exhaust-stack area. Engine was secured IAW emergency checklist for in-flight engine failure, and uneventful single-engine landing was made at airport.

R series

■ Engine chip light came on in cruise flight. Single-engine flight was available, and engine was shut down. Single-engine landing was made back at home station without incident. Maintenance inspection of chip plug revealed metal chunks and fuzz.

C23

Class E
B series

■ When IP attempted to retract landing gear after takeoff, handle would not move. Gear was left down, and aircraft returned to airfield and landed without incident. Inspection determined that weight on wheels switch striker plate had shifted, causing aircraft to sense that it was on the ground, thus not allowing gear to retract. Plate was rebonded to left-main landing gear.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action messages

AH-64-99-ASAM-02, 011502Z Dec 98, informational

There have been AH-64A and UH-60L on-ground flameouts that have been attributed to the overspeed and drain valve (ODV). The flameouts usually occur just as power control lever is moved from "fly" to "idle." Other factors associated with the incidents are that the aircraft has been on the ground and at flat pitch for a period of time. To date, there have been no in-flight shutdowns. The purpose of this message is to inform users of corrective actions to preclude ODV-related flameouts.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), chilton-hl@redstone.army.mil

OH-58-99-ASAM-01, 141325Z Dec 98, maintenance mandatory

The mast-mounted sight upper shroud assembly contains six clamps that hold the upper and lower shrouds together. Field reports indicate that certain clamps will remain loose even after required torque is applied to bolts. This message requires a one-time inspection for suspect clamps and to verify correct installation of threaded insert.

AMCOM contact: Mr. Ron Price, DSN 788-8636 (256-842-8636), price-sf@redstone.army.mil

UH-1-99-ASAM-02, 091320Z Dec 98, maintenance mandatory

ASAM UH-1-98-03 directed a one-time inspection of all UH-1 tail-rotor control tubes to remove parts manufactured by Master Swaging. This inspection was to be performed no later than 31 December 1998. The purpose of this message is to extend that requirement to 30 June 1999.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil

UH-60-99-ASAM-04, 011502Z Dec 98, informational

See AH-64-99-ASAM-02 above.

AMCOM contact: Mr. Ed Goad, DSN 897-2095 (256-313-2095), goad-er@redstone.army.mil

UH-60-99-ASAM-05, 071608Z Dec 98, maintenance mandatory

Certain spindle bearing assemblies procured under a spares contract initially did not include the sleeve bearing, P/N SB5203-202. This message requires a one-time inspection of the spindle bearing assembly, P/N 70102-08100-044/056, for the presence of the sleeve bearing.

AMCOM contact: Mr. Ed Goad, DSN 897-2095 (256-313-2095), goad-er@redstone.army.mil

UH-60-99-ASAM-06, 101503Z Dec 98, maintenance mandatory

Certain pitch horns, P/N 70102-08111-047, failed to pass fatigue tests. This message requires a one-time inspection to locate the pitch horns specified in paragraph 7 of the message and to establish a reduced retirement life of 2500 hours for those horns.

AMCOM contact: Mr. Ed Goad, DSN 897-2095 (256-313-2095), goad-er@redstone.army.mil

Safety-of-flight message

AH-1-99-SOF-03, 141510Z Dec 98, technical

This message requires a one-time inspection for and removal of suspect scissors lever assemblies manufactured by Imperial Tooling and Machine Company.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), chilton-hl@redstone.army.mil

POV fatality update through December

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY99
26	37

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Class A Accidents

through December

		Class A Flight Accidents		Army Military Fatalities	
		98	99	98	99
1ST QTR	October	2	1	0	0
	November	1	1	0	2
	December	2	1	2	0
2D QTR	January	1		0	
	February	1		0	
	March	1		0	
3D QTR	April	0		0	
	May	1		0	
	June	2		4	
4TH QTR	July	1		0	
	August	0		0	
	September	0		0	
	TOTAL	12	3	6	2

U.S. ARMY SAFETY CENTER

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Charles M. Burke
Brigadier General, USA
Commanding

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

MARCH 1999 ◆ VOL 27 ◆ NO 3 http://safety.army.mil

We as commanders and other leaders are on the front lines in the aircraft accident prevention battle. But we are not without effective weapons and powerful support. One of the most potent weapons in our arsenal is . . .

ACCOUNTABILITY

"... even a seemingly small infraction can become a key factor in a set of circumstances that leads to an accident."

Accountability

Much too often, safety is defined as the absence of accidents. Such a definition can easily lead to an attitude similar to that of a lawbreaker who measures his success by the number of times he gets away with it. As leaders, we must recognize that even a seemingly small infraction can become a key factor in a set of circumstances that leads to an accident. Therefore, we must create a climate of accountability in our units by taking positive action to deal with every breakdown in professional discipline and standards.

Safe aviation operations require elimination of undisciplined actions before they cause an accident. But many times, in the name of "protecting" an aviator's career, we hesitate to hold aviators accountable for breaches of flight discipline, disregard of procedures, and failures to perform to standard. We sometimes treat such violations as isolated incidents that don't warrant disciplinary action. However, doing this can allow a climate of tolerance to develop, a command climate in which breaking the rules is overlooked.

This must stop. We must create a command climate of accountability in which violations of regulations and procedures are not tolerated. And we must do it before an accident happens.

There is no better predictor of future performance than past performance. The insurance industry knows this to be true. Their studies have shown, for example, that a person convicted of a first offense of drunk driving has gotten away with it many times before being caught. This is why insurance rates go up immediately upon the first conviction: the insurance companies know it wasn't the first time the driver drove drunk; it was simply the first time he or she was caught.

There's a lesson here for commanders. Few of us will ever deal with a true first-time violator; what most of us will see are repeat violators who are caught for the first time. And that's why we must take action at the first sign of a regulatory or procedural violation. If we do not, we as leaders set a new standard—a lower standard.

This is not to suggest that every infraction should result in the violator being removed from the cockpit; rather, every infraction should be dealt with appropriately. We have powerful tools—harsh and not so harsh—we can use to show that we will not tolerate even the slightest infraction. And we can do this without ruining the careers of aviators who deserve a second chance.

All it takes is consistent enforcement of standards. We have the tools—actions ranging from counseling to removal from flight status—to make the "punishment" fit the "crime." There is no excuse for a commander ever to overlook an infraction, even a minor one, because overlooking violations creates a tolerant command climate that will eventually result in an accident. Let me give you an example.

Several years ago, an Army aviator flew his helicopter into a lake while flying at 90 to 100 knots within 5 feet of the water. In the 12 months before the accident in which he died, this aviator had had four operational hazard reports (OHRs) filed against him in addition to at least two verbal reports about his flying.

Although the unit commander knew about the OHRs, written and verbal, and rumors about the aviator's "cowboy" style of flying and reputation as a "hot dog," the commander apparently looked at each report as a separate incident and never considered them as an indication of a pattern. As a result, this aviator got a "second chance" one time too many, and it cost him his life.

Many years ago, the Army Safety Center surveyed three aviation organizations that consistently maintained excellent safety records to determine the characteristics that led to their exceptional safety records. Each of them—a combat aviation battalion, an air cavalry squadron, and an aviation battalion—had a different organizational structure. And mission-wise, they had little in common except their success. But their commanders had one important characteristic in common: Each of them consistently took immediate and

effective action against deviations from established standards.

Undisciplined behavior rarely corrects itself. It's the commander's job to deal appropriately with violations as they occur. And, as commanders, we must take it one step further: We must document infractions so that habitual violators don't revert to "first-time" violators when a new commander comes in or the aviator moves on to a new unit.

Where soldiers' lives are at stake, we cannot afford to forgive and forget.

Leaders save soldiers.

—BG Charles M. Burke, Director of Army Safety and Commanding General, U.S. Army Safety Center, DSN 558-2029 (334-255-2029), burke@safety-emh1.army.mil

One of the tests of leadership is the ability to recognize a problem before it becomes an emergency.

—Arnold Glasow

Train as you'll fight: An ideal, not an imperative

"Train as you'll fight. Fight as you've trained. Train safely so you'll be there."

We are an Alabama Army National Guard, UH-60A equipped assault helicopter company preparing for a deployment to JRTC. The admonition quoted above appears at the end of every issue of our company safety office's unit safety bulletin. It is an important touchstone for our training. It is also important, however, that commanders, trainers, leaders, and soldiers clearly understand the differences between the risks we are permitted to take in training and the risks we would find acceptable in combat.

This issue becomes especially critical when we face training events such as those conducted at NTC and JRTC. I'm sure I'm not the only soldier who has ever heard the comment that "JRTC is different. The 'war rules' apply." The fact is that neither NTC nor JRTC are combat situations. They are training environments. The issue is addressed in chapter 5 (Risk Management) of TC 1-210: *The Aircrew Training Program: Commander's Guide to Individual and Crew Standardization*. Following are excerpts:

> One of the most fundamental concepts in both FM 25-100 and FM 25-101 is to "train as we will fight." However, to train as we will fight is not always possible for a number of reasons. Safety-related restrictions also must be considered. Many risks that are reasonable in combat are not supportable in training. The benefits of accepting some risks in training are not as great as the benefits of accepting the same risk in combat. Therefore, commanders do not accept all the risks in training that they would during combat.

So, whether it's a weekend drill, a trip to the firing range, or a deployment to NTC or JRTC, the question remains the same: "Can I do this safely?" It's the first question every soldier should ask before any mission. It is also the first question that must be asked by those entrusted with the training and safety of our soldiers.

—CW4 Frank B. Angarola, ASO, Company B, 1/131st Aviation, ALARNG, 1-131st.uh60safety@salem.aorcentaf.af.mil

The Devil's in the details

Since, technically, a war story should have something to do with war, here's the tale I use to introduce my aircrew coordination classes. Some quick background. It was late April 1970. One night an armored cavalry squadron got cut off and chewed up by the 17th North Vietnamese Army Division. The senior advisor called for an urgent medevac; what he got was me and my merry killers . . .

Sometimes somebody with only your best interests at heart will try to get you killed.

It ***really was*** a dark and stormy night. We—a crew of six—were flying a UH-1H Nighthawk gunship (minigun slaved to a xenon searchlight and a .50-cal on the right, twin 60's and a grenade launcher on the left) through a midnight monsoon at 500 feet. It was, after all, an ***urgent*** medevac.

Believe it or not, we had actually managed a flight brief before takeoff and a crew brief en route—a sort of Jurassic version of aircrew coordination, but with a crew of six (four of them heavily armed), I didn't want any solo players. My Firefly flare ship took up a five-rotor-disk staggered-right after confirming that he could see my steady-dims with no problem (no, child, NVGs hadn't been invented yet).

I won't bore you with the details of torrential rain, lightning, turbulence, and popping in and out of clouds we never did see or the cheery, "Radar contact lost; last observed heading was *skrrrk*. See you *skrrrk* you get *skrrk*...", or the water leaking from the overhead panel or the intermittent radio contact with our folks on the ground (it made FM homing a real chore until we finally made visual contact—we could tell where they were laagered by all the green and white tracers converging with all the mortar explosions).

I will, however, bore you with two very important details. My Peter-Pilot's only previous night flight had been at an Alabama stagefield, and his only previous flight in the Land Of The Two-Way Gunnery Range had been ***yesterday's*** in-country checkout flight. But earlier in the evening, I had observed that he could fly instruments like a 'Thirties mail pilot. Oh, frabjous day! The boss had finally paired me up with a copilot who wouldn't try to kill us in the clouds.

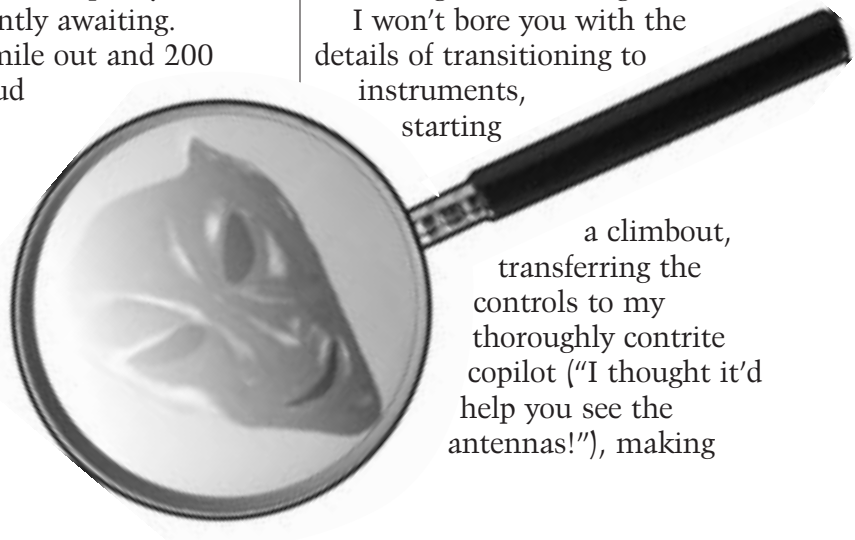
And now for the part you've been so patiently awaiting.

At a half-mile out and 200 feet above mud level, the opposition stopped firing into the laager and began putting random bursts into the sky. Heh, heh—not even close! One hundred meters out and 75 feet up, I could see armored personnel carriers skulking in the murk. Thirty meters out and 30 feet above the mud, I was nice and slow, picking my way through the antennas, raindrops and rice straw beginning to swirl in the rotor wash—the Zippo lighter in the steel pot began to flicker, marking my touchdown spot.

Question. If you were shooting a night approach into an Alabama stagefield, what is the very first thing you would expect an Army aviator to do? Conversely, if you were shooting a night approach into the middle of a firefight, what is the very last thing you'd expect said Army aviator to do? If you answered, "Turn on the landing light," to both questions, you're absolutely correct. Care to guess what my instrument ace did? Unannounced?

The troops in the laager nipped back inside their APCs, the raindrops and rice straw turned into a million points of light swirling in a million different directions; the bad guys reoriented their fire with commendable speed, and lovely green basketballs now joined the tumbling mirth of rain and straw 2 feet from my face. My previously dark-adapted eyeballs uncaged, and I got a screaming dose of vertigo.

I won't bore you with the details of transitioning to instruments, starting a climbout, transferring the controls to my thoroughly contrite copilot ("I thought it'd help you see the antennas!"), making



calls to Firefly, and trying to figure out why the direction "up" had suddenly acquired the gift of bilocation. At least I didn't have to turn the landing light off; one of the other team's superstars shot it out for me—along with my chin bubble. I won't bore you with the details of what happened when I disgustedly hollered, "Aw, SHOOT!" and the fearsome foursome in the back opened up with full left and right suppression. And I certainly won't bore you will all the details of our ***second*** voyage into the laager to pick up the wounded that Firefly couldn't extract. (Everybody we hauled out lived, which is the best part of the story!)

Would a really, ***really*** thorough crew brief have reduced the thrill factor? That's kinda hard to say. I'd been Nighthawking for months, and it would never have occurred to me that a pilot would ***touch*** the landing-light switch, never mind turn the blasted thing ON in a hot LZ. So just where does aircrew coordination come into play here?

Well, for starters, how about "situational awareness for two"—the newbie not being fully aware of just what "combat zone" really meant, and the old guy not being fully aware of just ***how*** unaware a newbie could be. And, oh yeah, the "halo effect": "Kid's great on the instruments—this should be a no-sweat mission." And let's not overlook "sudden loss of judgment." Did I make his comfort zone a wee bit ***too*** comfortable with my piece-of-cake briefing?

Details, details, details. The Devil's in the details.

—CW4 Bill Tuttle, Army Aviation Support Facility #1, NJARNG, West Trenton, NJ, DSN 445-9261 (609-530-4251)

Shortfax
Keeping you up to date

Static grounding points

Technical advisory message #99 (261510 Jan 99) from the U.S. Army Petroleum Center published new guidance on static grounding points. Following is a summary of the message.

SUMMARY

FM 10-68: *Aircraft Refueling* was rescinded and replaced by FM 10-67-1: *Concepts and Equipment of Petroleum Operations* effective 2 April 1998. Since then, significant discussion has surfaced Armywide in reference to testing frequencies of grounding points used for aviation and general petroleum refueling operations.

In September 1990, TRADOC granted a waiver to the old FM 10-68 requirement for annual testing of grounding points. In September 1994, FORSCOM granted a similar waiver. These waivers precluded any continuing testing to verify performance of grounding points.

Due to the revised ground-testing frequencies contained in the current FM 10-67-1, the TRADOC and FORSCOM waivers are no longer valid. These frequencies have been coordinated throughout the Army petroleum community and with respective safety points of contact within TRADOC and FORSCOM. All sources agreed with the guidance set forth in FM 10-67-1 and recommend that all Army petroleum units comply with the procedures.

It should be noted that the ground-testing procedures referenced in FM 10-67-1 are applicable to grounding points used for refueling operations on aircraft ramps and flight lines and in fuel tanker parking areas. Ground testing requirements for other operations have more stringent requirements. Following is a summary:

■ **Aircraft apron (refuel) and tanker parking area grounding points.** Guidance published in FM 10-67-1 requires testing of grounding points after initial installation and every 5 years thereafter, after repair of damaged grounding points, or when obvious damage is discovered.

■ **Aircraft hangars.** TM 1-500-204-23-1 states that grounding systems in aircraft hangars must be inspected and tested annually or whenever there is a possibility of mechanical damage.

■ **Ammunition & explosives.** AR 385-64 refers to ground-testing requirements for aircraft during ammunition operations. It states that ground rods must be visually inspected every 6 months and electrically tested every 24 months.

—POC: Mr. Del Leese, Army Petroleum Center, DSN 977-8580 (717-770-8580), dleese@usapc-emh1.army.mil

System safety: How it happens

Most soldiers, especially aviation soldiers, are familiar with the Army Safety Center's accident-investigation mission. However, analysis and dissemination of accident information to field units is only one of the many ways the Director of Army Safety (DASAF), who is also the commander of the Army Safety Center, fulfills his responsibility under AR 385-10 to "administer and direct an effective Army Safety Program (ASP) to reduce the occurrence of accidents." This article focuses on defining system safety and outlining the key players' responsibilities.

System safety is a proactive program that applies safety processes to Army systems throughout their life cycles, from inception to disposal. The key players in system safety are combat developers, materiel developers, and soldiers—the ultimate users of the equipment.

Background

Department of Defense Instruction (DODI) 5000.2R requires system-safety programs for all major acquisition systems. In the Army, AR 70-1 delineates risk-management responsibilities throughout the acquisition force, while AR 385-16 delineates responsibilities for system safety and engineering management. The commander of the Army Safety Center and Director of Army Safety has overall responsibility for managing the Army System Safety Program and developing system-safety policy.

Policy

Army policy dictates that system safety be applied and tailored to all Army systems and facilities throughout their life cycles. This policy is institutionalized through partnerships and coordination with Assistant Secretary of the Army for Research, Development, and Acquisition; Assistant Secretary of the Army for Installation, Logistics, and Environment; and other Army staff offices. Implementation rests with the program managers responsible for Army systems development in all stages of life-cycle management (figure 1).

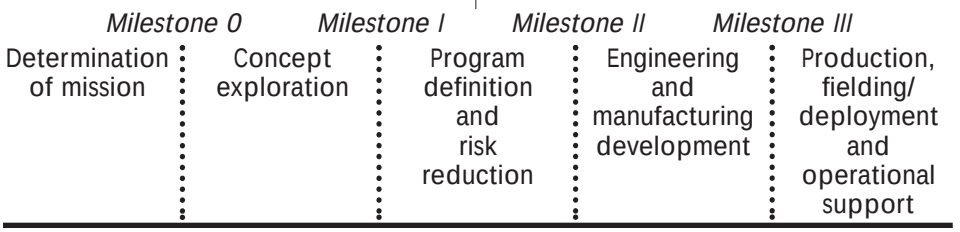


Figure 1. Life-cycle management model

Objectives

The objectives of system safety are to—

- Maximize operational readiness and mission effectiveness by ensuring that appropriate hazard-control measures are designed into systems in a timely manner.
- Ensure that hazards associated with new technology or operations are identified for consideration in later applications.
- Ensure that hazards are eliminated or controlled through design and that risk associated with residual hazards is formally identified, accepted at the appropriate management decision level, and documented.
- Identify hazards and manage the risk associated with these hazards for each system or facility throughout its life cycle in all possible configurations and all mission variations.

The combat developer

The combat developer is the user's representative. System safety is introduced early into the development process by combat developers in the concept-definition stage. Safety is infused into systems based on user experience with previous systems and analysis of future operational capabilities. To design safety into a system, the combat developer—

- Identifies safety requirements in the operational requirements document, which defines system performance.
- Monitors program development and makes recommendations on all hazards identified by the program manager.
- Has formal concurrence/nonconcurrence for risk-management decisions at program and milestone decision reviews.

The combat developer is involved in the identification, assessment, and recommendation process informally as well as through formal day-to-day monitoring of system progress as a member of the System Safety Integrated Product Team (SSIPT). Additionally, as system safety risk assessments are coordinated, the combat developer formally concurs or nonconcurs with risk-mitigation methods proposed by the program manager or decision authority.

THE MATERIEL DEVELOPER

The materiel developer is the point man for system safety. Materiel developers assess, refine, and track safety issues through production to fielding. The materiel developer identifies hazards throughout the entire life cycle; however, early identification of hazards and designing safety into the system provides the most long-term benefit.

THE PROGRAM MANAGER

The program manager (PM) charters an SSIPT of technical experts to assist in managing the safety program. One of the SSIPT's first tasks is to develop a system safety management plan, which establishes management policies, objectives, and responsibilities for execution of the system-safety program for the life cycle of the system. The plan outlines government-contractor responsibilities, ensures that hazards are identified and risk assessments and decisions are documented, outlines tasks of SSIPT participants, and lists milestones for safety actions with respect to system development.

After fielding, the PM is responsible for tracking worldwide accident and incident data, improvement recommendations, deficiency reports, and other data to correct safety hazards as they arise. Through system safety risk assessment (SSRA), the severity and probability of hazards are determined and presented to the appropriate level decision maker for risk management (figure 2). The decision-maker implements controls within the following resource constraints:

- Design for minimum risk.
- Incorporate safety devices.
- Provide warning devices.
- Develop procedures and training.

THE USER

Users participate in operational testing of systems as part of the materiel-development process and have an opportunity to evaluate and identify system-safety deficiencies. Once a system is fielded, efforts focus on discovering safety deficiencies that were not identified during the development process. As users, soldiers have direct input to system safety by identifying safety deficiencies through actual system use. They also provide insight into unforeseen hazards and new mission requirements. Soldiers may submit equipment improvement reports, quality deficiency reports, and DA Forms 2028 or coordinate with logistics assistance representatives (LARs) to document and fix specific safety hazards.

SUMMARY

System safety provides the optimum level of safety attainable through engineering efforts balanced against operational capabilities. Risks are considered throughout the development and fielding process and eliminated where possible; those that cannot be eliminated are reduced to the lowest level possible. Few soldiers probably realize the magnitude of safety efforts to provide safe and reliable equipment for Army operations. Regulations, policies, and key organizations are in place to field and sustain you, the soldier, with the best possible equipment available.

—MAJ Don Presgraves, Aviation Systems & Accident Investigation Division, DSN 558-9858 (334-255-9858), presgrad@safety-emh1.army.mil

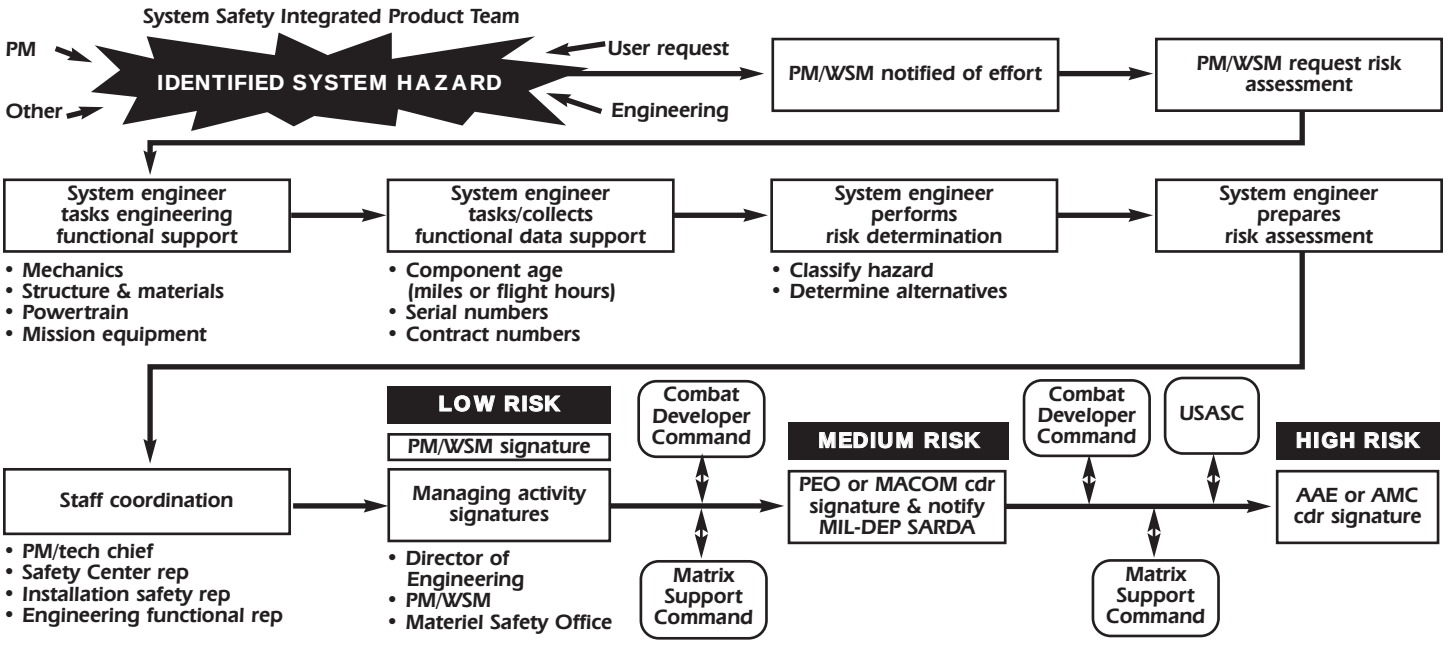


Figure 2. SSRA process (risk assessment flow)

Human error brought on by design deficiency

2200 hours, 1 September 1996. PZ Bastogne, Fort Campbell, KY.

It was a very dark night; there was no illumination. The 1st Brigade of the 101st Airborne Infantry Division (Air Assault) was, as usual, training for war. The scenario involved moving the entire brigade deep into enemy territory with helicopters.

The mission was planned out in detail. The coordination meetings, briefings, and rehearsals were done. The mission was going to be complicated and difficult, involving flights of AH-64s, UH-60s, and CH-47s moving soldiers and equipment into a combat zone. The flights were required to take off, cross conflicting routes, land, discharge cargo and personnel, and take off again for the next load on a timetable. The division standard was to be on time ±30 seconds and on target ±50 meters.

I was flight lead of the first four CH-47s; PZ control wanted all four loads on the LZ at the same time. The flight of Black Hawks ahead of me had taken off a little late, and Chalk 4 of my flight was having a problem hooking up his load. PZ takeoff time came and passed; we finally took off 9 minutes behind schedule. We adjusted our airspeed, and time was made up along the route. RP crossing time was about 20-seconds fast.

As we approached the LZ, I could see the intended point of touchdown. The crew prepared for landing as I slowed from about 70 KIAS, turned to the briefed heading (330 degrees), and started to come down from about 75 feet above the treetops. We were going to make our time, no problem.

The copilot completed the before-landing checks.

The flight engineer prepared to call the load clear of the final barriers.

Our airspeed was down to about 30 KIAS, and we were about 70 feet above the ground; our heading was still 330 degrees.

As I mentioned before, it was a very dark night. Chalk 3 had his IR band-pass filter light on, and this light cast the shadow of my aircraft and load—a HMMWV—onto the ground about 200 feet out in front of me.

I was commenting on how large the LZ was and that we would have no problem fitting four hooks when I saw my load falling. Then I saw the glaring red of two master caution and three hook-open lights.

What happened

In a moment I went from bewilderment to rage to realizing that now was not the time to vent.

"What just happened?" I asked over the intercom.

The flight engineer immediately took responsibility for the release. He said, "Sir, I hit the release button when I went to push to talk."

Why it happened

A design deficiency in the arrangement of switches on the winch/hoist-control grip was a significant contributing factor. The cargo-hook-release switch is located about ¾-inch and 30 degrees to the upper left of the microphone switch.

My story is not the first to point out a problem with the hoist/winch-control grip. There have been numerous incidents over the years; in fact, from 1991 through 1997, an average of 2.6 inadvertent releases per year were attributed to the design deficiency. Following are excerpts from some of the reports on file:

- On final during external-load training, flight engineer was using winch/hoist-control grip when he experienced communications failure. During the confusion, he accidentally pressed cargo-hook-release switch, jettisoning load.
- While hovering, flight engineer erroneously jettisoned load (bridge ramp section).
- During hover, external load (M102 howitzer) was unintentionally jettisoned.
- When crew chief attempted to transmit status of cargo over intercom, he inadvertently pressed cargo-hook-release switch, dropping load (truck and miscellaneous equipment).
- During approach, flight engineer unintentionally released load (backhoe).
- On final approach, crew chief inadvertently released load while attempting to communicate with flight engineer. He depressed load-release switch instead of push-to-talk switch on hoist-operator's grip assembly.
- M1038 HMMWV was inadvertently jettisoned during final approach.

■ External load (M998) was inadvertently jettisoned during hover.

■ As crew chef repositioned himself in cargo hole to observe load during NVG approach, his finger inadvertently depressed jettison button on pistol grip, releasing load (2 M102 howitzers) from approximately 5 feet agl.

■ Flight engineer inadvertently released external load during final approach.

■ Crew chief inadvertently pressed cargo-hook-release button during final approach, resulting in unintentional jettisoning of M998 truck.

WHAT *COULD* BE DONE ABOUT IT

■ Remove one of the two switches from the winch/hoist-control grip.

■ Place a spring-loaded protective cover over the cargo-hook-release switch (similar to the one covering the cable-cutter switch located immediately to the right of the cargo-hook-release switch).

■ Provide written procedures and/or guidance. Submit a change to the operator's manual to include a warning. Submit a change to the ATM to prohibit the use of the winch/hoist-control operators grip for communicating during external-load operations.

■ Dictate specific procedure in unit SOP.

WHAT *SHOULD* BE DONE ABOUT IT

Any of the above would help. A combination of written procedures, properly posted warnings, and a protective cover would be not only operationally but also economically effective.

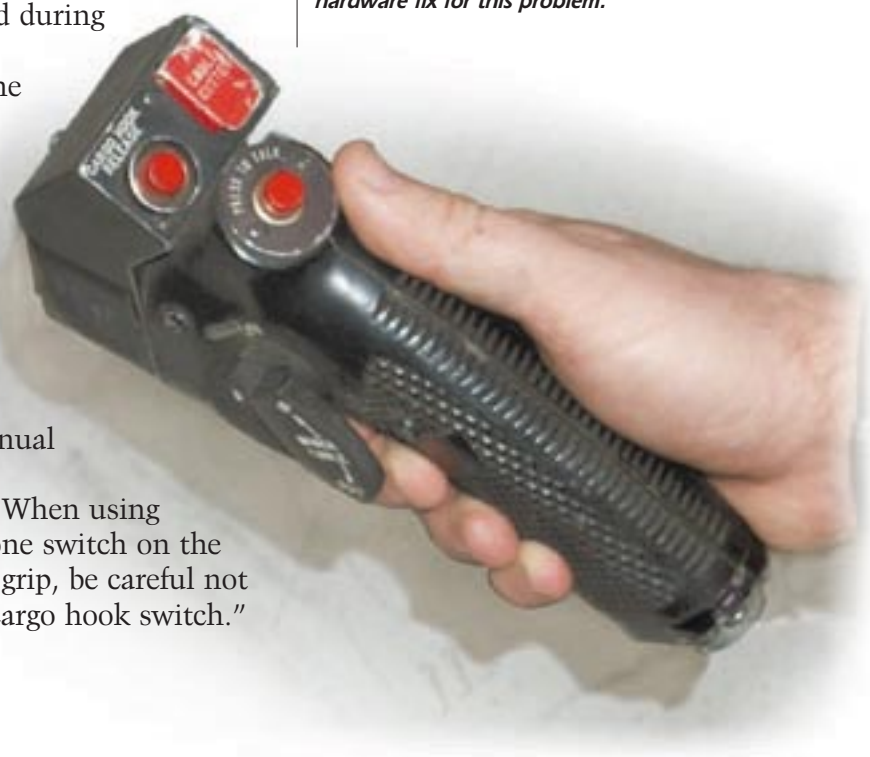
WHAT *WAS* DONE ABOUT IT

■ A protective ring was installed to prevent accidental release of external cargo. The intent was for the ring to extend beyond the button enough that it would alert the operator as to which button he was attempting to operate. Unfortunately, that is not what resulted. I have checked 10 CH-47s, and in all of them the button protrudes beyond the protective ring by about 1/16-inch. If the operator is working by feel, he can push the wrong button and not know until it is too late.

■ Some units have addressed this problem in their SOP by prohibiting the use of the winch/hoist-control grip for communicating.

■ The following warning was posted to the CH-47D Nonrated Crew Member (NCM) Familiarization Instructor Booklet (ETP 2C-011-0002-AL), June 1995: "Warning: The PTT switch on the hoist-control grip is similar to the cargo-hook-release button on the same grip. If the PTT switch is used during external-load operations, the NCM could inadvertently release the load."

■ The following caution was posted to the CH-47D operators manual (page 4-23): "CAUTION: When using the microphone switch on the hoist control grip, be careful not to press the cargo hook switch."



SUMMARY

Costs related to this problem go far beyond the dollar costs, although the dollars lost are significant. In only 3 years (1996-98), 24 inadvertent-cargo-release mishaps cost more than $1.3 million (see December 1998 *Flightfax*). They also resulted in seven injuries—not to mention the incalculable costs of degraded crewmember morale and professional standing within the unit.

The recommendations made here are based on the limited experience of one person—namely, me. However, it is clear to this Chinook driver that the issue of inadvertent cargo release needs more attention.

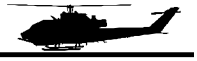
—CW2 John P. Garske, B Company 1-223rd Aviation Regiment (Provisional), Fort Rucker, AL, DSN 558-6218 (334-255-6218), garske@snowhill.com

Editor's Note: This hazard was identified through accident investigations and was also raised as a concern at last year's CH-47 User's Conference. The Army Safety Center is working on the problem with combat developers, PEO-AVN CH-47, and Boeing Corporation. Currently, Boeing is evaluating the work station in order to provide a hardware fix for this problem.

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class E
F series

■ During student training, crew executed shallow approach to running landing. At termination of normal approach angle, forward crosstube broke above left and right skid cuff.

■ Shallow approach to running landing was executed without any unusual flight or touchdown peculiarities. Aircraft slid about 1½ aircraft lengths and came to a stop. As ground movement terminated, crew heard a loud pop. Inspection revealed front cross tube was broken above right-side skid cuff.

■ During engine startup, generator and master caution lights came on. Generator would not reset. Aircraft was shut down without incident. Caused by sheared starter generator drive shaft. Generator was replaced, and aircraft was released for flight.

AH64

Class A
A series

■ Crew was preparing to execute single-engine operations from a 400-foot hover when aircraft reportedly entered uncommanded right turn. Aircraft entered trees and landed hard. Aircraft was destroyed in postcrash fire, but crew escaped without injury. Accident is under investigation.

Class C
A series

■ Suspected transmission overtorque (135 percent for 1 second) occurred during single-engine operations.

■ Crew noted vibration and illumination of APU fire light while on short final to approach. Fire handles were pulled, and APU fire light went out. Crew landed and exited to inspect. Fire was seen in the "turtle-back" area, and fire-extinguishing units were activated.

Class E
A series

■ During runup, crew was performing engine HIT check on No. 1 engine. When engine anti-ice system was tested, tgt rose only 5° to 20° (30° is minimum). A second check produced the same results. Caused by faulty engine anti-ice valve, which was replaced.

■ During takeoff to hover, utility psi caution light came on and utility hydraulic pressure went to zero. Aircraft landed without incident. Inspection revealed that hose clamp had worn through hydraulic hose.

■ During OGE hover, ECS light come on intermittently and TADS image began to degrade. Crew engaged standby fan, and, during return to airfield, odor of burning plastic was detected. Caused by failure of TADS ECS fan.

■ Automatic stabilator audio and caution light activated intermittently after takeoff. Warnings continued to appear even after pilot took manual control of stabilator. Crew elected to terminate mission and return to airfield. Maintenance could not duplicate problem. Suspect malfunction was caused by combination of moisture and cold weather.

CH47

Class C
D series

■ Transmission oil hot light came on during MOC, accompanied by tripping of left engine transmission overtemp latch and left-engine transmission oil temperature reading of 140°C. Aircraft was shut down. Inspection revealed that fan blower drive shaft was sheared.

Class D
D series

■ While attempting to hook up HMMWV, hook-up man struck VOR antenna in front center cargo hook with reach pendant, breaking antenna off aircraft.

E series

■ Aircraft was taxiing backwards on aft wheels when aft right landing gear drag beam failed and landing gear collapsed. Aircraft was brought to hover and repositioned with aft right landing gear section over pallet. Aircraft was shut down without further damage.

Class E
D series

■ Left aft pylon work station platform opened during cruise flight. Postflight inspection revealed that honeycomb material around forward latch on work platform had failed. Work platform was replaced.

■ During cruise flight, copilot noticed small crack develop in left front windscreen. Within 1 minute, crack continued across windscreen, stopping at window's edge. PC landed and shut down aircraft without further incident. Windscreen was replaced.

■ No. 2 engine fire light illuminated during runup with no indication of fire. Aircraft was shut down. Maintenance replaced sensing element.

OH58

Class C
D(I) series

■ MOC was being conducted for replacement of engine oil bypass switch. High engine oil temperature caution light came on while Nr and Np were at 100 percent. Np gauge continued to climb to 130°C for 4 seconds during shutdown. Suspect improper rebuild of bypass switch, resulting in obstruction of oil flow to engine.

Class D
C series

■ Tail stinger contacted ground during demonstration of standard autorotation. Aircraft landed hard.

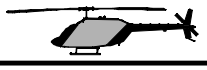
Class E
C series

■ During descent from OGE hover, aircraft was nearing ground for termination at 3-foot hover when aircraft felt as if tail stinger had contacted ground. Descent was terminated and aircraft repositioned at a 5-foot hover. During clearing turn, crew spotted a survey stake marker and landed. Postflight inspection revealed damage to lower cabin.

D(I) series

■ When aircraft picked up to 2-foot hover, tgt rose rapidly to 817° for 5 seconds. Upon landing, all instruments went back to normal. When crew again picked up to 2-foot hover, tgt rose rapidly to 819° for 4 seconds. Crew landed and shut down. Maintenance flushed engine and found remnants of shop towels in compressor bleed port. No limits were exceeded, and aircraft was checked and found okay.

TH67



Class B

A series

■ Crew reported abrupt upward pitch of the nose during forward hover, after which aircraft rolled, coming to rest on its right side. IP was injured, and aircraft sustained major structural damage.

Class D

A series

■ During standard autorotation, student held aircraft off ground too long, then touched down 5 degrees right of runway heading in a nose-low attitude, setting off a fore and aft motion. As aircraft rocked back level, IP heard spike knock and shut down. Striker plate on roof was knocked loose by transmission spike, and Thomas coupling on main drive shaft shaved top of elastometric dampener cover.

UH1

Class D

H series

■ IP initiated standard engine failure at 3-foot hover. Student applied too much cushion and climbed to approximately 5 feet. He then rapidly lowered collective to bottom stop. Aircraft bounced hard before coming to a stop.

UH60

Class A

A series

■ Aircraft crashed on landing. PC and PI were killed, and crew chief and two passengers were injured. Accident is under investigation.

Class C

A series

■ Engine temperature rose to 850°C during startup and reached 990°C during engine abort. Cause not reported.

K series

■ During NVG snow landing to dry lakebed, stabilator contacted obstacle obscured by snowdrift. Postflight inspection confirmed stabilator (sheet metal) damage.

Class D

A series

■ Aircraft was engulfed in dust cloud during landing. Crew attempted go-around, but had insufficient power due to aircraft weight. Pilot on controls lost all visual reference and became disoriented. Copilot noticed aircraft drift aft and took controls as stabilator contacted ground. Damaged stabilator was replaced.

Class E

A series

■ Crack in ski was found on postflight. Suspect that ski contacted uneven terrain or snow-covered object during blowing-snow landing to unimproved LZ. Suspect ski flexed upward, contacting step, resulting in crack.

■ When visibility dropped during slingload mission, PC turned left to avoid weather and lost sight of road. PI noted low rotor rpm but still had contact with road and took controls and turned back to the right. Load started oscillating severely and decision was made to jettison load. When crew chief manually jettisoned load, rotor rpm returned to normal and aircraft climbed through clouds and broke out VFR on top. Load was recovered the following day; blivet had burst on impact.

L series

■ Aircraft landed hard on uneven terrain during brownout, and landing light hit ground. Light required replacement.

■ During multiship air assault, aircraft landed in high grass and rolled into rut. Searchlight contacted ground, breaking fore and aft gear. Maintenance replaced searchlight.

■ Crew repositioned aircraft 2 kilometers from parking area to perform HIT check, during which No. 1 hydraulic pump failed and No. 1 hydraulic light illuminated. Aircraft was cleared for one-time flight back to parking area, where it landed without incident. Inspection revealed that hydraulic pump had failed internally.

C12

Class B

R series

■ During maximum-power takeoff, aircraft ran off runway and struck several runway lights. Aircraft decelerated and, upon returning to runway, struck concrete slab before being stopped. Right main landing gear, right engine, all four propeller blades, and right side of fuselage were damaged.

Class C

F series

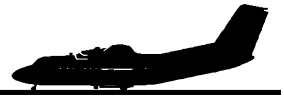
■ Multiple bird strikes occurred during night training flight. Aircrew was completing their third practice landing at home airfield when a flock of geese flew into path of aircraft during rollout phase of simulated single-engine landing. Damage included scuffed prop on No. 1 engine, bent prop on No. 2 engine, left-side pitot tube torn from mount, and two flat main gear tires.

Class E

H series

■ Cockpit filled with smoke and fumes during climb through flight level 140. Aircraft immediately returned to base without further incident. Caused by failure of blower cooling fan in inertial navigation unit. Blower was replaced.

O5



Class E

DHC-7

■ With full brakes applied as power was increased for takeoff, aircraft began moving forward. Nos. 1 and 2 hydraulic pump warning lights came on, and emergency brakes were applied to stop aircraft. Caused by rupture of hydraulic flex line on outboard spoiler actuator and loss of fluid. Flex line was replaced.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

Aviation messages

Recap of selected aviation safety messages

Safety-of-flight message

UH-1-99-SOF-1, 071844Z Jan 99, technical

SOF message UH-1-98-06 directed the installation of a limited number of new coated spur gears on T53 engines installed on UH-1 aircraft that passed the vibration inspection directed by SOF message UH-1-98-05. In addition, SOF UH-1-98-08 was issued to extend the recurring vibration inspection interval to either 50 or 150 hours depending on whether the coated spur gear was installed.

The purpose of this message is to establish a calendar date suspense for completion of field installation of the coated spur gears, provide requisitioning and credit instructions for the coated spur gear, and authorize re-use of certain parts from engines that fail the vibration inspection required by UH-1-98-SOF-08.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil

Safety-of-use message

SOU TACOM 98-01 to aviation units, 161937Z Dec 97, operational (retransmission)

There have been several reported failures of D-1 refueling nozzles (NSNs 4930-01-440-1085, 4930-01-297-3777, 4930-01-369-6230, and 4930-01-369-9821). Although not Armywide, the situation seems to be occurring in hot-climate locations. Apparently, solar heating causes thermal expansion of fuel trapped inside the nozzles and increases internal pressure beyond the allowable limit. This over-pressure situation causes the shutoff linkage assembly to fail, resulting in a fuel spill.

This message outlines a method of relieving internal pressure from the nozzle assembly until testing and analysis have been completed.

Unit commanders, contact your local TACOM Logistics Assistance Representative (LAR) or your state Surface Maintenance Manager for assistance. If you do not know who your LAR is, call DSN 367-6204/6293 for CONUS; DSN 375-6063/6064 for Germany; and DSN 315-722-3036/3881 for Korea.

TACOM contact: LTC Genaro J. Dellarocco, DSN 786-4200 (810-574-4200), dellarog@cc.tacom.army.mil

Maintenance-information messages

AH-64-99-MIM-03, 021923Z Dec 98

There have been several documented occurrences of AH-64A generator failure, with some reports of smoke entering the cockpit. The primary failure mode of the generator has been drive-end-bearing failures that often result in extensive damage to the generator. The purpose of this MIM is to modify phase-inspection requirements of the generator to aid in detecting impending bearing failures.

AMCOM contact: Mr. Matt Benzek, DSN 897-4915 (256-313-4915), benzekm@avrdecr.redstone.army.mil

AH-64-99-MIM-04, 161706Z Dec 98

Cracking has appeared in fuselage station 530 and 547 frames, which support the vertical stabilizer. The purpose of this message is to clarify and provide additional details for the 50-hour special inspection of these areas.

AMCOM contact: Mr. Lee Bumbicka, DSN 897-4925 (205-313-4925, bumbickal@avrdecr.redstone.army.mil

POV fatality update through January

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY99
40	45

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Class A Accidents through January

		Class A Flight Accidents		Army Military Fatalities	
		98	99	98	99
1ST QTR	October	2	1	0	0
	November	1	1	0	2
	December	2	1	2	0
2D QTR	January	1	1	0	0
	February	1		0	
	March	1		0	
3D QTR	April	0		0	
	May	1		0	
	June	2		4	
4TH QTR	July	1		0	
	August	0		0	
	September	0		0	
	TOTAL	12	4	6	2

U.S. ARMY SAFETY CENTER

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Charles M. Burke
Brigadier General, USA
Commanding

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

APRIL 1999 ◆ VOL 27 ◆ NO 4 http://safety.army.mil

Black Hawk vs. buzzard: it could have been ugly

This UH-60 was in the traffic pattern at 700 feet agl and 115 knots when its rotor blade met with a buzzard. The crew had entered a right descending turn in an attempt to miss 5 or 6 birds in the flight path. One bird, however, followed the aircraft into the turn. The strike was a little like hitting a ripe tomato with a ball bat and sprayed bird over the entire aircraft. When the crew righted the aircraft, they were pointed toward the runway on a modified final at about ½-mile. With no landing area available below, they continued with a roll-on to the runway and completed an emergency shutdown.

Damage was limited to the blade. And to the bird.

—Thanks to CW4 Kim Randall, ASO, 1-147th Cmd Avn Bn, WI ARNG, randak@wi-arng.ngb.army.mil

Call of the wild: Preventing bird strikes on Army airfields

Blood was everywhere. Bird parts and feathers mixed in with the smell of JP-8 and oil. When all was said and done, the body count was eleven. Eleven dead Canadian geese and nearly $80,000 in damage to an Army C-12 airplane.

A bent prop, a sudden-stoppage engine, a blown tire, and eleven dead geese were the result of a night bird strike at Davison Army Airfield on 6 October 1998. Like all accidents, this one could have been avoided.

factoid:
An adult Canadian goose produces 4 pounds of wet manure a day.

A LITTLE BACKGROUND

When I first took over the job as the Airfield Safety Officer at Davison, I was told that geese on the airfield are protected by the Bird Migratory Act of 1918. I was told that there wasn't anything we could do about the hundreds of geese that made this airfield their home. Those same people told me that the swamp we have on our airfield is a Federally protected wetland. I was told that wetlands are untouchable—just like the geese.

I was comfortable that we had done all we could do. Then we had that night bird strike. We had eleven dead geese, a damaged airplane, and a very upset C-12 crew. It was time to separate the myths from the facts.

MYTH: BIRDS AND ANIMALS THAT ARE PROTECTED BY ENVIRONMENTAL LAWS CAN NEVER BE DISTURBED.

The first step was to see what the law allowed us to do about the bird hazard. I asked the folks who would know and got the same answer as before: "The geese are protected by the Migratory Bird Act of 1918 and cannot be harmed."

Okay. So what could we do about the problem?

With any law, there is often a difference between the letter of the law and the intent of the law. And that's the case here. The laws that protect migratory birds should not be confused with the laws that protect endangered species. The regulators of these laws are also very understanding of the special problems airports have controlling wildlife. But before we loaded up our shotguns, we had some real work to do.

The U.S. Department of Agriculture (USDA), the regulating authority for the Act, requires notification of any bird removal. They were very supportive and gave us a no-cost wildlife assessment and written endorsement of our plan. The USDA representative also informed us that the approval authority to destroy birds had been moved down to state level. In other words, the USDA wanted to know what we intended to do, but the approval authority had been pushed down to the State Game and Inland Fisheries.

MYTH: BIRD STRIKES AREN'T A REAL PROBLEM TO AIRCRAFT; THE AIRCRAFT ARE SO MUCH BIGGER, THE BIRDS ARE THE ONES WHO SUFFER.

In 1995, an Air Force E-3 AWACS aircraft struck a flock of Canadian geese at Elmendorf Air Force Base. The resulting crash killed 24 people and forever changed the way the military and the FAA look at bird strikes. In the Army alone, 185 bird strikes have cost just under $900,000 since October 1993. Thirteen years' worth of bird strikes have cost the Air Force nearly $471 million. And the FAA has published 7 years' losses at $47.9 million for bird-strike damage in civil aviation. These numbers do not reflect lawsuit dollars or insurance claims lost to bird-strike victims. They also do not reflect the bird strikes that are reported as FOD incidents or the ones that are not reported at all because there was no damage to the aircraft.

factoid:
The highest recorded bird strike occurred at 39,000 feet. On 23 October 1991, a DC-862 struck a blue-colored bird with red feet. The bird was never recovered.

MYTH: BIRDS DON'T DO DAMAGE TO ARMY HELICOPTERS.

The vast majority of Army aircraft bird strikes involve helicopters; helicopter-bird collisions also account for most of the cost of Army aviation bird strikes (figure 1).

Figure 1. Army aviation bird strikes (1 Oct 93 – 26 Feb 99)

Type Aircraft	Accident classification A	B	C	D	E	F	Damage Cost	Injury Cost	Total Cost
Fixed wing	0	0	1	11	32	1	$193,217	0	$193,217
Rotary wing	0	0	7	13	116	4	$704,483	$1,680	$706,163
Total	0	0	8	24	148	5	$897,700	$1,680	$899,380

Studies show that more than 90 percent of all recorded bird strikes occur below 1000 feet agl. More than 97 percent of those strikes happen at 500 feet and below. That's the same airspace in which tactical Army helicopters work. The Air Force has seen this as a disturbing low-level problem for them because, like the Army, they also use low-level routes for training. The problem is that birds rely on hearing to avoid predators, but birds don't hear jets until after they have passed over. Our helicopters make plenty of noise; birds hear us and do a better job of avoiding us—most of the time. But when they don't, there's usually trouble. Birds weigh anywhere from a few ounces to several pounds. Imagine an 8-pound bowling ball with wings heading toward your cockpit.

Myth: The Air Force's Bird Aircraft Strike Hazard (BASH) program is all about scaring birds.

The BASH program has many elements, and since no two airfields are the same, no two BASH programs will be the same. However, they all involve making airfields unattractive to birds and other wildlife.

All the things we do to make our airfields pleasant to look at also make them pleasant for birds to live and eat on. For example, airfields have plenty of nice short grass, and birds in general—and geese in particular—love short grass. The BASH program makes recommendations about how an airfield can become an unattractive area for birds. These recommendations might include using pyrotechnics and noisemakers to scare off the birds. The problem with noisemakers is that birds hear in the same frequency range as humans. So if they hear the annoying sound, so do we, and that can be very distracting to us. Ultrasonic noisemakers have proven to be ineffective in extensive studies by the USDA.

Another BASH-program recommendation is that grass be allowed to grow to 7 to 14 inches. However, for Army helicopters, this is unacceptable; spatial disorientation can be induced by hovering over tall grass.

The BASH program also recommends removal of all free-standing water within 5000 feet of the runway. The FAA also makes a similar recommendation to not allow ponds, swamps, wetlands, or any other water area that might be a host for birds anywhere near runways.

Myth: There are some good nonlethal means to permanently control problem birds.

Here is a breakdown of the vast array of techniques that can be used to control birds at airfields—but only temporarily.

■ **Harassment**. Harassment with pyrotechnics, electrically generated sounds, reflective tape, flags, and propane cannons work to some degree to repel fowl, but the birds grow accustomed to these measures after a while.

■ **Biological control.** Border collies, falcons, or other animals used to control birds are time intensive and expensive. The dogs are one more animal running around the airfield. The falcon is the same—one more flying target in the air. But both of these are effective to a point. However, at best, they are a temporary solution to a permanent problem.

■ **Exclusion**. Using wire, netting, floating balls, or other devices to keep birds away from water sources don't work because the birds often outsmart the device.

■ **Habitat alteration**. Planting grass that the birds don't eat or that is unpalatable to them is another option. This includes planting dense vegetation that prohibits the birds from entering the pond. Although this is an effective technique, it can be difficult for an airfield to execute around the entire base. Planting crabgrass instead of tasty Blue Grass also works well.

factoid:
Birds hear in much the same frequency range as humans, so if a noise distracts them, it will distract you.

■ **Repellents**. Taste repellent can be applied to grass, making the grass less desirable to the birds for feeding. The most effective of the repellents is a concentrate made from grape-seed extract. The problem is the cost—upwards of $100 for a gallon of the mixture, which has to be applied frequently. Airfields are big, making the cost of this technique out of reach for most airfield operators.

So, what's the answer?

Population management appears to be the only permanent answer. This technique includes hunting, nest/egg destruction, and euthanasia. Although these are lethal solutions to bird problems, the FAA, the USDA, and most state wildlife managers recommend these techniques for airfields.

The USDA and FAA recommend using shotguns, pellet guns, or air rifles in conjunction with pyrotechnics. By using the two together, the birds learn that pyrotechnics equal death, and the shooting doesn't have to happen as often. A well-placed flare will

work as effectively as a shotgun after the two have been used together a few times.

The foundation of the BASH program is to offer coexistence with nature by making our airfields less desirable to birds and to offer the birds suitable habitats elsewhere. The BASH program uses shooting as the last method to control birds and wildlife hazards. First steps include—

■ Reducing the attractiveness of airfield to birds. Keep the grass cut a little longer wherever you can. Use loud noises to scare off the birds, and constantly harass the birds as much as you can.

■ Steering clear of birds as they fly. Avoid flying under a flock of birds; birds dive for the ground when they are frightened. If a bird-strike appears imminent, pitch up in an attempt to fly above the bird. Use your landing light; birds will avoid you if they see you, and the landing light will help you be seen.

■ Avoiding flight over areas that have a high concentration of birds; stay clear of swamps, coastlines, landfills, and ponds.

Summary

According to the FAA, if you hit a two-pound seagull while traveling at 120 mph, the force exerted would be equal to 4,800 pounds. Some anti-aircraft rounds exert less force than that.

We need to learn how to manage our airfields and protect our fleet. As pilots, we need to know how to avoid bird strikes and how to report them when they happen. We can successfully coexist to complete our mission and not interfere with the birds if we learn how to keep the birds away from our training areas and away from our airfields.

We all want to go home at night safe and happy, including the birds.

—CW3 Bob Monroe, Davison Army Airfield Safety Officer, Fort Belvoir, VA, DSN 656-7006 (703-806-7006), robert_l_monroe@belvoir.army.mil

Lesson learned: Using your aircraft to scare away birds is a bad idea

On a cross-country flight with six aircraft, we were asked by ATC to fly down the runway at an Air Force facility to scare away a flock of birds so that a fixed-wing aircraft could take off. I was in the fourth aircraft, and we had a bird strike. Luckily there was no damage to the aircraft.

In those six aircraft were a commander, a few platoon leaders, and warrant officers of every grade. It sounded like a good idea to help our neighbor fliers. It wasn't until after the fact that we all discussed the situation and concurred that it was a stupid thing to do. While in flight, nobody thought it was a good idea, but no one spoke up

Another lesson learned.

—CW3 Chris Gunderson, ASO, N Troop, 4/2 ACR, Fort Polk, LA, DSN 863-6982 (318-531-6982), lilgundy@aol.com

fyi

For more information on bird strikes and bird control around airfields, visit the following web sites.

- http://www.faa.gov/arp/strkrpt.pdf
- www.airsafe.com/usda/birds.htm
- http://www.acc.af.mil/public/combat-edge/

At Davison AAF, thermal is for the birds

Imagine that you're tasked by your commander to drive an Army vehicle at speeds upward of 110 mph down a 1-mile stretch of road, which is only 90 feet wide, at night. This road is lit only by small blue lights, and there are numerous animals that inhabit the area around the road. You have only one small headlight to light your path.

Would you do it? Would you drive over 100 mph on a narrow stretch of unlit road with animals in the area and without the aid of any night-vision devices? What if your vehicle had only three wheels and was top heavy? Would you do it?

Why not? Army C-12 pilots do it every night.

Every night across the Army, ATC clears airplane and helicopter pilots to land on runways that may or may not have animals on them. A bird or animal strike or near miss is an almost weekly occurrence for these pilots.

At Davison Army Airfield, we're taking a multifaceted approach to eliminating bird strikes on our airfield. At the

forefront of the project is the use of thermal-imagery technology to detect all hazards on the airfield. Along with the thermal device, we use a specially trained dog named "Penny" to chase off the geese and pyrotechnics to harass them.

The thermal device is on a 360° mount on a tripod that's placed on top of the tower for maximum observation area. The device is controlled remotely either by a computer for automatic continuous surveillance or by manual override for close-up viewing of targets.

We're presently testing various types of thermal devices. Plans are to use either infrared motion detectors (IMDs) placed around the entire airfield perimeter or a software package known as "Automatic Target Recognition" (ATR).

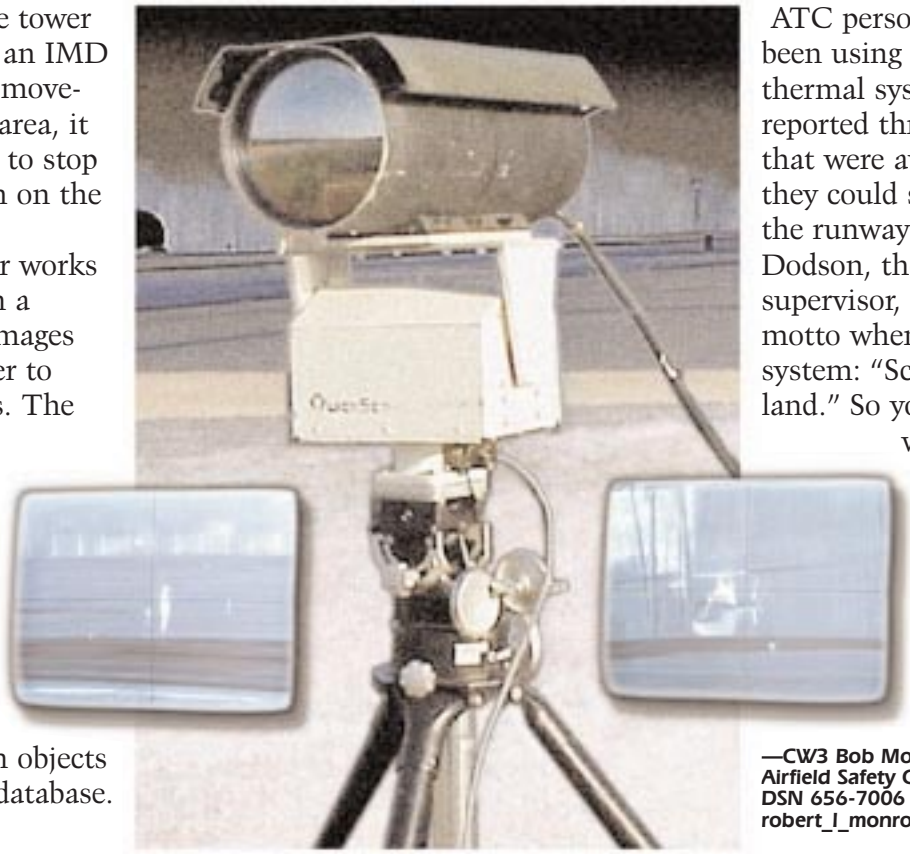
The IMDs are sensors that detect heat and motion within their designated area. They are connected to the main thermal unit on top of the tower by thin cables. When an IMD senses both heat and movement in its scanning area, it tells the thermal unit to stop scanning and zoom in on the area.

The ATR computer works differently. It relies on a database of thermal images stored in the computer to detect airfield hazards. The thermal device continuously scans the airfield and the entire perimeter, feeding the information into the ATR computer. The ATR constantly compares the video information to known objects that are stored in its database. When an object that produces heat is detected by the thermal unit and the ATR, the thermal unit will zoom in. The ATR software then analyzes the object, comparing it to known hazards to determine if the object is a person, a bird, a deer, or other hazard to the airfield.

Both systems rely on human verification to complete the targeting process. Everything the thermal device sees is displayed on remote monitors in offices around the airfield. Once an object is identified as a possible hazard, an automatic alarm goes off in the airfield services office, the tower, and base operations. Once the alarm is sounded, the thermal unit remains focused on the object, allowing the airfield services representative to either reset the alarm due to a false reading or pinpoint the location and get rid of the hazard.

Complete testing will take some time, but preliminary results are well beyond our expectations. As for the future, we're preparing to present the plan to the North American BASH Conference in Vancouver in May and to the FORSCOM Safety Conference in Atlanta in June. In addition, the Air Force is watching our program closely and has offered assistance. The FAA is also interested in the preliminary results and wants a full written report.

What does this type of system cost? Expect to pay $60,000 to $100,000 for the thermal device and between $5,000 and $25,000 for the primary-detection system. Most major airports use airport ground radar anyway, so this could be plugged into the thermal control computer as a primary detector. At Davison, we're looking at using Marine radar (the type used on expensive boats) for primary detection. Such radar will cost $5,000, but it will cover several miles.



ATC personnel who have been using Davison's thermal system have already reported three bird strikes that were avoided because they could see the birds on the runway at night. Mr. Bill Dodson, the tower supervisor, says they have a motto when they use the system: "Scan before you land." So you can know that when a controller at Davison Army Airfield tells you that you are cleared to land, you really ***are*** cleared to land.

—CW3 Bob Monroe, Davison Army Airfield Safety Officer, Fort Belvoir, VA, DSN 656-7006 (703-806-7006), robert_l_monroe@belvoir.army.mil

The A.T. flyaway blues

It was time at last for our attack battalion to depart for annual training (A.T.). The weather was clear as the previous companies departed and was forecast to be good all the way to our destination. If we hit our takeoff time, we should have similar weather.

Starting was normal. The first clue of any problem to come was when I pushed the button to check fuel quantity during run-up. It normally would read about 1750 pounds with a full tank. Being in the back seat, I would hold the button in until it lowered a few hundred pounds, release the button, and ensure the fuel-quantity gauge returned to its starting point. I recited the numbers to the front-seater: "Fuel quantity 1550, bled down to 1000, and returns to 1550." Neither of us paid much attention to the fact that the indication was somewhat less than a full tank as that was not the primary purpose of ***that*** check. It probably just meant that maintenance had completed an engine run-up after the aircraft had been refueled.

Poised for takeoff on the ramp as Chalk 1, we checked "fuel required for mission and transponder up normal." At that point, the fuel quantity gauge indicated 1250 pounds. I usually planned fuel stops for ECAS Cobras at about 175 nautical miles in no-wind conditions; this first leg was only 158 nautical miles. At 120 knots ground speed, we were looking at about an hour and 19 minutes with winds forecast to be light and variable at 3000 feet. We would be flying at 3500 feet and had previously computed fuel required for the flight and VFR reserve at 1080 pounds. So we still had a 170-pound (15-minute) cushion. We concurred that we were "good to go."

Our takeoff was uneventful. Departing the pattern, I glanced at the fuel gauge. It read about 1100 pounds.

Upon reaching cruise altitude, we started our fuel check. I recited, "Fuel 950 pounds. Fuel 950 pounds?!? We just went through 150 pounds of fuel in less than 5 minutes. That's over 1800 pounds per hour, about three times our usual burn rate. We really ought to have about 1600 gallons in this tank. Somehow we've lost an hour's worth of fuel and it's apparently going down fast!"

We asked the battalion maintenance officer in the trail Cobra to come up to take a look to see if we were losing fuel overboard. After checking, he replied in the negative. One of the other aircraft in the flight suggested that we continue on; there was an airport with fuel about 58 miles from home plate and 18 miles south of our course. He said that if our low-fuel caution light had not come on by the time we reached the airport, we could assume that the fuel gauge was inoperative and just continue on. If it had illuminated we could land, refuel, and decide what to do from there.

I remembered reading somewhere that we were to believe the worst-case indications in the event there was a discrepancy involving fuel quantity. I looked at the fuel gauge and said aloud, "Now indicating 800 pounds." We decided right then to invoke the "most-conservative-response rule."

We passed lead over to Chalk 2, turned around, and headed

back for home plate. We were about 25 miles out (12 to 13 minutes) and immediately called the tower. They said that rain squalls and bad weather were rapidly approaching from the northwest and the wind was increasing and shifting around to the north or northwest. This weather had not previously been of concern to us as we would have easily outrun it on our way to A.T. We now hoped to get back home and get the aircraft in the hangar before the bad weather arrived.

By the time we were about 15 miles out, we were in rain. By 10 miles out, visibility was decreasing in heavy rain. Tower indicated they were not working any other aircraft, and we were issued a special VFR clearance. By 5 miles out, we could see the ground very clearly, but forward visibility was still decreasing. My normal inclination would have been to slow down considerably and prepare to land ASAP if visibility deteriorated too badly. But a glance at the fuel gauge showed 450 pounds and the needle dropping like a rock. By 3 or so miles out, home base was no longer in sight, so we just continued on with our present heading.

After a minute or two, it became clear to both of us that something was wrong. Home base should have been in sight ahead and down, especially since we obviously were so close and could see the ground so clearly. My front-seater commented that the wind must have blown us off course. I agreed. I figured we must be passing south and west around the base, so we should head due north. We both would have liked to slow down, but the fuel gauge was now showing 240 pounds and was still dropping like a rock. Moments after changing our heading to north, home base came into sight and the tower cleared us to land.

We hovered up to the safe line and shut down in the lee of the hangar. The fuel gauge was now indicating 120 pounds. The aircraft could not be fueled in the storm, so we didn't really know how much fuel was in the tank. When maintenance later fueled the aircraft, it took only 350 pounds to fill the tank. Maintenance replaced the fuel gauge, but it still wouldn't indicate properly. They ultimately had to repair the probe.

Lessons learned

What did we do right, what did we do wrong, and what did I learn from this experience?

■ We should have noticed sooner that something was amiss with our fuel quantity. We didn't concern ourselves with it enough initially as we let ourselves become too busy doing other things. Besides, we wrongly felt that we were safe on the ground and could deal with that when it was time to take off.

■ Having the unit maintenance officer check us out in flight to see if there were any obvious amounts of fuel spilling overboard was probably not a bad measure.

■ Our believing the worst case of the fuel discrepancy was the correct thing to do and it was also required. Sure enough, in our unit all-read file, I found requirements to believe the worst case in the event of fuel-quantity discrepancies. Continuing on to see if the low-fuel-warning light would illuminate would certainly not have been the safest action.

■ Returning to home plate was a good initial reaction; it had everything we required, including fuel, maintenance, parts, ground-handling wheels, and a hangar for the aircraft. It was the safest place for all concerned, and we were just minutes away. In fact, at that point, we didn't have enough fuel, on a worst-case indication, to go anywhere other than home base.

■ We could have landed the aircraft in one of the many large, flat farm fields beneath us. We had good visibility down, and an immediate landing would have been the most conservative response to our situation. And that is where we now feel we were in error and should do differently in a like situation.

■ We made a wise initial decision not to continue the flight and instead to return to home plate. But when the storm beat us home and the visibility decreased, we should have landed immediately and let maintenance worry about recovering the aircraft later.

Summary

The overall lesson we learned is that each successive situation we face and each decision we make limit our alternatives. So each and every decision is important—and, often, critical. You can't ever relax and motor on, fat, dumb, and happy, even for a moment, just because things are going well or you have chosen a wise course of action or you're doing the right thing. That's because the next situation surely lies just around some unknown corner and it will require new decisions and actions that are just as important and possibly more critical than the last ones.

One right call doesn't always mean you're out of the woods. It may take a number of astutely correct decisions and actions to get you home safely.

—CW4 Don Thomson, Army Aviation Support Facility #2, MO ARNG, DSN 555-9330/9347 (573-526-9330/9347), aasf2@mo-ngmet.army.mil

Along for the ride

One of the most effective tools we have to prepare aircrews for emergencies is the visual simulator. It helps develop instinctive responses and builds confidence. It reduces reaction times and aids in malfunction recognition. It also does one other thing: It enables aircrews to identify flight envelopes in which the aircraft would be particularly vulnerable in the event of certain malfunctions.

Take the AH-64 Apache for example. The Combat Mission Simulator (CMS) provides us the opportunity to fly the Apache in virtually any profile—tactical, instrument, or emergency. We can practice our tactical procedures on a regular basis, perform instrument tasks as necessary, and even experience emergencies that cannot be performed in the aircraft. Therefore, when we experience the real thing, we instinctively act, without hesitation. In the CMS, only one thing is missing, adrenaline.

A recent AH-64A accident happened during the day, under ideal training conditions, in the traffic pattern, at the proper altitude—at a 400-foot out-of-ground-effect (OGE) hover—with an experienced instructor pilot on the controls. As it did every day, the preflight briefing had included emergency procedures. The CMS and the Combat Weapons and Emergency Procedures Trainer had been used to reinforce those procedures. The crew knew what to do for in-flight emergencies.

The crew had performed numerous contact-type maneuvers that day, including a simulated single-engine failure OGE. They had just flown an abbreviated traffic pattern and were preparing to fly another simulated engine failure OGE. The AH-64 was at a gross weight of 14,500 pounds with 72 percent torque applied.

When the student pilot made a right pedal turn to align the aircraft with the landing strip, the nose continued to the right, accelerating into the turn. The IP then took the controls and applied full left pedal to arrest the rate of turn. However, the right turn continued, and the aircraft went into an uncommanded right-hand, descending spin. The crew immediately recognized the condition as some sort of tail-rotor malfunction. In fact, the tail rotor drive shaft had actually severed at the forward hanger bearing.

Emergency procedures in the operators manual describe this event and recommend that the crew "accelerate the aircraft into forward flight. If unable to accelerate, initiate a power-on descent with the collective adjusted so that an acceptable compromise between rate of turn and rate of descent is maintained. At approximately 5 to 10 feet above the ground, perform a hovering autorotation by activating the chop collar or pulling both power levers to off."

This complicated procedure assumes you have someplace to go. In this case, the crew was unable to accelerate forward. The aircraft porpoised in its descending spin, and there was little they could do except try to keep the aircraft upright. The major obstacle to getting on the ground was that the emergency

occurred directly over a stand of 80-foot-tall pine trees.

The aircraft went in vertically. The main-rotor blades disintegrated as they contacted the 10-inch diameter trees, and the tail boom was severed. The fuselage fell vertically approximately 15 feet, landing on its left side. The engines were still running and had to be shut down manually. The student pilot exited the aircraft through the left, broken-out canopy, the IP through his door. There was a residual postcrash fire, which was soon extinguished by crash-rescue personnel. The crew was lucky—neither was seriously injured.

Recreating the circumstances of the accident in the CMS, we made an interesting discovery: In six attempts—and knowing what was going to happen, we made only two successful landings. Add into the equation the 80-foot pine trees over which the emergency occurred, and it was next to impossible for this crew to get on the ground without major damage to the aircraft.

Lessons learned

What severed the tail-rotor drive shaft? A flange (NSN 3010-01-336-0783) located in the forward hanger-bearing assembly failed due to hydraulic embrittlement. It failed forward of the splined portion of the flange, severing all drive to the tail rotor. The Aviation and Missile Command (AMCOM) is currently reviewing all associated history and maintenance procedures to determine the extent of the problem and corrective actions for the Apache fleet.

What can we do to reduce our risk? Fixing the mechanical problem is the first and most important step in reducing our risk, and that's being expedited through appropriate channels.

The bottom line is that it is truly surprising that there was so little the crew could do once the drive shaft severed. Two 1690-shaft-horsepower engines operating at normal rpm, sustaining an OGE hover for a 14,500-pound aircraft, produce substantial torque forces. Breaking the antitorque drive defeated counter-forces, resulting in the accelerating spin. The natural porpoise of the airframe in the spin eliminated the possibility of accelerating into forward flight. The aircraft was therefore destined to go into the trees.

Recognizing the hazards of operating within certain flight envelopes is a viable step crews can take to mitigate risks. Performing emergency procedures in the CMS can help us react instinctively during emergencies, but reducing our exposure to critical parameters will reduce our risks significantly further.

There are times when we must operate within these parameters, but if we choose a spot above an open area, or reduce our time in that position, we increase our chances for success. Stacking the deck in our favor to give us the best odds should something go awry is just plain smart thinking. We should increase that margin for error whenever possible.

—MAJ Mark Robinson, Aviation Systems & Accident Investigation Division, DSN 558-1253 (334-255-1253), robinsom@safety-emh1.army.mil

Shortfax

Keeping you up to date

Synthetic fabrics and static electricity

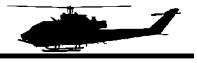
Over the years, concern about electrostatic discharge (ESD) has resulted in various alerts to users of possible static discharge from the camouflage cold weather parka (NSN 8415-01-228-1306 series) and trouser (NSN 8415-01-228-1336 series). These items are worn as the outer garments to the extended cold weather clothing system (ECWCS). Recent research, however, has shown that soldiers wearing ECWCS or other garments made of synthetic fabrics during operations such as conventional ammunition, munitions, or missile handling should not present a hazard. The one possible exception to this concerns 20mm and 30mm rounds containing the ESD-sensitive M52 electric primer. Users of these items and specialty munitions or explosives should always follow the guidelines in appropriate technical and field manuals.

—Mr. Paul G. Angelis, System Safety Engineer, U. S. Army Soldier, Biological, and Chemical Command, DSN 256-5208 (508-233-5208), pangelis@natick-emh2.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class E
E series

■ Broken skid cuff on left rear was discovered during hot refueling. Flight was terminated.

■ After entering high-speed simulated engine failure, SP noticed oil temperature fluctuating between 90° and 150°C. He took controls and made precautionary landing. Engine oil temperature fluctuated until shut-down. Maintenance replaced engine wiring harness.

■ Engine oil temperature fluctuated from 90° to 150° while on ground. Aircraft was shut down. Caused by dirty oil temperature transducer cannon plug.

F series

■ Twenty seconds into start sequence, pilot noted initial voltage drop and heard loud whining noise. Start sequence was aborted. Investigation revealed that starter generator shaft had sheared. Starter was replaced.

■ At 1000 feet agl and 100 KIAS during takeoff, master caution and alternator segment panel lights came on. Resetting PR-10 failed to bring alternator on line, and aircraft was landed without further incident. Electrical odor was detected during postflight inspection, which revealed that alternator control unit was defective and showed signs of internal overheating.

AH64

Class A
A series

■ Aircraft crashed into trees during night training flight. Main rotors and tail boom separated, and aircraft came to rest on its side. Investigation is under way.

Class B
D series

■ APU fire light and audio came on at 400 feet agl during final approach. Aircraft landed immediately, and crew extinguished APU fire with onboard agents. APU and cover, sheet metal, and wiring were damaged.

Class C
A series

■ Aircraft was trail in flight of three landing to holding area when it struck wires at approximately 100 feet agl. Wires were crossing river in the vicinity. PC noted tugging, followed by vibration sensation from aircraft and landed without further incident. Two main-rotor blades were damaged.

Class D
A series

■ At 34 feet agl and 18 knots during approach for landing at field site, No. 2 engine shut down. Crew continued descent for landing, applying 126 percent torque on No. 1 engine for 3 seconds. Landing and touchdown were completed without incident. Over-torque inspection revealed elongated bolt hole on No. 1 engine input drive shaft and corresponding coupling. There was no other damage to aircraft or No. 2 engine.

Class E
A series

■ Bird entrails were found on two main-rotor blades after shutdown. Inspection revealed no damage.

■ During day cross-country flight, duck in flock collided with lead aircraft. No unusual control or flight indications were present, and aircraft was safely flown to next scheduled stop. Bird-strike damage to main-rotor blade was discovered during postflight inspection.

■ While at 80-foot OGE hover during two-ship battle-position operations, CPG noticed aircraft was in rapid descent and informed pilot. Pilot arrested the descent at tree-top level, and neither crewmember felt any impact. Aircraft returned to 80-foot OGE hover and continued operations. Postflight inspection revealed several gouges on underside of stabilator.

■ Smoke began entering cockpit during engine start with APU running. Aircraft was immediately shut down, and crew exited without incident. Inspection revealed smoke coming from primary hydraulic pump. Suspect that primary hydraulic pump overheated. Maintenance replaced primary hydraulic pump, manifold, and lines.

■ During ALQ 144 power-up, unusual noise was heard, followed by caution light illumination. ALQ 144 exploded; cause not reported.

■ During in-ground-effect hover during NVS training, crew noticed high-frequency airframe vibration in cockpit floor. Vibration increased with high power settings and decreased with low settings as aircraft was brought to a hover and landed. Cause not reported.

CH47

Class A
D series

■ Crew reported engine overspeed while preparing to land to airfield. Aircraft landed hard off the airfield, sustaining extensive structural damage.

Class C
D series

■ One sling leg broke away from load while aircraft was at hover. Postflight inspection revealed sheet-metal damage to undercarriage due to recoil of sling leg.

Class E
D series

■ Uncommanded flight control inputs in roll axis occurred during cruise flight. Copilot attitude indicator was indicating turn in level flight. Crew executed emergency procedure for VGI failure. After uneventful landing, maintenance replaced vertical gyro.

■ During cruise flight, PC determined that fuel on board and fuel required for mission would be close but sufficient. However, due to headwinds, fuel rate was higher than anticipated, and PC decided to offload external load and continue mission. During takeoff after offloading, left and right fuel-low caution lights came on. Aircraft landed without incident.

■ Smoke began coming out of maintenance panel during runup. Pilot performed normal shutdown procedures without incident. Maintenance replaced aft transmission press-to-test light.

OH58

Class A
D(I) series

■ Uncommanded left roll occurred following pick up to hover. IP lowered

collective and applied right cyclic to arrest roll, but aircraft continued to roll left. Aircraft was destroyed upon impact with ground. Crew was treated and released. Investigation continues.

Class C

C series

■ Aircraft rocked on touchdown to sloping terrain, and tail stinger and front lower WSPS contacted ground. Aircraft was shut down without further incident.

D(R) series

■ Computer overtorque reading (132%/1.54 seconds) was discovered during preflight. Incident is under investigation.

Class E

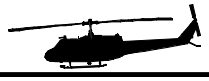
D(I) series

■ During approach to FARP after several running-fire engagements, forward battery-access door came open in flight. Aircraft landed without incident. Only damage was to battery-access door.

■ As aircraft hovered by parked aircraft, unlatched door of parked aircraft blew off. Damage was limited to door hinges.

■ About 1 hour into gunnery mission, crew got a d.c. generator failure caution message. When it didn't come on after they twice performed emergency procedures, crew left it off. Soon after continuing flight, the following caution messages came up: SCAS DISENG, RECT FAIL, AC GEN FAIL, and fuel filter bypass failure. IP immediately landed. After shutting down and smelling smoke, crew discovered that d.c. generator was on fire.

UH1



Class C

H series

■ While aircraft was in holding pattern, portion of greenhouse broke away and blew out, striking main-rotor blade. Aircraft was landed without further incident. Blade required replacement.

Class E

H series

■ During cruise flight as Chalk 3 in four-ship formation, crew heard bang from rear of aircraft. After precautionary landing, inspection found evidence of bird strike on main-rotor blade.

■ During entry to traffic pattern, transmission oil pressure was noted at zero; no other segment lights or master caution light illuminated. Caused by failure of transmission pressure transmitter, which was replaced.

V series

■ During contour flight, smoke began venting from battery and acidic odor was noted. Crew immediately diverted to nearby landing zone and completed emergency procedures. Smoke continued to vent from both vents for some time after landing. Battery was replaced.

■ Aircraft was at 250-foot hover, reseating a rescue hoist. As 250-pound block was being raised, it began to swing fore and aft. As it was raised closer to aircraft, it hit front right crosstube and underside of aircraft. Crosstube and hoist cable were replaced.

UH60

Class C

A series

■ Avionics (nose) door opened during autorotational check portion of flight. Contact with windshield resulted in damage to numerous components.

L series

■ During landing to unimproved landing zone, crew maneuvered aircraft to avoid obstruction. After touchdown, crew noted lack of imagery on FLIR screens. Inspection revealed damage to FLIR turret ball, searchlight motor, and PLS antenna.

■ Routine maintenance inspection revealed gouge marks on all four main-rotor blades as a result of contact with uppermost screws of ALQ-144. Further inspection revealed damage to main-rotor hub and spindles, possibly requiring replacement. Final determination pending.

■ While being positioned for parking, aircraft's rotor blades contacted AH-64 parked on adjacent pad. UH-60 sustained damage to two blades and three blade tip caps; AH-64 sustained damage to one blade.

Class D

A series

■ During taxi from runway to parking, PC noticed M130 cover next to runway and placed aircraft in decelerating attitude to land and recover M130 cover. When he felt slight bump, PC thought tail wheel had contacted ground. However, postflight inspection revealed damage to stabilator trailing edge and sheet metal damage to central trailing edge.

■ Crew had windshield anti-ice on during entire flight. While taxiing to parking, pilots saw spark on left edge of center windscreen and turned off anti-ice. Windshield required replacement due to 6- to 8-inch crack beginning at origin of spark.

■ While at 20 KIAS and 70 feet agl supporting insertion to confined area, crew detected change in rotor noise and landed. Postflight inspection revealed damage to two tip caps.

■ Main-rotor blades struck tree during NOE flight over creek bed. One tip cap required replacement.

■ When test pilot increased collective for power recovery, nose compartment door came open, striking and breaking left and right windshield panels. Aircraft was landed without further incident.

■ When No. 1 engine fuel system selector was placed in crossfeed during runup, it sprang back to first detent then froze in place. Maintenance determined that shroud covering cable shredded, causing selector to stick. Fraying was caused by force applied to sticking valve.

C12

Class E

F series

■ Pedals felt sloppy during taxi for takeoff, and aircraft was difficult to steer, especially to left. Crew taxied back to hangar, where it was discovered that tube in front wheel well was bent and about to break. Mission was canceled.

■ While in climbing turn just after leaving icing conditions, aircraft encountered onset of stall condition. Aircraft began to shudder, and roll increased. Pilot assumed manual control and recovered aircraft.

N series

■ After release of brakes, crew noted severe vibration in nose gear. Inspection revealed that nose wheel tire was flat.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action messages

CH-47-99-ASAM-01, 081929Z Feb 99, maintenance mandatory

Investigation of cracked rod ends on blade lag dampeners with elastomeric bearings revealed that the rod ends had been adjusted to the length applicable to the older Teflon rod-end bearings. This improper adjustment increases fatigue stresses, which can cause the banjo portion of the rod-end assembly to crack.

The purpose of this message is to require a one-time inspection of lag dampeners with elastomeric bearings for proper adjustment and to emphasize correct rod-end adjustment during maintenance of all dampeners.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil

CH-47-99-ASAM-02, 161228Z Feb 99, maintenance mandatory

Investigation of incidents of uncommanded maneuvers or flight-control lockup in flight have identified factors that may have contributed. These factors include contamination of hydraulic fluid, internal parts out of tolerance, corrosion on internal parts, high barium content in preservative hydraulic fluids, hands-off flying, and internal FOD created by wear of aluminum parts. Flight simulators demonstrated that when such factors are present and actual hands-on flying is not being observed, aircraft may perform uncommanded movements with a slow degradation in flight capabilities. However, computer simulation is not sophisticated enough at this time to produce the exact maneuvers of the incident aircraft; therefore, no absolute cause-and-effect relationship has been established.

The purpose of this message is to eliminate known deficiencies that have been identified as suspect causes of uncommanded maneuvers or flight-control lockups.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil

CH-47-99-ASAM-03, 241820Z Feb 99, maintenance mandatory

Investigations have discovered hoist/cargo panels with chaffed wires and corrosion on the terminal plugs. These conditions could cause electrical shorting and inadvertent jettison of external cargo.

The purpose of this message is to require a one-time inspection of the hoist-cargo control panel for corrosion, wire routing, and wire positioning on terminal lugs. An inspection for water intrusion will also be performed. In addition, the message establishes a 200/300-hour recurring inspection during phase.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil

OH-58-99-ASAM-02, 162018Z Feb 99, maintenance mandatory

Tail-rotor gearbox support assemblies are being damaged by putting improper length (too long) screws through the top three holes of the gearbox support during installation.

The purpose of this message is to require a one-time inspection for damage and repair of the tail-rotor-gearbox support by drilling three holes in the area of contact. In addition, the three holes will be drilled in all tail-rotor gearbox supports to eliminate future damage.

AMCOM contact: Mr. Ron Price, DSN 788-8636 (256-842-8636), price-sf@redstone.army.mil

POV fatality update through February

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY99
51	53

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Class A Accidents through February

		Class A Flight Accidents		Army Military Fatalities	
		98	99	98	99
1ST QTR	October	2	1	0	0
	November	1	1	0	2
	December	2	1	2	0
2D QTR	January	1	1	0	0
	February	1	4	0	2
	March	1		0	
3D QTR	April	0		0	
	May	1		0	
	June	2		4	
4TH QTR	July	1		0	
	August	0		0	
	September	0		0	
	TOTAL	12	8	6	4

U.S. ARMY SAFETY CENTER

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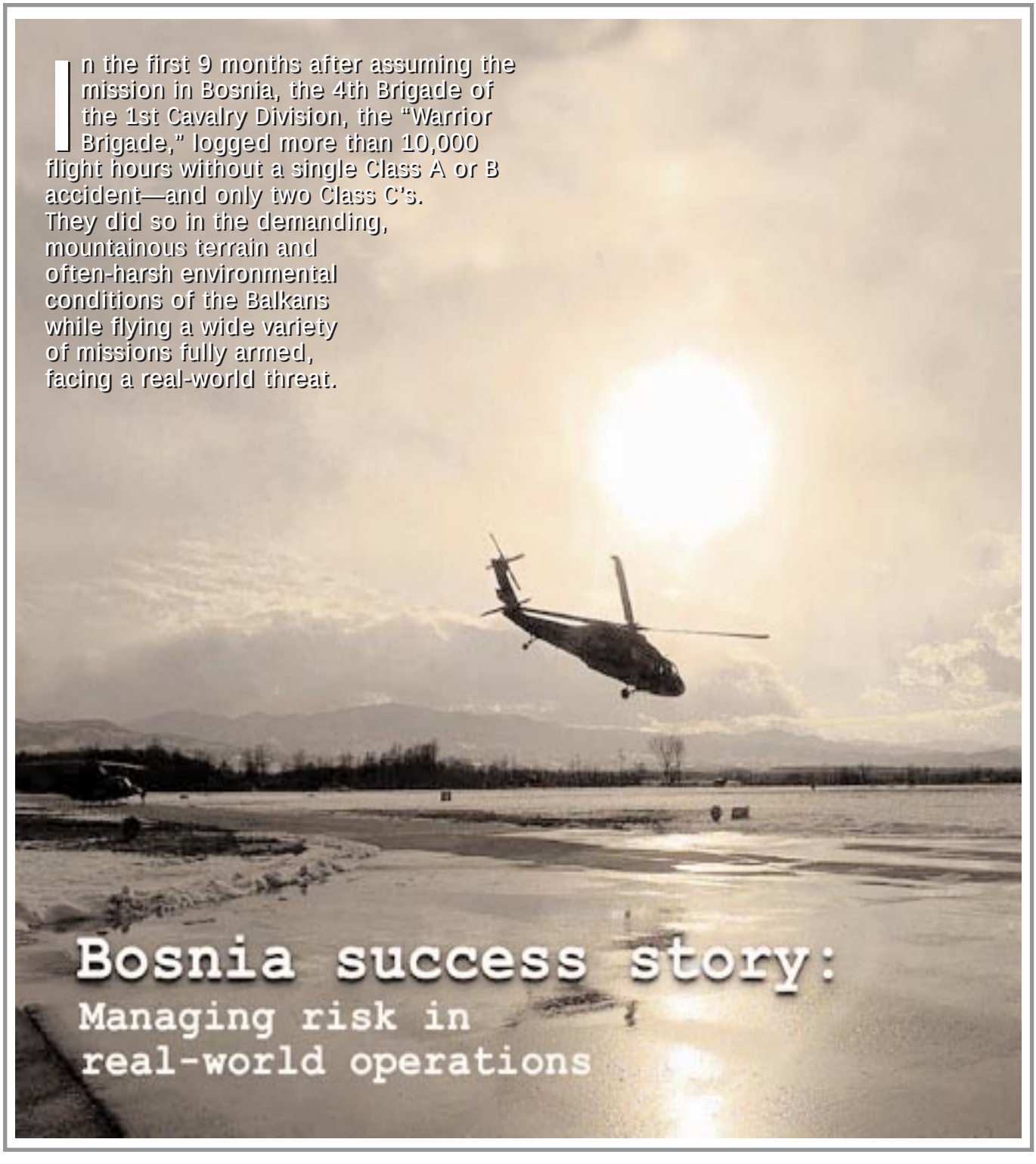
ARMY AVIATION RISK-MANAGEMENT INFORMATION

MAY 1999 ◆ VOL 27 ◆ NO 5 http://safety.army.mil



In the first 9 months after assuming the mission in Bosnia, the 4th Brigade of the 1st Cavalry Division, the "Warrior Brigade," logged more than 10,000 flight hours without a single Class A or B accident—and only two Class C's. They did so in the demanding, mountainous terrain and often-harsh environmental conditions of the Balkans while flying a wide variety of missions fully armed, facing a real-world threat.

Bosnia success story:

Managing risk in real-world operations

Bosnia success story: Managing risk in real-world operations

Flying 10,000 hours in 9 months with a great safety record while executing demanding missions doesn't happen by accident. It takes thorough planning, disciplined execution, and relentless application of risk management at all levels. The Warrior Brigade is doing just that. The brigade is mission-focused, has a strong safety program in place, is appropriately managing risk, and is accomplishing their difficult mission while maintaining an outstanding safety record. Let's look at how they're managing the risks involved in the special challenges they face.

Pre-deployment training

Extensive pre-deployment training is a requirement for all units preparing to assume the Stabilization Force (SFOR) mission in Bosnia. One of the real success stories has been development and execution of the Aviation Training Exercise (ATX) at Fort Rucker for units preparing to deploy to Bosnia.

The ATX uses a Bosnia-terrain database and real-time connectivity with the Brigade headquarters in Comanche Base, home of the Warrior Brigade. As a result, unit commanders, staff officers, and aircrews conducting the ATX plan and fly missions that are actually being executed in Bosnia. In addition, they are able to capitalize on the expertise of units already there. From planning for adverse weather and difficult terrain to accounting for wires and towers, time invested in the ATX is one of the best tools available to prepare units getting ready to "assume the mission."

Weather and terrain

The weather in the Balkans, particularly during the winter, is prone to change rapidly and dramatically. Even within Tuzla valley, home of both Eagle Base and Comanche Base, the weather can be significantly different. For example, an aircrew at Eagle Base told of receiving a weather brief by the forecasters on Comanche—only 2½ miles away—that was far above minimums. At the same time, however, they were unable to see across the runway at Eagle Base. For this reason, units will routinely supplement official USAF forecasts by calling outlying base camps to verify local conditions.

Because of the tricky weather, the brigade commander has mandated higher than normal weather minimums: 500'/1600m (essentially, 1-mile visibility) day, and 1000'/1600m night. The brigade commander alone retains authority to authorize flights below the minimums.

Another control measure involves development of special routes that take into account the weather and terrain. These low-level weather routes are designed to provide safe passage during the worst flyable weather conditions.

Wires and other obstacles

As is the case in most developed countries, wires and other manmade obstacles represent a real threat to aircrews. To mitigate the risks, a 300-foot-agl "hard deck" is established for most areas (it's 500 feet in some). Except in an emergency, aircraft are not authorized to descend below the hard deck until occupying a battle position or landing to an airfield or a planned LZ. To accommodate terrain-flight requirements, two training areas have been established to allow single aircraft to conduct terrain-flight training.

Command involvement

Controls are in place that ensure battalion-commander involvement in every mission. Due to installation of auxiliary fuel tanks on the AH-64s and some of the UH-60s, most mission briefings require the approval of the battalion commander.

Crew selection is managed in excruciating detail. In the 2-227th General Support Aviation Battalion (GSAB), platoon leaders and company commanders select aircrews, but the battalion commander must approve each selection. The bottom line is that aircraft don't fly in theater without the knowledge and approval of an O5 commander. Further, a crew change doesn't happen unless the battalion commander approves it.

The same battalion commander subscribes to the policy of alternating pilots among two or three crews. The philosophy is that flying together too much leads to complacency—and complacency can be deadly.

Complacency

Complacency is also addressed in planning. While units are doing a wide variety of missions, many of these missions are repetitive. It should be expected that a degree of complacency could develop. Deliberate, methodical, and well thought-out missions are the brigade's control to combat the growth of complacency in mission planning. In addition, every multi-

ship mission is briefed, back-briefed, and rehearsed before it is executed.

Crew rest

While a sense of total mission focus contributes to the brigade's success, such total focus can very quickly result in fatigue. To reduce that possibility, the GSAB commander's policy is to ensure that all soldiers get a 24-hour period off each week—depending, of course, on the tactical situation.

Uploaded Apaches

For operational reasons, all Apaches remain uploaded at all times with a standard load of Hellfire missiles and 30mm rounds. To control the risk involved, the brigade SOP requires that crews remain more than one switch away from firing at all times. The absence of rockets from the standard load also reduces the risk of accidental discharge. In addition, because the aircraft remain uploaded (another control measure), personnel are not routinely handling ammunition, which also reduces the risk. To date, there have been no incidents involving armament or accidental discharges.

Proficiency

There is some concern regarding proficiency in armament switchology and IFR flight procedures. There are currently no UH-60 simulators or AH-64 Combat Mission Simulators in country. This, combined with the facts that the AH-64s remain armed and the hard deck prevents frequent terrain-flight training,

Warrior Brigade: Who they are, where they are, and what they're doing

The Warrior Brigade is approximately 1400 soldiers strong (including a two-ship AH-64 section from the Royal Netherlands Air Force). Prior to scheduled unit rotations in March, the brigade was composed of—

- Brigade Headquarters and HSD
- 3/229th Attack Helicopter Regiment (Fort Bragg)
- 2-227th General Support Aviation Battalion
- 615th Aviation Support Battalion (direct support)
- 126th Medical Evacuation Company (CA ARNG)

Comanche Base, home of the Warrior Brigade, lies in the Tuzla valley in the northeast corner of Bosnia-Herzegovina. About 2½ miles away, in the same valley, is Eagle Base, the headquarters of the 1st Cavalry Division, commanding the Multi-National Division-North. The 126th Medevac Company and the command aviation section of the 2-227 GSAB also reside at Eagle Base. In addition, Warrior Brigade has a medevac detachment located at Camp McGovern, near the contested border city of Brcko and positioned along the border of Bosnia-Herzegovina and Croatia.

The Warrior Brigade sustains an exceptionally challenging optempo. Their everyday activities involve a wide variety of missions, from the 3/229th's reconnaissance and security missions to the 2-227th's nonstop air movements to "on-call" coverage provided by the 126th Medevac.

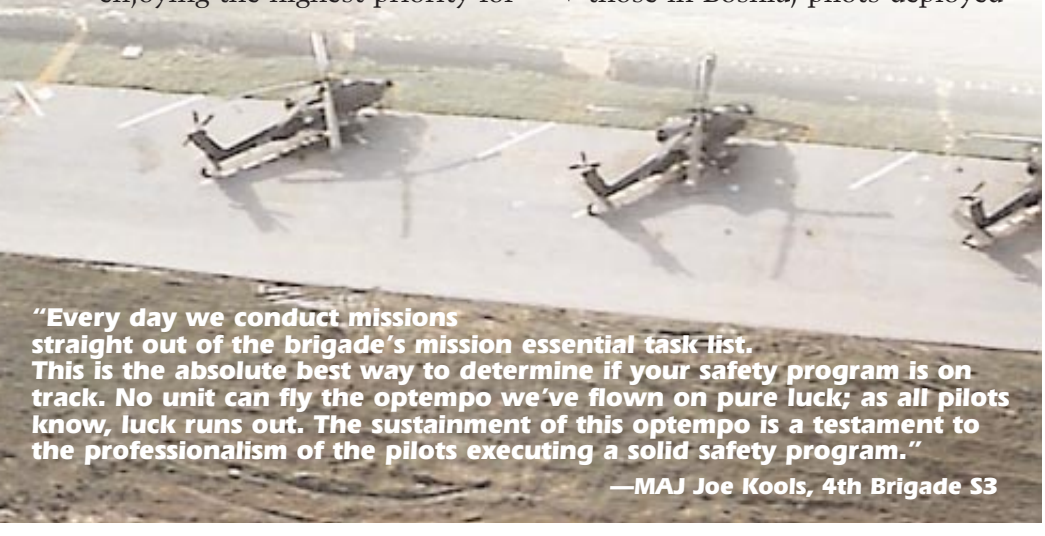
means that numerous crew tasks cannot be practiced. To address the IFR flight training shortfall, the brigade sends selected crews to Germany on temporary duty to use the UH-60 simulators there. In addition to the training benefit, these infrequent trips also assist in the treatment of chronic fatigue.

Maintenance

An outstanding maintenance program reduces the risk of maintenance-related accidents in Warrior Brigade. In addition to enjoying the highest priority for repair parts, units are also wisely capitalizing on the availability of contract maintenance. The Brigade has maintained an 86-percent mission-capable rate while flying an extremely high optempo. In one month, the 15-aircraft UH-60L fleet averaged 43.9 hours per airframe, roughly three times the Army average.

Redeployment

Risk management cannot be focused only on the near term. In recognition that flight conditions in Texas are much different from those in Bosnia, pilots deployed from Fort Hood are required to re-certify upon redeployment. They complete a 2-week program of aviator familiarization with local airspace and procedures. This pilot-orientation course ends in a checkride.



"Every day we conduct missions straight out of the brigade's mission essential task list. This is the absolute best way to determine if your safety program is on track. No unit can fly the optempo we've flown on pure luck; as all pilots know, luck runs out. The sustainment of this optempo is a testament to the professionalism of the pilots executing a solid safety program."

—MAJ Joe Kools, 4th Brigade S3

Summary

Completing the mission while managing the risk, the Warrior Brigade has met the challenge in Bosnia. While the two battalions and the medevac company rotated back to CONUS in March, the Warrior Brigade will continue to execute the mission until August, when it is scheduled to be relieved by the Aviation Brigade from the 10th Mountain Division. With winter receding and spring rains approaching, the challenges will change. What won't change, however, is the dedication of the troops to complete the mission and the chain of command's application of sound risk-management principles.

—MAJ Joe Blackburn, Aviation Systems & Accident Investigation Division, DSN 558-9852 (334-255-9852), blackbuj@safety-emh1.army.mil

Shortfax

Keeping you up to date

DA Pam 738-751 update

The long-awaited update of DA Pam 738-751: *Functional Users Manual for the Army Maintenance Management System-Aviation (TAMMS-A)* has been published. Here's what you'll find inside:

- Policy and procedures for Unit-Level Logistics System-Aviation (ULLS-A).
- Policy and procedures for documenting component repair at AVIM and depot levels of maintenance.
- Aviation life-support equipment and night-vision goggle record-keeping procedures.
- Standard Army Maintenance System (SAMS) policy and procedures.
- Phase maintenance and periodic inspection documentation procedures.
- One new form (DA Form 2408-14-1) that replaces four (DA Forms 2409, 2408-15-1, 2408-5-2, and 2408-14).
- Incorporation of forms and records instructions previously published in TBs 1-2840-20-3, 1-2840-214-20-1, 1500-348-30, and 55-1520-238-23.

The new publication is making its way through normal distribution channels. If you don't want to wait, you can find it online at www.usapa.army.mil.

POC: Ms. Anne Waldeck, AMCOM, DSN 746-5564 (256-876-5564), waldeck-ab@exchange1.redstone.army.mil

Power available vs. power required

The saga continues ...

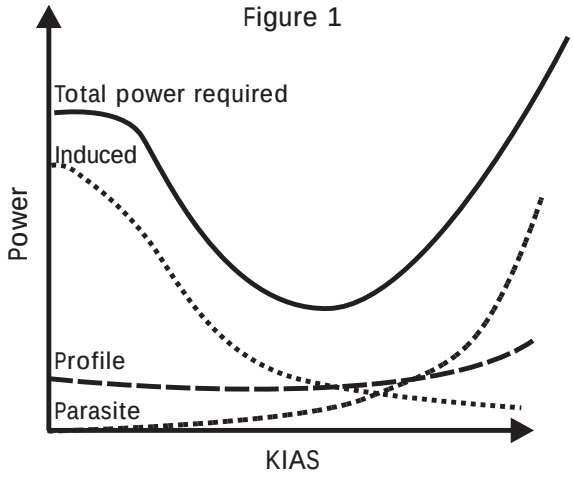
The mishap investigation report read: "The helicopter was operating near max gross weight when the rotor began to droop at the bottom of the approach to the unfamiliar mountainous landing zone (LZ). The crew was able to land safely, but, on takeoff, the pilots realized too late that the power required to depart the LZ was more than normally available at sea level. The aircraft impacted the ground."

Sound familiar? Though the relationship between power available and power required is recognized, it's often misunderstood. As a result, the lesson is often learned the hard way.

A solid understanding of the power relationship and exercising a little risk management would have prevented helicopter accidents in the past. We receive excellent instruction on the subject during flight training; however, knowledge and skill are both perishable. Even the most experienced aviators suffer from a lack of understanding. Let's revisit this issue by taking a look at what comprises the power required and power available charts and, of course, the main factors that affect both: gross weight and density altitude (DA).

All helicopters—whether with a single main rotor or a tandem rotor configuration—display a similar power-required curve. This curve is made up of three power requirements: induced, profile, and parasite. Each dominates in a particular airspeed range. Let's look at them separately, referring to figure 1 during the discussion.

Figure 1



Induced power

Induced power is what people are referring to when they say helicopters "beat the air into submission." This power requirement dominates at a hover or low airspeeds below ETL. During these regimes, the airflow pattern is through the rotor system, perpendicular to the rotor path.

Induced power is the extra power needed when this induced or downward airflow interferes with the normal streamlined airflow along the rotor path. (See figure 2 for depiction of airflow.) Because of induced flow, the relative wind changes, requiring a higher blade pitch angle to keep the same angle of attack. Remember, it is the angle of attack that directly translates into lift.

Seventy to eighty percent of power required in this regime is induced power; the rest is profile power.

Profile power

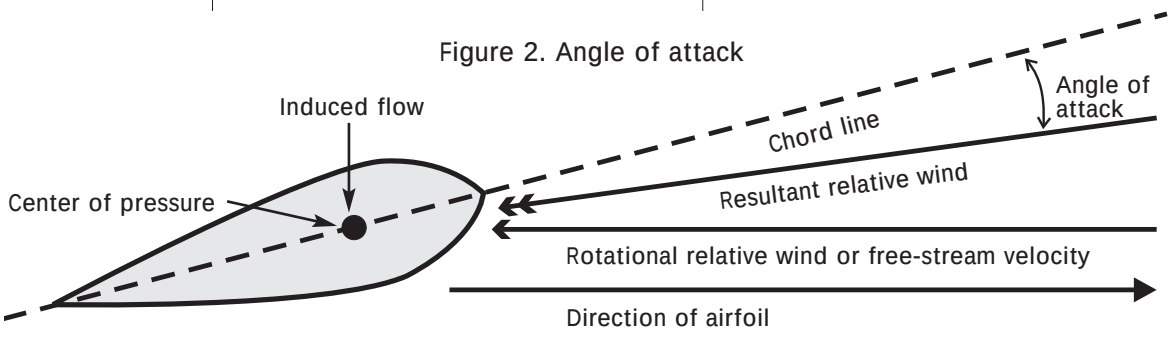
We have the profile power requirement to overcome all form drag and skin friction that occurs with a rotor blade at a zero-lift condition. In other words, it's the drag of the blade at flat pitch. Look at it as the resistance that results when an object (such as rotor blades and vertical or horizontal stabilizers) moves through the air, producing lift. It is proportional to forward flight speed (squared) and blade pitch, yet inversely proportional to density altitude.

Why? As density altitude increases, it means that less air molecules are available to resist the surfaces. This type of power is dominant in a very small speed range, but it consistently affects power required though all speeds.

Parasite power

Parasite power is the power required to overcome the "barn door" effect. Objects exposed to

Figure 2. Angle of attack



relative wind that do not generate lift decrease our performance as airspeed increases. In a nutshell, it takes more power to move a non-aerodynamically shaped object through the air than one that is designed as a lift-generating surface.

Speaking of moving barn doors through the air, helicopter designers will work feverishly to reduce the nose-down attitude of an aircraft in high-speed flight in hopes of minimizing the area exposed to the air, thus resulting in less resistance.

This type of power required can be significant, especially at the upper end of our airspeed range due to its proportionality to flight speed (cubed). For example, in addition to the fuselage, our external fuel tanks, missile launchers, and slingloads all contribute to providing unwanted wind resistance. Air has a difficult time negotiating sharp turns as it passes around components on our aircraft. To decrease parasite drag doesn't necessarily require making an object smaller, but, rather, to shape it aerodynamically so that air moves around it with the least amount of turbulence. So it's not by coincidence that external fuel tanks are not shaped like bricks.

Power required

The total-power-required curve shown in figure 1 is synonymous with the torque-required curves that we find in chapter 7 of our operators manuals. These charts are normally represented as a family of curves corresponding to various aircraft gross weights, temperatures, and pressure or density altitudes. This is because these factors significantly affect the components of the total power required.

As we see in figure 1, induced power dominates the power required in low-airspeed regimes, including hover. It decreases as the airflow through the rotor system increases, providing for better rotor performance. As the helicopter progresses through translational lift, airspeed increases and profile power kicks in. Again, the lifting surfaces (the rotor blades) fight the resistance as they slice through the air, resulting in increased profile-power demand. As we continue to pull collective and approach cruise speed, the parasite power requirement takes off.

Why is there a certain airspeed that is optimal to conduct an autorotational descent? The answer should be obvious when we look at figure 1, total power required.

The power required to move a helicopter to velocity-not-to-exceed (VNE) airspeed is quite significant. It is usually greater than hover power—but not always. This discussion on the power requirement curves will now help us analyze helicopter performance in the worst of flight conditions—the high, hot, and heavy environment. But first, let's take a look at power available.

Power available

Unlike jet engines on fixed-wing aircraft, helicopter turboshaft engines do not show an appreciable increase in power available as a result of the inlet pressure rise associated with ram air. Therefore, helicopters demonstrate roughly the same power available in a hover as they do at VNE airspeed. This is all well and good, but what happens with changes in density altitude and gross weight?

All jet engines need to balance a proper fuel-to-air ratio to ensure maximum efficiency at all torque settings. If the air gets thinner, as it will as DA increases, the amount of fuel introduced by our fuel management systems decreases, thus limiting the power available. Why? Because jet engines operate most efficiently when the fuel-to-air ratio is held constant for combustion. Therefore, at high altitudes and temperatures, most engines cannot provide all the horsepower the transmission can handle. That's why the power-available line in figure 3 shifts downward. This is occurring at the same time that the rotor system is requiring more angle of attack (air density decreases, so angle of attack needs to increase to maintain lift). The result is a higher collective setting—thus, more power required.

Figure 4 shows the power-required curve merging with the power-available curve. If the aircraft is flown at an airspeed below the left intersection (Vmin) or above the right intersection (Vmax) of the power-required and power-available curves, aircraft rpm will decrease. A descent will follow—a typical result when power required exceeds power available.

Power required is also directly related to bank angle. What these graphs don't show is how power required depends on bank angle. You could easily compute that your worst case for a mission may be a 5-percent power margin available. But are you sure? Didn't you compute that based on level flight? It's likely that you did. However, in a 60-degree bank, does your 5-percent power margin still apply? No. More than likely, you have produced a negative power margin. Remember, as bank angle increases, the lift

component counteracting your weight decreases. In order to maintain altitude in a turn, you know you have to add power or trade speed for altitude. At a 45- to 60-degree bank angle, you will require a significant power increase to maintain altitude. You simply won't have that power in high, hot, heavy conditions. Therefore, power must be managed continually.

An extreme example of a high DA and gross weight situation is the Mount Everest rescue of 1996. A Royal Nepalese Army helicopter pilot, LTC K. C. Maden, volunteered to rescue climbers when area contract pilots refused to accept the mission due to altitude and poor weather conditions. He rescued an American and a Taiwanese at an elevation of 20,000 feet on the slopes of the highest peak in the world.

The Nepalese pilot understood very well the power requirements of his single-engine AS 350. He flew 2500 feet above the helicopter's 20,000-foot service ceiling to get over a ridgeline, where he located the climbers. After several landing attempts that resulted in a decrease in rpm and loss of altitude, he realized the need to shed some weight. So he continued down the mountain to a lower elevation and dropped off his copilot.

Figure 3

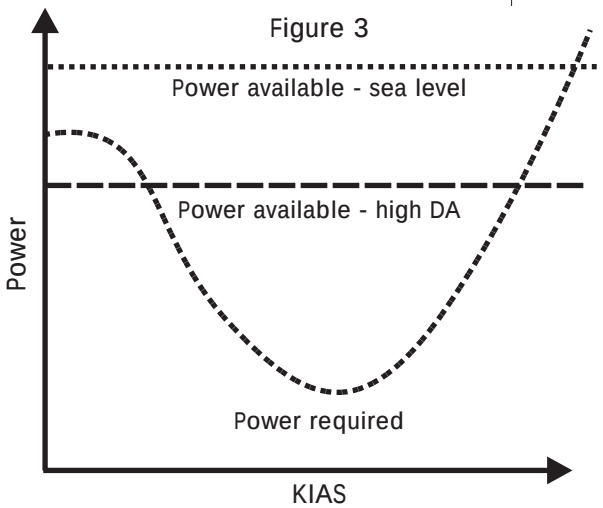
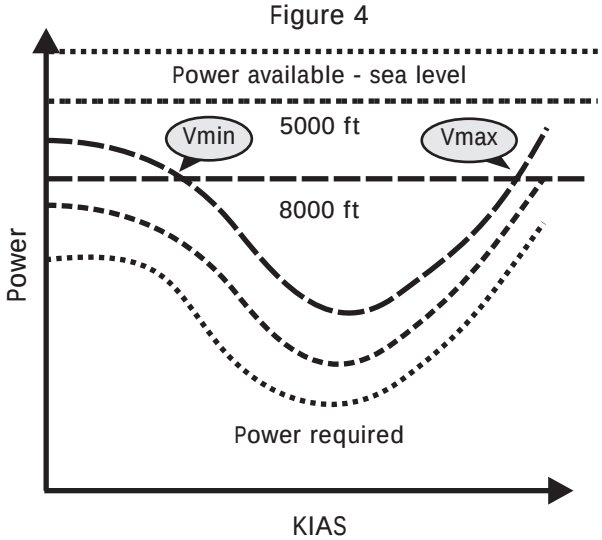


Figure 4



As the afternoon sun began setting, LTC Maden knew the helicopter would still have a difficult time hovering in ground effect, so he attempted a no-hover landing. Concerned with the firmness of the snow, he hoped for hardpack and got it. He stayed light on the skids and took one climber at a time, staying in ground effect until he could push the nose of the helicopter over to pick up airspeed while following the downsloping terrain. He successfully picked up the second climber in the early evening and is credited with performing the highest helicopter rescue in the world. Only through his familiarity with the austere flying environment and his precise understanding of power available versus power required was LTC Maden able to complete such a mission successfully and safely.

Summary

In conclusion, a change in aircraft configuration, gross weight, or environment (including winds or landing or takeoff direction) should activate a switch inside our helmet telling us to closely review the performance planning card and understand what these changes do to helicopter performance. We should know what our power margin is at all times. Proper performance planning and in-flight recalculations based on changing conditions is the only way to achieve this.

Why is this so important? The bottom line is that power-management errors are extremely dangerous. Take the UH-60 for example. In a study of FY94-98 Black Hawk accident experience, power-management accidents ranked number-one in cost, fatalities, and disabling injuries. And there's no reason to suspect that this is unique to the UH-60. We'll soon know for sure; the Army is in the preliminary stages of a study to identify the prevalent hazards for all aircraft. It's a pretty safe bet that power-management errors will show up as an accident cause factor across the rotary-wing fleet. We'll let you know once the study's completed.

In the meantime, here's some food for thought: Does your unit use the risk-assessment sheet to evaluate power margin available? If you don't, should you? And if you do, are you asking for the power margin in level flight or based on a bank angle? Either way, it deserves serious attention.

—adapted from an article by MAJ David P. Lobik, USMC, Naval Postgraduate School

USASC POC: CPT Stace Garrett, Aviation Systems & Accident Investigation Division, DSN 558-9853 (334-255-9853), garretts@safety-emh1.army.mil

UH-60 dual engine rollback

Numerous misconceptions exist within the UH-60 community regarding the phenomenon known as "dual engine rollback" (DER). This article will discuss the history of this phenomenon and clarify what is and what isn't a DER.

What it isn't

An engine failure that occurs when single-engine capability does not exist and exceeding power available are not dual engine rollbacks. In addition, maneuver-induced transient rotor droop is often wrongly perceived to be a DER. Pilots have induced transient rotor droop and believed they corrected a DER with the trim switch; in reality, the engine control unit corrected the transient droop.

What it is

A DER is a reduction of rotor speed (Nr) and the power-turbine speed (Np) of both engines from 100 percent to a lower value (during flight or on the ground) that was not maneuver-induced transient rotor droop and where trim switch activation is not considered likely. In some cases, incidents in which Nr/Np's fail to reach 100 percent on start-up are also considered by investigators to be DERs.

History

Since 1990, the Black Hawk fleet has had 15 substantiated DERs during flight and 12 on the ground. Two aircraft were damaged during precautionary landings performed in response to rollback events. During the same period, Army H-60s flew 1.5 million flight hours.

Teams from Sikorsky, General Electric, the Utility Helicopters Project Manager's Office, and the Aviation Research Development Engineering Center have conducted extensive testing and troubleshooting of the DER phenomenon. A correlation between transient droop and some reported dual engine rollbacks has been made, but no cause for the rollbacks has yet been determined. The investigating teams have never been able to duplicate a reported rollback.

Discussion

Typically, a dual engine rollback results in Np's and Nr decreasing simultaneously to between 94 and 96 percent. In some events, Nr/Np's as low as 92 percent were reported. In one event, Nr/Np's fell low enough to shut down instrument displays, but maneuver-induced transient droop probably caused the Nr/Np's to reach such low values.

In some substantiated DER cases, Nr/Np's were returned to 100 percent using the trim switch. In other cases, the aircraft was shut down while Nr/Np's were at a lower value. In one case, the Nr/Np's cycled between 100 percent and some lower value. In other cases, the Nr/Np's were observed decreasing faster than the trim system can move.

Summary

Prudence dictates that excessive maneuvering should be avoided when operating at less than 100-percent Nr/Np's. An emergency procedure for reduced rotor rpm will be included in change 3 to the operator's manual (estimated to be out in June). Change 5 to the operator's manual will include a section in chapter 8 explaining the mechanics behind transient droop that can occur on the UH-60A and conditions under which it can be encountered. Users with access to the Utility Helicopters Project Office web site can view these approved changes. In addition, improved dual engine rollback reporting procedures are being developed.

The Project Manager for Utility Helicopters, GE, and Sikorsky are committed to resolving the DER phenomenon. If you suspect that a dual engine rollback has occurred, contact your AMCOM LAR and your local Sikorsky and GE representatives.

—Douglas Denno, Science Applications International Corp., PM-Utility Helicopters, DSN 645-0355 (256-955-0355), douglas.denno@uh.redstone.army.mil

They know better!

What happened changed the way I would do business for the rest of my aviation career.

It was one of those nice, warm, sunny days in May. Three days earlier, our unit had deployed down to Myrtle Beach to conduct JAATs with the Air Force for a week. The weather was beautiful; we had not seen a cloud in 2 days. Everything had gone smoothly, and everyone was getting plenty of flight time. Our aircraft were in good shape, with very little maintenance down-time. There was plenty of work for all the pilots—both Army and Air Force. I remember hearing our commander comment about how smooth everything was going.

Maybe he shouldn't have said anything.

I guess that ***what*** happened next isn't as important as ***how*** it happened. It was a Thursday, about 11 o'clock in the morning. I was the IP of an OH-58C; my left-seater and I were conducting JAAT missions with jets out of Myrtle Beach. Our refueling site, located about 35 miles west of there, had been established to cut down turnaround time. The FARP consisted of two fuel handlers and one 49C refueling truck.

We were the first aircraft into this FARP that day. The fuel handlers appeared to be very professional until—well, let me tell you about it.

As I retarded the throttle to the flight-idle position, one of the fuel handlers approached the right side of my aircraft.

He asked for and received approval to walk under the rotor system to hook the grounding cables to the aircraft. When he got within 4 feet of the aircraft, I heard someone hollering. As I looked to the front of the aircraft, I saw the other fuel handler; he was patting his head, signaling to the other fuel handler. As I looked back at the fuel handler next to my aircraft, I saw him take off his Kevlar helmet. Before I could say anything, he had sent his helmet bouncing along the ground to the other refuel handler.

"No big deal," I said to myself. "They know better than to throw a helmet into the rotor system."

"I should get out and tell them not to throw things around the aircraft," I said to my left-seater. I was getting out anyway.

"No," my left-seater said. "They know better! They won't throw it into the rotor system."

"Sounds good to me," I said. "Let's finish up here and move out to let the other ship refuel."

We moved our helicopter off the refueling pad to a place where we could observe the refueling procedure. As we watched the refuelers approach our sister aircraft, I noticed that they had switched jobs. The guy who had been in front of us operating the pump was now approaching the side of the aircraft to operate the refueling nozzle.

What happened next changed the way I would do business for the rest of my aviation career.

The fuel handler next to the aircraft, which was at flight idle, removed his Kevlar helmet and ***threw it through the aircraft's rotor system.*** Well, not actually ***through*** it; if that had happened, I wouldn't be writing this article.

Anyway, this Kevlar helmet was hit by one of the main rotor blades and went flying about 75 yards into the woods. I couldn't believe my eyes. Then I realized that I had become something I had thought I would never be: the ***weak link*** in a chain of events that leads to an accident.

Here I had the opportunity to stop an accident before it happened, and what did I do? ***Nothing.*** This inaction on my part resulted in a lot of time-consuming actions: mission cancellation, aircraft recovery, and accident-reporting paperwork—not to mention the mark against our safe-flying record. Luckily, though, no one was injured.

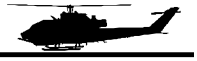
If only I had gotten out of the aircraft and said something to the refuelers, this accident would have never happened. I mean, I knew better!

—CW5 Bill Ramsey, EUSA G-3 Aviation, ramseyw@usfk.korea.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class E
F series

■ During takeoff, transmission oil pressure gauge indicated zero. Crew aborted takeoff and shut down engine without incident. Caused by failure of transmission pressure transmitter.

■ During hydraulic performance systems check, pilot in back seat moved hydraulic switch to No. 2, failing No. 1 system. Master caution and hydraulic pressure lights came on, and 10 seconds later, No. 1 hydraulic pressure light came on. Crew heard hydraulic pump cavitate and shut down aircraft. Inspection revealed severe leak on No. 2 hydraulic pump. Maintenance replaced pressure line, hydraulic pump, and various fittings.

■ During hover after landing, ground observer noticed something hanging from left skid tube. Ground crew confirmed that object was loose piece of wear bar from skid tube. Aircraft landed without incident. Skid tube wear bar is a locally manufactured part that is welded to skid shoe for running landings. During landing, a piece that had worn thin became dislodged from skid shoe.

AH64

Class C
A series

■ Aircraft experienced icing during planned IFR flight. Postflight inspection revealed broken FM antenna on vertical stabilizer. Subsequent inspection revealed damage to one tail-rotor blade.

■ Aircraft was Chalk 2 in flight of two on approach to LZ. While repositioning forward of Chalk 1, which had already landed, aircraft struck wires at approximately 50 feet agl. Aircraft was landed without further incident. Two main-rotor blades were damaged.

■ Blade-strike damage was discovered on preflight inspection. During previous mission, aircraft had descended during OGE hover until detected by PI, after which power was applied and aircraft repositioned. Crew detected no unusual indications that would indicate blade strike.

Class D
A series

■ Crew heard and felt something strike canopy during cruise flight. Postflight inspection revealed bird remains on canopy. Tip cap assembly on one main-rotor blade was damaged beyond repair. Tip cap was replaced.

Class E
A series

■ After landing, left forward avionics bay access door was found to be open with latches in locked position. Door was cracked in half and could not be repaired.

■ During standard autorotation, electrical odor and fumes entered cockpit through environmental control system. Double generator failure followed, with associated loss of systems. After landing and emergency shutdown, No. 1 generator was smoking significantly through catwalk area. Generator was replaced.

■ During short final, crew smelled smoke coming through ENCU vents. Just before landing, shaft-driven compressor caution light came on. Crew set aircraft down and performed emergency shutdown. Postflight inspection revealed charred and smoking SDC, which was replaced.

■ During climbout from confined area at night under the system, aircraft was transitioning to NOE flight in a left turn with 80 feet on radar altimeter. Aircraft struck tree on right side. After incident, crew flew approximately 4 kilometers to airfield. Maintenance made sheet-metal repairs to stabilator and wing.

CH47

Class C
D series

■ Crew noted 35- to 40-percent split in torque readings during cruise flight. In-flight adjustments were unsuccessful, and aircraft was landed. With rotor rpm still set for flight, crew noted rapid increase to 115 percent but not more than 120 percent before engine condition levers could be reduced to ground idle. Suspect engine or transmission limitations could have been exceeded.

Class D
D series

■ Flight engineer closed upper half of cabin door in flight while aircraft was above max airspeed for door closure. Door departed aircraft and fell on side of mountain.

Class E
D series

■ At 150 feet agl just after takeoff, load released from aircraft. Inspection revealed that C-clamp used to couple two 1-inch cables came apart, causing load to fall. Nonstandard rigging had been used for the nonstandard load (connex to be used for targets by Air Force).

■ Loud, high-pitched whine was heard in forward transmission area during slingload operations. In addition, an unusual vibration was detected in vicinity of flight control closet. Aircraft was landed and shut down without further incident. Maintenance inspection revealed that one flight hydraulic pump was unserviceable. Pumping unit was replaced.

■ While hovering with external load at 135 feet agl, aircrew experienced trouble setting load on ground in the LZ due to blowing snow. As crew placed load on ground, load turned over on its side. Crew landed next to load, shut down aircraft, and inspected load. There was no damage.

OH58

Class C
D(I) series

■ During autorotation, aircraft touched down slightly tail low, and tail skid hit runway. Inspection revealed damage to vertical fin at attaching point area of tail skid.

■ RSP was performing standard autorotation from altitude when IP noted insufficient rotor rpm to complete maneuver. He took controls and attempted to terminate with power, but aircraft landed hard.

Damage reportedly sustained by landing gear, one FM antenna, and one main-rotor blade.

Class D
D(I) series

■ Simulated engine failure at altitude resulted in hard landing. Landing gear WSPS was damaged.

Class E
A series

■ Transmission oil pressure low light came on during engine runup. Pilot got out of aircraft to inspect transmission oil level and found oil flowing down side of aircraft. Aircraft was shut down. Caused by broken transmission oil line.

C series

■ When increasing throttle after simulated forced landing from hover, crew heard series of pops coming from engine and noted corresponding rise in TOT. Caused by failure of bleed valve.

■ Aircrew had stored logbook on top of dash, wedged under GPS mount. During takeoff, aircraft encountered light to moderate turbulence while in a right turn. Logbook dislodged and fell into pilot-side chin bubble, knocking hole in Plexiglas. Chin bubble was replaced.

■ During student change, door was blown open by another aircraft hovering nearby. Door hinge required replacement.

D series

■ High rotor rpm audio alarm sounded while aircraft was en route to field landing site in heavy rain. At the same time, the rotor rpm analog gauge increased to 124 percent (no time). As PI increased collective to rotor system, he visually verified that Ng and Np were both in limits. Incident is still under investigation; however, electrical short due to heavy rain is suspected.

D(I) series

■ Simulated engine failure at altitude resulted in hard landing. Landing gear and WSPS required replacement.

■ Aircraft was at hover, performing day aerial gunnery .50-cal qualification. As aircraft was engaging target, copilot door opened in flight. Copilot tried to grab the door handle, but door was caught by rotorwash and swung open and began to separate from door frame. At this point, door was penetrated by a single .50-cal round. Door then separated completely, coming to rest on ground. Maintenance inspection revealed no other damage.

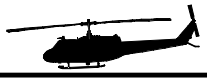
TH67

Class E
A series

■ Aircraft struck bird during cruise flight. Crew landed without incident.

■ Smoke began emitting from air conditioner intake during hover. Maintenance replaced blower motor.

UH1



Class D
H series

■ While on ground with engines running, crew heard loud noise followed by airframe vibration. Aircraft was shut down without incident. Postflight inspection revealed that Bishop plate (bearing cover) departed aft portion of engine and penetrated tail-rotor drive shaft cover, striking tail-rotor drive shaft and tail rotor.

Class E
H series

■ Aircraft experienced complete hydraulic failure and numerous hard-overs during cruise flight. Crew performed emergency procedures and completed run-on landing and emergency shutdown. Crew noted empty hydraulic fluid sight gauge and fluid under aircraft. Maintenance replaced hydraulic hose assembly.

UH60

Class C
A series

■ As flight of four UH-60s was landing, trail aircraft landed to undetected sloping terrain. Three main-rotor blades contacted ground.

Class D
A series

■ Main-rotor droop stop slipped during runup. As main rotor began to gain lift on low blade, moderate vibration was noticed in flight controls with both engines at idle. During shutdown, main-rotor blue droop stop failed again. Postflight inspection revealed blue main-rotor conical elastomeric bearing had separated from main-rotor hub spindle assembly. A Category II QDR was submitted on the elastomeric bearing.

Class E
A series

■ Parking brakes were set during simulated No. 1 engine fire. During roll-on landing, crew heard loud noise and smelled burning-rubber odor. Brakes were still set when aircraft touched down. Postflight inspection found that right tire was flat and left tire was rubbed bald in one spot.

■ Aircraft experienced uncommanded right yaw during takeoff. Aircraft landed with lateral vibration, causing tail pin to bend. Maintenance test flight could not duplicate uncommanded right yaw. Tail wheel pin was replaced and aircraft released for flight.

L series

■ During cruise flight, crew saw flock of birds in and below flight path. One of the birds suddenly flew upward and hit aircraft. Postflight inspection revealed crack in upper flight control cowling.

■ Unusual noise was heard during runup but quickly went away, and no other indications were noted. During postflight after 3-hour training flight, ALQ 144 cover was discovered in the oil cooler compartment. Two fuel lines were damaged.

C12

Class C
K series

■ Crew heard thump during final approach phase of landing. Suspecting a bird strike, crew continued their approach and landed without further incident. Postflight inspection confirmed damage (12-inch crack) to right wing pod.

Class E
K series

■ During step-down on VOR approach, No. 2 engine surged when power was applied to stop descent. Engine recovered, but situation recurred during subsequent step-down. After second occurrence, No. 2 engine was brought to flight idle and uneventful single-engine landing was made. Caused by failure of engine fuel control unit.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action messages

AH-64-99-ASAM-03, 081119Z Mar 99, maintenance mandatory

Several incidents have been reported of night- and day-side shroud assemblies separating from the aircraft during flight. This has been attributed to improper tension on the clamps or improperly sized clamps. The purpose of this message is to check for correctly sized rim-clenching clamp and to ensure that proper tension is applied to the clamp and the jam nut.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), howard.chilton@redstone.army.mil

AH-64-99-ASAM-04, 151234Z Mar 99, operational

Recent investigation revealed that AH-64-98-ASAM-07 erroneously required a change to AH-64D technical manuals. The changes addressed in that ASAM do not apply to the AH-64D. Therefore, no changes were required for the AH-64D operators manual, checklist, or maintenance test flight manual. The purpose of this message is to direct all AH-64D series aircraft flight crews to correct the errors, which are outlined in the message.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), howard.chilton@redstone.army.mil

CH-47-99-ASAM-04, 151843Z Mar 99, maintenance mandatory

Two instances have been reported of bushings being left out during installation of longitudinal cyclic trim yokes. The first was corrected before any damage occurred; the second, however, resulted in damage to the yoke assembly mounting lug on the forward transmission. Review of the maintenance manual confirmed that two bushings are not sufficiently represented in the text or diagrams. The purpose of this message is to inspect both forward and aft yoke assemblies to ensure proper bushing installation and to annotate changes to the maintenance manuals.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), bob.brock@redstone.army.mil

OH-58-99-ASAM-03, 171230Z Mar 99, maintenance mandatory

A certain PC filter tube used in some OH-58A/C helicopters has been identified as the suspected source of several cases of loss of engine power due to the tube cracking. The tube cracking is resulting from handling and overtorquing of the tube during maintenance. A replacement tube with a thicker wall and improved routing configuration has been identified in the supply system. The purpose of this message is to alert users and to initiate recurring inspections with part replacement not later than 31 January 2000.

AMCOM contact: Mr. Ron Price, DSN 788-8636 (256-842-8636), ron.price@redstone.army.mil

UH-60-99-ASAM-07, 111827Z Mar 99, maintenance mandatory

UH-60-97-ASAM-01 imposed a visual inspection for an edge break (deburred) condition and fluorescent penetrant inspection for cracks on the inside surface of the hub. Recently a hub that had been previously inspected was found to have a crack in the same location in a more critical direction. The purpose of this message is to implement a recurring inspection of the main-rotor hub assembly (P/Ns 70103-08112-041 and -045) for cracks in specified areas. This message also supersedes paragraph 9d of UH-60-97-ASAM-01. Note that this message does not apply to the P/N 70103-08112-047 rotary hub assembly.

AMCOM contact: Mr. Ron Price, DSN 788-8636 (256-842-8636), ron.price@redstone.army.mil

POV fatality update through March

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY99
58	59

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Class A Accidents through March

		Class A Flight Accidents		Army Military Fatalities	
		98	99	98	99
1ST QTR	October	2	1	0	0
	November	1	1	0	2
	December	2	1	2	0
2D QTR	January	1	1	0	0
	February	1	4	0	2
	March	1	0	0	0
3D QTR	April	0		0	
	May	1		0	
	June	2		4	
4TH QTR	July	1		0	
	August	0		0	
	September	0		0	
	TOTAL	12	8	6	4

U.S. ARMY SAFETY CENTER

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Brigadier General, USA
Commanding

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

JUNE 1999 ◆ VOL 27 ◆ NO 6 http://safety.army.mil

Tree strikes, you're out!

The poem entitled "*The Tree*," by Joyce Kilmer, describes the beauty of a tree. However, if you're an Army helicopter pilot who spends time flying amongst these gentle giants, you may have a different opinion about trees. According to Army accident data, trees are the number-one hazard to Army helicopters. In the past 5 years, tree strikes by OH-58D, AH-64, and UH-60 aircraft have killed 9 crewmembers, seriously injured 20 others, and destroyed or damaged a lot of helicopters (table 1).

The data might suggest that a tree can knock a helicopter out of the sky just about as quickly as any air defense system any country can develop. But why? Why are Army helicopters hitting trees? Are we pilots being properly trained to operate around trees? Is there a common thread among the different types of aircraft involved in tree strikes? There are plenty of questions, but are there any answers?

Tree strikes, you're out!

A BIT OF PERSONAL BACKGROUND

Back in 1972 (and some of you go back that far, too!), my unit went to Camp Attaberry, IN, for a field training exercise. During one part of our training, we were told to fly our OH-58A real low and close to the trees—they called it "nap-of-the-earth" (NOE) flying. Now, back in 1972 this was all new to us young aviators. There were no Aircrew Training Manuals (ATMs) with tasks, conditions, and standards to look at. We had no aircrew coordination training program to go through prior to NOE flight. Mission-briefing sheets, risk assessments, and risk management had not yet been thought of. Night-vision devices (NVDs) were still in the development stages. There were no visual simulators in which to practice NOE techniques. The only resource we had available at the time was the guys returning from Vietnam—guys who had a lot of experience flying the only way they knew to survive to fly another day.

But I digress.

We were told to "fly NOE, as close to the vegetation as possible. And, oh by the way, if you have a blade strike, you're more or less on your own."

I didn't have a problem with the first part; as a matter of fact, I really enjoyed seeing how low I could get, how close to the trees. That was the fun part. What I had a problem with was the "if you have a blade strike, you're on your own" part.

The fun lasted all of a half a day before my main-rotor blades hit a tree, damaging a rotor blade. It wasn't bad, but it was bad enough that a maintenance pilot had to evacuate the aircraft back to Fort Knox. We (WO1 and 1LT) had been using all of our ability and experience to keep our aircraft out of the trees, but with only 500 hours between us, it wasn't enough. We had failed. More to the point, ***I*** had failed; I had allowed the main-rotor blades to strike a tree during our NOE flight.

Looking back, I've come to realize that neither of us had been properly trained on NOE flight techniques nor the hazards associated with NOE flight.

MISSION

In today's helicopter world, survival is the number-one priority—especially for Army pilots. The world has developed many different ways of knocking a helicopter out of the sky, and, with the chance of combat ever looming on the horizon, it behooves pilots to train to keep their aircraft as close to vegetation as possible. That's how today's Army helicopter pilots are trained; NOE flight is a way of life for most of us. We train at it day and night.

Table 1. Tree strikes (FY94 - FY98)

Type aircraft	Class A	Class B	Class C	Class D	Class E	Fatalities	Disabling injuries
OH-58D	4	1	7	6	1	1	5
AH-64	5	1	14	1	6	0	4
UH-60	1	2	21	33	15	8	11
Total	10	4	42	40	22	9	20

Missions we once considered to be high risk, such as NOE flight, we now consider routine. However, if we really think about it, ***are*** they "routine"? Are we pilots so used to flying NOE that we've gotten too comfortable with our surroundings?

TRAINING

Today's new Army pilots undergo thorough terrain-flight training in flight school, including nap-of-the-earth, low level, and contour flight. They learn the hazards to terrain flight, including trees. There are ATMs with tasks, conditions, and standards that pilots are evaluated against. After leaving flight school, helicopter pilots are evaluated each year during their APART on their ability to operate their aircraft amongst the trees. They're evaluated not only during the day, but also at night using NVDs.

Today's pilots are required to go through formal crew-coordination training. They're also taught about spatial disorientation, relative motion, depth perception, and visual illusions. Risk management is now the tip of the spear in mission planning and training; we have mission-briefing and risk-assessment sheets that are being used by every unit for detailed planning.

So, why so many tree strikes?

ATTITUDE

I've heard it all in my 27 years in Army aviation.

"Tree strikes are the price of doing business."

"The next tree strike will cost the pilot 2 months' base pay."

Do either of the attitudes

reflected in these statements help prevent tree strikes in the Army? As a pilot who suffered a tree strike early in his career, I can tell you that neither of these statements made me feel any better. But I was fortunate that the only thing that got hurt that day was my pride; not everyone was as lucky as I was.

Most of the line pilots I've talked to in the past few years have a very good attitude about their job and really enjoy flying. They're eager to learn and willing to perform any mission. In talking with them, the one thing that almost always comes out is that they have become very comfortable flying NOE, especially during NVG NOE. Maybe they've become ***too*** comfortable. A common attitude I see is this one: "I've flown this mission a hundred times and never hit a tree." This can lead to our flying on ***attitude*** rather than ***ability***, which can result in an accident.

Proficiency

Depending on what type of aircraft you fly, you could spend almost all of your flight time NOE. That's a lot of exposure to trees and a lot of potential for a tree strike.

In looking at tree strikes while preparing to write this article, I noticed some common threads. I saw tree strike after tree strike with IPs on board, especially in the OH-58D. In fact, one Class A involved ***two*** IPs with more than 7000 hours between them. That's a lot of experience in the cockpit.

We know that, because of money constraints and reduced flying hours, pilots are not getting as many flight hours as we once did. The thing is that flight hours don't always reflect the level of a pilot's proficiency. Ask pilots about the amount of flight time they're getting and the quality of their individual proficiency. You'll find that some pilots feel that they're only maintaining currency rather than building proficiency, especially in the NVG arena.

So, if proficiency is based on experience, and pilots are not flying a lot of hours, what happens to proficiency? One would think it would go down. On the other hand, a look at the tree-strike numbers shows that pilots were having a lot of tree strikes even when hours and money were plentiful. So, what's the problem?

Capabilities

In the latest generation of helicopters, technology has placed in our hands very capable machines. These aircraft can fly faster—except for the OH-58D—see farther, engage targets at longer ranges, and navigate using internal navigation systems. These aircraft can also just about fly themselves. So where do pilots fit in?

As an OH-58D pilot, I find that the technology keeps me busy. In other words, I have my hands full when operating all the systems in the aircraft. There have been times that I've become so involved in operating an aircraft system that I'd forget to fly the aircraft. That's called ***loss of situational awareness.*** There have also been times that I have become so focused on what the other pilot was doing or on imparting some instruction or other that I'd forget where I was—that is, until I looked up and found myself flying sideways at 30 knots, 6 inches above the ground, under NVGs.

My review of accidents while researching this article showed that I'm not the only pilot who's ever gotten involved with a system and lost situational awareness. The problem is that some of those other pilots were not as fortunate as I was and were involved in accidents.

The bottom line is, we pilots have to remember not to let aircraft systems overwhelm and overload our own capabilities.

A look at the accidents

A review of OH-58D, AH-64, and UH-60 accident data produced some interesting insights.

- More OH-58D tree strikes occurred during night-vision-system (NVS) operations than during day flights. However, don't think that we had tree strikes only under NVS. The majority of UH-60 tree strikes occurred during the day.
- About 75 percent of OH-58D tree strikes involved the tail rotor. Most of these mishaps occurred at an OGE hover during a weapon engagement, with an IP on board, and flying aided. Either a descent or an undetected drift to the rear occurred prior to the mishap.
- A little more than a third of AH-64 tree strikes involved the main rotor system, followed by the fuselage, then the tail rotor. Most of them happened during OGE hover in a battle position and NOE flight.
- Most UH-60 tree strikes happened during confined-area takeoffs and landings. Main rotor tip caps suffered the most damage, followed by the fuselage, then the tail rotor.
- Brownout conditions contributed to a large number of UH-60 tree strikes during landings to confined areas.
- Of 60 UH-60 Class A-E mishaps reviewed, 20 involved NVGs. The other two-thirds took place during the day.

Some closing thoughts

NOE flying is a tasked-saturated, demanding job. Our new pilots are receiving good training and building a firm foundation during flight school. We older pilots have to continue that good training by teaching them good habits once they arrive in our units.

Our attitude about flying NOE is going to have to change. We must begin taking NOE missions seriously again. NOE can be a high-risk mission, depending on the conditions, crew, and type aircraft flown. AH-64s alone have averaged nearly one Class A tree strike every year for the past 10 years. That's a lot of lost readiness.

And what about proficiency? I think that individual proficiency is suffering most due to today's reduced flight hours. Pilots have to become individually proficient in flying their aircraft. That's hard for all of us, but especially for UH-60 pilots—most of their missions involve multi-ship operations. It's hard to work on individual proficiency in a ten-ship air assault, under NVGs, with poor weather conditions. We have to give our aviators the time to become proficient, not only in mission tasks, but in individual tasks.

And, finally, let's talk about capabilities. Advanced technology is a good thing, but I believe that we can sometimes exceed the capabilities of our operators. I found this a lot in looking at OH-58D accident summaries. Oftentimes, the pilot became so involved in operating systems (task overload) that he lost situational awareness and allowed the aircraft to drift into the trees. In other words, the pilot became so involved with aircraft systems that he forgot to fly the aircraft.

The one thought I want to leave you with is that we—all of us—are only inches and seconds from an accident every time we're NOE. We must never forget that.

—CW5 Bill Ramsey, EUSA G-3 Aviation, ramseyw@usfk.korea.army.mil

Tree strikes: selected accident briefs

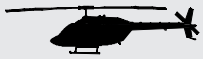
AH64

Class A
While crossing ridgeline as Chalk 3, main rotor blades contacted trees located to the right and upslope from aircraft. Aircraft descended to impact through the trees.

Class B
During an OGE hover, main-rotor blades struck tree. PC flew aircraft forward and landed in sparsely vegetated field.

Class C
During confined-area approach, aircraft developed immediate severe vibration. Approach was aborted and aircraft was flown to field 1.5 kilometers away. Damage to four main-rotor blades and one tail-rotor blade was found on postflight.

OH58



Class A
OH-58D(I) drifted rearward from stationary OGE hover as crew conducted hasty attack against OPFOR ground targets. Tail rotor contacted pine tree and then several other trees prior to ground impact.

Class B
OH-58D(I) was at 250 feet agl in OGE hover as crew conducted Airborne Target Handover System (ATHS) training. Both pilots transitioned their attention inside the aircraft for 10 to 15 seconds while completing task. Aircraft drifted rearward approximately 200 meters, resulting in tail rotor making contact with treetops.

Class C
IP was holding a stationary OGE hover under NVGs while pilot set up for simulated missile engagement. IP allowed aircraft to drift aft approximately 25 feet, and tail rotor contacted tree.

UH60

Class A
During NVG approach to dirt landing strip, pilot encountered brownout conditions. Aircraft drifted into trees, sustaining major damage.

Class B
During NVG multi-aircraft approach to extremely dusty landing zone, aircraft main rotor blade tip caps contacted tree. Flight terminated in hard landing.

Class C
On short final to LZ, main-rotor blades contacted two small trees. Main rotor blade tip caps were damaged.

Piece o' cake

What more could you ask for if they won't station you in Hawaii or Key West?

It's a beautiful fall day, "clear, blue, and 22" with light winds and no turbulence. Pick up the General and nine staffers at the headquarters helipad, fly a 35-minute hop to a conference site, lunch with the "Big Dog," 35 minutes back to the HQ pad, and you're mission complete. You're flying with one of best crews possible, in the fleet's newest Black Hawk. This bird is a 95-series UH-60L with less than 340 hours on the clock.

It's gonna be a piece o' cake.

The hairs on the back of your neck come to attention during ground taxi when the aircraft emits a deeply pitched moan accompanied by a mild shudder. You stop immediately; three heads swivel as one, their faces reflecting the same questioning look. In your best airline captain voice, you say: "Y'all feel that? Wellllll, she hasn't flown in a while; we'll just sit here for a moment—let her warm up and see what happens...."

Is this cake maybe a little stale?

All systems are normal, and she hovers as smooth as ever. There are no more moans or shudders, so off you go. The 5-minute leg to the HQ pad is smooth and uneventful. Noting the passengers in a tight group very close to the pad, you inform the crew that the approach will be to the ground. To avoid sandblasting the General, you tell them not to expect one of your softest touchdowns.

This turns out to be something of an understatement.

As the mains touch down following the tail wheel, you hear the sickening, unmistakable sound of a large metal structure letting go. The helicopter lurches down and to the right, with the main-rotor blades coming so close to the ground and the passengers that you instinctively hiss "OH SH--!"

Somehow you manage to return to a hover before the main rotor blades puree the approaching passengers. When asked if the right main tire has blown out, the crew chief informs you that the wheel is now lying on the pad with its severed drag beam and main strut end still attached.

I don't believe I'd care for any cake!

It doesn't take too long for you to decide that it might be prudent to leave the area before your mount sheds any more parts on the General's pad. You take off and inform the crew that you intend to return to home plate where there are, among other things, slopes to attempt landings, crash trucks, and, last but not least, friendly faces that belong to very competent people.

Thoughts are racing through your head during the short flight back to the airfield. How can the helicopter be landed with only one

main without endangering the crew and without inflicting additional damage to the aircraft? You solicit input from the copilot and the crew chief after telling them you intend to land on a slope. You're concerned about two things, both centered on what remains of the right main strut: What will prevent it from pivoting about its upper mount, and how far will the strut sink into the sod on a slope? Either possibility could result in blade-ground contact with obvious consequences.

By now it's time to make initial contact with the tower; the copilot is instructed to declare an emergency and ask the control tower to position crash-rescue in the vicinity of the slope. While the ATC guys are digesting this request, the copilot informs flight operations of your status and intentions. Confirming that fuel remaining is about 2 hours, you're requested to hover in front of operations while key personnel come outside and take a look-see.

The crew chief passes the 50-

foot ICS cord through the gunner's window, enabling communications with ground personnel while hovering. The ground crew plans to assemble a platform consisting of C-5A loading ramps and a stack of bunk-bed mattresses.

It's time to shake those cake crumbs off your lap and think about the best way to land your one-legged mount.

As the photos show, this one had a happy ending. Chalk it up to teamwork and true crew coordination that extended to include the ground crew. Their efforts made a safe landing possible, saving a helicopter and its grateful crew.

—CW2 John Law, McEntire ANGS Eastover, SC ARNG, DSN 583-1821 (803-806-1821), lawjl@sc-arng.ngb.army.mil

"Bedded down" for the night.

Shortfax

Keeping you up to date

Coming soon: New crash-rescue video

The Army Safety Center has produced a video for use in training personnel, both military and civilian, who could potentially be involved in emergency response to Army helicopter accidents. *Army Aviation Crash Rescue* (PIN 709717, TVT 20-1038) explains how to shut down aircraft engines, fuel systems, and electrical systems and the proper and safe way to remove injured pilots and passengers from aircraft wreckage. The new video also identifies the kinds of weapons and ammunition that might be on board each type of Army aircraft, and explains how to "safe" such weapons before entering danger zones.

The video will be widely available at local audiovisual libraries by mid summer. It may also be ordered electronically through the Defense Automated Visual Information System (DAVIS) web page (http://dodimagery.afis.osd.mil).

POC: Mr. Tony Brown, Media & Marketing Division, DSN 558-2178 (334-255-2178), brownt@safety-emh1.army.mil

ALSE user conference coming up

The 1999 ALSE User's Conference will be held in Huntsville, Alabama, 2-4 November. Commanders, ALSE officers and technicians, and unit safety officers are invited.

If you plan to attend, please notify Mr. Bernard Roberson or CPT Andrew J. Doniec at Fort Rucker's Directorate of Combat Developments by 18 October.

POCs: Mr. Bernard Roberson, DSN 558-9130 (334-255-9130), robersonb2@rucker.army.mil; and CPT Andrew J. Doniec, DSN 558-9702 (334-255-9702), donieca@rucker.army.mil

FYI: Pubs update

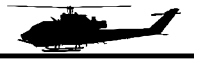
FM 20-151: *Aircraft Emergency Procedures Over Water*, which was referenced in the February 1999 *Flightfax*, is now obsolete. So is FM 20-150: *National Search and Rescue Manual*. These manuals have been replaced by Joint Pub 3-50: *National Search and Rescue Volume I—National Search and Rescue System* and Joint Pub 3-50.1: *National Search and Rescue Volume II—Planning Handbook*. Both publications may be downloaded from www.dtic.mil/doctrine/jel along with other joint combat search and rescue publications.

Thanks to SSG Doug Penovich, ALSE NCOIC, 1st-106th Aviation Regiment, IL ARNG, Peoria, IL, for this information.

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class E
F series

■ At completion of practice topping check and during descent at 150 knots and 15-percent torque, aircraft began uncommanded left roll. IP placed cyclic to right stop to arrest roll. Aircraft was slowed and roll SCAS channel was disengaged with no apparent effect. Right stop was reached twice more prior to landing. Maintenance could not duplicate problem.

AH64

Class A
A series

■ Aircraft struck tree and crashed. Both pilots escaped before postcrash fire caused explosion of onboard munitions. Investigation is under way.

Class C
A series

■ Damage to tail rotor was discovered during postflight maintenance inspection on the day following the last mission. All four tail-rotor blades required replacement.

Class E
A series

■ Fuel access panel was found to be missing on postflight. Aircraft had been fueled at tactical FARP.

■ During short final, crew smelled smoke coming through ENCU vents. Prior to landing, SDC caution light illuminated. Crew landed and performed emergency engine shutdown. Postflight revealed charred and smoking SDC. SDC was replaced.

■ While operating as lead aircraft in flight of three, PC felt a bump. Chalk 3 immediately called and reported that transmission left-side panel had separated from aircraft. Chalk 3 located panel on ground while damaged aircraft landed in nearby field and shut down without further incident. Panel was recovered by ground personnel, but it could not be reattached to aircraft.

■ No. 2 fuel pressure light came on during landing. Aircraft was taxied to parking and shut down. Caused by failure of engine-driven fuel pump.

■ With rotor brake engaged to stop rotor system during student change, oil low utility hydraulic caution light came on. Caused by leak in rotor brake caliper.

CH47

Class C
D series

■ Crew noted 35- to 40-percent split in torque readings during cruise flight. In-flight adjustments were unsuccessful, and aircraft was landed. With rotor rpm still set for flight, crew noted rapid increase to 115 percent but not more than 120 percent before engine condition levers could be reduced to ground idle. Suspect engine or transmission limitations could have been exceeded.

Class E
D series

■ During runup and before-takeoff checks, AFCS #1 light would not extinguish. Caused by failure of No. 1 vertical gyro.

■ During slingload operations, loud high-pitched whine was heard in forward transmission area, and unusual vibration was detected in vicinity of flight-control closet. Aircraft was landed and shut down without further incident. Caused by failure of No. 1 flight hydraulic pump.

■ No. 1 engine gearbox latch indicator activated during departure and could not be reset. PC turned aircraft around to land back at airfield; during short final, No. 1 engine transmission chip light came on. Maintenance inspection revealed metal chips on detector. Engine transmission was replaced and combining transmission was serviced.

OH58

Class B
C series

■ SP was on controls when IP noted rapid N1 increase at 550 feet and 60 KIAS during climb-out after takeoff. IP took controls and executed 180-degree turn for return to airfield. IP reported low rotor rpm indication during short final, and aircraft landed hard and rolled onto its left side. Aircraft sustained major damage to fuselage, main- and tail-rotor systems, and tail boom. Crewmembers were not injured.

Class C
C series

■ Postflight inspection following simulated antitorque malfunction maneuver revealed separation of left and right windshields at upper outside corners and crack in lower (Fiberglas) section of fuselage, forward of and below tail boom attaching points.

D(I) series

■ Aircraft landed hard during low-level autorotation. All four main-rotor blades were damaged beyond repair; forward crosstube was also damaged.

Class D
D series

■ During maintenance test flight at 55 KIAS and 1700 feet msl, test pilot rolled throttle down to perform autorotational rpm checks. During crosscheck, he saw Ng stabilized at 63.2 percent; 3 seconds later, engine flamed out. Pilot executed autorotational landing without incident.

Class E
A series

■ Fuel odor was detected during terrain flight, and aircraft was landed. Trace amount of fuel was found on external fuel tank on right side, forward of fuel cap. Shortly after continuing mission, fuel odor became stronger, and aircraft again landed when crew saw fuel leaking in back seat.

C series

■ During landing to unimproved surface during NVG training, crew experienced brownout condition just prior to touchdown. Aircraft rocked forward as it touched down, causing lower WSPS to contact ground. On postflight, breakaway tip was found missing and small cracks were found on lower wire cutter assembly. Assembly was replaced.

D series

■ Generator caution light and SCAS-disengaged light came on during downwind leg of traffic pattern. Pilot reset generator switch with no effect. At that point, cockpit filled with fumes. Suspecting electrical fire, IP performed power-on emergency landing. Caused by a.c. generator failure.

TH67

Class D

A series

■ During postflight, leading edge of tail rotor was found damaged due to missing drive shaft cover fastener. Fastener was replaced.

UH1

Class C

V series

■ Crew felt increasing lateral vibration at 500 feet agl and selected site for emergency landing. By the time aircraft had descended to 75 feet, engine rpm had bled to less than 4000. Aircraft contacted trees during landing, and crew performed emergency shutdown upon touchdown.

Class E

H series

■ During cruise flight on night IFR training mission in VMC conditions, duck struck aircraft's left windshield. Windshield broke and 14x12-inch piece of glass was thrown through cockpit and into passenger compartment. Duck remained outside aircraft and was struck by main-rotor blade after initial impact. No crewmember was injured, and aircraft damage was restricted to windshield.

■ Engine began smoking during hot refueling, and aircraft was shut down without incident. Caused by engine oil leak.

■ During touchdown on VMC approach to helipad, front crosstube broke. Aircraft was shut down without further incident. Inspection revealed damage to fuselage at station 23.0. Maintenance replaced crosstube and repaired fuselage damage.

V series

■ At 50 feet during terrain-flight takeoff over trees, low rpm audio and light activated. Noting engine rpm at 6000, IP took controls and executed descending right pedal turn to ground. Throttle was verified full on. Aircraft was shut down without incident. Maintenance could not duplicate underspeed condition.

UH60

Class A

L series

■ Aircraft crashed into trees, killing seven and injuring four occupants. Accident is under investigation.

Class B

A series

■ Crew chief standing fireguard for engine start sustained 7.62mm round in left leg when M60 door gun fired a chambered round during operational check. PC had reportedly visually inspected weapons and ammo feed trays prior to the accident.

Class C

L series

■ Tail-rotor de-ice cable and bracket were found missing during postflight inspection, and damage to one rotor blade was discovered. Separation of component is suspected to have occurred during second leg of flight, as through-flight inspection revealed no discrepancies.

Class D

L series

■ During multiship artillery raid, crew inserted six guns, went to laager site, then returned to extract M119 howitzer. When crew picked up howitzer, right chain leg came off wheel, causing gun to flip over.

Class E

A series

■ Before takeoff, with aircraft at 100-percent rpm, No. 1 main generator caution light came on. Mission was cancelled. Maintenance discovered that generator shaft had broken and fallen into input module. Module generator was replaced.

■ During postflight inspection, crew noticed right cargo door handle was missing. Maintenance found worn snap ring that holds handle in place. Worn snap ring allowed handle to work its way off shaft and fall off aircraft during flight.

■ During cruise flight, No. 1 engine experienced multiple compressor stalls. Tgt exceeded 950°C for 6 to 9 seconds. Crew initiated emergency procedures and landed without incident. Engine is being returned to depot for evaluation.

■ No. 1 engine low oil pressure caution light came on during taxi. Engine was shut down and aircraft taxied back to parking without further incident. Maintenance found oil filler cap not installed.

L series

■ While in straight and level flight under IMC, transmission main module chip detector caution light came on. Crew made emergency descent to VMC conditions, where uneventful precautionary landing to open field was performed.

■ During extraction phase of multiship artillery raid, right chain leg came off hub of M119 howitzer, causing gun to flip over. Aircraft landed and shut down without further incident.

■ Aircraft was at 143 KIAS in formation flight when crew heard loud bang from left side of aircraft. Crewmember noticed that left-hand doorstep was missing. Two crewmembers said they had performed walk-around inspection before takeoff and believed that fairing was secure. No noise was noted until loss of fairing.

C12

Class C

F series

■ After No. 2 engine shutdown and successful restart during flight evaluation, propeller would not come out of feather and returned to high rpm. Crew elected to shut down engine and made single-engine landing at home station. Cause not reported.

■ As aircraft passed through 13,000 feet during climbout, crew detected ice buildup sufficient to warrant inflating de-ice boots. As PC inflated boots, master warning and right bleed air fail lights came on. CP noted only partial inflation of right-wing de-ice boot. PC immediately descended out of icing conditions and landed at home base. Two holes were found in polyflow tubing; tubing was replaced.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action messages

OH-58-99-ASAM-04, 051711Z Apr 99, maintenance mandatory

Allison engine company has determined that some Allied Signal (Bendix) OH-58D(I) fuel control unit and main fuel control assemblies (new or overhauled since September 1996) may contain springs that have manufacturing damage that will, if spring failure occurs, result in immediate engine deceleration. The purpose of this message is to inspect all fuel controls to identify those that require modification and to place operating restrictions on aircraft operations until discrepant fuel controls have been replaced.

AMCOM contact: Mr. Ron Price, DSN 788-8636 (256-842-8636), ron.price@redstone.army.mil

OH-58-99-ASAM-05, 271152Z Apr 99, maintenance mandatory

Three field reports have indicated cracking of a tail-rotor drive shaft bearing hanger support. Suspect support is the third hanger support on the tail boom at fuselage station 281. Analysis has determined the cause to be burrs on the tail boom mount holes. The burrs create a potential stress point that, when exposed to surrounding loads, can result in crack formation. The purpose of this message is to initiate a before-first-flight daily inspection of the support and also a special inspection at the next 20-hour/14-day PMS inspection.

AMCOM contact: Mr. Ron Price, DSN 788-8636 (256-842-8636), ron.price@redstone.army.mil

CH-47-99-ASAM-05, 221518Z Apr 99, maintenance mandatory

Several instances have been reported of failed aft landing gear drag links. Investigation has revealed the cause to be stress-corrosion cracking. New drag links are now made from a material that is not susceptible to stress-corrosion cracking. The purpose of this message is to extend replacement date of certain aft landing-gear drag links to 31 October 2000

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), bob.brock@redstone.army.mil

Safety-of-flight message

AH-64-99-SOF-02, 222003Z Apr 99, technical

Investigation of an in-flight BUCS activation revealed a suspect condition in AH-64A/D BUCS servocylinders. The servocylinder contains a linear variable differential transducer that may move out of an electrical null position and result in BUCS activation. The purpose of this message is to direct initial and recurring inspections of AH-64A/D BUCS servocylinders for correct electrical null.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), howard.chilton@redstone.army.mil

POV fatality update through April

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY99
64	69

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Class A Accidents through April

		Class A Flight Accidents		Army Military Fatalities	
		98	99	98	99
1ST QTR	October	2	1	0	0
	November	1	1	0	2
	December	2	1	2	0
2D QTR	January	1	1	0	0
	February	1	4	0	2
	March	1	0	0	0
3D QTR	April	0	2	0	7
	May	1		0	
	June	2		4	
4TH QTR	July	1		0	
	August	0		0	
	September	0		0	
	TOTAL	12	10	6	11

U.S. ARMY SAFETY CENTER

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Charles M. Burke
Brigadier General, USA
Commanding

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

JULY 1999 ◆ VOL 27 ◆ NO 7 http://safety.army.mil

As we celebrate the birth of our nation and remember those who have sacrificed, let us not forget those who are in the process of writing tomorrow's history.

Happy Independence Day to all soldiers, wherever you are.

RISK MANAGEMENT LESSONS LEARNED

WAR STORIES

Welcome to hell

"Please, God, don't let them find my pliers."

I couldn't sleep or eat. The guilt burned in me like acid. I still hadn't mustered the courage to admit that I was missing a tool from my work center.

It seems incredible that I let a pair of missing safety-wire pliers go without reporting them, but I was scared. I'm sure now that threats concerning tool loss were directed at people who didn't follow SOP for tool control, but that's not how I took it. I didn't want to get hammered for losing a tool.

I'd been in my new command for about 6 months, and tool control was lax compared to my last duty station. I thought I could help, so I volunteered to be tool-control petty officer (PO) for airframes.

Upon our return to the hangar after finishing up an at-sea period, I dutifully inventoried our tools and found that a pair of safety-wire pliers was missing from a tool pouch. I told my supervisor; he replied that we'd left a pair on the boat with our troubleshooter. I was uncomfortable with the answer, but, being a brand-new PO2 with all of 3 years' experience, compared to my supervisor's 17, I figured he knew best. He went on leave, and I anxiously awaited the boat's return.

When a tall, lanky metalsmith walked in with his gear, I yanked the troubleshooter's pouch out of his hand. A cold shiver streaked down my back when I didn't find the extra safety-wire pliers he was supposed to have. Questioning him yielded nothing but a dumb look.

I called my supervisor at home, but he'd already left town. I knew I had to tell maintenance control, but the master chief had just told us that the next person who reported a missing tool was going to see the old man—not exactly the kind of encouragement I needed. I went through the shop with a fine-tooth comb looking for those pliers; I came up empty-handed again and again.

I didn't sleep that night. I even discussed the problem with my wife. She convinced me to come clean and take my lumps. The situation obviously wasn't going to fix itself, and the potential consequences were too risky to ignore.

The 10-mile trip to work took forever. It was a crisp, fall day with the sun shining brightly, but I made the trek from the parking lot filled with dread. With the first few steps into the hangar, I heard the chaos and excitement associated with something big. One of my coworkers dashed past me exclaiming, "The Skipper had to bail out; his flight controls jammed. Uncontrolled roll!"

Time compression made him sound like a bad eight-track tape. I prayed that the aircraft had crashed without hitting a hospital or a school and that it had burned and disintegrated.

"Please, God, don't let them find my pliers."

Three days later, I was walking up the stairs to admin when I heard a slow, shuffling sound ahead of me. Looking up, I stared straight into the eyes of my CO. Ejecting at more than 400 knots at 30,000 feet with his visor up hadn't helped his complexion. His face was a sickly montage of purple, green, blue, black, and yellow from the wind stream hitting him. He was stiff and sore from the rocket ride, and he moved with slow, deliberate steps. He sniffled and was kind enough to ask me how I was doing. I wanted to scream out, "How am ***I***

doing? My God, I almost killed you!" But I didn't. We exchanged small talk, and then I excused myself to go vomit.

That chance encounter was bad enough, but the clincher came when I took my wife to a predeployment briefing for dependents. I guess it was divine chance that the CO's wife sat next to me. The skipper's face had lost most of its grotesque hues, but he was still plenty sore. He addressed the audience and made a wisecrack about being "glad to be here—literally!" The crowd laughed politely, and I glanced over to see his wife's reaction. She sat there with a broad smile, arms wrapped around their two young daughters—tears streaming down her face. The chilling realization that we could have been attending his funeral sickened me once more.

The aircraft had landed in a Georgia swamp. The investigation attributed the mishap to a burst hydraulic line.

The safety-wire pliers? Our berthing PO returned from the ship and handed them to me. He had walked into the shop while everything was being packed up for the off-load and just grabbed them to go hang bunk curtains! To the best of my knowledge, no one ever knew what happened except me.

Tool control has gone through a lot of refinement since that awful incident. I realize now that I misinterpreted the master chief's warnings about missing tools. No one should be threatened with punishment for losing tools, but maintainers need to understand how deadly important those procedures are.

—adapted from an article by AMCS(AW) Keith Dennis in *Mech*

When things don't seem right

Pay attention to feelings of uncertainty; when something doesn't fit, stop and heed.

I recently had a experience that retaught a lesson I've learned several times before. Some of us are stubborn, I guess, or maybe it's just that we need recurrent training from time to time.

Under visual flight rules, I was knocking around the airport under a 1200-foot ceiling, giving my father his first ride in my airplane. The visibility below the clouds was good, but I don't like venturing too far in marginal VFR, so we stayed within a few miles of the airport. Then it occurred to me that I could make the flight more interesting—and productive—by asking approach control for a clearance to a nearby VOR and a practice instrument approach back to the airport. I tuned the frequency and made my request.

"Beechcraft One-Two Yankee is over Cleveland [Texas]. Traffic permitting, we'd like clearance to Daisetta, and then a VOR Alpha approach back to Cleveland."

Approach control wasn't busy, so the controller gave me a heading to fly and an altitude to maintain. He also told me to expect vectors to the final approach course.

To understand what happened next, you must picture the local geography.

Daisetta VOR provides instrument approaches to two local airports. Cleveland Airport is west-northwest of the VOR; the approach uses the 291-degree radial, and it's 21 miles from the VOR to the airport. Liberty Airport is 7.4 miles south of the VOR on the 195-degree radial; it, too, is a VOR Alpha approach.

The initial heading I received was somewhat north of a direct line to the Daisetta VOR. This made sense because the controller obviously needed some room to turn me back to intercept the approach. I was mentally prepared for a right turn to join the final approach course.

After reaching my assigned altitude of 2000 feet and flying for several minutes on the assigned heading, approach control gave me the approach clearance.

"Beechcraft One-Two Yankee, turn right, heading one-seven-zero, maintain two thousand until established on the approach, cleared VOR Alpha approach."

Had this been almost any other instrument approach, I would have refused the clearance immediately. Fly a heading of 170 degrees to intercept a final approach course of 295 degrees? A 125-degree intercept angle? No way! As it was, I knew the area well, knew the ceiling was well above minimums, and knew that the missed approach fix was 22 miles out—plenty of room to get myself established on the radial. Not wanting to accuse the controller of giving me a lousy intercept, I figured I'd just work it out. I read back the intercept instructions, finishing with "...cleared for the VOR Alpha approach."

Because I knew what to expect and was ready, the intercept wasn't too difficult. As the VOR needle centered outbound, and I was congratulating myself on doing a fine job of salvaging a difficult situation, ATC called again.

"One-Two Yankee, are you doing a procedure turn?"

. . . when a controller has to ask a question like this, someone has screwed up.

I immediately tensed up. In my experience, when a controller has to ask a question like this, someone has screwed up. I quickly verified the VOR frequency and radial before answering. All was as it should be.

"One-Two Yankee, I show myself established on the two-ninety-five-degree radial. And, Sir, this approach doesn't have a procedure turn."

"Ah, roger," the controller said, sounding a bit confused. Then, after a couple of seconds, he said, "One-Two Yankee, are you doing the approach to Cleveland?" I answered in the affirmative.

"Sir, I cleared you for the VOR Alpha approach to Liberty! You are now cleared for the VOR Alpha approach to Cleveland."

Because I'd never mentioned Liberty when I called ATC, it never entered my mind that my clearance limit might be any airport other than my home base. The controller had apparently stated Liberty in the approach clearance, but it didn't register because I didn't perceive any need to verify the destination. I stopped listening after I heard "...VOR Alpha approach...."

When I read back the clearance, I read back everything except the airport name, eliminating any chance the controller had to catch the error. Confusing my request was the controller's mistake initially, but not catching the new clearance limit and not reading back the full clearance made it my mistake. It's called failure to comply with an ATC clearance.

What's the lesson I relearned—and experienced I don't know how many times before? Simple. In aviation, especially when communicating with ATC, when something doesn't sound right, it probably isn't.

As I think back over my flying career, I can remember many times when things just haven't seemed right. Sometimes a clearance or cockpit indication wasn't what I was used to seeing. Other times, I just had an uneasy feeling about something without being able to put my finger on exactly what was bothering me. Most of the time when I felt this way, my vague uneasiness was justified because something was indeed wrong. A couple of times when I ignored the warning bells in my head, bad things happened. Call it intuition, a sixth sense, or your guardian angel; the lesson is to stop and pay heed when something doesn't seem to fit.

On this flight, the intercept angle just wasn't reasonable. At the time, I passed it off as sloppy controlling. Yet I know that controllers generally do a darn good job. Even a rookie wouldn't be likely to botch a vector to the final that badly. The warning bells were there; I just ignored them.

What could I have done to heed them? It hadn't occurred to me that another airport was involved, so I wouldn't have thought to verify which approach I was cleared for. But plain English is always available when standard phraseology doesn't exist. How about, "Approach, that's more than a ninety-degree intercept. Verify heading one-seven-zero?"

It may have taken a second for the controller to figure it out, but the same process—questioning things that don't sound right—also works from his perspective. "Why is this guy saying it's a ninety-degree intercept when it's really only twenty degrees?" Between the two of us, we would have figured it out.

This particular error could have been avoided in another way. Throughout my IFR career, I've recognized that understanding approach clearances is critical to safety, so I've always read back each element of the approach clearance—except for the airport name. The destination never struck me as ambiguous, so it seemed unnecessary to state it. Controllers always state it, though. Now I know why, and now I always read it back, too.

What other events have taught me this lesson? There have been several, but I'll mention two. There was my canceled IFR-to-Newark-Approach-Control flight, when the controller responded with my call sign and the word "Roger." Yes, I knew that they usually say "Cancellation received, squawk one-two-zero-zero, frequency change approved."

The controller sounded very busy, so I convinced myself that he probably didn't have time to utter the standard phraseology. I dismissed my doubts and went off frequency. The result was to be met at my destination by an FAA inspector. Although the ATC tapes eventually proved that I had indeed canceled my flight plan, I still got an unpleasant ramp-check out of it.

Then there was the time the prop-governor check on runup seemed just a little strange. I ignored it, and 3 hours later I found out what runaway props are all about.

Remember, when that little voice says something's not right, LISTEN!

—adapted from an article by Robert I. Snow in *Flight Training*, Feb 98

The Army Aviation Broken Wing Award recognizes aircrewmembers who demonstrate a high degree of professional skill while recovering an aircraft from an inflight failure or malfunction requiring an emergency landing. Requirements for the award are in AR 672-74: *Army Accident Prevention Awards*.

■ CPT Richard Q. Carrol
■ CPT James H. Fraser

Aviation Training Brigade
Fort Rucker, AL

CPT Fraser was PC and CPT Carrol was PI of a UH-1H providing flight following for student NOE training at night. CPT Fraser was on the controls after temporarily breaking station to refuel when the crew heard a fizzing sound coming from the rear of the aircraft. Immediately thereafter, the aircraft yawed, followed by illumination of the master caution and hydraulic pressure caution lights. Simultaneously, the cyclic slammed to the right forward quadrant, causing a violent pitch-down and right roll of the aircraft.

CPT Fraser attempted to center the cyclic with both hands, gaining a somewhat level attitude, and called out the emergency procedure. CPT Carrol completed the first three steps with no effect. At CPT Fraser's direction, CPT Carrol put both hands and both legs around the cyclic to prevent the aircraft from pitching further right and forward, possibly becoming inverted. The two crewmembers completed the emergency procedure with no change in aircraft response. At this time, the aircraft was at 3000 feet and about 10 miles from the airport.

Moments later on short final, when CPT Fraser was forced to move one hand to the collective to make the landing, the cyclic surged forward with increased pressure to the right forward quadrant. After helping CPT Carrol regain control, he was able to make an input on the collective control. He then elected to use airspeed to descend and land, as the pressure needed to maintain the cyclic in a landing position would not allow either crewmember to release it.

The aircraft touched down at greater than ETL, and CPT Fraser maintained directional alignment through use of the pedals. He reduced ground-speed after touchdown by reducing engine rpm, and the aircraft came to a stop without damage or injury. Postflight inspection revealed that all hydraulic fluid had sprayed out of a burst hydraulic line.

Time from onset of the emergency to landing was 12 minutes

■ CW2 David W. Elsberry
■ CW2 Steven D. Swenson

1-183d Aviation (Attack Helicopter), ID ARNG, Boise, ID

CW2 Swenson was pilot in command, and CW2 Elsberry was pilot of an AH-64A performing aerial gunnery in a desert environment. While at a 150-foot hover with hover hold engaged and velocity vector solid and centered, the aircraft began making sudden violent uncommanded forward nose-down, tail-up movements. CW2 Elsberry made a mayday call as CW2 Swenson applied full aft cyclic with no effect. After about 2 seconds, the PC gained cyclic control for about ½-second, then the aircraft pitched up. As the PC continued to fight for control of the aircraft, CW2 Elsberry called out instrument readings. An instrument check showed no caution lights, and the DASE was engaged. The PC disengaged the DASE as the aircraft made a violent uncommanded roll to the right and up. He then applied full left forward cyclic with no effect. Disengagement of DASE had no apparent effect. After 3 to 4 seconds, CW2 Swenson gained ½-second of cyclic control, and the aircraft rolled back to the left. He initiated a descent in an attempt to land, and during descent, the aircraft made several violent uncommanded movements with no cyclic effect and complete loss of control. Every 3 to 4 seconds, CW2 Swenson attempted to coordinate and time cyclic inputs to keep the aircraft at near-level attitude prior to impact.

At 15 to 20 feet agl, the aircraft was in a very nose-low, left-low attitude. Just before ground impact, CW2 Swenson bottomed collective and rotor system appeared level. When he started the APU, uncommanded rotor movements again began, so he initiated emergency engine shutdown and engaged rotor brake. As the rotor wound down, it pitched down and came very close to the PNVS unit. The rotor head made loud popping noises as it turned and came to a stop. The servos and control head continued to move after shutdown with generators and APU off, and the CPG attitude indicator and RMI spun uncontrollably.

Time from onset of the emergency to landing without damage or injury was 1 minute.

■ CW2 Rollin E. Knifley

Army Aviation Support Facility, KY ARNG, Frankfort, KY

CW2 Knifley was pilot-in-command of a UH-60 as it departed on an IFR clearance for the third leg of a cross-country ferry flight. About 5 minutes after leveling off at altitude, the crew heard a loud grinding noise from the vicinity of the right engine. The noise stopped after 5 to 7 seconds, but was followed by an explosion. The low-rotor warning horn immediately activated, followed by loss of Nr signal. In addition, the No. 2 hydraulic pump, main transmission oil pressure, right chip input module, chip main module sump, No. 2 main generator caution, and backup pump advisory lights illuminated. All this was followed by transmission pressure falling to zero psi.

The copilot, who was on the controls, lowered collective to full down while adjusting airspeed for autorotational descent. CW2 Knifley retarded the No. 2 power-control lever (PCL), set the transponder to emergency, and made the call on UHF guard frequency that the aircraft was in emergency descent due to transmission problems. He made a conscious decision to keep the copilot on the controls rather than transfer controls at that time. He directed the copilot to make a right turn toward a nearby airport and provided airspeed and altitude information to the copilot. As the aircraft transitioned through the 5000-foot-broken cloud layer, the copilot made visual contact with the airfield. Due to loss of transmission oil pressure, the autorotational descent was continued to keep the rotor aerodynamically loaded because of concern that the main transmission might seize. As the copilot continued to maneuver the aircraft through the clouds, CW2 Knifley directed airspeed adjustments to ensure reaching the runway.

Throughout the descent, the lack of Nr signal prevented the low-rotor audio warning horn from being deactivated, creating the potential for distraction in the cockpit. However, CW2 Knifley overcame this by continuous communication with the crew and proper division of flying duties.

CW2 Knifley assisted in maintaining rotor rpm awareness by visual observation of the tip path plane, comparison of rotor and engine noises, and by "feel" for the aircraft. Upon reaching 2000 feet at a rate of descent of 3000 fpm, the copilot maneuvered the aircraft for landing. As the aircraft descended through 500 feet, CW2 Knifley called out airspeed and radar altimeter readings to the copilot and directed the crew to prepare for a touch-down autorotation, not knowing whether or not the main transmission would respond to engine input when power was applied.

As the aircraft reached 100 feet agl, a cyclic flare was initiated, followed by collective cushion. The aircraft touched down with approximately 30 knots forward airspeed, and a roll-on landing was completed with no damage to the aircraft or injuries to the crew. CW2 Knifley performed an emergency shutdown on both engines, and the crew exited the aircraft.

The crew's postflight inspection revealed catastrophic failure of the right input module, loss of all transmission oil, and additional damage to the airframe and main-rotor system due to exploding debris from the input module.

Time from onset of the emergency to landing without damage or injury was approximately 3 minutes.

Note: The copilot, CW2 Gerald A. Carroll, also received the Broken Wing Award for his performance during this emergency (see Apr 98 *Flightfax*).

■ CW3 Bric A. Lewis
■ CW2 Patrick O. Nield

F Company, 158th Aviation Regiment New Century, KS

CW3 Lewis was flying from the right seat of the CH-47D, and CW2 Nield was manning the radios and navigating when the aircraft suddenly pitched nose down, followed by a rapid left yaw. CW3 Lewis' application of aft cyclic and right pedal seemed to have some effect, but the yaw could not be stopped with full right pedal. CW2 Nield placed his hands on the glare shield to prevent interference with the controls and scanned the master caution panel for an indication of the problem. Seeing no evidence of emergency or caution lights, both pilots assumed they had an advanced flight control system (AFCS) failure.

Not responding to flight control inputs, the aircraft continued its violent and uncommanded movements, making it impossible for the crew to initiate emergency procedures. CW3 Lewis attempted to reestablish aircraft control; however, as the aircraft increased its left yaw, it began to roll left as well. CW3 Lewis tried to apply right cyclic to correct the roll but

found the cyclic to be unmovable. He advised CW2 Nield that he needed assistance on the flight controls.

Despite both pilots' best efforts, the aircraft rolled left to an inverted position. It was at 1100 to 1300 feet agl and falling fast. The pilots increased their furious attempts to regain control of the aircraft as it continued its upside-down descent.

At approximately 300 feet agl, the aircraft snap-rolled upright, but it remained in a steep dive. At 250 feet, as CW3 Lewis was pulling aft on the cyclic, CW2 Nield noted that the airspeed indicated zero, but the aircraft was moving extremely fast. Both pilots began to feel weight in their seats as they saw the nose of the aircraft starting to come up. CW3 Lewis quickly glanced at the rotor rpm as it was decreasing through 115 percent, and the radar altimeter indicated 97 feet. The aircraft was now in a 20- to 30-degree climb and dissipating airspeed rapidly.

With both pilots pushing forward on the cyclic, the controls began to respond partially, and the aircraft began to level off. It still wanted to yaw left, so both pilots had to apply full right pedal. The aircraft was still approaching the ground rapidly, and CW3 Lewis attempted to stop the descent by applying full thrust, but the thrust control (collective) would move up only slightly. CW2 Nield also tried, but even with both pilots pulling together, the control would not move.

Without effective thrust control, CW3 Lewis used cyclic control to flare, and the aircraft touched down on the aft gear. After a ground roll of only 30 feet, the forward gear settled and the aircraft touched down without further damage.

CW2 Nield directed the flight engineer to check for fire and then performed emergency shutdown procedures. After the engines were secured and the rotor system began to slow down, a deafening sound filled the helicopter as the aft rotor blades struck the top of the fuselage, cutting through the hydraulic lines and flight controls. The crew immediately assumed as low a profile as they could, waiting for the blades to stop. Eventually the rotor blades came to a stop, and the crew as able to exit safely.

Lapsed time from onset of emergency to termination was less than one minute.

Note: See the May 1998 issue of *Flightfax* for first-person accounts of this accident by both pilots, the flight engineer, and the crew chief.

■ *CW2 Michael T. Senyczko*

Army Aviation Support Facility, MI ARNG, Grand Ledge, MI

CW2 Senyczko was in the back seat of an AH-1F on the second leg of a cross-country ferry flight. They were flying unaided at night with zero illumination. The terrain below was rolling and wooded with residential housing adjacent to an interstate highway, where moderate traffic was moving at 65 mph. Highway signs were located along the road, and high-tension wires crossed the road at every-other exit ramp.

The Cobra was at 1300 feet agl in cruise flight at a moderate power setting when the engine chip detector and master caution lights came on. CW2 Senyczko immediately advised the PC that the best forced landing area was a nearby highway, with the nearest airport being about 4 miles away. Fearing that the engine would fail before he could reach the airport, the PC initiated a clearing turn toward the highway. CW2 Senyczko announced that he would handle air traffic control while the PC flew the aircraft as prebriefed.

About 10 to 15 seconds after the chip light illuminated, the PC felt a yaw and heard sharp reports from the engine area. Suspecting a compressor stall, he reduced power and maneuvered the aircraft for landing to the highway. CW2 Senyczko cleared the aircraft and continued communication with approach control, who was now directing a medevac aircraft to their location.

During the prelanding check, the crew discovered that the landing light fixed to the skid had shifted during flight and was now pointing up toward the main-rotor blades. Five to ten seconds after the first compressor stall, the aircraft yawed again, accompanied by more sharp reports followed by total engine failure. CW2 Senyczko cleared the aircraft as the PC entered autorotation and continued the turn to land with the flow of traffic.

CW2 Senyczko set the transponder to emergency and declared an emergency with approach control while continuing to provide verbal guidance regarding obstacle identification and avoidance. The PC maintained airspeed at 70 knots until touchdown so as to better merge with traffic. As the aircraft skidded down the highway, he slid left to keep the right lane free for traffic. His high touchdown speed and the askew landing light helped avoid an aircraft-automobile collision.

CW2 Senyczko continued his communication with approach control throughout the emergency, then dialed 911 on his cellular phone to advise local authorities of the situation and their location.

Time from onset of the emergency to landing without damage or injury was less than 90 seconds.

Note: The pilot in command, CW4 Dennis P. Hallada, also received the Broken Wing Award for his performance during this emergency (see Apr 98 *Flightfax*).

Leadership vs. management: Some food for thought

FM 22-100 defines ***leadership*** as "the process of influencing others to accomplish the mission by providing purpose, direction, and motivation." Webster's defines ***management*** as "the act, art, or manner of handling, controlling, or directing."

Let's not miss the important difference here: Through motivation, leadership ***inspires*** performance; through control, management ***mandates*** it.

The corporate approach

Over the years, constant attrition of resources—especially of experienced personnel—has systematically molded the character of the Army's everyday operations to follow a more corporate approach. In many cases, this has slowly but surely allowed "management" to displace "leadership." As aviators and crewmembers, we need to be aware that this can have a tangible and very serious impact upon the safe conduct of our mission. We need to understand what has changed and how those changes have placed new demands upon our individual responsibilities.

In the Real Army of today, values have shifted: the "process," in many instances, has become far more important than the results it was intended to achieve. For example, during my recent Bosnia tour, notification of genuine emergency medevac missions first mobilized an administrative team dedicated to recording times and summaries of significant events. Some teammembers worked on large presentation easels for one after-action briefing, while others feverishly transferred the information into a series of PowerPoint slides for another briefing to be held at a higher level. Often, important minutes ticked painfully by as aircraft running at full rpm waited for a higher-echelon, nonaviation commander to be located and briefed so "launch authority" might be granted (and the precise time recorded).

For commanders, "control" is—and has always been—a primary objective; however, management has lately replaced leadership as the dominant means of achieving it. "Effective leadership" is now often judged—and leaders rated—by how completely and how intensively control is exerted.

"Flatlining"

Flatlining (elimination of as many variables as possible, personally managing details down to the lowest possible level, ensuring everything unfolds as precisely and predictably as planned to provide the next higher commander with a smooth, flawless after-action briefing) seems to have become an unofficial cornerstone of many real-world Army operations. While the commander-as-flatliner might serve well when, say, meticulously managing supply statistics, it can be a radically different story when applied to aviation. Despite this, it happens—and happens often.

Imagine this: Worried about higher headquarters tracking the number of deficiencies on unit aircraft, a commander personally examines every logbook and demands a justification for each write-up from the crew chief. He or she then imposes a "solution" that results in restating, interpreting, waiving, or eliminating the deficiencies such that the statistics "improve" without, in some cases, any work being done to the aircraft. Would this be "effective management" (i.e., systematic evaluation to bring documentation into line with regulations and perhaps produce a more accurate picture)? Very likely. But how many crew chiefs waiting with logbooks decide to distort that picture by understating problems to avoid being harangued? And how many subsequently hold off reporting discrepancies they know might bring unwanted attention?

Unnecessary stress

Imagine this: During real-world operations, the commander assails a pilot-in-command during the daily flight operations briefing for reporting the actual number of hours of sleep he got the previous night. Why? The real number would drive up the numerical value of the mission risk assessment and call attention to the statistic. In front of his colleagues, the aviator receives serious rebuke from his commander (and senior rater) for telling the truth in a document designed to provide a realistic evaluation of life-critical risk. The PC, an IP and highly experienced aviator, grudgingly revises upward the number of hours he slept.

Stress? What would you have done? What might you do the next time? Be honest, now.

An important bottom line is that, once through translational lift, aviators enter an environment where the certainty of physics displaces even the most fashionable management model. Demands in this environment never change, and neither must the aviator. Aviation is very likely the most unforgiving of human activities, and this is especially true as aircraft and systems have grown increasingly powerful and complex. In today's more "corporate" atmosphere, the requirement for aviators and other crewmembers to realistically assess and deal with their environment has never been greater.

"Team playing"

In three decades as an Army aviator, I've served under a lot of commanders and observed a myriad of leadership—and management—styles. More and more in today's Army, I'm seeing that commander-managers are increasingly likely to believe that just because someone has passed the checkride, they're "good to go." Seemingly far more important to some commanders than flying ability nowadays is how individual aviators couple with nonaviation goals; i.e., is this person a "team player?" With the decrease in flying hours and actual aviation activities, emphasis appears to have shifted to additional duties and how compliant and productive an individual might be relative to the constantly changing requirements of everyday administration. This encourages the "Well, if you can't do it, I'll just get someone who can" syndrome.

Imagine this: Higher has requested that two aircraft launch to a remote base late at night and in bad weather. It's not an emergency, and en route conditions are reported below minimums. Crews openly resist attempting it while, pressured from above, the commander and the next higher echelon insist they go. Meanwhile, similar pressure is applied to the weather forecaster as an O-5 personally requests that the forecaster make a "special observation." Finally, as the new, bare-minimum special observation arrives, the commander substitutes the unit SP for the PC who's been most vocal about the obvious hazards. At the same time, the commander decides to personally take the place of a far more experienced PI on the second crew since that PC is a proven "team player." All this unfolds amid bitter argument in Flight Operations and in front of most unit aviators. The mission launches, encounters the previously reported below-minimum conditions at the halfway point, and has to "feel" its way back.

Though what I've described isn't supposed to happen, it has happened and continues to occur. However, Army aviators and other crewmembers have a genuine responsibility to maintain a clear and unmistakable sense of personal integrity, identity, and sovereignty, despite attempts at flatlining anywhere in the command chain. Aviators, as distinct from most other line officers, face a unique and unyielding requirement to address and quickly deal with situations whose edges are at best ill-defined and where the penalty for incorrect assessment can be deadly.

Summary

As leadership has deteriorated into management, the climate has grown increasingly hostile to individuality and calculated risk-taking, replacing it with structured review and carefully controlled response, perhaps imposing risks that might be wholly unnecessary. Statistically, this approach might prove cost-effective in some broader sense, but, in aviation, situational demands and immediacy make it unrealistic. What will ultimately show itself most productive is still uncertain; learning and change go hand-in-hand, but neither happen overnight.

In the meantime, as Army aviators and crewmembers, we must discipline ourselves to retain our individuality and independent thought processes that form the foundation of effective risk management. We must be prepared to make informed decisions and stick by them.

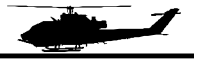
This is nothing new. More than 50 years ago, General George S. Patton summarized it well: "When everyone is thinking alike, no one is thinking."

—CW4 David Rosenthal, 126th Medical Company (AA), DSN 437-6401 (760-939-6401), n6tst@ridgenet.net

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class E
F series

■ While hovering to park following limited maintenance test flight, engine oil bypass light came on. Aircraft was landed and emergency shutdown performed. Inspection revealed that broken O-ring in ODDS chip plug had allowed more than 4 quarts of engine oil to leak out.

■ At end of hot refueling operation, refuelers shut pump off at truck. When refueler removed nozzle from aircraft, fuel under hose pressure sprayed on aircraft. Dead-man valve and emergency shutoff were closed, and pilot performed emergency shutdown. Ground personnel applied water to aircraft and refueler. Inspection found that pin inside nozzle had broken off, preventing nozzle from shutting off. About 5 gallons of JP-4 spilled.

■ During flight, both pilot and gunner's N1 gauges became erratic. No other indications were noted. Caused by failure of N1 tachometer generator.

■ Master caution and No. 1 hydraulic pressure caution lights came on in cruise flight at 200 feet agl and 100 knots during training mission to exercise operational float. Aircraft was flown to nearby airfield, where shallow approach and landing were made without incident. Caused by defective switch.

AH64

Class A
A series

■ Aircraft crashed during night training flight. Both crewmembers were killed. Investigation is under way.

Class B
A series

■ Aircraft was hovering at 150 feet agl in battle position during night battle drill. Aircraft settled and blade tips came into contact with tree. Crew was not injured.

■ Maintenance personnel discovered damage to all tail- and main-rotor blades and stabilator. Aircraft had last been flown the evening before for unit deep-attack training.

Class E
A series

■ After 1 hour night flight, aircraft was landed to refuel. Fuel handlers noticed that both tail-rotor driveshaft covers were unsecured. Aircraft was shut down, and damage was found on aft driveshaft cover.

■ APU failed during normal ground operation, resulting in hard shutdown. Troubleshooting revealed that No. 2 generator was throwing sparks out of inboard side. APU was 100 percent, but generators were off line. Generator was replaced.

■ While hovering to land, oil bypass utility caution light came on. Aircraft was taxied to parking. Troubleshooting revealed utility manifold was defective.

■ Aircraft was refueling in FARP with No. 2 engine power lever off and No. 1 engine power lever at fly. When aft fuel cell was full, fuel crossfeed switch was placed in aft position in preparation for filling forward fuel cell. Amber crossfeed caution light came on, indicating that No. 1 engine fuel crossfeed shutoff valve had not rotated to correct position, but pilot failed to recognize condition in time to prevent No. 1 engine from flaming out. Aircraft was shut down without further incident. No. 1 engine crossfeed shutoff valve was replaced.

■ No. 1 engine would not start. Maintenance removed starter and found that starter shaft was sheared. Starter and starter valve were replaced, and QDR was submitted.

CH47

Class C
D series

■ No. 2 engine transmission hot light came on during vibration check, followed by combining engine hot light. Damage was confirmed to nose and combining gearboxes.

Class E
D series

■ Aft cargo hook open caution light came on during hover power check with M198 in tandem configuration. Load was set down, and crew attempted to manually reset hook. Caution capsule illuminated during second attempt, and external load portion of mission was terminated. Maintenance replaced aft hook.

■ Aircrew was performing amphibious operations when crew chief announced hydraulic fluid was leaking from flight-control closet. PC announced to abort maneuver and depart for landing area. PI began climb and, at 40 feet agl and 10 KIAS, No. 1 hydraulic flight-control light came on with No. 1 AFCS light. Aircraft then entered uncommanded 25-degree nose-down attitude. PC recovered aircraft and landed without further incident. Maintenance replaced failed packing.

■ Aircraft made uncommanded right-pedal yaw during hover. Aircraft landed without incident. Maintenance could not duplicate during test flight.

■ While passing through 60 KIAS during instrument takeoff, aircraft started to vibrate. As airspeed increased to 80 KIAS, vibration became severe. Aircraft landed without incident. Postflight inspection revealed that red forward rotor blade was separating.

■ During cruise flight, IP initiated simulated engine failure by decreasing emergency engine trim. Engine failed to stabilize, and N1 fell to zero. Aircraft landed safely. Maintenance replaced bleed actuator.

OH6

Class C
J series

■ Tail boom contacted ground during landing. Aircraft sustained damage to two tail-rotor blades, tail-rotor gearbox and driveshaft, vertical stabilizer, and tail stinger.

OH58

Class A
D series

■ Engine-out audio activated at 400 feet AHO and 80 KIAS, followed by low-rotor audio. Crew initiated autorotation, lowering collective before aircraft descended to ground impact.

Skids spread and right skid reportedly caught, after which aircraft rolled onto its right side with the blades still turning. Crew was able to egress with only minor injuries through front windscreen.

Class C

D series

■ Aircraft encountered birds as IP was demonstrating antitorque maneuver. As IP attempted to avoid bird strike, mast torque limit light came on and engine torque reading reached 122 percent. Aircraft was hovered to parking and shut down without further incident. Regulatory limit for engine torque is 121.6 percent. Extent of engine damage has yet to be determined.

■ Crew noted engine torque reading of 125 (limit is 121.6) percent during power recovery from standard autorotation at 15 to 20 feet agl. Extent of engine damage has yet to be determined.

Class E

C series

■ During simulated antitorque (fixed right pedal), aircraft touched down aligned with runway. During ground slide, wind (gusts to 35 knots) pushed aircraft to left toward taxiway light. IP initiated brief cyclic climb to get over light; however, right skid hit and broke light. Aircraft continued to slide off runway about 50 feet. No aircraft damage was found.

D series

■ As aircraft descended into canyon, wind gust from behind aircraft caused increased rate of descent. To prevent landing on Chalk 1, pilot performed go-around, which demanded more power to climb out above ridgeline. Aircraft overtorqued. Inspection revealed no damage.

■ Engine oil pressure oil low caution light and audio activated during cruise flight. Crew executed precautionary landing to unimproved field site without incident. Maintenance inspection determined that the manufacturer had incorrectly assembled a seal in the engine, resulting in internal engine oil leak. Engine will be replaced; QDR was submitted.

■ During MOC for tail rotor at 0 KIAS and 3 feet agl, system indicated high engine oil pressure. Crew landed without incident. Caused by faulty pressure transducer.

■ During runup for multiship mission, FADEC degrade (droop) advisory message appeared. Pilot aborted mission and began shutdown procedures. When he closed throttle, there was no response from engine. He then pulled fuel valve handle to starve engine of fuel and finished shutdown procedures. As engine began to wind down, pilot received FADEC fail warning message. Cause not reported.

UH1

Class E

H series

■ Rotor and engine rpm light and audio came on in cruise flight. With engine rpm at 5680 and rotor rpm at 280, pilot lowered collective to regain rotor rpm and performed emergency governor operations to recover engine rpm. Engine overspeed (6950 rpm) during short final lasted 5 seconds. Aircraft landed in horse corral without incident.

■ En route to field landing site after picking up three passengers at civilian airport, engine tach indicator malfunctioned. Caused by broken shaft on N2 latch indicator.

UH60

Class D

A series

■ Infantry soldier inadvertently jettisoned cargo windows on left side of aircraft during offloading. Missing windows were not discovered until return to PZ.

■ Tail-rotor de-ice cable separated, then shed its insulation. Insulation hit top of stabilator, causing skin damage.

Class E

A series

■ During cruise flight, left antitorque pedal moved 1 inch forward without pilot input. This was followed by flight path stabilization system and gyro system failure advisory lights. After resetting automatic flight control system computer, electrical odor and smoke filled cockpit. Computer was shut off and aircraft landed without further incident. AFCS computer was replaced.

■ During shutdown after test flight for fluctuating tgt on No. 1 engine, No. 2 engine failed while retarding power lever to idle. Cause not determined.

■ While on ground with engines running, No. 2 engine failed when No. 1 engine was placed in ECU lockout. Aircraft was shut down without further incident. Maintenance replaced No. 2 engine pressurizing and overspeed unit.

L series

■ During shutdown after IFR flight, APU would not start. Several attempts were made to manually start the APU without success. With No. 1 engine at idle and No. 2 at fly, battery and generator power were removed and then reset. At this point, No. 1 engine flamed out. Maintenance investigated incident and determined that fuel starvation had occurred. O-ring packing around No. 1 main fuel tank breakaway valve disintegrated, allowing air into the fuel system and resulting in engine flameout.

C12

Class E

D series

■ During taxi, right pedal was displaced 6 inches forward of left pedal to maintain centerline. Maintenance inspection revealed faulty link assembly, which was replaced.

F series

■ While leveling at FL200 in IMC, CP windshield cracked at lower left center area. Seconds later, external cracks spread to finally cover three-quarters of the surface area.

■ While moving power levers from flight idle to max available during demonstration of a stall "clean configuration" maneuver, what was believed to be a compressor stall occurred between 400 and 600 pounds of torque. Crew discontinued mission and returned to airfield. Caused by inoperative low bleed air valve on No. 2 engine.

J series

■ After landing, aircraft would not respond to rudder pedal steering input due to failure of nose wheel steering actuator. Aircraft was safely taxied to parking by using differential braking and power. Actuator was cleared and lubed, and aircraft released for flight.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action messages

AH-64-99-ASAM-05, 121843Z May 99, maintenance mandatory

Investigation of a fire in the APU area revealed the need for additional installation, inspection, and servicing procedures for the PTO clutch. This message outlines the new requirements and procedures.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), howard.chilton@redstone.army.mil

AH-64-99-ASAM-06, 121910Z May 99, maintenance mandatory

A main rotor retention nut was recently found to be cracked. Failure of this nut was attributed to stress corrosion cracking. The purpose of this message is to direct initial and recurring inspections of AH-64 main-rotor retention nuts.

AMCOM contact: Mr. Howard Chilton, DSN 897-2068 (256-313-2068), howard.chilton@redstone.army.mil

OH-58-99-ASAM-06, 171323Z May 99, maintenance mandatory

Some Allied Signal (Bendix) fuel control units may contain springs that have manufacturing damage. Failure of these springs will result in immediate engine deceleration.

This message requires inspection of all fuel controls to identify those that require repair.

AMCOM contact: Mr. Ron Price, DSN 788-8636 (256-842-8636), ron.price@redstone.army.mil

OH-58-99-ASAM-07, 271156Z May 99, maintenance mandatory

Message OH-58-99-ASAM-05 required removal of tail-rotor driveshaft bearing hanger supports for nondestructive inspection (NDI). This messages revises the NDI procedures outlined in the previous message.

AMCOM contact: Mr. Ron Price, DSN 788-8636 (256-842-8636), ron.price@redstone.army.mil

Safety-of-flight messages

UH-1-99-SOF-02, 071815Z May 99, emergency

A recent UH-1V accident involved in-flight separation of the tail boom vertical fin. It is suspected that the vertical fin spar assembly failed due to metal fatigue.

This message grounds the Army's fleet of UH-1s until each helicopter's vertical tail fin spar assembly can be inspected in accordance with approved procedures, which will be published in a follow-on SOF message.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), bob.brock@redstone.army.mil

UH-1-99-SOF-03, 281815Z May 99, technical

The purpose of this message is to require mandatory initial and recurring inspections of the vertical fin spar assembly for cracks. Inspection procedures have been provided to all Logistics Assistance Representatives (LARs) and ARNG AVCRADs. Fax and e-mail will be used to provide these instructions to units that do not have access to a LAR. Procedures will also be available in TB 1-1520-210-30-1 and on the utility-helicopter web page.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (256-842-8632), bob.brock@redstone.army.mil

POV fatality update through May

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY99
79	86

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Class A Accidents through May

		Class A Flight Accidents		Army Military Fatalities	
		98	99	98	99
1ST QTR	October	2	1	0	0
	November	1	1	0	2
	December	2	1	2	0
2D QTR	January	1	1	0	0
	February	1	4	0	2
	March	1	0	0	0
3D QTR	April	0	2	0	7
	May	1	3	0	2
	June	2		4	
4TH QTR	July	1		0	
	August	0		0	
	September	0		0	
	TOTAL	12	13	6	13

U.S. ARMY SAFETY CENTER

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Gene M. LaCoste
Brigadier General, USA
Commanding

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

AUGUST 1999 ◆ VOL 27 ◆ NO 8 http:/safety.army.mil

"Weather " or not to go?

In this issue of *Flightfax,* we have compiled several historical articles on weather risk management to help you answer that age-old aviation question.

Next month's issue: Power management issues. We look at the problem and consider solutions

FYI

Recipe For Disaster

"Well, that would never happen to ME!"

This is a true story written by a senior warrant officer. It's full of food for thought about a lot of things: about weather; about cockpit communication; about aircrew coordination; about speaking up, giving in, giving up—about saying "Enough"; about mission at all costs, about unnecessary risk; about judgment, about lack of it; and about craziness—and how good aviators can let themselves get caught up in it.

We don't know that these guys were doing anything ***illegal***, but they certainly were doing things that were ***imprudent***. Luck is all that got them back alive.

We've all heard it. Most of us have said it—maybe a couple of times.

It happens when we hear a "war-story"—or read an account in *Flightfax*—about some tragic, scary, or incredibly stupid experience in aviation. Our bluster is kind of a posturing—deflecting possible notions by peers that chinks might exist in our armor.

But how many of us have actually been present as one of these aforementioned events unfolded? How many have actually sat there watching things get stupider and stupider? And it's *you* sitting there. And you find yourself essentially powerless to do anything.

I'm here to tell you that, despite aircrew coordination training, despite the "Two-Challenge Rule," despite *anything*, it *can* happen and it happens every day.

My tale begins in the jungles of Central America—the Last Mission of the Last Day of a 6-month road- and school-building operation. The pilots were two senior W4s: one, an IP, PC, and UH-60 operations officer who'd been in- country for the entire operation; the other, me, at the end of my second 2-week deployment.

A Chinook was scheduled to extract a group from a hillside LZ, but the aircraft developed maintenance problems. Ops decided our UH-60 would try to do it. But it was the rainy season, and the afternoon torrent had already begun.

With it coming down faster than an inch per hour, visibility was nearly nonexistent as we cranked, and water poured into the cockpit from various leaks. Nevertheless, the PC thought we might make it to the pickup point by slowly working our way up the river that ran by our base camp. We crept off the ground, our young—and now drenched—crew chief clearing us past mist-shrouded trees.

We picked our way along in intense rain with the ceiling defined by getting high enough into the shower to lose sight of the ground. I remarked that it didn't seem like a very good idea to try and get through in these conditions, but the PC told me he'd seen worse. I suggested we try a route along the nearby coastline since shower activity looked to be minimal there. He agreed but wanted to press on in case we could skirt everything via the river. Then the FIRE light came on.

False alarms are common in

heavy rain. We checked for smoke or other evidence of fire and no one was surprised that nothing was wrong. Moments later, the FIRE light went out.

We continued, conditions worsening and visibility decreasing—as low as a hundred feet or so in some of the heavier downpours. Even with the windshield wipers flailing at their highest speed, navigation was treetop-to-treetop at best. I told the PC this *still* didn't seem like a wise thing to do and he sort of agreed, admitting it didn't look good to him either. The FIRE light popped on again and went out.

This prompted us to turn around. Then the FIRE light came on and stayed on. Concerned, I suggested we call this whole thing off, but he now wanted to try the coast and asked if either of us had a problem with doing that. Considering that the crew chief and I both knew the FIRE light was a false alarm and the coast looked a lot better, we reluctantly assented.

Toward the coastline, we immediately broke out of the heavy rain, and the FIRE light disappeared. We headed along the fringe of the rain activity to try and find a spot to get through.

But it quickly became obvious that this shower was massive: a solid wall running through the hills for many miles. As we continued, conditions worsened again; the downpour resumed, and visibility in the direction we needed to go dropped to zero.

Suddenly, our PC turned out to sea, heading for an island about 5 miles across open water, telling us his plan was to follow a string of islands and try to reach the pickup point that way. In driving rain, at an altitude of about 500 feet above the water, without floatation gear, no navigational receiver or GPS, a marginal-at-best tactical radio, and no map, I felt like we'd been hijacked. Only I couldn't squawk 7500 because the transponder didn't work either. And besides, what the *hell* were we doing in heavy rainshowers at 500 feet and more than 2 miles from the nearest patch of solid ground? I told him I had genuine reservations about continuing.

"No problem," he told me as we followed the islands back toward the Great Wall of Weather. He'd been here 6 months, he said, and knew exactly where he was. I told him that might be true, but *I* still didn't have a good feeling for where we were. He lamented that people sent down here didn't get the opportunity to become as familiar with the area as *he* was.

He began describing landmarks visible here and there and insisted he knew where he was. I told him none of that would matter if we got stuck behind some ridgeline. He pointed out that we had plenty of fuel.

As we continued, I imagined someone reading the account of this foolish misadventure as part of an accident report. Suddenly, all the unbelievable, fact-filled reports I'd read assumed a new reality—it was *me* being drawn ever deeper into deadly absurdity by some individual apparently obsessed with accomplishing a mission. Remembering my aircrew coordination training, I again told him I was genuinely uncomfortable with what we were doing and that we should turn back. No response. ("Two-Challenge Rule" scoffers take note: *YOU* get into a cockpit fight under these conditions!)

Back on the mainland, we felt our way through the torrent, poking around hilltops until he decided this approach wouldn't work after all. To my—and I'm sure our crew chief's—utter relief, he headed back toward the bay and more open conditions.

But as we continued homeward, he spotted an opening and decided to follow it. I told him again how uncomfortable I was with doing this—the Cold War was over and there were no Russians chasing us. He chuckled as we followed the cloud-obscured ridgeline until finding a tiny hole.

He dropped over it despite my warnings about its volatility. No problem; we could always find another way out.

Now inside the ridgeline and committed to a yet *more* intense adventure, he joked about our spending the night at the remote camp. Nobody laughed.

Following a dirt road and a few treetops, we located the edge of a village and picked up the road our Task Force had built. We traced it up the mountain, slowly ascending through the downpour toward the ragged cloud bottoms. The LZ came into view just beneath the ceiling. The PC gave me the controls and I landed.

Our contact was "Shark Fin 07," and the radio operator sounded amazed as he answered our call. The PC asked for ten passengers and they sent them. I told him that once—and *if*—

we got back, that was *it* for this day as far as I was concerned. Sensing by now that I was somewhat troubled by the enormous amount of unnecessary risk this mission represented, he told the radio operator this would have to be our only load. The radio operator assured us that was okay; because of the weather, they'd already set up rides back to the base camp for everyone via ground vehicle anyway. He thanked us for our efforts.

Loaded up, I pulled in power to find our rotor in the clouds. The PC took the controls. He'd spotted some trees down the hillside and headed for them. We began picking our way back along the base of the ridgeline, now looking for an escape.

As we approached what looked to be a hole, I angrily told him I thought what we were doing was foolish and absolutely unnecessary, that we now threatened the lives of ten innocent people in addition to our own. The crew chief, who had been keeping quiet all this time, came on the intercom to say he wanted out when we got back.

The hole turned out to be a good escape, and we dove for it. All at once, visibility improved and we headed back. He gave me the controls again. He'd proved he could "accomplish the mission." And he'd certainly impressed me.

We got down, and all I wanted was out. After shutdown, I grabbed my gear and stormed off in the still-pouring rain, more angry at myself than anything else.

Stupidly, I had let myself be drawn under the control of someone with an obsessive compulsion to "accomplish the mission" regardless of risk. What happened to myself and the crew chief is the very stuff I "tsked" about when reading accounts of events leading up to accidents. It will never happen again.

Every day during my deployment, I'd posted a "Thought for the Day" in Flight Ops; that day's was: "Experience is something you don't get until just after you needed it." Apparently, I'd missed my own point.

I had a long talk with the aviation OIC but to little avail; after all, the operation was over now. The next day, I took the ops officer/IP/PC aside for a half-hour discussion about how stupid it had been: I was lucky because *he* was lucky; how would he like his excessive motivation to be responsible for killing a bunch of innocent people? I think he listened. Or perhaps he didn't.

What might have prevented the whole debacle would have been a serious pre-mission brief stressing risks, controls, and the criticality of continually verifying *everyone's* desire to continue. Plying a razor-thin line between treetops and cloud-bottoms is hardly the place to discover your PC has flushed everything he learned in aircrew coordination training. And that seems the most important lesson, since in today's "can-do," "Hooah!," "good-to-go" world, excessive motivation increasingly replaces calm and considered judgment.

And, sorry, but I don't want to hear, "Yeah, well *I* woulda took them controls!" or "*I* woulda put it on the ground right then and there!" or any other armchair quarterback chin music. Like any genuine war-story, you had to *be* there.

And remember too: This guy is *still* out there.

—Anonymous. Reprinted from *Flightfax*, November 1996.

Thunderstorms: A primer

What is a thunderstorm? Simply stated, it's a storm that generates lightning and thunder. But it's also capable of generating a lot more, including high winds, hail, flash flooding, and tornadoes.

During their formative stage, thunderstorms are characterized by strong updrafts that can force the storm to a height of more than 60,000 feet. Moisture in the lowest levels of the atmosphere becomes the fuel that fires up the thunderstorm development process. As tiny moisture particles are forced upward, condensation causes them to develop into droplets. As they collide with other droplets, they merge and grow in size. When they become too large for the updrafts to support, the droplets begin to fall. This falling precipitation creates a ***downdraft***.

As the downdraft reaches the surface, it produces a diverging pool of cool air, which becomes the ***gust front*** or ***downburst***. A downburst with winds extending 4 kilometers or less is known as a ***microburst***. Microburst, and its accompanying

(light • ning bolt)

...an electric discharge that can have a current as great as 100,000 amperes.

A charge of this magnitude can damage an aircraft's fuselage and electrical components; it could even cause fuel combustion.

wind shear (rapid changes in windspeed or direction) can be difficult to detect and predict because of its small scale and short lifespan.

On a larger scale, one of the most potentially severe events is the ***squall line***. The squall line is a line of thunderstorms that can form along a front or develop 100 to 300 kilometers ahead of it. The mechanism for this event is the angle of the wind flow at about 10,000 feet. A wind flow aloft that is parallel to the front will generally keep most squall-line activity along the front. However, a perpendicular flow can cause squall-line development well ahead of the advancing frontal system. As the thunderstorms in the line develop downdrafts, downbursts may generate new thunderstorms ahead of the squall line. As the advancing downburst winds advance, they may force warm, moist air aloft ahead of it, generating a new squall line.

Strong upper-level wind flow may cause individual thunderstorms to develop rotation in their core. If a large-enough portion of the core is rotating, it's called a ***mesocyclone***. Within the mesocyclone, there may exist a smaller, more intensely rotating updraft that can lead to the birth of a ***tornado***. This violently rotating column of air descends from the base of the storm, at which point it takes on its familiar appearance. If the tornado, with its windspeeds of more than 180 knots, doesn't reach the ground, it's called a ***funnel cloud***.

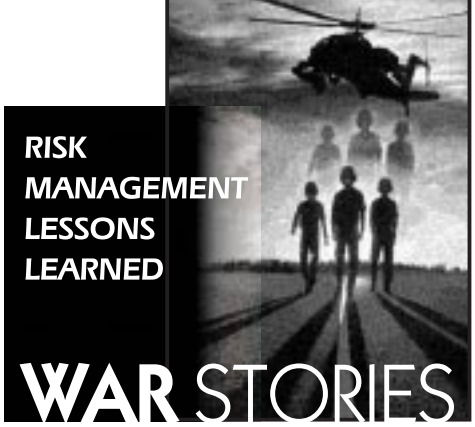
One of the greatest threats to aviation is that of ***lightning***. As a thunderstorm develops, an electrical charge builds up in the cloud. The exact cause of this electrification is unknown, but what is known is that unlike charges attract each other. The manifestation of this attraction is the lightning stroke (or bolt), an electric discharge that can have a current as great as 100,000 amperes. A charge of this magnitude can damage an aircraft's fuselage and electrical components; it could even cause fuel combustion.

Most lightning strikes to aircraft occur near the freezing level during ascent and near the tops of thunderstorms in level flight. As an aircraft flies through the air, it develops a charge, which in turn could attract an opposite charged lightning strike. The use of composite materials in aircraft skins increases the buildup of a charge during flight, increasing the probability of attracting a lightning strike.

One final phenomenon associated with thunderstorms is ***hail***. As the updrafts in the storm carry moisture aloft past the freezing level, water droplets freeze into ice. As these ice particles are held aloft, they pass through areas of moisture and acquire further coats of ice. This process continues until the ice buildup makes the particle too heavy to be supported aloft, and it falls. This falling particle is hail, which could be encountered aloft during flight even in areas where the freezing level is high enough that the hail melts before it hits the ground.

Despite all the recent advances in technology, there are still limitations to what can and cannot be done to support aviation when it comes to thunderstorms. Even with Doppler weather radar and new lightning-detection capabilities, the oldest axiom still applies—avoidance is still the best rule to live by.

—MSG Ray O'Brien, U.S. Air Force Weather Service, Fort Rucker, AL, DSN 558-8270 (334-255-8270). Reprinted from *Flightfax*, August 1997.



Gremlins lurking in the weather office?

It was mid July, and I was to fly an OH-58 out of a commercial airport in the Midwest. As I headed out to the ramp, I noticed the sky darkening far to the northwest. My weather brief was about 30 minutes old, so I decided to go back inside and get an update. I called Flight Service at 1700 and was told that an AIRMET had been issued for thunderstorms. The prediction was that these storms would not arrive at my location before 2200. The controller then added, "It may get there a little sooner than forecast, but you should have at least 2 to 3 hours."

As we took off at 1715, I looked to the northwest and saw black clouds. It was difficult to tell how far away they were, but they seemed a little closer than they had been at 1700. A few minutes later, my crew chief asked, "How far away does that storm look to you?" I looked around; it was definitely closer now. I replied, "Too close!"

The storm cloud was black, and we could now see that it was spitting lightning rapidly. The tower confirmed that it was headed toward the airfield from which we had just taken off and "closing rapidly." I notified the tower that we wished to land ASAP. At that point, we were 1 to 2 minutes from the airfield. I glanced at the clock; it was now 1737. It had been only 22 minutes since we took off.

What had happened to the forecast 5 hours and the assured minimum of 2 to 3 hours we would have before any foul weather appeared? As we approached our landing spot, we could see what looked to be horizontal tornadoes of dust spooling across the plowed fields to the northwest. We landed and dropped off our passenger without shutting down.

The storm had a forward-sloping leading edge, which, at a few thousand feet AGL, had already passed over us by a couple of miles. We took off into the wind and built up airspeed and altitude before turning downwind and away from the approaching storm. We set maximum endurance airspeed power for possible turbulence penetration.

We continued flying out from underneath the upper leading edge of the storm for 3 or 4 minutes. There was only light turbulence and no rain or visibility restrictions. The leading edge seemed to be getting higher and higher above and further behind us and we were breaking out into clearer skies. I set cruise power. It looked as though we had outrun the storm and had a clear path back home.

Just then, we abruptly encountered turbulence that was as strong as any I have ever encountered in a helicopter. We were at about 1100 feet AGL.

I reduced torque back down to that for maximum endurance airspeed for turbulence penetration and no less. The engine governor was already struggling with N2 upper excursions in this turbulence.

And then we were out of it. It was gone as suddenly as it had appeared.

It all turned out well, but what can we learn from this experience? The way I see it is that we pilots can get into enough trouble on our own without being lured into false security and poor decision making by inaccurate and incomplete weather information. It's a given that we cannot expect perfection in weather forecasting, but we should be able to expect a reasonable degree of accuracy on forecast weather. And we should expect ***very*** accurate, detailed, and complete reporting of ***current*** weather conditions.

Weather is a realm of constant, ongoing change and evolution. Forecasts are continually becoming present weather. Current weather is moving elsewhere—and usually evolving into something different as it moves along.

What we can do to reduce the risks inherent in ever-fluctuating weather is to make the very most of new-generation Doppler radar and satellite coverage. It is, fortunately, becoming widely available at flight facilities across North America. This on-line weather service allows us to "visualize" weather. Its time-motion sequence enhancements and wide variety of other tools enable us to be as thorough as we wish to be in obtaining weather information.

We should be cautious and skeptical anytime we must receive a weather briefing solely by telephone or radio. In such cases, we should ask a lot of questions. If we have even the slightest doubt about the briefing, we shouldn't hesitate to call the nearest military weather office—even if it is some distance removed from our location. Our first choice should be to get a genuine "full-

service" military weather briefing. If that's not possible, we should try to get input from more than one source. This is not "shopping for weather" if we remain suspicious and promote a mindset that the worst forecast is probably the most accurate.

—CW4 Don C. Thomson, Missouri ARNG, DSN 555-9330/9347 (573-526-9330/9347). Reprinted from *Flightfax*, July 1997.

Communication: Live by the word, die by the word

We all know that military aviation is an inherently dangerous business. Having been in the "business" for a little over 18 years, I've witnessed many of those dangers. Sometimes, however, we experience luck and the danger passes with no damage to personnel or equipment (or both). During my career in aviation, I've noticed that mishaps have a single common thread that not only links the results, but could have prevented the mishaps in the first place.

Of course, that link is communication. If you think of all the situations leading up to a mishap, you can pinpoint a breakdown (at some point) in communication. A breakdown in communication is usually the first hazard that creates a chain of events, a chain that ultimately leads to a mishap.

I'm reminded of my experiences as a junior aviator and what I've learned from many close calls while flying attack helicopters. Recently, I was going through some pictures of fellow aviators I once flew with. One of those pictures was of a brand-new pilot assigned to our unit just before we deployed for a 30-day field exercise at Fort Irwin, CA. As one of the unit's new trainers, I was assigned the new guy as a copilot. He was not only young but seemed to be somewhat of an introvert (unusual for the attack-helicopter community). Every day we flew together, I wanted to teach him something new and valuable that would make him not only good, but safe! We spent our battle drills working on crew-coordination techniques, tactics, and other tools to improve our proficiency. That one aspect of his personality, shyness, never seemed to surface during our flights. My assumption was that he left that on the flightline when he climbed in the aircraft. This assumption was the beginning of a breakdown in communication that nearly cost us our lives and the lives of another aircrew.

We were flying a Combined Arms Team battle drill. Our mission was to fly to a battle position (BP) with three other AH-1s. We had 2 Scout helicopters with us that provided oversight, command and control, and other routine services. As we entered the BP we had maneuver room and set about getting the best observation position for unmasking and locating the armor targets we knew would be entering the "kill zone." As we maneuvered, I was unaware that one of our Scout helicopters had landed (to our 5 o'clock) and was waiting for commo from another battle captain. My new guy (in the front seat) saw the Scout land, and he assumed that I had seen it as well. Unfortunately, my eyes were trained in the direction the enemy was expected to come from, and my scan was limited to that side of the aircraft (opposite the Scout). As we slowly hovered at 10 feet agl, something didn't feel right, and I increased power to gain about 10 additional feet. As I did, something caught my peripheral vision. The two pilots from the Scout were looking up at us as they ran away from their aircraft, ***which I now saw below our own landing skids.*** Our skids cleared their main rotors by no more than 5 feet as we flew directly over them! The Scout pilots knew it was too late to get our attention with a radio call, so they bailed. As I cleared their main rotor with our aircraft, my terror was replaced by sheer anger at my copilot, who seemed to be enjoying the whole ordeal. My first words to him were, "Did you see that aircraft?" He said he had and didn't say anything to me because he thought I saw it too. I was livid.

We landed and shut down our aircraft. I quickly approached the Scout pilots and apologized, explaining the problem. They were just happy I had my "psychic friends" along that day when I decided a 20-foot hover felt safer (just prior to impacting their aircraft). My new guy and I had a long talk about never assuming anything while in the cockpit. I told him that our breakdown in communication for just that single 30- to 40-second period nearly killed us and the Scout crew and nearly destroyed two aircraft.

I learned a valuable lesson that day, not only about crew coordination and communication between crewmembers, but also that personality plays a significant role in determining the thoroughness of a crew briefing. Knowing my copilot's introverted nature outside the cockpit should have sent me a signal. I should have stressed to my new guy that shy behavior and precise cockpit communication is an oxymoron.

We can never assume anything about the other crewmember while flying. When we aren't as precise as possible in communicating thoughts, ideas, and directions, there is a degradation of safety and a sharp increase in potential risk.

In Army aviation, as well as in every aspect of today's society, there seems to be a decline in understanding between individuals caused by a simple lack of or breakdown in communication. The only way to improve our skills in this area is to practice constantly. Mission pre-briefs and post-briefs are ways to identify and correct deficiencies in communication. Writers, politicians, and some other professions "live by the word and die by the word." Believe me, aviators can be added to the list of professions that should heed that old axiom. Your life may depend on it!

CW4 Tom Clarke, PA ARNG, DSN 664-3221, ext. 8903 (703-604-3221, ext. 8903).
Reprinted from *Flightfax*, March 1997.

Ask yourself: Even if it's *legal* to go, how *prudent* is it?

What happens if it's right at the limit—just good enough to take off? What if you do take off and then it turns to soup 15 minutes into the mission? What are you going to do now? Can you land where you are and wait it out? What are you going to do if you can't?

What if it gets so bad that you decide to turn around, and there ***ain't no turning around***—you bump into the clouds? What are you going to do now? Do you have a plan? Do you have enough fuel? Are you prepared to deal with IMC?

Ask yourself: Am I truly prepared to deal with IMC?

Do you have excellent proficiency? Are you totally prepared? Do you have a plan that you've coordinated with the rest of the aircrew? Have you briefed it? Is the aircraft properly equipped? Do you have navaids and instrument approaches available? Do you have a coordinated plan to reduce the effects of spatial disorientation should it strike you or another crewmember in inadvertent IMC?

Ask yourself: How bad does it have to get before I say no?

If you are routinely flying in the worst weather that's legal to fly in, it's only a matter of time until you find yourself inadvertently IMC. And if you're not ready—not fully prepared—this could be where the statistics catch up with you and you have an accident. And please remember that accidents resulting from inadvertent IMC situations are ***very rarely*** minor accidents.

Ask yourself: Is *this* mission worth doing in *this* weather?

Maybe your unit should establish some weather criteria of its own. How much experience does the unit have? Are you a bunch of old-timers who've got a lot of IFR time and are well prepared to deal with IMC? Or are most of you rookies who haven't been inside a cloud since you were with your IP in flight school? Or are you somewhere in between? Maybe you should have different unit minimums that consider not just crew experience but mission criticality as well. And what if you establish ahead of time the level at which go-no-go decisions are made—that if the weather is here, then the decision must be made at this level. In other words, what if you elevate the decision to a level that's consistent with the level of risk?

Sound familiar? Good! That's basic risk management.

And basic good sense.

Shortfax
Keeping you up to date

A call for articles

Looking for your stories for the upcoming October-December issues on the following subjects:

- Aircrew coordination: Breakdown or success stories
- Unit Simulator Usage Programs —how does your unit best use the asset?
- Wire Strikes or Almost-Strikes stories and unit programs to deal with the threat.
- Cold Weather Operations: What are we missing in our risk assessments?
- Your In-Flight emergency stories

Don't worry if you think you can't write! The benefit of your story is in the substance—besides, we have editors. Just e-mail it to CPT Garrett at flightfax@safety-emh1.army.mil.

RMIS *The website for Safety Officers and Commanders. Sign up on-line.*
http://rmis.army.mil

Update

- New POV page
- Updated Leader's Guides for Korea and Southwest Asia
- Summer Safety Handbook
- Safety classes—ready for you to download.

An appreciative word

We at the US Army Safety Center would like to take a few lines of *Flightfax* to show our appreciation to a dedicated employee. Ms. Sally Yohn has been the *Flightfax* editor and coordinator since October 1996. She developed a tremendous relationship with the field and other DA agencies and catapulted *Flightfax* to a higher standard. In June this year, she accepted a position at the Center for Disease Control as the senior technical writer and editor. For her 28 years of service to the US Army, US Army Safety Center, and especially *Flightfax*, we say, "Thank you, Sally. No one can replace you."

H-60 Anti-Ice Start Bleed Valve HIT checks

Daily Anti-Ice Start Bleed Valves (AISBV) and Health Indicator Test (HIT) checks are a requirement! Sticking AISBVs is the number one cause of T700-GE-700 engine in-flight shutdowns. It is a requirement per the maintenance manual, TM 1-2840-248-23, to perform a daily AISBV check in conjunction with the HIT. The AISBV checks were put in place to verify the valve operability. Potential sticking valves that can cause an in-flight flame out can be identified by indications of an Anti-Ice light illumination and temperature rise/decrease. "Cycling" of the valve to clear a deficient light or temperature indication is not permitted. Valves are to be replaced if any part of the daily AISBV check fails.

Recent experience has revealed that some units either avoid taking corrective action for valves that fail to meet the HIT check requirements or cycle the valve. The practice is against established manual requirements to ground the aircraft until the AISBV problem is corrected. Failure to do this will expose the crew and passengers to an unnecessary potential for an engine flame out. Safety is paramount. Do your HIT checks correctly and reduce In-Flight Shut Downs (IFSDs).

Reprinted from the *Black Hawk Newsletter*, Issue 36, January/February 1999. POC: Mr. Curtis Stevens, DSN 897-4983 (256-313-4983), stevensc@redstone.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH64

Class C
A series

■ Crew experienced unannounced No. 1 engine failure while at 1200′ AGL. Aircraft was flying at 130 kts and 85% torque when failure occurred. Rotor speed decreased to approximately 70% before control was regained. No. 2 eng was at upper limit of 130% torque then stabilized within usable limits. Aircraft was landed without further incident. Drive train, to include transmission, was replaced due to overtorque.

■ Aircraft reportedly initiated a series of uncommanded yaws while at an OGE hover. The IP (front seat) took the controls from the pilot-trainer and, as he was attempting to disengage the TADS and engage the PNVS, the aircraft descended to the ground impact. Both crew members egressed without injury.

D series

■ Aircraft tail boom reportedly contacted raised vegetation while in flight, separating the tail wheel. Crew elected to continue flight to conclusion for assisted (mattress) landing.

■ Aircraft was in cruise flight at 100′ AGL and 50 KIAS when APU fire light and audio activated. APU fire handle was deployed and aircraft was landed immediately without further incident. Driveshaft was twisted off and APU showed signs of high temperatures.

Class E
A series

■ While at a 140 ft AGL hover with the attitude hover hold engaged, the aircraft had five uncommanded flight control inputs. Each time, the PC cycled the attitude hover hold switch and the DASE switches, while returning the aircraft to the field site assembly area. The aircraft was landed without further incident. Maintenance determined that the DASE computer memory was saturated with data.

D series

■ During cruise flight the primary hyd pressure caution light illuminated on the UFD. This was immediately followed by a BUCS failure warning and voice message, along with the master warning. The PC landed the aircraft and made an emergency shutdown. Maintenance discovered the pressure line from hydraulic pump to hydraulic manifold had failed.

CH47

Class C
D Series

■ Excessive power turbine inlet temperature (PTIT) reading (1000° C) was noted on the No. 1 engine during the conduct of a health indicator test (HIT) check. The No. 1 engine had been stabilized at ground idle while the No. 2 engine was being tested. At some point, as crew was responding to the sudden acceleration of the No. 2 engine, the No. 1 engine came off line and stalled.

Class D
D series

■ During a maintenance operational check (MOC), as the engine control levers (ECLs) were advanced from ground (GND) toward flight (FLT), the aircraft began an abnormal lateral vibration. The PC returned the ECLs to GND. Since the lateral vibration was still present, the PC elected to complete a shut down. As the blades slowed, the flight engineer advised the pilot that one of the aft blades was tracking lower than the others. As the rotor rpm reached near zero, the aft yellow (a-y) blade struck the drive shaft cover and upper fuselage.

E series (MH-47E)

■ Right cockpit door separated in flight. Aircraft was landed without further incident. Door could not be located.

Class E
D Series

■ Aircraft was on base leg of the traffic pattern during ATM training when the aircraft vibrated severely for about two seconds. The pilot on the controls reported uncommanded inputs to the thrust control. These inputs were up and down oscillations of approximately three inches. The pilot on the controls could not override them, so he landed immediately with no further incident.

■ During a two-ship formation flight at 30 kts in a left hand turn, chalk 2 reported that the thrust control became difficult to move in either direction. Even with the thrust trigger depressed, the pilot had to override the CCDA clutch in order to move the control. Aircraft was landed in a field site without further incident.

OH58

Class A
D Series

■ Crew reported activation of the engine-out audio signal at an estimated altitude of 400 feet (AHO) at approximately 80 kias, followed by the low-rotor audio. Crew initiated autorotation, lowering the collective before the aircraft impacted the ground. The skids spread, and the right skid reportedly caught in the ground, after which the aircraft rolled onto its right side with the blades still operating. Crew was able to egress through the front wind screen.

Class C
C Series

■ Turbine gas temperature (TGT) increased during engine start sequence. TGT peaked at 1005° C before engine could be shutdown.

■ Post-flight inspection revealed damage to the tailboom (wrinkling), tail rotor drive shaft (dent), and isolation mount. The crew of the previous mission reported low rotor rpm and vibration on touchdown from a standard autorotation maneuver but suspected no damage.

D Series

■ While on final approach to field site at 10-15 kts, 75-100 ft AGL, the pilot in command (PC) felt a sudden right yaw induced by a minor wind gust. The PC applied left pedal, adjusted collective pitch, and landed the aircraft without further incident. Computer interrogation of the engine electronic control unit (ECU) revealed an engine overtorque of 132.4 percent for 1.54 seconds.

■ On takeoff, crew experienced a series of loud reports and uncommanded right spin. IP initiated

an autorotation and aircraft came to rest upright. Crew reported an overtorque of the engine (reading of 169 percent for 1 second) and damage to the rear landing gear mount.

Class D
C Series

■ During a low-level training autorotation, the OH58C landed tail low and pitched forward, causing suspected spike knock and hard landing. Aircraft was shutdown without further incident.

Class E
A Series

■ Aircrew heard loud bang while enroute at 3500 ft. PI checked aircraft systems along with doors and equipment for possible shifting in flight. Aircraft was landed and shutdown. Inspection revealed a bird strike to the left windscreen, but no damage was found.

UH1

Class E
H Series

■ While on the ground, pilot noticed a smell of hydraulic fluid. The flight engineer found a hydraulic leak on the pitch actuator. Crew performed an emergency engine shutdown. Post-flight inspection revealed a manifold packing had worn out. Manifold packing was replaced and aircraft was returned to service.

UH60

Class C
A Series

■ IP initiated a descending left-hand turn after crossing power lines. The aircraft nose reached 20 degrees nose-low and continued to descend. It contacted tree tops before aircraft responded to corrective control inputs. Aircraft was landed without further incident. Visual inspection revealed damage to left position light, HF antenna, lower anti-collision light, tail wheel actuator, and the stabilator.

L Series (MH-60L)

■ Aircraft was in level flight when PC observed an unidentified object depart the aircraft. No unusual vibrations were evident, but for safety sake, the crew made a precautionary landing to a rearming pad. Post-flight inspection revealed black main rotor blade anti-flap stop and bracket were missing. Yellow main rotor blade was damaged.

Class E
A Series

■ After normal takeoff, crew detected change in rotor sound and noted engine Np and Nr at 96 percent with all other indications normal. An initial attempt to increase Np with RPM control switch was unsuccessful. A second attempt resulted in normal operation and the crew landed without further incident. Investigation failed to duplicate suspected dual-engine rollback.

■ Aircraft was parked in unimproved field with engines shut down when second aircraft landed next to it. Left cockpit door of parked aircraft was forcefully blown open. An immediate inspection revealed no apparent damage, however, a later inspection revealed that the chin bubble was cracked and door frame was bent.

■ The No. 1 engine flamed out during a maintenance test flight. Crew initiated emergency procedures and was able to restart the engine and land without further incident. The In-flight shut down was caused by an intermittent failure of fuel-control section of the hydro-mechanical unit.

■ During cruise flight at 1000 feet and 110 knots, the crew chief saw a bird fly into the rotor system. The aircraft was landed. No damage was found.

■ Enroute to pickup zone, the aircraft was unable to avoid hitting bird, which impacted below the center windshield. The aircraft was returned to the airfield where an inspection revealed no damage.

■ A grinding sound was heard and the left-hand input module chip light came on during hover. The tower observed oil spraying into the mast and instructed the aircraft to land immediately. The oil spray caused a smoky mist cloud to form, but no other damage. Oil was leaking from the gimbal seal.

■ During a HIT check, the No. 2 engine anti-ice start bleed valve stuck in the open position. The anti-ice light did not go off and TGT did not decrease when No. 2 engine anti-ice was turned off. Flight was aborted.

L series

■ Scratch marks were found on undersides of all four main-rotor blades during post-flight. It is suspected that the blades contacted the ALQ-144.

■ During shutdown, a vibration was felt while the main rotors were slowing down. The crew chief noticed that one droop stop did not completely seat. During the post-flight inspection, a tear was noted in black main rotor elastomeric bearing. Further inspection found damage to spindle thrust bearing, spindle, and hub.

C12

Class C
F series

■ Crew experienced lightning strike while in cruise flight at 29,000 ft AGL. No instrumentation anomalies were noted and flight was continued to destination. Post-flight inspection revealed burn marks/damage to the right wing, right propeller, radar dome, 2 antennas, and left elevator trim tab.

O5

Class E
DHC-7

■ No. 1 fuel quantity indicator went inoperative in flight. Caused by moisture in cannon plug.

■ No. 4 engine T-5 gauge was inoperative following startup. Maintenance replaced T-5 terminal block.

■ Ground crew detected leak from roll spoilers. Maintenance replaced left outboard spoiler pressure hydraulic line.

C35

Class C

■ While landing, after completing a PAR approach, the pilot at the controls allowed the right wing tip of the UC-35 to touch the ground. At the Decision Height (DH), the pilot noticed that the runway was to the left, so a left correction was made. The pilot actually overcorrected left and, then reacted by banking right, just as he flared for landing. The right wing tip touched the runway.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action messages

UH-60-99-ASAM-08, 091620Z Jun 99, maintenance mandatory

Revise retirement life of Bellcrank Support Assembly, P/N 70400-08162-042/043/045, manufactured by Air Industries (Cage 8L513).

The Bellcrank Support Assembly, being delivered under production and spares contracts through Sikorsky aircraft company, was manufactured by air industries, an untested source. A reduced life of 5,000 hours must be set on Bellcrank Support Assemblies, P/N 704000-08162-042/045, and a reduced life of 2,200 hours on Bellcrank Support Assembly P/N 70400-08162-043, from Air Industries, Cage 8L513. These reduced lives will hold until the required engineering tests are complete. The subject part is also known as the main support bridge and/or bridge support.

AMCOM Contact: Mr. Ron Price, DSN: 788-2096 (256-842-8643), ron.price@redstone.army.mil

AH-64-99-ASAM-07, 011648Z Jun 99, maintenance mandatory

One time and recurring torque check inspection of three Tail Rotor Nuts no later than the next 10 hour/14 day inspection.

Upon investigation, it was discovered that the procedures contained in TM 1-1520-238-22 and TM 1-1520-Longbow/Apache IETM (interactive electronic technical manual) are incorrect. Urgent TB 1-1520-238-30-15 dated 07 Dec 1998 was then issued providing correct installation instructions. As a result of field compliance with this TB, there have been reports of properly indexed tail rotor forks having nut(s) that do not pass the torque checks.

No later than the next 10 hour/14 day inspection, perform torque check of the three nuts securing the tail rotor fork to the tail rotor gearbox output shaft. This inspection will reveal insufficiently-torqued nuts and will be repeated at each 250-hour phase inspection.

AMCOM Contact: Mr. Howard Chilton, DSN:897-2068 (256-313-2068), howard.chilton@redstone.army.mil

Safety-of-flight message

SOF-AH-1-99-04, 231840Z JUN 99, maintenance mandatory

Replace T53-L-703 engine non-coated spur gear with coated spur gear not later than 01 December 2000.

The T-53 series engine has experienced a number of N2 spur gear failures that have been attributed to vibration. A SOF was issued to implement a vibration inspection utilizing the AVA test equipment. Aircraft that passed the vibration inspection were released to fly and were required to perform a recurring 25 hour vibration inspection. That has since been extended to 50 hours for aircraft with non-coated spur gears and 150 hours for aircraft with coated spur gears. Those that fail the initial or subsequent vibration inspections are grounded until future corrective action is decided.

A coated spur gear has been developed that attenuates the stresses in the gear to lower levels. This message mandates the installation of coated spur gears in AH-1's that have passed, and continue to pass, the recurring AVA inspection.

AMCOM Contact: Mr. Robert Brock, DSN: 788-8632 (256-842-8632), bob.brock@redstone.army.mil

POV Fatalities through 30 Jun

FY99	FY98	5-yr Avg
97	86	85

HIGH-RISK PROFILE

Age & Rank: 19-23, E1-E4, O1, O2
Place: Two-lane rural roads
Time: Off-duty, 1100-0300
Friday & Saturday nights

TRENDS 1. No seatbelt or helmet 2. Too fast for conditions 3. Fatigue

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FY99 Aviation Accidents through 30 Jun

		Class A	Class B	Class C	Total
ACCIDENTS	Total Avn Acdts	14	10	64	88
	Flight Acdt Rate	2.05	1.32	7.18	10.55
RATE COMPARISON	FY99 vs. FY98	20.6 %	113 %	14.1 %	62.5 %
	FY99 vs. 5-yr avg	61.4 %	37.5 %	12.5 %	30.0 %
	Aviation Military Fatalities				13

U.S. ARMY SAFETY CENTER

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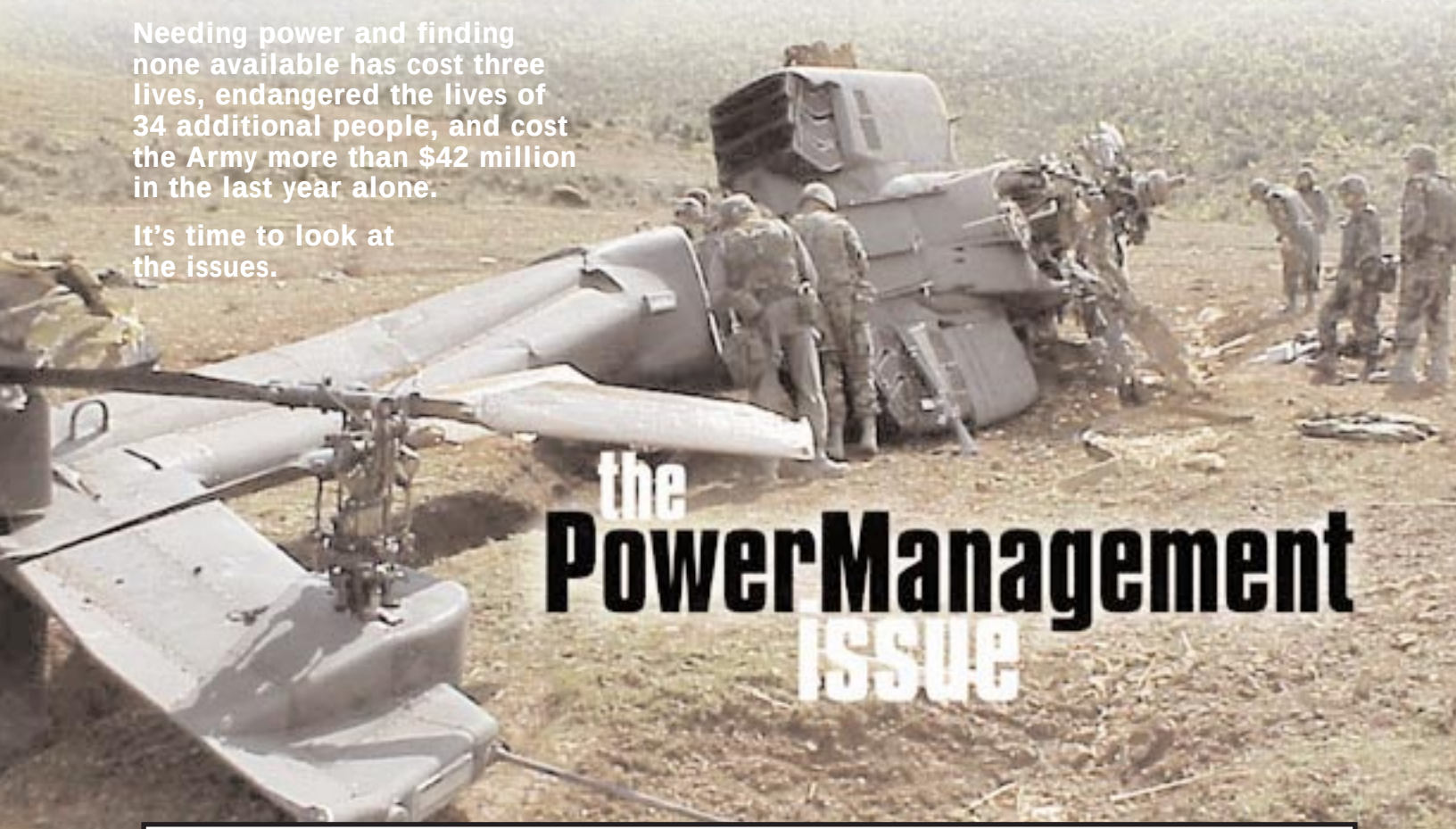
Gene M. LaCoste
Brigadier General, USA
Commanding

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

SEPTEMBER 1999 ◆ VOL 27 ◆ NO 9 http://safety.army.mil



Needing power and finding none available has cost three lives, endangered the lives of 34 additional people, and cost the Army more than $42 million in the last year alone.

It's time to look at the issues.

the PowerManagement ISSUE

DASAF Safety Alert: Power Management

As a result of a number of recent Class A aviation accident investigations throughout the Army, U.S. Army Safety Center (USASC) personnel have noticed an increased number of mishaps caused by a lack of proper aircraft power-management procedures. Army aviators have become conditioned to the benefits of seemingly unlimited power from modern multi-engine aircraft often operated at low pressure/density altitudes and temperatures.

An organization may find itself deployed to an area very environmentally different from home base, operating in both high pressure/density altitudes and temperatures. These conditions, along with the high gross weights associated with many mission profiles, may result in less power available to the aircrew. The process of confirming power requirements with power available requires continual awareness and constant performance planning. Aircraft performance is predictable for any given environmental condition provided the planning data is accurately calculated and applied through appropriate power checks. However, performance planning is not enough. Aviators must also understand exactly how power-limited aircraft will perform during all phases of the assigned mission.

Training is the key to success in preventing mishaps involving power-management procedures. Instructor pilots and unit trainers need to emphasize the importance of proper aircraft performance planning as well as the application of that data to the mission. Aviators brought up on the latest generation aircraft must be made aware of the limitations of the aircraft they are operating. In the end, it is incumbent upon leaders to ensure timely, effective training and rigorous enforcement of standards.

—BG Gene M. LaCoste, Director of Army Safety

It was a beautiful, sunny day in the tropics. Hot? Yes! Humid? Yes! Boring? No, especially since the mission was detached from the proverbial "flagpole." With little command supervision and an inexperienced company commander on site, it was easy to bend the rules a bit. Commanders and pilots know that without appropriate supervision some aviators will take unnecessary risks for one simple reason: they can do it and not get caught. Unfortunately for this crew, their lack of professionalism and self-discipline caught them in the worst way imaginable.

The UH-60L maintenance test flight mission was a routine one—routine missions being the ones that cause so many accidents. The routine portion of the mission went just fine. The unauthorized portion that followed resulted in the deaths of two innocent people.

Have you ever been tempted to do a 60-degree bank angle turn? Probably. After all, there is a certain exhilaration to it. Plus, you're an aviator—chosen because you're willing to accept the risks of flying, and high bank angle turns just happen to be one of the more fun risks. It was no different for this crew, an ME and an IP. In spite of their considerable experience, this crew was not immune to power-management mistakes.

During the unauthorized portion of the flight and while seeking a little thrill, the pilots executed a high bank angle turn to the right at 100 feet above the highest obstacle (AHO). Not a problem, right? Wrong. It was a very big problem in this case. On a very hot day with low-pressure altitude (tropics) and a heavy aircraft (extra fuel tank on board), a high bank angle turn was not a good choice. Whether it was compressibility effects, retreating blade stall, or just plain exceeding power available (RPM decrease), the aircraft shuddered violently, the nose pitched up, the aircraft rolled left, and then it descended 100 feet to make an incredibly high-G impact into a densely wooded area.

When the thrill ride was over, two innocent people were dead, a $6 million aircraft was a mangled mess, and the high cost of this experienced crew's power-management error was readily apparent.

Lessons Learned:

■ **Experience:** Even experienced aviators are not immune to the effects of power-management mistakes. With a combined total of more than 2700 hours, the ME and IP piloting this aircraft failed to manage the power required to conduct this maneuver.

■ **Load Factor:** Computing a performance planning card (PPC) only tells how much power is available; it does not tell what the maximum power the crew is going to ask from the aircraft will be.

Unless you forecast *how* making turns increases power required, you really don't know *what* you will require from the aircraft. For example, a 30-degree bank requires an additional 15.4 percent power over cruise power to maintain altitude and speed. A 60-degree bank takes 100 percent more power. This must be considered before you can know whether you really have the power to do a maneuver.

■ **Retreating Blade Stall:** A quick look at Chapter 5 of the UH-60 -10 reveals that given a mildly hot day of 30°C (86°F) with an aircraft at 20,000 pounds at a pressure altitude of 0 feet while cruising at 100 KIAS, blade stall will occur somewhere near 52 degrees of bank angle. These are not an uncommon set of parameters, but frequently we fail to check this in Chapter 5.

The crew lived; in fact, they walked away from the mangled mess—a testament to the UH-60's crashworthiness. But a power-management error and a serious lack of professionalism and self-discipline resulted in these pilots killing two innocent people. With their careers destroyed and personal lives shattered, every day they will have to face the fatal consequences of their actions. □

Trying to Make Something Out of Nothing

The accident AH-64 was in a flight of six, conducting a simulated deep attack. The mission called for a long route at night, moving to attack by fire (ABF) positions. The aircraft were laden with armament and extended-range fuel system (ERFS) tanks. Performance planning indicated that the aircraft with 701C engines would have marginal hover power at the ABF positions, and those with 701s would exceed power available.

Instead of changing the aircraft takeoff weight, the command decided to identify the risk and mitigate it through controls. The command identified that some of the aircraft would not have the power to hover in the ABF and recognized that the associated risk of losing an aircraft and crew demanded some type of control measures. The commander implemented an in-flight power check prior to reaching the ABF positions to determine the ability of the aircraft to hover. Good idea? Not necessarily.

OGE hover power checks are conducted IGE instead of OGE for one reason: to mitigate the risk of falling out the sky. If you had to check OGE hover power at OGE height, you may run out of power on the way, potentially placing yourself in an emergency situation. However, for METT-T reasons, the AH-64s were to conduct an in-flight hover power check at a high hover near their ABF positions.

The potential to run out of power during the check was clear, and the command knew it. Realizing that residual risk would remain following application of their control (the hover check at the ABF positions), the command decided to modify the control to mitigate the residual risk further. The decision was made that, just prior to entering the temperature associated with TGT limiting, the pilots would execute a go-around to burn off more fuel. The power check would be done at a height not less than 200 feet AGL, giving altitude to accelerate back into effective translational lift (ETL). This would be repeated until they were light enough to conduct the hover in the ABF positions.

Unfortunately, the control broke down for the accident aircraft. The flight approached their positions and began to decelerate. The mishap aircraft crew slowed to about 20 knots, at which point they experienced a loss of rotor RPM with audio. The RPM warning extinguished as the PI reduced collective and applied forward cyclic to gain forward speed. It was at this point that the PI was forced to switch controls with the PC due to a pilot night vision system (PNVS) failure. Again, the RPM warnings went off immediately after transfer of the controls. Now the PC was trying to save the aircraft and crew.

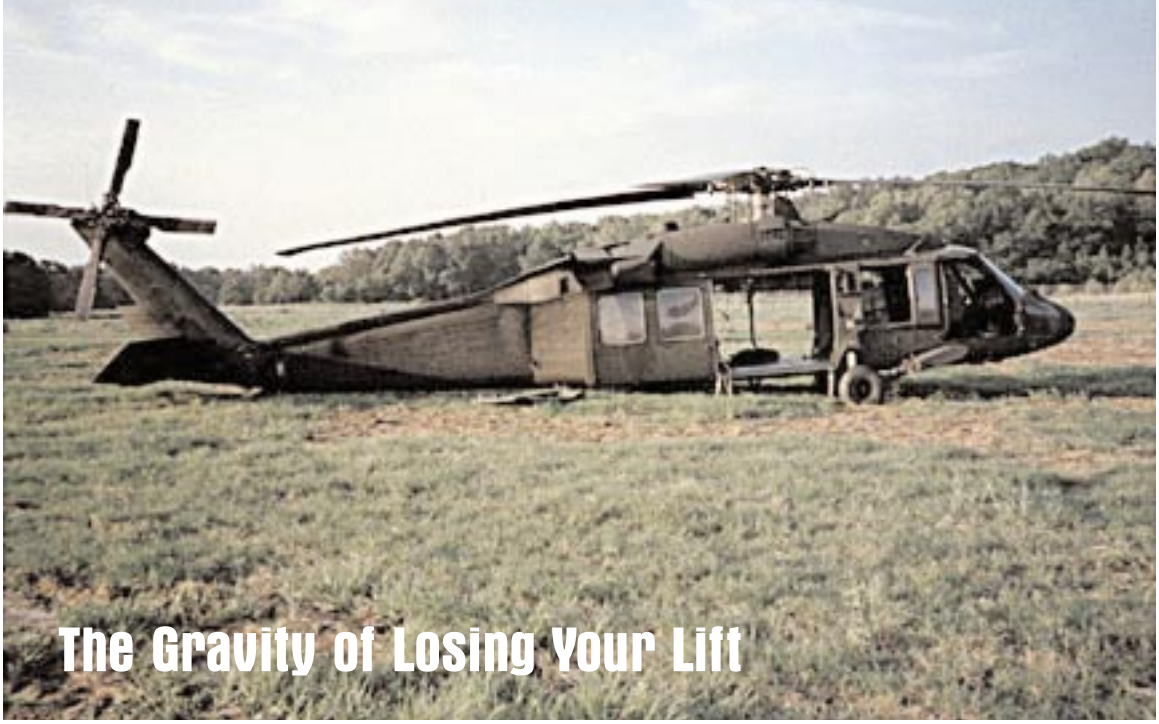
The PC executed the appropriate recovery maneuvers, but again the RPM warnings sounded. The PC decided to attempt a controlled landing in a clear field. At approximately 25 feet AGL and less than 30 knots airspeed, the nose of the aircraft abruptly turned 90 degrees to the right and the left main gear struck the ground. The aircraft rolled left, disintegrating the rotor system upon ground contact. When the aircraft came to rest, it was near inverted. The engines finally quit from sand ingestion and fuel starvation. Both pilots walked away with minor injuries.

This scenario represents a clear example of exceeding power available. Even worse, the pilots had calculated that they needed 94 percent for a hover at the ABF positions, yet they only had 85 percent available. Trying to make something out of nothing cost the Army a $15.5 million aircraft and left us with more lessons learned from power-management errors.

Lessons Learned

■ **Don't underestimate the risk of low-power margin, or in this case, no-power margin.** These were common missions with relatively benign events. Why would it turn into an accident? In essence, there was no room for error built in. Once you get to the limit of power in a hover check, you are either in an emergency situation or not. No room for error. A margin of safety could be applied to the go/no-go TGT criteria set by the command; that is something below TGT limiting.

■ **Don't underestimate the wind direction and speed in any aircraft.** As the crew started their deceleration to get below ETL, do you think their perception of speed was influenced by the 24 knot tailwind they were in? Read the article "When OGE Hover Power is Required—And You Didn't Even Know It" featured in this issue of *Flightfax* to understand how it was involved. □



The Gravity of Losing Your Lift

We talk power all the time: power available, power required, power margin, hover power. But ability to lift is something less understood. Lift created by the rotor is the only thing keeping the aircraft from falling out of the sky, and although it is inextricably linked to power, there are conditions more governed by the ability of the rotor to produce lift.

Settling with power, or the vortex ring state, is such a case where the disruption of airflow reduces lift even when power is applied. The crew of a UH-60 with 13 soldiers on board found out too well how this loss of lift can ruin their day.

The crew was conducting one of the most hazardous missions: a demonstration for holiday gatherers. The soldiers on board were to demonstrate the Fast Rope Insertion/Extraction System (FRIES) and Special Patrol Insertion/Extraction System (SPIES) for a crowd of family and friends. Before the actual demonstration, the accident aircraft, weighing only about 15,500 pounds (light by comparison), came to a 500-foot hover. The pilot was unable to make contact with the ground crew timing the event, so he cleared his line of sight by executing a high hover.

After an unsuccessful communications check, the pilot began a descent to return to his IGE hover. The descent, originally planned for 100 feet per minute, accelerated to 300 feet per minute. At approximately 150 feet AGL, the aircraft began shuddering and increased its descent rate with the application of power. The aircraft initially impacted in a slightly nose up, right side low attitude and bounced back into the air where the crew regained control and landed the aircraft. The aircraft sustained major structural damage; fortunately, the passengers reported only minor injuries.

The pilot had entered settling-with-power conditions without realizing it. The vortex-ring state began to interfere with the lift production of the blades; hence the shuddering from disturbed air over the blades. Application of power increased the vortices produced at the trailing edge of each blade, exacerbating the situation. This easily could have resulted in 13 deaths. Luckily, it didn't.

Lessons Learned

■ **Settling with power conditions are easy to encounter.** FM 1-203 states that the conditions conducive to settling with power are a vertical or near-vertical descent of at least 300 feet per minute and low forward speed. The rotor system must be using some of the available power (20 to 100 percent) with insufficient power to retard the sink rate. These conditions are common to downwind approaches, formation approaches, steep approaches, NOE, mask and remask operations, and OGE hovering.

■ **Experience doesn't always prevent an accident.** The PC and PI had a combined total of more than 4,500 flight hours. But all their combined experience didn't prevent them from making a power-management mistake.

■ **Extra power may not stop your descent rate.** This aircraft was relatively light at a low-pressure altitude and had 100-percent power available. The extra power that should have retarded their descent didn't. If you're going to put yourself in the conditions conducive to settling with power, realize that the extra power available may not be enough to stop your descent rate.

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"Jettison" Your Old Mindset

"Why didn't they punch off their external stores?"

This was an interesting question posed following a recent settling-with-power accident. Some would speculate that pilots are wary of punching off external loads if confronted with a power-critical situation because they think it's automatically, at least, a Class C accident based on the potential damage cost to the jettisoned equipment. And who wants an accident on their command or pilot record; someone might view it as a reason for not giving the pilot a top block on an evaluation report. Assuming that there is at least some validity in this speculation, it's important that pilots understand that jettisoning equipment is not an automatic accident.

Before getting to the decision moment for jettisoning anything, the first line of defense is pre-mission planning. Avoiding power-critical situations by understanding power margin—difference between power required and power available—at every point in the flight makes this a moot discussion. The second line of defense is the emergency procedures and recovery techniques that all pilots should know without hesitation; for example, knowing the symptoms of settling with power and how to recover. If for some reason, the emergency procedures and recovery techniques can't or don't resolve the power-critical situation, then it's time to think about increasing the power margin in some manner. That usually means jettisoning weight.

There is no question that getting rid of weight is a prudent thing to do to save an aircraft and crew. No one should be concerned about some gunpowder, fuel, or composite material if keeping it means risking the lives of those on board or destroying the aircraft. Whether it's settling with power or decreasing rotor RPM, less weight means more power margin. As weight drops, less power is required, and therefore more margin is available to get out of a power-critical situation. Bottom line is that jettisoning slingloads, weapon stores, and fuel tanks is **not** automatically an accident.

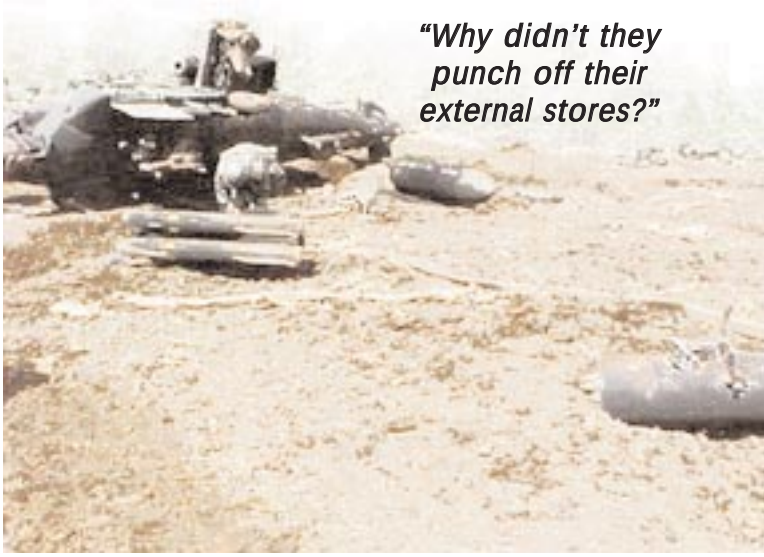
AR 385-40: *Accident Reporting and Records* (paragraph 2-11.b.(9)(f) states that intentional in-flight controlled jettison or release of mission essential aircraft equipment/stores that are not essential to flight—for example, canopies, doors, drag chutes, hatches, life rafts, auxiliary fuel tanks, missiles, drones, rockets, non-nuclear munitions, and externally carried equipment—are not included in aircraft accident costs. It is relatively clear that if presented with a power-critical situation, the regulation gives a pilot license to punch off weight and not call it an accident.

However, there is a stipulation. The same section states that there must be no injury or reportable damage to the aircraft or other property. So, if a crew falls within these guidelines and needs more power to continue flight, is jettisoning the right thing to do? Not always.

Pilots should not be afraid to dispose of weight if it means saving the aircraft and crew, but a recent accident highlights another issue to consider. The accident that prompted this discussion involved an AH-64 that decelerated to a high OGE hover with a tailwind. The aircraft was laden with full racks of munitions and an ERFS tank that was about one quarter full. As the vibrations began to mount because of settling with power, the aircraft had already lost so much altitude that the standard recovery technique (gain airspeed) would have been futile.

The first two lines of defense broke down. In pre-mission planning, the crew did not foresee this power requirement and didn't recognize the settling-with-power situation fast enough to execute a recovery. Obviously, the only thing available to the crew was jettisoning their external loads of fuel and real munitions. Jettisoning the load seemed logical, but it wasn't a good idea in this situation. Fortunately, the crew knew it.

The aircraft crashed violently, causing total destruction of another $15.5 million aircraft. However, the two pilots received



only minor injuries—another testament to the crashworthiness built into the aircraft. So why didn't the pilots save the aircraft by jettisoning the loads? They would have had time to jettison the loads, but thought about it and decided against it.

The power-critical situation occurred over a sloped area populated with parked aircraft and ground crews. In a split-second risk assessment, the crew decided that the jettisoned racks might roll down into the ground crews and parked aircraft and explode to cause even greater damage and potential injuries. So the crew rode it in with the hopes that only their aircraft would be harmed. Their accurate risk assessment prevented a bad situation from becoming worse.

While it's easy to see and understand that jettisoning isn't always a viable option, crews need to understand that in some cases it is an acceptable option that doesn't automatically result in having an accident appear on their flight records.

Creating a mindset that jettisoning may be an option can be reinforced by establishing a standard procedure in the cockpit that is briefed before every mission. If single-engine capability doesn't exist, it might be prudent during takeoffs and landings to have the pilot not on the controls place a hand near the jettison switch and announce it. This automatically makes the crew aware that they are entering a flight regime where they do not have single-engine capability and might need to eject weight. The first two lines of defense are ineffective in a single-engine-failure situation, so jettisoning should be on the crew's mind.

If you happen to be one of those who thinks that getting rid of extra weight is automatically an accident, then it's time for you to jettison your old mindset. It isn't, but it could be. Use your pre-mission planning and standard emergency procedure and recovery techniques to avoid the decision to jettison. If it's your last option, don't hesitate to make the decision—just be careful not to cause more harm than good.

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When OGE Hover Power is Required—And You Don't Even Know It

Place yourself in the following situation, and see if you can describe what has aerodynamically happened to make this aircraft crash.

It's a great day for flying. The sky is clear, the air is stable, but winds are strong. Your aircraft is on long final for a landing to a tactical assembly area on a heading of 080. The TAC tower informs you that winds are 240 at 15 gusting to 25, but you've been landing 080 the entire exercise. You've just completed a successful training mission where the aircraft was at near gross weight for the entire mission. Since you were operating at high gross weights, you were very meticulous about your performance planning. You noted that OGE hover power was not available, and your IGE hover power was limited at landing to 25 feet AGL.

As you begin your landing to the strip, you realize you're landing downwind—but you are in a dual-engine aircraft. Even though you have a small power margin, you don't foresee a problem as long as you land with some forward airspeed. You pick up a constant, normal angle of approach. At about 200 feet AGL, you continue to slow your airspeed and begin to focus on your rate of closure. You know to ensure that your rate of closure is appropriate for the conditions, so you decide that a 10- to 15-knot ground speed at landing is appropriate.

At about 100 feet AGL, you notice a slight shuddering of the aircraft and 25 KIAS on the dial, but your ground speed is still fast. However, you still feel like you're on track to touch down at your desired speed. At 75 feet the shuddering becomes more prominent, but you're focused outside and still decelerating to make a smooth landing. Immediately, you begin to drop. You try to arrest the descent with more power, but the RPM starts to bleed off. At this point, you still have a ground speed of 20 knots. Your aircraft lands hard, the rotor horn blaring. So what happened?

The aircraft did not have OGE hover power when it needed it. But why did an aircraft in these conditions need OGE hover power if it never hovered?

FM 1-203: *Fundamentals of Flight* says that "hovering is when a helicopter maintains a **constant position over a selected point,** usually a few feet above the ground." Based on this definition, the aircraft in the above situation

was not hovering because it did not maintain a position over the ground. However, aerodynamically, the aircraft was hovering at the point where the ground speed equaled the tailwind speed. That means that the air the rotor system was using for lift was moving at the same speed as the fuselage. The airflow pattern while the aircraft moved in concert with the tailwind was the same as the airflow pattern for an aircraft hovering over a point on the ground in a no-wind condition. The manual definition of a hover assumes this no-wind condition.

In the scenario, at about 75 feet AGL when the shuddering began, the aircraft was below ETL even though the ground speed was about 20 knots. The relative speed of the aircraft through the air would have been no more than 5 knots. Aerodynamically, the pilot was effectively OGE, requiring OGE hover power. The pilot had determined that a 25-foot IGE hover was the maximum power available, and without realizing it, he placed the aircraft in a 75-foot OGE hover.

This phenomenon is not isolated to landing an aircraft with a tailwind. It's prevalent when taking off, coming to a hover for an attack/support by fire position, landing to a pinnacle, and in-close-to-the-ground low-speed flight like NOE above lightly vegetated forests. In fact, on a normal takeoff, you could actually fly into an OGE hover power requirement. How could this be if you do a hover power check and have the 10 percent needed for a normal takeoff?

Consider an extreme case. Let's say you have a 30-knot tailwind on takeoff and you have predicted only enough power to hover at 25 feet (not OGE). You conduct your hover-power check, and it's less than the predicted hover torque. When lifting off the ground, the tailwind places the aircraft through ETL (the aircraft is over a point and the air flows through the rotor at 30 knots). While climbing and accelerating ground speed in this normal takeoff, you actually are leaving the positive effects of ETL as you catch up to the tailwind. At 25 feet, you notice you are pulling maximum torque available just to maintain altitude, yet you have a ground speed of 30 knots. If you pull more power to accelerate, you will descend. If you have ever executed a downwind departure with high power margin, you have undoubtedly seen the effects of catching up to the tailwind; that is, a positive climb rate on takeoff, then a large decrease in climb rate as the aircraft matches speed with the tailwind, followed by a positive climb as it passes through ETL again.

Although downwind takeoffs and landings are extremely dangerous with a low power margin or in a single-engine failure mode, the opposite is also true. Headwinds can help significantly by increasing the time you're in ETL during a landing or takeoff.

The bottom line is that a PPC cannot tell you everything about the performance of your aircraft. In Chapter 7 of the UH-60 -10 under the GENERAL section, it states, "In addition to the presented data, **your judgment and experience will be necessary** to accurately obtain performance under a given set of circumstances." This article presents only one of those circumstances that the performance charts don't explicitly evaluate. And as the Army creates heavier payloads and operates at higher altitudes, each of us should be conscious of power margin needs at every point in flight.

If you're a pilot in the dual-engine community that shies away from calculating the effects of wind direction and speed during maneuvers, perhaps you should take a lesson from the single-engine community—a community not prone to power-management errors because they constantly operate at low power margins. They are bred to be cognizant of wind and how it affects the rotor aerodynamics during every maneuver. It's habit to them, and it should be habit for you as well. You may be frequently flying with large power margins, but the time will come when you have to fly near gross weight—and the habits that you've learned will be the habits you apply.

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Controlling power-management errors

The trend over the last few months definitely suggests that power-management errors are occurring more frequently. With a rise in deployments and the operational need to carry more weight, the potential for running out of power and lift capability has increased.

As a commander, you should effectively risk manage this identified hazard by implementing controls. The following controls are presented as ideas to prompt thinking and discussion.

FYI

In Production: A Power Management Video

The Army Safety Center has teamed with several other agencies to address the problem of power management. Through an accident recreation you will hear lessons learned delivered by the pilot in command and safety professionals who investigated the mishap. Areas addressed are:

- Power management
- Crew coordination and
- Risk management.

When it's ready we'll announce it in *Flightfax* and on the Army Safety website http://safety.army.mil, along with instructions on how to obtain a copy.

Reference PIN number 711267.

■ *Simulators.*

If you have a simulator, you have one of the most powerful tools to stop this rash of power-management accidents. Although a simulator cannot simulate settling with power, compressibility, or retreating blade stall, it can be used to stay out of those conditions. Ask yourself the following questions:

- Do I have a formal program that makes the simulator actually simulate a real flight? This takes some policies, but it would undoubtedly result in better-trained pilots.
- Do I enforce proper habits in the simulator? For example, is the mission fully planned, is the PPC completed, are winds considered in all maneuvers regardless of weight?
- Do I help my pilots train for the worst conditions in the least risky environments? Have pilots ***frequently*** conduct simulator flights at ***high gross weights***, on ***hot days***, and at ***high altitudes***. This makes them constantly think about the effects of power margin. They'll learn to finesse the aircraft.
- Do I have my pilots demonstrate the effects of and show recovery from settling with power, compressibility, retreating blade stall, and especially, the effects of high-load factors (steep turns)?
- Do I have my pilots show proficiency in the ability to jettison external stores?

If you want to help your pilots stay away from deadly power-management problems, the answer should be yes to each of these questions.

■ *Jettisoning.*

All too often, pilots and commanders rely on the fact that jettisoning will allow the pilot to gain a higher power margin when necessary. There are two problems with this. First is that power-critical moments tend to come while close to the ground, not allowing enough time to make the decision. Of six power-management accidents in the past few months, five of the aircraft had jettisonable stores and all of the accidents happened close to ground. Second, we do not train to be cognizant of the pertinent times that we may need to jettison stores. Here are some areas to consider:

- Check every pilot in the simulator with a no-notice emergency that requires jettisoning. For example, initiate a single-engine failure while at a 50-foot hover or while landing to a point with no single-engine capability.
- During the crew brief, have the crew discuss the times at which it may become necessary to jettison the stores.
- Consider an SOP that makes the pilot not on the controls place a hand next to the jettison switch and announce that they are ready for a jettison command if necessary. This could be a requirement any time power may become a problem such as exceeding power available on takeoff or landing, or during a single-engine failure, or settling with power.

■ *Extended-range fuel system.*

ERFS tanks are **not** crashworthy! The atomization of fuel, combined with sparks from crunching metal or hot exhaust, is a recipe for destruction. In the six recent power-management accidents, ERFS was in use in five. Luckily, only one of the aircraft had a fire associated with the tanks, and that did not end in injuries or fatalities.

An assessment of ERFS use should include not only the risk of rupture but also should address the reduced power margins that follow. Is the mission really worth being exposed to this hazard? Is it really necessary to fly with ERFS to accomplish this mission? Recent accidents suggest that commanders are answering "yes" quite often.

■ *Risk assessment sheets.*

The risk assessment sheet has become a great way to assess the cumulative risk of recurring factors that affect aviation safety.

Help pilots think about power management by prompting them on the risk assessment sheets. Pilots are overburdened with requirements (all of which are necessary), but the best way to help them is to prompt them to think of things they might have missed. The risk assessment sheet does that. However, the risk associated with low-power margin has not been assessed on any risk assessments I've seen. In fact, the first time I saw it was on a commercial airline risk assessment sheet.

If you include a low-power margin risk factor, you might want to ensure that pilots use the worst-case scenario that comes throughout the flight, including power expected to conduct their turns. What value do you assign a low-power margin risk? As commanders, you have the freedom to assess the risk using your best judgment, but consider how much room for error a 3- or 4-percent power margin leaves during some maneuvers.

■ *Know aircraft limits.*

Power-management problems can be eliminated with a good knowledge of the aircraft's limits. A PPC provides a good understanding, but not the full picture. Obviously, the first steps in knowing the power limitations in varying conditions is to do the PPC regularly and understand the meaning of the numbers.

Leaders and mission briefers can help develop a better understanding of PPC results by asking pilots about power requirements while giving them their mission brief. Ask to see what they have computed if the aircraft is relatively heavy. Knowing the numbers is not enough; understanding and applying them are critical.

Only through a thorough knowledge of the aerodynamics of maneuvers, coupled with good knowledge of the PPC, can a pilot make an effective decision when presented with a power-critical situation. Understanding how wind, descent rate, temperature, turbulence, and other factors influence regular maneuvers is one of the best defenses against this hazard.

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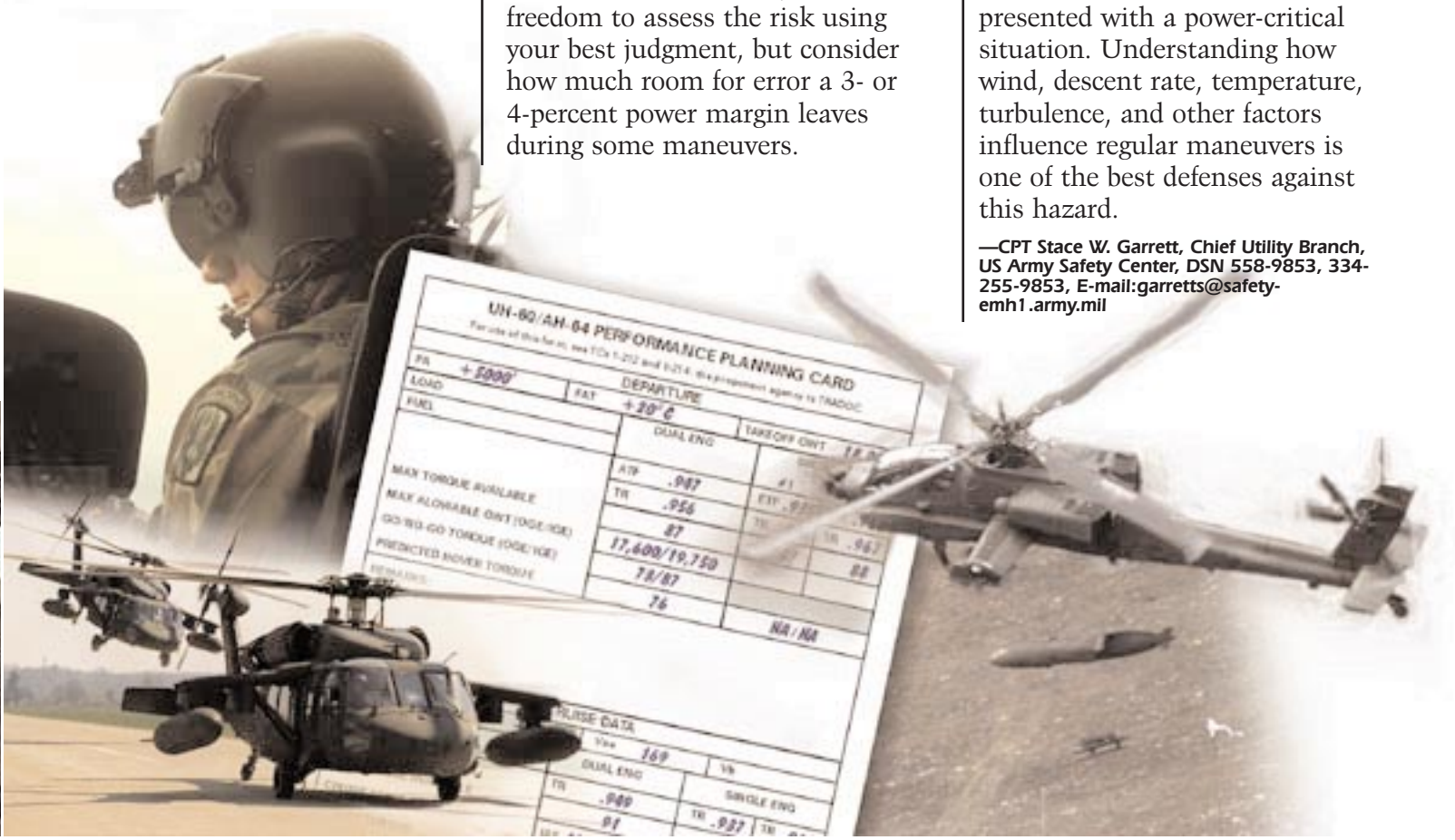

Power Management Jumble

Directions: Take a moment to answer the following 15 questions. The answer is jumbled in the questions and underlined. Un-jumble the answer and place in the spaces provided. Place the letter that corresponds to the numbered space in the quote.

Post the following question wherever pilots do risk assessments:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

of

25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

I'm about to do?

1. The objective of risk management is not to remove all the risk, but to ___ ___ ___ ___ (NELIITAME) unnecessary risk.

2. Specific hazards to terrain flight safety that must be considered include ___ ___ ___ ___ (YIACPLSH) hazards, ___ ___ ___ ___ (ARWEEHT) hazards, and human factors.

3. The addition of the relative wind and any induced flow is called ___ ___ ___ ___ (LTTUSAERN) relative wind.

4. The angle measured between the resultant relative wind and the chord line of the blade is the ___ ___ ___ ___ . (GLAEN FO KTAATC)

5. If a force enters into the rotor (by wind or control input), how many degrees later in rotation does the force really act (gyroscopic precession)? ___ ___ ___ ___ (ENNYTI) degrees.

6. In-ground effect increases rotor efficiency by almost ___ ___ ___ ___ %. (WYNETT)

7. For most helicopters, you effectively are out-of-ground effect at a height equal to 1 to 1¼ of the rotor ___ ___ ___ ___ . (RTEEDMIA)

8. In your helicopter, you are flying on a hot day at high altitude near your gross weight and at a little above cruise speed. You feel vibrations increase and the aircraft's nose suddenly pitches down and to the right. What effect did the advancing blade experience? ___ ___ ___ ___ ___ ___ ___ ___ (ITPBIESOSICLTMR)

9. In your helicopter, you are flying on a hot day at high altitude near your gross weight and at a little above cruise speed. The weather is slightly bumpy, but the vibrations start to increase. Your aircraft's nose suddenly pitches up and rolls left. What effect did the rotor system experience? ___ ___ ___ ___ ___ (GNIRTEETRA LAEBD ATLSL)

10. What condition is the only difference between retreating blade stall and compressibility effects? ___ ___ (PMR)

11. You are chalk 2 in a flight of five, shooting a downwind approach. You are in a hurry to land, and your approach is very steep. Your aircraft begins to vibrate, and it descends faster than you expect. With more power applied, the descent rate increases. What effect are you experiencing? ___ ___ ___ ___ ___ (LIGTTSNE HWTI WOEFP)

12. Settling with power is caused by the rotor system descending through its own ___ ___ ___ ___ (SOWHANDW).

13. For single-rotor system aircraft, if enough power is not available to break settling with power, the preferred method of recovery is increasing ___ ___ ___ ___ (ERDSIEAP). Hint: for tandem rotor aircraft, the preferred method is lateral cyclic movement.

14. You are flying at 100 kts and 50 feet AHO on the range, and approach a 90-degree turn. In order to maintain altitude and speed in the turn, what angle of bank are you most likely in if your power required is twice your cruise power? ___ ___ ___ ___ (TSXYI) Hint: 73° requires three times the power of cruise flight.

15. When doing your PPC, you calculate that the smallest power margin during your mission is 2%. You have looked at all parts of your flight, including the fact that the highest bank angle you expect is 30° (15% more power needed in the turn). Where is a good place that this risk can be assessed with the overall mission? ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ (IKRS EEASMSNSTS EHTSE)

AH-64 BUCS

The backup control system (BUCS) on the AH-64A and the enhanced backup control system (EBUCS) on the AH-64D Longbow have become synonymous with uncommanded flight control inputs, aircraft loss of control, and in general, demons in the Apache. Aviators fear the system, crew chiefs avoid it when possible, armament personnel loath the system, and maintenance officers are in awe of it. What is it about BUCS that instills this fear of the unknown?

BUCS DEFINED

The BUCS is an integrated electrical fly-by-wire emergency flight control system on all Apache helicopters, though it was disabled on the earlier models. The system itself was designed to be used only as an emergency backup to the primary hydro-mechanical flight controls. The system components were intended to require little or no maintenance. So, what is the mystery and why do we even have BUCS?

The BUCS was designed into the Apache as a way to meet specifications for ballistic tolerance. To have a redundant system meant the Apache could meet these requirements with a lighter weight primary flight control system. For example, instead of 3-inch diameter control tubes necessary to withstand a 12.5mm impact, much smaller control tubes were acceptable due to the redundant backup control system.

Therefore, the BUCS was designed as an integral part of the aircraft to make it more survivable in combat. Based on carefully established parameters, software, electrical, and mechanical features, BUCS engages in whichever axis fails and for whichever crew station is in control. The system may go into operation due to a jam, a severance, or a mistrack between crew station flight controls.

CLASS A ACCIDENT

A recent Apache accident involved a very senior standardization instructor pilot with some 4,500 hours of flight time. He found himself in an emergency situation, an unusual attitude, and with BUCS engaged suddenly in two axes—pitch and yaw. The DASE was disengaged in both axis, by design. He was unable to successfully land the aircraft, resulting in a Class A accident. The crew was lucky, escaping virtually without injury. Did BUCS work as advertised? If so, why couldn't a capable master aviator regain control of the aircraft?

THE "RED TEAM"

Questions from this accident and from other past incidents led the Deputy Chief of Staff for Logistics to charter a team of engineers and experts—a "Red Team"—to look at the entire Apache flight control system.

The team examined the AH-64 history, hydro-mechanical flight control system, and why the key decisions were made. Additionally, they analyzed mishap statistical data, examined BUCS, evaluated BUCS training, and reviewed all related critical components.

A REVIEW OF BUCS INCIDENTS

Early on in the Apache fielding, aviator mistrust of the BUCS, exacerbated by an incident at the aircraft plant involving inadvertent BUCS activation, led to a decision to inactivate BUCS on all Apache aircraft. This remained in effect until 1988 when the decision was reversed. All subsequent aircraft have a fully active BUCS system. Older BUCS-inactivated aircraft are currently going back to the plant for conversion to AH-64D Longbow aircraft with fully active EBUCS.

Since 1984 there have been some 59 instances of uncommanded Apache flight control inputs reported to Boeing (McDonnell Douglas), the Army Safety Center, or the Aviation and Missile Command. These range from simple kicks in the controls to "BUCS ON/BUCS fail" warning lights and uncommanded aircraft movements.

Causes of these inputs can be attributed to several different sources: digital augmentation and stabilization equipment computer (DASEC) inputs, heading and attitude reference system (HARS) input, mechanical failure (hydraulics contamination or servo-actuator), and the BUCS, both inadvertent activation and failure of the system to engage when needed.

Most occurrences involved warning lights only. Actual uncommanded flight inputs were rare and generally categorized as HARS or DASEC inputs, ranging from mild pedal kicks to complete hardovers in one axis. Of the 12 reported HARS/DASEC hardovers, only two aviators elected to disengage DASE channels as prescribed in the emergency procedures. The others continued to fight the controls. The improved –15 HARS has since significantly reduced this type of incident.

There were a few instances where the servo-actuators were affected by the stabilization augmentation system (SAS) sleeve. The SAS has a total of 20-percent authority (+/- 10 percent) in the roll axis and 30 percent in pitch. When the SAS sleeve assembly sticks to the servo-actuator, the SAS movement is transferred directly to the servo and gives feedback into the controls themselves.

There was one instance of BUCS failing to engage when needed. This occurred on a maintenance test flight when a shear pin actuating device (SPAD) broke, placing the aircraft into roll channel BUCS; however, a faulty micro-switch failed to actuate BUCS in that axis, rendering it out of control. This resulted in a Class A accident, a destroyed aircraft, and two serious injuries. There have been two instances, however, where BUCS was engaged during a jam and enabled the aircraft to be flown and safely landed. (The Israeli Air Force had two more.)

BUCS TRAINING

Based on the evidence, an interesting picture began to materialize. Training on BUCS had never been considered a critical task item. Accordingly, training is totally inadequate for everyone involved with BUCS aircraft, from the aircrew to the mechanic. For example, the aircraft qualification course (AQC) has a program of instruction (POI) of just 2.5 hours of academics for the entire

flight control system, 10 minutes of which is devoted to BUCS. There is no simulator or BUCS flight training. Though aircrews believe that BUCS activation enables complete control, transparent in the cockpit, that isn't the case. The aircraft has different handling characteristics in BUCS, with affected DASE channels disengaged and force trim either active or inactive. The time to realize this is not during an emergency in an unusual attitude. Additionally, BUCS does not "kick in" immediately. There is a 1- to 3-second built in delay (depending on type of engagement) to prevent a full hardover as BUCS engages.

All this is manageable, given proper training. The Apache Longbow crew trainer (LCT) simulator is presently the only device that will replicate "BUCS ON" flight. The AH-64 simulator does not. Additionally, classroom instruction is inadequate beyond AQC and throughout the maintenance officer and mechanics courses. Troubleshooting procedures are either inadequate or not understood. This lack of understanding BUCS maintenance can lead to mishandling of components and improper trouble-shooting, causing us to overlook potential problems in the system. Since it isn't activated until needed, these may go unnoticed for years.

Additional Problems

A recent safety-of-flight (SOF) message, SOF-AH64-99-02, requires that the linear variable digital transformers (LVDTs) be checked for voltage output. This is required on all AH-64 BUCS-active aircraft. The tolerances are very exact. Any LVDT out of tolerance must be adjusted and all eight voltage readings are to be recorded on the DA Form 2408-13-1. The LVDT is a critical BUCS component, providing control position data, through voltage readings, translated to the system. Improper adjustment or failure to properly record the voltages could lead to inaccurate control position interpretation by the system.

Just as any flight control system, it is absolutely essential that BUCS be maintained as intended. It is critical that we know how to troubleshoot problems. Maintainers must know the system.

So why not just inactivate BUCS as before? With BUCS inactivated, an integral part of the designed flight control system is inoperative, leaving the aircraft with a reduced-strength primary mechanical flight control system. The BUCS inputs are controlled through the HARS. These computations are always present, regardless of the BUCS status. Bottom line—aircraft survivability is decreased without BUCS.

As aircrews, we must understand our flight control systems, including BUCS. Maintainers, too, must fully comprehend the system. Components must be maintained within tolerances; controls must be properly rigged. The flight control system must be kept operational and internally clean. All are essential to a fully functional control system on such a complex aircraft.

Summary

The "Red Team" is currently exploring options, developing potential solutions, and making recommendations concerning fixes. Answers to the puzzle are on the way, and those answers lie in knowing, understanding, training, and maintaining an integral part of the aircraft flight control system.

—MAJ(P) Mark Robinson, Chief, Attack Branch, US Army Safety Center, DSN 558-1253, 334-255-1253, E-mail: robinsom@safety-emh1.army.mil

POV Fatalities through 30 Jul

FY99	FY98	5-yr Avg
99	96	91

HIGH-RISK PROFILE

Age & Rank: 19-23, E1-E4, O1, O2
Place: Two-lane rural roads
Time: Off-duty, 1100-0300
Friday & Saturday nights

TRENDS 1. No seatbelt or helmet 2. Too fast for conditions 3. Fatigue

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FY99 Aviation Accidents through 30 Jul

		Class A	Class B	Class C	Total
ACCIDENTS	Total Avn Acdts	16	9*	73	98
	Flight Acdt Rate	1.96	.98	6.99	9.93
RATE COMPARISON	FY99 vs. FY98	18 %	78 %	12.6 %	2.6 %
	FY99 vs. 5-yr avg	58 %	3.2 %	9.9 %	16.25 %
	Aviation Military Fatalities				13

*Class B downgraded to Class C

U.S. ARMY SAFETY CENTER

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Gene M. LaCoste
Brigadier General, USA
Commanding

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

OCTOBER 1999 ◆ VOL 27 ◆ NO 10 http://safety.army.mil

Despite a long and successful tradition of work into the important relationship between safety and individual aspects of behavior and attitudes, wider organizational factors have only recently been clearly identified as contributing significantly to accident causation. This does not necessarily mean that organizational causes of accidents are a new phenomenon in Army operations; these factors have almost certainly been present since the earliest days of military operations. However, what has changed in recent years has been our thinking about the human origins of accidents. Safety culture is one such concept that explicitly addresses the wider social causes of accidents, and thus represents a significant departure from the traditional approach to safety.

In this issue

- Safety culture
- Luftwaffe and Battle of Britain
- Broken Wing Award recipients
- Quarterly Message update

Safety Is A Leader's Job

Organizational Safety Culture: Implications for Commanders

Accidents happen for a number of reasons. Some research suggests that management or supervisory inattention at all levels are the most prevalent causal category and perhaps contribute as much to accidents as the total number of operator and maintenance errors put together. This emphasizes the fact that soldiers often inherit faulty systems directly as a result of decisions made elsewhere up the chain of command. The concept of safety culture points to a number of ways of understanding and influencing, some of these factors that serve to undermine safety. Broadly defined, safety culture is the set of beliefs, norms, attitudes, roles, and social and technical practices within an organization which are concerned with minimizing the exposure of individuals to conditions considered to be dangerous. A safety culture is created as soldiers repeatedly behave in ways that seem to them to be natural, obvious, and unquestionable, and as such serve to minimize risks and dangers and increase safety.

Commander's commitment

The first necessary condition for the development of a safety culture is that responsibility for safety should not reside purely with the soldier, but be a leadership issue as well. Effective safety programs begin at the command level with a strong emphasis on safety that flows through the entire organization. Such command commitment is essential for a number of reasons. It is important because attempts to effect enduring change are unlikely to succeed if Commanders are not seen to be closely involved and committed to the initiative. Soldiers will quickly sense where the leadership's true priorities lie and will, more often than not, try to accomplish those priorities despite explicit policy statements. This issue becomes very important when marginal decisions to go or not are required. Thus strong leadership commitment to safety is critical to support soldiers' decisions made in the face of external pressures brought about by high op-tempo. One sign to soldiers of command commitment is the perceived status within the organization of the personnel directly dealing with safety. Also, merely paying lip service for safety transgressions, rather than taking strong corrective action, can bring about a lax safety culture.

Distributed concern

While the leadership's commitment to safety is necessary, there must be other elements in place for safe operations. The second requirement for the development of a safety culture is for concern about safety to be distributed, supported, and endorsed, by all soldiers throughout the organization. Distributed concern for safety needs to be representative of all unit soldiers. Only in this way is it possible to move toward a safe state in which

Effective safety programs begin at the command level with a strong emphasis on safety that flows through the entire organization.

...merely paying lip service for safety transgressions, rather than taking strong corrective action, can bring about a lax safety culture.

soldiers recognize the necessity and desirability of conforming to both the spirit and letter of safety rules and regulations. Under such circumstances all soldiers regard the reduction of risk as a personal as well as a unit goal. Toward this end, formal safety directives should be instituted with more subtle approaches aimed at promoting caring on the part of soldiers and the unit in terms of concern for the personal outcome of dealing with risks, and also for the effects of their activities upon other people.

Rules and regulations

The specific norms and rules governing safety within the unit will also be at the heart of a safety culture. As guidelines for action, these will shape the perceptions and actions of your soldiers in particular ways, defining what is and is not to be regarded as a significant risk, and what represent appropriate responses to such risks. In an ideal world one might attempt to specify a set of complete, up to date, and practical contingencies that anticipate all foreseeable risks and hazards. However, there is always stress between the need to handle both hazards that are well defined in advance, and those that are ill-defined or unexpected, perhaps because they arise only infrequently in periods of crisis or because they are completely beyond the boundary of current operational experience. Being alert to both well-defined and ill-defined or unseen hazards is a demanding task, since the application of existing rules and Standard Operating Procedures to guard against anticipated hazards might lead to crucial oversights. Guarding against this involves a willingness to monitor ongoing practices in many ways; to accept uncertainty and the unknown as facts of life; to exercise creativity and safety imagination as aids in assessing risks and hazards; and to be prepared both to listen to opinions about risk from all soldiers, as well as to reward rather than ignore or punish those who point out safety deficiencies.

Ongoing reflection

The final requirement for the development of a safety culture is ongoing reflection about current practices and beliefs. This involves the search for meaning and new knowledge in the face of initial ambiguity and uncertainty about what may prove to be a significant risk or hazard. This process is crucial if a unit is to learn, as well as adapt to changing circumstances. As noted earlier, one function of reflection is to guard against the over-rigid application of existing safety rules, regulations, and procedures. This reflection is most effective when used by both reactive accident investigations, together with proactive incident reporting and feedback. Such open communication links between the leadership and soldiers have been found to be associated with safe organizational climates. This is fostered where units actively avoid laying blame for mistakes and errors. This latter consideration sets special responsibilities, once again, on the leadership for setting the framework within which safety can gain suitable priority.

Conclusion

It will be no simple matter to translate these concepts into practical action. The Army is notoriously resistant to change, and there is no reason to believe it will react any different in this respect to the concepts of safety culture. Any permanent change will be best addressed through long-term organizational learning on the part of every commander, officer, non-commissioned officer and enlisted soldier in the Army.

It must be emphasized that safety culture cannot be considered a cure-all to prevent accidents in the face of more pressing issues that undermine safety such as poor infrastructure or lack of resources and personnel. Senior Army leadership is aware of these threats to readiness. Yet, they are also aware of the serious consequences (both direct, such as deaths and injuries, and indirect, such as loss of resources and mission capability) that accompany poor safety. At the Safety Center we are launching several initiatives to address their concerns and improve safety. In order for these initiatives to be effective, every soldier at every level within the Army must support them. Your emphasis on safety and the establishment of a safety culture within your command is key; leaders' involvement saves lives.

Being alert to both well-defined and ill-defined or unseen hazards is a demanding task

—adapted from Pidgeon and O'Leary (1994). *Organizational Safety Culture.* Hants, UK: Ashgate.

—CPT(P) Robert M Wildzunas, Ph.D., Command Psychologist, US Army Safety Center, DSN 558-2477, 334-255-2477, wildzunr@safety-emh1.army.mil

Luckily, They Didn't Use Risk Management

Lest we forget the lessons

A dramatic and violent battle raged in the skies over Great Britain during the summer of 1940. Field Marshall Göring promised Hitler that the Luftwaffe could and would make quick work of the Royal Air Force, as the forerunner to Operation Sea Lion, the German invasion of the British Islands. Why couldn't they? Success belonged to the Luftwaffe and their tactics known as Blitzkrieg, the first fully modern combined arms warfare. In a matter of months, they had conquered all of Western Europe, handing defeat after crippling defeat to the allies.

The Luftwaffe was at its peak in proficiency. They were combat experienced, confident, and battle hardened. They had flight time, training, and field leadership. They outnumbered the British by more than two to one.

Historians and scholars argue about the reasons why the Luftwaffe eventually failed at gaining and maintaining air superiority during those crucial months, but it is certain that the highest German leadership made several critical mistakes at a time when mistakes were unacceptable. They failed to recognize the newly developed technology that radar offered the RAF as a force multiplier. The British, using radar, were able to mass their very limited fighter resources in the right times and places, intercepting, attacking, and disrupting the huge German bomber formations.

Although the Germans initially went after the RAF fighter bases, attacking their aircraft and support facilities on the ground, Hitler ordered a shift in policy. After a German bomber formation accidentally bombed London, RAF bombers retaliated against Berlin, something Hermann Göring promised would never happen. Absolutely furious, Hitler ordered London bombed off the face of the earth, giving invaluable recovery time to the RAF fighter squadrons.

Having limited range, the German fighters were unable to escort their bomber formations to the targets. Had they utilized drop tanks, the bombers would have taken far fewer losses. In essence, the Luftwaffe faced the same problems as the Army Air Corps faced in the latter stages of the war.

However, in wartime, mistakes do happen, and the German High Command leadership made their share. Still, the Germans came incredibly close to winning the Battle for Britain. With their superiority in sheer aircraft

"Take calculated risks . . .

numbers, the Germans could have easily defeated the British, despite mistake-ridden, High Command decisions. The slight difference could have been made with the concept of risk management.

Wartime accident losses are usually preventable and reduce your ability to complete the mission. It is even more true today than then. Although no statistics are available on exact losses due to accidents, it is fair to assume that at least 50 percent of the 1655 German aircraft lost were due to accidents. This rate has remained somewhat steady over history for the United States, ranging from 56 percent in WWII, to 44 percent in Korea, to 54 percent in Vietnam. In Desert Storm, accident losses went to 75 percent of the total US casualties (USASC files).

Given the extreme conditions of the extended ranges, poor weather conditions, field maintenance, flight discipline, and rushed training, it is conceivable that a 50 percent loss rate due to accidents is quite realistic for the German forces. Imagine if the basic German leadership had used the principles of risk management. Imagine if they had identified and controlled, to the best of their ability, hazards to protect their force. A reduction of perhaps five to ten percent might have made the difference in the numbers, allowing the Luftwaffe to deplete the severely limited RAF fighter pilot reserves and gain air superiority.

The risk-management process is not rocket science. The simple steps, when incorporated into every activity, reduce the risks to an acceptable minimum. The steps are (1) identify hazards, (2) assess hazards, (3) develop control measures and make risk decisions, (4) implement controls, and (5) supervise and evaluate. Using this process, the Germans could have effectively reduced maintenance errors, weather-related accidents, crew-mix-related accidents, crew coordination problems, and training-related accidents. Indeed, the very switch in tactics from Blitzkrieg to massing aircraft to obtain air superiority likely caused battlefield confusion and probably was not taken into account as a potential hazard.

Remember the fine line between victory and defeat is sometimes measured in small numbers. Even a slight reduction in the German accident rate could have made the difference then. It is important that we do not forget the lessons of the past and incorporate our safety doctrine and risk management techniques into all operations, peacetime and wartime.

—LTC Mark Robinson, Chief,
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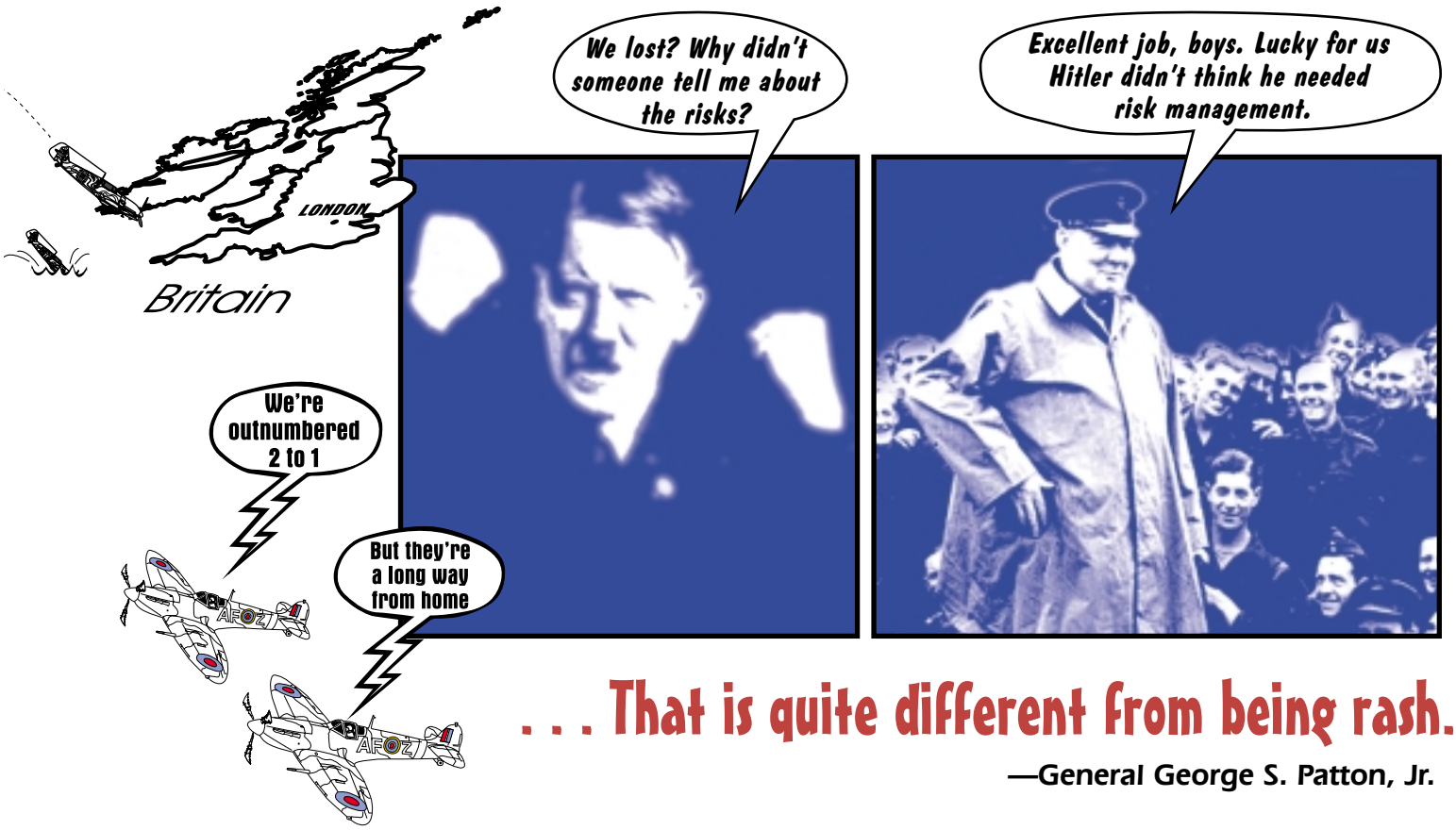


. . . That is quite different from being rash."

—General George S. Patton, Jr.

The Army Aviation Broken Wing Award recognizes aircrewmembers who demonstrate a high degree of professional skill while recovering an aircraft from an inflight failure or malfunction requiring an emergency landing. Requirements for the award are in AR 672-74: Army Accident Prevention Awards.

Making The Near-Impossible Happen!

The Broken Wing Award is awarded to CW4 Thomas Panza (PC) of the 3-7 Cavalry, Fort Stewart, GA, for exceptional flying skill in the face of extreme adversity. *Congratulations!*

The OH-58D(I) was at 1700 ft MSL and 55 KIAS when CW4 Panza lowered the collective to perform the autorotational RPM check during his MTF. The Nr and Np were within normal limits, so CW4 Panza reduced the throttle to the idle stop. He cross-checked his instruments and saw the Ng stabilize at 63.2 percent. Approximately 3 seconds later at 1250 ft. MSL, the engine went below 63 percent Ng. CW4 Panza rolled the throttle back on, but the engine did not respond.

At 1000 ft MSL the engine-out warning illuminated on the MFD as Ng decelerated below 41 percent. CW4 Panza continued his autorotational descent, cross-checked his instruments to maintain a steady autorotational profile, made a MAYDAY call to Wright Tower, and executed a autorotational landing with only minor damage to the aircraft.

CW4 Panza skillfully maneuvered the helicopter to avoid standing dead trees, large bushes, ruts in the ground that were over 2 feet deep, and cut logs that were lying across the ground. He also realized that the extremely wet conditions of the landing area necessitated a zero ground run autorotational landing. Given the poor autorotational characteristics of the OH58D(I) and the lack of training on zero ground-run autorotational landings, CW4 Panza made the near-imppossible happen due to his excellent flying skills. The elapsed time from onset of emergency to termination was 20 seconds.

5500 ft Is A Long Way To Drop!

The Broken Wing Award is awarded to CW3 Ronald L. Peterson (PC) and CW3 Roger A. Merrill (PI) of the NGB Army Aviation Support Facility, St. Paul, MN, for exceptional flying skill and crew coordination in the face of extreme adversity. Congratulations!

The crew departed Minneapolis at approximately 0800 in an AH-1F. Approximately 1.5 hours into the flight, after a long period of level cruise at 5500 feet, a series of three sharp reports were heard coming from the engine area. The engine RPM fluctuated, and CW3 Peterson confirmed the emergency with the instruments. The master caution light and engine oil pressure light illuminated, and the oil pressure gauge read zero. CW3 Peterson directed the PI to transmit a MAYDAY call and to lock shoulder harnesses while he assumed an autorotational profile and placed the transponder to emergency.

The engine continued to stall until the throttle was reduced to flight idle. After the aircraft was in a proper autorotational state and the crew had confirmed their landing spot , CW3 Peterson tried to increase throttle to see if power could be restored for the landing. The engine immediately experienced continuous compressor stalls, so CW3 Peterson returned the throttle to flight idle and refocused his efforts on the landing plan. At approximately 2500 feet altitude and 80 knots airspeed, the engine failed completely.

The aircraft was aligned on a modified base for landing into an open field. At approximately 500 feet AGL and 80 knots IAS, CW3 Merrill confirmed the landing zone, but then noticed wires paralleling the road and questioned whether they would be able to avoid the wires. CW3 Peterson agreed and selected an adjacent open field. Again, CW3 Merrill was able to make out wires that crossed this field also. CW3 Peterson agreed with CW3 Merill's assessment and selected a third open field.

CW3 Peterson made the correcting turns to align the aircraft and entered a steep deceleration profile to deplete airspeed prior to touchdown. Upon feeling the airspeed diminish and the aircraft beginning to settle, CW3 Peterson leveled the aircraft and applied full collective to arrest the descent. The aircraft landed level, skidded approximately 10 feet, and rocked forward slightly on the skid shoes before coming to a complete stop. Within 20 seconds, the rotor

stopped. The elapsed time from onset of the emergency to termination was 5 minutes.

That Crew Coordination Stuff Really Does Work!

The Broken Wing Award is awarded to CW3 Michael J. Knuppel (PC) & CW2 Joseph P. Zewiske, (PI) of the 832nd Medical Co (Air Ambulance), West Bend, WI, for averting disaster with excellent crew coordination and situational awareness.
Congratulations!

During a day, VFR NOE training flight in a UH-1V, the PC entered a descending right turn from 300 ft AGL in order to resume NOE flight. At approximately 160 ft AGL (100 ft AHO), the crew heard a loud pop from the engine area. Immediately, the aircraft experienced a left yaw, a decrease in engine and rotor RPM, illumination of the RPM warning light, and the sounding of the RPM audio. The PC was on the controls and immediately lowered the collective to try and regain RPM. He turned the aircraft parallel to the hill, toward an old tank trail that was surrounded with trees, and made a MAYDAY call on tower frequency.

During the descent the PI focused on his area of responsibility, without direction, and noticed the RPM was decreasing below 5900 RPM (more than 10% below normal). He announced to the PC that he was placing the GOV switch in the emergency position, which occurred at approximately 20 ft above the trees. The engine RPM immediately increased to 6700, and the PI announced and took manual control of the throttle to maintain RPM within limits. The PI then announced that the engine and rotor RPM were within limits and, in conjunction with the PC, immediately increased collective to stop the descent into the trees.

The PC then decided to turn right, toward a nearby military drop zone that offered a better area for landing. During this time, the PI placed the transponder to emergency, made numerous MAYDAY calls and continued to monitor throttle application. Arriving at the drop zone, the PC made a left turn to align the aircraft with the rolling terrain and announced that he was performing a running landing. The aircraft was landed with no damage and shutdown without any further incidents. The elapsed time from the onset of the emergency to the landing was approximately 45 seconds.

Never Stop Flying, No Matter How Many Parts Fall Off!

The Broken Wing Award is awarded to DAC Joe J. Hudgens, Jr. (PC) & CW4 Francis M. Crawford (PI) of the US Army Aeromedical Center, Fort Rucker, AL, for exceptional crew coordination and flying skill in the face of extreme adversity.
Congratulations!

After dropping off a MAST (Military Assistance to Safety and Traffic) patient in Birmingham, AL, the UH-1V and crew were heading back to Cairns Army airfield. The aircraft was in straight-and-level flight flying at 90 knots and 2500′. The crew heard a loud bang, then the aircraft violently yawed to the right and pitched nose down 40 degrees. At this point both pilots realized that they had, at least, lost tail rotor control. Due to the fatigue in the tail spar, the aircraft lost 100.6 lbs. of vertical fin and tail rotor, causing a rapid shift in CG and a violent right yaw.

CW4 Crawford initially lowered the collective, but this only increased the aircraft's nose-low attitude. CW4 Crawford then raised the collective slowly trying to arrest the nose-low attitude. DAC Hudgens then came on the controls with CW4 Crawford because he knew that more than one pilot would be required to fly the aircraft. With both pilots manipulating the controls, they directed the crew to send out a MAYDAY call, alleviated the rapid descent without rapid aft cyclic, and gained control of the aircraft.

Knowing that they had limited control and stability, the crew located the only area suitable for a crash landing, a small field with short trees to the right of the aircraft. With both pilots utilizing unparalleled crew coordination, DAC Hudgens and CW4 Crawford managed to guide the aircraft in a right hand, semi-circular pattern to make the landing area. Once the crew was assured that the landing area

could be reached, they began their final descent.

While CW4 Crawford was slowing the forward momentum of the aircraft with the use of the cyclic and collective, DAC Hudgens was controlling the yaw by adjusting the throttle. When the aircraft was approximately 5 ft above the trees and at approximately zero airspeed, DAC Hudgens brought the throttle to idle to arrest the yaw rate of the aircraft. Both pilots began to increase collective to cushion the aircraft's impact into the landing site. The aircraft impacted the ground with the nose of the aircraft slightly to the right. Both pilots and one crewmember suffered severe injuries and the other crewmember was only slightly hurt. The elapsed time from the onset of the emergency to termination was approximately 20 seconds.

Can You Fly The Unflyable?

The Broken Wing Award is awarded to CW3 Paul A. Pederson (PC) and WO1 James K. Soltani (PI) of the 3rd Squadron, 4th Cavalry, Fort Hood, TX, for exceptional flying skill and crew coordination in the face of extreme adversity. ***Congratulations!***

The OH-58D(I) crew had just completed refueling the aircraft at a field FARP following an NVG training mission. The PI was on the controls at 150 feet AGL and 40 knots when the aircraft developed severe lateral and vertical vibrations as a result of a tailrotor counterweight bracket failing. The PC got on the controls with the PI and initiated an approach without delay.

Immediately, the aircraft was vibrating so violently that the crew was unable to communicate through the aircraft intercom system or read the flight instruments. To make matters worse, the Pitch/Roll SCAS disengaged during the descent, adding to the already impossible task of flying this aircraft. The flight recorder data show that the crew battled erratic pitch, roll, and yaw rates on the order of +45 to –43 degrees for pitch, +24 to –24 degrees for roll, and +23 to –19 degrees for yaw. The vibrations were so intense that the aircraft's position lights were blown out.

Both crewmembers showed great skill in recognizing the severity of the situation. While both crewmembers were on the controls, and without the aide of SCAS, they were able to safely land the aircraft without further incident. After shutdown it was noted that the 90-degree gearbox had two bolts holding the gearbox to the tailboom. The remaining bolts had been stretched to the point where the entire gearbox could be lifted off the tailboom mounting point. The entire drive train from the engine back had to be replaced. The engine was loose at the forward mounting points where the engine mounts to the airframe, and it was replaced due to the compressor rubbing on the compressor housing. The elapsed time from onset of the emergency to termination was 25-30 seconds.

Text-Book Maneuvers By Remarkable Pilot!

The Broken Wing Award is awarded to CW2 John A. Cappadaro (PC) of the 1st US Support Battalion, South Camp, Sinai, Egypt, for exceptional decision making and flying skill in the face of extreme adversity. ***Congratulations!***

During takeoff of a transport mission, the master caution light in his UH-1H illuminated. Subsequently, the engine chip and engine oil pressure lights illuminated. CW2 Cappadoro announced the emergency and described the indications of the emergency to the PI, who was on the controls. CW2 Cappadoro practiced excellent crew coordination by allowing the PI to maintain aircraft control while he began evaluating the surroundings for a possible forced-landing area.

As the PI began a left turn toward the most suitable area and away from buildings and wire hazards, the engine began to overspeed. CW2 Cappadora immediately announced an overspeed condition and increased collective to load the rotor system. Both engine and rotor RPM were maintained within normal, safe operating limits by CW2 Cappadoro's quick identification and corrective actions.

CW2 Cappadora assumed control of the aircraft and reduced the throttle in an attempt to maintain aircraft control and keep engine RPM within limits. When the throttle was reduced, the engine RPM began to fluctuate severely. He directed the PI to place the governor switch into the emergency position and prepare for a possible forced landing. CW2 Cappadora was maneuvering the aircraft into the wind, away from wires and several other structures when the engine finally failed.

CW2 Cappadora announced the failure and placed the aircraft into an autorotational profile. The aircraft touched down in a semi-level attitude with minimal ground run. Although the aircrew initiated the autorotation at 70 ft AGL and 30 knots when the engine failed, the aircraft was not damaged and no injuries were sustained by the crew or by the six passengers. The elapsed time from onset of the emergency to termination was 30 seconds.

3 Out of 4 Wheels Isn't Good.

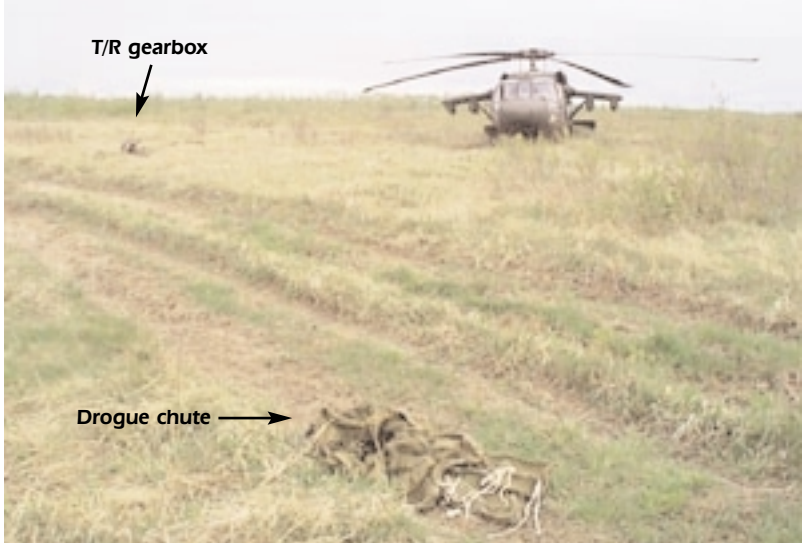
The Broken Wing Award is awarded to CW4 Timothy K. Welsh (PC) of the 7th Battalion, 101st Aviation Regiment, Fort Campbell, KY, for exceptional decision making and situational awareness in the face of adversity. ***Congratulations!***

CW4 Welsh was returning his CH-47D to the tactical assembly area after completion of an NVG Brigade Air Assault operation. The aircraft was transporting the maintenance recovery team, which consisted of an internally loaded HMMWV and six maintenance personnel. The aircraft was landing to the desert floor (3200 ft MSL), under NVGs, in brownout conditions at the time of the emergency.

CW4 Welsh was on the controls, and occupying the right-side pilot seat. As the aft landing gear touched down, the aircraft suddenly rolled to the right, so violently that CW4 Welsh's flight helmet struck the right-side window. CW4 Welsh applied immediate left cyclic, and as the aircraft rolled level, he pulled in maximum thrust to get the aircraft airborne. By this time, the master caution and utility system failure lights had illuminated.

After clearing the brownout conditions, the aircraft was stabilized at a 250 ft OGE hover to check systems. The flight engineer (FE) confirmed that utility system pressure was at 0 psi. Due to the existing brownout conditions, CW4 Welsh elected to recover the aircraft to nearby Bicycle Lake AAF. The airspeed was kept to 40-50 knots IAS, due to excessive vibrations caused by the damaged landing gear.

The PI coordinated with ground personnel to construct a landing platform to support the right, aft portion of the aircraft. The platform was necessary because the landing gear had fallen off during the flight to Bicycle Lake AAF. After the aircraft landed, CW4 Welsh ordered the passengers to exit the aircraft through the cabin door. No other damage or injuries occurred. The elapsed time from the onset of the emergency to termination was approximately 1.5 hours.



Get That Drogue Away From Me!

The Broken Wing Award is awarded to CW2 Ryan M. Sarvie (PC) of the 10th Avn Regt, Fort Drum, NY, for exceptional decision making and flying skill in the face of extreme adversity. ***Congratulations!***

CW2 Sarvie was on the controls of the trail UH-60L in a flight of seven that was landing to an LZ under NVG conditions. While on short final over uneven and rutted terrain, CW2 Sarvie heard a loud bang from the rear of the aircraft and felt the aircraft violently shudder. Unknown to CW2 Sarvie, a drogue chute and parachute pack had become entangled in the tail rotor of his aircraft, causing the tail rotor gearbox to be torn from the aircraft and a fire to ignite in the tail rotor gearbox area. They had been left in tall grass and brush near the approach end of the LZ after a parachute operation.

The aircraft immediately yawed hard right, pitched forward, and rolled left. Recognizing that the aircraft was not in a condition for sustained or controlled flight and that Chalk 6 was in close proximity, CW2 Sarvie took immediate action to attain a level and survivable landing attitude. Left pedal inputs had no effect on the yaw, and there was no time to reach up and retard the power control levers. He controlled the spin by immediately lowering the collective and simultaneously applying hard right and aft cyclic to arrest the left rolling and forward pitching motion.

Moments later, while still slightly left-side low and spinning to the right, CW2 Sarvie successfully landed the aircraft in a near-level attitude a safe distance from the rest of the flight. The aircraft landed hard, but damage was minimized by a proper landing attitude.

Once on the ground, the aircraft spun another 30 to 40 degrees, but CW2 Sarvie continued to fly the aircraft and was able to keep it upright. Upon seeing that the aircraft may be on fire, CW2 Sarvie determined that the turning main rotor blades were stable, so he ordered the immediate evacuation of the aircraft. The elapsed time from onset of emergency to termination was one minute.

—Adapted from the Broken Wing Award nomination packets. Refer questions to the editor. DSN 558-9853, (334) 255-9853, E-mail: flightfax@safety-emh1.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH64

Class C

A series

■ The aircraft was being MOC'ed for tail rotor assembly maintenance when the FM antenna separated from the upper tail pylon and contacted the tail rotor assembly. Stabilator sustained sheet metal damage. Tail rotor blade and whip antenna required replacement.

D series

■ The aircraft tail rotor contacted power lines while on a training flight with a British exchange pilot onboard. Aircraft landed and damage was found on one tail rotor blade and the FM whip antenna.

Class D

A series

■ During test flight for an unrelated maintenance action, a zeus fastener on the 90-degree gear box cover detached from the helicopter. The fastener struck a tail rotor blade and fragmented. The resulting shrapnel punched two holes in the top of the horizontal stabilator. The leading edge of one tail rotor blade was damaged.

CH47

Class C

D Series

■ During slingload training with 18000 lbs block, at a hover, the crew heard a loud bang from the back of aircraft. Crewchief stated that sling leg had broke and crew landed aircraft without further incident. After returning to airfield crew found sheet metal damage around center cargo hook area.

■ During engine run-up for a hydraulic MTF, the FE reported to the IP that he had located a droop stop lying on the ground. Maintenance personnel were immediately notified and wood and mattress shoring was emplaced to protect the aircraft fuselage against contact by the rotor blades during shutdown. During final rotation, the aft yellow blade contacted one of the wood beams, causing it to strike and rip away a portion of the upper fuselage.

■ Cargo door portion of the ramp was discovered missing during postflight inspection. Suspect cargo door fell off during flight, but crew didn't know when it might have happened. Another cargo door was installed.

Class D

D series

■ During a two-wheel back taxi out of hot refuel, the aft right gear turned perpendicular to the direction of travel and broke off. The crew had locked the swivels and rolled forward to ensure they were locked, but they did not visually check. Landing gear was replaced.

■ During maintenance test flight, left side "eyebrow" above copilot seat cracked and flew off aircraft.

OH6

Class A

J series

■ Aircraft landed hard after flight test maneuver. The flight maneuver exceeded aircraft performance parameters. Extensive damage was reported. Contract pilot was able to egress and sustained only minor injuries.

OH58

Class B

D Series

■ Crew experienced loss of tail rotor authority during flight and initiated an emergency landing to a pinnacle. Aircraft sustained damage to main rotor blades, tail boom, nose, and landing gear upon landing.

Class C

C Series

■ Crew was performing a power check from a 60-foot hover when aircraft yawed slightly, followed by an engine surge. Surge and yaw continued to increase as PC assumed controls. PC executed autorototation, and aircraft touched down hard on uneven terrain.

D Series

■ On takeoff, crew experienced a series of loud reports and an uncommanded right spin. IP initiated an autorotation and aircraft came to rest upright. Crew reported overtorque of the engine (reading of 169% for 1 second) and damage to the rear landing gear mount.

■ Crew reported power surge during an approach to land, at approx. 4 feet AGL. Aircraft landed hard, and the engine was pulled for replacement. Subsequent inspection revealed additional damage to other components (drive train, flex coupling).

■ Crew experienced dust during an approach to land at an LZ. Skids descended into soft ground/dirt on touchdown, and aircraft rocked forward, contacting the WSPS to the ground. Postflight inspection revealed damage to WSPS, skids (spread), and sheet metal.

■ While aircraft was still positioned on the ground and at 100% Nr, engine Np peaked at 125% for 4 seconds. Pilot on the controls had just switched the FADEC from the "auto" to the "manual" position.

■ Aircraft tail rotor contacted a tree while at a hover during live fire, "stinger" operations. Aircraft was landed without further incident.

■ Aircraft engine temperature peaked at 1032°C for one second during start up.

Class D

C Series

■ During touchdown on standard autorotation, aircraft touched down tail low and nose high. Aircraft rocked forward, became airborne again, and landed hard.

UH1

Class B

H Series

■ Aircraft drifted rearward into another parked aircraft during an extended hover operation.

UH60

Class A
A Series

■ Aircraft was Chalk 2 in a flight of two, flying in an extended formation. PC initiated steep turn during contour flight and lost altitude. Aircraft was slow to recover from such a steep turn, and incidentally, flew through the trees, causing extensive damage to aircraft. PC landed the aircraft in small opening with no further incidents. No injuries reported, but extensive structural damage occurred.

Class B
A Series

■ Aircraft was at a high hover when it reportedly experienced settling with power. Aircraft rapidly descended to ground impact, became airborne again after bouncing, and then landed with no further incident. Amongst the damage, the tail landing gear collapsed and right cockpit door separated.

Class C
A Series

■ During engine start, crew noticed that one of the main rotor blade tie-downs was still attached so an emergency engine shutdown was performed. Inspection revealed that the tie-down damaged the T/R blades and aft antenna.

■ During air assault demo rehearsal, the stabilator contacted the ground during landing. The aircraft had an excessive nose-high attitude on touchdown. Landing area was a generally flat grass area between taxiways.

■ Aircraft was making a downwind landing into a tactical assembly area with a 20 knot tail wind. A "roll-on" landing was being executed, but vibrations from ETL transitioning mounted and the aircraft hit hard. The rear strut on tail wheel assembly was destroyed. The tailboom and some fluid lines may also be damaged.

■ Crew reported loss of Nr(RPM) during simulated engine-out procedure. Crew initiated emergency landing procedures. Aircraft sustained stabilator and under-carriage damage after a hard landing.

L series

■ Aircraft's main rotor system contacted tree branches during taxi from parking to the FARP site for a FARP fire drill. Three tip caps were damaged, two of which were destroyed and required replacement.

■ Aircraft was on final approach to LZ, where tail and the stabilator were damaged during deceleration prior to landing.

■ Main rotor blade tip caps contacted a light pole while aircraft was taxiing to refuel.

A-series (MH-60)

■ Cargo door window separated in flight and contacted one main rotor blade. Blade replacement required.

K-series (MH-60)

■ Flight consisted of night, fastrope training for crewchiefs while under NVGs. Aircraft had completed one iteration/approach to an elevated platform and was on the second approach when the tail wheel made contact with the platform. Aircraft was landed without further incident. The tail wheel was found pushed up into the tailboom.

Class D
A series

■ Upon completion of MEDEVAC mission, the left APU door was found missing during postflight. The departing door struck the stabilator and damaged it. Inspection of aircraft revealed structural failure of the APU door hinges.

L series

■ Crew was flying an NVG troop insertion mission, at approximately 100 ft AGL and 90 knots. Crew was descending from a ridgeline into a valley when aircraft struck three power lines, cutting through them. The power lines were at 50 ft. AGL. Crew landed aircraft without further damage. Postflight inspection revealed damage to aft (bottom) cabin area and to tail wheel.

■ PC attempted to hook up a M119 with the gun barrel facing aft in a field of 7-foot-tall grass. After 2-3 min. of trying to hook up the load, the crew backed off the load and the PI attempted it. After the PI hovered over the load for another 2-3 minutes, the crewchief called load strike when the aircraft descended on to the load. No damage occurred to the M119, but aircraft received damage in the tail cone section.

C12

Class C
R series

■ Aircraft was struck by lightning at 17,000 ft MSL. Lightning struck the right propeller and exited at the right inboard edge of the landing flap. A static wick was also blown off during strike. Onboard weather scope showed there was 15 miles of lateral separation from clouds at time of strike. Aircraft was landed without further incident.

■ Aircraft was struck by lightning during initial portion of flight and recovered to home station without further incident. Crew had been briefed of isolated thunderstorms during weather briefing, but weather radar indicated no weather hazards in the vicinity.

Class D
F series

■ After being refueled, aircraft began taxiing and struck a 3-foot ladder that was used for refueling. One of the three blades on the left propeller was damaged.

Class E
F Series

■ Engine shutdown in flight during training, while at cruise altitude. Four attempts to restart the engine failed. Aircraft was flown back to home field approximately 10 minutes away without further incident.

■ Number 2 engine would not produce minimum takeoff power under the conditions for the day. Maintenance personnel removed corrosion from the P2 cannon plug, and the aircraft checked out OK.

O5

Class A

■ Aircraft was reported missing during a service/surveillance mission. Wreckage was located and identified in a remote, mountainous, and heavily forested region. Aircraft impacted the side of a mountain during VMC, night conditions. Seven fatalities.

For more information on selected accident briefs, call DSN 558-9853 (334-255-9853). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

Aviation messages

Quarterly list update - Have you read these?

Aviation safety-action messages

June 99

AH-64-99-ASAM-07: Tail Rotor Head Assembly
UH-60-99-ASAM-08: Bellcrank Support Assembly Inspection

July 99

UH-60-99-ASAM-09: M/R Blade Expandable Pin Inspection
UH-60-99-ASAM-10: Crossfeed Breakaway Valve Inspection

August 99

AH-64-99-ASAM-08: Inspect T700-GE-700/701/701C Engines
UH-60-99-ASAM-11: Inspect T700-GE-700/701/701C Engines
UH-60-99-ASAM-12: Inspect Hamilton Standard HMU's
UH-1-99-ASAM-03: Inspection of Fuel Quantity Transmitter
OH-58-99-ASAM-08: Mast Torque Transient Limit Change

Safety-of-flight messages

June 99

AH-1-99-04: Mandatory N2 Spur Gear Replacement
CH-47-99-01: Synchronized Shaft Mounting Brackets

July 99

OH-58-99-02: Replace Main Fuel Controls

August 99

CH-47-99-02: Immediate Grounding due to Planetary Gear
AH-64-99-03: Remove APU
CH-47-99-03: Forward/Aft Transmission Gear/Bearing Assembly
CH-47-99-04: Inspection of Forward/Aft Gear/Bearing Assemblies

September 99

CH-47-99-05: Replace Forward/Aft Transmission Assemblies

Don't Have One of These? Log-on to the Risk Management Information System (http://rmis.army.mil). Your ASO or commander should have a password.

Shortfax

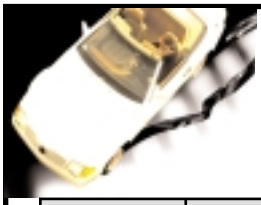
Keeping you up to date

Looking For Answers?

Last month, in the September issue of Flightfax, a Power Management Jumble puzzle appeared. There was a printing error in question number 8. The jumbled word contained an extra "T", and no "Y" to make the word, "compressibility". Our apologies for the error. Additionally, the answers to the rest of the puzzle appear below in case you had difficulty.

Answers: 1. Eliminate 2. Physical, Weather 3. Resultant 4. Angle of Attack 5. Ninety 6. Twenty 7. Diameter 8. Compressibility 9. Retreating Blade Stall 10. RPM 11. Settling With Power 12. Downwash 13. Airspeed 14. Sixty 15. Risk Assessment Sheet

Answer to Jumble:
What is the high risk portion of my low risk mission I'm about to do?



POV Fatalities

through 30 Aug

FY99	FY98	3-yr Avg
116	107	104

TOP 3 KILLERS

1. Speed 2. No seatbelts 3. Fatigue

TREND: Motorcycle accidents on the rise

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Luckily, They Didn't Use Risk Management 4
Broken Wing Awards 6
Quarterly Aviation Messages 12
Looking for Answers? (SF) 12

WS • War Stories, CC • Crew Commo, SF • Shortfax

FY99 Aviation Accidents through 30 August

		Class A	Class B	Class C	Total
ACCIDENTS	Total Avn Acdts	18	9	82	109
	Flight Acdt Rate	2.20	0.98	7.81	10.98
RATE COMPARISON	FY99 vs. FY98	49 %	50 %	0.2 %	13 %
	FY99 vs. 3-yr avg	90 %	31 %	13 %	25 %
	Aviation Military Fatalities				20

U.S. ARMY SAFETY CENTER

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Gene M. LaCoste
Brigadier General, USA
Commanding

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

NOVEMBER 1999 ◆ VOL 27 ◆ NO 11 http://safety.army.mil

Flying habits and judgment are infectious.

Are yours worth catching?

In the fight against accidents, one thing rings true—it takes good habits and good judgment on the part of the individuals flying to ensure people's lives and expensive equipment are not squandered. In this issue, we take an interesting look at the liability of judgment.

In this issue

- Learn from the dinosaurs
- I've had an accident - What can they do to me?
- German hotdogs get a taste of Göring
- Does skill and knowledge equal judgment?
- Quitting nicotine? Read this!

Learning from the Dinosaurs

Have you ever run across one of those old dinosaur Cobra or Huey pilots from the Vietnam era? He could spin a yarn about the old days, when you never had enough power. He'll tell you about trading off ammunition or fuel just to get off the ground. He might even tell you about when he had to rock the pedals to get the aircraft moving, then gingerly apply forward cyclic to start sliding along the ground, the crew chief running along side. When he finally reached effective translational lift (ETL) the crew chief would jump on board and the helicopter would struggle into the air.

The old Cobra pilot will tell you of riding the limit of 50 pounds of torque, and having to reduce power prior to a left hand turn, just to prevent an over-torque due to the transient torque induced by the advancing blade. This all sounds ridiculous to the twin-engine modernized high-performance helicopter pilot. After all, there are no power issues in this day and age. The days are gone when you had to finesse the old Cobra around, keeping the nose into the wind and turning off your environmental control unit (ECU) because your exhaust gas temperature (EGT) was in the yellow range. Or are they?

Helicopter pilots used to have trouble because the former families of aircraft only had minimal power. The old guys used to have to meticulously plan every aspect of the mission related to power available at each stage of the mission. And, they're glad to tell you that. But that doesn't happen any more. Right?

Typically, we fly around Fort Campbell, or Fort Hood, or Fort Bragg and never have a problem. Performance planning is almost a formality. The 5- or 10-foot hover power check is a glance at the torque just before takeoff. Recently, however, there have been a rash of accidents directly related to power management in the twin-engine modernized aircraft we presently fly around the world.

We deploy from home station to a totally different environment. Sometimes we get classes on PPC as it relates to the new conditions. Sometimes those conditions are extreme. For example, this year's deployments to Honduras, Guatemala, Albania, and Fort Bliss have each resulted in a power management-related major accident. Even twin-engine super aircraft have power limits.

When we get to a 3000-, 4000-, or even 6000-foot density altitude, power from our engines reaches limits. With the GE 700 and GE 701 family of engines we reach a point where turbine gas temperature (TGT) is limited to prevent engine damage. The engine electronic control unit (ECU) begins to limit output to the hydro-mechanical unit (HMU), and we simply can get no more power from that engine. Although the –10 says TGT limiting happens at 867° C, we find this occurs around 860 +/- 9° C on the GE 701. A demand for more power results in rotor RPM bleed-off. A tail wind or turbulence can exacerbate this further.

The PPC calculated prior to the mission gives us a fair idea of what to expect during the mission at a predicted gross weight at a given altitude. We validate our gross weight through the 5- and 10-foot hover power check (200 lbs. = 1% roughly for GE 701 series aircraft). Then we compare our predicted value to our go/no-go values. If we cannot fly out-of-ground-effect (OGE), we should know it prior to getting into the cockpit. If there is a question of actual power or controllability, then we validate and should look to modify the mission. Let's take advantage of those conditions that are in our control, such as gross weight, or direction of flight, or abrupt control inputs. Learn to finesse the aircraft.

Maybe the old Cobra and Huey pilots knew something after all. Their old meticulous planning and flying habits are definitely worth catching!

—LTC Mark Robinson,
(334) 255-1253/3943, DSN 558-1253,
E-mail: robinsom@safety-emh1.army.mil

How to know when things "Don't look right"

The U.S. Army Safety Center (USASC) offers aggressive safety initiative programs that include on-site assistance visits and an NCO professional development mobile training team (MTT) to provide corps/division/brigade-sized units and installations with safety assistance. The Safety Center provides the programs at no monetary cost to the unit, providing risk management training and assistance at all command levels.

Assistance Visit Program

You get a week-long assistance visit, tailored to unit requirements, to provide training in hazards identification, POV toolbox application, driver's training program applications, ground and aviation systems safety, and risk management at leader and senior NCO levels.

You may select activities from a menu which USASC subject matter experts tailor to meet unit needs. Some visits target large air and ground audiences, providing an overview of the latest Army accidents as well as the hazards associated with them. Other events take a "train the trainer" approach, leaving the organization with a core of trained personnel more fully able to effectively apply risk management to all operations.

The assistance team can also provide an individual unit (battalion) assessment on maintenance, training, operations, and safety, to give non-attribution feedback to the commander. The assessment can also identify good ideas to share Army-wide. We learn from the units what works and then provide other Army organizations proven methods to eliminate potential accidents.

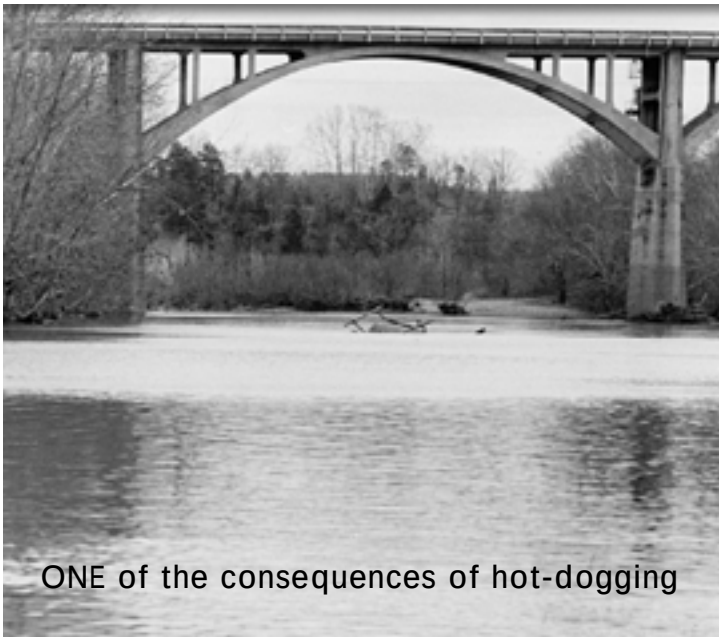
NCO Professional Development Mobile Training Team (MTT).

The MTT teaches risk management to NCOs—we don't produce a Safety NCO. NCOs are the leaders on the ground "where the rubber meets the road" and are most likely to have a direct impact on accident prevention. So, we have designed a 45-hour course focused on hazard identification and risk management. The target audience is sergeants and staff sergeants who can apply risk management in all phases of training and operations. Their direct leadership translates into speaking up when something just does not "look right". This training provides positive habit transfer where risk management skills learned on-duty will help soldiers become better risk managers off-duty as well.

Give us 30-50 NCOs for a week. The USASC will help train leaders who are better prepared to identify and control hazards on ranges, in motor pools, or wherever high-risk operations occur. This program rewards your outstanding NCOs with three hours of college credit.

The cost to the unit is only a commitment of time and selected personnel for a single week. We will do everything possible to accommodate your training schedule. Tell us when you need us, and we'll make every effort to be there.

—LTC Mark Robinson,
(334) 255-1253/3943, DSN 558-1253,
E-mail: robinsom@safety-emh1.army.mil



ONE of the consequences of hot-dogging

Am I Liable?... Should I Be Liable?

Accountability Should Be Part Of Every Commander's Safety Program

The US Army Safety Center and the policies it promulgates are focused on accident prevention. Part of the prevention process is accident investigation and reporting. Through investigations, we strive to identify causes of accidents and recommend changes to preclude the same mistakes from occurring again.

Under AR 385-40 (the regulation governing investigations), no one in the Army may use the

information gathered during a safety investigation to take any adverse action against the person or persons whose actions (or inaction) caused the accident. Often though, the errors of the individuals involved in an accident arise to such a high level of negligence or willful disregard for safety that administrative or punitive measures should be taken. Although these measures cannot be based on information obtained through the safety investigation, commanders can rely on collateral reports, reports of surveys, line of duty determinations and other criminal or administrative reports to provide the factual basis for action against a soldier or civilian employee.

The purpose of this article is to inform commanders of their options under the Uniformed Code of Military Justice (UCMJ).[1] The UCMJ has several provisions that can be used to charge leaders and operators for their inappropriate actions or inaction regarding the performance of their duties and the impact on the safety of their soldiers. These articles include:

ARTICLE 93 – CRUELTY AND MALTREATMENT:

"Any person subject to this chapter who is guilty of cruelty toward, or oppression or maltreatment of, any person subject to his orders shall be punished as a court-martial may direct." A Blackhawk pilot who chooses to take an infantry squad on the "ride of their life" and intentionally sets out to "make them puke" could be guilty of this article.

ARTICLE 119 – INVOLUNTARY MANSLAUGHTER:

"Any person subject to this chapter who, without an intent to kill or inflict great bodily harm,

unlawfully kills a human being by culpable negligence." A similar offense is...

ARTICLE 134 – NEGLIGENT HOMICIDE.

If on the same "ride of their life", the Blackhawk pilot exceeded the aircraft's capabilities and crashed the aircraft, killing those same infantry squad members, the pilot could be prosecuted for these offenses which carry a potential sentence of a dishonorable discharge, forfeiture of all pay and allowances, and confinement for 10 years for involuntary manslaughter or 3 years for negligent homicide.

ARTICLE 92 – FAILURE TO OBEY ORDERS OR REGULATIONS.

This is by far, the article most commonly available to commanders for safety violations.

Many provisions of regulations are included for the safety of our service members, their family members and the general public. Failure to adhere to these regulations can lead to an Article 15 or prosecution under Article 92. Violations of this article include disobeying an order, disregarding regulations or being derelict in the performance of your duties. The maximum punishments for these offenses vary with the degree of culpability of the defendant.

Violating an order or regulation is fairly clear cut and is an easy concept for each of us to understand. If the army has published an order or regulation and it is lawful, you must follow it. To be guilty of dereliction of duty, you need only be found to have acted with simple negligence or with culpable inefficiency in the face of a duty to act otherwise. 'Negligence' is any act or failure to act when you have a duty to use care. Aviation is an inherently dangerous business and you always have a duty to use care in the operation of an aircraft. 'Culpable inefficiency' means a reckless, gross or deliberate disregard for the foreseeable results of an act or a failure to act without a reasonable or just excuse. Operating an aircraft on

the edge of its performance limits ('hot-dogging', "crankin' and bankin' ", etc.) would be acting with culpable inefficiency.

EXAMPLES

Several high-visibility courts-martial illustrate the application of these articles. The trials of Navy and Army aviators in the spring and summer of 1999 made headlines around the world.

■ **Aviano.** In February, 1998, an Navy EA-6B Prowler on a training mission near Aviano Air Base, Italy, killed 20 people when it severed the cables supporting a gondola. In July of that year, general courts-martial were ordered for Capt. Richard Ashby, the aircraft pilot, and Capt. Joe Schweitzer, the navigator. Capt. Ashby was charged with 20 counts of involuntary manslaughter, one count of destroying government property, destroying private property, and two charges of dereliction of duty. Capt. Ashby was acquitted of all charges. Capt. Schweitzer, originally charged with many of the same charges, was ultimately tried on one count of impeding an administrative proceeding related to his removal of and hiding/or destroying a videotape of the accident flight. He admitted his guilt and was sentenced to dismissal from the military. Other members of the EA-6B crew were originally charged with UCMJ violations but were given immunity for their testimony against Ashby and Schweitzer.

■ **Bahamas.** Closer to home are the trials of Chief Warrant Officers Guido and Riddell for the deaths of their wives while aboard a Blackhawk for an unauthorized familiarization flight in the Bahamas. Together, these aviators were originally charged with over 25 counts of UCMJ violations. Only four charges went forward to court-martial. The most serious charges, involuntary manslaughter and wrongful destruction of military property, were dropped after the Article 32 hearing. At trial, Riddell was found guilty of wrongful appropriation of a military aircraft and violation of a lawful regulation. He was sentenced to forfeiture of $500 pay for five months and a $2,000 fine.

This accident was a tragedy for the entire aviation community. One news account claimed that Riddell, at the controls at the time of the accident, had earned the nickname "Air Show Dan".[2] Other reports claim that the aviators assigned to the Bahamas mission had "started performing flight maneuvers in a 'competition' to outdo each other weeks before [the] accident." One aviator in the unit testified that pilots would do a low fly-by over the housing area and abrupt turns. Complaints to the chain of command about the lack of safety in the operational environment went unanswered. The extreme danger of allowing these actions is the cumulative effect. This aviator testified that "When someone performs a maneuver and others see it, they think it's OK. The next person performs it with a little more flair and pretty soon, it becomes a competition."[3]

Commanders should learn from this tragedy. Accepting your unit's own "Air Show Dan" can lead to another death or loss of another aircraft. Don't tolerate such behavior. Don't ignore complaints made about safety. And, don't be afraid to take action. An Article 15 or courts-martial is a very serious thing…but so is aviation safety. Use all the tools you have to ensure the safety of your units and the soldiers you carry.

If you have any questions about this article or your obligations as a leader to maintain the health and welfare of your soldiers, please contact the USASC Command Judge Advocate or your local Judge Advocate's office.

—LTC Gleisberg, Command Judge Advocate, United States Army Safety Center, (334) 255-2924, DSN 558-2924, E-mail: gleisberc@safety-emh1.army.mil

[1] The Army regulatory structure offers numerous administrative actions to be taken against officers, enlisted soldiers and civilians who fail to perform their duties. These measures will be discussed in a future issue of *Flightfax*.

[2] The *Savannah Morning News Electronic Edition*, "Who's to Blame? Attorneys debate cause of Black Hawk crash that killed the wives of two Hunter pilots.", by Noelle Phillips.

[3] The *Savannah Morning News Electronic Edition*, "Pilot tells of unsafe flying in the Bahamas", by Noelle Phillips.

An Early Holiday Gift

The latest aviation safety poster should be arriving at your unit soon. Check with your battalion or brigade ASO. If it hasn't arrived by 30 November, email your request for "Windsock poster" to forehans@safety-emh1.army.mil.

You can also download posters from our website and print your own. Go to http://safety.army.mil, click on MEDIA, then POSTERS. Select the one you want, click download, pour a cup of coffee and...

Achtung! You Never Had It So Good!

(Management of Flying Safety in the Luftwaffe during WWII)

There has been much focus in recent years on the responsibility of management in flying regulations, the prevention of aircraft accidents, and the promotion of flying safety generally. Accident investigators tend to look a lot closer at flying accidents that [appear to be "pilot error."]

Observing the passage of time that has elapsed we can, perhaps, look back with tongue in cheek a little at how flying safety was managed (and the processes employed) in one air force during WWII. The incidents cited in this article were extracted from captured German Air Force flying safety records.

At the beginning of WWII, Reich Marshal Herman Göring gave each *flieger* the one-time word on the subject of violating flying regulations while in the employ of the Luftwaffe. The German Air Force accident or violation report was officially known as a Disturbance Report. When a pilot got his name on one of these reports, it was usually SOP to give him a large boulder, a hammer, and a five-year plan to convert the boulder to sand.

The Reich Marshal took a dim view of anybody in his Air Force who violated regulations. And, in a letter to his commanders in the field Göring said, "I order, that in cases against flying order and discipline, the disciplinary superiors will take merciless action with the utmost strictness against the guilty ones and advance their education as fliers with all means at their disposal. They will be responsible to me to see to it that the efficiency of the troops will not be weakened due to careless accidents."

His order of 'merciless action' worked two ways. If a superior failed to take action in cases of infractions, or if he did and the action was not severe enough, then Herman had two candidates for the rock farm. To cite examples of how flying safety was prompted in the Third Reich, the following should suffice.

Irresponsible aircrew

Lieutenant Engler, a pilot attached to one flying school, received five years in prison and a reduction in rank. On a navigational flight, he temporarily permitted the flight engineer to take over the controls and then made turns below the prescribed minimum safe altitude over a town. Following this, Engler flew up a valley where, due to downdrafts, the aircraft crashed after clipping a tree, and was destroyed. Four occupants were killed and two seriously injured.

Then there was the case of Lieutenant Schmidt of the Blind Flying School. He got one year in prison and a reduction [in rank]. On 12 June, 1941 he was ordered to fly a JU52 from Gardemoen to Neuruppin. During the first intermediate landing in Copenhagen, he neglected to refuel. He pulled the same trick

CANDIDATES FOR

"YANK AND BANK"

"CAV TAKEOFF"

after landing at Prenzlau. Some 15 minutes after taking off from Prenzlau, his aircraft's engines failed due to fuel exhaustion. An attempted forced-landing was unsuccessful and the aircraft crashed in a forest, injuring three of his crew.

Not to be outdone by his Luftwaffe cronies, Lieutenant Kornblum of the 10th Squadron Bomb Wing, during a cross-country flight from Lille to Brussels, flew low-level without authority. While flying over a bridge at an extremely low altitude, the aircraft struck a telegraph wire where, due to the damage suffered by the aircraft, it necessitated an emergency landing. Still not be outdone, his superiors gave him months at a lower altitude yet.

THE ROCK FARM

"SKIMMING TREES"

"TAIL SURFING"

Misguided Student

Student pilots too had their "15 minutes of fame" in the GAF. Lieutenant Schaefer, a student at a training establishment at Pardubitz, was "awarded" eight months in prison and a reduction in rank for his misdemeanor. Apparently, after failing to "gas up" at his home base, he took off and promptly deviated from his flight plan, without authorization, [and landed] at another base to refuel. Coincidentally, relatives were residing nearby. After carrying out a good number of steep turns at low level over their property, he landed back at the refuelling base, returning by road to visit his relatives.

In another "relative" incident, Lieutenant Klein and S/SGT Satow of Special Purpose Bomb Wing No. 1, got four months and two months in the pokey [jail], respectively. Lieutenant Klein, as commander, and S/SGT Satow, as pilot, were on a delivery flight and made an intermediate landing in Prague-Rusin. While there, they had the opportunity to visit a relative who expressed a burning desire to go for a flight. Following an initial refusal, a flight was made under the pretext of a communications or a local weather flight, and three cousins were taken along who were not members of the Wehrmacht. During this flight, the passengers were treated to a no-doubt enjoyable, but nevertheless unauthorized, low-level trip.

The fact that even threats of incarceration failed to impress irresponsible GAF pilots suggests that there are many ways of moving men, but only one way may be depended upon to bring about the use of sound judgment and dependability. You can push people around with a strong arm. You can overwhelm them with authority. You can stampede them with fear. You can confuse them with falsehood. You can wear them down with endless argument. But the only way of making men obey regulations willingly and effectively, and of keeping them moving in the right direction, is to impress them with the responsibilities and liability entrusted to them, so that they will stay on the straight and narrow of their own free will.

Isn't that the way it ought to be?

—Reprinted with permission. Article originally appeared in *Supervision and Risk Management,* First Edition, 1998, published by the Director of Flying Safety, Australian Defense Force.

This speech was given by Gerald M. Bruggink during the July 1, 1999 graduation ceremonies for Dutch pilots at the U.S. Army Aviation Center, Fort Rucker, Alabama. Mr. Bruggink, born and raised in the Netherlands, first began his military flight training in 1939. He fought in World War II as a combat fighter pilot and became a POW of the Japanese in 1942. After the war, he returned to flying units on Java, but in 1950 he returned to the Netherlands to begin instructing. He emigrated to the U.S. in 1955, where, soon after, he became an instructor pilot in Air Force and Army schools. In the early 1960's, Mr. Bruggink started his career in safety—a career that took him through the U.S. Army Safety Center and National Transportation Safety Board (NTSB). He retired as the Deputy director of the Bureau of Accident Investigation in the NTSB.

You Should Have Heard What the Dutch Were Told...

Reflections on the role of judgment

"Being asked to address a group of graduating Dutch pilots here at Fort Rucker is a distinct honor for an old-timer, who would like to use this opportunity to offer you more than congratulations and good wishes. However, all the smart things that can be said on such a momentous occasion have already been beaten to death many times in the past. Nevertheless, I am going to dig up an ancient piece of wisdom as it appeared in a prepared text presented by Charles Lindbergh at a safety conference in New York in 1928: "A pilot's real training begins in flying, as in other professions, after he has left school."

That was 71 years ago, and you have no reason to question the validity of that statement. As a graduate with brand-new wings, you don't expect to get orders tomorrow assigning you as pilot-in-command of Queen Beatrix's helicopter. What makes the difference in selecting a pilot to a particular task? The standard answer is your experience level. But, is that the complete answer? Did Lindbergh have something else in mind when he used the term "real training"?

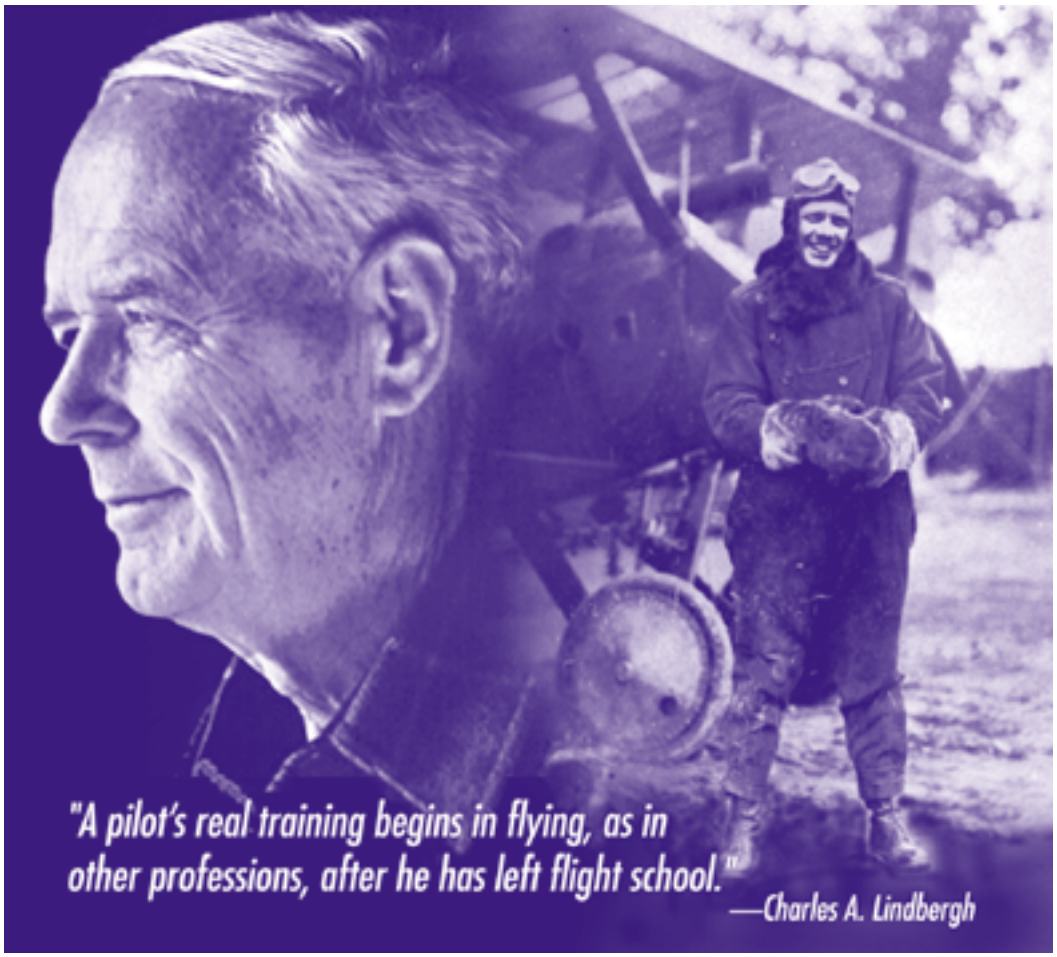
As one of this country's most gifted pilots, he was well aware that the most critical part of a pilot's "real training" is the development of his judgment as he gathers experience. While there is a limit to the skills you can learn in handling your aircraft, the development of your judgment in using these skills is a never-ending process. Thus we should never look at a pilot's total flying experience in isolation. The most telling, as well as the most elusive part of a pilot's make-up, is the maturity level of his judgment. Where does that leave you now that you are stepping out of the protective school environment with limited experience and judgment? This ceremony today provides the answer. You got your wings because you have sufficient maturity of judgment to safely gain the experience that turns you into a mission-ready pilot.

As I have no business venturing onto terrain covered by the land mines of behavioral science, I won't mess with the intricacies of pilot judgment. Instead, I will remind you of your familiarity with the development of judgment and its effects on risk management in a more mundane form of transportation: driving a car. The value of this comparison is not reduced by the rumor I heard that it is easier to get a private pilot's license in this country, than a driver's license in Holland!

When you passed your driver's test, you convinced the examiner that you had adequate skills, knowledge and judgment to gain practical experience on your own without endangering yourself and others. As your experience grew, you found out that risk management on crowded highways requires more than driving skills and obeying traffic rules. You learned to make allowances for the unpredictable behavior of other road users without using foul language or insulting gestures. You discovered that your judgment of traffic situations and your subsequent decisions were affected by your mood, the influence of distractions, time pressures, fatigue and a host of other factors. You were also confronted with the hazards of road conditions, inclement weather, and design shortcomings in your car. Finally, you probably learned the hard way that constant vigilance sets the stage for the exercise of sound judgment.

You will go through a similar but more complex and unforgiving maturing process in aviation. As a pilot who began his military flight training 60 years ago in what now seems the Stone Age of Aviation, I could entertain you for hours with the things I got away with and those that got me into trouble. But this is not the time or the place. Instead, I have capsulized what I learned and observed over the years in a number of thoughts that may benefit the development of your aviation judgment:

1. An unpredictable factor in any person's life is the blind role of chance, be it hostile or



benevolent. Don't look at this as a form of fatalism, but as an incentive to give fate a helping hand in your favor.

2. For many years, I have tried to spread the word that one of the greatest hazards in aviation is uncritical acceptance of easily verifiable assumptions. The collision in Tenerife between two B-747's that killed 583 persons proves the point. This was the mother of all human factor accidents.

3. The development of your judgment is not only governed by your own experience, but also by the experience of others, negative as well as positive. Those who learn the most at Happy Hour are the ones who keep their mouth shut and their ears wide open. In addition, read every mishap report you can lay your hands on with this question in mind: At which point would I have done things differently?

4. Many accident investigating authorities fail to strengthen the protective role of the human element by not answering this question: What might have reduced the likelihood of the accident or the severity of its consequences?

5. Persons who survive adolescence and ownership of their first car have been exposed to the basic human factor aspects and the elements of chance in accident avoidance and causation. What they actually learned in this process is largely a matter of their perceptiveness, innate intelligence and sense of care.

6. [What is] the most simple and practical interpretation of human factors in our daily activities? Make it easier for yourself and others to stay out of harm's way.

7. Every form of flying has an ultimate objective, which is not safety per se. Commercial aviation has to keep its stockholders happy; military aviation is perfecting its capabilities in pursuit of the nation's objectives; and the general aviation pilot who flies just for the fun of it may have safety on his mind but not as his ultimate objective.

8. Even the crew of Air Force One cannot assure the President that they will complete their next trip without a mishap. They can only bend the odds in their own favor and hope that everyone involved in the condition of their aircraft and the progress of their flight does the same thing.

9. Whether you realize it or not, having confidence in your aircraft implies that you have confidence in its maintenance personnel. You promote the "Right Stuff" in those personnel by taking an active interest in what it takes to keep your aircraft serviceable.

10. Considering the uncertainties of the future, you may want to keep this thought in the back of your mind: Contrary to conventional wisdom, the principal driving force for an individual in a combat situation is not so much flag and country and similar lofty notions but the trust and the expectations of his teammates and leader.

These are some of the thoughts that may be helpful as your aviation career develops and your judgment matures. In the meantime, I have been hovering out of ground effect too long and I come back to earth with this wish: May sound judgment always remain your trustworthy companion in the air, on the road, and at home."

—Gerald Bruggink

"I want to quit smoking. Can I fly?'

The bottom line up front is that nicotine patches, even though they are now an "over the counter" (OTC) medication, are still a medication; the use of which must be monitored by a flight surgeon or Aeromedical Physician Assistant.

Nicotine from any source, including patches, can have systemic effects. Although generally safe when properly used and monitored, some of the most frequently reported adverse effects from using patches include, diarrhea, heart burn, insomnia, nervousness, excess sweating, joint and muscle pain, nausea and vomiting, headaches, and rashes. Any of these will be made worse if, as some people have done, they use nicotine gum or continue to smoke while using patches.

The good news is that no waiver is required for using nicotine patches. Nevertheless, the guidance of the Aeromedical Policy Letter (APL) concerning smoking cessation is quite clear, "…No waiver is required. Nicotine gum may not be used while flying. Nicotine patches may be worn while flying; however, it is advisable to fly with another fully qualified, rated aviator. Local flight surgeons are responsible for prescribing and managing the nicotine weaning program for all aviation personnel. When initially prescribed a nicotine patch or gum, the aviator will be restricted from flying for 72 hours. Once 72 hours has passed with no evidence of significant side effects and the patient has successfully abstained from smoking, the aviator may return to full aviation duties. Smoking is absolutely forbidden at all times. One episode of smoking voids the contract made with the flight surgeon, and the aviator must be considered to be medically restricted until cleared by the flight surgeon (FS). Temporary clearance should be granted for the duration of treatment while under the direct guidance of the FS…"

The guidance of the APL is consistent with AR 40-8, Temporary Flying Restrictions Due to Exogenous Factors:

> "4. Exogenous factors. Aircrew members receiving any substance or procedure likely to provoke an adverse systemic reaction shall be restricted from flying duties until declared fit by a flight surgeon. Factors to consider and appropriate medical restrictions to flying activities are:
>
> a. Administration of drugs. Aircrew members taking drugs which have a systemic effect will be restricted from flying duties until convalescence and/or rehabilitation is completed. This will not, however, be construed as prohibiting aircrew members use of chemoprophylactic agents recommended after aeromedical evaluation by the appropriate medical authority. All drugs and medications will be dispensed by or with the knowledge of a flight surgeon."

Remember, what is safe for a guy who works behind a desk, may not always be safe for flying NOE with NVGs.

If you are interested in quitting smoking through the use of patches, your local flight surgeon or Aeromedical Physician Assistant is there to help you; it is what they get paid for. Experimenting on your own is not the right answer.

—LTC Noback, Flight Surgeon, US Army Safety Center, DSN 558-2763, Comm (334) 255-2763, E-mail: nobackr@safety-emh1.army.mil

AVA Y2K OK?

Aviation Vibration Analyzer Update

Your unit's aviation vibration analyzer (AVA) is infected with the Year 2000 bug—meaning the AVA will shut down on 01 January 2000 unless you take action to prevent it. Change 4 to TM 1-6625-724-13&P (Aug 94) tells you how to keep it working.

You need to change the current year (99) to the conversion year (91) before 01 January 2000. Here's what you do:

- Turn on the AVA Control and Display Unit (CADU).
- Select MANAGER by pressing the F4 function key.
- Using the directional arrow buttons, highlight SETUP on the next screen and press the DO button.
- Highlight SET TIME & DATE and press the DO button.
- Enter the conversion year (91) in place of the current year (99) and press the DO button to save and exit.

If you don't change the current year to the conversion year before 01 January 2000, you will need to reformat your CADU. Assistance is available by contacting Robert Branhof at (256) 313-4948 or DSN 897-4948 or by e-mail at: robert.branhof@redstone.army.mil

This work-around holds the Y2K bug at bay until a permanent fix can be fielded. Change 4 also changes the AVA calibration requirement from once every 360 days to once every three years.

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Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH64

Class B
D series

■ Aircraft hovered to the left for parking. While over the cement parking pad, both pilots agreed that a pole, located 75 feet to the 11 o'clock position, might be too close. The PC hovered to the rear and contacted a parked AH-64D 40 feet behind them. The AH-64D lost tail rotor thrust and crashed. Both aircraft sustained extensive damage, yet the pilots were uninjured. The PC had been in the cockpit for approx. 10 hours, flying for approximately seven hours, and awake for approximately 20 hours.

Class C
A series

■ While in cruise flight, the TADS night site shroud fell off the aircraft. The missing shroud wasn't detected until the post flight inspection. There was no further damage to the aircraft, and maintenance replaced the night site shroud assembly.

■ IP initiated a simulated, OGE single engine failure from a 400-foot hover. He retarded the No. 1 engine to idle, but during the PI's application of collective to arrest the aircraft's descent, the No. 2 engine torque peaked at 134%. The IP reduced collective to normal operating range, and the aircraft was landed without further incident. Requires replacement of transmission and drive shaft.

Class E
A Series

■ During an approach to a parade field for a static display, downwash from the aircraft blew two folding card tables into the air. One of the card tables hit a woman in the back of the head. She was taken to a medical facility and diagnosed with a mild concussion. The other table hit a man on the leg causing some abrasions.

D Series

■ During troubleshooting of the 30mm gun, the ground crew failed to close the left, forward avionics door. During a test of the gun, it impacted the door while being slewed. Only the door was damaged.

■ During armament troubleshooting procedures, the right EFAB door was opened to checkout circuit breakers. The back seat pilot announced he was going to shut down the APU, but the front seat pilot announced he wanted to check the gun one more time. Before the ground crew could close the door, the gun was slewed and impacted the right EFAB door. Only the door was damaged.

CH47

Class C
D Series

■ During SVFR departure for hurricane evacuation, Chalk 2 in a flight of two executed a decelerating turn for spacing due to heavy rain and low visibility. The No. 2 engine failed, and the aircraft descended to momentary contact with the water below. The right gear contacted the water with sufficient force to knock the FE to the floor and bend the hydraulic test panel door back 90 degrees. Cause of engine failure under investigation.

Class E
D series

■ During hot refueling, crewmember noticed an empty trash bag fly into the aft rotor system. Crew shutdown aircraft and inspected the blades after removing the trash bag. No damage was found.

OH58

Class B
D(R) Series

■ During a training flight, crew experienced engine overspeed, followed by a loss of tail rotor control. Crew attempted a run-on landing, but the aircraft landed hard, sustaining major structural damage. No injuries reported.

Class D
D Series

■ After the RADS equipment was removed from aircraft, the MP completed a through-flight inspection before the final run-up. As the blades began to turn, the CE noticed an object fly away from the aircraft. Upon shutdown, the MP found two M/R blades and one pitch change tube damaged.

UH1

Class B
V Series

■ Aircraft was in a deceleration during a practice autorotation. The tail stinger and tail rotor contacted ground, causing the aircraft to pitch forward and land hard. When the aircraft came to rest, the skids were spread and the 90-degree T/R gearbox had separated. The IP received minor injuries.

UH60

Class A
MH-60K

■ During the deceleration for a Fastrope maneuver, the power available was exceeded, and the aircraft descended into the trees with violent force. Although the pilots had correctly computed their performance numbers, the engine torque factor for both engines was logged incorrectly. This caused the power available to be lower than the pilots computed. One passenger, a soldier, received fatal injuries.

Class B
L Series

■ Auxiliary Power Unit compartment door separated during flight and struck two main rotor blades. Crew noted a disturbance in the controls during the flight and executed a precautionary landing. Post flight inspection revealed damage to two main rotor blades, No. 1 engine HIRSS, the tail rotor drive shaft, APU compartment, and the VHF-FM No. 2 antenna.

Class C
L series

■ While taxing to parking, the crew heard a strange noise. During the post flight inspection, the crew found that a main rotor blade abrasion strip had come off and struck tail rotor gearbox and blades.

Class D
A series

■ While conducting and external load operation, the aircraft contacted the top of load. This caused three puncture holes in bottom of aircraft, resulting in minor airframe structural damage and damage to marker beacon antenna.

L series

On post flight inspection, the crew discovered that the APU access cover had been ripped from aircraft while in flight. No other damage was reported.

Class E
A Series

Crew experienced an in-flight engine shutdown, resulting from a worn power available spindle barrel that failed.

L Series

During the extraction phase of a multi-ship artillery raid, the left chain leg detached from the M119 howitzer load, causing the gun to flip over as the aircraft tried to pick it up.

■ During an NVG brigade air assault, flight lead encountered brownout conditions while landing. There was zero illumination, and the ground was sloped. The crew executed a hard landing, right wheel first. Upon completion of the mission, the crew noticed that the left wheel was flat and that the wheel fairing was cracked.

C12

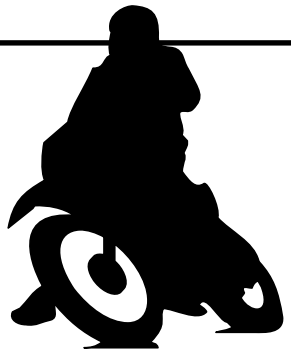
Class D
J series

■ During a VFR, night landing in heavy rains, the pilot at the controls touched down left of centerline. The aircraft hydroplaned and struck two runway edge lights before the pilot could correct. The wheel and tire had to be replaced due the damage. Contributing factors were glare from bright edge lighting on runway, heavy rain on windscreen, ending on a 13-hr duty day (9hrs of flying), and a lack of center line lighting.

Class E
H Series

■ RC-12H - During cruise flight in IMC, the pilot's flight instruments failed, followed shortly by the failure of the co-pilot's instruments. The crew declared an emergency and continued the flight to the airfield under a partial panel. The aircraft descended into VFR conditions under radar control. After breaking out into VFR conditions, the crew completed a visual approach, and the aircraft was landed without further incident. The emergency was caused by the failure of a 26 VAC fuse in the primary electrical BUS.

For more information on selected accident briefs, call DSN 558-9855 (334-255-9855). Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.



POV Fatalities through 30 Sep

FY99	FY98	3-yr Avg
124	**116**	**113**

HIGH-RISK PROFILE

Age & Rank:
19-23, E1-E4, O1, O2
Place:
Two-lane rural roads
Time:
Off-duty, 1100-0300
Friday & Saturday nights

TRENDS
1. No seatbelt or helmet
2. Too fast for conditions
3. Fatigue
4. Motorcycle accidents up

"... leaders must be willing to underwrite their subordinates' honest errors and coach them on to excellence, without tolerating incompetence or laxity. We must recognize that Army leaders are not perfect, and that activity at the ragged edge of audacity sometimes leaves debris in it's wake." —GEN William W. Hartzog

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FY99 Aviation Accidents through 30 September

		Class A	Class B	Class C	Total
ACCIDENTS	Total Avn Acdts	18	13	90	121
ACCIDENTS	Flight Acdt Rate	1.97	1.31	7.67	10.95
RATE COMPARISON	FY99 vs. FY98	46 %	191 %	0.3 %	16 %
RATE COMPARISON	FY99 vs. 3-yr avg	81 %	42 %	14 %	26 %
Aviation Military Fatalities					20

Note: FY99 Flight Accident Rate is based on estimated year-end flying hours

U.S. ARMY SAFETY CENTER

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Gene M. LaCoste
Brigadier General, USA
Commanding

Flightfax
ARMY AVIATION RISK-MANAGEMENT INFORMATION
DECEMBER 1999 ◆ VOL 27 ◆ NO 12
http://safety.army.mil

Improving Aviation Safety Performance

As an Army, we are involved in missions around the world and doing a lot of things without the experience base we once enjoyed. This lack of experience, continuous deployments, and not having the discipline to maintain and enforce standards are basic causes of accidental losses. Some of us wearing wings are not executing fundamental tasks, those taught to us in flight school, to standard. Analysis of major FY99 aviation accidents reveals that most of the accidents didn't happen at the time of impact or during the crash sequence; they really occurred much earlier with a breakdown in leadership, standards, or discipline.

In fact, FY99 produced Army aviation's worst safety performance since Desert Shield/Desert Storm. With 18 Class A aviation flight accidents

and 20 fatalities, the upward trend in accidents that began in FY98 continued to climb. When leaders fail to enforce established standards, the natural result is accidents—and accidents cost. They cost lives, they cost time, and they cost equipment: a total cost of more than $139 million for aviation in FY99.

The bottom line: soldiers are dying and we are destroying costly equipment at a rate that is unacceptable. Leaders who understand and accept responsibility will help solve this Armywide problem. Effective leaders will make sure soldiers know what the standards are and will ensure the standards are enforced.

Leadership

Leadership is a challenging art. It encompasses the awesome responsibility of ensuring the combat readiness of your unit and the safety of your soldiers. We always talk about Command and Control, but what does it really mean? Safe operations are a function of effective command and control. Depending on the level at which we are located, all of us are either commanding or controlling, or both. It's imperative that leaders get out there with their units and help them understand where they are at risk.

■ **Commanders.** The quality of today's soldier is superior, and their motivation to excel is second to none. You give a mission; soldiers will accomplish it. Unfortunately, how they do it, is too often left up to them. You are the commander. Make sure that your controllers—platoon leaders, NCOs, squad leaders, instructor pilots, crew chiefs—understand what you want them to control and the standards to which you want your unit or the mission controlled. Make sure the policies that are being executed are your policies and that they are being executed to the exact standard you set.

If you really want to make a difference in your unit's safety performance, the fastest, surest way is to go to training meetings. It's understood that your time is limited, but training is the essence of what you do. So what could be more important than training? The answer is, risk management integrated training. When the brigade commander starts attending training meetings, it's incredible how quickly the battalion commander does so as well. You can train . . . train hard . . . and still do it safely if you get involved in early planning, identification of hazards, and development of controls.

■ **Controllers.** The safest place in the Army for anyone to drive or fly is at a combat training center. CTC rotations involve the hardest, most demanding training, but there is high awareness and close supervision. Observer-controllers will stop an unsafe maneuver or action before soldiers can do something to hurt themselves or damage equipment. Unfortunately, this level of supervision is not being carried out in all units during the day-to-day missions. The question we must ask ourselves is, Why not?

Whether you're a commissioned officer, warrant officer, or noncommissioned officer, you must understand what the commander wants you to control and the standard he or she has set. The individual who prevents the accident is the one who is with the soldiers every day, every night, in garrison, in the field, on the flightline, in the cockpit. It is your responsibility to ensure that soldiers execute every task to the established standard.

If you are the unit's safety officer, you must have direct access to the commander. Get in to see the boss and understand his intent. If you are not into his or her thought processes, you are not part of the solution. Do not allow yourself to say, "We can't do this mission; it's too dangerous." Your job is to step up to that commander and say, "Sir, we can do this mission, but we can do it more safely by applying these controls."

Senior officers, warrant officers, and NCOs, get out on the flightline and mentor the young aviators and crew chiefs. Show them what right looks like. Lead from the front.

Standards

Despite the inherent challenges of goggles, nap-of-the-earth flight, high gross weight, systems flight, and flying in difficult environments, we excel . . . especially in the missions we classify as high risk. However, many of the so called "routine" or "low-risk" missions end up being the subject of an accident report. What we sometimes fail to realize is that every low-risk mission has a high-risk portion. Most of the FY 99 18 Class A aviation accidents were during routine, low-risk missions. We must constantly strive to identify what part of our low-risk mission is high risk.

The sense of a higher risk tends to sharpen our awareness of the dangers, and we rise to meet the challenges—safely. "Routine" seems to imply that pilots don't need to emphasize basic flight techniques or that our scanning techniques don't need to be as rapid or as thorough. Nobody gets so proficient that they can forget

the basics of performance planning, power management, aerodynamics, and crew coordination.

As leaders, professional aviators, NCOs, and soldiers, we must each take personal responsibility. We must get back to the basics: executing missions to established standards. The following are recommendations that leaders and aviators should incorporate into every METL task and every battle task. These must become the standards.

■ Do Performance Planning. A PPC is your first line of defense against power management errors. You should habitually complete a full PPC for every mission, even the "routine" ones. As the mission or profile changes, update the PPC.

■ Train heavy. Plan simulator periods with little power margin. Make the simulator period a practice in battle tasks. Fly high, hot, and heavy. You can't know what right looks like or feels like without experience. The simulator is a great place to see what right looks and feels like. Here is where a mistake is forgiving. Simulator periods should be challenging, difficult, and educational. Millions of dollars have been invested in them; use them to their fullest capacity.

■ Use the wind. Always contemplate having a low power margin. Maximize available power. Properly utilize the wind to increase power availability. This is a basic flight technique; however, it is routinely abused and the result is accidents.

■ Be prepared to jettison. More than likely, you have never used the jettison switch, even in training. Accidents usually happen close to the ground, and there is little time to react. Stay actively prepared to jettison stores during landings and takeoffs. However, preparation begins on the ground. Ensure that the electrical current is good, and your squibs are within requirements.

■ Understand emergency procedures. Memorizing an emergency procedure does not mean the same as understanding an emergency procedure. You must understand what each input you make does to the aircraft, and you must know what the aircraft will do after every input you make.

■ Use crew coordination. The need for crew coordination cannot be overstated. Don't hesitate to share information and to speak up when something doesn't feel or look right to you. If you just sit there and let something happen, you become part of the problem. Your life may depend on your willingness to make the tough call when a fellow pilot is exceeding aircraft or his or her individual capabilities. Some units have great crew coordination sustainment training. If yours doesn't, get a program started.

■ Practice effective risk management. Managing risks isn't complicated; it's simply identifying and assessing hazards and developing and implementing controls to mitigate risks to the lowest level possible. We are doing a good job of identifying hazards and assessing risks. However, this is where we often stop the process. Many times, we do not implement controls, supervise, or reevaluate to ensure that the controls implemented have mitigated the risk.

No mission is so simple or routine that it eliminates the requirement to execute to standard. You owe it to your passengers, crew, and family to maintain high professional standards.

Discipline

Good training produces tough, disciplined, and highly motivated soldiers, and it bonds units through shared experiences and mutual challenges. Safe performance is a predictable result of performing to standard, and performing to standard is a result of training to standard. Training to standard leads directly to discipline—both collectively and individually. Disciplined soldiers and operations are inherently safer.

Discipline is a 24-hour-per-day, 7-days-per-week, on-and-off-duty concept. There can be no lapses. A disciplined, professional aviator will not willfully put lives at risk.

Effective training is the key not only to sustaining a combat-ready Army but also to reducing human-error accidents. Training to standard produces skilled, disciplined soldiers. And skilled, disciplined soldiers are professional soldiers who accept responsibility for the safety of themselves, the safety of others, and the protection of Army equipment.

Leadership involvement at all levels-combined with effective risk management, discipline, and strict adherence to standards-are the primary tools that can save lives and prevent this tide of overwhelming accidents from continuing to erode valuable combat power. It is an unequivocal fact that a disciplined force trained to standard equals a combat-ready force that executes the mission safely. It's up to each of us to "step up to the plate" and accept responsibility for improving our aviation safety performance.

— BG Gene M. LaCoste, Director of Army Safety

Rollcall: Recent U.S. Army Aviation Centralized Accident Investigations

Aviation safety suffered a setback in FY99. Accident rates, total losses, and fatalities all were on the increase. By year's end the Army had suffered 103 class A-C flight accidents, including 10 destroyed aircraft and 20 killed soldiers. This yielded an accident rate of 11.28 accidents per 100,000 flight hours. Statistically, this was the worst year for U.S. Army aviation accidents since 1991 (since 1982 excluding Operation Desert Storm). In this article we summarize recent centralized accident investigations conducted by the U.S. Army Safety Center and emphasize problem areas that must be addressed if we are to reverse this upward trend.

Recent centralized accident investigations have conclude that leadership, crew coordination, and power management practices are recurring problems and primary areas for improved safety emphasis to prevent accidents. We must address these problem areas if we are to reverse the recent increase in Army aviation accident rates.

Leadership

The risk-management process must become habitual to all leaders. We must understand how to identify the hazards that face our aviators in the unforgiving environments in which they operate. It is only through thorough understanding and complete application of the risk-management process, and disciplined enforcement of standards that accurate and timely controls can be identified and implemented to mitigate unacceptable risks.

Power Management

The process of confirming power requirements with power available must also be habitual. Harsh environments demand a disciplined focus and continuous application of the fundamentals learned throughout careers. Aviators must remain aware of their changing flying environments and manage their aircraft power diligently.

Crew Coordination

Crew coordination is also a must in today's complex aircraft. All too often accident investigations find both crewmembers were focused inside the aircraft, conducting specific mission tasks. Crewmembers must know and understand each other's capabilities and limitations. They must be willing to make the tough call when a fellow pilot is exceeding his/her individual capabilities and getting them into a situation from which they may not be able to recover. Effective crew coordination demands constant communication, discipline, and adherence to standards.

Rollcall '99:

AH-64

■ During day hover fire gunnery operations at 220 feet AGL, the pilot-in-command (PC) and/or the pilot fired approximately 860 rounds of 30mm target-practice (TP) M788 rounds from the M230E1, 30MM Automatic Gun. The gun ruptured and shrapnel from the externally mounted gun and fragments from several TP rounds penetrated the bottom of the aircraft, compromising components of both the mechanical and backup control systems. Aircraft control was lost, the aircraft spun right, and it descended to ground impact. The AH-64D aircraft received extensive damage;fortunately the crew was not injured.

■ The AH-64A accident occurred during day, VFR, aircraft qualification training. The aircraft began an uncommanded right turn while at a stationary, 400-foot, out-of-ground-effect hover. Left pedal

application did not arrest the right turn, and the aircraft spun several times. The aircraft descended vertically through 50- to 60-foot-tall trees to ground impact. The aircraft was destroyed, and both occupants received minor injuries.

■ The training accident occurred during a night terrain flight at 100 knots and 70 feet AGL, with the crew using a target acquisition designation system/ pilot night vision system. The AH-64A aircraft struck and descended through 70-foot-tall pine trees to ground impact. The aircraft was destroyed, and both crewmembers received major injuries.

■ The AH-64A night training accident initiated as the pilot-in-command (PC), in the rear seat, using pilot night vision system, attempted to establish and maintain a 170-foot out-of-ground-effect hover for an overwatch position. The aircraft descended near vertically to impact after the PC initiated a deceleration. The aircraft was destroyed, and the PC and the pilot received minor injuries.

■ The accident occurred while the AH-64A crew was conducting night training, with one Hellfire missile launcher, two rocket launchers, and a full external fuel cell mounted. The aircraft was observed to pitch up, roll right, and descend about 150 feet to ground impact from cruise flight about 45 KIAS. The aircraft was destroyed in the explosive impact and secondary explosions. Both crewmembers received fatal injuries.

■ The night AH-64D accident initiated as the pilot on the flight controls decelerated below effective translational lift airspeed in an attempt to validate power requirements to establish a 200-foot out-of-ground-effect hover. As the airspeed decreased, the rotor RPM began to decay with accompanying low rotor RPM warnings. The aircraft descended and about 25 feet and 30 knots, the nose abruptly turned right. The aircraft touched down in a right yaw, rolled left, and the main rotor blades struck the ground. The aircraft came to rest nearly inverted and the crew egressed unassisted.

■ Returning from a night weapons firing at 0340 hours, the PC on the controls in the back seat, attempted to land the AH-64D on the parking pad. Both pilots on the night systems had their attention diverted to a pole in their forward field of view and commented it seemed close. The PC hovered the aircraft to the rear while still focussing on the pole and allowed the tail rotor to make contact with the aircraft parked behind them. Both aircraft were substantially damaged and both crewmembers egressed uninjured. The PC at the time of the accident had been awake for approximately 20 hours and on duty for 10 hours and 40 minutes.

CH-47

■ While the CH-47D was on base leg for landing in formation as chalk 4, the rotor RPM increased to approximately 105 percent with an associated split in engine torque (No. 1 high). The pilot-in-command reduced the No. 1 engine ECL and attempted to gain control of rotor RPM with the Nos. 1 and 2 engine beep trim. The formation approach continued, and on short final, the rotor RPM decreased. The aircraft settled with power, and the approach terminated with a forced landing short of the intended landing area. The aircraft was extensively damaged, and three of the occupants received minor injuries.

MH-6

■ The MH-6J (MELB) accident occurred during qualitative testing to determine 5-percent engine droop with bleed valve inoperative at high-altitude operations. The experimental test pilot (XP) initiated a terrain approach from 250 feet AGL and 80 knots airspeed. During the maneuver, the XP entered a 180 degree descending turn to obtain appropriate G-loading and droop the engine. The engine did not accelerate fast enough to enable the XP to arrest the descent and terminate at a hover as planned. The aircraft landed hard on the runway and was extensively damaged but the XP received only minor injuries.

■ The MH-6J accident occurred after touchdown to a steep right downslope during a night multi-aircraft troop insertion with the crew using Omni-4 night vision goggles. As the four CETs on the external personnel system pods began offloading from chalk 2 to join the live-fire exercise, the aircraft rolled right, wobbled, and then yawed left. The main rotor blades struck and fatally injured one of the CETs as he attempted to maneuver from beneath the rotating main rotor blades. Aircraft damage was limited to the main rotor blades.

OH-58

■ During a day, deliberate, zone reconnaissance training mission, about 37 feet AGL, the OH-58D(I) aircraft drifted, and the tail rotor blades struck a tree. The tail rotor gearbox separated from the aircraft, and the aircraft rotated about 360 degrees to the right and descended to ground

impact. The aircraft was destroyed, and both pilots received major injuries.

■ While the instructor pilot was attempting a terrain flight takeoff from the ground, aircraft control was lost. The OH-58D(I) aircraft tail and main rotor blades struck the ground, and the aircraft came to rest on its left side. The two crewmembers were not injured and exited the aircraft unassisted. The aircraft sustained extensive damage.

■ During a day contact training flight for a pilot trainee at approximately 300 feet AGL and approximately 60 knots during takeoff, the OH-58C experienced an N1 oscillation with an observed N1 rise to 108 percent. The N1 continued to oscillate, and the aircraft descended to ground impact with decreasing rotor RPM. The aircraft received extensive damage, and the pilot trainee received minor injury. The contract flight instructor was not injured.

■ During a night vision goggle reconnaissance and surveillance mission, between 60-70 knots and approximately 400 feet above the highest obstacle, the OH-58D(R) generated an erroneous ENGINE OUT warning. The crew executed an autorotation resulting in a hard landing. The aircraft was destroyed, and both pilots sustained minor injuries.

■ The OH-58D(R) accident occurred during FADEC manual throttle operations in day VMC conditions. During a simulated emergency procedure, sufficient control inputs were not made to arrest the rate of descent and prevent inadvertent ground contact. As a result the aircraft struck the ground with a rate of descent in excess of 500 feet per minute and sustained major damage to the aircraft.

UH-1

■ During 90-knot cruise flight about 1,820 feet AGL, the UH-1V's vertical fin separated from the tail boom causing the nose to abruptly pitch down 30 to 40 degrees and the aircraft yawed right. Even with both the pilot-in-command (PC) and the pilot (PI), on the controls, only minimal control could be maintained. The aircraft descended in a right turn to ground impact in a left-side-low, nose-low attitude. The aircraft was destroyed and the PC, the PI, and the medical attendant received serious injuries. The firefighter received minor injuries.

■ The UH-1V accident occurred during the conduct of Task 1053, TC 1-211, Perform simulated engine failure at altitude, as part of the APART for the pilot. The maneuver was to terminate at a 3- to 5-foot AGL hover (terminate with power). The aircraft impacted the terrain 65 feet short of the runway in a nose-high, tail-low attitude and rebounded, coming to rest on the runway about 200 feet from the initial impact point. The aircraft was destroyed, and the instructor pilot received minor injuries.

UH-60

■ The mission was a VFR, day, single-ship operation in support of hurricane disaster relief. The UH-60A landed hard on upsloping terrain approximately 52 feet downslope of the intended pinnacle landing zone (LZ). The aircraft received minor damage. The crewmembers and passengers were not injured.

■ The UH-60A accident occurred during an attempted crosswind takeoff from a runway at 4,952 feet MSL. The rotor RPM began to decay at about 20 feet AGL on takeoff, and the aircraft descended to ground impact between the runway and the parallel access road. The aircraft received major damage, but the crewmembers and the passengers were not injured.

■ The accident occurred during an attempted, day, visual meteorological conditions approach and landing to a dusty field site. The UH-60A aircraft drifted right in the brownout condition, and the right main landing gear and the tail wheel contacted the ground. The aircraft rolled right, and the main rotor blades struck the ground. The aircraft received major damage, and the pilot-in-command and the pilot were fatally injured. The crew chief and the two passengers received minor injuries.

■ During a day, contour, pathfinder extraction mission, at approximately 80 knots and less than 50 feet above the highest obstacle, the UH-60L descended and crashed through 75-foot-tall trees to ground impact. The aircraft was destroyed. The pilot-in-command, both crewchiefs, and four CETs were fatally injured.

The pilot and three CETs received major injuries.

■ The UH-60A accident sequence initiated from a downwind, 500-foot, out-of-ground-effect (OGE) hover. From the OGE hover, the pilot-in-command, on the flight controls, initiated a vertical descent. The rate of descent continued to increase and the aircraft entered a settling-with-power condition, a vortex ring state. The descent continued to ground impact. The aircraft was extensively damaged, but the crew and passengers were not injured.

■ While flying at 100 knots and approximately 300 feet AGL above rising terrain as the trail aircraft in a flight of two, the UH-60A aircraft entered a 50- to 60-degree right bank. The aircraft descended rapidly into 50-foot-tall trees, terminating in a hard landing on a nearby roadway. The aircraft received major damage, but the crew and passengers were not injured.

■ The MH-60K accident occurred after the pilot (PI) began a slow, vertical descent of 10 feet to about 70 feet AGL. The descent was as requested by the right side crewchief (CE) during a fast rope exercise. About 4 seconds after the PI stopped the descent, the LOW ROTOR warning tone sounded. The PI reset the announcement as the pilot-in-command (PC) monitored the instruments. Eight seconds later, as an individual began his fast rope descent, the aircraft began an uncommanded descent. The PI requested the engine control levers be placed to ENGINE LOCKOUT, and then he increased power demand in an attempt to keep the aircraft from descending onto the individual on the fast rope. As rotor RPM continued to decline, tail rotor effectiveness was lost and the aircraft began to turn to the right. The aircraft spun about 1½ turns as it descended through the trees to ground impact. The aircraft was extensively damaged, and the individual on the fast rope was fatally injured. The PC, PI, and the left side CE received minor injuries.

TH-67

■ The instructor pilot (IP) was conducting primary flight training for initial entry rotary-wing training. The TH-67 aircraft was at a stationary in-ground-effect hover in preparation for takeoff. The nose of the aircraft pitched up, the aircraft rolled to the left, and the main rotor blades struck the ground. The aircraft came to rest on its right side with the engine running. After shutdown, both crewmembers exited unassisted. Crash rescue extinguished a postcrash fire. The aircraft received major damage, and the IP received minor injuries.

Fixed Wing

■ The RC-12K accident sequence began as the crew conducted ATM "upper airwork" training. The aircraft departed controlled flight at approximately 6,800 feet AGL and descended out of control to ground impact. The aircraft was destroyed, and both crewmembers were fatally injured in the explosive, high-G impact.

■ The O-5A aircraft, at cruise airspeed, impacted the side of a 8,300-foot mountain at an altitude of approximately 7,800 feet. The aircraft was destroyed, and the seven occupants were fatally injured in the explosive high-G impact.

Getting Back to the Basics

Failure to execute "the basics" is costing the Army precious resources that we can ill afford to lose.

The basics may include using the proper equipment to inflate a split-ring rimmed tire, properly training and licensing drivers, conducting a thorough passenger briefing, or making on-the-spot corrections during training exercises. Combinations of high optempo, fatigue, personnel turnover, overconfidence, and complacency have caused us to forget the basics, and our soldiers and our Army are paying the price. Injuries, destruction of equipment, and most tragically, fatalities are often the consequences of letting our guard down during basic day-to-day operations.

The leading causes of aviation and ground accidents continue to be overconfidence and complacency that often result in soldiers failing to execute operations using the task, conditions, and standards to which they were trained. Evidence suggests that leaders rarely check to ensure that routine duties—the simple things—are performed to standard. Unsupervised, a soldier's desire to accomplish the mission can lead to taking shortcuts. Shortcuts in routine duties often lead to shortcuts in more complex tasks...and those shortcuts often lead to disaster.

Examples of accidents caused by overlooking the basics are located in the database here at the Safety Center and are too numerous to list. These accidents share a common thread--somewhere in the accident sequence, someone knowingly violated a basic standard or SOP, usually with good intentions, often trying to make things easier, and with mission accomplishment as the goal. In many of the cases, leaders failed to take corrective action either before or during the accident sequence.

Active leadership is the key to halting this alarming trend. When soldiers violate a procedure or standard, leaders must take immediate action to correct the situation. In effect, failure to correct the violation sets a new, lower standard. It legitimizes the shortcut. Leaders at every level must establish procedures, and set and enforce standards that focus on doing things, including the routine things, the right way every time. This is something that we owe our soldiers. Tasks, conditions, and standards; standard operating procedures; and regulations have been developed over time for a reason: to ensure safe, efficient operations. Enforcing them is one of the best ways we can take care of our soldiers. Taking or allowing shortcuts does not help our soldiers nor does it help us maintain an Army that is combat ready.

We are destroying equipment and putting soldiers at risk because they are taking shortcuts and not executing the basics.

Setting the standard is a function of command; however, the primary responsibility for ensuring execution to standard lies with first-line leaders. The squad leader, instructor pilot, team chief, and even the "battle buddy" must understand fully what the standards are and understand that shortcuts are not the answer. Our junior NCOs and officers must be the commander's controllers. Tell them what you want and the standards to which you expect your soldiers to perform. Give them the authority to enforce those standards and halt unsafe activities. Then hold them accountable. They must set the example and be the commander's representative in garrison, in training, and during deployments.

We are an Army of standards, and we know the basics contained within those standards. We execute them every day. But the trends indicate that collectively we are letting our guard down. We are destroying equipment and putting soldiers at risk because they are taking shortcuts and not executing the basics. Don't let the next fatal accident be on your watch because you took the basics for granted.

POC: LTC William R. McInnis, Operations, USASC, DSN 558-2194 (334-255-2194), mcinnisw@safety-emh1.army.mil

Shortfax
Keeping you up to date

The Army's Blue-Light Special

Here's some shopping help for maintenance and supply folks, just in time for the holidays. The Army has a reduced price initiative (RPI), sort of a blue-light special offering selected items at half-price.

If you're looking to stretch your maintenance dollar, the RPI may be for you. Established in 1995 as a way to increase the spending power of Army field maintenance customers, the list of items topped out at over 1200 in FY 99. The list continues to grow with the addition of force modernization and Army-managed field level reparables in FY00.

To learn about what's on special in RPI, as well as current RPI policies, log on to their web site at: www.hqda.Army.mil/logweb/directorates/sm/smhp/htm

Go to Hot Actions for the latest in RPI information.

Adapted from PS Magazine

Aviation Links on the Web

■ Comanche PM (POCs)
http://www.comanche.redstone.army.mil/pm_folks.html
■ OH-58DKW Maintainers Homepage
http://members.tripod.com/~bob58dkw/bob58dkw.html
■ U.S. Army TACOM - RI Aircraft Armament Points of Contact
■ Scout/Attack Product Office (Kiowa Warrior POCs)
http://www.redstone.army.mil/kiowa/names1.html

Military Links:
■ BosniaLINK
http://www.dtic.mil/bosnia/army/
■ Comanche PM Office
http://www.comanche.redstone.army.mil/logo_rah.html
■ DefenseLINK
http://www.defenselink.mil/
■ Ft. Rucker, Home of Army Aviation http://www-rucker.army.mil/
■ Ft. Stewart
http://www.stewart.army.mil/
■ OH-58D Information Center
http://www.redstone.army.mil/kio

Ground Support Conference

Aviation Maintenance Support User's Conference

When: 14-15 Dec 1999

Where: Building 5206 Fort Rucker AL

Who: NCOs and Maintenance Officers

What: Significant issues in Aviation GSE

Why: Learn about
Developments in
Provide user input for
Bring back information about

EMERGING GSE TECHNOLOGY

How: Contact
Mr. John Popovich DSN 558-1590 (334) 255-1590
Or
SSG Ed Lawton DSN 558-9276 (334) 255-9276
e-mail:
popovichJ@rucker.army.mil
lawtonE@rucker.army.mil
FAX: DSN 558-9191 (334) 255-9191

ATTENTION Black Hawk crews:

The UH-60 with its dual engines brought a safety margin to utility helicopter operations that wasn't possible with single-engine aircraft.

However, as mission demands expand and new equipment is added, Black Hawks frequently operate at higher gross weights than in the past.

UH-60 crews should be aware that operating in the height-velocity-avoid regions can be hazardous if one engine becomes inoperative. The avoid regions vary, based on gross weight and atmospheric conditions.

Pilots should review the information in the operator's manual on the height-velocity-avoid regions for single engine failure. Avoid flying in these danger zones as much as possible.

Reprinted from the Black Hawk newsletter
Michael Lupo, AMSAM-DSA-UH-T

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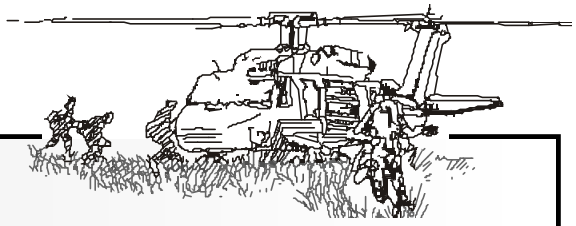


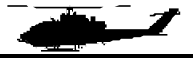
Deployed numbers

More than 120,000 service members are deployed worldwide supporting exercises, theater engagements, forward presence commitments and 20 ongoing operations, according to Defense Department figures. Another 200,000 are permanently stationed in Europe and the Asia-Pacific region.

Accident briefs

Information based on preliminary reports of aircraft accidents

AH1



Class C

F series
While hovering to the take-off pad, the M97 gun fell to fully depressed position and hit the pavement. The gun barrels immediately dug into the asphalt, halting the forward progress of the aircraft. When the aircraft landed, it had a nose high attitude of approximately 20 degrees.

OH6

Class B

Series F
A 3 hour flight included approximately 7 gun runs performed by each pilot, spread over two ammunition loads. Post-flight inspection of the Instrument System revealed an overtorque of 88.3 PSI. 80 psi is maximum and anything over 84 requires component change. Neither pilot observed 88.3 on the digital display during flight.

AH64

Class B

A Series
Aircraft was in cruise flight at 600' AGL when it was struck by a bird on the right front corner of the front seat windscreen. The bird broke the screen and rebounded into the rotor, damaging the trailing edge of two blades. The mission was terminated with a precautionary landing to a field site.

Class C

A series
Crew experienced stabilator and generator warning indications during takeoff. Crew reported smelling smoke during landing. As crew exited the aircraft, following shutdown, they noted flames emanating from the generator/transmission area. Fire was extinguished by ground crew.

Class C

A series
A main rotor blade was damaged during aircraft runup when a blade weight that reportedly had been left on the fuselage was blown into the main rotor system.

MH47

Class C

Series E
While in formation flight at 130 KIAS, 400 ft AGL, with a 25 knot left crosswind and light to moderated turbulence while utilizing Night Vision Goggles (NVG), the pilot (PI), in the right seat and on the controls, felt a large blast of wind and an

increase in cockpit noise. After assessing the situation, the PI determined his jettisonable cockpit door had departed the aircraft. The crew conducted an airborne search for the door for one half-hour and then landed the helicopter to inspect for additional aircraft damage. While there was no further damage, the door was never found.

OH58

Class A

D Series

During a day, VFR, single-ship aircraft series qualification, the aircrew was flying up a ravine when the crew realized they had insufficient power, airspeed and altitude to clear the highest terrain. During a right turn to fly back down the ravine the aircraft began a descent and a rapid right yaw which the crew was unable to arrest. The aircraft descended into the ravine and was destroyed. One crewmember received minor injuries.

Class B

D Series

Fire initiated in the avionics compartment during run-up for flight. Crew completed emergency shutdown and utilized hand-held extinguisher to successfully extinguish the fire prior to major aircraft damage. Damage occurred to the mast-mounted site platform and master control power supply assembly components.

Class C

D Series

Aircraft was out of refuel returning to parking. Wind gusts were 10 to 18 knots. Aircraft was in a down wind condition 20-25' AGL when suspected settling with power occurred. Aircraft sustained damage to skids, both chin bubbles and lower WSPS cutter. 3 MR blades, FM antenna and pitot tube were also damaged. Aircraft was landed in "suspected" mine field.

Class C

Aircraft landed hard during autorotation training. Skid, Lower WSPS, Mast, XMSN and Tailboom damaged.

TH67

Class D

During postflight, striker plate found broken. Suspect spike knock. No further damage found.

C12

Class C

R Series

Aircraft skidded and proceeded off the runway during landing. Damage to the #1 engine and propeller and main landing gear.

For more information on selected accident briefs, call DSN 558-9855 (334-255-9855). Note: Information published in this section is based on preliminary mishap reports submitted by units

POV Fatalities

through 31 Oct

FY00	FY99	3-yr Avg
7	14	11

TOP 3 KILLERS

1. Speed 2. No seatbelts 3. Fatigue

TREND: Motorcycle accidents on the rise

" Safety is not something we simply add to the task at hand; it must be an integral part of everything we do—both on and off duty" **Defense Secretary William Cohen**

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FY00 Aviation Accidents through 31 October

		Class A	Class B	Class C	Total
FLIGHT ACCIDENTS	Flight Acdts	1	2	7	10
	Flight Acdt Rate	1.41	2.82	9.86	14.08
RATE COMPARISON	FY00 vs. FY99	0 %	NA %	40 %	67 %
	FY00 vs. 3-yr avg	4 %	107 %	21 %	29 %
Aviation Military Fatalities					0

Note: FY99 Flight Accident Rate is based on estimated year-end flying hours

U.S. ARMY SAFETY CENTER

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Commanding