Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

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A new year's look at the numbers

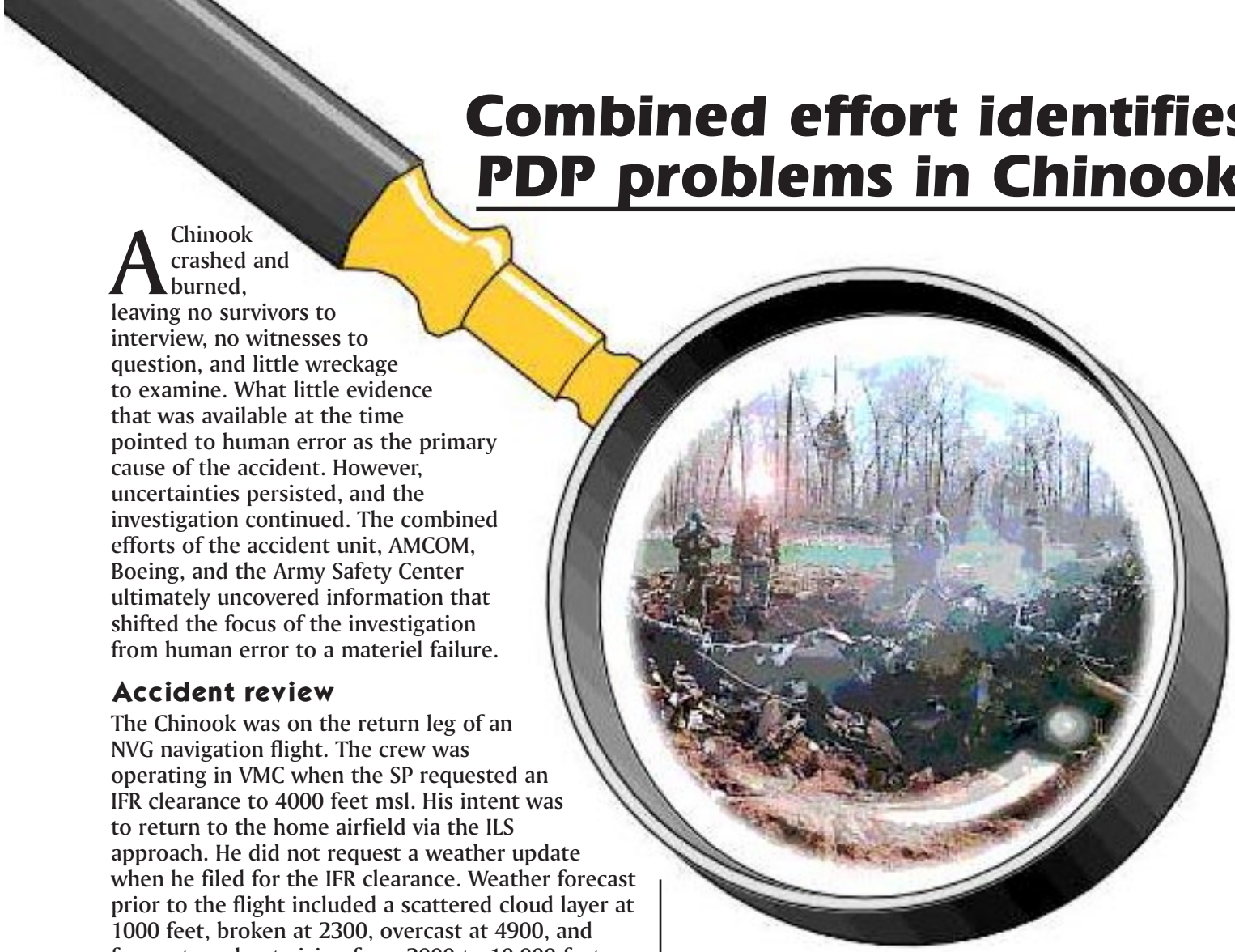
I want to bring this to your attention: Statistically, after our holiday break, we experience a rise in accidents. Think about it.

BG Burt S. Tackaberry
CG, U.S. Army Safety Center

MONTHLY CLASS A FLIGHT ACCIDENT COMPARISON

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOT
FY92	1	3	1	3	1	4	1	1	2	2	1	2	22
FY93	6	2	0	1	5	1	4	1	0	0	1	2	23
FY94	2	3	2	1	2	0	5	0	0	4	1	1	21
FY95	0	0	1	1	0	1	1	2	1	0	2	1	10
FY96	1	0	0	1	0	2	1	0	1	0	1	1	8
FY97	0	0	1	2	0	2	2	1	3	1	0	0	12
FY98	2	1	2										5

Combined effort identifies PDP problems in Chinook



A Chinook crashed and burned, leaving no survivors to interview, no witnesses to question, and little wreckage to examine. What little evidence that was available at the time pointed to human error as the primary cause of the accident. However, uncertainties persisted, and the investigation continued. The combined efforts of the accident unit, AMCOM, Boeing, and the Army Safety Center ultimately uncovered information that shifted the focus of the investigation from human error to a materiel failure.

Accident review

The Chinook was on the return leg of an NVG navigation flight. The crew was operating in VMC when the SP requested an IFR clearance to 4000 feet msl. His intent was to return to the home airfield via the ILS approach. He did not request a weather update when he filed for the IFR clearance. Weather forecast prior to the flight included a scattered cloud layer at 1000 feet, broken at 2300, overcast at 4900, and forecast moderate icing from 2000 to 10,000 feet.

Approximately 18 minutes after granting the IFR clearance, approach control directed the crew to make a 15-degree right turn for a vector to intercept the ILS approach course. During the turn, the radar controller noted that the aircraft had tightened its turn radius and passed through its assigned heading. Moments later, radar contact with the aircraft was lost, and it was quickly established that the aircraft had crashed and burned.

The investigation

At the time of the accident, all available evidence indicated that the primary cause of the accident was human error on the part of the SP and PI. Since then, additional information became available, and the focus shifted to a suspected materiel failure. This new evidence led to the conclusion that the most probable cause of the accident was an electrical power failure that caused loss of aircraft control.

Let's look at this evidence.

From October 1992 through June 1996, seven Chinooks experienced varying degrees of electrical power failure. It was determined that heavy precipitation, aircraft washing, or extended overwater operations can result in water leaking into the cockpit area and entering the a.c. auxiliary power distribution panels (PDPs). When this happens, the water can cause the circuit breaker "bus ties" to short, resulting in either partial or complete power loss to both primary and standby flight instruments.

While it's impossible to know for sure that such a power failure occurred in the accident aircraft, that is a reasonable conclusion. Complete power loss to the cockpit of a Chinook can result in loss of all primary and standby instruments, the advanced flight control system (AFCS), and all avionics except the transponder and FM and SATCOM radios. It is reasonable to conclude that such circumstances would have made it impossible for the crew to maintain aircraft control.

In summary, it is now suspected that the crew was conducting a standard-rate right turn when a power loss occurred, resulting in the loss of, at a minimum, the primary flight instruments and the AFCS. With no visible horizon, it is probable that the pilot quickly became disoriented and the aircraft entered an unusual attitude that the crew was unable to recover from.

Lessons learned

Hazard: Water can enter the PDPs; once it does, it deposits dirt and salt deposits on the contacts, which creates a good conductor. At some point, the electrical connections short out, causing the system to overload and the multifunction displays to all go blank.

Controls: Changes have been initiated to protect the PDPs from water intrusion by either channeling water away from pilot doors and windows or designing and installing a cover for the PDP and circuit breakers. In addition, crews should inspect the PDPs and circuit breakers for corrosion on a regular basis and more often during periods of prolonged heavy precipitation and after aircraft washing.

Hazard: The "improved" generator control units (GCUs) currently installed on some Chinooks do not allow the PDP bus ties to operate as designed. As a result, both generators will be taken off line before the GCU can isolate the electrical fault.

Control: A circuit breaker has been identified that will work with the current GCU to allow for redundancy within the electrical system as designed.

USASC POCs: MAJ Harry Trumbull; Chief, Operations Branch; DSN 558-2539 (334-255-2539); trumbulh@safety-emh1.army.mil; or CW4 Keith Freitag; Aviation Systems and Investigations Branch; DSN 558-3262 (334-255-3262); freitagk@safety-emh1.army.mil

Reporting Class E's: What's the point?

Recently, SSG Matthew J. Morrison (see box below), the ASO for the 12th Aviation Brigade in Wiesbaden, Germany, called to tell me about a rash of engine failures among their UH-60Ls. SSG Morrison reported that there had been six failures, mostly in aircraft operating over water. At the direction of the brigade commander, SSG Morrison contacted the Army Safety Center to see if they were alone in the world with this problem. The folks who manage the Army Safety Management Information System (ASMIS) quickly identified a total of 11 single-engine failures for UH-60s in FY 97 alone. The Safety Center notified the USAREUR Safety Office and is conducting its own investigation.

This brings up a number of important issues:

■ The old saying, "You don't know what you don't know," applies here. Reporting Class E incidents directly to the Safety Center cuts out layers of safety officers who used to review PRAMs and were able to identify trends. Downsizing has reduced the ability to conduct statistical analysis in the field. Unit ASOs must ensure that courtesy copies of precautionary-landing reports are sent through safety channels to their MACOM Safety Office. Without them, it's next to impossible for the Corps or MACOM to know the event occurred.

■ Reporting non-accidents through appropriate mechanisms is essential. Unit personnel must know what to report to the ASO, and the ASO must ensure the event is investigated and the appropriate report is filed: AAARs (AR 385-40) for precautionary landings and aborted takeoffs, and Deficiency Reports (AR 738-751) for equipment failures and malfunctions.

■ The value of field units tracking trends cannot be overemphasized. The Safety Center and the Army Aviation and Missile Command (AMCOM) are not always going to spot a problem; it takes everyone.

■ Failing to report accidents and incidents can slow identification of trends, which can delay corrective actions, which can kill. Safety officers must educate their commander and every soldier in their unit that, by regulation, accident reports can be used only for accident-prevention purposes. This should be continually emphasized in safety meetings. Commanders must use a collateral investigation when punishment or administrative actions are warranted.

■ There may be a problem with T-700 series engines.

The point is that, thanks to the alertness of the 12th Brigade team (commander, maintenance officer, and safety officer), increased attention is now being paid to this potentially serious situation.

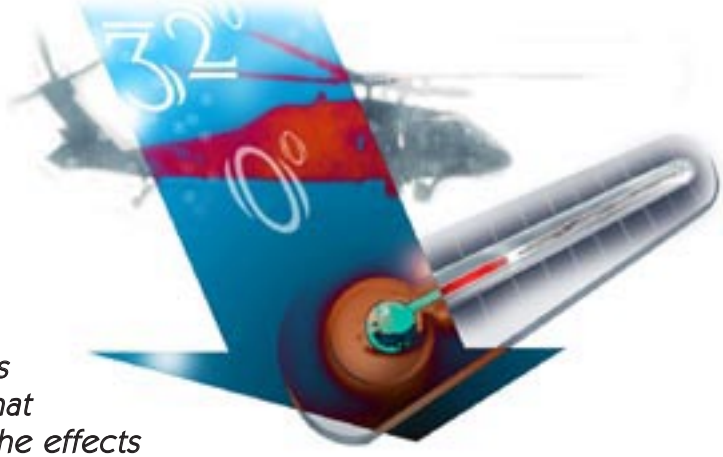
—CW5 Steve Rauch, ASO, Headquarters, USAREUR, rauchs@hq.hqusareur.army.mil

Did he say "SSG"?

That's right, SSG Matthew J. Morrison is the Aviation Safety Officer for the 12th Aviation Brigade. SSG Morrison has held the position since the DEROS of the last CW5. The reason for this mismatch is that the personnel system has trouble getting qualified CW5 ASOs to accept assignments in Germany.

The brigade commander could fill the position with a CW4 or CW3 ASO, but then PERSCOM would not have a vacancy to fill, and the brigade would go without a CW5 until the CW4/CW3 departed. With this in mind, the brigade commander has designated the senior battalion ASO to be the acting brigade ASO while holding the position open until a CW5 is available.

Preparation key to safe winter operations



Operating aircraft in cold weather or even in an arctic environment presents no unusual problems if you're prepared. *Managing the risks requires that both flight-line and cockpit crews be aware of the effects low temperatures and freezing moisture can have on aviation operations.*

Preflight

Preflight checks must be extra thorough when temperatures have been at or below 0°C (32°F). Water and snow may have entered many parts of the aircraft during operations or when the aircraft was parked unsheltered. Such moisture can form ice that can immobilize moving parts, damage structures by expansion, or occasionally foul electrical circuits.

Covers can protect against freezing rain, sleet, and snow if they're installed on a dry aircraft before precipitation begins. Since it's not practical to completely cover an unsheltered aircraft, parts not protected by covers, parts adjacent to cover overlaps, and joints require closer inspection, especially after periods of blowing snow or freezing rain.

Accumulations of snow and ice on aircraft must be removed before flight. Failure to do so can result in aerodynamic and center-of-gravity disturbances or introduction of snow, water, or ice into internal moving parts and electrical systems. Main and tail rotor systems and their exposed control linkages require particularly close attention.

Flight

Hovering helicopters produce a great amount of rotor wash, creating the potential for rotor-induced whiteout during operations over snow-covered terrain. The hazard is not as serious for aircraft with wheels as it is for those with skids. Aircraft with wheels can be ground-taxied safely to the takeoff point with only minimum blade pitch, thus reducing rotor wash.

Takeoffs pose a hazard in snow-covered terrain because of the lack of visual cues for peripheral vision. And landing can present a significant hazard unless aircrews follow proper landing procedures to avoid whiteout.

FM 1-202: *Environmental Flight* recommends specific techniques pilots should use when taking off from and landing on snow-covered areas.

Maintenance

Cold weather increases aircraft-maintenance requirements. Aircraft operation at temperatures below -50°F should not be attempted except in emergencies unless the aircraft is equipped with the appropriate winterization kit and auxiliary systems and has proven reliable at low temperatures. The following special precautions and equipment are necessary to ensure efficient aircraft operation:

- Reciprocating engines should not be started at temperatures of 10°F and below without using an auxiliary power unit for assistance.
- External heat applied to the engine accessory case, carburetor induction system, oil pump, and battery will ensure easier starting. Standard portable combustion-type heaters that include a blower and flexible hoses for application of heat to localized areas may be used to preheat components and systems before starting. These units may also be used to heat specific portions of the aircraft so that maintenance personnel can work without gloves. (Don't forget that touching cold metal with bare hands in below-freezing temperatures can tear the skin right off your hands.)
- For aircraft equipped with internal-combustion heaters, the heaters should be turned on at least 20 minutes before operating hydraulic systems to avoid damage to the systems.
- Some system gauges or indicators are unreliable until the system reaches operating temperature.
- In temperatures below freezing, aircraft batteries not in use should be removed and stored in a warm place.
- When transferred from a warm to a cold environment, some aircraft engines, transmissions, and hydraulic and landing-gear systems may require a different kind of lubricating oil or hydraulic fluid.
- Thickening of oil at low temperatures presents problems in operation and starting. Installing standard winterization equipment that includes baffles on oil coolers and engine cowl baffles can aid

in maintaining proper temperatures. Oil dilution units may also be installed, although it's normally satisfactory to drain the oil from engines at the end of the day's operations and to heat it before replacing it in the engine.

■ Aircraft with air-charged components such as accumulators and cargo hooks should be charged with nitrogen because air condenses and contracts in cold temperatures. Low pressure and moisture in the system may prevent the system from functioning properly.

■ Operation of aircraft in temperatures below-35°F results in a marked increase in metal fatigue. All metals become increasingly brittle as temperatures decrease. This will be evidenced by an increase in the number of skin cracks and popped rivets in stress areas. Careful attention must be devoted to these areas during all stages of maintenance operations.

Fortunately, most units are not subjected to severe cold weather during the entire year. But many units do encounter some snow and ice conditions during winter months. And a lack of recent experience in such conditions—skill decay—can lead to accidents. Field manuals and operators and maintenance manuals for your aircraft contain suggested techniques and procedures for flight and maintenance operations in cold weather. Be sure to follow them.

You can't eliminate all the risks associated with cold-weather operations, but you can learn to manage them.

And you can be prepared.

"It's Air Force; can we use it?"

Consider for a moment the following scenario: An aircraft crashes to the ground from an OGE hover. Given the energy-attenuating capabilities of modern aircraft, the crew is uninjured. However, an external fuel tank bursts on impact and ignites. The crew must negotiate a wall of flames as soon as the cockpit doors open.

Sound likely? From 1992 through 1996, 43 Class A, B, and C Army aircraft accidents involved fire. Could you escape? Are you wearing the proper clothing—correctly?

Two Army aviators were faced with just such a scenario one winter day. Both pilots received burn injuries egressing the aircraft. One pilot, who was correctly wearing authorized and serviceable protective clothing, recovered after a short hospital stay and quickly returned to flight status. The other pilot was wearing a CWU-23/P liner, antiexposure coverall as long underwear under his flight suit. He might have believed the CWU-23/P was an acceptable piece of ALSE because it was a valid Air Force issued item with an NSN label. However, it contained an insulating layer of Rochelle knit nylon, which melted into his extremities as he was exposed to the fire. The nylon had to be cut out of his muscle tissue. He was also wearing gloves with small holes in the fingertips, which resulted in severe burns and permanent partial disability. This pilot spent an extended period in the hospital and was medically retired.

The USAF CWU-23/P was specifically developed as a liner for the CWU-21/P antiexposure assembly and is intended for use only as part of that assembly. It is not authorized for wear as long underwear. (The CWU-21/P is authorized for wear when flying over water having a temperature of 60°F or less. In this case, the risk of hypothermia after ditching is greater than the risk of fire.) For a list of long underwear that meets the requirements of AR 95-1, see the January 1997 *Flightfax*.

Many Army aviators wear unauthorized ALSE with the belief that because it says "Air Force" it must be good. This misconception can have severe consequences when it comes to Army helicopter operations. Many of the ALSE products used by the Air Force were developed for fixed-wing applications where the injury risks during a mishap are substantially different than they are for rotary-wing aircraft. Before a component is approved for use by Army aviators, testing and risk assessments are performed to determine its suitability for Army operations.

If you are using a CWU-23/P or any piece of ALSE in a manner for which it was not intended, stop! If the right equipment is not available for the mission, consult the Program Manager, Aircrew Integrated Systems, for information on obtaining the proper equipment. If you cannot get the proper equipment, have your chain of command perform a risk assessment on the mission, using the hazards associated with the alternate equipment. Contact the ALSE School, the U.S. Army Safety Center, or the U.S. Army Aeromedical Research Laboratory for information on the hazards associated with alternatives.

—CW2 Douglas Denno, U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL, DSN 558-6889 (334-255-6889)

Moments from disaster

What are the consequences of rolling into a bank close to the ground? Too often, the answer to that question is, "Disaster."

Figure 1 illustrates how our apparent weight (G-loading) increases proportionally with the angle of bank when we maintain our initial altitude and airspeed by applying the required collective power. For example, a 10,000-pound aircraft in a 60-degree bank, maintaining altitude and airspeed, will have an apparent weight of 20,000 pounds. But what happens if we do not have the power available to lift twice our weight, or if we do not apply collective power immediately upon rolling into the bank?

Assume that we're flying along at 300 feet above ground level and roll into a 60-degree bank while maintaining our airspeed but without increasing our collective power. How long will it take before we hit the ground? Figure 2 plots the time to impact from various entry altitudes and angles of bank. Actually, the plotted time to impact corresponds to when the altitude-sensing port hits the ground; obviously, the main rotor will hit first.

This plot is independent of the type of aircraft or gross weight and is merely a function of angle of bank. Note that any partial application of collective power or reduction in airspeed will increase the time until you hit the ground; conversely, any power reductions or increases in airspeed will decrease the time. Also, an initial descent rate at entry will decrease the time; any initial rate of climb will increase the time.

Consider our example of starting at 300 feet agl and rolling into a 60-degree bank without any power adjustment while maintaining our entry airspeed. The time to impact is approximately 6 seconds, which is probably how long it took you to read this sentence. A moment's hesitation in applying collective power when rolling into an angle of bank at low altitude may result in a descent rate that may not be recoverable.

Even after you roll wings-level and start a dive recovery, the aircraft will continue to descend (figure 3). On any given day, we can determine our maneuvering envelope by reviewing our energy-to-maneuver and excess-power diagrams published in helicopter tactical manuals. The fixed-wing community has been using these diagrams for years, mainly as tools to compare their capabilities to those of their adversaries. The diagrams show an aircraft's ability to maneuver based on its excess power. Excess power is the difference between the power available and the power required for straight and level flight under a given set of atmospheric conditions, aircraft loads, and configurations. The excess power can be used to climb, roll into an angle of bank, or a combination of the two.

In some cases, maneuvering may result in too little power instead of extra power, causing a descent instead of a climb. For example, we decide during preflight planning that our mission must be flown at 100 knots. If we then roll into a bank more than 50 degrees and maintain our 100 knots, even while applying full collective power, we will descend (figure 4).

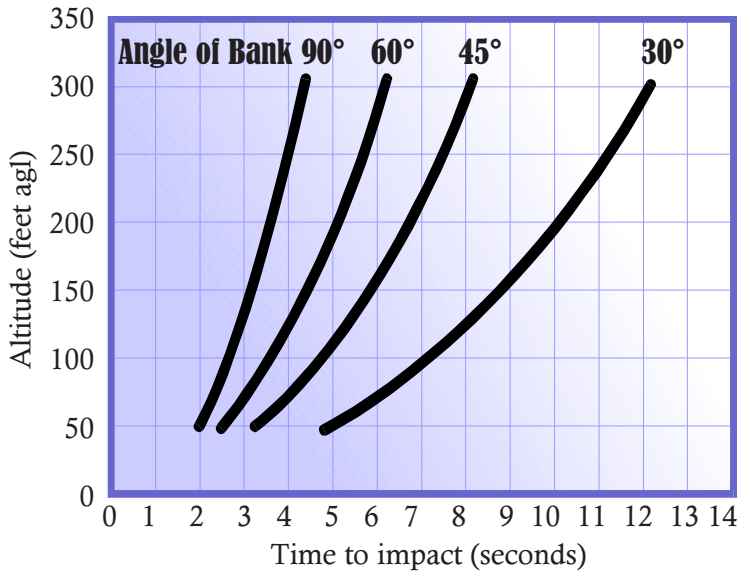
Planning can define what an excessive angle of bank is for the mission profile on that day and prevent another mishap with the same old cause factor.

—adapted from an article by LTC R.E. Joslin (Operations Officer, Naval Test Pilot School), in Approach

Figure 1. How heavy does your helicopter feel?

Angle of Bank	G Load	Apparent Weight (pounds)
0	1.00	10,000
10	1.02	10,200
30	1.15	11,500
45	1.41	14,100
60	2.00	20,000
75	3.86	38,600
85	11.50	115,000
90	∞	∞

Figure 2. How long until you hit the ground?



time to impact is... seconds

Figure 3. Dive recovery and G's

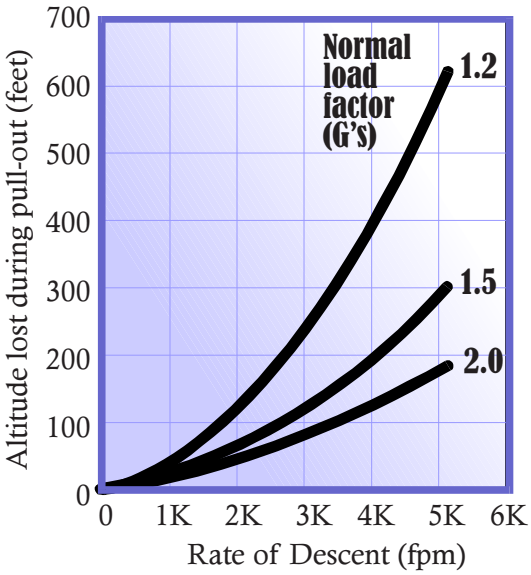
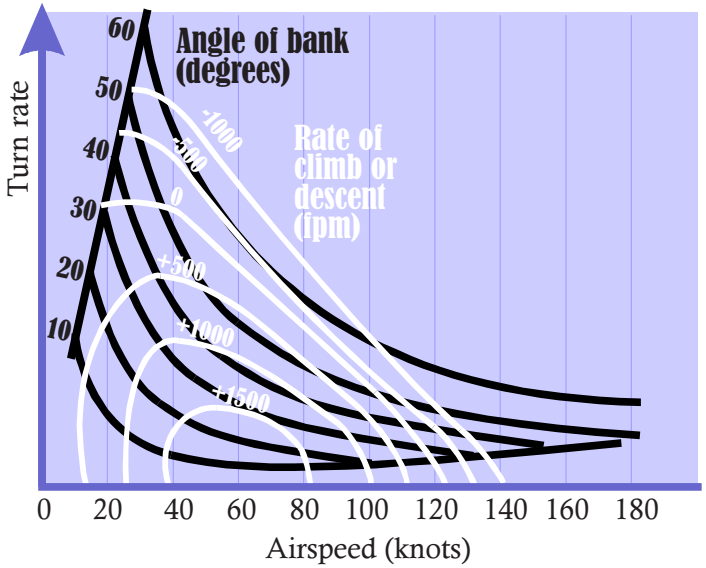


Figure 4. Representative energy to maneuver



"Back-seaters"

It has been my experience in Army aviation that we as enlisted crewmembers often tend just to float through the flying portion of our job. Our responsibilities include a huge variety of duties just to get that aircraft off the ground: maintenance, ATM training, forms and records—and don't forget those basic soldier skills. These things often preclude us from being pro-active as crewmembers.

It has become increasingly important for us "back-seaters" to become a more integral part of the crew team. We should be asking questions during crew briefings, in fact more questions than the front-seaters. We should make it our duty to learn everything we can about the aircraft we fly. We may not have the controls, but we should know the right switches to flip and the right buttons to push. We should know the capabilities and limitations of our aircraft, the temperatures, the systems, the emergency procedures. If we know these things, we might someday be able to provide that little bit of edge needed to save the aircraft and crew. Who knows? We could see a change in rotor speed, or a transmission temperature change, or a torque split a few seconds before the pilots and make a critical difference in living and dying.

So think about what it is you are really doing next time you go fly. If an emergency happens, will you know the right thing to do? Will you be able to help at all?

I have considered these things, and I know that I will do everything within my power to be a real crewmember and not just a "back-seater" collecting flight pay.

What about you?

—SPC Bryant W. Clark; B Company, 2nd Battalion, 1st Aviation Regiment; Katterbach Army Airfield, Germany; lightning06@compuserve.com

How big is my airplane?

I remember the first time I flew an Apache helicopter. As I walked toward the aircraft, it seemed to become a fire-breathing, towering monster. I had already logged hundreds of hours in the OH-58 and UH-1, but the Apache was in a whole new aircraft league. For one thing, it was huge, and I felt very small standing beside it. I felt intimidated by a machine for the first time in my life.

In the months that followed during the aircraft transition, I learned every inch of the beast. My hands-on flight training came from a very wise Chief Warrant Officer. We flew daily, weather permitting, and each day the aircraft became a little less intimidating and a little smaller. After the aircraft qualification course, my first assignment was as a platoon leader in an attack company. As my logged hours grew larger, the aircraft size grew smaller. Eventually, flying the Apache was no different than riding my motorcycle or driving my Porsche (would you expect any less from a young, single attack pilot?).

But nowadays, in my personal world and in the military training world, things are different. I got married and exchanged my Porsche for an Acura. I became a commander, then a staff officer. Military funding grew tighter, and I began to fly less and less. The Apache began to grow in size again. Each time I

approached the aircraft, it grew a little larger and a little more intimidating. I started feeling as though I were climbing into a large truck. The Apache had again become a beast.

I am sure I am not the only pilot who is experiencing this uneasiness. With reduced budgets, flying hours will continue to diminish. As this reduction in training occurs, I recommend that we all recalibrate our limits and watch for the warning signs of reduced proficiency. We should determine if our aircraft are growing in size and look a little larger as we approach them. Maybe we should fly just a bit higher or a little slower tonight and put a touch more space between ourselves and our individual wing men.

In the meantime, we can still remain intimate with our airplanes. We can sit in them in the hangar or on the flight line. We can review checklists and switchology. We can sit in a quiet room and visualize our flights and our actions. As we encounter reduced air time, let's each ask ourselves, "How big is my airplane?"

—CPT Michael Zapata III, North Carolina ARNG, 919-515-9807, mz3@mindspring.com

T-53 engine N2 accessory gear and shaft failures

I'd like to share the following information with as many UH-1 and AH-1 crewmembers as possible to prevent accidents from N2 accessory gear and shaft failure.

Symptoms of failure

The most noticeable cockpit indications of an N2 accessory gear or shaft failure will be the following:

- Change in engine noise as engine rpm increases.
- Engine rpm warning light activation.
- N2 tach needle drops counterclockwise to zero.
- Torque needle drops to zero.
- Rotor rpm increases.
- May or may not have an engine chip segment light and master caution light.
- Engine may or may not fail, depending on where the failed parts lodge.

Emergency procedure

The emergency procedure steps in the dash-10 (TM 55-1520-21-10, change 17) for N2 engine overspeed are as follows:

1. Collective—INCREASE to load the rotor in an attempt to maintain rpm below the maximum operating limit.

2. Throttle—REDUCE until normal operating rpm is attained. Continue with manual throttle control. If reduction of throttle does not reduce rpm as required:

WARNING: Land even if manual throttle corrects the overspeed since there is a chance of an impending engine failure due to the debris generated by the initial N2 failure.

3. EMERGENCY GOV OPNS.

Discussion

Specifics of this type of failure are not well covered in the operators manual and are not addressed in our normal training. The following information is based on our simulator tests and accident investigations.

A problem with step one of the emergency procedure is that the torque gauge is inoperative, and simulator tests have found that transmission overtorque (65 lbs UH-1 and 130% AH-1) is possible without knowing it. In step two, a throttle reduction of one-quarter to one-third turn will give manual control of engine rpm, but, because the N2 needle is at zero, the rotor rpm needle will be the only indicator of N2 rpm. Therefore, the pilot must fly the aircraft with manual control of the throttle, using the rotor rpm needle for both N2 and rotor operating limits and land as soon as possible, keeping in mind that the engine may fail at any time.

Simulator tests have shown that pilots who have not been trained or recently briefed about N2 gear and shaft failures respond to the N2 gear failure emergency with the procedure for a main drive shaft failure. The confusion appears to be with the N2 needle interpretation.

If the N2 needle is not being observed when the failure occurs, the pilot assumes that the needle moved ***clockwise*** to an overspeed indication (above the rotor needle), which is confirmed by his or her physical senses with the engine rpm increasing. With that conclusion, the pilot's visual picture is of the rotor needle dropping and the N2 overspeeding, which indicates a main drive shaft failure. The actual situation is that the N2 needle has moved ***counterclockwise*** to zero, and rotor rpm is increasing.

When responding to a rotor rpm needle, the bottom line is this: If the rotor rpm is ***increasing,*** apply collective; if it's ***decreasing,*** reduce collective.

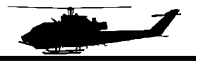
I hope this helps.

—CW5 James D. Bankston, Minnesota ARNG, DSN 825-3419 (612-281-3419), bankstonj@mn-arng.ngb.Army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class E

F series

■ At completion of topping check, collective was lowered from 94 percent to 84 percent. There were four loud reports (indicating compressor stall), and tgt spiked to 900°. After gauges settled down, collective was further lowered to 75 percent. Aircraft shuddered and four loud reports were again heard. Once aircraft power was set to normal cruise, collective was lowered to 65 percent, which resulted in another compressor stall. Running landing was made to airfield without incident or damage. At no time did tgt rise above 900°C. Maintenance adjusted bleed band actuator and cleaned B-nut on customer bleed air line, which was leaking a small amount of air.

■ During maintenance test flight following autorotation with power recovery, transmission oil hot caution light came on at about 500 feet agl. Aircraft was landed in open field without incident. Caused by failure of switch.

AH64

Class A

A series

■ Aircraft reportedly crashed following inflight fire, killing both crewmembers. Accident is under investigation.

■ Aircraft hit trees during approach to LZ under FLIR while conducting night proficiency training. Crew sustained minor injuries; aircraft was destroyed. Accident is under investigation.

Class E

A series

■ During runup, fuel boost pump caution light remained on after completion of engine start sequence. Light did not extinguish even with both engines operating at 100 percent. Maintenance replaced fuel boost pump solenoid shutoff valve.

■ While taxiing for takeoff, crew noticed that environmental control unit (ECU) airflow stopped. No caution lights illuminated. ECU switch was recycled, but airflow did not return. However, within 10 seconds, crew compartment began filling with smoke and fumes. Crew conducted emergency engine shutdown and egressed aircraft without further incident. ECU bearing had seized, causing oil in casing to burn and smoke.

■ On base turn to final during maintenance test flight, crew heard loud bang and felt vibration from left side of aircraft. Aircraft was landed and shut down without incident. Postflight inspection revealed that No. 1 engine cowling door was unlatched. Cowling had been checked for security by both pilots and the crew chief prior to the flight.

■ During runup, CE saw hydraulic fluid venting from APU. Maintenance personnel determined that APU had been overserviced. During maintenance, hydraulic servicing system could not be pressurized because of a stuck valve. Solenoid valve was replaced.

D series

■ On runup, CE smelled fuel in cockpit. Maintenance inspected fuel system and discovered nitrogen inerting unit fuel hose leaking.

CH47

Class B

D series

■ Crew noted vibration on engine shutdown and rotor rpm rose to 120 percent. Crew shut down both engines. Both rotor heads will be replaced.

Class D

D series

■ During rehearsal for air assault demonstration, external load touched down before aircraft came to stabilized hover. External load, an M119A artillery piece, turned over before CE was able to release it. Forward movement of aircraft caused load to be pulled over.

Class E

D series

■ Crew felt severe vertical vibrations in cruise flight at 120 knots. Dual feedback transducer was replaced.

■ Right aft wheel rim split during four-wheel ground taxi, resulting in flat tire. Aircraft was shut down without incident.

■ During cruise at 500 feet agl and 95 knots on an NVG flight, aircraft was struck by two birds. Second bird crashed through upper panel assembly on copilot's side and came to rest by No. 1 power distribution panel. Aircraft returned to home base and landed with no further incident.

OH58

Class C

D(I) series

■ Suspected engine and mast overtorque occurred during climbout from field site. Maintenance evaluation substantiated engine torque at 139 percent for 1 second and mast torque at 140 percent for 2 seconds. Engine inspection is ongoing.

Class E

D(I) series

■ During Hellfire gunnery, crew received caution message for high engine oil pressure when aircraft came to OGE hover. Pressure registered 135 on MPD and aircraft was landed. Crew noted that every time collective was raised, message displayed. Maintenance replaced engine oil pressure transducer and flushed engine oil cooler, which did not correct problem. Free-wheeling unit aft seal was replaced and aircraft was released for flight.

■ During takeoff after rearming with Hellfire missiles, crew encountered brownout conditions. After applying power, crew observed low rotor and high torque time limit message. Review of engine history page indicated engine torque had peaked at 131 percent for zero seconds and mast torque peaked at 115 percent for 2 seconds. Maintenance inspected aircraft and released it for flight.

■ During runup, CE noticed smoke coming from aircraft at engine idle. Crew executed emergency shutdown and heard grinding noise while engine was spooling down. Crew reported that it had been a normal runup. During subsequent inspection, AVUM personnel determined that internal damage had occurred to compressor assembly, calling for component replacement. QDR was submitted on compressor assembly.

UH1

Class C

V series

■ At 700 feet agl following takeoff on medevac mission, crew noted N2 overspeed indications and engine chip light illumination. Aircraft was flown to nearest open field, and crew initiated steep approach to avoid power lines. Aircraft began an uncommanded right yaw, and crew initiated autorotation to ground. One main rotor blade was damaged when it hit a wire during the descent.

■ During night unaided approach to confined area, aircraft was engulfed in snow cloud, causing crewmembers to lose outside visual reference. Aircraft drifted forward, contacting trees with main rotor blades. IP landed aircraft in place and performed normal shutdown. Postflight inspection revealed damage to both main rotor blades.

H series

■ During cruise flight at 1500 feet agl, crew heard loud noise and engine chip light came on. As PC began right turn to perform precautionary landing, loud noise came from engine, and oil pressure light illuminated. N1 went to zero. During autorotation to rolling hayfield, aircraft touched down hard. Main rotor blade struck tail, and gear collapsed.

Class E

H series

■ During engine start and runup, N2 tachometer needle indicated zero and normal shutdown was performed. Maintenance replaced N2 tachometer generator.

■ After normal start, N1 failed to accelerate past 40 percent and actually decreased slightly. Transmission oil pressure light remained on, and egt suddenly increased to 800° before throttle was turned off. Once throttle was turned off, egt decreased to normal.

■ Crew detected fuel odor in flight and landed to inspect aircraft. Fuel leak was found on left side of engine compartment near fuel control. Maintenance replaced fuel line between cylinder 1 of the VIGV actuator and the fuel control.

■ Master caution and engine chip detector lights came on during takeoff. Aircraft was landed immediately with no further incident. During required engine runup, engine chip detector light again came on. Engine was replaced.

■ During cruise flight at 90 knots, crew heard loud whine from hydraulic pump accompanied by master caution and hydraulic segment light with loss of hydraulic pressure to flight control. Emergency procedure was completed, and hydraulics-off landing was made. Inspection revealed loss of hydraulic fluid was due to crack in check valve from overtorquing of hydraulic line.

V series

■ MOC was being conducted after installation of stainless steel fittings on engine. One start was aborted due to slow increase of transmission oil pressure. After concluding that transmission oil pressure was not a problem, a second start was attempted. Engine started very slowly, and battery power started decreasing. Shutdown was attempted at 8 percent N1, but throttle detent solenoid would not activate and throttle would not close. Fuel switch was turned off. At this point, egt was 450°C, but it increased to 650° for 30 seconds.

UH60

Class B

L series

■ Hard landing resulted in damage to all four main rotor blades and severing of main transmission drive shaft. Investigation is under way.

Class C

A series

■ During maintenance check for initial engine runup and track and balance, a main rotor tip cap contacted a tail rotor tip cap. Incident is under investigation.

L series

■ Aircraft was at 15-foot hover during air assault slingload training when M119 howitzer was inadvertently dropped. Howitzer barrel broke off on impact with the ground. Aircraft landed without incident.

Class E

A series

■ During cruise flight, No. 1 engine tgt fluctuated from 0 to maximum, causing torque splits when tgt limiting engaged. Aircraft returned to base and landed without incident.

L series

■ Aircraft was attempting to pick up M119 howitzer when one of the sling legs apparently got under the brake handle. As tension increased, sling leg dropped off brake and crew prepared to drop load. Howitzer was on ground when aircraft drifted slightly forward, causing gun to tip over on its barrel. Aircraft landed without further incident.

C12

Class E

K series

■ Aircraft lost mission equipment and a.c. power 1.5 hours into flight. Crew turned off mission equipment and returned to base. Caused by failure of the 400-amp combined current limiter.

■ During step-down for 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.

O5

Class C

DHC-7

■ During taxi for takeoff after refueling, crew noted aircraft vibration. From cockpit, PC visually identified damage to right wing and returned to parking. Postflight inspection revealed damage to right wing tip and aileron and one antenna. Cause not reported.

Class E

DHC-7

■ No. 1 engine hydraulic pump caution light came on during taxi. Troubleshooting revealed faulty pump. Shortly before this failure, No. 2 pump had failed. Unit reports that, although these two systems are independent, they have on three occasions experienced failure of the second pump within a few flight hours of the first. Unit suggests possible cause is peak loading immediately after failure.

■ Hydraulic pump 4 failed during IFR flight at cruise altitude. Five minutes later, hydraulic pump 3 failed. Alternate gear extension was conducted successfully, and aircraft landed without incident.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785).

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action message

UH-1-98-ASAM-02, 181421Z Nov 97, maintenance mandatory.

Abrasions have been found on the spars of UH-1 elevators manufactured by Chem Fab Corporation. These abrasions were likely caused by a drilling operation used in attaching the skin to the ribs during elevator assembly. All Chem Fab elevators are suspect. The spar is the fatigue-sensitive component on which the 3600-hour elevator life is based, and abrasions can cause stress concentration points that can reduce fatigue life.

The purpose of this message is to require mandatory removal of elevators manufactured by Chem Fab Corporation when they reach their 3600-hour retirement life, but no later than 365 calendar days from the date of inspection, and to require reporting of serial numbers and operating times on all UH-1 elevators.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (205-842-8632), brock-rd@redstone.army.mil

Safety-of-flight messages

UH-1-98-SOF-01, 202124Z Nov 97, technical.

This message concerns two issues involving the UH-1 tail rotor slider.

(1) UH-1-91-ASAM-05 assigned a 3600-hour retirement life to the UH-1 tail rotor slider, P/N 204-010-720-3. Recent analysis of fatigue test results has shown that the correct life should be 3000 hours.

(2) UH-1-96-SOF-02 established a 170-hour retirement life for certain UH-1 tail rotor sliders (cage code 0H0W5) due to a thin tube outside diameter. Subsequent fatigue testing of these sliders has shown that their retirement life can be extended to 250 hours.

The purpose of this message is to reduce the retirement life on the UH-1 tail rotor slider from 3600 to 3000 hours and to extend the retirement life of sliders with cage code 0H0W5 from 170 to 250 hours.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (205-842-8632), brock-rd@redstone.army.mil

UH-1-98-SOF-02, 212257Z Nov 97, operational.

UH-1-96-SOF-03 imposed flight restrictions on all UH-1 aircraft due to numerous failures of the N2 spur gear cup-type retainer. A newly designed retainer was developed and installed on a large portion of the fleet. There have been additional failures of the T53 N2 drive train since the new design retainer was installed. These failures occur almost exclusively as a result of failure of the spur gear (P/N 1-070-062-04, NSN 3020-00-453-9441).

All failures of the spur gear have been contained in the engine. If the spur gear fails, the possibility exists for an accompanying engine failure. This could be caused by the spur gear falling into the accessory gear carrier assembly and severely damaging the other drive gears. This will likely be accompanied by severe vibrations and grinding noises. The carrier assembly also drives the N1 gearbox. If the carrier is no longer able to drive the N1 gearbox, the fuel control will stop operating and the engine will shut down due to fuel starvation. The correct response to an N2 failure is to initiate emergency governor operations, reduce throttle to control rotor speed, and make a powered precautionary landing.

The purpose of this message, which *does not* apply to T53-L-703 engines, is to alert users to this engine problem and provide procedures for corrective action. It also restricts certain aircraft operations for all UH-1 series aircraft.

AMCOM contact: Mr. Robert Brock, DSN 788-8632 (205-842-8632), brock-rd@redstone.army.mil

Maintenance-information message

AH-64-98-MIM-01, 131542Z Nov 97.

The time between overhaul of the AH-64 main transmission clutch assembly, P/N 7-311310003-9 only, has been extended from 1000 to 2500 hours. Assemblies with other part numbers remain at 1000 hours.

The information in this message may be used to change the main transmission clutch assembly historical record (DA Form 2408-16) to reflect the new time between overhaul.

AMCOM contact: Mr. Carl Duffner, DSN 897-4321 (205-313-4321), duffner-c@redstone.army.mil

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Class A Accidents

through November		Class A Flight Accidents 97	Class A Flight Accidents 98	Army Military Fatalities 97	Army Military Fatalities 98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1		0	
2D QTR	January	2		2	
	February	0		0	
	March	2		1	
3D QTR	April	2		2	
	May	1		1	
	June	3		0	
4TH QTR	July	1		8	
	August	0		0	
	September	0		0	
	TOTAL	12	3	14	0

U.S. ARMY SAFETY CENTER

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Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

FEBRUARY 1998 ◆ VOL 26 ◆ NO 5

visit our web site • http://safety.army.mil

IT seems that these days even the average soldier is a problem solver looking for a problem to solve. Given all the suggestions on operational applications for hand-held lasers we've received at the Army Safety Center, a lot of thought is going into using these devices to command and control the future battlefield. But when it comes to mixing laser technology with night-vision devices—especially in Army aviation. . .

WHAT WE DON'T KNOW CAN HURT US!

HEADS-UP—Army aviation experienced five Class A accidents during the first quarter of this fiscal year, compared to one during the same period for the last 3 years. The first quarter was especially tough for the AH-64 community. Three of the five accidents involved AH-64s. — BG Burt S. Tackaberry, Commanding General, U.S. Army Safety Center

Testing the technology

Hand-held lasers are simple to buy, easy to use, and very effective. Buyers can purchase these devices from any number of catalogs or military-gadget stores. Some Army aircrewmembers started to use laser devices several years ago when about the only thing available was the red penlight type typically used for classroom pointers. Primarily because of the color, but also because we just didn't know what effect these lasers would have on NVGs or what sort of eye hazard they represented, they were prohibited last spring from use in the cockpits of Army aircraft until testing could be accomplished. Paragraph 8j of GEN-97-ASAM-04 (101430Z Apr 97) said:

"The use of laser pointers in the cockpit of Army aircraft is prohibited. Laser pointers may be used only in the cargo compartment of UH-1, UH-60, or CH-47 aircraft at the discretion of the PC. The PC should include the use of laser pointers in the crew and passenger briefing. Warning: Users should be aware that any laser can permanently or temporarily degrade the performance of NVGs if used improperly. Any laser that is not a Class 1 laser device has the potential to cause direct damage to the eye. Testing is currently being accomplished to assist in the selection and development of proper operating procedures for safely allowing the use of these devices in NVG aviation operations."

The message went on to list the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) Laser Program, DSN 584-3932 (410-671-3932), as point of contact for laser issues.

This prohibition was included in the message because we just didn't know what hazards we were dealing with. In order to try to identify the hazards associated with hand-held-laser use in Army aircraft, a study group consisting of representatives from CHPPM (the laser folks), CECOM (electronic-equipment manager), PM-Night Vision (equipment-fielding folks), and the Safety Center (NVG systems manager) went to the laser range at Fort A.P. Hill, VA, and tested numerous lasers.

Personnel from CHPPM conducted the first part of the test by measuring the amount of energy reflected when individual lasers are fired through aircraft windscreens. In addition, they also measured the energy reflected off the instruments.

Following these reflective-energy measurements, the reps from CECOM, PM-Night Vision, and the Safety Center measured the amount of NVG-resolution degradation caused by each of the test lasers. In addition to this compatibility test, we evaluated the range individual lasers could be seen with NVGs. While we didn't establish go/no-go criteria for this part of the evaluation, we did get input from some operational folks about what tactics, techniques, and procedures they'd like to use. Based on this input, we determined that we should be able to see the lasers from 200 to 1500 meters under various ambient-light levels. The illumination levels during the test period varied from clear starlight to 91-percent moon illumination with clear skies.

We tested three Class 1 and five Class 3a and 3b lasers. Most of the lasers tested were available through normal distribution channels, but two of the lasers were catalog penlight type.

All the Class 1 lasers degraded the NVGs in varying degrees, but all of them measured within acceptable limits. The AN/PEQ-2 pointer/illuminator is a new laser that has high (Class 3b) and low (Class 1) power settings for the laser pointer. In the low power setting, the PEQ-2 only slightly degraded NVG resolution, which made it acceptable for use in the cockpit. This low-power laser was able to generate a good spot out to about 1500 meters under very dark conditions. However, it was able to generate only a weak spot out to about 400 meters under higher illumination. When we switched the PEQ-2 to the high-power level, we had much improved range, but significant NVG-image degradation made it unacceptable for aviation NVG use. This laser also has the capability of illuminating a larger area (like you would expect with a searchlight) by defocusing the laser beam.

Note: The Army has not approved the use of the AN/PEQ-2 (not to be confused with the "A" version). The AN/PEQ-A laser illuminator, which is currently in production, is not a Class 1 laser and should not be directed toward friendly personnel within 15 meters, even in the low-power mode.

We also looked at the Ground Commander's Pointer (GCP-1A). This device is near-IR and has two operating modes. One mode is low power (Class 1); the other is high power (Class 3b). The low-power position of this device degraded the NVGs more than the other Class 1 lasers but still was considered acceptable. This laser was able to point to target areas out to at least 2000 meters and more during very low illumination and to about 1600 meters during high illumination.

Note: With regard to the eye safety of laser pointers, model numbers make a difference (e.g., the GCP-1, GCP-1A, and GCP-2A are not the same power). All laser pointers sold in the U.S. are required by law to have the laser classification labeled on the device.

The next Class 1 laser we checked was the AN/PAQ-4C. This is a 0.7-milliwatt near-IR laser. It caused only slightly more degradation in the NVG

than the PEQ-2 but was well within the acceptability range for use with aviation NVGs. When we conducted the visibility test, we were able to see the laser spot out to about 2000 meters under very dark conditions and out to about 1500 meters under high ambient illumination. This laser was the overwhelming choice of the study group because it had adequate range under all illumination levels, was eye safe, and is readily available now as a standard piece of Army equipment. Although the PAQ-4C is not yet approved for use with aviation NVGs, look for its approval in an upcoming ASAM.

We evaluated several Class 3 lasers that worked very well in terms of useable range under various light levels, but none of them was satisfactory for use with aviation NVGs because of image degradation. In addition, none of the visible lasers we tested were acceptable because of their effects on the NVGs.

Summary

The upcoming ASAM on night vision will authorize the use of some Class 1 near-IR lasers. Use of these hand-held lasers in Army aviation will require not only ensuring that the right lasers are used but also good crew coordination as well.

Problems arise when lasers are used improperly or when devices are incorrectly labeled. One final word of caution: These devices are great tools, but they must be operated safely. Everyone who uses them should be aware of their associated hazards and make on-the-spot corrections to anyone not using them correctly.

—CW5 Bob Brooks, NVG Systems Manager, USASC, DSN 558-1253 (334-255-1253), brooksr@safety-emh1.army.mil

Presently fielded laser devices

AN/VVG-1, Laser Rangefinder. *Typically on M551 howitzers using a 694.3nm laser. Class 4.*

AN/VVG-2, Laser Rangefinder. *Typically on M60 tanks using a 694.3nm laser. Class 4.*

AN/VVG-3, Laser Rangefinder. *Typically mounted on M1 tanks using a 1064nm laser. Class 3b.*

AN/GVS-5, Laser Rangefinder. *Hand-held using a 1064nm laser. Class 3b.*

AN/TVQ-2, Ground/Vehicle Laser Locator Designator (G/VLLD) *using a 1064nm laser. Class 4.*

AN/PAQ-3, Modular Universal Laser Equipment (MULE) *using a 1064nm laser. Class 4.*

AN/PAQ-1, Laser Target Designator (LTD). *Hand-held laser using a 1064nm laser. Class 4.*

Laser Augmented Airborne TOW (LAAT). *In AH-1 helicopters using a Target Acquisition and Designator Sight Pilot Night Vision Sensor (TADS/PNVS) using a 1064nm laser. Class 3b.*

Mast Mounted Sight (MMS). *Used in OH-58D helicopters using a 1064nm laser. Class 4.*

AIM-1, Infrared Aiming light. *Used on some helicopters and mounted on small arms using an 820-850nm laser. Class 3b.*

TADS/PNVS, Laser Rangefinder Designator. *In AH-64 helicopters using a 1064nm laser. Class 4.*

LPL 30, Long-Range Laser Pointer. *Hand-held device used to mark targets. Uses a laser at 830nm. Class 3b.*

GCP-1, Ground commander's pointer. *Uses 820-825nm diodes. Class 3b. (Note: Several models of the GCP-1 and GCP-2 have been produced.)*

AN/PVS-6, Miniature Eyesafe Laser Infrared Observation Set (MELIOS). *Hand-held laser rangefinder using a 1540nm laser. Class 3a.*

M55, Laser Tank Gunnery Trainer. *Uses a 632.8nm laser. Class 1.*

Multiple Integrated Laser Engagement System (MILES). *Using 905nm lasers. Classes vary from 1 through 3b.*

PAQ-4A/B/C Infrared Aiming Light. *Small, light-weight, most commonly mounted on small arms. Class 1.*

What you can't see can hurt you

Class 3B hand-held lasers such as the LPL-30 long-range laser pointer and the GCP-1 ground commanders pointer can range in power from 5 milliwatts (mW) to 500mW. At the higher levels, they can cause serious eye injury if used improperly. The major hazard is to the unprotected eyes of users who look at the laser from within the direct beam.

The problem is, these lasers emit energy that is invisible to the unaided eye. As a result, users sometimes tend to look into the business-end of the device to try to ascertain whether or not it's working. With these near-infrared lasers, even if users looked at the beam at very close range, the most they'd see would be a very weak red dot of light, if that. But staring into the laser from within the beam can cause serious eye injury. Even that very weak red dot of light is delivering a laser overexposure—these are non-visible lasers.

Users should never stare into any laser, regardless of what the label says. Buyers should be wary of any claim of device safety unless the laser is clearly labeled a Class 1 laser in accordance with Title 21, Code of Federal Regulations (CFR), Part 1040, Performance Standards for Light-Emitting Products. This information must be on the label.

Users of laser pointers other than Class 1 must never aim a pointer at unprotected personnel. To protect themselves, users can unscrew the case enough to disable the power source or remove the batteries when storing it in their shirt pocket or rucksack.

Remember, these devices are not flashlights and should not be used haphazardly.

For more information, contact the Army Center for Health Promotion and Preventive Medicine (CHPPM) Laser Program, DSN 584-3932 (410-671-3932).

Laser-device classifications

Class 1

Class 1 laser devices are not capable of emitting hazardous laser radiation under any operating or viewing condition. These lasers include those that are fully enclosed.

Examples: PAQ-4A/B/C infrared aiming lights and many of the laser marksmanship trainers.

Class 2

Class 2 laser devices are usually continuous wave (CW) visible laser devices. Precautions are required to prevent continuous staring into the direct beam. Momentary exposure(>0.25 second) is not considered hazardous.

Examples: Laser pointers, construction lasers, and alignment lasers.

Class 3a

Class 3a lasers normally are not hazardous unless viewed with magnifying optics from within the beam. Includes visible- and invisible-frequency lasers.

Example: Miniature Eyesafe Laser Infrared Observation Set (MELIOS).

Class 3b

Class 3b lasers are potentially hazardous if the direct or specularly reflected beam is viewed by the unprotected eye. Care is required to prevent intrabeam (within the beam) viewing and to control specular (from mirrors, still water, etc.) reflections.

Examples: Many rangefinders and the AIM-1, GCP-1, and AN/PEQ-2A laser pointers.

Class 4

Class 4 lasers are—

- *Pulsed, visible, and near-infrared lasers capable of producing diffuse reflections and fire and skin hazards.*
- *Those lasers with an average output power of 500 milliwatts (mW) or greater.*

Safety precautions generally consist of using door interlocks to prevent inadvertent exposure to personnel entering the laser facility, using baffles to terminate primary and secondary beams, and wearing protective eyewear and clothing. For military operations during peacetime, these lasers are normally operated only on cleared, approved laser ranges or while using appropriate laser eye and/or skin protection.

Examples: Industrial welders and target designators.

Reference TB MED 524: Control of Hazards to Health from Laser Radiation

Pull-out posters pages 5-8

WHAT YOU CAN'T SEE CAN HURT YOU!

HAND-HELD LASERS: more than meets the eye

MISSIONS

- PZ/LZ identification
- General-area illumination
- Slingload marking
- Target identification

HAZARDS

- Eye injury
- NVG-image degradation
- NVG damage
- Invisible/ reflected energy
- Battlefield confusion

CONTROLS

- Treat laser as loaded weapon
- Develop/practice crew coordination
- Never look into laser
- Use low-power near-IR devices
- Know and follow unit SOP for use

For more Information, see February 1996 Flightfax or call CHPPM Laser Program, DSN 584-3932 (410-671-3932).

Driving tired can be as dangerous as driving drunk.

ISAQ vs. TM: Which takes precedence?

According to an AMCOM Director of Aviation Engineering Message (191656Z December 97), there has been some confusion about what to do when there is a discrepancy between an Interim Statement of Airworthiness Qualification (ISAQ) and a technical manual. The short answer is that ***the ISAQ takes precedence over the technical manual, regardless of publication dates.***

An ISAQ is issued to authorize flight use of a system prior to full airworthiness release. It is issued separately from normal publications changes and retains its authority over technical manuals, regardless of respective dates.

For additional clarification concerning ISAQs or other issues relating to Army aircraft airworthiness, contact your local Logistics Assistance Representative or an AMCOM System Engineer supporting your system.

POC: Mr. Ron Branson, Aviation Systems Engineering, AMCOM, DSN 897-4904 (205-313-4904), bransonr@redstone.Army.mil

FYI: AVA adjustment in the works

The aviation vibration analyzer (AVA), NSN 6625-01-282-3746, is Army standard equipment for rotor track and balance analysis and analysis of other rotating-component-induced vibrations for all Army helicopters. The AVA indicates maintenance actions necessary to efficiently smooth rotor systems and eliminate unacceptable component-induced vibrations.

The current AVA will not process nor accept date entries beyond the year 1999. This results in an AVA system failure as it can't process diagnostics and corrections in accordance with Army standards. AMCOM is working on a software adjustment that will remedy the situation. The modification will be fielded by the end of 1998.

POC: Mr. Randall Bunley, AVA System Manager, AMCOM, DSN 788-0043 (205-842-0043), bunley-rc@redstone.army.mil

Helmet-liner reminder

The thermoplastic liner (TPL) system currently used in Army aviation helmets provides comfort, stability, retention, and impact protection to the wearer—if it's properly fitted. The TPL system conforms to variations on the surface of the head, providing several benefits over the previous sling suspension system. The TPL evenly distributes the weight of the helmet across the head, eliminating hot spots and improving comfort. In addition, impact forces during a mishap are distributed over a wider area of the skull, reducing the potential for injury.

Obviously, keeping all the layers of the TPL in the helmet provides the greatest benefit, but since the SPH-4 and SPH-4B come in only two sizes, layers may have to be removed to custom fit the helmet. However, at least ***two*** layers must be retained. The TPL system will not conform to the head if only one layer is used, and impact protection may be compromised.

The HGU-56/P, currently being fielded, comes in six sizes, permitting aviation crewmembers to choose the proper helmet size rather than remove TPL layers. In fact, removing TPL layers from the HGU-56 is not permitted; the TPL can be heat fitted if necessary.

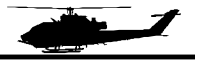
Unfortunately, a small percentage of Army aircrewmembers cannot obtain a proper helmet fit and still retain the required number of TPL layers. In these cases, the crewmember's ALSE shop should contact the U.S. Army Aeromedical Research Laboratory's helmet-fit program for assistance.

—CW2 Douglas Denno, Helmet Fit Program Manager, USAARL, Fort Rucker, AL, DSN 558-6804 (334-255-6804), alserp@rucker-emh2.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class C

F series

■ During PMD, mechanic found 3-inch tear in vertical fin on tail-rotor side. Subsequent inspection revealed that 90-degree gearbox was loose, with 3/8- to 1/2-inch play at end of crosshead. Retaining bolts had backed out and allowed tail rotor to contact vertical fin during shutdown. Pilots acknowledged that they had felt tail rotor hit static stops during shutdown, but no damage was noted during postflight inspection.

Class E

F series

■ While at 2-foot hover just after liftoff, PI started pedal turn to the right to set up for terrain flight takeoff. Aircraft started to drift right. PC looked to the right, identified a rock sticking up, and announced the hazard as the right skid contacted the rock. Aircraft began right rolling motion, but PI recovered and flew 200 meters to suitable landing area. Skid tube was damaged at forward attachment point and was replaced.

■ Forward fuel boost pump segment light came on after takeoff. Aircraft landed immediately at takeoff airport. Maintenance replaced forward fuel boost pump.

■ During engine runup while performing hydraulic system check, No. 2 hydraulic segment light would not illuminate. Aircraft was shut down and mission canceled. Maintenance cleaned corrosion from electrical cannon plug.

■ Forward fuel boost pump segment light came on in cruise flight. After precautionary landing, maintenance repaired chaffing wire on boost pump.

AH64

Class E

A series

■ During attempt to land in response to indications of engine failure, engine caught fire. Crew was able to extinguish fire with onboard extinguishing system. Incident is under investigation.

■ During cross-country deployment, aircrew discovered oil seepage from No. 1 generator seal. Seal was replaced and mission continued.

■ Primary hydraulic caution/warning light came on during out-of-ground-effect hover. Aircraft landed without incident, and maintenance replaced hydraulic filter.

■ CE saw hydraulic fluid venting from auxiliary power unit during runup. Maintenance determined that APU had been overserviced. During maintenance, hydraulic servicing system could not be pressurized because of a stuck valve. Maintenance replaced solenoid valve.

■ Shaft-driven compressor and master-caution lights came on during cruise flight, and crew performed emergency landing and shutdown without incident. Maintenance replaced SDC.

■ During runup, HIT check on No. 2 engine indicated temperature differential above allowable limits. Aircraft was shut down with no further incident. Maintenance replaced anti-ice bleed valve on No. 2 engine.

CH47

Class E

A series

■ Right combining transmission debris screen tripped after takeoff, and indicator would not reset. Emergency landing was made to airfield without incident.

D series

■ Hydraulic fluid began to draw from return line fitting of utility hydraulic pump during cruise flight at 7000 feet msl. Crew made precautionary landing without incident, and inspection revealed that return line fitting was stripped, resulting in severe leak of hydraulic fluid.

■ Transmission oil hot light came on during approach. After landing, ground checks revealed no other indications of possible high temperature on any transmission. Caution warning panel was replaced.

■ No. 2 normal engine beep trim failed during hover. No. 2 N2 actuator was replaced.

OH58

Class D

D(I) series

■ When PC applied collective to transition into forward flight at 30 feet agl, aircraft settled due to suspected wind gust. PC continued to apply collective to arrest settling and experienced engine (132% <1 second) and mast (129% for 1 second) overtorque. Engine, 90-degree gearbox, and drive shafts will be replaced.

■ Aircraft experienced engine overtorque during takeoff. No other information reported.

Class E

C series

■ During hover, rotor wash caught copilot door and broke upper door hinge.

■ During runup, rotor tachometer failed when throttle was increased. Aircraft was shut down without incident. Maintenance replaced dual tachometer indicator.

D(I) series

■ Crew chief noticed smoke coming from aircraft at engine idle during runup. Crew executed emergency shutdown and heard a grinding noise while engine was spooling down. Compressor assembly was replaced and QDR submitted.

■ Several pitch and roll caution messages appeared during cruise flight, followed by two low hydraulic-pressure messages. Pilot broke formation and flew back to home base. During return flight, pitch and roll continued to display. Aircraft was landed and shut down without incident. Problem would not replicate.

Class F

A series

■ **(Engine FOD)** Master-caution and engine chip-detector lights came on during MOC, and aircraft was shut down without incident. Inspection revealed 1¼-inch piece of broken snap-ring attached to bottom chip-detector plug.

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.

UH1

Class C

H series

■ At 150 feet agl after takeoff, master caution and chip detector lights came on, and engine oil pressure dropped to zero. Crew initiated emergency governor operations, during which engine failed. Aircraft landed hard following autorotative descent.

Class E

H series

■ Fuel was seen leaking from main fuel filter at about 6 drops per minute during runup. Aircraft was shut down without incident. Maintenance replaced fuel filter drain valve.

■ Crew detected strong fuel odor in cruise flight just after takeoff. During return to airfield, crew did not notice any loss of fuel on the gauge or see signs of fuel leaking inside the aircraft. After landing, crew chief exited aircraft and saw fuel dripping from drain tube. Maintenance replaced fuel control.

■ During hover, PI noticed that transmission oil pressure was past 100 psi. Aircraft was immediately shut down. Maintenance replaced oil pressure transmitter.

UH60

Class C

A series

■ Damage to undersides of all four main-rotor blades found on postflight inspection. Aircrew noted no inflight difficulties. Suspect contact with AN/ALQ-144 antenna.

Class E

A series

■ En route to training area, weather became worse than forecast. Crew returned to airfield and canceled mission.

■ Upon shutdown, APU failed after 5 minutes of operation due to electronic sequence unit (ESU) failure. ESU was replaced.

■ During environmental control unit (ECU) lockout operations in cruise flight, No. 1 engine would not come out of ECU lockout position after several attempts. Aircraft landed and crew tried again without success. Maintenance replaced hydromechanical unit.

■ While conducting flight-control check during runup, crew experienced uncommanded up collective movement and shuddering in pedals. SAS2 yaw rate gyro failed. Part was replaced and aircraft released for flight.

L series

■ Crew had just dropped off M119A howitzer and had established cruise flight when nose cowling came open. Cowling was damaged when it hit and broke center windshield. It is suspected that crew chief had opened nose cowling to adjust volume on radio and failed to lock cowling.

■ Front right cargo door window was inadvertently jettisoned during passenger off-loading. The window was subsequently damaged while equipment was unloaded. Suspect that window was either jettisoned by passenger trying to open door or that a piece of equipment may have become entangled on jettison handle and then activated when crew chief opened door.

■ Stabilator failed in auto mode during cruise flight. Attempts to reset to auto mode were unsuccessful, so crew flew home in manual mode. Maintenance replaced stabilator actuator.

C12

Class C

F series

■ During ground taxi from parking, right-side prop assembly struck 50-pound wheeled fire extinguisher. Inspection revealed damage to right-side prop assembly and left-side engine cowling.

Class E

D series

■ During runup for training mission, left propeller gauge read 0 rpm. Aircraft was shut down without incident. Caused by failure of propeller rpm gauge.

F series

■ Crew began to notice acrid smell during cruise flight. As aircraft began initial descent for arrival, crew saw flames and smoke coming from between pilot's windshield and dash panel. Crew completed emergency procedure for electrical fire in flight, and fire ceased as master switch was turned off. Caused by faulty windshield heating element.

■ While in cruise at flight level 270 with an outside air temperature of -29°C and windshield heat in normal position, No. 1 windshield (outer) cracked from lower right corner to lower left corner and up right side to top right corner. Crew verified that checklist required no action and continued to home base and landed without further incident. Maintenance could not determine cause.

K series

■ No. 2 needle low light came on at 100 pounds in cruise flight. Crew initiated descent and, during crossfeed oscillations, light went out. Crew landed without further incident. Suspect check valve froze.

■ Front tire failed at about 100 KIAS during takeoff run. Crew aborted takeoff without incident. Suspect tire failure was due to repeated exposure to extreme cold temperatures. Tire broke bead from rim but did not separate or blow from rim.

C20

Class E

E series

■ After engine start, left alternator would not come on line, and mission was aborted. Caused by failure of left alternator converter.

F series

■ During normal engine start sequence, No. 1 start valve open indicator failed to display when start switch was depressed, and there was no indication of HP or LP rotation. Start attempt was aborted and mission terminated. Maintenance determined that several wires pulled loose from diode terminal block, breaking current path to engine starter.

J series

■ Pilot heard loud thud during cruise at FL 290 and discovered crack in outer windshield. Aircraft continued to home base and landed without incident. Maintenance could not determine cause for the failure, but windshield had been installed for 23 years.

C23

Class E

B series

■ During stall training, crew noted electrical odor in cockpit. Training was terminated and aircraft returned to airfield and landed without incident. Maintenance found and replaced resistor that had overheated.

■ Tire locked up on landing, and tire deflated during rollout. Aircraft came to safe stop without incident.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action message

AH-64-98-ASAM-02, 181526Z Dec 97, maintenance mandatory.

The FS 176 frame may develop cracks around the web holes and must be inspected. This frame was redesigned beginning with tail number 85-25351. This and subsequent-numbered aircraft do not require inspection.

The purpose of this message is to require a one-time visual inspection of the FS 176 frame on or before the next 10-hour/14-day interval; a recurring visual inspection of the FS 176 frame; scheduling of a one-time repositioning of the pitot and static lines; and a recurring eddy-current inspection on or before the next phase.

AMCOM contact: Mr. Howard Chilton, DSN 746-7271 (205-876-7271), chilton-hl@redstone.army.mil

Safety-of-flight message

UH-1-98-SOF-03, 221418Z Dec 97, technical.

Units have requested procedures to positively identify the 250-hour sliders manufactured by Collins when identification of cage code 0H0W5 is not possible. In many cases, the cage code was ink stamped and subsequently covered with paint. The 250-hour Collins sliders may be positively identified by serial number; verification by cage code is not required.

The purpose of this message is to provide serial numbers of subject sliders for positive part identification and to preclude unnecessary maintenance and disposal of serviceable repair parts.

AMCOM contact: Mr. Dave Scott, DSN 897-2068 (205-313-2068), scott-dc@redstone.army.mil

Safety-of-use message

SOU TACOM 98-01 to aviation units, 161937Z Dec 97, operational.

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

Let's share . . .

In Army aviation, we can't 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.

Send your war stories and other lessons learned to *Flightfax* at flightfax@safety-emh1.army.mil or call Ms. Sally Yohn at DSN 558-2676 (334-255-2676).

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Class A Accidents

through December		Class A Flight Accidents 97	Class A Flight Accidents 98	Army Military Fatalities 97	Army Military Fatalities 98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2		2	
	February	0		0	
	March	2		1	
3D QTR	April	2		2	
	May	1		1	
	June	3		0	
4TH QTR	July	1		8	
	August	0		0	
	September	0		0	
	TOTAL	12	5	14	2

U.S. ARMY SAFETY CENTER

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Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

MARCH 1998 ◆ VOL 26 ◆ NO 6

visit our web site • http://safety.army.mil

Everybody talks about it,

but nobody does anything about it.

No procedures exist that can guarantee safe flight through a thunderstorm . . .

Food for thought. Seven Class A flight accidents took 2 lives and destroyed 5 aircraft during the first 4 months of FY 98. Let us not forget that the difference between Class A and Class C accidents often can be measured in inches and seconds. Think about it.
—BG Burt S. Tackaberry, Commanding General, U.S. Army Safety Center

It's true that most people don't do anything about the weather, including, in some cases, Army aviators. Now, that's not to say we shouldn't be doing something. We might not be able to change the weather, but we can—and must—do some things about it. What we can do is respect it. And learn all we can about it. The unpleasant fact is that some of us haven't developed the professional respect we need because we haven't fully boned up on what adverse weather can do.

In the course of any day's flight, we could run into some kind of weather condition that could give us trouble and some anxious moments if we're caught unprepared. Even as you're reading this, some Army aviator somewhere is preparing to cope with an ominous mass of black clouds looming on the horizon. Or if it isn't a storm, it could be too many clouds and too little visibility. Or clear air turbulence. Or fog.

Staying on top of the weather business is a continuing challenge, but it's one all of us must meet. We must acquire enough professional knowledge to stay out of trouble, which is another way of saying we need a healthy respect for the weather.

Take thunderstorms. Read about them in any scientific journal and you'll find that they're a seething mass of forces caused by a variety of factors and that no two are ever alike. You'll read hair-raising facts about updrafts and downdrafts in excess of 65 knots, hailstones as big as golf balls, blinding rain, severe icing, lightning, and surface wind shears that can rip up an aircraft like confetti. You won't have to read much to reach the sensible conclusion that the inside of a thunderstorm is a good place not to be.

Inside a thunderstorm is a good place not to be.

Thunderbumper time's on the way

The months having the highest frequency of storms—June, July, and August—will be here before we know it. So it's not too early to give summertime flying some thought and review what we know about thunderstorms.

People who keep up with such things estimate that about 44,000 thunderstorms churn daily over the earth's surface, with at least 1800 in progress at any given moment. That adds up to a lot of lightning bolts, high winds, rain, hail, and vicious turbulence.

Since no aircraft can withstand the full impact of the tornadic forces often generated by thunderstorms, avoidance is the best policy. One of the best protections against encountering thunderstorms in flight is being forewarned of their existence. If available weather information hints at thunderstorm possibilities, if your weather forecaster confirms their existence, and if those clouds in the distance begin to look boiling, think again before making the "go" decision.

The best safeguard against thunderstorm flying is a thorough preflight weather briefing. But that's not enough by itself. Aviators must stay aware of what's going on weather-wise throughout every flight. For example, study the clouds. When billowy white "puffs" begin to increase in number and size, take heed. These clouds can change in form and become cumulonimbus, with varying degrees of turbulence, rain, lightning, and, sometimes, hail. Towering cumulus can change into a raging thunderstorm in just a few minutes. Excessive radio static may also indicate the approach of a storm.

One positive sign of a thunderstorm is the "roll cloud" that extends down from the main base of the storm. This highly turbulent cloud is located along

Another type of turbulence

Although turbulence caused by thunderstorms is the most violent variety, don't make the mistake of overlooking the turbulence associated with heat and terrain.

Heated air rises in the form of thermals, drawing cooler air along the ground. This air "boils" and "bubbles" as it flows over hills and hits peaks and ridges. Anticipating this kind of turbulence and knowing where you are most likely to encounter it can keep you on guard. Areas bare of vegetation, hilly or broken terrain, and an abrupt change from one kind of terrain to another all lend themselves to turbulence. Waving branches, smoke trails, and blowing dust serve as positive indicators that the air below is acting up.

the front and bottom of a violent thunderstorm. Its appearance means plenty of severe weather lies within the storm. An aircraft flown too close to a roll cloud could be inadvertently hurled into the storm. The possibility of this happening is greatest at night or when the roll cloud is hidden behind other clouds surrounding the storm. While radar can provide a picture of what lies ahead, it's important to remember that clear air outside the clouds can contain severe turbulence that even radar cannot detect.

Unwary aviators who don't know about the roll cloud—which isn't always visible—have been known to try to avoid a storm by hedge-hopping under it. They've also been known to get flattened by the turbulence they wham into long before they think they're close enough to a storm for it to reach out for them.

When thunderstorms are associated with a frontal system, they may be organized in long bands that progress ahead of the front. These are commonly referred to as "squall line thunderstorms" and are the most intense thunderstorms imaginable. Squall lines usually appear in the late afternoon and last until dark or longer. No attempt should be made to climb over, slip under, or penetrate a solid squall line. Bear in mind that no procedures exist that can guarantee safe flight through a thunderstorm.

In addition, gusty surface winds and downdrafts that precede a thunderstorm can be exceptionally violent. Trying to take off or land when a thunderstorm is approaching an airfield is an extremely hazardous practice. Vortices, or tubes, of tornadic or near-tornadic intensity may be encountered in and under innocent-looking lines of clouds extending from thunderstorms. These vortices are invisible and may exist as far as 20 nautical miles from the associated thunderstorm. Sometimes their presence can be detected by noting dust-whirls over land areas or swirls on the surface of water.

When faced with deteriorating weather during flight, deciding the best course of action is not always easy. Can you safely circumnavigate the storm? Should you land at an alternate airfield? Or should you turn back? One important criterion that can help you reach the right decision is to ask yourself whether or not a decision to continue flight would rely to any degree on the element of chance to ensure your safety. If the answer is yes, then you'd better make another decision. And the importance of your decision cannot be emphasized too strongly. If you are to head for an alternate field or make a 180-degree turn, the time to do it is before you get caught inside a storm. Once trapped, you're committed to continue. There's no turning back.

When it comes to summer flying, you must stay constantly alert. And bear in mind that the only recommended and safe policy when confronted with thunderstorms is to avoid them.

As a general rule, suspect tornadic vortices any time a thunderstorm forecast includes the possibility of tornadoes.

A flashy show of force

Various terms have been used to describe lightning, but few capture the awesomeness of this natural phenomenon. It's hard to believe that several thousand shows of force are flashing at any one time somewhere in the world. They provide a spectacular show, particularly if you're in an aircraft.

Lightning can occur almost any time, but statistics show that lightning occurs most often in clouds, within about 5000 feet of the freezing level, in light rain and some turbulence, and within 8°C of the freezing level. Most lightning strikes on helicopters occur below 6000 feet, but some have occurred as high as 9000 feet. Rarely are aircraft struck when operating below 1000 feet agl.

The risk of a lightning strike injuring a person

onboard an aircraft is relatively insignificant. Possibilities include mild electric shock from the strike, and, more likely, temporary blindness from the flash. Such blindness usually occurs at night and lasts only 30 seconds or less. (It's interesting to note that night-vision devices will recover from a lightning flash even faster than the eye.)

There's a chance that a lightning strike could cause physical damage to an aircraft. Lightning is most likely to strike sharp or pointed areas such as wing and rotor tips, elevators, and rudders. Theoretically, a lightning bolt should pass through aircraft metal structures without causing damage. But it doesn't always, as is attested to occasionally by wrinkled, burned, and split aircraft skin, shattered structures such as radomes, and damage to wiring and electronic equipment.

The best protection against a strike is to avoid lightning altogether, and doing so isn't as difficult as one might think. Lightning rarely occurs without some or all of the following conditions being present:

- Clouds
- Precipitation, particularly icy types
- OAT near 0°C
- Progressive buildup of static
- Light turbulence
- Altitude between 10,000 and 15,000 feet

If combinations of these conditions cannot be avoided, take as many of the following actions as possible:

- Avoid areas of heaviest precipitation.
- Reduce airspeed to slow static buildup.
- Avoid freezing level by at least 8°C.
- Turn up cockpit lighting.

If a strike occurs, monitor equipment for malfunctions. In addition, if you encounter unforecast weather conditions, report them so that other aviators may be warned.

Thunderstorms: A quick review

- The safest course is away from the thunderstorm area. Go a few miles out of your way or land and wait it out if the shortest and most direct route is through the storm area.
- Lowering ceilings and rain showers may indicate thunderstorm activity.
- Don't be fooled by gentle winds and rain; you could be flying into the teeth of a thunderstorm.
- Excessive radio static is a sure sign of a thunderstorm in the area.
- Don't land or take off in the face of an approaching thunderstorm. A sudden gust front and associated low-level turbulence and wind shear could cause loss of control.
- Don't attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and wind shear under the storm could be disastrous.
- Destructive hail can be tossed from thunderstorms into adjacent clear areas. Bear this in mind if you're ever tempted to sneak between thunderstorms.
- Don't trust appearance to be a reliable indicator of the degree of turbulence inside thunderstorm.
- Avoid by at least 20 miles any thunderstorm identified as severe.

When in doubt, turn about.

The best pilot in the unit

As the commander continued the eulogy, I reflected on his statement and stared at the flag-draped casket in front of the altar. That mahogany box contained all that was left of "the best pilot in the unit"—precious little, since the accident site was a smoking hole in the side of a local mountain. He had missed clearing the ridge by only 10 feet.

Rumor had it that the cause was pilot error, but I couldn't buy that. Pilots of his caliber don't just fly into mountains. There had to be something else—an engine failure or loss of tail rotor. I was sure he had wrestled with the aircraft every inch of the way, trying to get it airborne and save his crew. If he couldn't save that helicopter, no one could.

He thrived on challenge. He did things I could only dream about. We both flew formation, but he could fly tighter. When flying low-level, he flew lower. He flew longer hours and took off in weather that kept me on the ground. His briefs and debriefs were just that—brief.

"Nobody ever learned about flying from talking about it," he said. He didn't believe in preflights—except on checkrides.

"This aircraft has had its daily, right?" he once asked me. "If it flew in, it'll fly out."

The XO was speaking now, recounting the time 6 months ago when the late pilot had won a medal for serving as officer in charge of a short-notice surge operation. He won all the accolades when he managed to target the high-value "enemy" unit without being detected. It had been a black, moonless night, and he had closed to within 2 miles by flying at 40 feet and 120 knots. I had flown earlier that night, but I wouldn't trust myself or the autopilot below 125 feet. It was all I could do to relax my death grip on the cyclic. But then, I wasn't him.

"Heck," I remember his saying later, "I could have gone 10 feet lower, but I thought my copilot would have a heart attack."

I also knew he had flown more than 50 hours during that 5-day period; he had even launched on an 8-hour mission without having slept in the previous 30 hours. But everyone knew he could handle it. When he wasn't flying, he was directing the action. He was that type of guy: He liked to manage everything. That's why he was always considered for the difficult tasks and why he always got the medals.

No one was going to miss him more than our maintenance officer. He had a reputation for getting the bird up no matter what. If the numbers were close, the plane was up.

"It's all in how you look at the gauges," he said. "Besides, some engineer has added a fudge factor." Many times, he completed a functional check flight well after official sunset.

"It's not *really* nighttime while it's still pink," he claimed. He was sure the commander would give him a waiver if he asked for it. It's not that he broke any rules. He just "bent" them a little.

Then there was the Air Medal. He launched in zero-zero weather—he had a special instrument card—to rescue an A-7 pilot who had ejected 15 miles off the coast. As it turned out, a Coast Guard cutter got there first and made the rescue. However, his basic flight instruments went "boots up" and the airmanship he demonstrated in getting back earned him the Air Medal. He later confided to me that in the rush to launch, he had skipped the checklists that would have probably caught the problem. Checklists were for people like me. He didn't need them.

I glanced at his wife in the front row, stoically listening to the service. His young son and daughter sat beside her, neither seeming to grasp the fact that they would never see their father again.

Checklists were for people like me. He didn't need them.

In the end, it was a day VFR hop that got him. He always flew a little too low and a little too fast in the valleys up the mountains. He was "training" for his upcoming deployment to a hot overseas area. Never mind that nap-of-the-earth was not our mission.

"When the balloon goes up," he always said, "your mission is whatever they tell you it is. You've got to be ready for anything."

That day, power required exceeded power available, the most basic of truths. He had pushed the envelope a little too far this time and didn't make it. He made a nugget's mistake—him, the best pilot in the unit.

"Ashes to ashes, dust to dust," the chaplain said. "From dust we came and to dust we shall return...."

Could I have prevented this? Could anyone? All the signs were there. What could we have done?

It suddenly occurred to me that the comment the commander had made in his eulogy was all wrong. The deceased was *not* the best pilot in the unit. The best pilot is the one who knows his limitations and doesn't push them. The best pilot understands that the rules are for everybody, not just the other guy. The best pilot in the unit is the one who adds that little margin of safety instead of taking it away.

The best pilot in the unit is the one who is still with us.

—adapted from an article by LCdr. Lawrence Downs, Jr., in *Approach*

Shortfax
Keeping you up to date

JP-8 +100 fuel-additive warning

The Air Force and Navy are operationally testing an experimental aviation jet-fuel additive commonly referred to as "plus 100." This additive is designed to increase the thermal stability of aviation jet fuel and reduce maintenance costs. However, the Army has not tested and certified the fuel for use in Army equipment. Therefore, Army aircrews obtaining aviation fuel at Air Force and Navy facilities must ensure that their aircraft are not refueled with aviation fuel containing the +100 additive. In addition, Army aviation maintenance personnel should ensure that fuel containing the additive is not allowed to enter into Army refueling or petroleum-distribution systems.

The JP-8 +100 fuel additive is still being field-tested by the Air Force; this field testing will not be completed until FY 2000. While the potential benefits of the +100 additive are important (less carbon buildup on engine parts and decreased maintenance), it can also have detrimental effects on fuel-distribution systems. The additive disarms filter separators, has a detergent effect on tank and piping surfaces that can increase fuel-filter plugging during initial use, and makes aqua-glo water detector and AEL free-water detector readings unreliable. In addition, there is currently no practical means to detect the presence of the +100 additive in aviation fuel.

Any activity inadvertently receiving aviation fuel with the +100 additive into an aircraft or refueling/distribution systems should contact the U.S. Army Petroleum Center immediately.

—Ms. Ileana Yost, U.S. Army Petroleum Center, DSN 977-6053/4392 (717-770-6053/4392), iyost@usapc-emh1.army.mil

Flightfax reader survey

Please help us keep *Flightfax* relevant to your needs by completing the questionnaire on pages 7 and 8. Return the survey by using the pre-addressed mailer on page 8, or fax it to Ms. Sally Yohn, DSN 558-9478/3743 (334-255-9478/3743).

Rotor-blade reminder

Fortunately, we don't have a lot of accidents in which people are injured by rotor blades. But when they do happen, they're usually serious. Even a momentary lapse of attention can be deadly to people who work near operating aircraft.

The most serious hazard is that of being hit by the main or tail rotor blades when approaching or leaving an aircraft while it's in operation. Following are a few reminders about what to do when you're near an aircraft with the rotors turning.

- Keep your head down when approaching a helicopter. Remember that the tops of the main-rotor blades droop when the engine is idling, so there's less clearance at the ends of the blades than at the rotor hub.
- Be especially careful if the ground slopes.
- Go around, not over, any obstructions on the ground.
- Approach helicopters with tail rotors from the side or—-preferably—45 degrees to the front, in view of the pilot and crew. Never approach from the rear. The tip of the tail rotor may be as little as 1½ feet off the ground.
- Except for CH-47s, go around the front, never around the rear, of operating aircraft.
- Approach CH-47s from the side or rear, never from the front. When operating, the forward rotor blades can be as little as 4 feet off the ground.

Flightfax
READER SURVEY

Return this questionnaire using the pre-addressed mailer on the back or fax it to Ms. Sally Yohn, DSN 558-9478/3743 (334-255-9478/3743).

Name (optional) _____ Rank/Grade _____

Duty status
___ Active Army
___ Army Reserve
___ Army National Guard
___ DA Civilian
___ Civilian contractor
___ U.S. Air Force
___ U.S. Navy
___ U.S. Coast Guard
___ Foreign ally
___ Industry
___ Other *(specify)* _____

Flight hours
___ Not rated
___ 1-500
___ 501-1000
___ 1001-1500
___ 1501-2000
___ 2001-2500
___ 2501-3000
___ 3001-3500
___ More than 3500

Duty assignment
___ Operational flying
  ___ Unit commander
  ___ Staff
  ___ Primary duty
  ___ Enlisted crewmember
___ Aviation safety
  ___ Unit
  ___ Division headquarters or below
  ___ MACOM
  ___ DA
___ Aviation staff
  ___ Unit
  ___ Headquarters

Duty location
___ CONUS
___ Outside CONUS

How often do you read Flightfax?
___ Every month
___ Every other month
___ Every 3 months
___ Rarely

How much of Flightfax do you read?
___ 100%
___ 75%
___ 50%
___ 25%
___ Less than 25%

Where do you read Flightfax?
___ Office
___ Home
___ Flight ops
___ Other *(specify)* _____

When do you usually receive Flightfax?
___ Early in the month it's dated
___ Mid month in the month it's dated
___ Late in the month it's dated
___ The month after it's dated

Have you visited the Army Safety Web Site?
___ Yes
___ No

How do you receive Flightfax?
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___ Through local distribution
___ I don't know

Do you have access to Flightfax on the world-wide web?
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___ Yes, at home
___ No

How would you prefer to receive Flightfax?
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___ Electronically (e-mail, web)
___ Other *(specify)* _____

Do you have e-mail at work?
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___ No

How do you use the information in Flightfax?
___ Topics for safety meetings
___ Topics for unit publications
___ Items for bulletin boards
___ Topics for directives
___ Items for reading file
___ To keep myself informed
___ Source of authority on safety issues
___ Other *(specify in Remarks section)*

Use this scale to rate each of the following.

None= 1 Low= 2 Medium= 3 High= 4 Extremely High= 5

Rate these Flightfax features in terms of their value to you in your current assignment.

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___ "War Stories" (Risk Management Lessons Learned)
___ Recap of aviation safety messages
___ "Shortfax" (Keeping You Up To Date)
___ Posters
___ Broken Wing Award recipients
___ Web site updates
___ Monthly Class A accident update
___ STACOM (flight standardization issues)
___ Seasonal articles
___ Life support equipment information
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Rate the overall quality of Flightfax.

Content

___ Accuracy
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___ Choice of topics
___ Credibility
___ Interest to Army aviation personnel
___ Timeliness

Layout

___ Appearance
___ Format
___ Illustrations
___ Readability

Rate the following safety publications in terms of their value to you in your current assignment.

___ *Flightfax*
___ *Countermeasure*
___ *Approach*
___ *Flying Safety*
___ *PS magazine*

Rate the following types of information in terms of your interest in and need for it.

___ In-depth reports of accidents, causes, and cures
___ Hazards, risks, and controls
___ Risk-management process
___ Maintenance topics
___ Accident rates
___ Statistical studies
___ Lessons learned
___ Technical information on equipment and systems

How can we improve Flightfax or make it more relevant to your needs?

_____

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Remarks _____

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Fold

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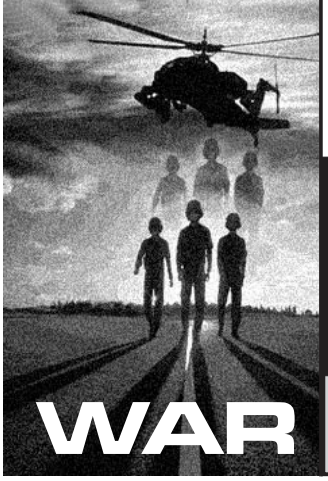

RISK MANAGEMENT LESSONS LEARNED

WAR STORIES

What's a show stopper?

I was recently asked the question, "What do you consider to be a show stopper?" After only a few minutes' thought, the following incident popped to mind.

We were on a training exercise during, of course, the best time of year—flu season in weather not conducive to living in a tent. The dreaded bug was working its way through the unit. We were conducting operations both day and night, and our sleep cycles were always being interrupted by movement through the tent. I should also mention that, as with most small-unit operations, we conducted all our briefings and rehearsals in that same tent. And, yes, even the troop TOC was in there.

Several of our pilots came down with the flu, requiring medical attention from the flight surgeon in the field. One of these pilots was a PC, and his illness resulted in several healthy pilots being unable to fly because they weren't PCs. One of these pilots was a platoon leader, so he had a vested interest in getting his sick PC up and running.

After about 3 days of recovery, the PC was convinced he was ready to go out and help win the war. After all, staying in the tent performing fire guard and TOC watch was not a lot of fun.

After receiving their briefing, the PC and the platoon leader headed out to get a little fresh air and some flight time. They did fine through the first and second fuel load. After a number of flight hours and much movement through the maneuver area, they became a little misoriented and decided to land and find themselves on the map.

While making a turn to land into the wind, the PC misjudged his altitude and flew into the ground. At that point, the two pilots were along for the ride. The good news was that they were able to crawl out of the wreckage and dust themselves off. The bad news was that we destroyed an aircraft that day. The aircrew and the aircraft were out of the fight for the rest of the exercise. But that wasn't the end of it. All of our aviation assets were put down due to the accident.

So, an ill pilot—even an ill PC—is not a show stopper.

A show stopper is a Class A accident.

—CW5 Mike Moorehead, Aviation Systems and Investigation Division, USASC, DSN 558-3703 (334-255-3703), moorehem@safety-emh1.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH64

Class B

A series

■ Suspected drive train overtorque during takeoff from field site resulted in Class B damage.

Class C

A series

■ During formation flight, smoke was seen coming from aircraft and SDC warning light came on. During emergency shutdown after landing, PC (rear seat) saw smoke in cockpit and directed the PI to egress. During shutdown, main rotor blades contacted aircraft, reportedly destroying one blade and the PNVS. No inflight or postlanding fire ensued. Incident is under investigation.

D series

■ Engine cowling door opened during training flight, and engine heat blanket was blown into main-rotor system. Three main-rotor blades were damaged; two will require depot-level maintenance.

Class E

A series

■ During slope operations in sod, utility hydraulic psi light and utility hydraulic low light came on, and utility pressure gauge went to zero. Aircraft was landed and shut down. On postflight, hydraulic manifold was almost empty, and hydraulic fluid was sprayed throughout TI catwalk.

■ No. 1 engine fire light came on at high hover. Crew landed and immediately pulled fire handle. After activation of fire bottle, light went out and aircraft was shut down. Inspection revealed no indications of fire. No. 1 engine fire bottle and firing equipment were replaced.

■ During warm refuel operation, IP heard series of loud reports. He at first thought that refuel personnel were tapping on his canopy for his attention, but then the APU failed, causing aircraft to experience hard shutdown. APU was replaced.

■ During preflight inspection, hole was found on outboard leading edge of tail rotor blade. Caused by FOD during confined-area operations at unimproved landing area.

CH47

Class E

D series

■ During external load operations, aircraft settled onto vertical exhaust snorkle of HMMWV. Fuselage skin sustained 6x12-inch tear.

■ During cruise flight at 140 KIAS, fuel gauge needle rotated backwards 360 degrees and fuel totalizer read 9700 pounds, which is more than aircraft holds. Maintenance replaced fuel quantity indicator.

■ No. 2 engine accelerated through ground to flight with ECL in ground. ECL was positioned to stop with no immediate response. When fire handle was pulled, torque went up to 109 percent on No. 2 engine; no other limits were exceeded. Maintenance replaced No. 2 N1 control box.

■ Crew detected high frequency vibration in combining transmission at 10-foot hover and on ground. Maintenance replaced combining transmission.

■ During postflight, PC discovered top transmission seal seeping. Flight engineer serviced transmission by adding oil. After next flight, maintenance determined that seal was leaking excessively due to fact that slider oil seal had not been installed during scheduled maintenance.

OH58

Class A

D(I) series

■ During multi-ship aerial recon mission, lead aircraft reportedly struck wires. One pilot sustained serious injuries; the other pilot was treated for minor injuries and released. Aircraft was reportedly destroyed. Investigation is in progress.

Class C

C series

■ During pinnacle landing, nose of aircraft pitched up. As PI applied forward cyclic to arrest pitch, one main-rotor blade contacted upper WSPS. Aircraft was shut down without further incident.

D(I) series

■ Aircraft drifted rearward during simulated hellfire-missile engagement. Main- and tail-rotor blades contacted trees during re-masking. Aircraft landed without further incident. Investigation is in progress.

■ Tgt rose sharply when aircraft was restarted about 30 minutes after uneventful maintenance test flight for rotor smoothing and subsequent blade adjustment. Pilot verified that throttle was still closed and continued to motor engine in attempt to cool it. Engine continued to engage even after the other pilot closed the fuel valve. Aircraft was shut down. Incident is under investigation.

Class E

C series

■ After 2.3 hours of flight and at engine idle, transmission chip light came on when attempt was made to run up aircraft to 100 percent. Aircraft was immediately shut down. Maintenance discovered that piece of transmission gear had broken off. Transmission was replaced.

D(I) series

■ During hover taxi for takeoff, PI stated that left pedal did not work. IP took controls and confirmed that left pedal inputs could not be made. IP reduced power and landed without incident. Maintenance found deformed cotter pin on control tube running through avionics compartment. Suspect it snagged on soundproofing.

■ Left door came off in flight. Door was replaced.

TH67

Class B

A series

■ During hover to takeoff point, rpm

was lost and nose pitched forward. IP applied aft cyclic to arrest pitch, and tail rotor hit ground. Aircraft initiated spin, IP fully lowered collective, and aircraft came to rest upright. Tail boom was nearly severed just forward of 90-degree gearbox, main transmission deck buckled, and undercarriage was damaged. Accident is under investigation.

Class E

A series

■ Circuit breaker popped during engine start. IP reset it, but it popped again within 5 seconds, this time accompanied by strong electrical smell. Maintenance replaced condenser blower assembly.

UH1

Class E

H series

■ Master caution light came on during takeoff, followed by engine chip light. Engine oil pressure light then came on, followed by engine overspeed. Crew performed emergency governor operations and, as they began to descend, engine N2 went to zero indicated and engine failed at 100 feet agl. PC put aircraft into autorotation and impacted ground with no visible damage.

■ During taxi, high-pitch sound was heard from transmission area. Aircraft was landed and shut down without incident. Maintenance replaced main inverter.

UH60

Class C

A series

■ Postflight inspection following confined-area operations revealed damage to three main rotor blade tip caps.

K series

■ Aircraft was in hot refuel point prior to maintenance test flight. At about 1400 pounds indicated fuel in main tanks, loud sound was heard in cabin area. PC noticed that No. 1 auxiliary fuel cell was seeping fuel and that both auxiliary fuel cells were unusually swollen. Refuel operations were immediately ceased. Aircraft was taxied back to parking, and test flight was terminated. Cause not reported.

■ On approach to building at MOUT site at night, aircraft tail boom contacted building. Tail boom was dented just forward of tail wheel and stringer was cracked.

Class D

A series

■ Aircraft was at 100-foot-agl hover when rescue hoist training weight began to oscillate while crew chief was reeling it in. Oscillation increased as load got closer to aircraft, but crew chief continued to reel it in. Load struck bottom of aircraft twice before cable snapped. Damage consisted of two large dents, one under the fuel cell on No. 1 side and the other on and around the ADF loop antenna.

■ Brakes were set when aircraft touched down during roll-on landing at 55 KIAS. Both main landing gear tires blew as IP applied collective pitch to begin go around. Aircraft was hover taxied to parking without further damage.

■ IE turned on de-ice when aircraft entered IMC. Crew soon noticed five cracks forming at top of windscreen. Aircraft landed without incident, and maintenance replaced windscreen.

Class E

A series

■ Crew heard rumbling and felt vibration through cyclic, collective, and seat during landing. After normal shutdown, maintenance found excessive amount of oil/lubricant on rotor cabin top. Source of fluid is unknown.

■ During landing on parking pad after 1.5-hour flight, No. 2 engine shut down. Crew completed emergency shutdown and exited aircraft due to smoke coming from exhaust and intake. Caused by ECU failure.

C12

Class D

F series

■ During taxi, left wing contacted right wing of another C-12 that was conducting stationary engine runup checks. Both aircraft were taxied to parking and shut down without further incident. Inspection revealed damage to left position light lens and vertical position light glare shield of first C-12 and damage to the right position light lens and two rivets along a stringer of the other.

■ During descent and approach for landing, aircraft was struck by bird. Aircraft landed without further incident.

■ During postflight inspection, maintenance discovered damage to left wing on outboard side of stall warning vane. Crew had neither heard nor felt any indication of bird strike. Stall warning vane and mounting doubler were repaired, and deice boot was replaced.

Class E

F series

■ During cruise flight, right prop rpm gauge started fluctuating with no change in noise or engine torque. Propeller rpm gauge continued to decrease and bounce between 300 and 500 rpm. Crew aborted mission and returned to airport. Caused by tachometer generator failure.

■ During taxi for takeoff, excessive pressure on rudder pedals was required to steer aircraft. Mission was aborted. Caused by failure of solenoid on rudder boost.

O5

Class E

DHC-7

■ During climbout, cabin over-pressurized to below sea level at a rate of 2,000 fpm. Crew dumped cabin pressure using auto-dump switch. Flight continued unpressurized. Trouble-shooting revealed faulty cabin pressure controller.

■ During engine start, starter would not engage when No. 2 engine was selected. Troubleshooting revealed faulty engine start panel.

■ After passengers unloaded, ground crew noticed hydraulic fluid on No. 3 engine nacelle. Maintenance found pin-hole leak in spoiler hydraulic line. 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

Aviation safety-action message

C-12-98-ASAM-01, 141309Z Jan 98, operational.

In August 1997, C-12-97-ASAM-03 was issued to temporarily restrict use of the KLN-90B GPS for instrument approaches. A problem was identified that could affect course accuracy during GPS approaches at some airports. Allied Signal has since issued database cycle 9708, which masks the problem airports so that they are not available for selection and approaches using the KLN-90B. A permanent correction is forthcoming.

The purpose of this message is to notify C-12 operators of a potential hazard to flight and relieve the restriction of C-12-97-ASAM-03 if database cycle 9708 or subsequent is incorporated in the KLN-90B GPS.

AMCOM contact: Mr. Ron Price, DSN 788-8638 (205-842-8638), price-sf@redstone.army.mil

Safety-of-flight messages

AH-64-98-SOF-01, 271945Z Jan 98, operational.

The extended range fuel system (ERFS) was developed for self-deployment and ferry flights. Its increased mission capability has encouraged commanders to integrate it into daily operations and mission-essential tasks. However, use of ERFS carries an increased risk to flight crews and passengers. These risks include decreased maneuverability, performance, and responsiveness and increased possibility of postcrash fuel spill and fire.

An Army Safety Action Team (ASAT) convened 12 December 1997 and assessed the current risk of ERFS as "high." This is a joint U.S. Army Aviation Center and U.S. Army Aviation and Missile Command message implementing the recommendations of the ASAT to mitigate the risk of using ERFS.

The purpose of this message is to specify the decision-making process and minimum risk-control measures to be used when authorizing flight with fueled ERFS external tanks and provide authorization for fueled ERFS operations/training in the AH-64.

The message outlines correction procedures in three sections. The first contains mandatory risk-management and ERFS-equipped-aircraft flight-approval procedures. The second contains specific training information. The third contains information specific to the aircraft and the tanks.

USAAVNC contact: Mr. Gerald Smith, DSN 558-9006 (334-255-9006), gerald_smith@rucker-emh4.army.mil

AMCOM contact: Mr. Dave Scott, DSN 897-2068 (205-313-2068), scott-dc@redstone.army.mil

UH-60-98-SOF-01, 271945Z Jan 98, operational.

See AH-64-98-SOF-01 above.

USAAVNC contact: Mr. Walt Garner, DSN 558-1866 (334-255-1866), walt-garner@rucker-emh4.army.mil

AMCOM contact: Mr. Dave Scott, DSN 897-2068 (205-313-2068), scott-dc@redstone.army.mil

POV-fatality update through January

- No seatbelt
- Speed
- Fatigue

No new causes, just new victims.

FY98 = 39

FY97 = 22

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Class A Accidents through January

		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	2	2	0
	February	0		0	
	March	2		1	
3D QTR	April	2		2	
	May	1		1	
	June	3		0	
4TH QTR	July	1		8	
	August	0		0	
	September	0		0	
	TOTAL	12	7	14	2

U.S. ARMY SAFETY CENTER

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Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

APRIL 1998 ◆ VOL 26 ◆ NO 7

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DIGITAL SOURCE COLLECTORS: Where they came from, where they're going

Food for thought. *Historically, human performance has been a factor in 80 percent of all aviation accidents, both military and civilian. The human factor in accidents is one thing digital source collectors have the potential to reduce. The DSC is an asset that provides valuable assistance in accident investigation. But more importantly, it provides commanders a training resource to ensure "command presence" on all flights and a maintenance tool to reduce maintenance costs.*

—BG Burt S. Tackaberry, Commanding General, U.S. Army Safety Center

The IP announces over the intercom, "Simulated engine failure."

You think to yourself, "No problem." It's your APART checkride, and you've expected this. You smoothly but deliberately reduce collective, scan the instruments, and then look outside for a place to land. You quickly determine that you're going to have to do an autorotation with turn. Again, no problem. You have more than 200 hours in the aircraft and know exactly what to do. Everything is going fine when, all of a sudden, the master warning audio and light come on.

What's wrong? You've done everything right. The IP takes the controls, telling you that you've had an engine NP overspeed. He declares a precautionary landing and safely lands the aircraft.

There was a time when such an incident would have resulted in routine replacement of a $37,000 engine module. However, this aircraft was equipped with a digital source collector (DSC), and the data retrieved from it assured maintenance personnel that there was no need to replace the engine module. As an added bonus, the DSC showed that there were no crew-coordination problems.

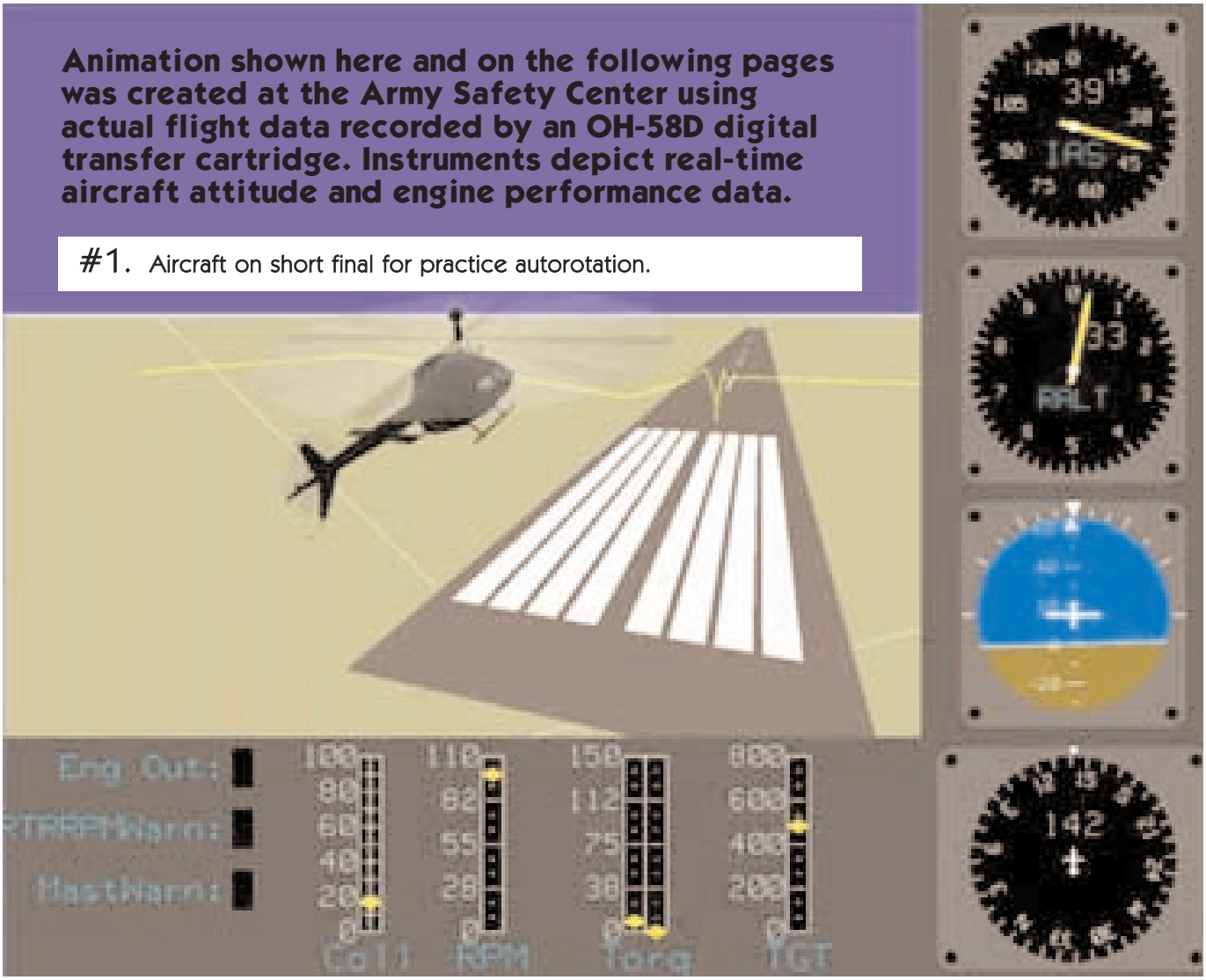
A bit of history

The Army's Digital Source Collector Program began in 1986 when, in response to a series of suspected flight-control problems in the UH-60A, the Army Chief of Staff directed procurement and installation of flight-data recorders (FDRs) in the Black Hawk fleet. By 1987, a commercially available tape-type interim crashworthy FDR (ICFDR) had been installed on 196 UH-60A aircraft. The program gathered flight data for several years and assisted in more than a few accident investigations. However, the ICFDR was heavy, and it was installed in the tail section, which made data retrieval difficult. Over time, the Army stopped funding the program.

In 1991, the Army Aviation Center, PEO Aviation,

Animation shown here and on the following pages was created at the Army Safety Center using actual flight data recorded by an OH-58D digital transfer cartridge. Instruments depict real-time aircraft attitude and engine performance data.

#1. Aircraft on short final for practice autorotation.



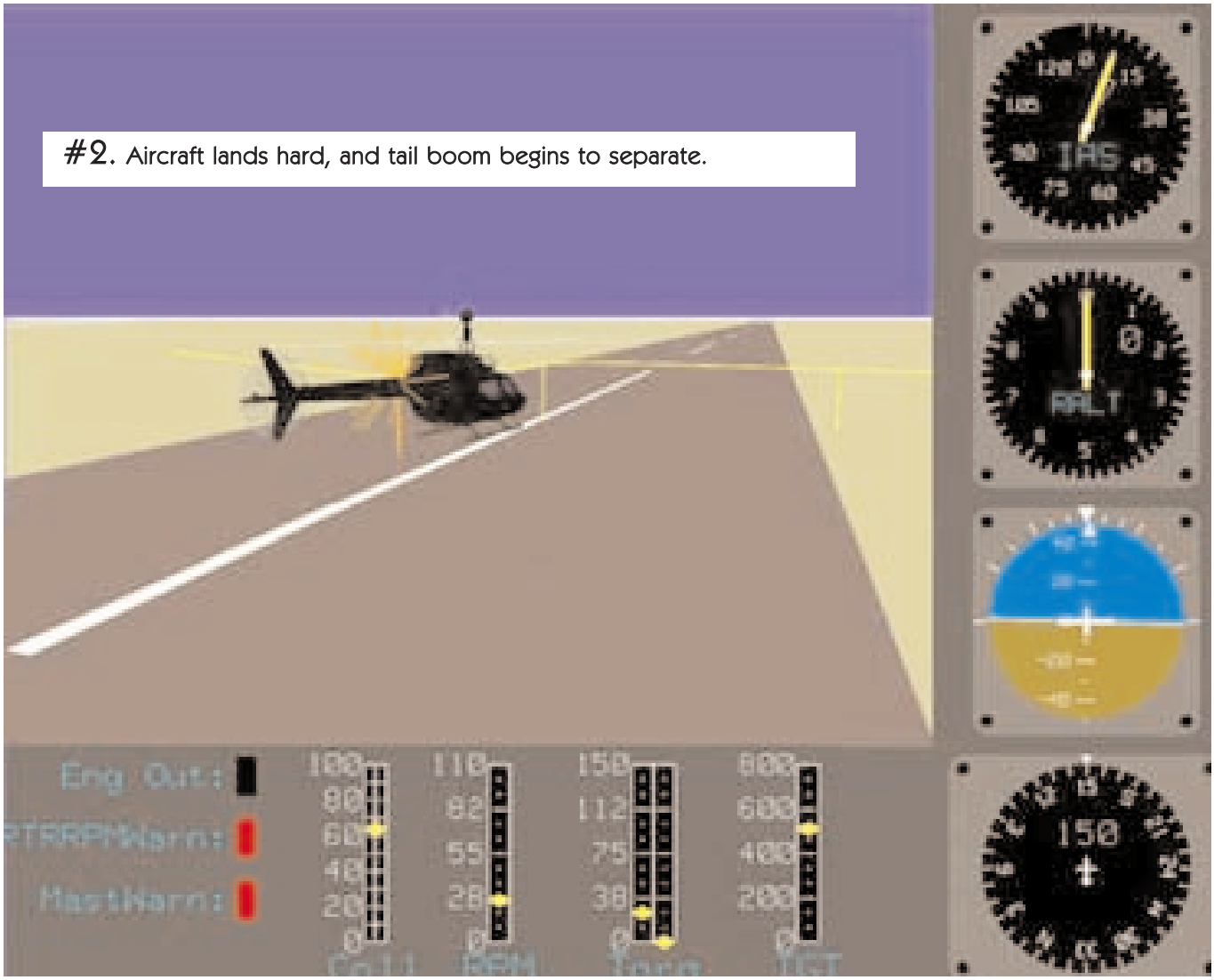
ATCOM (now AMCOM), and the U.S. Army Safety Center established a unified approach to acquiring and fielding a solid-state FDR for the Army's front-line combat aircraft: OH-58D(I), AH-64A, MH-60K, MH-47E, and AH-64C/D. Within a year, though, an executive steering group (ESG), realizing that FDR technology had leapt far beyond the scope of the original contract, terminated the contract for a solid-state FDR.

The next step was to study the feasibility and benefits of a flight data/maintenance recorder (FD/MR). The ESG wanted to know whether or not an FD/MR could provide maintenance prediction and diagnostics as well as support accident investigation. The study found that, while an FD/MR approach would result in significant cost savings, the Army lacked the necessary infrastructure to use FD/MR data. The conclusion was that fielding of a solid-state FDR should not wait for development of an FD/MR infrastructure.

During the summer of 1994, PM OH-58D and Safety Center demonstrations at Fort Rucker showed that an off-the-shelf solid-state FDR could successfully record required flight data in Army aircraft without an expensive and heavy installation package. The Navy and Coast Guard have since completed similar efforts and entered into contracts to field new-generation solid-state FDRs. In May 1995, an FDR Joint Service Process Action Team (JPAT) was chartered to promote inter-service cooperation, standardization, interoperability, information exchange, and support for FDR data reduction, analysis, and presentation system development.

During the spring of 1995, the program manager for aircrew integration systems (PM ACIS) requested that a program be developed to install a limited number of solid-state FDRs on OH-58D(I) helicopters at Fort Rucker. About the same time, the Army aviation leadership coined the term "digital source collector" to capture the full spectrum impact of maintenance, training, human-performance, and accident-investigation uses of FDR data.

A team composed of representatives from PM



ACIS, PM OH-58D, the Army Aviation Center, the Army Safety Center, and ATCOM was created to develop the program. Called the "DSC Demonstration Program," the effort is ongoing and is being funded by PM ACIS. The effort includes installation of DSCs on 20 aircraft: 6 OH-58D, 3 AH-64A, 5 UH-60A/L, and 5 CH-47D helicopters and 1 C-12 fixed-wing aircraft. In addition, PM Night Vision/RSTA supports the DSC Demonstration Program through installation of the ANVIS-HUD on UH-60A/L and CH-47D aircraft. The DSC and ANVIS-HUD installations will demonstrate a simple and inexpensive method of recording limited flight data.

Looking to the future

The Army's FDR Program includes all recorders—solid state and tape type—on all Army aircraft. The list includes—

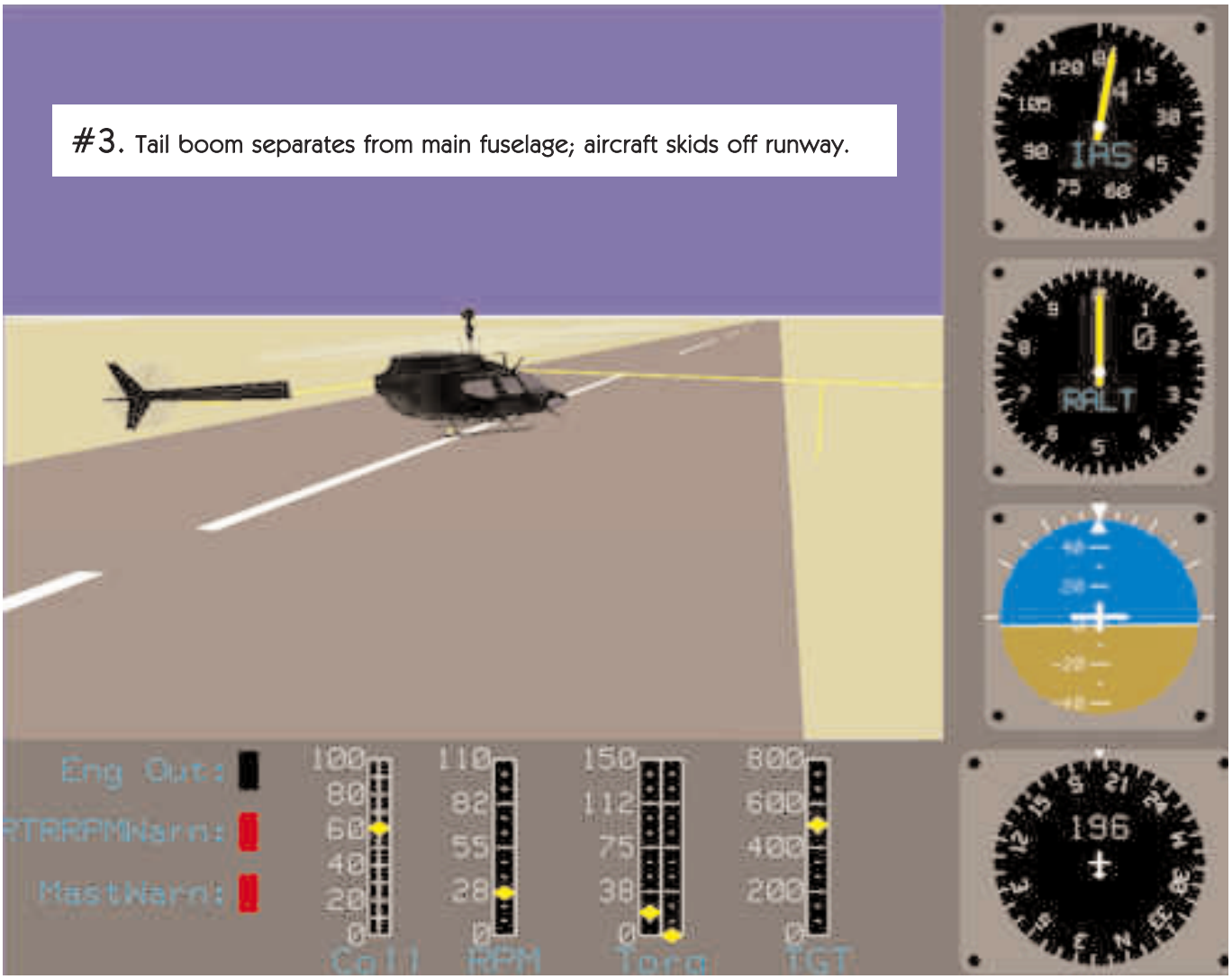
- The Digital Transfer Cartridge (DTC) on the OH-58D Kiowa Warrior.
- The Smiths Voice and Data Recorder on special ops and DSC Demonstration Program aircraft.
- The Fairchild Cockpit Voice Recorder on fixed-wing aircraft.
- The Strategic Technology System Maintenance Data Recorder being installed on the AH-64D Longbow Apache.

The Army Safety Center is working on the capability of downloading all these recorders. What will this mean to users in the field? Once a recorder is downloaded, the Safety Center will be able to animate flight data and even recreate actual flights. The resulting images could then be transferred to videotape.

A series of articles in upcoming issues of *Flightfax* will highlight each of the four types of recorders, with emphasis on information relevant to the user.

—Mr. Jody Creekmore and Mr. John Mainwaring, Research Analysis and Maintenance, Inc., prime contractor on DSC Demonstration Program, DSN 558-2259/1178 (334-255-2259/1178), creekmoj@safety-emh1.army.mil, mainwarj@safety-emh1.army.mil

About the authors: Both are graduates of the United States Military Academy and provide the Army Safety Center engineering and mishap-investigation support involving DSCs.



A look at official messages

Safety-of-flight (SOF) messages and Army safety action messages (ASAMs) are mandatory directives that must be complied with by all users identified in the message. However, some of them offer commanders the opportunity to share in the ultimate risk decision based on their unique mission profiles.

It is impossible for every hazard associated with every mission to be included in a single message. Therefore, in addition to complying with the direction contained in official messages, commanders at all levels should dissect each and every one, and apply the risk-management process from their own mission perspective.

Very few messages identify hazards and risk levels, although we know that, in general, SOF messages mitigate medium to high levels of risk and that ASAMs deal with low risk levels (AR 95-1). One recent SOF message provides an excellent example of how commanders should apply the risk-management process to an official message.

An Army Safety Action Team (ASAT) determined that use of fueled extended-range fuel systems (ERFS) on UH-60 and AH-64 helicopters was a high-risk hazard. The resulting SOF message informed commanders that this high level of risk would exist in any operations with fueled ERFS. The SOF instructed the chain of command to apply the risk-management process at all levels to reduce the high level of risk.

This message made it clear that not all hazards and controls had been identified. It mandated that all levels of command identify their own residual hazards and develop the controls they deemed necessary to reduce the risk level to meet local requirements.

Aviation commanders have a valuable asset to assist in applying the risk-management process to messages—their aviation safety officer (ASO). School-trained ASOs have been trained in risk management. Accident prevention is the ASO's major duty, and he or she can serve as the organization's "honest broker" who can assist and advise the commander on all matters of concern—even official messages. At the very least, the ASO can assess the controls identified in the message to determine if they are sufficient for the unit's mission profile. Being intimately familiar with unit missions, the ASO can identify hazards, assess risks, develop sound controls, and make recommendations that are tailored to the unit's particular and unique missions. For this reason, commanders should consider including the unit ASO in their official message distribution list.

Users Armywide should automatically apply the risk-management process to every message—not only to those that specifically require it. As we do so, we'll create a safer environment for this very risky business we're in.

—MSG Ruben Burgos, Aviation Systems & Investigation Division, USASC, DSN 558-3650 (334-255-3650), burgosr@safety-emh1.army.mil

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.

■ *CW2 Gerald A. Carroll*

Kentucky Army National Guard
Frankfort, KY

CW2 Carroll was at the controls of one of seven UH-60s being ferried cross country for annual training. Weather required that all crews file IFR and maintain a 15-minute en route separation. The first two legs were completed without incident.

After refueling and completing a through-flight inspection, CW2 Carroll took off on the third leg at 1545. ATC instructed him to climb to 9000 feet msl.

About 5 minutes after leveling off at the assigned altitude, the crew heard a loud grinding noise coming from the vicinity of the No. 2 engine. After 5 to 7 seconds, the grinding noise stopped, followed by an explosion. The low-rotor warning horn activated immediately, followed by loss of Nr signal. In addition, the No. 2 hydraulic pump, main transmission oil pressure, chip RH input module, chip main module sump, No. 2 main generator caution, and backup pump advisory lights illuminated. The transmission pressure then fell to zero.

CW2 Carroll lowered the collective to full down while adjusting airspeed for autorotational descent. The PC retarded the No. 2 PCL to idle, set the transponder to emergency, and made a call on UHF guard frequency that the aircraft was experiencing transmission problems and was in emergency descent.

ATC responded that an airport was about 6 miles away at their 6 o'clock position, and CW2 Carroll turned right toward that location. A broken layer of clouds was at 5000 feet, but there was a clear area large enough to see to the ground and maneuver the aircraft to the airport. Due to loss of transmission oil pressure, CW2 Carroll continued his autorotational descent to keep the rotor aerodynamically loaded in case the main transmission seized. He maintained rotor rpm by visual observation of the tip path plane, comparison of rotor and engine noises, and by "feel."

Upon reaching 2000 feet with a rate of descent of 3000 fpm, CW2 Carroll maneuvered the aircraft from an extended left base for a 270-degree runway landing at the uncontrolled airport. As the aircraft descended through 500 feet, he prepared for a touchdown 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, he initiated a cyclic flare 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.

Postflight inspection revealed catastrophic failure of the right input module, loss of all transmission oil, and damage to the airframe and main rotor system due to exploding debris from the input module.

■ *CW4 Dennis P. Hallada*

Michigan Army National Guard
Grand Ledge, MI

CW4 Hallada was pilot in command of an AH-1F on the second leg of a cross-country ferry flight. He was in the front seat, 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. Fearing that the engine would fail before he could reach the nearest airport 4 miles away, CW4 Hallada initiated a clearing turn to search for a suitable landing area. About 10 to 15 seconds later, he 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.

During the prelanding check, CW4 Hallada 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. CW4 Hallada entered

autorotation and continued the turn to land with the flow of traffic. He 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.

Time from onset of the emergency to landing without damage or injury was less than 90 seconds.

■ CW2 Drew R. Holt

4-227th Aviation Regiment, 1st Cavalry Division
Fort Hood, TX

CW2 Holt was administering an APART and NVG currency checkride in a UH-60A. Just after the PI (left seat) performed an NVG takeoff, as the aircraft turned onto the downwind leg and climbed through 400 feet agl, the crew lost visual contact with the ground. CW2 Holt radioed the tower that they were entering IMC and took the controls from the PI.

As CW2 Holt initiated a level climb, the PI removed his NVGs, turned the transponder to emergency, and radioed flight operations of the emergency. ATC transitioned the aircraft to conduct the ILS approach.

During descent on final approach, CW2 Holt regained visual reference at about 400 feet agl. When the aircraft reached 20 feet at 40 knots in preparation for landing, the No. 1 tail rotor drive shaft sheared, causing loss of directional control. The aircraft suddenly began an uncommanded right spin.

CW2 Holt "worked" the tail rotor pedals to diagnose the situation but received no response, and the right spin accelerated. Realizing he had lost his tail rotor, he told the PI to shut down the engines. The rate of spin then decreased. The aircraft struck the runway upright and turning, then flipped onto its right side. All three crewmembers walked away.

■ CW2 James B. Smith

Louisiana Army National Guard
New Orleans, LA

CW2 Smith was the IP on a VFR training flight in a UH-1H. During cruise at 5500 feet msl and 100 knots, the aircraft yawed left, and the rpm warning light illuminated. With the rpm audio sounding intermittently, CW2 Smith immediately took the controls and lowered the collective. N1 fluctuated at approximately 80 percent, and N2 tachometer indications were at first erratic and then went to zero. Concluding that the engine was still operating and believing that the N2 tachometer had failed, CW2 Smith increased collective, but rotor rpm decayed to 260. He immediately lowered collective, and rpm slowly returned to normal range.

At 3500 feet msl and 100 knots, after confirming that the throttle was open, CW2 Smith placed the governor switch into the emergency position, but N1 did not change. At that time, he began a descent toward what appeared to be an open field.

At about 1800 feet msl, CW2 Smith determined that the field was unsuitable due to thick brush and small trees. He decided to land to a road parallel to the field. Avoiding wires on the west side and tree branches overhanging the east side of the road, he managed to land the aircraft safely. The only damage involved dents from 1- to 2-inch branches hitting the bottom of the main-rotor blades.

■ CW2 Robert N. Smith

B Company, 1-212th Aviation Regiment
Fort Rucker, AL

CW2 Smith was conducting an out-of-ground-effect hover check over a tactical training site with a rated student pilot at the controls of an OH-58C. During the ascent portion of the maneuver, the aircraft drifted slightly over the trees and climbed to 110 feet agl, placing it about 50 feet above the highest obstacle. As the student began a left-pedal turn, the aircraft began a series of uncommanded 30- to 40-degree yaws with corresponding uncommanded changes in altitude due to engine surges. N2 was fluctuating from 100 to 65 percent. CW2 Smith took the controls just as the aircraft began a series of violent yaws and started settling toward the 40- to 50-foot trees. After initiating emergency procedures for engine surges, he began maneuvering the aircraft toward an open field about 150 feet away. Using throttle and collective, he was able to maintain control until clearing the trees, at which time the aircraft was yawing violently more than 60 degrees and he was no longer able to maintain control under reduced power conditions. He closed the throttle and executed an emergency low-level, low-airspeed autorotation. At about 20 feet, he applied aft cyclic to zero out forward airspeed and applied sufficient collective at 10 feet to reduce his rate of descent in preparation for landing to a 7-degree slope. He landed the aircraft without damage or injury. Elapsed time from onset of the emergency to termination was 15 to 20 seconds.

Shortfax
Keeping you up to date

Attention UH-1 users

In a 25 February 1998 AMCOM message, PM Utility Helicopters updated the status of restrictions on UH-1 aircraft with T53-L-13B (P/N 1-000-060-22) installed engines. Following is a summary of that message.

Background

SOF message UH-1-98-02 (TB 1-2840-229-20-13), issued 21 November 1997, imposed restrictions on all UH-1 aircraft with T53-L-13B engines installed. That action was taken as a result of continuing failures of the T53 N2 drive train.

Update

From August 1996 through January 1998, 22 spur-gear-related mishaps occurred—1 Class B, 2 Class C, and 19 Class E. At current optempo, we can expect an average of 1.25 to 1.50 mishaps per month to occur.

A T53 Blue Team was formed at AMCOM in December 1997 to identify and isolate the root cause of the failures and develop an action plan to lift flight restrictions as soon as possible. The Blue Team's activities to date and emerging results are as follows:

■ The spur gear failure is caused by a high-cycle vibration that induces high strain levels within the gear, resulting in a fracture. Testing is ongoing to isolate the source of the vibration. Although the source is still unknown, there is high confidence that it is within the engine itself.

■ Potential corrective actions to safely lift flight restrictions are being evaluated. At this time, no action that can be implemented by field units has been deemed sufficient to relieve flight restrictions. Several approaches, to include replacing the N2 spur gear with an original-equipment manufacturers part and nondestructive testing of the carrier assembly, are apparently being marketed as means to lift flight restrictions. **None of these are approved for use by Army units.**

■ No quick corrective actions are anticipated. Best estimates are that corrective actions will begin implementation in 6 to 12 months and that implementation across the entire UH-1 fleet will take 18 to 24 months.

On 17 February 1998, an Army Safety Action Team (ASAT) met to review the status of Blue-Team efforts and consider additional action that may be required. Based upon the data presented there, a follow-on session with Aviation Center, Army Safety Center, AMCOM, and selected operational users was conducted to consider AMCOM's draft system-safety risk assessment and address alternative courses of action. Attendees discussed modification of current flight restrictions, and a revised SOF message is expected to be issued shortly. In addition, a video is being produced to provide information on the failure mode, how to recognize it in flight, and proper procedures to follow when it occurs. That tape will be available to augment unit aircrew training.

POC: Mr. Wally Newcomb, APM UH-1, AMCOM, DSN 645-8769 (205-955-8769), newcomb-wb@redstone.army.mil.

AMCOM points of contact

The U.S. Army Aviation and Missile Command (AMCOM) is now located at Redstone Arsenal, AL. The mailing address for all AMCOM correspondence is Commander, USAAMCOM, ATTN: (office symbol), Redstone Arsenal, AL 35898. The office symbol for aviation-specific issues is AMSAM-SF-A.

Safety-office

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■ **UH-60:** Mr. Ed Goad, DSN 897-2095 (256-313-2095), goad-er@redstone.army.mil

■ **OH-58, fixed wing, UAV:** Mr. Ron Price, DSN 788-8636 (256-842-8636), price-sf@redstone.army.mil

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■ **CH-47:** Mr. Teng Ooi, DSN 897-2094 (256-313-2094), ooi-tk@redstone.army.mil

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■ **SOF/ASAM-compliance responses:** Address e-mail to safeadm@redstone.army.mil. Send postal mail ATTN: AMSAM-SF-A (SOF Compliance Officer). (Note that the message and mailing addresses differ from those in AR 95-1, chapter 6). Data fax number is DSN 897-2111 (256-313-2111).

■ **Aviation safety officer:** Mr. John Kavanaugh, DSN 897-2101 (256-313-2101), kavanaugh-jw@redstone.army.mil

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Maintenance bulletin board system (BBS)

The BBS operator is Ms. Sybil Johnson, AMCOM Operations, AMSAM-MMC-RE-FD, DSN 746-0723 (256-876-0723), johnson-sd@redstone.army.mil. Individuals may access safety-of-flight and aviation-safety-action messages and other aviation maintenance information via the BBS. The BBS is also available to transfer data. Use a file transfer protocol (FTP) or dial-up modem to electronically access the BBS. The FTP address is 136.205.224.141. To access the BBS via modem, set modem software for 8-bit, no parity, one-stop bit, and either 9600, 2400, or 1200 baud rate. The phone number to access the BBS is DSN 897-9057 (256-313-9057). Use the log-in (lowercase letters) "guest"; no password is required. The BBS is operational 24 hours a day.

Other

■ **2410 hot line:** Mr. Willis Lucero, AMCOM Operations, AMSAM-MMC-RE-FD, duty hours DSN 897-2410 (256-313-2410), after hours DSN 788-6091 (256-842-6091), fax DSN 897-2075 (256-313-2075), data2410@redstone.army.mil

■ **Crashed, deteriorated, and retired aircraft (CDRA):** Mr. John Zuber, AMSAM-MMC-RE-FD, DSN 788-0860 (256-842-0860), fax DSN 746-4904 (256-876-4904), zuber-jw@redstone.army.mil

■ **2408-19-3 reporting:** Ms. Judy Lynn, AMSAM-MMC-RE-D, DSN 788-6705 (256-842-6705), fax DSN 788-7004 (256-842-7004), data2410@redstone.army.mil

■ **Specialized repair activities (SRA):** Mr. Ken Hudson, AMSAM-MMC-RE-FD, DSN 897-1658 (256-313-1658), fax DSN 788-6665 (256-842-6665), cfo@redstone.army.mil

■ **DA Pam 738-751:** Ms. Ann Waldeck, AMSAM-MMC-RE-FF, DSN 746-5564 (256-876-5564), fax DSN 746-4904 (256-876-4904), waldeck-ab@redstone.army.mil

■ **Home page:** http://www.redstone. army.mil/

■ **Safety home page:** http://www.redstone.army.mil/safety/home.html

■ **Quarterly summary of ASAMs and SOF messages:** May be accessed via the safety home page. Text of individual messages reside in the maintenance BBS (see instructions above).

■ **Command operations center:** Operational 24-hours a day to help resolve aviation- and missile-related problems. DSN 897-2066/2067 (256-313-2066/2067), fax DSN 788-8176 (256-842-8176), amsamcoc@redstone.army.mil

POC: Mr. Jim Wilkins, AMCOM, DSN 897-2098 (256-313-2098), wilkins-jk@redstone.army.mil

1997 AAAA awards

Congratulations to the 1997 Army Aviation Association of America national award winners.

■ **Outstanding Aviation Unit of the Year (Active):** 1st Battalion, 1st Aviation Regiment Aviation Brigade, 1st Infantry Division, APO AE 09250. LTC John M. Kelley, commander; CSM Donald K. Henry, senior NCO.

■ **Outstanding Aviation Unit of the Year (ARNG):** 126th Medical Company (AA), Mather, CA. MAJ Manuel Anthony Lascano, commander; 1SG Eugene Joe Baker, senior NCO.

■ **Outstanding Aviation Unit of the Year (USAR):** B Company, 6-52nd Aviation (TA), Dobbins AFB, GA. 1LT Michael J. Livatino, commander; SPC Zachary K. Taylor, senior NCO.

■ **Army Aviator of the Year:** CW4 Michael E. Sheldon, D Troop, 1st Squadron, 10th Cavalry Aviation Brigade, 4th Infantry Division, Fort Hood, TX.

■ **Aviation Soldier of the Year:** SPC Michael R. Swingle, D Company (AMC), 82nd Aviation Brigade, Fort Bragg, NC.

■ **James H. McClellan Aviation Safety Award:** CW4(P) John H. Aberg, 160th Special Operations Aviation Regiment (Airborne), Fort Campbell, KY.

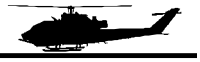
■ **Robert M. Leich Award:** Directorate of Combat Developments, U.S. Army Aviation Center, Fort Rucker, AL. COL Jesse M. Danielson, director; MSG Donald D. Altgilbers, senior NCO.

■ **Joseph P. Cribbins Department of the Army Civilian of the Year:** Mrs. Diane Ottolini, formerly with U.S. Army Aviation and Missile Command, Chesterfield, MO.

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class C

S series

■ During NOE flight at 25 feet and 25 knots during NVG test assessment under zero illumination, main rotor blades hit pine tree. Damage to both main rotor blades was found upon shutdown.

Class D

S series

■ Uncommanded yaw to left occurred during flight in light turbulence. When aircraft landed, crew found that left-hand exhaust duct clamp and extension were missing and left synch elevator was damaged.

Class E

F series

■ Aircraft was NOE at 20 knots and was just starting climb when engine was heard increasing and both rotor and N2 rpm began rising. When PI increased collective to control rotor and decreased throttle to control N2, low rpm audio sounded. Rotor was stabilized, but N2 had dropped to zero, N1 was steady, and torque had dropped to zero. PI was able to control rpm with manual throttle, so emergency governor operations were not performed. Aircraft returned to heliport and PI made running landing without incident. Caused by failure of N2 accessory gearbox shaft.

AH64

Class C

A series

■ Irregular puncture (0.5" x 0.125") was discovered in one tail rotor blade during routine maintenance. Last flight had been 9 days earlier. Blade was replaced and aircraft released for flight. Cause unknown.

Class E

A series

■ Pilot noted excessive sand and dirt in vicinity of engine nacelle during preflight. Pilot cleaned area, then cranked. Hearing intermittent noise, pilot shut down No. 1 engine. Maintenance replaced engine.

■ During ATM training in traffic pattern, SP entered standard autorotation. At 400 feet agl, No. 1 engine failed. IP took controls and made single-engine landing. Caused by clogged fuel filter to No. 1 engine.

■ During descent to terrain flight mission profile, pilot's ICS failed. He was able to hear but unable to transmit on radios or talk to CPG. Maintenance replaced ICS junction box.

■ No. 1 engine failed at 400 feet agl during simulated autorotation. PI executed roll-on landing and ground taxied aircraft to parking without incident. Engine failed due to anti-ice start bleed valve or binding VG system suddenly breaking free.

■ During ground taxi, both crewmembers detected electrical burning odor in cockpits and conducted emergency shutdown. Caused by No. 1 generator failure. Generator was replaced.

Class F

A series

■ After swashplate maintenance during unit aerial gunnery training, maintenance pilot flew aircraft back to home station without incident. Two days later, tech inspector discovered metal fragments on lower nacelle panel. Further inspection revealed two 2-inch holes and two deep indentations in inlet particle duct assembly. Engine was not damaged.

CH47

Class A

D series

■ While returning from disaster relief mission, helicopter was hit by civilian fixed-wing aircraft. Chinook crew executed precautionary landing; aircraft was damaged on right side at water line in area of ramp. Fixed-wing aircraft crashed, killing one civilian. Accident is under investigation.

Class C

D series

■ During left cross-slope landing, drag link on left aft landing gear failed. Aircraft was brought to hover and brake-steer isolation switch was turned off to stop hydraulic fluid loss. As immediate landing was not possible without support equipment, flight was continued to home base. Aircraft was landed without further incident, using tires to support left aft portion of aircraft.

■ Aircraft experienced rotor overspeed of 120 percent for 1 second during engine runup/fuel cross-feed check in preparation for flight. Crew executed emergency shutdown. Engine inspection is pending.

Class E

D series

■ During main-rotor track and balance in cruise flight at 1000 feet and 80 knots, both left- and right-hand bubble windows exited aircraft. Cause not reported.

■ When right rear landing gear contacted ground during landing, spindle housing failed. Aircraft started to roll right, and utility hydraulic caution light came on. Pilot executed go-around to stop roll, and flight engineer advised pilot that right aft landing gear had broken off and was hanging below aircraft. En route to airfield determined by pilot and unit commander as safest place to land, landing gear fell off. Upon arrival, ground crew had built platform of railroad ties, the only material available to block up aircraft. However, ties shifted during first landing attempt, and PC determined that structure was not stable enough to shut down upon. He was able to stabilize aircraft on the three remaining gears to allow passengers to disembark from cabin door. He then repositioned aircraft and ground crew rebuilt structure. On second attempt to land, crew felt aircraft was stable enough and completed emergency shutdown. Railroad ties caused some damage to aircraft sheet metal and rescue door.

OH6

Class D

J series

■ Tail stinger contacted ground during standard autorotation to runway. Impact

resulted in loss of tail stinger and damage to tail-rotor assembly.

OH58

Class C

D(I) series

■ Aircraft had earlier experienced Class C accident due to engine and mast overtorque. About 8 weeks later, during post-maintenance MTF autorotational check, engine reportedly flamed out. Aircraft landed hard, damaging landing gear.

Class E

C series

■ DC generator failed in flight. Aircraft landed without incident. Maintenance replaced generator.

D(I) series

■ During 50-caliber live fire, left door vibrated loose and fell from aircraft. Door was punctured by one round. Crew landed, shut down, and inspected aircraft. No other damage was found. Maintenance repaired and reinstalled door.

Class F

D(I) series

■ **(Engine FOD)** During MOC with engine operating at 100 percent, maintenance personnel alerted pilot to shut down engine due to loud popping noises and a yellowish dust exiting the compressor bleed port hose. Inspection revealed compressor shipping dust-cover partially ingested through compressor. Engine will be replaced.

UH1

Class E

H series

■ Pilot felt resistance in cyclic controls during climb and returned to airfield without incident. Maintenance confirmed binding fore and aft cyclic. Jack-shaft bearings were replaced.

■ During cruise flight, master caution light flickered with no caution segment light. Postflight inspection revealed that wire insulation had worn through in channel between pilot and copilot windshield and was grounding out intermittently due to aircraft vibration. Maintenance replaced wire.

UH60

Class A

L series

■ During aerial recon mission, tail rotor of lead aircraft in flight of two reportedly struck wires at 200 to 300 feet. Aircraft descended in slow, controlled spin and crashed through trees. All passengers and crewmembers were injured, one critically. Tail boom was severed upon contact with trees.

■ During MOC following installation of fuel filter to No. 2 engine, gust lock reportedly failed and main-rotor system engaged. Crew chief, who was positioned on No. 2 engine cowling, was killed when struck by main-rotor blades. Pilot, positioned inside aircraft at controls, also sustained fatal head injures. Second crew chief was injured. Aircraft was destroyed.

Class C

A series

■ During NVG orientation flight in desert environment, rough landing caused main rotor blades to contact ALQ-144, causing damage to all four main rotor blades.

Class D

A series

■ Postflight inspection after confined area operations revealed significant damage to three main rotor blade tip caps. Crew did not notice any indication of tree strike in flight. Tip caps were replaced.

L series

■ During maintenance in hangar, tiedown strap was attached to one blade for rotation purposes. After maintenance, aircraft was moved outside for MOC. Upon runup of one engine and engagement of main-rotor system, tiedown, which had not been removed, contacted tail rotor. Tail rotor and associated components were damaged.

Class E

A series

■ During postflight, 3-inch-diameter hole was found on belly of aircraft just inside right main landing gear strut. Suspect damage occurred during blowing-snow approach to sloping and rough landing zone.

■ While repositioning for departure, Chalk 2 hover taxied over 10-foot-deep ditch, which increased his hover height to 25 feet agl. At the same time, the aircraft entered Chalk 1's rotor wash. This greatly increased the induced flow within his rotor system, which was further aggravated by operating at just below maximum gross weight with a 5-knot left-rear quartering tailwind. These conditions combined to reduce lift, which resulted in loss of rotor rpm and hard landing.

L series

■ PC was attempting an NVG landing in dusty conditions under zero illumination in an LZ that had not been reconned. Aircraft landed on rock, which punctured softball-size hole in bottom of aircraft between main landing gears.

■ During passenger unloading, VS-17 panel marker dislodged from soldier's rucksack and went through main-rotor blades. One blade was damaged.

C12

Class E

F series

■ While applying brakes after landing, right brake pedal moved fully forward with no effect. Inspection revealed packing O-ring failed, causing hydraulic brake failure.

G series

■ During No. 2 engine start, compressor stalled multiple times. Inspection revealed metal chips on oil filter. Engine was replaced.

O5

Class C

DHC-7

■ During taxi for takeoff after refueling en route, right wing tip contacted 35- to 40-foot tree. PC aborted takeoff and returned to parking. Right wing tip and aileron and one antenna were damaged.

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-64-98-ASAM-03, 022136Z Feb 98, operational

At least two inadvertent rocket launches have been reported recently. A potential for inadvertent rocket launches exists due to a combination of aircraft switch positions and an aerial rocket control system (ARCS) panel hardware design issue. An inadvertent rocket launch can occur if the ARCS panel and station directors are powered up on the ground by selecting "ground override" or at liftoff when "armed" power is restored by the squat switch. When power is initiated the ARCS panel initiates its internal built-in test routine. During about one in eighty tests, the ARCS panel will send a drive trigger signal to one or more of the station directors. This signal could fire a rocket if the pilot's master arm switch or the copilot's arm/safe switch is in the "arm" position. When either switch is in the "safe" or "off" position, no inadvertent rocket launch can occur.

The purpose of this message is to ensure that all AH-64 flight crew personnel are familiar with the procedures and timing sequences required in selecting and deselecting the "arm" position of the pilot and copilot/gunner fire control panel switches to prevent accidental launch of onboard rockets. It also emphasizes the importance of maintaining a "safe" selection on the pilot and CPG arm/safe switch when use of live armament is not imminent, particularly in a training environment.

AMCOM contact: Mr. Howard Chilton, DSN 746-7271 (205-876-7271), chilton-hl@redstone.army.mil

AH-64-98-ASAM-04, 241907Z Feb 98, maintenance mandatory

This message deals with two components: the main-rotor strap pack and the lead lag-link assembly. Cracks may develop around the inner diameter of the outboard main-rotor strap pack bolt, and some teflon liners in sleeve bearings of the lead lag-link (P/N 7-311411155-11) are deteriorating after a short period of use. All premature sleeve bearing failures have been traced to a single vendor, Southwest Products (SWPCO, cage 81376).

The purpose of this message is to direct—

- One-time and recurring inspections of all strap pack outboard bolts for cracks. All strap packs with flight hours will be inspected within the next 50 flight hours and each 125 flight hours thereafter. (These inspection intervals were chosen to allow aligning the inspections with scheduled phase maintenance. Every effort should be made to coordinate inspections so that all strap packs on each main rotor hub assembly are inspected at the same time.)
- A one-time inspection of all AH-64 aircraft to determine presence of 7-311411155-11 lead lag links containing sleeve bearings manufactured by Southwest Products.

AMCOM contact: Mr. Howard Chilton, DSN 746-7271 (205-876-7271), chilton-hl@redstone.army.mil

POV-fatality update through February

- No seatbelt
- Speed
- Fatigue

No new causes, just new victims.

FY98 = 50
FY97 = 27

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Class A Accidents through February

		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	2	2	0
	February	0	0	0	0
	March	2		1	
3D QTR	April	2		2	
	May	1		1	
	June	3		0	
4TH QTR	July	1		8	
	August	0		0	
	September	0		0	
	TOTAL	12	7	14	2

U.S. ARMY SAFETY CENTER

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Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

MAY 1998 ◆ VOL 26 ◆ NO 8

visit our web site • http://safety.army.mil

Lesson learned: Never give up.

Food for thought. It is unacceptable that we are losing soldiers in POV accidents at the rate of one every 3 days. And we are losing more than our fair share of aviation-MOS soldiers. According to the Chief of Staff, Army, the key to reversing this trend is active, caring leadership at every level to increase command emphasis on POV safety. I agree wholeheartedly. See page 8 for General Reimer's recent guidance on the subject.

—BG Burt S. Tackaberry, Commanding General, U.S. Army Safety Center

Never stop flying the aircraft . . .

"First and foremost, control the aircraft."

"Fly the aircraft all the way to the ground."

"Never stop flying the aircraft."

These are all words our instructors have used to drive home the important point of aircraft control during simulated emergencies in the aircraft and simulator. Chapter 9 of every Army aircraft operators manual stresses the importance of controlling the aircraft when responding to real emergencies: "The most important single consideration is aircraft control."

Recently, four crewmembers survived inverted flight in a CH-47 because the pilots never stopped flying the aircraft—even when it appeared the aircraft was unrecoverable.

The two pilots, the flight engineer, and a mechanic had done everything right. They had spent 2 days inventorying, inspecting, and test flying the aircraft they were receiving from depot following phases one through four maintenance services. Although not required, they had performed a full maintenance test flight of the aircraft and found and corrected a few minor problems. They were more than merely satisfied that the aircraft was suitable to accept and fly; they agreed that this was one of the smoothest flying CH-47s they had ever flown.

The first leg of their planned 2-day mission back to their unit was without incident. They were about an hour into the second leg—and only 18 minutes from their destination—when they encountered their emergency.

The PC, who also was an IP and MP, was on the flight controls when the nose of the aircraft began a slight pitch down. He applied aft cyclic to correct for what seemed to be a normal divergence in the CH-47. But as he applied aft cyclic, the nose began a slow left yaw that he could not control with full right pedal.

The aircraft then began a slow left roll to about the 90-degree point and then continued with what

After 360-degree roll in flight, the crew managed to land the Chinook with surprisingly little damage. During shutdown, however, damaged droop stops allowed the aft rotor blades to pound into the fuselage.

seemed to be a snap roll through the remaining 270 degrees.

But it didn't happen that fast; it felt like eternity to the crewmembers. As the aircraft inverted, the PI, figuring he had nothing to lose, joined the PC on the flight controls. (I am not advocating that two people try to fly an aircraft, but this action confirms that both pilots knew they were in a desperate situation.) Instinctively responding by doing what they had been trained to do, the pilots continued to fly the aircraft even as they saw the ground through the greenhouse and it appeared there was no hope of recovering control of the aircraft.

The aircraft miraculously returned to a wheels-down attitude at about 250 feet agl. The pilots were able to control the aircraft to a near-normal touchdown, although full right pedal was still necessary to control aircraft heading. As the crew performed an emergency shutdown, the aft rotor blades made contact with the fuselage since the damaged droop stops did not operate normally.

They had, in the words of the PC, "killed the beast"—all with only minor injuries to the mechanic, who had been standing at the onset of the emergency. The aircraft was severely damaged, but four extremely valuable aviation resources who unexpectedly found themselves in a life-or-death situation that was not of their making are still with us today because they did not give up.

All four of these crewmembers share their stories on the following pages. What you'll read comes from the first-person accounts they gave only hours after the incident. We are publishing their stories here with their permission and approval, and we're grateful to them for their generosity.

—MAJ Herb Burgess, Aviation Systems & Investigation Division, USASC, DSN 558-9853 (334-255-9853), burgessh@safety-emh1.army.mil

After months of investigation and extensive research, testing, and analysis, the cause of this accident has never been determined. The Army Safety Center, the CCAD Investigative Analysis Unit, AMCOM, and Boeing continue to monitor and evaluate all CH-47 flight-control anomalies to determine the cause of this accident and take corrective actions.

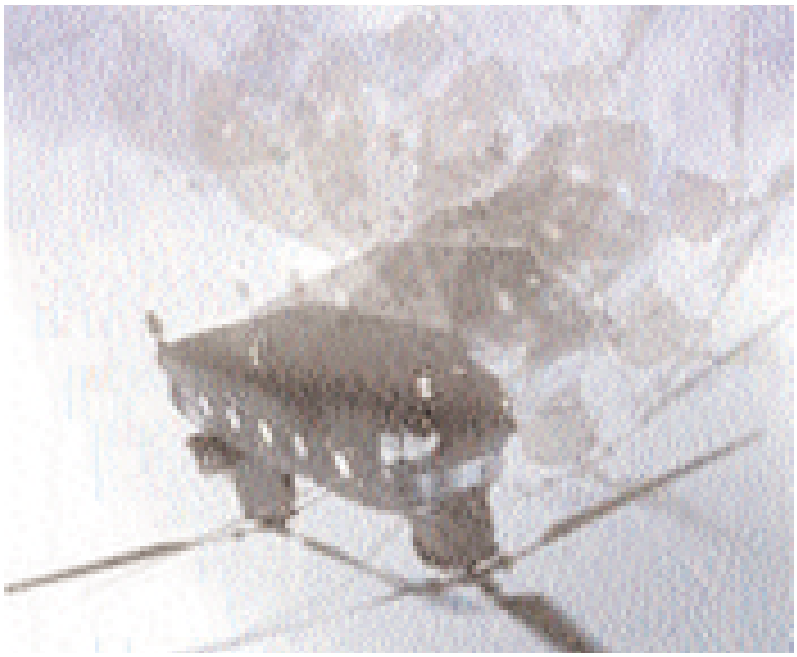
The view from the cockpit

CW3 Bric Lewis, PC

It was cold, but we couldn't have asked for better weather—you could see forever.

We were going along at 1100 to 1500 feet above the ground, running between 130 and 135 knots indicated, and I was letting it float. I didn't have altitude hold engaged. I had my feet resting on the pedals and my hands lightly monitoring the controls. The aircraft would float up, and I'd bring it back down to between 1500 and 1100 feet, depending on the terrain.

I'd made a correction in altitude because it was climbing a little bit; we were somewhere around 1100 feet agl when I felt satisfied I was at an altitude that was okay. We were about 135, 140 knots when I noticed that the aircraft nosed over. I let it go for a second. And then it yawed. The tail end was coming around the right side. I applied right pedal and a little bit of aft cyclic to stop the descent. But it got worse. The yaw rate increased dramatically, and I had full right pedal. It continued on around and Pat, the PI, grabbed the dash. I didn't hear anything from the guys in the back.



There were no indications on the dash that there was anything wrong, no lights—nothing. I thought for a second that there was an AFCS problem.

And then the aircraft got on its side. Pat was screaming, "Catch it, Bric, catch it!"

At that point, I had the pedal jammed against the stop, and it was still yawing to the left. By this time we were on our left side. The seat of my pants told me that the tail was coming around, so I applied full right cyclic.

The stick wouldn't move; it was like it was in concrete. Just about the time I noticed the stick wouldn't move, the nose pitched UP, and the aircraft rolled over on its back.

I yelled, "Oh, God!" and Pat got on the controls. I didn't know which way we were going. All I knew was, it's upside down. I was looking through the ceiling, and I could see the ground rushing up towards us. Pat was beneath me—from where I was, I could see the top of his head below me, and the aircraft was falling upside down. The nose was low, and I knew that the cockpit was going to hit first. I still hadn't heard anything from the crew chiefs. I could sense Pat on the controls with me. And they weren't moving.

I saw my wife.

Then the stick hit me in the leg, and I said, "This thing ain't gonna kill me!" We were flopping the cyclic around, but it wasn't doing anything.

We were getting fast, real fast. I had that elevator feeling in my stomach. And I thought, "This is the way it is. They lied. They tell your family it's instant." But you have that two or three seconds, and you know what's going on. It made me mad.

I remember thinking to myself, "It's upside down. There ain't nothin' you can do."

And then it flipped over! I don't know why; I don't have any idea why it did.

Pat was on the controls with me. And we were FAST, fast. I looked at the airspeed indicator, and it said zero. I said, "No! It's FAST!" And he screamed, "250!" I thought he was calling out airspeed, but he meant altitude. The ground was rushing up.

Something flashed by the window, and I said, "We're close to the ground." I honked back on the stick, and Pat was with me. It was yawing terribly to the left, and we went—I know he was there—full right pedal and applied just as much aft cyclic.

I felt it lift. And I thought, "Yeah, we ballooned. Airspeed's coming back." I looked at the rotor, and it was coming back down through 115 percent—I don't know where it *had* been. And it was SCREAMING.

And I thought, "I'm gonna MAKE it!" It was slowing down; everything was coming in good. We had back some altitude, and there was nothing in front of us. Just level ground. I thought, "Yeah, we're gonna make it."

And then the nose kept coming up. "No," I thought, "we're going to end up stopped, but we'll be 25 feet off the ground!" So we pushed the stick forward, and the nose came down. We were getting ready to come down. This time it was SLOW; it was REAL slow. I don't know how slow it was.

We got ready to cushion, but I couldn't lift the thrust. With all my strength, I couldn't lift the thrust.

I could feel that little jump you get

During the wild ride, flight pubs stowed on the right side created a blizzard inside the cockpit. Most of them ultimately settled on the left floor and dash.

when it's in the hangar and you move the controls—a little inch or so of movement. Pat was pumping it, and I was pumping it, and it wouldn't move. The aircraft was yawing BAD to the left, and we still had full right pedal. Finally, I just flared a little bit more with the cyclic, and the back wheels touched. And then the front wheels touched. And it STOPPED. We didn't hit brakes; it just stopped.

For the first second or two—and it was SCREAMING—we sat there. And then WE started screaming, "We made it! We killed the beast!" And we gave each other the big high-five right there in the cockpit.

Pat did the emergency shutdown while I tried to center the controls. The cyclic came back. We could move the thrust. The right pedal was stuck all the way to the front. And Pat was excited. He was hollering, and the blades were starting to wind down. And then he asked the crew chiefs to see if there was any fire. But we could tell; it wasn't coming apart. I mean, it felt *normal*. Pete, the flight engineer, said, "I don't see any fire." That was the first we'd heard from him.

And then there were three real fast bangs. And the whole airframe shook.

And then there were three more, not as fast. After the first three, we knew what it was.

Pat tried to lean down over the console, and I tried to get down between the pedals, but our shoulder harnesses were locked and we were fighting with that. And I was thinking, "Man, this thing is *still* trying to kill us!"

All of a sudden, it came to a stop. It just—everything stopped. We didn't holler again. We just shut off the battery. Pat was going to go through the checklist. "Just leave it like it is," I said. "Just leave it. Just make sure we're all okay."

We got out, and we were pumped. We looked at it; it was torn up, but we were on the ground.

CW2 Pat Nield, PI

We were at about 1000 to 1100 feet agl, right at between 135 and 140 knots. The aircraft was tracked really smooth; it flew better than anything I'd ever flown out of Corpus. I was looking down at the map when I felt the nose pitch down, and I got a little bit of a shudder. I looked up and saw that the airspeed had picked up. At that point, Bric, the PC, started pulling back on the cyclic. That's the last time I looked at him because we started an abrupt yaw that made me grab onto the dash. My perception is that the nose pitched UP and continued to yaw really strongly. At this point, I knew things were bad; I didn't think we were going to be able to recover.

All of a sudden, the aircraft just snapped over; it felt like it went upside down. I was seeing ground through the greenhouse. Maps were flying everywhere in front of me. I heard Bric say "Oh, God!" a couple times and things got really frantic. I remember thinking, "Oh, God, this is bad if HE's saying 'Oh, God'," because Bric's the best pilot I know.

When we went upside down, I figured I had nothing to lose, so I went ahead and got on the controls. I was fishing around, but nothing would bite. It was just like the rotor system was unloaded. I couldn't see anything inside the aircraft, because everything was shaking too much. There was lots of noise, lots of vibration.

I was trying to obtain a ground reference point; I didn't get one until I could see the ground through the windscreen right in front of me. It was just rushing up, and we were turning. At that point, I remember trying to put in full right pedal, and I felt a response. I don't know if that was the response I felt or the billions of others I was doing. But something bit. Something took hold, and we got an input. I can remember pulling back aft left, and the aircraft started coming up. It was then that I realized that Bric was on the controls with me. He was still there. When we were upside down, I had no idea.

When the aircraft finally recovered, we were about 100, 200 feet agl and screaming out of the sky. We were both pulling back on the cyclic, flaring the aircraft. We started getting to where we were flared a little too much, and we thought the bottom was going to drop out on us. We attempted to pull up on the thrust and got maybe an inch at the most. Thrust just wouldn't go anywhere. So we started pushing it through. Bric said later that I was yelling out instructions; I don't really remember that. I just remember pushing the stick down.

We made a pretty good approach angle, and I remember touching down at what I'd estimate at 10 to 20 knots. It was really a relatively smooth touchdown. At that point, I released the controls, turned off the AFCS, and took both engines to stop. After that, I told the chief to check for fire on board. Then I looked at Bric; we got a little emotional and high-fived each other.

We thought it was over.

And that's when the rotor blades started slamming into the fuselage.

I knew that was a pretty bad thing because it could come through the companionway and chop up a crew chief or get Bric and me up in the cockpit. But, luckily, it slowed down and stopped.

I don't know how this thing righted itself other than God reached down and snatched this aircraft and turned it over. But it was like Bric and I had been joined at the hip at birth. We had worked together real well.

The view from the cabin

DAC Peter Biessener, flight engineer

We were in level flight. I had done a ramp check, so I was looking at my watch and listening to the pilots and looking out the left forward window and thinking I probably needed one more ramp check before we landed. I looked over at Bill, the mechanic, in the other seat. Suddenly, the aircraft pitched down, and it started picking up speed. I thought, "That was kind of a strange descent."

And then it started yawing. I thought, "Gee, we're out of trim. This isn't right." And then there was this tremendous lateral g force. The aircraft was really popping, and I thought, "This is really bad." I saw Bill wasn't in his seat anymore; he was up by the right-hand post of the companionway, right by the heater closet.

I saw the ground rotating around in my window, and I thought, "Oh, Jesus. We're going upside down."

We rolled to the left. Out the left window, the ground was going around. And then Bill was up by the ceiling. We were upside down, and the aircraft was shaking really bad. "This is it," I thought. "We're upside down, and this aircraft's coming apart."

I heard Bric say, "Oh God!" And then it got really quiet. I never heard anything else from anybody.

I don't know why, but I started thinking, "I gotta get Bill." He was up on the ceiling. I was being pulled all over in my seat, but I was there; my seatbelt was holding me in. And I had to get Bill because he was flying. I could see the terror in his eyes. The next thing, he kinda came down on top of me, right in front of the radio closet, and I held on to him.

It started getting really noisy, a lot of wind noise. Everything was really FAST. Like the engines. And the rotors—really noisy. Bill was trying to get up, and I was just hanging on to him. And then I looked out the window.

The ground was not above us anymore. It wasn't on top of the window, it was on the bottom. And I thought, "God, we're right side up."

The ground was coming up really fast. I was thinking, "I have to get Bill into a seat! He has to get into a seat because this is going to hit hard." He was trying to get up and go across the aircraft, and I was pushing him over there. He was looking at me, and I was pushing him. I was yelling, "Bill, get in the seat!" He grabbed the seat, and he fell back on the floor. And then I started calling, "Put your seatbelt on!" I don't know why, but I grabbed mine, and it had become disconnected.

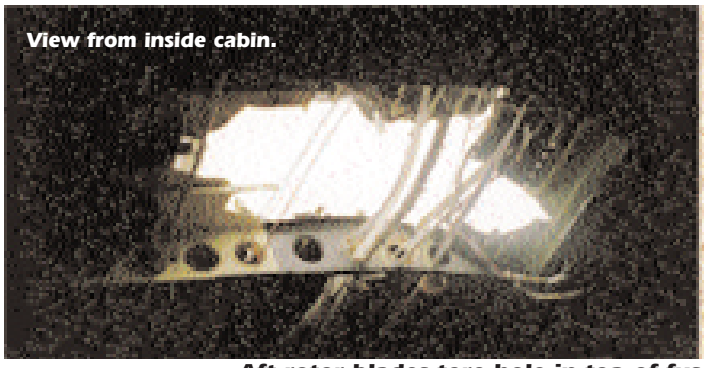
I looked out the window, and the ground filled the entire window. Bill was in a seat, but he didn't have a seatbelt buckled. I rebuckled mine and again looked out the window.

The ground was right there, and it wasn't moving. I thought, "This is impossible; there was no impact!"

Everything was really quiet, and I got up. Looking down, I saw my mic cord on the floor; that's when I realized I had come unplugged. That's why I hadn't been hearing anything. I picked up my mic cord and plugged it in. From the companionway, I looked up front at Bric and Pat. They said something like, "We did it!" and gave each other a high-five. Then Pat said, "Okay, guys. Let's check for fire. We're okay. We're on the ground."

So I turned around, and that's when I noticed that the entire cabin was a mess. All our baggage had come out from underneath the cargo straps; it was thrown everywhere. I saw an oil can underneath my seat. The first-aid kits were on the floor. I couldn't believe it. I turned and went to the ramp and hit the ramp down. I stayed on the ramp—I didn't want to get off—and looked out the left at the engine. There was no smoke or fire or anything. Then I turned to go to the other side.

That's when the pounding started. Everything


View from inside cabin.

View from outside.

Aft rotor blades tore hole in top of fuselage during emergency shutdown.

started hammering, and I looked up at the aft transmission. I started moving fast; I wanted off that ramp really bad. I'd seen a Chinook where the aft transmission had fallen out and onto the ramp, and I didn't want to be there. Somewhere toward the front of the ramp, I fell down. At that point, with all the shaking, I realized that the blades were actually pounding on the fuselage. As I was crawling on the floor toward the front, I saw that Pat and Bric were laid over in their seats. Pat was down by the center console, and he started hollering, telling me, "It's okay! Stay back! Stay back!"

I guess I stopped moving near the cargo hole. I was on the floor, and that's when everything just got quiet. And everything quit moving.

I got up and took my helmet off. Bill was pulling on the door and looking to the back. When everything stopped, he kinda stood up, holding his back. His face was cut below his eye. He was hurting.

I looked around. I'm still amazed the way everything flew around the cabin. The scary part was the oil cans that were underneath my seat. I remember thinking that I don't always lock the ramp fire extinguisher in; a lot of times I just set it in its mount. And I thought, "Yeah, this time I locked it in, and it stayed there. It's a good thing."

I guess I thought a lot about securing equipment in the aircraft; I kept thinking about that. I was amazed. Stuff came out from *behind* the seats. It was in the cockpit. I mean this stuff that had been properly secured was thrown *everywhere*. The crossed straps on the boxes of gear worked well. I have to remember this, that it's not all just forward loading or a hard landing or something. This stuff could be thrown *sideways* out of its straps.

We were just really happy. We thought that if they ever put this aircraft back together, we want it back. Because it stayed together. I mean, no matter what it did wrong, it still *stayed* together.

At the hospital, I started thinking that this was really a good day. Because we should have been a big pile, just a smoking hole. Chinooks don't go upside down and come back to life. They just don't do that. It's like God reached over and set us right side up again.

DAC Bill Gorenflo, mechanic

So we're flying along. Pete does his ramp check. I'm impressed with ol' Pat; I can see him sitting in the front seat. He's got his map, and he puts an X and says, "I've got this tower over here. Bric, did you see that tower?" I mean, they're a good team. And Pete and I give thumbs up; these guys are *all right*. I said, "Man, it was a good trip."

The aircraft's flying smooth.

We're just flying along, fat, dumb, and happy. Another ramp check comes up, and Pete says, "Systems okay. Ramp check good."

It was cold. We had the heater going, but I was cold, so I went to my suitcase and got my flight jacket out and put it on. I don't know how much time went by before I decided to unbuckle and see how ol' Bric was doing up there. I had just unbuckled my belt and started to get up when, all of a sudden, it's like catching one of those big updrafts. As I was getting up, it just threw me, slammed me up on the structure between the heater and the closet area. Just slammed my face up there. And I'm telling you, holy hell broke loose.

I turn around, and it slaps me up against the radio compartment. I'm airborne. I'm going, "What's going on?" It rips my headset off, and I can't hear anything but transmissions screaming.

I can't see anything. I mean, my face hit that post and then, like when something pops you in the eye and you see a little bit of stars, and then all of a sudden, I'm spinning back toward the closet. I can't grab anything. Pete's in his seat, strapped there. He's trying to grab me. All I know is we're just *rolling*. I'm going, "Oh God, no!" And I picture my 6-year-old boy right there. And I go, "God, no!" And Pete's trying to hold me, and I'm looking at that seatbelt over there. I say, "Oh, God, no!" I know—we're waiting for the impact. You know, here comes the impact.

It throws me to the floor, and I'm trying to go for the seatbelt over there. It's just happening so fast. And I'm on the floor. When the aft gear touches down, I'm still on the floor.

Finally, I look at Pete. He mouths, "We made it."

I can hear the pilots hollering up front, and I look up there. All of a sudden, the pounding starts.

I knew THAT sound; I knew the blades wanted to come through. It was just POW, POW, POW! I try to reach the knob to the lower cabin door so I can get the hell outa there. But the handle was turned; it was catching the top cabin door and I couldn't get out. I looked back, and Pete already had the ramp down. He makes a beeline—I think he set a speed record for the low-crawl.

Finally, it gets quiet. I look up. My face is hurting; my back is hurting. And we get out of there.

It's cold out there; I'm shaking. And I'm hurting. And I'm thinking, "What just happened?" I go back in. Pat's still inside, standing there. We just hug each other. I say, "Man, you guys saved our lives. What in the world...?" He says, "I don't know. Just thank God we're on the ground."

All I've got to say is that those two guys were a team up there, and with their ability and their experience and their training or whatever and the grace of God got us out of that or else it would have killed all of us. I don't know how they did it.

General Reimer sends

CSA directs leader action against POV accidents

I am deeply troubled that, on average, one soldier dies every 3 days in a POV accident. Thus far in FY98, 53 soldiers have perished in POV accidents. This is a 71-percent increase over the previous year, an alarming and unacceptable trend.

The causes of these accidents are not new or different: speeding, alcohol, fatigue, and carelessness. Use of seatbelts in many of these accidents could have saved soldiers' lives.

Your involvement is paramount in gaining control of this situation, influencing how our soldiers operate their POVs, and stopping this tragic and needless loss of life. Positive, hands-on leadership at all levels is imperative, particularly at the squad leader or first-line supervisor level.

Getting there is half the battle

The Director of Army Safety has developed a Model POV Safety Program. I am directing that this six-point program be used in every unit. It is the minimum standard. The Model POV Safety Program requires—

■ **Command emphasis.** Positive leadership at all levels is imperative. Leader emphasis on POV safety must be unrelenting. Our junior officers and noncommissioned officers see their soldiers every day. They should know where their soldiers go, what they do, and then assert positive influence on how, when, and where they operate their POVs.

■ **Discipline.** Our junior leaders work with their soldiers daily and know them well. Soldiers sometimes telegraph signals that translate later into accidents. Negative behavior such as traffic offenses, alcohol abuse, misconduct, and poor performance often are indicators of potential POV accident victims. Identify "at risk" soldiers; counsel them; take proactive measures to modify their risky behavior.

■ **Risk management.** Use risk management. Identify hazards associated with POV operations; assess the hazards; make decisions to control them; implement the controls; and supervise execution. The Director of Army Safety has prepared a POV risk management toolbox for commanders and leaders. This toolbox provides a comprehensive set of tools and controls that have proved successful throughout our Army. The toolbox is available at http://safety.army.mil. Use it. Make it available to leaders at all levels.

■ **Standards.** Set high and unmistakable standards. Enforce them. Follow Army regulatory traffic standards. Be uncompromising on the use of seatbelts and motorcycle safety equipment. Educate soldiers on the risks of speed, fatigue, and use of alcohol. Conduct mandatory POV safety inspections and random roadside checks. Emphasize the use of designated drivers for social events.

■ **Provide alternatives.** Provide alternatives for soldiers to driving POVs. Schedule activities on post to keep soldiers on post and off the road. Keep gyms, recreation centers, and other places soldiers use off-duty open later. These same measures also can provide alternatives to alcohol use. Look for transportation alternatives as well. Promote use of alternate transportation methods to POV use. Prominently post public transportation schedules. Where possible, use Morale, Welfare, and Recreation (MRW) Services to provide buses or vans to transport soldiers to the places they go when off-duty. Arrange reduced hotel rates in nearby communities to encourage soldiers to remain overnight on weekends and stay off the highways late at night.

■ **Commander's assessment.** Following every fatal and serious-injury POV accident, commanders will conduct an assessment of the accident with the involved soldier's chain of command. Determine what happened, why it happened, and how it could have been prevented. Implement corrective and preventive measures. Publicize lessons learned.

I have tasked the Director of Army Safety to visit major installations beginning in late March and brief leaders on the Model POV Safety Program. You will receive coordinating instructions about this briefing in a subsequent message.

I want every Army leader to clearly understand the depth of my determination to end these tragic and needless POV fatalities. I cannot accept the current POV fatality trend we are experiencing. Direct, positive, hands-on leadership will make a difference. This is leaders' business at every level of our Army.

—General Dennis J. Reimer; Chief of Staff, Army; 24 March 1998

Soldiers are our credentials!

"How could they have had an accident? They were just . . ."

With today's real-world missions, commanders anticipate hazards. They integrate risk management into planning to ensure mission accomplishment and to reduce the chances of injury to personnel and damage to equipment. They brief, back brief, rehearse, and supervise at that critical time and place on the battlefield, especially on those moderate- and high-risk missions.

But what about the low-risk missions? Every mission conducted today could have an element of high risk hidden in it—especially those that are "just low-risk" missions. For example:

■ The most experienced crew is "just going to land" in an observation position for a few moments. There's a loss of situational awareness in the cockpit, and the PC fails to maintain ground track on touchdown. Result: One aircraft destroyed at a cost of $6.6 million.

■ The most experienced crew is "just finishing up an APART evaluation" on a marginal FLIR night. There's a breakdown of crew coordination, and the SP lands the aircraft in the trees. Result: One aircraft destroyed at a cost of $11 million.

■ The crew is "just doing an MOC on the parking pad." There's a crew-coordination breakdown and a failure to follow standards. Result: two fatalities and an aircraft destroyed at a cost of $6.3 million.

The next time a crew says they are "just going to" go do something, take a few moments with them to make sure they are not "just going to" have an accident.

—CW3 "Stew" Milligan, Aviation Systems & Investigation Division, USASC, DSN 558-9857 (334-255-9857), milligad@safety-emh1.Army.mil

Shortfax
Keeping you up to date

ALSE-message update

The project manager for aircrew integrated systems (PM ACIS) recently published its annual update of messages dealing with aviation life-support equipment. Following is a recap of current messages.

- AIS 96-03, 072220Z Mar 96, overview of SPH-4/4B helmet.
- AIS 96-08, 041239Z Apr 96, aviator and crewmember laser eye protection.
- AIS 96-10, 051938Z Mar 96, survival ration (NSN 8970-00-082-5665).
- AIS 96-15, 301900Z Jul 96, personnel distress signal kit (NSN 1370-00-490-7362).
- AIS 96-18, 051531Z Aug 96, Mustang survival, MAC-10 anti-exposure suit.
- AIS 96-19, 142203Z Aug 96, disassembly/reconfiguration authorization for aircraft modular survival system.
- AIS 96-20, 232000Z Sep 96, requisitioning life raft and container assembly.
- AIS 97-02, 052025Z Feb 97, delayed implementation of paragraph 7-6b, AR 95-3.
- AIS 97-03, 052029Z Feb 97, compressed gas cylinder overhaul/inspection.
- AIS 97-04, 052031Z Feb 97, use and inspection of safety harnesses (NSNs 1680-00-982-9973 and 1680-00-169-0656).
- AIS 97-05, 052034Z Feb 97, battery used in distress light marker.
- AIS 97-06, 052054Z Feb 97, multi-climate survival kit for OH-58D aircraft.
- AIS 97-07, 052103Z Feb 97, ALSE course.
- AIS 97-08, 052104Z Feb 97, manual reverse osmosis water purifier.
- AIS 97-09, 031939Z Jun 97, leg straps on restraint harness (NSN 1680-00-982-9973).
- AIS 97-10, 032017Z Jun 97, HGU-56/P ear-cup assembly.
- AIS 97-11, 221812Z Sep 97, SARVIP modification strap kit.

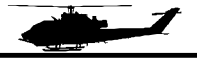
Visit the PEO-Aviation web site at http://134.78.40.107 for additional news, system updates, and copies of ALSE messages.

POC: SSG M. Fisher, AMCOM, DSN 897-4259 (256-313-4259), fisherm@peoavn.redstone.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1

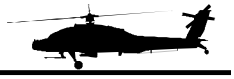


Class E

F series

■ At 2000 feet and 105 knots, aircraft went into immediate right roll, accompanied by severe vibrations. Pilot's cyclic became uncontrollable until collective pitch was reduced. Aircraft was immediately landed and shut down; it continued to rock until blades came to a stop. Cause not reported.

AH64



Class C

A series

■ Aircraft was at 500 feet msl and 100 KIAS in downwind condition when bird struck and damaged day side of TADS.

■ Crew heard thump while on base leg of traffic pattern, and SP in rear seat noted flock of birds approaching. Postflight inspection revealed damage to leading edge of right wing in vicinity of inboard pylon.

■ Bird strike during cruise flight at night damaged windshield, wiper arm, and No. 2 engine air intake cowling.

Class D

D series

■ No. 2 engine cowling door came open during maintenance test flight training. Engine heat blanket was blown up into main-rotor system, damaging two main rotor blades.

Class E

A series

■ Aircraft was at 150 feet agl and 10 KIAS when wingman saw smoke coming from exhaust of No. 2 engine. There were no engine-malfunction indications. Aircraft landed in field without incident. Caused by failure of No. 2 B-sump seal. Engine was replaced.

■ Postflight inspection revealed that main rotor blade had debonded. Blade was replaced.

■ Crew noted uncommanded lateral flight control inputs during low-level flight. Mission was terminated, and aircraft landed at nearby airfield without further incident. Troubleshooting with test equipment revealed numerous sensors inoperative or out of adjustment.

■ While in cruise flight during night unaided training flight, crew detected burning odor in cockpit. As aircraft turned toward nearest airfield, master caution and shaft-driven compressor segment warning lights came on. Crew immediately landed and performed emergency shutdown. During egress, crew saw thick gray smoke billowing from catwalk area in vicinity of transmission and rotor-head area. Inspection revealed SDC housing had split.

CH47

Class C

D series

■ When aircraft entered autorotation as part of track and balance during maintenance test flight, No. 2 engine N1 decreased below 60 percent and engine failed. PTIT reached 1100°C. Crew conducted power recovery on No. 1 engine and performed abort-start procedure on No. 2 engine. Aircraft returned to home base, where crew performed roll-on landing without further incident.

Class D

D series

■ During water-bucket mission, aircraft approached fire from downslope at 20 knots. When pilot increased power to initiate climb, water bucket hit top of tree and punctured side of Bambi bucket.

Class E

D series

■ Right bubble window blew out 30 minutes into flight. Crew was unable to find window and continued mission. Reason for loss of window could not be determined.

■ On approach to unimproved area during multi-ship external-load operations, aircraft encountered whiteout due to blowing snow. As crew flew out of snow cloud, load (M105 howitzer) became entangled in sling legs.

OH6

Class C

J series

■ During approach to land during NVG flight, pilot of Chalk 3 applied additional power to arrest descent when the aircraft descended below Chalk 2's flight path. Postflight instrument monitoring system revealed transmission overtorque.

OH58

Class A

D(R) series

■ Main-rotor blade struck tree during dual-ship NVG gunnery training. Aircraft descended and contacted ground upright. Main-rotor blade mast and tail boom separated. One .50-cal round remained in gun chamber and seven 2.75-inch detonation rockets remained on board. EOD personnel removed ammo without incident. No injuries were reported.

Class C

D(I) series

■ When aircraft was picked up to hover after refueling at civilian airport, vertical fin contacted ground, bending lower 8-inch portion out about 90 degrees. SCAS had been deactivated. Fin was replaced.

■ During pickup to hover, tail stinger contacted ground, followed by vertical fin and tail rotor. Aircraft landed after spinning to right about 200 degrees. Damage reported to tail stinger, vertical fin, drive shaft, and tail-rotor blades.

Class E

D series

■ During climbout, small bird flew up from the left into main-rotor system. Aircraft landed without incident. There was no damage.

D(I) series

■ After 1.7 hours of flight during gunnery training at night, IP and student noticed breeze in cockpit. Pilot's door was missing.

■ At completion of overwater NVG gunnery, 14 NM from land, Chalk 2 reported flames coming from engine compartment of lead. Lead continued powered flight to nearest land and landed without incident. Maintenance personnel found that internal metal o-ring seal had not been installed on power turbine oil strut T-fitting.

■ Crew door came off and hit left-skid during hover at 120 feet agl during gunnery operations at night. Door became hooked on the skid through a hole in the window created by impact.

■ During cross-country formation flight, PI smelled burning odor. As PC took controls, all auxiliary interior lights failed. PC landed aircraft in open field without incident. Caused by burned wire behind mag compass.

UH1

Class E

H series

■ Master caution and right fuel boost pump lights came on during takeoff, and aircraft landed. Caused by clogged ejector pump.

■ While at stationary IGE hover, aircrew heard two loud bangs and aircraft shuddered and yawed. Crew immediately landed. Suspect compressor stall.

■ Improper aft crosstube was installed on aircraft. Crosstube from UH-1M was installed on UH-1H aircraft. Improper installation caused all four saddle mount brackets to mushroom with excessive rollover of mount bracket.

■ During hover awaiting takeoff, aircraft experienced violent compressor stall. Pilot reduced power and landed in place without further incident. Maintenance replaced VIGV self-aligning bearing.

V series

■ During cruise flight, rpm warning light came on and N2 tachometer dropped from 6600 rpm to zero. Tach remained at 324 and all other engine instruments were normal. Caused by sheared shaft to N2 tachometer generator.

UH60

Class B

A series

■ After landing to confined area, crew of lead aircraft noted small tree within rotor-disk radius. On-site inspection revealed no damage, and aircraft returned to home station. Inspection the following day revealed damage that required replacement of all four main-rotor blades.

Class D

A series

■ Aircraft stabilator struck ground during approach to unimproved landing area.

■ Chalk 2 in flight of four on approach to unimproved LZ entered near whiteout conditions and did not see 2-foot ditch in LZ. Upon landing, aircraft rolled into ditch, and nose contacted opposite side of ditch. Damage consisted of two large dents in front underside of nose section.

Class E

A series

■ After landing during air-assault training, passengers on both sides pulled emergency-exit handles instead of cargo-door handles. Right front cargo window fell out, breaking the Plexiglas.

■ During fuel transfer on ERFS in preparation for flight, crew noted strong smell of fuel in cockpit and stopped fuel transfer check. CE found puddle of fuel in left aft portion of cabin. Caused by improper connection between fuel vent and fuel transfer line.

L series

■ Postflight after first leg of service mission revealed ¾-inch-long skin debonding on trailing edge of tail-rotor blade.

■ Small wooden box entered main-rotor system about 3 feet inboard of blade tips during ground taxi. No unusual flight control response or feedback was noted.

■ During assault landing, right wheel rolled into hole, causing 3-inch crack on lower right fairing.

■ During multi-ship landing at tactical PZ, two aircraft at 90-degree angle under blackout conditions made evasive maneuvers to prevent midair collision. Rotor rpm of one aircraft bled off and main generators went off line due to abrupt maneuver. Aircraft shuddered and crew landed aircraft abruptly. Inspection revealed all four main-rotor blades were damaged by striking the ALQ-144. It is not known whether excessive maneuvering or abrupt landing caused damage.

C12

Class D

F series

■ During landing flare just prior to touchdown, bird struck left wing in vicinity of stall strip. Postflight revealed dent in lower leading edge of wing.

N series

■ Aircraft was taxiing to parking when left pod (located on wing tip) and dipole antenna struck 2½-foot fence. Dipole antenna broke off.

Class E

D series

■ When power was applied for takeoff, torque on No. 1 engine fluctuated significantly. Takeoff was aborted. Caused by broken wire connector on torque meter.

O5

Class E

DHC-7

■ During cruise flight, crew experienced full indication of fire on No. 4 engine. After executing emergency procedure for in-flight fire, crew expended both fire-extinguisher bottles, secured No. 4 engine, and landed without further incident. Caused by short in fire indicating system.

■ Hydraulic fluid leak in left-main gear area came from brake shuttle valve.

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

UH-1-98-ASAM-03, 251933Z Mar 98, maintenance mandatory

The UH-1 tail-rotor control tube (P/N 204-010-742-9), which is a flight safety part, has been undergoing fatigue testing to ensure that all vendors' parts meet the strength requirements of the originally qualified design. Parts manufactured by Master Swaging (cage 05056) do not conform and will be removed from service.

The purpose of this message is to outline requirements for a one-time mandatory inspection of all tail-rotor control tubes.

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

Safety-of-flight messages

CH-47-98-SOF-01, 181519Z Mar 98, technical

In two reported instances, the wrong bolt was installed between the aft upper boost actuators and the aft stationary swashplate. In both cases, the aircraft had come out of the refurbishment/standardization program at CCAD. In addition, confusion may exist in identifying the correct bolt due to incorporation and labeling of the forward and aft controls installation on the same page of the parts manual.

The purpose of this message is to require a one-time verification of hardware installation on the aft upper boost actuators to stationary swashplate for proper attachment.

AMCOM contacts: Mr. Dave Scott, DSN 897-2068 (205-313-2068), scott-dc@redstone.army.mil; or Mr. Teng Ooi, DSN 897-2094 (205-313-2094), ooi-tk@redstone.army.mil

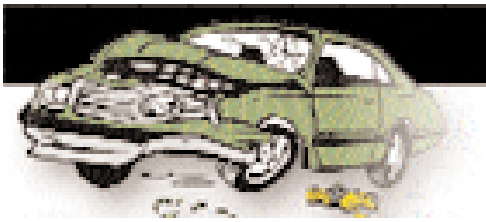
UH-1-98-SOF-04, 280136Z Mar 98, emergency

Since November 1997, UH-1 helicopters have operated under flight restrictions due to a trend of spur-gear failures caused by vibrations in the aircraft's T-53 engine.

The purpose of this message is to ground the Army's fleet of UH-1 helicopters until each engine can be tested to determine if the vibration is present.

AMCOM contact: Mr. Howard Chilton, DSN 746-7271 (205-876-7271), chilton-hl@redstone.army.mil

POV-fatality update through March



- No seatbelt
- Speed
- Fatigue

No new causes, just new victims.

FY98 = 56

FY97 = 35

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Class A Accidents through March

		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	2	2	0
	February	0	0	0	0
	March	2	1	1	0
3D QTR	April	2		2	
	May	1		1	
	June	3		0	
4TH QTR	July	1		8	
	August	0		0	
	September	0		0	
	TOTAL	12	8	14	2

U.S. ARMY SAFETY CENTER

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Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax
ARMY AVIATION RISK-MANAGEMENT INFORMATION
JUNE 1998 ◆ VOL 26 ◆ NO 9
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Lesson learned: Never underestimate those simple missions

Food for thought. Nine Class A accidents took four lives and destroyed seven aircraft during the first half of this fiscal year. This represents a 65-percent increase in our aviation Class A accident rate over the same period of FY97. Only the numbers have changed; the top cause remains the same as last year: collision with trees, wires, objects, or the ground. Think about it. **—BG Burt S. Tackaberry, Commanding General, U.S. Army**

A simple mission

The mission

The mission was simple. An OH-58C had made a precautionary landing out on the range and needed a part flown out. It would take about 30 minutes to replace the part. The aircraft could be signed off and flown back home.

CW3 J was tasked to perform the support mission single pilot. He was told to take along a technical inspector (TI) and a crew chief, who would perform the work and return to base in the other aircraft.

CW3 J did the normal things—preflight, weather check, and mission planning. The mission brief was simple; after all, it was a simple mission. He knew the range by heart—every LZ, road, and checkpoint. Navigating was a cinch; he wouldn't have to rely on a map. Of course, he'd take it, along with all the other required publications. He believed in doing things the right way and by the book.

The only thing that bugged CW3 J was the weather. He didn't like flying single pilot at night; since he had gotten used to NVGs, night unaided had lost its luster. Besides, quite honestly, he hadn't flown unaided in a good while. This was the Cav, where night flights meant goggle flights. He looked at the weather information closely. Clear, moon would be up, and visibility unrestricted. As he prepared a local flight plan, he thought about the fact that this was the fall of the year—hot in the day and cool at night. Ground fog came up fast on the range.

"Oh well," he thought, "I know that range like the back of my hand—every creek, every lake where the fog likes to hide." Besides, he would be returning early, before the fog began to settle in over the low areas.

The flight out to the downed aircraft was uneventful. After shutting down, the TI and crew chief went to work. CW3 J talked with the two aviators from the downed aircraft. CW3 J kidded the PC about causing him to miss getting home early and having supper with his family.

"Should have let you stay out here—good survival training," he joked.

The work took longer than expected, but, about an hour later, it was time to head for the barn. The pilots of the now-repaired -58 at first suggested that CW3 J follow them back. However, as they discussed it, they all realized that they had not been briefed for formation flying. So that was not a good idea.

CW3 J told the other crew to take off first. He would wait a few minutes and then follow. After all, they were going in the same direction. As long as they were not in formation, it should not be a problem. Everyone agreed.

On the return flight home, the two aircraft kept their distance but maintained internal FM radio communication. CW3 J maintained visual sight of the lead aircraft's position lights as they followed the route to exit the range.

Except for the fact that it was about 90 minutes later than he had initially expected, everything was going smoothly. It was simple to follow the route back—mostly range roads—but patches of ground fog were beginning to show in low areas.

About 5 minutes from home, things began to go wrong. The fog was getting worse, and CW3 J lost sight of the aircraft ahead. One call assured him they were okay and that they had the airfield in sight.

Suddenly the fog thickened. CW3 J told the TI, who was in the left seat, to let him know if he began to lose sight of the ground to his left. The pilot slowed the aircraft a little but decided to maintain altitude.

Should he turn around? He could still see the ground, and the PC of the lead aircraft had just flown through this and stated he had no problems. CW3 J knew that they had followed the same route and were no more than a kilometer ahead of him.

When he was almost to the exit point, where he would change frequency from Range Control to the airfield tower, he looked to his right. It was mostly open fields; at night, it appeared to be a black hole.

Suddenly, they were engulfed in fog and rapidly lost all visual contact with the ground. How deep was this fog? How high was it? Was it a simple scud layer? Single pilot at night on instruments? Should he climb? Descend? Do a 180? That didn't sound smart. Neither did the idea of flying in this soup.

"Your left, sir." The TI had seen a sucker hole.

CW3 J immediately turned left, descended through the hole, leveled off, and looked for an open field. He knew there was a field somewhere to his left, off the range road. It was getting difficult to maintain visual reference. Below were trees and more trees. Then, straight ahead, there was the field he had been searching for. Before landing, CW3 J made a quick call to unit ops that he was landing and shutting down. They could come get him—he had no intentions of flying this aircraft back tonight.

Should he climb? Descend? Do a 180? That didn't sound smart. Neither did the idea of flying in this soup.

As the two crewmembers sat by the fire they'd built in the field they'd landed in, the fog continued to roll in. CW3 J looked over at the TI and realized that he could have killed this young soldier. Of course, that he could have died along with the TI didn't make that realization any easier to take.

What had seemed a simple mission had turned into a close call—brief seconds of fear and decisions involving high risk.

This is a true story. It happened about 12 years ago. I was the pilot.

Same song, second verse

Years later, I was an accident investigator for the Army. One day I found myself walking around the wreckage of an AH-64 that had entered a fog bank. The pilot had initiated a right turn, and, within seconds, both crewmembers experienced spatial disorientation and loss of situational awareness. Now one was dead and the other was seriously injured.

Theirs had also been a simple mission—to fly an aircraft back to the airfield. They were both experienced, high-time pilots. What went wrong? The same thing that went wrong 12 years before at another time and another place to another—but much luckier—guy.

Much can be said of the safety programs and improved technology in aviation that have reduced risk and resulted in significant reductions in our overall accident rates. However, regardless of that progress, we aviators are still the same human beings who flew the first biplane. Though more knowledgeable, we are still capable of making the same errors we've always made.

We have been successful at standardizing our equipment; technology allows us to improve machinery across the board. Human beings, however, we have to improve one at a time. That is the reason standardization is critical. It allows us to train each aviator to a particular level and standard.

What went wrong on both those nights I talked about earlier was that the humans involved were not adhering strictly to standards. I had completed the risk assessment sheet with all the right numbers, and it had come out "low risk"—nice if everything goes perfect—which it seldom does.

I had not flown unaided in quite a long time, and flying unaided is not the same as flying NVGs. I knew that, but I wasn't going to turn down a mission because of it. I didn't consider it to be a serious factor. In addition, we fudged on the formation flight. Sure, we were *legal*, but we weren't very smart. My intentions were to keep the other aircraft in sight—we would "unofficially" flight follow each other. What I did not know was that the other crew was flying NVGs, and that's why they had fewer problems than I did. Of course, since we were not "flying formation," there had been no need to brief, so critical information was never shared.

Last, but hardly least, was the weather. The risk level changed when the time line changed—the weather was changing even as we were discussing our takeoff. And my decision-making process left out still another critical fact as we droned along that night: The other aircraft was a kilometer ahead, and that made a difference.

The only weather you should trust absolutely is what you are seeing out your cockpit window. The weather that night was saying "Land!" I hesitated almost 30 seconds too long. And that could have cost my life and the life of the TI. I realized as I surveyed the crash site 12 years later that this crew

had made the same mistake. They anticipated better weather, they saw a low risk, and they were confident they could handle any situation that might occur. After all, it was a simple mission, they knew the area, and it was a short flight back home.

The ability to learn from your own mistakes is a blessing, not a given. I was allowed to learn from my experience. As I walked through the wreckage of the Apache, I knew that the pilot in the front seat of this aircraft would not have the same opportunity.

It's not our equipment or the environment that causes most of our accidents. Machines and environment are fairly predicable. We can plan on these with acceptable accuracy. Human beings are not quite as predictable; they make decisions that lead to accidents. It's not too difficult to determine *what* they did wrong, but determining *why* is more challenging.

Lessons learned

From these two separate events, I learned what I call my top ten "WHY" lessons.

1. Most "extremely high" risks are self-imposed. Actions we take in flight or on the ground usually are influenced by personal motivation or unplanned responses to a situation. Whether it is desire to complete the mission, ego, or simply not thinking consequences through, the result can be catastrophic.

2. The response to accepting "high" risk is influenced more by actual outcome than by possible outcome. If we gamble and succeed, we are more apt to see it as a good decision than a bad one. Too many times we insist on learning our lessons from accidents rather than close calls. Both can teach the same lesson.

3. It's better to have a damaged ego than a damaged aircraft or body. Many times we go that extra 30 seconds simply because we can not or will not admit we've exceeded our capability or made a mistake or bad decision. So we make an even greater mistake or worse decision.

4. Every aviator will be faced at least once in his or her life with making a decision whose outcome can mean the difference between an accident, a close call, or a good no-go choice.

5. Aircrew coordination must involve effective communication and teamwork. One thing I remember most is the silence between the TI and me during our flight. I never communicated my concerns to him or he to me about continuing to fly that night as visibility grew worse. He was ready to land and get out several minutes before we ultimately did. The crew of the other aircraft never communicated to me that they were giving weather observation under NVGs. The crew of the accident aircraft years later never effectively communicated to each other during the last critical 2 minutes of the flight. Two highly skilled pilots do not automatically equal good aircrew coordination.

6. Making a critical decision based on a self-imposed emergency is seldom done without hesitation. The same professional pilot who will instantly respond to an emergency such as an engine failure may hesitate to abort a mission due to such factors as fatigue, bad weather, poor FLIR conditions, or simple personal conflict with another crewmember. We don't react as fast to internal warnings as we do to external.

7. Risk management during every phase of mission planning reduces unpredictable "human" actions. We reduce risk by reducing unpredictable actions. Accident-causing errors usually result from individuals' unplanned actions, and unplanned actions are usually due to unidentified risk.

8. We must seek to anticipate and eliminate every risk. Every aviator must be prepared to identify risk and work the process through to completion. Don't accept unnecessary risk, no matter what phase of the mission you're in.

9. There are no simple missions. The more we identify and eliminate risk, the greater our opportunity for success.

10. Every flight should start and end with standardization. Human beings are the most complicated of the man-machine-environment mix. There is no substitute for training to standards and enforcing those standards. Ignore standards and accidents will occur.

Too many times we insist on learning our lessons from accidents rather than close calls. Both can teach the same lesson.

Summary

My top ten "WHY" lessons are not all-inclusive. When it comes to safety, nothing is. Accidents do not just happen, they are caused. The goal of every individual in the unit should be to ensure that nothing he or she does will cause an accident.

And, because you may not get the chance to learn from your own mistakes, take every opportunity to learn from someone else's.

—CW5 John H. Strickland, V Corps Aviation Safety Officer, g1safavnof@hq.c5.army.mil

Cowboys alive and well and flying Army aircraft

As an aviation safety officer and former accident investigator, I am always on the lookout for "high risk aviators," or what we used to call "cowboys."

Cowboys are not identifiable by age, gender, race, rank, or position. They can be anyone in your unit—the commander, the operations officer, an IP, or the ASO. They can be the best or the worst officer in your organization. Their behavior can be very obvious or very discreet. They don't like doing things by the book and don't understand why they should. They become defensive when confronted and will always have an excuse for their actions. They also have a very difficult time complying with the instructions on the mission briefing sheet. When flying, one of their favorite terms is, "Watch this!"

At one point, the copilot was heard to say, "Yeeeeeee haaaaaaaa" as the PC completed a return-to-target maneuver.

I once served on an AH-64 accident investigation board. Shortly after arriving at the scene of the accident, we were handed the tape from the aircraft's video recorder. After viewing the tape, I knew we were dealing with cowboys. An accident had been inevitable during this flight; it wasn't a question of "if" an accident was going to happen, only "when."

The mission was a single-ship, day ATM training flight for an officer who had not flown much but was scheduled to deploy on a JRTC rotation. The training was to include high- and low-level reconnaissance, low-level flight, and nap-of-the-earth flight with target-engagement operations. The crew was briefed to conduct the flight in the local training area utilizing several different sectors and transition corridors.

As part of preflight planning, the crew checked the weather, computed aircraft performance data, and assessed the risks associated with the mission. Additionally, they conducted all mission and crew briefings. The crew then filed their flight plan and completed the preflight inspection of the Apache.

It was about 1400 when they took off. The PC, who was also a unit IP, was in the back seat on the controls, and the CP was in the front seat. They conducted ATM training consisting of low-level and NOE operations in several different training areas. They also practiced multiple target engagements and high- and low-recon of landing zones. This training was completely documented on the aircraft's videotape. The video also showed the PC operating the aircraft as low as 3 feet agl at 26 knots between trees and wires beside common-use roads. At one point, the copilot was heard to say, "Yeeeeeee haaaaaaaa" as the PC completed a return-to-target maneuver.

The crew continued their flight along a common-use roadway until arriving at one of the large drop zones scattered around the reservation. The PC turned the aircraft left to a heading of about 320 degrees toward a stand of trees. As the aircraft approached the trees, the PC noted a gap in the trees and asked the copilot, "Do you think we can make it between there?"

The copilot answered, "Nope."

The PC then remarked, "Sure we can. Look how big it is. Oh, ye of little faith."

At 1532 hours, immediately after the PC's remarks, the No. 4 main rotor blade struck a 2½-inch-diameter limb, breaking off an 8½-inch piece of the blade. The Nos. 2 and 3 main rotor blades also struck the tree. The aircraft shuddered violently, but the aircrew was able to land in an open field and exit the aircraft unassisted.

The aircraft was at 16 feet agl and 76 knots when it struck the tree, resulting in more than $1 million in damage to the aircraft.

So, "cowboys" are still alive and well in Army aviation. As hard as we try to identify and eliminate them in initial flight training, some still manage to get through. As professional aviators, we have a responsibility to report and eliminate them once they have been identified.

Our business is a dangerous one, and the cowboys only increase the risk. We must not condone their behavior by doing nothing.

—CW4 Gary D. Braman, 3-501 MI, Camp Humphreys, Korea, bramang@humphreys3-501mi.korea.army.mil

Hypoxic hypoxia in a Hawk?

We in the rotary-wing community tend to take certain human factors for granted at times. More specifically, the physiological effects of our environment are often ignored because we perceive our relatively slow airspeeds, low-G environment, and low mission altitudes as anything but "high performance."

As a safety officer and unit trainer in a Black Hawk company, I periodically instruct aeromedical classes. One of the hardest things to convince crewmembers of is that we are susceptible to altitude-related physiological events—in particular, hypoxic hypoxia.

Recently while serving in the Former Yugoslavian Republic of Macedonia, our company instrument examiner (IE) was giving me an annual instrument evaluation. Our flight profile took us to altitudes between 11,000 and 13,000 feet msl. Armed with the knowledge of AR 95-1's oxygen-usage rules, we proceeded, knowing we would be below 10,000 feet in well less than an hour. What happened next was a surprise to some of the crew: One of our crew chiefs began experiencing early symptoms of hypoxic hypoxia. Could it be? We had been above 10,000 feet for only 20 minutes, and above 13,000 feet for 10. The expected performance time (EPT) at this altitude is nearly 45 minutes. Yet, even this early, clearly visible were his mildly cyanotic lips and ashen skin (except for two rosy blotches on his cheeks). When asked, he admitted to feeling slightly euphoric.

Seeing this as a potentially valuable training experience, I began pointing out the objective symptoms of hypoxic hypoxia our crew chief was displaying. These, outlined in FM 1-301: *Aeromedical Factors,* should be familiar to us all. Some pilots may not have seen the various types of hypoxia recently, or even since our initial exposure during low-pressure-chamber training in flight school. For the crew chiefs and passengers this day, this was their first time ever seeing hypoxic hypoxia.

Why had only one of the crewmembers displayed the early signs of hypoxic hypoxia? Simply put, hypoxia affects people differently and at various rates.

This particular crew chief had slept only 5 hours the night before. He was a 21-year-old smoker, and he had eaten only a small breakfast more than 4 hours earlier. These factors could have contributed to the early onset and severity of hypoxia for this individual.

As we began our descent for final, our crew chief's color quickly returned. The hypoxic hypoxia had subsided, yet the valuable lesson remained. Whether you are flying at 10,000 feet msl under IMC or are involved in a multiship NVG air assault at 100 feet agl, you too can experience physiological events.

We in the low-and-slow flight community must remember that we are susceptible to altitude-induced physiological events.

Many human-factor detriments to safe flight, including decreased night vision from smoking, poor decision making due to fatigue, or loss of situational awareness resulting from task saturation, can and should be anticipated. We in the low-and-slow flight community must remember that we can induce such physiological events and even accelerate them by coupling our demanding mission profiles with self-imposed stressors.

Human factors are often found to be "contributing factors" in aircraft accidents. How you decide to proceed after identifying these detrimental factors in your mission plan is a result of your training and experience.

Some advice

Begin your flight day well rested whenever possible. Try to maintain a well balanced, nutritious diet and exercise regularly. If you are a smoker, refrain from smoking for at least 2 hours prior to flight, especially at night. When your mission profile calls for excessively high or extremely demanding modes of flight, be prepared for and expect to deal with possible human factors that could arise. These include stress, fatigue, the various types of hypoxia, and other psychological and physiological factors. As

you identify these factors, take steps to reduce the likelihood of their affecting the safe execution or continuation of the mission.

Lessons learned

We were able to modify our flight altitude that day, and the crewmember was not on the flight controls, so the situation was not critical. In this case it was just an interesting experience worth sharing: hypoxic hypoxia in a Black Hawk on an otherwise normal training mission. It was also a valuable lesson learned: All of us could experience physiological frailties within the norms of our standard mission—even in a helicopter.

As you focus on planning a successful mission, remember to consider human physiological limitations; they can be and frequently are factors during your mission—whether you recognize them or not.

—CW2 John Ramiccio, ASO, B Company, "Black Knights" 2-501st Aviation Regiment, Operation Joint Guard, Comanche Base, APO AE 09789, jramiccio@compuserve.com

Shortfax

Keeping you up to date

Class A-C reporting requirements

In a message dated 5 May 1998, the Director of Army Safety extended the reporting requirements for Abbreviated Aviation Accident Reports (AAAR) (DA Form 2397-AB-R) for applicable Class C and above accidents from 30 to 90 days. There is no change to the requirement for immediate *telephonic* notification of all Class A, B, and C aviation accidents.

POC: Mr. John Crossette, USASC Policy Branch, DSN 558-2643 (334-255-2643), crossetj@safety-emh1.army.mil

Survival radio repair and turn-in

The PRC-112 survival radio has a current-funded maintenance program at Tobyhanna Army Depot, PA. Customers should return bad radios to Tobyhanna, get them off their property books, and requisition replacements through the normal supply system. Since the PRC-112 is a major end item, it is free-issued to authorized customers only.

Tobyhanna does not have radios available to fill shortages. However, we do have a few radios that we use as maintenance floats to replace bad radios as customers return them.

—Mr. James MacElderry, CECOM PRC-12 Project Leader, DSN 992-4605 (732-532-4605), macelder@doim6.monmouth.army.mil

STACOM

STACOM 171 ◆ June 1998

OH-58 qualification

Recent questions from the field indicate some confusion concerning aviators who have completed initial-entry rotary-wing (IERW) flight training arriving at units without having qualified in the OH-58.

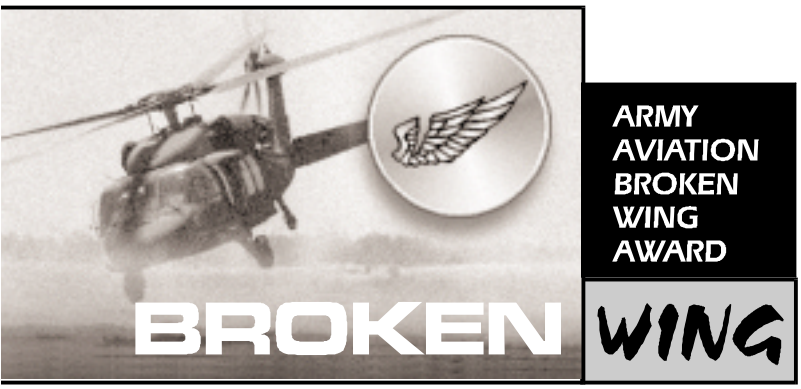
Student pilots undergoing IERW training at Fort Rucker will complete initial training qualified in *either* the UH-1H or the OH-58. All students will be qualified in the TH-67.

An aviator who has never been qualified in the OH-58 must meet the requirements of TC 1-215, paragraph 2-2: A minimum of 10 hours of flight time, including at least 1 hour of night flight and 1 hour of hooded flight.

AR 95-1, page 14, paragraph 4-19, lists the TH-67 and the OH-58 in the same series for the purpose of aircraft currency. This paragraph applies only when the aviator has completed qualification training in both airframes and is designated by the commander to fly both airframes, one as a primary and the other as an additional aircraft. Series qualification in TC 1-215, paragraph 2-3, does not address the TH-67.

POC: CW3 William Osmond, DES, DSN 558-2532 (334-255-2532), william_osmond@rucker-emh4.army.mil

***Standardization Communication* ■ Prepared by the Division of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208, DSN 558-2603/2442. Information published in STACOM may precede formal staffing and distribution of official DA policy. Information is provided to commanders to enhance aviation operations and training support.**



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.

■ CW2 Gerald R. Sherrill

Company D, 1st Battalion, 14th Aviation Regiment
Fort Rucker, AL

CW2 Sherrill was conducting live-fire gunnery training in an AH-64A with his first student of the day. The Apache was loaded heavy with Hellfire training missiles, 10 live 2.75-inch rockets, and about 100 30mm rounds.

While at a stationary out-of-ground-effect hover at 100 feet agl, the aircrew heard a high-pitched whine followed by a loud report from the No. 2 engine. Then an airframe vibration started, followed by loss of power and the aircraft settling towards the ground. While attempting to achieve single-engine airspeed, CW2 Sherrill realized that, with the current tailwind, the 60-foot trees were getting closer by the second. He decided to jettison the wing stores to achieve single-engine airspeed and announced cease-fire (aircraft were conducting live fire on adjoining pads) and mayday calls over all three radios. Once he achieved single-engine airspeed and secured the bad engine, he was able to fly to an area where he performed a single-engine landing without further incident.

Postflight inspection revealed that the No. 2 engine inlet separator blower bearing had disintegrated in flight, causing engine failure due to severe airflow disruption at the engine inlet and damage to the accessory gearbox, fuel filter system, and inlet particle separator blower housing.

■ CW4 Philip R. Westerlund

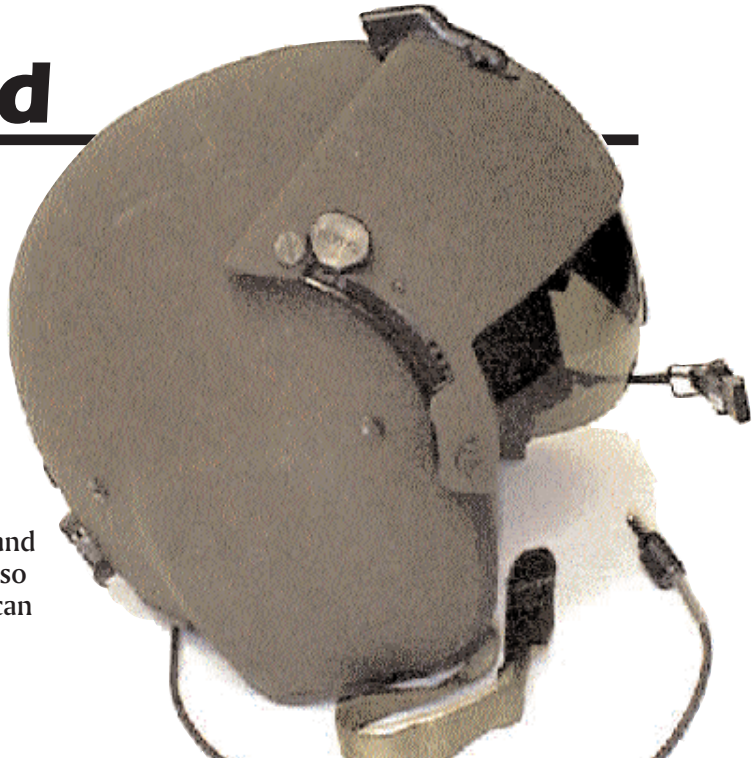
A Company, 1/140th Aviation, CA ARNG
Mather, CA

CW4 Westerlund was flying a medevac mission in a UH-1H and had just taken off after deplaning a patient at a Naval hospital. One minute into the flight, with the aircraft at 600 feet agl over a densely populated area, the master caution, engine chip detector, and engine oil pressure lights came on, followed by a shudder in the airframe and a violent yaw to the left. The only available landing area was an eight-lane interstate highway. CW4 Westerlund was able to successfully negotiate numerous wire hazards, an overpass, and heavy traffic traveling at 60 to 80 mph and complete a run-on landing with only minimal damage to the skid shoes and no injury to himself or the other three crewmembers. Estimated time from onset of the emergency to the aircraft coming to a stop was 30 to 45 seconds.

Postflight inspection revealed that the spur gear in the accessory drive assembly had cracked and peeled away from its attachment point, leading to loss of engine power.

HGU-56/P fielded

Turn-in of SPH-4/4B helmets



The HGU-56/P Aircrew Integrated Helmet System (AIHS) has replaced the SPH-4 and SPH-4B, providing a common helmet for use by all Army rotary-wing aircrewmembers. The new helmet is 20-percent lighter than its predecessors and comes in six sizes for better custom fitting. In addition to better helmet retention, the HGU-56/P offers improved impact and acoustic protection and is compatible with all aviation life support equipment. It also has a dual visor assembly with clear and tinted visors and can

accommodate a day (dark amber) and night (green) laser visor.

Fielding was managed by Project Manager Aircrew Integrated Systems (PM ACIS) based on DA priority. During fielding, pilots were allowed to keep their SPH-4 or SPH-4B helmet as well as the HGU-56/P. When they PCS'ed, they were required to turn in only the HGU-56/P. That way, if their new installation didn't yet have the AIHS, they could go back to using their SPH-4 or -4B until the HGU-56/P was fielded at their new location. However, with fielding to DCSOPS-directed units now complete, all this has changed.

New guidance

Authorization for pilots to retain their SPH-4/4B helmet and turn in their AIHS upon reassignment has been withdrawn.

Installation central issue facilities and/or property book officers who have been fielded HGU-56/P will soon require turn-in of SPH-4/4B helmets. Effective immediately, when pilots are reassigned, they will take their AIHS (HGU-56/P) helmets with them to their new units.

POC: SSG Marcella Fisher, DSN 897-4259 (256-313-4259), fisherm@peoavn.redstone.army.mil

Insert removal now authorized

Users have requested permission to remove the small foam insert located in the nape strap pad of the HGU-56/P helmet. Some aviators feel that removal of this insert gives them an increased range of head motion while wearing the helmet.

Recent retention testing (report pending) performed by the U.S. Army Aeromedical Research Laboratory (USAARL) indicated that removal of the foam insert does not degrade the dynamic retention characteristics of the HGU-56/P helmet. Therefore, optional removal of this foam pad is now authorized. Removal of the pad, however, must be annotated on DA Form 2408-22: *Helmet and Oxygen Mask/Connector Inspection Record.* In addition, the nape strap pad should be retained for reinstallation upon turn-in of the HGU-56/P helmet.

Technical point of contact is Mr. Jim Hauser, DSN 897-4267 (256-313-4267), hauserj@peoavn.redstone.army.mil.

Sizing and fitting reminder

Proper fit is essential to proper functioning of the HGU-56/P. Fit affects all helmet modules, NVG mounting, and, ultimately, the safety of the user. If optical systems such as ANVIS are used, helmet fit must be checked with that system attached. If M24 or M43 CB masks are used, they should be worn during helmet fitting.

HGU-56/P helmet size is based not on hat size but on "head length." Detailed measuring and fitting instructions are in TM 1-8415-216-12&P, the operators and unit maintenance manual for the HGU-56/P.

FYI: ALSE messages

Getting a copy of a PM ACIS message after its initial release is easy. You can obtain copies in a couple of ways:

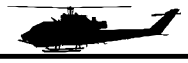
- Visit the PEO Aviation web site at http://134.78.40.107. In addition to copies of ALSE messages, you can get system updates and other news.
- Send an MS-DOS formatted 3.5" disk to Project Manager ACIS; ATTN: SFAE-AV-LSE (SSG Fisher); Bldg. 5681, room 151; Redstone Arsenal, AL 35898. Please enclose a return address label preprinted with your unit address so your request can be processed faster.

POC: SSG Marcella Fisher, DSN 897-4259 (256-313-4259), fisherm@peoavn.redstone.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class E

F series

■ Engine oil temperature rose to 92° during takeoff. Although temperature did not exceed normal limits, PC elected to terminate flight. Maintenance inspection found that oil cooler fan had bad bearings and a bad shaft.

■ During cruise flight, several loud bangs were heard from engine and aircraft yawed at each occurrence. After fourth or fifth occurrence, master caution and engine oil segment lights came on, and engine oil pressure went to zero. PC began descent to land and reduced N2 rpm in attempt to reduce severity of engine stalls. At engine idle position, stalls stopped and engine ran smoothly for about 10 to 15 seconds before failing completely. Autorotation to plowed field resulted in bent crosstube. Caused by compressor seizure due to failure of No. 1 bearing in engine.

AH64

Class B

A series

■ Upon coming to a stop after ground taxiing to park, tail section started to swing to left. Main rotor blades contacted asphalt to left of aircraft and continued the approximately 100-degree rotation until they were destroyed. Aircraft came to rest on left wing store.

Class D

A series

■ During engine start, crew noted red glow emanating from left side of aircraft, accompanied by illumination of No. 1 engine fire pull handle light. Crew performed emergency shutdown. Only damage was exhaust damage to uppermost portion (cooling fins) of No. 1 engine nacelle.

■ When picked up to stationary hover during pre-phase maintenance test flight, aircraft began uncommanded oscillations fore and aft up to 30 degrees. Crew disengaged digital stabilization equipment and landed. During postflight, crew noted damage to underside of stabilator and tail wheel strut. Damage occurred during uncommanded pitch oscillations, the cause of which has not been determined.

Class E

A series

■ Pad chief cleared aircraft to take off after loading 110 rounds of ammunition. During flight, crew heard and felt thump on left side of aircraft. After landing, it was discovered that left-hand fab door had come open during flight and was cracked.

CH47

Class C

D series

■ Aircraft on two-ship service mission had been parked at a civilian airport in an area that was heavily used by fixed-wing aircraft. During postflight inspection at final destination, damage was found on one forward rotor blade. Suspect taxiing aircraft had contacted blade.

Class E

D series

■ After completing right turn in cruise flight, master caution and No. 2 hydraulic flight control and AFCS caution lights came on. Flight engineer confirmed fluid loss, and PC initiated approach to open field. Caused by failure of forward swiveling actuator pressure line.

OH58

Class C

D(I) series

■ During aerial gunnery training, PC applied power to lift aircraft to hover. With a .50-cal machine gun (300-400 rounds) on left side and Hellfire launcher (no missiles) on right, aircraft picked up left-skid low and aft. Due to slight incline to rear of aircraft, tail skid contacted ground as skids raised to the rear. PC continued to apply power, forcing tail skid into ground and increasing pressure on vertical fin, which buckled and allowed tail rotor to contact ground while sliding laterally to left. Immediate stoppage of tail rotor caused drive shaft to sever at third section from rear. Still increasing power to pull out of what felt to the PC like a stuck skid, aircraft lifted and, once airborne, began rapid right yaw due to loss of tail rotor authority. Both PC and PI took controls and put aircraft on ground, where aircraft continued to yaw right momentarily before coming to rest. Aircraft sustained damage to the vertical fin, tail rotor, tail rotor gearbox and drive shaft, and tail-boom assembly.

■ Aircraft was started and normal runup procedures were followed. During overspeed check, engine flamed out. Systems were shut down and, after 5 minutes, crew attempted to restart. Tgt rose rapidly when throttle was opened, and PC closed throttle and aborted start. Engine monitor showed 969° start, 1085° for 2 seconds run. Incident is being investigated.

D(R) series

■ Low rotor rpm light and audio activated during standard autorotation and termination with power. Aircraft landed without visible damage. However, postflight inspection revealed engine torque reading at 135.7 percent for 1.63 seconds and mast torque readings of 127 percent for 0 second and 125 percent for 1 second. Engine will be submitted for depot-level maintenance.

Class D

C series

■ Left front skid toe reportedly caught on obstacle on takeoff. Pilot lowered collective to avoid dynamic rollover parameters and aircraft landed hard.

Class E

A+ series

■ Crew experienced over-temp during engine start. Throttle was rolled off at 800°C, but TOT peaked at 1000°.

C series

■ Loud popping noise was heard with left and right yaws in cruise flight. Rotor rpm dropped and warning system

activated. TOT rose to 650° and continued to rise to 1000°. Engine QCA assembly was replaced.

■ Transmission oil pressure gauge began to fluctuate and went to zero during flight. Aircraft landed and shut down without incident. Maintenance replaced pressure transducer.

TH67

Class E

A series

■ Cyclic started motoring during engine start. After shutdown, cyclic continued jerking and binding. Maintenance replaced friction bearing.

■ During hover, crew felt pop in pedals and tail rotor chip light came on. Maintenance replaced tail-rotor gearbox.

UH1

Class E

H series

■ IP felt cyclic binding in left rear quadrant and landed without incident. Maintenance replaced bell crank in No. 1 hell-hole under right lateral servo.

UH60

Class A

L series

■ Crew of trail aircraft in flight of seven at 10- to 20-foot hover heard explosion from tail rotor gearbox, and aircraft crashed. Tail rotor and gearbox separated from aircraft, left main landing strut pulled out, tail-rotor pylon buckled, and fuselage sustained serious damage. Suspect tail rotor ingested cargo drogue shoot. Accident is under investigation.

Class C

L series

■ During over-water flight at 500 feet and 14 miles from nearest land, crew heard high-pitched noise followed by a rattle and vibrations. No. 2 engine torque increased to 120 percent and then decreased to 7 percent. Crew returned to shore and performed single-engine roll-on landing. Cause not reported.

■ During MOC for installation of No. 1 engine anti-ice valve, MP started engine while CE held controls. When MP took controls to verify tip path plane, he heard slapping noise from rear of aircraft and saw blade tiedown rope attached to main rotor blade. MP immediately shut down engine. Blade rope attached to rotating main-rotor blade damaged tail-rotor blade.

A series

■ Main-rotor blades struck trees during takeoff, damaging three tip caps.

■ Main-rotor blades contacted tree during approach to confined area, damaging three tip caps.

■ Following initial seconds of normal start sequence, crew experienced uncommanded rapid rise in tgt. It continued to rise during emergency shutdown, peaking at 1000°C. Engine send to CCAD for teardown analysis.

■ When SAS #1 was pushed on during runup with engines at 100 percent, No. 2 AC primary bus caught fire. Emergency shutdown was completed, and fire was put out with onboard fire extinguishers. Cause not reported.

Class D

A series

■ Crew failed to remove one main-rotor tiedown rope during preflight for single-engine MOC under zero illumination. CE was available but not used. When engine was started, crew heard loud noise and performed emergency shutdown.

L series

■ While aircraft was descending on extended downwind leg to traffic pattern altitude, bird strike dented nose compartment door and broke right-hand window panel.

Class E

A series

■ Stabilator caution light came on when PCL was set in "fly" position during engine runup. Crew attempted auto-control reset of stabilator, but it would not reset. Aircraft was shut down without incident. Maintenance replaced both stabilator amplifiers.

■ Crew felt extreme vibration during roll-on landing. Suspecting ground resonance, PI started to bring aircraft to a hover. When he heard a loud bang, he terminated flight. Maintenance discovered broken inboard axle adapter plate on left landing gear. Plate supports snow ski and is suspected of allowing ski to start resonant vibration.

L series

■ Right-hand input module was leaking during runup, and aircraft was shut down. Module gimble seal was replaced.

■ CP heard thud on windscreen frame during cruise flight. Postflight inspection revealed indications of bird strike.

C12

Class C

C series

■ Left wing clipped tree during takeoff, inflicting Class C damage.

F series

■ Lightning strike damage to No. 1 propeller, left and right flaps, and tail cone was discovered on postflight.

Class E

K series

■ During landing sequence, crew received nose-wheel-unsafe indication after landing-gear extension. Crew executed emergency procedure and manually pumped landing gear down until nose indicated safe. Defective nose-actuator switch was replaced.

O5

Class E

DHC-7

■ During cruise flight, crew experienced full indication of fire on No. 4 engine. After executing emergency procedure for in-flight fire, crew expended both fire-extinguisher bottles, secured No. 4 engine, and landed without further incident. Caused by short in fire indicating system.

■ After engine start, ground crew noted hydraulic fluid leak in left-main gear area. Maintenance replaced hydraulic line from brake shuttle valve.

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-1-98-ASAM-02, 301651Z Apr 98, informational

This message provides chip-light procedures for aircraft with the ODDS power module removed. AMCOM contact: Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil

CH-47-98-ASAM-03, 282043Z Apr 98, maintenance mandatory

This message requires torque checks, torque stripes, and 50-hour inspections of the bolts that secure the T-62T-2B APU turbine assembly to the reduction drive assembly to ensure proper torque until all six bolts have been replaced. AMCOM contact: Howard Chilton, DSN 897-2068 (256-313-2068), chilton-hl@redstone.army .mil

GEN-98-ASAM-01, 012050Z Apr 98, maintenance mandatory

This message provides consolidated and updated information on aviation NVG messages. It is not intended to replace any publication. AMCOM contact: Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil

UH-1-98-ASAM-04, 301651Z Apr 98, informational

This message provides chip-light procedures for aircraft with the ODDS power module removed. AMCOM contact: Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone .army.mil

UH-60-98-ASAM-04, 101914Z Mar 98, maintenance mandatory

The purpose of this message is to require a visual and physical inspection of all H-60 aircraft for paragraph 6 servo assemblies with improperly installed swaged pin fasteners. AMCOM contact: Ed Goad, DSN 897-2095 (205-313-2095), goad-er@redstone.army.mil

UH-60-98-ASAM-05, 301445Z Apr 98, maintenance mandatory

The purpose of this message is to direct removal of all swashplate links (P/N 70400-08110-054/-061, cage code 65780). AMCOM contact: Ed Goad, DSN 897-2095 (205-313-2095), goad-er@redstone.army.mil

Safety-of-flight message

UH-1-98-SOF-05, 152026Z Apr 98, technical

This message supersedes safety-of-flight messages UH-1-98-02 and UH-1-98-04 and supplements safety-of-flight message UH-1-96-03. This message directs a one-time screening inspection and 25-hour recurring inspections of all UH-1 aircraft with T53-L-13B engines installed for damaging engine vibration levels, identifies the procedure to obtain pre-programmed AVA memory cards to perform the vibration test, and directs special reporting of vibration screening results. AMCOM contact: Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil

POV-fatality update through April

- No seatbelt
- Speed
- Fatigue

No new causes, just new victims.

FY98 = 65

FY97 = 43

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Class A Accidents through April

		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	2	2	0
	February	0	0	0	0
	March	2	1	1	0
3D QTR	April	2	0	2	0
	May	1		1	
	June	3		0	
4TH QTR	July	1		8	
	August	0		0	
	September	0		0	
	TOTAL	12	8	14	2

U.S. ARMY SAFETY CENTER

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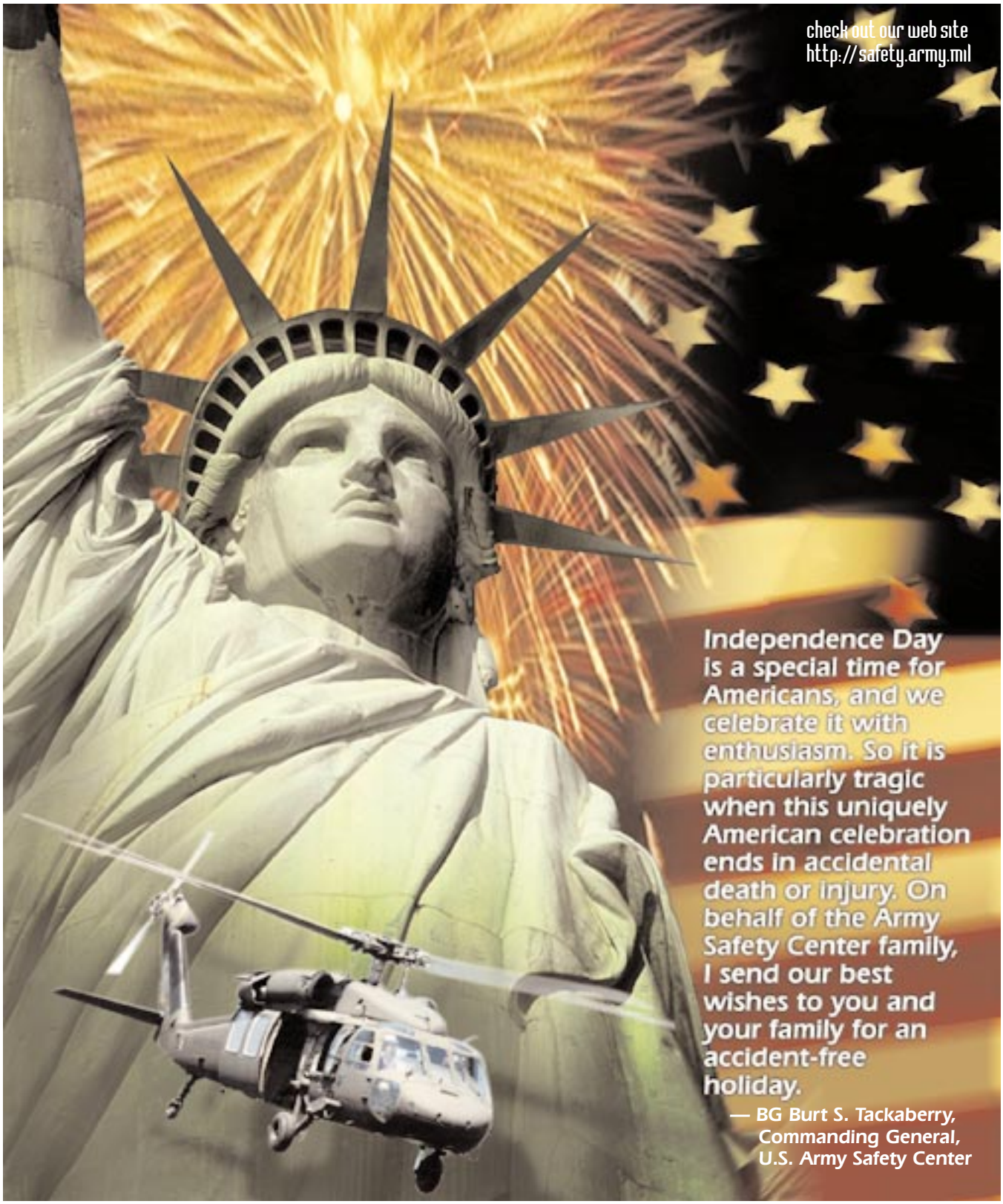
Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

JULY 1998 ◆ VOL 26 ◆ NO 10



Independence Day is a special time for Americans, and we celebrate it with enthusiasm. So it is particularly tragic when this uniquely American celebration ends in accidental death or injury. On behalf of the Army Safety Center family, I send our best wishes to you and your family for an accident-free holiday.

— BG Burt S. Tackaberry,
Commanding General,
U.S. Army Safety Center

Who's flying the aircraft?

"Thud!"

That's the sound two flight helmets with heads in them make when they hit each other.

That's the sound my PC and I heard one beautifully clear day over the Adriatic Sea as we flew toward our destination, a Navy warship off the coast of Albania.

Somehow, two prior Cobra pilots ended up together in the cockpit of a CH-47D on this beautiful day. My PC had been a Cobra IP; I am a safety officer and am well aware of what flight-crew horror stories are made of.

I was all of 6 months out of the CH-47 qualification course, and the PC had a year of Chinook experience under his belt. We were ex-gun guys with over 4500 hours between us and stars on our wings to prove it. Friends since flight school and very comfortable flying together, we were a good crew mix.

Or were we?

Our mission was to aid in evacuating American citizens from civil-war-torn Albania. We would pick up our passengers from the ship and fly them to the airport at Brindisi, Italy, and return for more.

We had been flying this mission for 3 straight days, and boredom had become our biggest enemy. Over-water flight, with its lack of visual cues, dulls the senses and leaves one searching for tasks to complete in hope of maintaining alertness. This, in addition to the effortless way the CH-47D makes its way through the sky and the repetitive nature of our mission, led us right down the path of complacency to a breakdown in our crew coordination.

We were headed back out to pick up yet another load of passengers. I was on the controls and, thus, "outside" the aircraft; the PC, working the radios, had announced that he was "inside."

We were about 30 minutes off the coast of Italy when it happened.

"THUD!"

We had bumped heads while tuning the radios. We looked up at each other, and then it occurred to us: "Who's flying the aircraft?"

Of course, *I* was supposed to be. So why was I "inside" when I should have been "outside?" Could it have been all those years of flying a tandem-seat aircraft where the placement of the radios would have made it necessary for the pilot (in this case, me) to tune the radios?

I think so.

Force modernization has phased out familiar aircraft, placing Army aviators in newer ones. It is not uncommon today to have two aviators with several thousand hours between them flying an aircraft they only recently transitioned into—an aircraft in which they have only a few hundred hours between them. Such crew mixes bring on a whole new challenge in the arena of crew coordination.

Crew coordination's role in Army aviation is more important today than ever. The aircraft we fly are more technologically advanced, and our missions are increasingly more demanding. We ***must*** talk to each other!

—CW3 Mitch Kemptner, ASO, F Company, 159th Aviation Regiment, Giebelstadt, Germany, DSN 352-7852

Learned a lesson lately?

We don't have to learn our lessons the hard way—through accidents. We can also learn from close calls, near misses, and minor mistakes—both our own and those of others. In fact, we must do so, because the cost of accidents is paid in lives, dollars, and readiness.

Share your lessons learned with all of Army aviation by sending your "War Story" to *Flightfax*:

- U.S. Army Safety Center, ATTN: *Flightfax*, Bldg. 4905, 5th Ave., Fort Rucker, AL 36362-5363
- flightfax@safety-emh1.army.mil
- Fax: DSN 558-9478/3743 (334-255-9478/3743), ATTN: *Flightfax*

What passengers don't know *can* sometimes hurt

Aircraft crewmembers know what to do when they get into their aircraft—where to step and not step, what to touch and not touch, when and how to buckle and unbuckle their restraint system, where the fire extinguishers and survival kits are and how to use them, and that their helmet's chin strap should be secured and their sleeves rolled down. However, it's just as critical that passengers know these things.

Crew familiarity with routine and emergency procedures may cause them to forget that their passengers know little or nothing about such things. Lack of knowledge in these areas can lead to serious accidents and injuries.

The pilot-in-command of an Army aircraft is required to ensure that all passengers are briefed on such things as approach and departure from the aircraft, exits, clothing, weapons and ammunition, and security of equipment. Each aircraft operators manual contains guidance for these *required* passenger briefings. Following are some general suggestions that can apply to just about any aircraft passenger briefing.

■ **Flight data.** Inform passengers of intended route, altitude, time en route, and weather.

■ **Approaching and departing the aircraft.** Explain proper direction to approach and depart the aircraft to avoid rotor blades or propellers and exhaust heat. Also go over proper entry and exit procedures.

■ **Seating.** When passengers occupy seats in the area of aircraft controls, caution them against intentional or inadvertent interference with the controls both during flight and when entering or leaving the aircraft.

■ **Smoking.** Remind passengers that smoking is prohibited within 50 feet of any aircraft.

■ **Emergency entrances, exits, and equipment.** Identify location and demonstrate operation of jettisonable doors and windows, escape hatches, cabin doors, cargo ramps, cutout/kickout panels, first-aid kits, troop alarms and jump lights, and emergency escape equipment (axes, etc.).

■ **Safety belts and shoulder harnesses.** Familiarize passengers with use and operation of this equipment and the *requirement* to use it.

■ **Helmets.** If passengers are equipped with helmets, remind them to keep the chin strap secured.

■ **Overwater flight.** If flight will be conducted over water, familiarize passengers with flotation equipment and the location and general use of all life-support equipment and methods of emergency egress in water.

■ **Survival equipment.** Point out location and explain general use of equipment such as flares, survival radios, etc.

■ **Fire extinguishers.** Point out their location and explain how to use fire extinguishers.

■ **Clothing.** Brief passengers that shirt sleeves must be rolled down during the entire flight. Be sure that all passengers without helmets wear earplugs or other hearing protection.

■ **Protective masks.** If toxic chemicals are carried inside the aircraft, make sure all passengers have protective masks readily available.

■ **Refueling.** Ensure passengers off-load and remain at least 50 feet from the aircraft during refueling.

■ **Equipment security.** Caution passengers not to throw anything from the aircraft at any time, in flight or on the ground. In addition, remind them to secure all equipment inside the aircraft to prevent its becoming a missile during a crash and outside the aircraft to prevent its being sucked into rotor systems or engine intakes or being blown into people or equipment.

■ **Emergency landing position.** Explain and demonstrate proper body position: Bend forward at the waist with feet planted firmly on the floor. Rest chest on knees and hold the position by enfolding and locking arms around and behind thighs.

■ **Off-loading.** Instruct passengers that under normal conditions they should wait until they receive word from a crewmember. In an emergency, they should off-load as soon as possible and move away from the aircraft to avoid possible fire.

UH-1 lesson learned

I recently had a small problem that might be of interest to Huey and Cobra crews.

Flying a UH-1H, we had an electrical fire during final approach. Properly following emergency procedures, we turned off the main generator (actually already off because of a prior in-flight failure), the standby generator, and the battery. We landed safely but with lots of cockpit smoke and stench. However, with no electrical power, one cannot close the throttle fully from the cockpit (power is needed to release the idle stop), nor can one turn off the fuel (a fail-safe system that needs power to activate the shutoff valve). (If memory serves me right, the AH-1 operates similarly.) Fortunately, we figured it out quite quickly and briefly turned on the battery, closed the throttle, turned off the fuel, and then turned off the battery again.

Hope this helps somebody.

—CW5 Roger Weaver, 1-158th Cav, Maryland ARNG, rogerw@capaccess.org

On crew chiefs

I am dismayed that sometimes crew chiefs are not recognized for their importance as an integral part of the aircrew. I feel fairly typical of the experienced Army aviator, so I'd like to share my feelings on this subject.

I have spent three decades in Army aviation learning from, teaching to, and sharing with the most highly skilled, motivated, and dedicated soldiers in the Army—the aviation soldier. I learned very early in my career (day-one in Vietnam) to listen to my crew chief and learn about my machine from him. That's where I learned that we were a team, that the fact that I was up front and he was in the back made no difference. If he said my tail was too close to a tree or that there was a funny sound coming from the transmission, it meant it was time to do something NOW. If I told him I needed those troops out NOW, it meant "use your boot!"

My first crew chief taught me what to ***really*** look for as I did my preflight inspections, how to fire and take care of an M-60, and how to put the aircraft to bed so it was ready to go the next day. He also taught me how to open a can of C's easier and why a .45 was better than a .38.

I taught him how to hover.

We did these things and others because we were a team, a crew.

The Army called us both "crewmembers." I was "rated," he was "non-rated." He was a skilled mechanic, I was a skilled pilot. Differences? Yes. Important? No. We were both members of a team.

I was always grateful that the crew chief looked after our aircraft and kept it healthy and that he was always "watching my six." He was grateful that I didn't run us into trees. I don't remember either of us ever saying "thanks," but we didn't have to; we were a team.

Today's "non-rated" crewmember is, more than ever, an integral and critical part of the aircrew. Like pilots, crew chiefs have an Aircrew Training Program, have minimum requirements, and are essential to proper aircrew coordination.

So that is my perspective, formed early in my career and reinforced at every assignment where I was lucky enough to have a crew chief to work with. And to every crew chief I've worked with in my 30 years, I thank you.

—Anonymous

A look at an old problem

We usually think of dynamic rollover as something to be avoided during ***slope operations***. FM 1-203: *Fundamentals of Flight* addresses dynamic rollover in the section on slope operations; aircrew training manuals include a note in the maneuver description that the aviator must understand dynamic rollover before conducting slope operations; and dash 10s include a slope-landing limit intended to minimize the chances of dynamic rollover.

Why, then, do we continue to have at least one Class A dynamic-rollover accident each year? And why have dynamic-rollover accidents destroyed six aircraft and killed one Army aviator and disabled two others in the last decade?

The attention we've given to preventing dynamic rollover during slope operations has paid off; slope operations are now involved in only a third of our dynamic-rollover accidents. The other two-thirds occur during operations on ***flat*** ground. If we understand dynamic rollover and take the same precautions when operating on flat ground as we do when operating on slopes, we should be able to virtually eliminate such accidents.

Definition

Dynamic rollover is the occurrence of a rolling motion, while any part of the landing gear is acting as a pivot, that causes the aircraft to exceed a critical angle and roll over.

Dynamic rollover is caused by main rotor thrust. Untrimmed lateral main rotor thrust causes roll rates that make the aircraft exceed its critical rollover angle. Other physical factors that contribute to dynamic rollover are center of gravity, tail rotor thrust, crosswinds, ground surface, slopes, and main rotor design.

Type Aircraft	Class A	Class B	Class C	Injuries Fatal	Injuries Disabling	Total Cost
AH-1E	1	0	0	0	0	$1,500,000
AH-1F	1	2	0	0	0	1,858,388
OH-58A	6	1	2	1	2	2,122,865
OH-58C	3	0	1	0	0	749,976
OH-6A	0	0	1	0	0	84,192
TOTAL	11	3	4	1	2	$6,315,421

Figure 1. Dynamic-rollover accidents, FY87 - FY97

...fly the aircraft *until* the aircraft's entire weight is on the gear.

Main rotor thrust

Main rotor thrust is laterally trimmed when it is acting more or less vertically. When hovering, a helicopter is laterally trimmed when ground movement is zero. If the helicopter has a pivot point in contact with the ground and main rotor thrust is not laterally trimmed, the sideward component of that thrust will roll the helicopter around the pivot. The roll rate depends on the cyclic input from the trimmed position and on the amount and rate of collective input. If the roll rate is high, the aircraft can rapidly reach its critical rollover angle.

Pilots can do two things to avoid dynamic rollover:

- Ensure that the cyclic is positioned to keep main rotor thrust laterally trimmed when touching down or lifting off to a hover.
- Stay alert to changes in aircraft attitude.

When touching down, adjust the cyclic only as necessary to maintain lateral trim and ensure a vertical descent until the aircraft's entire weight is on the landing gear. In most helicopters, once the collective is fully down, place the cyclic in the neutral or central position. In the AH-64 and UH-60, cyclic adjustment is coordinated with collective reduction.

When lifting off, first position the cyclic to ensure that main rotor thrust is vertical. As a guide, the main rotor tip path plane should be parallel to the horizon. As collective is increased and the helicopter becomes light on the gear, adjust the cyclic to compensate for winds, aircraft loading, and translating tendency. To ensure a vertical ascent, make further adjustments as each wheel or skid leaves the ground.

The pilot on the controls must always be alert to the cyclic's position, and all control movements must be smooth and coordinated. Maintain lateral trim with the cyclic, and do not apply excess cyclic to pin a wheel or skid to the ground during landing or takeoff. When landing, fly the aircraft until the aircraft's entire weight is on the gear. When taking off, start flying the aircraft before raising the collective. To avoid dynamic rollover, use these landing and takeoff techniques regardless of whether the aircraft is on flat or sloping ground.

Center of gravity

The critical rollover angle changes as the center of gravity (CG) changes. Helicopters generally have different CGs and, therefore, different critical angles in different configurations. The CG and critical angle change as fuel and ammunition are used. Asymmetric loading will also change the critical angle and make the aircraft more likely to roll toward the heavier side.

Be conscious of changes in CG that occur during the mission, and avoid asymmetric loading. When landing or taking off, think about the effect of the aircraft's CG ***before*** beginning the maneuver.

Tail-rotor thrust

In single-main-rotor helicopters, tail-rotor thrust can contribute to high roll rates. Because tail-rotor thrust acts to the right, the tail rotor tends to roll the aircraft in that direction, especially when the right skid, wheel, or float is acting as a pivot.

Historically, 9 out of 10 dynamic-rollover accidents have involved rollover to the right. Many of these accidents might have been avoided if the pilot on the controls had adjusted the cyclic to compensate for tail-rotor thrust (translating tendency), especially while lifting off to a hover.

Care must be taken when applying pedal inputs to ensure they are smooth. Adjust lateral trim with the cyclic whenever tail-rotor thrust is changed by pedal inputs. When increasing the collective, apply left pedal. As thrust is increased, adjust the cyclic to the left to compensate for increasing tail-rotor thrust to the right.

Crosswinds

Crosswinds acting on the fuselage can help roll a helicopter over. Avoid lifting off or touching down with crosswinds. If there is a crosswind, make the proper cyclic adjustment into the wind to keep the aircraft laterally trimmed. Crosswinds also require tail-rotor-pedal inputs to maintain directional control. Again, these tail-rotor thrust changes must be trimmed by cyclic inputs as necessary.

Ground surface

Rough ground or obstructions that pin a wheel or skid to the ground can contribute to dynamic rollover. Several rollover accidents have been caused by hitting an obstruction with the landing gear or by attempting a takeoff with an obstruction next to the gear. Accidents have also occurred when the aircraft was allowed to slide laterally across the ground. This can cause fuselage roll rates to develop, leading to dynamic rollover. Cold-weather operations introduce yet another danger. During liftoff, one skid will sometimes remain frozen to the ground after the other skid breaks free, resulting in the aircraft rolling over.

...start flying the aircraft *before* raising the collective.

When operating close to the ground, watch for obstructions and carefully select a landing point. If you inadvertently land with the skid or wheel against an obstruction, it would be safer to shut down and have the helicopter towed away or remove the obstruction than to attempt a takeoff.

It shouldn't be necessary to mention the need for a proper preflight inspection. However, aircraft still occasionally roll over because pilots try to take off with mooring chains still attached.

Slopes

When landing or taking off from a slope, a helicopter will roll over if the maneuver is continued after cyclic control limits are reached. Once a limit is reached, correct lateral cyclic trim cannot be maintained. Observe caution when operating on any slope, and take particular care to avoid slopes greater than the aircraft's slope limitation.

Main-rotor design

If you're an AH-64, UH-60, OH-58D, or CH-47 pilot, you already realize how sensitive these aircraft are to lateral cyclic inputs. These aircraft have good control authority; that is, they respond rapidly to cyclic inputs. Hence, they are quick to develop roll rates. However, the cyclic is also very effective in stopping that roll rate once it's detected.

Teetering-head helicopters—OH-58A/Cs, UH-1s, and AH-1s—are slow to develop a roll rate, but their control authority is so poor that cyclic inputs alone are unlikely to prevent rollover once a roll rate has developed. This characteristic is reflected in the accident data for the past decade: Every one of the Class A and B and all but 1 of the Class C dynamic-rollover accidents involved teetering-head helicopters.

While aviators have no control over the design of their aircraft's rotor, they do need to be aware of its characteristics. In a teetering-head helicopter, collective reduction is most effective at stopping a high roll rate. In other helicopters, cyclic input also has a rapid effect. Regardless of rotor design, actions needed to correct a roll rate are the same and should be instinctive: simultaneously reduce collective and adjust cyclic to maintain lateral trim.

Other factors

The physical factors already discussed—main-rotor thrust, center of gravity, tail-rotor thrust, crosswinds, ground surface, slopes, and main-rotor design—cause dynamic rollover. It's important that pilots understand that the way to prevent dynamic rollover is to avoid the physical factors that cause it. When they fail to avoid these ***physical*** factors, it's usually because of one or more of the following ***human*** factors.

■ **Inattention.** The pilot on the controls risks dynamic rollover any time he or she becomes inattentive to the aircraft's position over the ground or its attitude while lifting off or touching down. Any time you're on the controls, use extra care when operating close to the ground.

■ **Inexperience.** Inexperienced student pilots and low-time copilots have been on the controls in a large proportion of dynamic-rollover accidents. If you are the pilot-in-command, you are always responsible for the aircraft. Guard the controls, and monitor the pilot on the controls.

■ **Failure to take timely action.** The time to take action is ***before*** a roll rate develops. By the time you notice that a roll rate has developed, a rollover may be inevitable, especially in a teetering-head helicopter. When you detect a roll rate developing, simultaneously reduce the collective and adjust the cyclic to maintain lateral trim.

■ **Inappropriate control inputs.** This error is the root cause of almost all dynamic rollovers. Smooth and careful application of control inputs is the key to avoiding dynamic rollover.

■ **Loss of visual reference.** If you lose visual reference while operating close to the ground, take off or execute a go-around, using instrument techniques if necessary. If the aircraft contacts the ground while drifting sideward, rollover can occur.

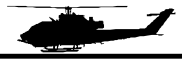
Summary

Dynamic rollover can be avoided by paying attention to the factors, both physical and human, that contribute to it. Trim the aircraft with the cyclic during landing and takeoff, and remain alert to the aircraft's attitude. Above all, fly the aircraft: when landing, until the aircraft's entire weight is on the landing gear; when taking off, before any collective is applied. And remain alert to the cyclic position and maintain lateral aircraft trim with the cyclic at all times, regardless of whether the aircraft is on flat or sloping ground.

—Update of a November 1991 *Flightfax* article by MAJ Trevor Jones, Directorate of Evaluation and Standardization, U.S. Army Aviation Center, Fort Rucker, AL

Case summaries: Dynamic-rollover accidents

AH1



Class A

E series

■ During night NVG departure from sandy area, crew lost visual reference with ground in brownout conditions and rolled aircraft on its right side.

F series

■ After refueling, aircraft climbed to 30 feet and air-taxied 300 meters to unlit holding area. As aircraft touched down, it began sliding right and started to roll. PC was unable to stop roll rate, and aircraft entered dynamic rollover and came to rest on its top right side.

Class B

F series

■ As pilot came light on skids during takeoff from sloping terrain, aircraft began to slide to right rear down slope. As pilot rapidly lowered collective and added cyclic into slope to arrest slide, rear of right skid dug into ground. Aircraft rolled right and down slope, coming to rest on its right side. Nearly inverted with engine still running, aircraft sustained major damage.

■ Malfunction in roll sensor amplifier module of SCAS as control inputs were being applied caused aircraft to abruptly roll right during attempted takeoff to a hover. Main rotor blades contacted ground, and transmission and main rotor system separated from aircraft. Aircraft was extensively damaged.

OH6

Class C

A series

■ After making adjustments to compensate for a light-collective tendency, MP started aircraft and brought it to full operating rpm. Judging collective to be excessively light, he reduced throttle to a setting above flight idle. Using his knee to hold collective down, he bent over to pick up a wrench from cockpit floor. As he did so, collective pitch stick slipped from under his knee and went to full up position. Aircraft came off ground and rolled left 90 degrees, coming to rest on its side and sustaining extensive damage to main-rotor system.

OH58

Class A

A series

■ Aircraft came to rest on its right side after encountering dynamic rollover during takeoff to a hover from level field site. Aircraft was destroyed; two crewmembers were injured.

■ Aircraft encountered dynamic rollover during night NVG landing from a hover. PC became spatially disoriented due to lack of visual cues over tall grass. Perceiving a slope where there was none, he allowed aircraft to roll right to point that blades hit ground. Aircraft was destroyed; one crewmember was injured.

■ Aircraft moved laterally to right as it descended from 3-foot hover during night orientation flight. Upon ground contact, main rotor blades struck ground and aircraft rolled onto its right side. IP was killed, student was injured, and aircraft was extensively damaged.

■ During blowing-snow approach and run-on landing, aircraft touched down skid/skis level and slid forward to where right skid/ski fell into rut created by a ski-equipped CH-47. Aircraft rolled to right, coming to rest on its right side. Aircraft was destroyed.

■ When upslope skid left ground during takeoff to a hover from side slope, student reacted by attempting to correct with cyclic control without lowering collective pitch. As a result, aircraft exceeded its critical rollover angle and rolled downslope onto its right side. It was damaged beyond economical repair.

■ After removing right front tiedown chain, crew chief unknowingly dropped it on top of right towing ring, where it became entangled. Later, during pickup to a hover, tiedown caused aircraft to roll right and nose down. Main-rotor blades struck ground, and transmission was torn from aircraft. Aircraft came to rest upright after sustaining extensive damage.

C series

■ While landing unaided at night, pilot approached ground with slightly excessive rate of descent and in right drift. Aircraft hit ground, bounced, became airborne, moved laterally to right, contacted ground on right skid, and rolled onto its right side, sustaining extensive damage.

■ Aircraft drifted right during day landing to open terrain as PC focused his attention on instruments. Right skid contacted ground as aircraft drifted laterally to right, and aircraft rolled onto its right side. Aircraft was destroyed; one crewmember was injured.

■ During takeoff to a hover, SP applied excessive right cyclic and aircraft encountered dynamic rollover. IP was unable to react in time to prevent aircraft from rolling over on its right side. Aircraft was destroyed, but crewmembers were uninjured.

Class B

A series

■ During takeoff from slope by copilot who was not OH-58 qualified, aircraft became light on skids and then continued to pivot around right skid assembly until main-rotor system and right horizontal stabilizer contacted ground. Aircraft came to rest on its right side after main-rotor system separated and tail boom sheared at attachment points.

Class C

A series

■ SP was attempting slope landing with right skid upslope. When he lowered collective with right skid down, aircraft began to slide down slope. SP corrected with collective pitch and cyclic, and aircraft rolled onto its right side.

■ When pilot increased collective to come to a hover, aircraft drifted slightly and began rolling motion to right. Pilot maintained heading and immediately lowered collective and applied left cyclic. Main-rotor blades struck ground on right side and separated from aircraft, which came to rest on original heading in upright position.

C series

■ With aircraft at out-of-ground-effect hover, IP attempted sliding right-pedal turn to reposition aircraft. As he did so, right landing gear contacted tree, and aircraft rolled to right and crashed inverted.

Hellfire system test set

A recent worldwide AH-64/OH-58 unit visit made it apparent that some units have outdated technical manuals and changes for the ATGM114 Hellfire system and AN/TSM HF 205 test set. The following are the current TMs and change numbers:

- **ATGM114 Hellfire Missile System:** TM 9-1427-475-20 (14 Jun 91) with change 9.
- **AN/TSM HF 205 Test Set:** TM 9-4935-462-12, +P (15 May 96) with no changes.

POCs: CPT Josh Sauls and Mr. Larry Niver, TSM-LB, DSN 558-3529 (334-255-3529), atzqtsml@rucker-emh4.army.mil; or SFC L.K. Faulkner, PMO Hellfire, DSN 788-0286 (256-842-0286), faulkner-lk@redstone.army.mil

Reminder: Up-slip required after medical referral

Downsizing of military health-care facilities has resulted in more and more off-post referrals. Aircrewmembers should note that such referrals do not excuse them from obtaining a DA Form 4186 (up-slip) from their local flight surgeon before returning to flight duty.

Regulations (ARs 40-8, 40-501, and 600-105) require that, after medical treatment, aviators report to the flight surgeon for appropriate fitness-for-flying determination before returning to flying duty. This is done to ensure that the medical condition, medication, or procedure does not affect the aviator's ability to perform flying duties safely. Specifically, AR 40-501, paragraph 6-11b(5) requires that DA Form 4186 be completed after treatment by a health-care professional other than a military flight surgeon.

If you have any questions on this issue, consult your unit flight surgeon.

POCs: MAJ John Albano, DSN 558-6943 (334-255-6943), or Mr. Joe Licina, DSN 558-6893 (334-255-6893), licina@rucker-emh2.army.mil, U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL

Recap of maintenance-information messages

AH-64-98-MIM-02, 171825Z Feb 98
Changes time between overhaul (TBO) of certain tail rotor swashplates.
AMCOM contact: Mr. Ken Muzzo, DSN 897-4812 (205-313-4812), muzzo-kw@avrdecr.redstone.army.mil

AH-64-98-MIM-03, 191341Z Feb 98
Authorizes continued inspection of strap pack borescope at 20-hour intervals pending publication of change 6 to TM 1-1520-238-23 in May.
AMCOM contact: Mr. Ken Muzzo, DSN 897-4812 (205-313-4812), muzzo-kw@avrdecr.redstone.army.mil

AH-64-98-MIM-04, 021324Z Apr 98
Corrects inaccurate effectivities for pilot power quadrant listed in TM 1-1520-238-23P, dated 28 May 96.
AMCOM contact: Mr. Ken Muzzo, DSN 897-4812 (205-313-4812), muzzo-kw@avrdecr.redstone.army.mil

AH-64-98-MIM-05, 131935Z May 98
Alerts users to possible faulty components on the AH-64 captive boresight harmonization kit (CBHK) that could potentially affect equipment accuracy.
AMCOM contact: Mr. Ed Daw or Ms. Kathlyn Dulaney, DSN 897-1423 (256-313-1423)

AH-64-98-MIM-06, 091415Z Jun 98
Outlines procedures for repacking main rotor head lower bearing with grease at same time upper bearing is repacked.
AMCOM contact: Mr. Ken Muzzo, DSN 897-4812 (205-313-4812), muzzo-kw@avrdecr.redstone.army.mil

GEN-98-MIM-01, 041942Z Feb 98
Confirms that additive deficiency exists in two lots of MIL-L-23699E corrosion-inhibited gas turbine engine oil manufactured by Mobil Oil Corporation.
AMCOM contact: Mr. Art Ather, DSN 897-1402 (205-313-1402), ather-im@exchange1.redstone.army.mil

OH-58D-98-MIM-02, 091430Z Mar 98
Clarifies repair criteria for low-smoke combustion liner installed in certain engines.
AMCOM contact: Mr. Jim Bartlett, DSN 897-4993 (205-313-4993), bartlettj@redstone.Army.mil

OH-58D-98-MIM-03, 091445Z Mar 98
Expands transmission overtorque limits.
AMCOM contact: Mr. Edward Mueller, DSN 645-9805 (205-955-9805), muellere@exchange1.redstone.army.mil

OH-58D-98-MIM-04, 011450Z May 98
Provides additional guidance for operating in desert environment to prevent engine wear and clogged air particle separator swirl tubes due to sand and grass accumulation in aft section of inlet shield assembly.
AMCOM contact: Mr. Gene Mergel, DSN 645-9806 (205-955-9806), mergele@avrdecr.redstone.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH64

Class B

A series

■ While purging fuel line bubble burn during hot refueling, crew noted smoking and sparking from No. 2 engine. At that time, main-rotor blades contacted PNVS and gunner's canopy. Crew executed emergency shutdown procedures and egressed without incident. PNVS and all blades sustained severe damage; engine and sudden-stoppage damage inspections are pending.

Class C

A series

■ Awaiting takeoff as Chalk 4 of flight of four, PC placed No. 1 power lever at idle to conserve fuel. On takeoff, he noted engine torque on No. 2 engine at 135 percent after about 10 seconds. PC reduced collective below 120 percent torque and moved No. 1 power lever to fly position. After torque stabilized, PC returned to takeoff point and landed without incident.

■ After maintenance test flight, crew noted that TADS day-side assembly shroud was missing. Clamp was still installed, and safety wire was intact. Cost of shroud is $30,624, and other minor damage was noted.

Class D

A series

■ During maintenance test flight for rotor track and balance, L-200 panel came open. On short final, crew experienced stuck pedal and aircraft began to yaw to right. At 10 feet, PI disengaged power by chopping the chop collar. Aircraft autorotated to runway and emergency shutdown was completed. Panel had jammed bellcrank to tail rotor. L-200 panel and drive shaft coupling were damaged.

■ Postflight inspection after landing revealed that right outboard P3 panel was missing. Fasteners and small piece of panel were still attached and intact. Panel was replaced.

CH47

Class C

D series

■ Aircraft experienced Nr reading at 120 percent for 1 second during runup in preparation for flight. Crew executed emergency shutdown. Engine inspection pending.

■ Midway through shutdown with thrust at ground detent and 100-percent rotor rpm, aircraft shuddered and rotor rpm and engine torque increased. As rotor rpm reached 120 percent, crew moved both engine condition levers to stop position and continued with normal shutdown.

■ When No. 2 ECL was moved from ground to stop during normal shutdown, crew heard rumbling from No. 2 engine and aircraft shuddered. When PTIT rose to 300°C, crew pulled fire handle. After noting no fire, crew continued shutdown. Postflight revealed shearing of Nos. 1 and 2 generator shafts and failure of No. 2 N2 actuator and sprag clutch.

Class D

E series

■ Postflight inspection revealed damage to aft rotor head as result of separation of rain shield in flight. Damage restricted to pylon area; no damage to rotor blades or swashplate.

Class E

D series

■ On short final after 1 hour flight, flight engineer heard thumping sound from No. 1 engine. PC checked engine instruments; torque was zero, N1 was 40 percent, and PTIT was 795°C. PC placed ECL to stop and motored engine to drop PTIT to below 260° as aircraft was landed. Incident is under investigation.

E series

■ When crew executed 180-degree turn to gain altitude, aircraft entered tailwind and settling/descending condition. Aircraft settled to 150 feet agl before initiating climb. No. 2 engine exceeded temperature limitations for 24 seconds. No engine damage.

OH58

Class A

D(I) series

■ Aircraft landed hard during orientation flight. Suspect inadvertent manipulation of collective. Aircraft sustained major damage to tail boom, airframe, and landing gear. Accident is under investigation.

Class C

C series

■ During pinnacle landing at night under NVGs, aircraft touched down on aft third of landing area. On touchdown, aircraft rocked back and nose pitched up. When PI in right seat applied forward cyclic, loud bang resulted and aircraft began to shake violently. Main-rotor blade had struck upper wire-cutter assembly. Crew performed emergency shutdown and safely exited aircraft.

D(I) series

■ During gunnery training, aircraft tail rotor hit tree after having been cleared to new firing position. Both tail-rotor blades were damaged.

■ During simulated engine failure at altitude, IP applied initial collective pitch between 20 and 30 feet agl. Low rotor rpm audio alarm sounded, alerting crew that throttle was still at idle. IP leveled aircraft and began to roll throttle back on but decided to roll it back to idle and applied all remaining collective pitch. Aircraft landed hard on skid heels and slid 70 feet along runway. Aircraft sustained damage to main-rotor blade, tail-rotor drive shaft, drive shaft covers, GPS antenna, and skid tube.

■ En route to FARP after firing two tables of .50-cal and rockets, left door fell off into impact area. Door was not recovered; aircraft landed at FARP without incident.

Class E

C series

■ Aircraft was told to land immediately because of improper maintenance. Logbook did not indicate that complete maintenance had been

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.

performed on PC links of rotor system.

■ Cyclic had excessive play in aft quadrants during IGE hover. Aircraft landed without incident. Maintenance replaced pilot cyclic pivot lever.

D(I) series

■ Transmission chip caution displayed during cross-country flight. After three unsuccessful burn-off attempts, crew landed without incident. Maintenance was unable to flush transmission system, so transmission was replaced.

■ Right pedal stuck during night NVG training mission. PC completed power-on run-on landing without further incident. Troubleshooting revealed that magnetic brake on tail rotor servo had failed. Brake was replaced.

UH1

Class C

V series

■ During IGE hover, transmission oil pressure gauge indicated zero without corresponding transmission oil pressure low light. Crew landed immediately. During hover to ramp 200 feet away, noise from transmission area increased and transmission oil pressure low light illuminated momentarily. Crew again landed immediately. Upon ground contact, aircraft began uncommanded left yaw. ME retarded throttle, and transmission seized. Main rotor made approximately two rotations before it completely stopped. Aircraft remained upright, sustaining damage due to sudden stoppage and resultant torque effect on airframe. Small oil fire noted in upper transmission area was extinguished without incident.

Class E

V series

■ Master caution and chip detector caution lights came on during in-ground-effect hover. Caused by failure of debris monitor (with ODDS).

UH60

Class C

A series

■ Main-rotor blades struck trees during takeoff. Three tip caps were damaged.

■ Input module exploded in cruise flight at 900 feet msl, resulting in damage to hydraulic system, engine, and fuselage.

K series

■ Five minutes into hover check after 30-minute full rpm ground runup following replacement of No. 1 accessory gearbox, crew noted vibration and illumination of rotor-brake light. As aircraft was being set down, crew noted grinding noise and performed emergency shutdown, during which rotor brake failed to engage. Inspection revealed damage to main transmission, oil cooler, and drive train in addition to rotor brake. Incident is under investigation.

L series

■ During approach to PZ, main-rotor system contacted two wires extended across field. Both wires were severed, and aircraft yawed 90 degrees to right. Aircraft was landed and shut down without further incident.

Class D

A series

■ During shutdown after NVG continuation training, pilot was unable to retract searchlight. Postflight inspection determined that searchlight mounting bracket was bent. Crew reported no unusual noise during operations. Searchlight assembly was replaced.

L series

■ After initial hookup with load (M119A1 howitzer) still on ground, aircraft drifted forward 2 to 3 feet. CE told CP to "come back two." Right sling leg caught under right recoil piston, causing gun to roll over onto its left side. Crew released load, but not in time to prevent gun from rolling over, damaging gun-sight mount.

Class E

A series

■ Loud, sharp reports were heard from No. 1 engine during runup. Crew initiated emergency procedure for compressor stall and shut down engine without any limits being exceeded. Engine was removed; inspection revealed foreign-object damage due to rivet. Exact source of rivet is unknown.

■ During refueling, crew chief noticed that right-side step cover was attached only by two fasteners. Bottom hinge had completely failed.

■ No. 2 engine flamed out when pulled to idle during simulated engine failure at altitude. Crew declared emergency and initiated roll-on landing. After restarting engine, crew obtained approval for one-time flight to home base. After uneventful flight, No. 2 engine again flamed out during shutdown. Anti-ice valve was replaced.

■ Postflight inspection revealed repairable damage to two main-rotor blade caps. Suspect blades contacted grounding rod of perimeter fence during taxi for takeoff.

L series

■ While ground taxiing to parking, PI noted that greater amount of power was required to perform normal taxi. Shortly thereafter, right tire stopped rotating, and PI terminated ground taxi and hovered to parking. Maintenance found right brake quick-disconnect line unsecured. Suspect crewmember accidentally stepped on and twisted connector during preflight, causing slow loss of fluid.

C12

Class D

C series

■ During taxi to parking spot, welcome mat was blown into left propeller. Mat had been placed 15 feet into parking area.

G series

■ During postflight inspection, crew noted right antenna pod had 1-inch-diameter area with chipped paint and a pin hole. Further inspection revealed left upper dipole antenna had broken epoxy at tip and also 1/8-inch of skin missing from aft outboard corner of left elevator. Suspect lightning strike.

H series

■ During engine runup in hard shelter igloo, overhead light fell from ceiling and struck aft upper portion of horizontal stabilizer and aft dipole antenna.

Class E

D series

■ During base turn to final after 20 minutes of engine operation, both pilots felt burning sensation in their eyes and had difficulty breathing due to noxious smell in cockpit. Caused by failure of avionics blower.

F series

■ Engine failed during startup due to fuel starvation. Maintenance replaced fire wall fuel shutoff valve.

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action messages

AH-64-98-ASAM-05, 131950Z May 98, informational

See UH-60-98-ASAM-06 below. There have been no confirmed ground or in-flight flame-outs attributed to the ODV within the AH-64 fleet. This message is only to inform AH-64 users of the problem since the ODV is used on all T700-GE-701 and -701C engines.

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

CH-47-98-ASAM-04, 141621Z May 98, maintenance mandatory

Investigation has identified 23 aft transmissions that have been overhauled with improper shimming of the input shaft. This deficiency causes excessive vibration of the transmission and premature wear of the input pinion gear and its mating gear. The shimming procedure has been corrected by tool modification, and only aft transmissions overhauled before 8 December 1997 are considered suspect. This message requires a one-time inspection to find improperly shimmed aft transmissions.

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

UH-60-98-ASAM-06, 131950Z May 98, informational

There have been several T700-GE-701C engine flame-outs in UH-60L aircraft while operating on the ground. The flame-outs have been attributed to the overspeed and drain valve (ODV). The flame-out usually occurs just as the power control lever is moved from "fly" to "idle." Other factors associated with these incidents are that the aircraft have been on the ground and at flat pitch for a period of time. To date there have been no in-flight flame-outs attributed to the ODV. The purpose of this message is to inform users of these incidents and actions taken to preclude recurrence.

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

Safety-of-flight messages

UH-1-98-SOF-06, 141508Z May 98, technical

A coated N2 spur gear has been developed that attenuates stresses in the gear. This gear will be installed on some UH-1 aircraft that have passed the vibration inspection required by TB 1-2840-229-20-15. This message directs installation of coated N2 spur gears in a limited number of T53-L-13B engines and outlines procedures for scheduling N2 spur gear replacement.

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

UH-1-98-SOF-07, 021449Z Jun 98, technical

Two problems have been identified on the UH-1 rod end clevis (P/N 204-011-136-103 or 1615UH1-100-1). Parts manufactured by GT Machine do not meet strength requirements, and some parts have been found without serial numbers to identify the manufacturer. All such parts shall be immediately removed from service. The purpose of this message is to require a one-time inspection of the rod end clevis.

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

POV-fatality update through May

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY97
80	57

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Class A Accidents through May

		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	1	2	0
	February	0	1	0	0
	March	2	1	1	0
3D QTR	April	2	0	2	0
	May	1	1	1	0
	June	3		0	
4TH QTR	July	1		8	
	August	0		0	
	September	0		0	
	TOTAL	12	9	14	2

U.S. ARMY SAFETY CENTER

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Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

AUGUST 1998 ◆ VOL 26 ◆ NO 11

AH-64A Safety Performance Review

Food for thought. This *Flightfax* spotlights the leading causes of AH-64A accidents Armywide. Do they reflect your unit's experience? I encourage you to, during pilot briefs and classes, discuss these causes and the circumstances under which they occurred, practice them in the simulator, and exercise good crew coordination by discussing—before every flight—what each crewmember will do should you find yourself in a similar situation. And, as always, FLY SMART, FLY SAFE.

—BG Burt S. Tackaberry, Commanding General, U.S. Army Safety Center

Spotlight: AH-64A safety performance review

Note: **This review of AH-64A safety performance covers fiscal years 1995 through 1997. It does not cover fiscal 1998 experience, which includes the three Class A accidents that took two lives and destroyed three Apaches during the first quarter.**

In the 3-year period FY95 through FY97, 48 Class A through C AH-64A accidents cost $67.7 million in damage and injuries; there were no fatalities. Analysis identified the following as the three most frequent types of accident:

- Tree strike
- Aircraft ground accident
- Wire strike

Tree strikes

Tree strikes accounted for 11 (23%) of the 48 accidents and $13.7 million of the cost. The primary causes were—

- Improper scanning techniques.
- Inadequate crew coordination.

Five of the 11 tree-strike accidents occurred while the aircraft was at an out-of-ground-effect (OGE) hover. In four of these, the crews were participating in aerial gunnery.

Of the 11 tree-strike accidents, 4 occurred during confined-area operations. In two of these, the crews were performing target-handoff operations.

The other 2 of the 11 tree-strike accidents occurred during nap-of-the-earth flight.

In some of these accidents, a little readiness-level (RL) training was going on at the same time, adding even more tasks to already extremely task-intensive cockpit situations.

Interestingly, experience seems to provide little protection from tree strikes. These accidents involved aircrews with all levels of experience.

Scenario 1

The Apache drifted rearward while at a 70-foot OGE hover during a target-handoff maneuver as part of RL-2 progression training. The inadvertent rearward drift toward rising terrain continued until the tail rotor struck a tree at about 20 feet agl. The crew lost directional control, and the aircraft crashed in a descending right turn. Both crewmembers were injured, and the aircraft sustained heavy damage. Injury and damage cost totaled $9.6 million.

Crew experience: The PC had a total of 5050 hours; the PI had 2521.

Scenario 2

During an ATM training flight, the AH-64A crew attempted to maneuver between two trees while conducting nap-of-the-earth flight at about 16 feet agl and 76 knots. The number 4 main-rotor blade contacted a 2½-inch-diameter tree limb, destroying 8½ inches of blade. The crew made a controlled landing approximately 500 meters from the tree strike. Neither crewmember was injured, but the aircraft was damaged to the tune of $1.2 million.

Crew experience: The PC had a total of 1319 hours; the PI had 280.

Scenario 3

While making a low approach in a training area, the AH-64A crew heard a banging noise followed by a one-to-one lateral vibration. The PC immediately made a minimum power landing. Postflight inspection revealed damage ($44,342 worth) to all four main-rotor blades.

Crew experience: The PC had a total of 887 hours; the PI had 700.

Aircraft ground accidents

Aircraft ground accidents accounted for 7 (15%) of the 48 accidents and $16.7 million of the cost. Of the seven accidents, five occurred in FY95, one in FY96, and one in FY97.

Scenario 1

Five accidents occurred during maintenance runup and troubleshooting operations. In one case, during runup for a maintenance test flight, the number 1 main-rotor blade was damaged by a survival knife that armament personnel had left on the main-rotor hub after replacing the omnidirectional airspeed sensor. Two other accidents involved drive-shaft separation as a result of tools or other FOD left in the drive-shaft tunnels.

Scenario 2

A grass fire began beneath the parked AH-64A as the flight crew conducted APU start procedures and progressed through avionics checks. When the crew saw the fire, they egressed and attempted unsuccessfully to extinguish it. The fire engulfed and totally destroyed the aircraft.

Scenario 3

When the PC's right knee-board slipped off his leg, he reached down to pick it up. As he did so, he inadvertently pushed the cyclic forward, causing the main-rotor blades to contact the pilot night vision system (PNVS).

Wire strikes

Wire strikes accounted for 4 (8%) of the 48 accidents and $10.7 million of the cost. Of the four, one occurred in FY95 and the other three in FY97.

Improper scanning was a factor in all four of the wire-strike accidents. Three of the four also involved inadequate crew coordination. And, as is the case with tree strikes, experience—or the lack of it—seems not to be a factor in wire strikes. They, too, involved aircrews with all levels of experience.

Scenario 1

A flight of five AH-64A aircraft were conducting night terrain flight. They were at approximately 200 feet agl when the lead aircraft's tail rotor struck a set of power lines, severing the tail-rotor drive shaft. The aircraft crashed into a building, causing two injuries, extensive aircraft damage, and major damage to the building and some semi-trailers. Total cost of injuries and damage from this accident was $8.5 million.

Crew experience: The PC had a total of 2413 hours; the PI had 815.

Scenario 2

During a night, unaided, formation flight in deteriorating weather conditions, Chalk 7 twice struck a set of high-tension wires at about 60 feet agl. The first strike, which damaged only the windscreen, occurred going west as the PI initiated a descent to a selected immediate landing area. The PC took over the controls, intending to land. About ¾-mile south of the initial wire-strike area, going generally east, the aircraft again struck the same set of wires. This time, the tail rotor separated from the airframe, and the aircraft crashed out of control. The two crewmembers sustained minor injuries; with damage, the total cost of the accident was just over $2 million.

Crew experience: The PC had a total of 1125 hours; the PI had 806.

Summary

This review of AH-64A accidents indicates that human-performance errors were primary factors. But, alone, that tells only part of the story. ***Why*** the human-performance errors were made is the important issue.

Could the crews have been task saturated?

Could the system have let the crews down?

Human-factor accidents usually result from a multitude of events. To prevent future accidents, these events must be identified and addressed. A well-thought-out risk assessment of each proposed mission will go a long way toward achieving this goal.

To ensure successful mission completion, all human-performance-related issues must be addressed. In other words—

- The individual aviator must demonstrate discipline and professionalism.
- Aviators must be properly trained, current, and proficient.
- Standards must exist for the task or mission being accomplished. If no standards exist, we should not be doing the task.
- Leaders must enforce the standards.
- Support, which includes aircraft design, must be adequate. If it's not, users must report deficiencies through proper channels.

Some of these human-performance-related issues deserve further discussion.

Training

From the schoolhouse to the unit, the training environment never stops. Whether as trainer or trainee, integrating today's technology with current tactics, techniques, and procedures (TTPs) can at times be overwhelming. Having so many tasks and so little time makes it easy to unconsciously put tasks that we "know well" on automatic.

This is what can get us in trouble. Putting things on "automatic" causes breakdowns in crew coordination. And, at very busy times, crew coordination becomes most important. Basically, someone must be ***consciously***, not ***automatically***, flying the aircraft.

Recognizing that task saturation is real and that materiel improvements are slow in coming, we must develop control measures from a training perspective.

Leadership and supervision

The mission-planning stage is probably the best time to address task-saturation issues. Control measures must be built in—relief valves that allow aviators to back off when they feel that saturation point coming on. To achieve this, leaders must visibly and consistently support aviators who express that a particular task may be beyond their individual capability. ("Visible and consistent" support would not include soliciting "any volunteer" as a replacement.)

Once task saturation is identified and recognized as a potential hazard, control measures can be addressed in local TTPs, SOPs, and policies.

Individual

There is no doubt that most aircrews are out there doing the very best they can. However, it appears that task saturation is becoming a reality in the Apache community. And as evidenced by the scenarios cited above, experience is no protection from it. One of the most important controls individual aviators can apply may be to recognize circumstances where task overload will likely occur and plan around it or, simply, back off.

Materiel

As equipment continues to get more and more complex, the probability of task saturation becomes more and more of a reality. Hover-hold, a three-axis autopilot that allows hands-off operation, may be part of the answer to task saturation.

POC: CW5 Mike McGee, Aviation Systems & Investigation Division, USASC, DSN 558-3754 (334-255-3754), mcgeem@safety-emh1.army.mil

AH-64 crew performance: DES observations

DES evaluation of AH-64 crew performance in the combat mission simulator (CMS) has highlighted a couple of shortcomings in crew coordination.

Inadvertent IMC

The CMS scenario that DES evaluates includes encountering inadvertent instrument meteorological conditions (IMC). Evaluations have found that during the initial transition from VFR to IFR flight, the pilot not on the controls many times does not properly support the pilot who is. He or she is concerned with finding IFR publications and tuning radios rather than assisting the crewmember who's flying the aircraft.

Proper crew coordination involves the non-flying crewmember assisting the flying crewmember through the first four steps of the transition. Only after the aircraft is under control and climbing to minimum safe altitude is there a need to get publications and tune radios.

Task saturation

DES evaluations have found that task saturation can become a significant problem when the copilot/gunner is not proficient in front-seat tasks. In such cases, the back-seater oftentimes becomes focused on talking the front-seater through systems operation rather than on flying the aircraft.

Crews must understand each other's strengths and weaknesses prior to flight to prevent task saturation.

Solutions

Proper crew briefs and good two-way communication can eliminate some of the problems discussed here, but this is not the total solution. During CMS evaluations, DES has seen crews communicate the entire time and still fail to successfully fly the aircraft. It's the crews that operate as a single entity instead of two communicating—but separate—entities that succeed when things go bad.

Proper planning, rehearsal, and—perhaps most important—individual and collective proficiency are the keys to crew success. Remember, proficiency cannot be banked until the next major training event; it is a perishable skill that must be maintained continuously.

—MAJ Don Dudley; Directorate of Evaluation and Standardization, U.S. Army Aviation Center, Fort Rucker, AL; DSN 558-1098 (334-255-1098), don_dudley@ rucker-emh4.army.mil

AH-64D Longbow Apache maintenance data recorder

The digital source collector aboard the AH-64D Longbow Apache, the Maintenance Data Recorder (MDR), is not the first crash-survivable, solid-state flight data recorder placed on an Army aircraft. The MDR is, however, the first one to be fully integrated into an Army helicopter system; it was aboard the first AH-64D off the assembly line.

Description

The MDR weighs 9.75 pounds, measures 8 x 6.5 x 5.2 inches, and receives its power from the aircraft's +28 VDC power bus. A key element of the Longbow Integrated Maintenance and Support System, the MDR is designed to store maintenance, safety, and cockpit audio data in crash-protected, nonvolatile memory.

Capabilities

In addition to cockpit audio data, the MDR records and stores 109 analog flight parameters and another 479 discrete flight parameters as maintenance and flight safety data.

Maintenance data recording includes all faults; all warnings, cautions, and advisories (WCA); any aircraft system "exceedances" indicated during aircraft operation; and all logbook-forms data: TAMMS-A 2408-4 (rounds fired), -12 (logbook), -13 (faults), and -19 (TEAC).

Safety data recording includes such things as engine torque, engine tgt, engine Ng, engine Np, main-rotor speed, altitude, attitude, airspeed, acceleration, flight control actuator positions, fuel system settings including valve positions, aircraft stabilization equipment mode selections, and all WCAs and faults reported by the aircraft.

Recording for both maintenance and safety data begins whenever a.c. power is applied to the aircraft, be it from a ground power cart, the aircraft's APU, or the aircraft's engines. Further, the MDR has a built-in test (BIT) integrated into the AH-64D diagnostics system and multifunctional displays that provides fault reporting and fault isolation for MDR failures.

Downloading

With aircraft power off, the MDR is downloaded using the Soldier's Portable On-system Repair Tool (SPORT) Computer and MDR ground station software.

Maintenance

The MDR requires no flight-crew operational checks and only limited unit-level maintenance. The only maintenance that flight-line personnel can expect is the replacement of a line-replaceable unit, which requires the removal of two screws and one connector.

Storage

Storage of the MDR is simple. It can be stored indefinitely in a dry, well-ventilated place that is free of dust and other contaminants. All that's required is a plastic cap on the J1 connector to prevent damage to the cannon plug.

The future

The AH-64D Apache Longbow MDR is not only a crash-survivable solid-state flight data recorder for today, but also a combat multiplier for the digitized battlefield of tomorrow. Already, the MDR is designed to accept an expansion module for analog-data-signal processing and acquisition. This expansion module will permit—

- Onboard rotor track and balance adjustment measurement.
- Transmission, airframe, and engine usage and vibration monitoring.

In addition, designs in the AH-64D MDR ground-station software will permit the eventual transfer of logbook, aircraft and equipment usage, and fault data directly to satellites of the Army's global combat support system. This capability will enable real-time transmission of aircraft-maintenance information from anywhere in the world to anywhere else in the world, a giant leap beyond the 5 to 10 days it now takes to mail forms and records from Bosnia to the United States.

—Mr. Joseph Creekmore, Research Analysis and Maintenance, Inc., prime contractor on DSC Demonstration Program for U.S. Army Safety Center, DSN 558-2259 (334-255-2259), creekmoj@safety-emh1.army.mil

Incident report: AH-64 uncommanded flight-control movement

AH-64A pilots have reported incidents of uncommanded flight-control movement. Descriptions have ranged from slight changes in aircraft attitude to, in rare instances, movement that affected aircraft control. The AH-64 System Safety Working Group developed this survey form to provide a means of capturing information needed to identify the cause and determine an appropriate fix. If you experience uncommanded flight-control movement, please complete and mail this survey to: Mr. Pete Alukonis, Boeing Helicopter Systems, 5000 East McDowell Road, Mail Stop M530/B145, Mesa, AZ 85205-9797.

POC name: _____ Phone: DSN: _____ Commercial: _____ Date: _____

Date of incident: _____ Aircraft S/N: _____

Location (lat/long coordinates): _____

During incident, disengage affected axis(es) on DASE: Note whether problem persists, clears up, or is intermittent:

_____

As soon as practical after an incident, record the following:

Affected axis(es): Longitudinal _____ Lateral _____ Directional _____ Collective _____

Aircraft attitude prior: _____

_____

Aircraft response during: _____

_____

Airspeed: _____

Engine torque: _____

"Feel" of controls: _____

Spontaneous movement of controls: _____

_____

Illuminated caution/info lights: _____

Hydraulic pressure: Primary _____ Utility _____

Hydraulic fluctuations: Primary _____ Utility _____

Force trim: on _____ off _____ **HAS**: on _____ off _____ **SAS**: on _____ off _____

Problem: Persistent _____ Intermittent _____ Cleared up _____

Shut down engines, keep systems on line, perform/record:

FD/LS read codes: HARS _____

DASEC _____

BUCS self (perform) _____

DASE self (perform) _____

After complete shutdown, perform/record:

Check rigging of mechanical controls: _____

Hydraulic actuator serial & part numbers: Longitudinal _____ Lateral _____

Directional _____ Collective _____

HARS S/N: _____

DASEC S/N: _____

Unusual maneuvers: _____

Last time aircraft was washed: _____

Examine hydraulic filters: _____

Examine hydraulic fluid samples: _____

Could connectors be wet? _____

Hydraulic pump or overheat history: _____

Maintenance history (Provide copy of log since last phase.)

Comments: _____

_____

_____

_____

Shortfax
Keeping you up to date

ALSE list server

In response to the needs of the U.S. Army - Europe community, the USAREUR safety office has established a list server for aviation life support equipment (ALSE) issues. The purpose of the "eur-alse" list server is to advance the Army's aviation life support system by facilitating open discussion of current issues and sharing ideas.

The eur-alse list is operated by headquarters, USAREUR, but it is open to all ALSE officers/NCOs, aviation safety officers/NCOs, commanders, and others interested in ALSE. Already signed up are 75 to 80 Active Army, National Guard, and Reserve participants from Korea to North Carolina.

The structure of the list is the same as the Army Safety Center's ASO list server; everyone on the list can post messages, and we encourage members to get involved. That said, however, I offer the following:

- When answering technical questions, cite facts supported by official references.
- When giving your opinion, state it as such.
- Use caution when attaching files; large ones choke the system. It's almost always better to describe the files (and their size) and let folks who want them contact you separately.
- Dumb-down files to PowerPoint version 4 or Word version 6.0/95.
- Use the list; it's yours.

To be added to the eur-alse list server, simply contact me at rauchs@hq.hqusareur.army.mil.

—CW5 Steve Rauch, USAREUR Safety Office, rauchs@hq.hqusareur.army.mil

Update on ASOLIST

ASOLIST, the Army Safety Center's list server for ASOs, has been on line for nearly 2 years. During this time, more than 300 ASOs all over the Army have taken advantage of this virtually instantaneous way to talk to each other across continents and oceans on topics important to Army aviation safety.

If you haven't yet signed on, you're missing a good deal. Signing on is easy. Just e-mail your request to—

LSTSERV3@PENTAGON-HQDADSS.ARMY.MIL

Be sure to use the e-mail system on which you want to receive ASOLIST traffic, because the server will automatically detect your user-ID and e-mail address from your request.

The first line of your request must read: SUB ASOLIST YOUR NAME YOUR POSITION YOUR LOCATION DSN [or commercial phone number] (example: SUB ASOLIST JOHN SMITH ASO FT ANYWHERE STATE DSN 555-5555). No other information is required.

As soon as you sign up, you will receive an e-mail message giving you the rules of engagement (ROE) for the list server. Please review these rules before sending a message to ASOLIST.

One reminder. In the simplest terms, ASOLIST automatically distributes messages to everyone on the list. So, although ASOLIST is a ***closed*** rather than a ***public*** list (not just anyone can subscribe), you should be sensitive to the information you transmit.

POC: CW4 Butch Wootten, USASC Training Branch, DSN 558-9197 (334-255-9197), woottend@safety-emh1.army.mil

New POV video on the way

Not the "usual" Army training film, this new video deals with the major causes of highway accidents in real-world terms. Soldiers will relate to the upbeat, entertaining manner in which the message is delivered. We expect that it will be widely available at local audiovisual libraries before Labor Day. Check it out by asking for "The Road Show," PIN 711133.

POC: Ms. Rebecca Nolin, Media & Marketing Division, USASC, DSN 558-2073 (334-255-2073), nolinr@safety-emh1.army.mil

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.

■ CW4 Lois R. Christensen
■ CW3 Dan A. Goddard

812th Medical Company (Air Ambulance), LA ARNG
New Orleans, LA

The medevac mission involved a hospital transfer. The patient was loaded and the UH-1V took off at 0120. While climbing through 700 feet, the aircraft twice yawed severely to the right. The rpm warning light came on, and the N2 gauge indicated zero engine rpm and overspeed on the rotor rpm. The master caution and engine chip segment lights then illuminated, followed by a high-pitch engine noise and moderate vibrations. CW4 Christensen, the PC, announced N2 failure and immediately took control of the throttle as previously briefed. CW3 Goddard, the PI, announced that he had a landing area and made a right turn toward it. The landing area was a large, well-lit concrete parking area with what appeared to both pilots to be a single wire marked with orange obstruction balls running down the middle, parallel to the approach path. What the balls were actually marking was not visible from altitude—numerous wires spaced 100 feet apart and crossing left to right across the approach path.

On short final, when the crew chief and medic began shouting "Wires! Wires!", CW3 Goddard saw the wires and slowed the aircraft. He made a pedal turn to the right and let down between the wires. CW4 Christensen continued to maintain rotor rpm with manual throttle application. A rapid collective-pitch pull was necessary to control descent to the ground, and rotor rpm began to decay.

At about 20 feet agl, the aircraft began to spin to the right. CW4 Christensen was unable to recover rpm and announced throttle going to closed position as CW3 Goddard completed his autorotative landing. During collective-pitch pull, a main-rotor blade flexed upward and contacted one of the wires, but there was no damage. An emergency shutdown was completed.

■ CW4 Phillip E. Hill

Army Aviation Support Facility, TN ARNG
Jackson, TN

During cruise flight at 1500 feet agl and 100 knots, the crew of the UH-1H heard a loud bang. Seconds later, the master caution and engine chip segment lights came on. CW4 Hill, the PC, made an immediate right turn toward an open field and began a powered descent. Seconds after that, another bang was heard, the engine oil pressure segment light came on, and N1 decreased to zero. CW4 Hill entered autorotation and called for emergency procedures for engine failure.

As he continued the autorotational descent, CW4 Hill realized that the aircraft would land short of the intended landing area. He then increased airspeed to maximum glide in order to make the open field. He successfully made his approach to the open field, which at a lower altitude revealed itself to contain no level touchdown area. He then maneuvered the aircraft to the best available area, which was the front side of a rolling hill. Considering the weight of the aircraft with nine personnel on board and the up-sloping terrain, CW4 Hill made a minimum deceleration termination and touched down in a nearly level attitude. But with the up-sloping terrain, the aircraft rocked forward on the toes of the skids, and the WSPS dug into the ground. CW4 Hill maintained control, keeping the aircraft from rocking forward, and maintained a straight ground track, which kept the aircraft from rolling onto its side.

As the aircraft slid toward the top of the hill, he assessed that the down-slope was excessive and to the right and quickly determined that the aircraft would very probably roll onto its right side. Realizing the importance of stopping the aircraft—even if it meant damaging it—in order to minimize injury to his passengers and crew, he applied aft cyclic, which stopped the aircraft upright at the top of the knoll.

Although the aircraft sustained Class C damage, no passengers or crewmembers were injured.

■ CW3 Michael W. Meyers

Army Aviation Support Facility, TX ARNG
Austin, TX

The AH-1F was returning at dusk from a firing range. The PI was on the controls, and CW3 Meyers, the PC, was in the front seat. With the aircraft in cruise flight at 1300 feet agl and 105 knots, he told the PI to turn and descend to avoid a fixed-wing aircraft at the same altitude.

As airspeed slowed to 90 knots during the descent, the pilots heard a loud crack from the rotor system. The aircraft immediately went into a right nose tuck, followed by a vibration so violent that both crewmembers' shoulder harnesses locked. Unsecured items were thrown around the cockpit, hitting the pilots, and the aircraft shook so violently that they were unable to read or interpret any of the engine or flight instruments. The noise level was such that ICS voice transmissions could not be understood. CW3 Meyers resorted to using hand and arm signals to direct the PI to start a descent.

CW3 Meyers then took the controls and tried to level the aircraft, but it again started to shake violently and rolled into a right turn. Both crewmembers attempted to stop the right turn with full left cyclic and left pedal. CW3 Meyers lowered the collective to the full-down position, which reduced the severity of the vibration, but the aircraft continued to turn to the right. As it slowed through 60 knots, he was able to stop the turn. At about 200 feet agl, he regained marginal control and spotted an emergency landing site southwest of their position.

The landing site consisted of an irregular-shaped field littered with small boulders, cactus, numerous stumps, and a 5- to 6-degree slope to the south. CW3 Meyers placed the aircraft in a left descending turn in an attempt to lose altitude and align the aircraft into the wind. As he decelerated at 10 to 15 feet, the aircraft again started vibrating violently, blurring the crewmembers' vision. Fearing loss of control, CW3 Meyers lowered the collective until impact with the ground. The aircraft touched down in a 5-degree nose down attitude between a lava rock outcropping and several tree stumps.

The aircraft sustained no damage during the emergency landing, but the PI received bruises to his inner thighs and lower legs from the violent displacement of the cyclic stick at the pilot station.

Postflight inspection revealed that the lower cheek plate fitting had broken free, allowing a main-rotor blade to twist and flap beyond normal limits.

■ CW2 Thomas J. O'Neal

C Company, 4th Battalion, 1st Cavalry Division
Fort Hood, TX

The mission was to complete CW2 O'Neal's APART and NVG currency. At 0545, the UH-60A departed the airfield to remain in right closed traffic. CW2 O'Neal, seated in the left pilot's seat, performed the NVG takeoff. As the aircraft turned onto the downwind leg and climbed through 400 feet agl, the crew lost visual contact with the ground. The IP radioed the control tower that they were entering inadvertent IMC, then took the controls from CW2 O'Neal. While the IP initiated a level climb, CW2 O'Neal removed his NVGs, turned the transponder to the emergency mode, and radioed flight operations of the emergency. ATC transitioned the aircraft to conduct the ILS approach.

As the aircraft descended through 400 feet agl on final approach, the crew regained visual reference. However, when the IP decelerated to 40 knots at 20 feet agl, the aircraft began an uncommanded right turn. As he worked the tail-rotor pedals to diagnose the situation, the IP received no response to his inputs, and the right spin accelerated. He then announced to CW2 O'Neal, "I've lost the tail rotor," and told him to shut down the engines. CW2 O'Neal had anticipated this instruction and was already working to overcome the considerable G forces involved by bracing himself against the left door with his left arm. Doing so enabled him to move both engine power control levers from "fly" to "engine off" with his right hand.

The rate of spin then decreased, and the aircraft descended to the runway, touching down upright and turning. It then flipped, coming to rest on its right side.

The aircraft sustained less than $1 million damage in what very well could have been a total-loss accident ($4.5 million). Both pilots walked away.

■ Mr. Bertrand Rhine, III

The Boeing Company
Mesa, AZ

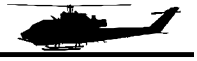
A senior experimental test pilot, Mr. Rhine was conducting a test flight of an MH-6J for the Mission Enhancement Little Bird (MELB) program. While collecting airspeed calibration data by performing a climbout at takeoff power (70 knots), the crew heard a loud bang and felt the aircraft shudder with some vibration. They were immediately informed by the chase aircraft that the tail-rotor gearbox, with tail rotor attached, and the "bicycle rack" instrumentation had separated from the aircraft.

Mr. Rhine initiated an autorotative descent and began a shallow turn toward a suitable landing area into the wind. He maintained a level attitude during the descent and initiated a deceleration in preparation for landing. During application of collective to slow the aircraft, it began a slow turn to the right, touching down with the nose approximately 45 degrees to the left of the initial landing direction. The aircraft slid and continued to rotate counterclockwise until it came to rest approximately 75 feet from its initial touchdown point, facing in the opposite direction. The aircraft sustained no damage other than that caused by the tail-rotor gearbox separating from the aircraft, and the crew escaped unhurt.

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class E

F series

■ On downwind after takeoff, ALT/RECT light came on. PC tried twice to reset alternator and was unsuccessful both times. During shutdown after precautionary landing, PC smelled odor coming from electrical compartment. Static inverter was replaced.

■ During flight idle, engine oil pressure began fluctuating between 40 and 150 psi, occasionally sticking at 150 psi. When crewmember opened left engine cowling and tapped on tranducer, oil pressure stabilized at 90 psi and crew continued mission. After closing out fuel check, crew noted excessive fuel burn rate and landed and shut down. Caused by failed forward fuel probe and bad engine oil pressure transducer.

AH64

Class C

A series

■ While ground taxiing aircraft for post-phase maintenance test flight, crew heard 30mm gun strike ground. All armament switches were off and safe. Maintenance personnel suspect that incorrectly adjusted elevation resolver allowed gun to strike ground.

Class E

A series

■ Rapid onset of severe vertical vibration occurred during climb from low-level flight. Crew elected to return to home base, where aircraft landed and was shut down without further incident. Caused by debonding of main rotor blade near tip cap. Rotor blade was replaced.

■ Brake handle was in and assumed released, but brakes were still set. This resulted in both main landing gear tires deflating on touchdown. Maintenance replaced tires and aircraft returned to flight.

CH47

Class B

D series

■ During taxi to park, aft rotor blades contacted windsock as aircraft turned left onto parking pad. All three blades required replacement.

Class C

D series

■ Crew heard high-pitched whine for several seconds while on ground in confined area but noted no abnormal cockpit indications. As they applied power to both engines to check for vibrations, No. 1 engine transmission oil temperature exceeded 130°C. As power was reduced, temperature continued to rise, exceeding 140°. Upon completion of emergency shutdown, No. 1 engine transmission oil temperature peaked at 145°, and No. 2 engine and combining transmission oil temperatures exceeded 120°C. Inspection revealed that combining transmission cooling fan shaft had sheared.

■ During taxi for takeoff, master caution light illuminated with associated transmission hot capsule. IP isolated problem to No. 1 engine transmission and immediately performed emergency engine shutdown of both engines. Postflight inspection revealed severed transmission cooling fan drive shaft and metal flaking on combining transmission filter.

Class E

D series

■ Fifteen-inch crack was found in aft rotor blade 42 inches from where trailing edge begins. Cause is under investigation.

■ During slingload operations in dry, dusty environment, hook-man failed to wait until static discharge probe had been connected to aircraft before making contact with forward hook. Static electricity discharged, shocking soldier off load. Soldier was admitted to local hospital for observation.

OH6

Class C

J series

■ During approach to confined area while conducting high-gross-weight training, PC suspected overtorque and landed. Instrument monitoring system confirmed 86.4 psi; maximum allowable torque is 84.5.

■ During test flight, engine flamed out during straight and level flight. PC entered autorotation; at about 20 feet agl, engine re-ignition system restarted the engine. Corresponding torque and difficulty handling the aircraft resulted in hard landing, which separated tail boom and damaged rotor blades.

OH58

Class A

A+ series

■ Radio communication was lost after aircraft encountered bad weather. Aircraft was found 3 days later, having impacted a severe slope in a densely wooded area. Pilot and passenger were both killed, and aircraft was destroyed. Accident is under investigation.

Class C

D(R) series

■ Tail rotor struck tree, damaging both tail-rotor blades.

Class E

C series

■ When student pilot was repositioning aircraft, gust of wind turned aircraft to left. Student applied left pedal, which increased rate of turn. As IP took flight controls, aircraft descended and contacted landing pad. Aft skids touched down first, and aircraft rocked forward. Front cross tube sustained minor damage.

D(I) series

■ Pilot was unable to engage stability and control augmentation system (SCAS)

Note: Information published in this section is based on *preliminary* mishap reports submitted by units and is subject to change.

during runup. Inspection revealed that copilot cyclic SCAS release switch had been wired backwards.

Class F

D(I) series

■ On final approach, aircraft yawed and PC heard loud bang from engine. Suspecting compressor stall, PC decided to make minimum-power run-on landing to taxiway. Compressor stall increased in severity at 15 feet, but aircraft was landed without incident. Inspection revealed compressor blades were damaged beyond repair from sand ingestion.

■ During formation flight, Nr dropped slightly and aircraft yawed left. PC also felt bump in flight controls. Thinking he had a bird strike, he landed on end of airfield. Inspection for visible damage revealed none. Maintenance inspection, however, found compressor blades damaged beyond repair.

UH1

Class D

H series

■ Forward cross tube failed during termination phase of run-on landing. Forward tunnel and fuselage (belly) were damaged.

Class E

H series

■ Aircraft was started with main-rotor blade tied down. N1 reached 40 percent before start could be aborted.

V series

■ During IGE hover, transmission oil pressure gauge indicated zero without corresponding transmission oil pressure low light. Crew landed immediately. During hover to ramp 200 feet away, noise from transmission area increased and transmission oil pressure low light illuminated momentarily. Crew again landed immediately. Upon ground contact, aircraft began uncommanded left yaw. ME retarded throttle, and transmission seized. Main rotor made approximately two rotations before it completely stopped. Aircraft remained upright, sustaining damage due to sudden stoppage and resultant torque effect on airframe. Small oil fire noted in upper transmission area was extinguished without incident.

■ Master caution and chip detector caution lights came on during in-ground-effect hover. Caused by failure of debris monitor (with ODDS).

■ After crew had started engine, crew chief checked engine compartment and saw fuel leaking from left side of engine. B-nut on manifold assembly had backed off, allowing fuel to leak.

UH60

Class A

L series

■ Aircraft crashed into mountain approximately 100 feet down-slope from peak. All three crewmembers were killed. Accident is under investigation.

■ Aircraft struck trees and crashed, killing two passengers. Accident is under investigation.

Class B

A series

■ Postflight maintenance revealed that all four main-rotor blades had contacted ALQ-144 antenna, damaging all components.

Class C

A series

■ Damage to main-rotor tip caps was discovered during postflight inspection following NVG confined-area operations. Suspect tree strike.

■ Tgt exceeded start-abort limit (850°C) during engine start. During start abort, tgt rose to 940°C for 10 seconds. Estimated engine damage: $340,000.

■ Structural damage was discovered during postflight after phase maintenance test flight. Investigation is under way.

L series

■ Crew smelled burning electrical odor during hot refueling, but all gauges were normal and crew could not find any indication of fire or smoke. As aircraft was positioned out of refuel, crew noted burning smell was becoming stronger. During shutdown, crew observed small amounts of smoke coming from No. 1 engine compartment. Inspection revealed heat damage to No. 1 engine compartment. Cause not reported.

Class E

A series

■ Ground crew heard whistling sound coming from rotor system of aircraft taxiing to parking. After shutdown, main-rotor blade erosion strip had 18-inch separation.

L series

■ Aircraft was on short final to LZ when parachute flare blew into rotor system. Blade was repaired and aircraft released for flight.

■ Complete loss of a.c. power occurred during landing. Emergency APU start was completed, and aircraft was shut down without further incident. A bare electrical wire was creating a short, which resulted in loss of a.c. power.

■ Four-inch tear was discovered on bottom of main-rotor blade. Inspection revealed metal clip from vehicle imbedded in blade. Suspect damage was caused when aircraft landed to unimproved LZ and mud containing clip was slung from landing gear into rotor system. Blade was replaced.

Class F

L series

■ Whining noise was heard from cabin roof area during cruise flight. About 10 minutes later, cruise climb was initiated; 20 to 30 seconds later, loud shudder and bang was heard. Aircraft was landed without incident. Caused by turbine engine FOD.

C12

Class E

G series

■ Right bleed air warning light came on during cruise at 21,000 feet. Crew performed emergency procedures and returned to takeoff point without incident. Poly-flow tubing had come in contact with bleed air line and melted hole in blue plastic tubing.

C20

Class E

F series

■ Left thrust reverser unlock light came on during climbout. Checklist procedures were followed, and light remained intermittent. Caused by improper adjustment of left thrust reverser doors.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785).

Aviation messages

Recap of selected aviation safety messages

Aviation safety-action message

GEN-98-ASAM-02, 251610Z Jun 98, maintenance mandatory

This message supersedes GEN-98-ASAM-01. The purpose of this message is to provide consolidated and updated information on aviation NVG messages. It is not intended to replace any publication.

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

Safety-of-flight message

AH-1-98-SOF-01, 242118Z Jun 98, technical

In November 1997, the Army placed flight restrictions on UH-1 helicopters in response to a trend of N2 spur gear failures caused by vibration in the aircraft's T-53 engines.

AH-1 aircraft equipped with the T53-L-703 engine has exhibited the same vibration found in the T53-L-13B engines. However, the T53-L-703 engine fleet has experienced a lower spur gear failure rate.

After careful consideration and as a prudent safety measure, the Army has determined that all AH-1 aircraft T53-L-703 engines will be inspected for vibration levels. An inspection procedure has been established to screen for and detect the presence of the vibration associated with failure of the spur gear (P/N 1-070-062-04, NSN 3020-00-453-9441). This procedure utilizes the aviation vibration analyzer (AVA) with a specialized application program specifically designed to detect the vibration.

Aircraft found to exhibit the damaging vibration will be grounded until the engine is replaced or a long-term corrective action is implemented. This long-term action is expected to be implemented by the second quarter of FY99. Aircraft that are screened and do not exhibit the damaging vibration will be released to fly. All aircraft released to fly will be required to repeat the vibration inspection every 25 flight hours.

Specialized reporting procedures are required to document the results of the vibration screening. Accurate, timely reporting is crucial to procuring the correct number of replacement assemblies and restoring the entire fleet to flight status as soon as practical.

The purpose of this message is to—

- Direct a one-time screening inspection and 25-hour recurring inspections of all AH-1 aircraft with T53-L-703 engines for damaging engine-vibration levels.
- Identify the procedure to obtain pre-programmed AVA memory cards to perform the vibration test.
- Direct special reporting of vibration screening results.

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

POV-fatality update through June

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY97
88	63

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CW3 Dan A. Goddard
CW4 Phillip E. Hill
CW3 Michael W. Meyers
CW2 Thomas J. O'Neal
Mr. Bertrand Rhine, III

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Class A Accidents through June

		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	2	2	0
	February	0	0	0	0
	March	2	1	1	0
3D QTR	April	2	0	2	0
	May	1	1	1	0
	June	3	2	0	4
4TH QTR	July	1		8	
	August	0		0	
	September	0		0	
	TOTAL	12	11	14	6

U.S. ARMY SAFETY CENTER

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Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

SEPTEMBER 1998 ◆ VOL 26 ◆ NO 12 http://safety.army.mil

Food for thought.
In our continuing effort to prevent soldier deaths in POV accidents, the Army Safety Center has produced "The Road Show," a short video that can be used in your unit to generate discussion of the major causes of and control measures for highway accidents. Visit our web site at http://safety.army.mil for ordering instructions as well as a downloadable facilitator's guide and additional briefing ideas. Working together, we can save soldiers' lives.

—BG Burt S. Tackaberry
Commanding General
U.S. Army Safety Center

Fiscal year 1998 has not been a great year for Army aviation as a whole, and the UH-60 has not been spared. In fact, we saw a sharp rise in UH-60 Class A-C accidents during the first 10 months of FY98, and UH-60s accounted for 6 of the Army's 14 Class A helicopter accidents during that period.

QUESTION:

Is there cause for alarm?
Let's look at the trends to find out.

Spotlight: UH-60 safety performance review

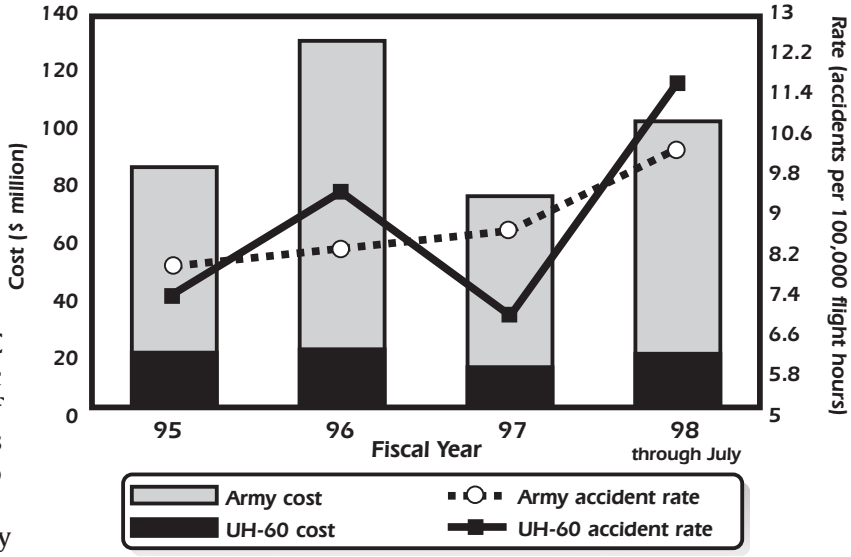

Figure 1. Rate and cost comparison of Army and UH-60 Class A-C accidents

Army trends

The overall Army aviation Class A–C accident rate is on a pretty dramatic upward trend (figure 1). Through July of this fiscal year, that rate is 10.23 accidents per 100,000 flying hours, compared to FY97's year-end rate of 8.60.

Why is this happening? There are many possible contributors. Among them are reductions in flight hours, experience (measured in terms of pilot-in-command (PC) time), and manpower.

A trend that all aviators probably know too well is that PC time, which equates to experience, is coming down. In 1992, for example, PC time in Class A-B accidents averaged 1327 hours. Five years later, in 1997, it was less than half that—536 hours. It's a pretty safe assumption that this severe reduction in our experience base has, to at least some degree, adversely affected our accident rate.

One type of accident seems to lead the pack every year: Collisions of all types, especially tree strikes, account for a large percentage of Class A-C accidents. This trend, which has persisted for more than 4 years, is common to nearly all Army helicopters, and the Black Hawk is no exception.

UH-60 trends

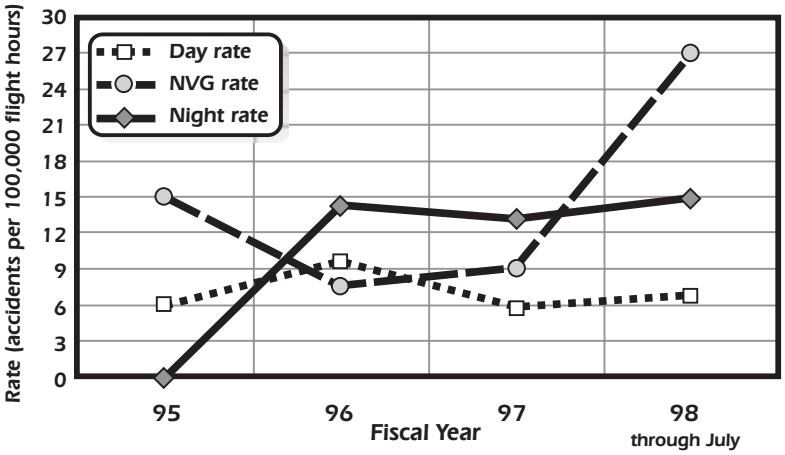

Figure 2. Comparison of UH-60 Class A-C accidents by mode of flight

Only a cursory glance at figure 1 makes it clear that UH-60s are not having a good year. So, back to the original question: **"Is there cause for alarm?"** The answer is no, not "alarm," but there is certainly cause for concern.

We should all understand that factors outside the Black Hawk community seem to have a wide impact. This is evidenced by the fact that not a whole lot of difference exists between the Army's Class A-C rate for all aircraft (10.23) and the UH-60 rate (11.60). Therefore, to reduce Black Hawk accidents, we may have to look at mostly aviation-wide controls. The Black Hawk community, though, is not absolved of responsibility. Although Army UH-60 rates are not severely out of synch with Army aviation as a whole, there are some trends that need immediate attention in the community.

When we look at Class A-C Black Hawk accidents by mode of flight (figure 2), we see a spike that could be defined as "alarming": The NVG accident rate rose almost 300 percent during the first 10 months of FY98. However, we should take this with a grain of salt; we had only 10 NVG Class A-C accidents in 37,100 NVG hours. This is a small sample on which to base a trend.

Day rates also rose. These rises were accompanied by a rise—albeit only slight—in the percentage of accidents that happen on single-ship missions. What emerges is a trend that suggests that, in the Black Hawk community, single-ship, NVG missions are the most likely missions to end in a Class A-C accident.

—CPT Stace W. Garrett, Aviation Systems & Investigation Division, DSN 558-2781 (334-255-2781), garretts@safety-emh1.army.mil

Smiths Industries Voice and Data Recorder

The Smiths Industries Voice and Data Recorder (VADR) was the first crash-survivable solid-state flight data recorder ever placed on an Army aircraft. It's also the digital source collector currently installed on the special ops version of the Black Hawk, the MH-60K. In addition, the VADR is used on the MH-47E helicopter and the RAH-66 flying prototypes and is widely employed by the Air Force, Coast Guard, Navy, and Marine Corps. The Army is currently evaluating VADR installation on A and L series UH-60s at Fort Rucker as part of a 19-aircraft demonstration effort that involves not only the UH-60 but also the CH-47D, AH-64A, and OH-58D.

Description

The VADR weighs 6.7 pounds and measures 5 x 3.4 x 9.6 inches. It records flight data from either the military standard 1553 data bus (OH-58D and AH-64A) or from the AN/AVS-7 ANVIS/HUD (UH-60A/L and CH-47D).

Capabilities

The VADR can record 25 hours of continuous flight data and up to 2 hours of continuous cockpit audio. Powered by the aircraft's +28 VDC essential power bus, the VADR records information any time the aircraft is powered, whether from internal or external sources. The VADR can withstand impact forces of more than 3400 G's as well as a 1-hour, 1100°C postcrash fire.

Downloading

Downloading and processing data is quick and simple. Maintenance personnel can connect a laptop computer to the VADR's download port (part of the installation kit) and download up to 13 hours of flight data in less than 3 minutes. The data is then transferred to a ground-station or desktop computer for analysis.

Software

The VADR is unique among flight data recorders now aboard Army aircraft in that, unlike the others, the VADR can be reprogrammed by users at unit level. For example, if a new flight parameter is added to the list of those already being recorded by the VADR, the Army simply ships new software upload disks to user units. Unit personnel then load the new program into each VADR right at the aircraft. This eliminates the need to ship recorders back to vendors for reprogramming.

Maintenance & storage

The VADR requires maintenance only when it is to be stored. Even then, the only requirement is placement of a plastic dust cap over the J1 connector to prevent damage or contamination.

Operational checks

Before use, flight crews should—

- Visually inspect the J1 connector on the side of the box for cracks or dents that could affect the recording capability of the unit.
- Visually inspect the wiring harness that connects to the VADR through the J1 connector for pinched or severed wires that would affect the recording capability of the unit.

—Mr. Joseph Creekmore, Research Analysis and Maintenance, Inc., prime contractor on DSC Demonstration Program for U.S. Army Safety Center, DSN 558-2259 (334-255-2259), creekmoj@safety-emh1.army.mil

UH-60 individual training: DES observations

The goal of every aviation unit is to train to a level of readiness that will enable it to perform its wartime mission. Flying hours are a precious resource, and every minute must be used to its maximum to ensure readiness. Recent assessments have revealed several areas that units should focus on to improve overall aviation training and readiness.

Commander's task list (CTL)

The CTL is used to inform crewmembers of their authorized flight duties and stations and their flying hour, task, and evaluation requirements. In many cases, units create generic CTLs and apply them to every assigned aviator.

The commander should tailor the CTL to each individual based on the crewmember's experience, abilities, and proficiency. For example, a commander may require a FAC 1 aviator who is a recent graduate of the UH-60 qualification course to fly more than 48 hours semiannually to gain proficiency. The number of iterations required for each task should also reflect the crewmember's proficiency. When an aviator fails a flight evaluation and a "U" is entered on the DA Form 7122-R: *Crew Training Record*, the CTL should reflect an increase in the number of iterations for the task the aviator performed unsatisfactorily.

In addition, not every crewmember needs to perform every mission task. For example, if a unit has a mission to perform water-bucket operations, the commander should carefully select the aviators he or she feels are qualified to perform the mission, and add that task to their CTL. Not every aviator needs to be water-bucket qualified.

Crewmember training records

Reviews of individual aircrew training folders reveal that few crewmembers are receiving unsatisfactory evaluations. DES has too often found units with only the rare "unsatisfactory" on unit aviators' training records. In one case, DES found not a single "U" in any of the unit's aircrew training folders. However, unit IPs gave a total of 11 "unsatisfactories" when they were being evaluated by DES SPs.

Unsatisfactory evaluations often turn into "training flights" to avoid a blemish on the record. In some cases, the IP will tell the crewmember that he or she is weak in certain areas but pass the crewmember on the evaluation. As a result, the standards are lowered because crewmembers learn they can remain weak and still pass annual or no-notice evaluations.

IPs may be reluctant to place a "U" on the DA Form 7122-R because it is a permanent record. However, the 7122-R is not an OER. No-notice and annual evaluations must be conducted to ATM standards, and the 7122-R must reflect the true results of the evaluation. Accurately graded evaluations will improve individual performance and keep standards constant.

No-notice program

The no-notice program is an extremely important tool for commanders to ensure crewmembers are maintaining standards. The unit SOP should define the no-notice program, and no-notice evaluations should include both rated and nonrated crewmembers. DES has suggested that no-notice performance be monitored at division and brigade level as a gauge to assist in the management of aviator training.

Nonrated crewmember training

Some nonrated crewmembers are progressing to RL1 without meeting the minimum flying-hour requirement of 5.5 hours. In other cases, units do an excellent job of training during RL progression but do not sustain the academic training once the RL progression is complete.

DES recommends that units use every available training opportunity to conduct nonrated crewmember academic training. During goggle inspection prior to an NVG flight, crews should discuss night illusions. In addition, crews can discuss various academic subjects during flight, including emergency procedures and aeromedical factors. Sergeants' time can also be used for academic training.

Another key to a successful nonrated crewmember training program is involvement of senior NCOs from company level through brigade.

Formal simulator program

The UH-60 flight simulator is an excellent training device. Units should create a formal simulator training program that includes both instrument and tactical scenarios. Crews should be given a scenario to plan and execute, and units should receive feedback from simulator operators on crew performance.

Tactical flight scenarios should focus on aircraft survivability equipment, emergency procedures, terrain flight planning, navigation, and inadvertent IMC recovery procedures. Instrument flight scenarios should focus on instrument planning and procedures, radio-aided navigation, emergency procedures, and use of the command instrument system.

The simulator is also an ideal device to train and evaluate aircrew coordination. Aircrew coordination training (ACT) does not end with course completion;

it is a vital part of the overall aircrew training program. ACT should be emphasized during readiness level progression and evaluated during APARTs.

There is a jump seat in the simulator that is ideal for platoon leaders and company commanders to observe their crews. That jump seat is also a great observation post for new aviators to observe what "right" looks like.

Bottom line is that the simulator is an essential part of a unit's training program and must have the commander's attention to ensure that it is used to its maximum.

Summary

Maintaining individual and crew proficiency requires constant attention. It also requires—

- A commander's task list that tells each aviator what his or her requirements are and what skills are expected.
- Crewmember training records that accurately reflect aviators' proficiency.
- A tough no-notice program to tell the commander where each aviator is throughout the year.
- A well-monitored simulator program to ensure that those tasks that cannot be accomplished in the aircraft can be executed to standard should the real situation arise.
- A nonrated crewmember program that ensures that crew chiefs are a fully functioning part of the aircrew.

None of this is easy, but it can be done—and it can be done well. There are units that have been almost perfect in their execution of the ATP, there are units that are doing well above average, and there are units that have challenges.

Take full advantage of every flying hour to maximize training. In today's times of reduced resources, every hour is more than precious.

—CPT Steve Millward; Directorate of Evaluation and Standardization, U.S. Army Aviation Center, Fort Rucker, AL; DSN 558-9229 (334-255-9229); steven_millward@rucker-emh4.army.mil

Current Black Hawk issues

Power management & "wrong engine"

Power management has been steadily creeping up as a cause of UH-60 accidents in the Army. And any accident in which power management is a factor is usually catastrophic. In the span of only about a year, two Black Hawk accidents have been attributed to power-management errors. Both ended in multiple deaths and destroyed aircraft.

Here are a couple of real concerns that Black Hawk pilots need to think about:

- How many times have you consulted figure 5-9 in TM 1-1520-237-10 to know when blade stall can occur?
- When was the last time you practiced (in the simulator) recovery from blade stall?
- Have you practiced (in the simulator) getting into and recovering from power-management-critical areas?

Another important question is this: How many aviators have touched or moved the wrong power-control lever during an emergency—simulated or real? This question was asked to many aviators a couple of years ago in a survey that came as a result of an accident in which the pilot shut down the No. 1 engine in response to a No. 2 engine fire. Recently, a group of Army Aviation Center and Army Safety Center personnel gathered to assess the current risk and develop controls to mitigate it. The group identified that the hazard of a forced landing due to moving the wrong PCL in an emergency situation was high. The controls include a myriad of design and training possibilities. But what can be done at unit level right now? Much of what is discussed in the risk-management example on page 6 could also apply here.

Dual engine rollback

This is a condition that is isolated to the Black Hawk community in T-700 and T-701C engines. It involves simultaneous decrease of both Np down to, normally, 95 to 96 percent, but sometimes down to 88 to 92 percent. The condition persists for only seconds before it returns to normal. Since 1990, we have had 17 incidents, with only one repeat aircraft. None of these incidents, however, resulted in damaging accidents.

Tiger teams from AMCOM have investigated numerous times, but no definitive cause has been identified. Information is needed. If you experience this condition, do not hesitate to report it to AMCOM or the Army Safety Center.

ALQ-144 strikes

We in the Black Hawk community seem to be forgetting that the ALQ-144 can be hit in certain conditions like aft cyclic and rough landings. During the first 10 months of FY98 alone, we had five ALQ-144 blade strikes that cost the Army nearly half a million dollars. Remind yourself often that the "disco light" is back there and that ATM procedures are designed to help avoid costly errors.

—CPT Stace W. Garrett, Aviation Systems & Investigation Division, DSN 558-2781 (334-255-2781), garretts@safety-emh1.army.mil

UH-60 operations: A lesson in risk management

Analyzing accident trends gives us an overview of Black Hawk safety performance. What we are truly interested in is not simply identifying the problems, but rather, first eliminating those hazards that can be *eliminated* and then *controlling* the rest. That's where risk management comes in.

FM 100-14: *Risk Management* was published in April 1998 to give commanders and other leaders a five-step process for managing the risks that are inherent in Army operations. Let's look at how the process works in Black Hawk operations.

The first step is to **identify the hazards**. Obviously, you need good information, and you have three ways to get it:

- Use your own unit's experience (experience goes a long way in identifying hazards).
- Log on to the Army Safety Center's Risk Management Information System to look at Armywide hazards. Contact your ASO for access.
- Request information through your safety chain.

All of these methods will help you identify the hazards inherent in the specific missions your unit performs.

Table 1 provides information on Armywide Class A-C UH-60 accidents for the period FY94 through the first 10 months of FY98. From this information, we can draw conclusions about the top hazards affecting the Black Hawk community.

For the purpose of this article, let's look strictly at the number-one Black Hawk accident event Armywide—collisions—and apply the five-step risk-management process to it in order to suggest control options for your unit.

Step 1: Identify the hazards

We've identified collisions as a hazard, given that they comprise 47 percent of all UH-60 Class A-C accidents for a 5-year period. What can be done to mitigate this hazard?

Step 2: Assess the hazards

FM 100-14 gives guidelines for assessing the severity and probability of a hazard; those guidelines appear here as tables 2 and 3.

In our example, the probability of a collision is about 4.7 Class A-C collisions per 100,000 flight hours. That correlates to the definition in table 2 under the term "Seldom (D)" for a single item, "Not expected to occur during a specific mission or operation." Therefore:

HAZARD PROBABILITY = D

We can assess hazard severity from either of two perspectives: the most *likely* severity or the most *dangerous* severity. The most *likely* severity correlates with the definition of "Marginal (III)" in table 3, since most collision accidents are Class C with no loss of life or injury. On the other hand, if we look at the most *dangerous* severity, we must classify it as "Catastrophic (I)" because a collision has proven fatal in the past. Therefore:

HAZARD SEVERITY = I or III

Quite a disparity, isn't it? The bottom line is that the assessment of hazard severity is your call based on your intuitive analysis, experience, and judgment. The option you choose is up to you, but the process remains the same.

For our purposes here, let's risk manage from the perspective of "most dangerous," the I-D, which, according to table 4, equates to high risk. Keep in mind that this assessment is for illustration purposes only; it is by no means an "official" assessment for this hazard.

continued on page 8

Table 1. UH-60 Class A-C accidents, Oct 93 – Jul 98

Top 3 Accident Events	Percent of All A-C	Top 3 System Inadequacies*	Top 3 Task Errors**
1. Collisions (tree, bird, object, ground, water, etc.)	*47%*	*1. Overconfidence* *2. Inadequate supervision* *3. Inadequate experience*	*1. Inadequate crew coordination* *2. Improper scanning* *3. Improper estimation or control input*
*2. Flight-related operations****	*10%*	*1. Insufficient information* *2. Inadequate SOP* *3. Inadequate training*	*1. Inadequate crew coordination* *2. Failed to follow instructions* *3. Failed to follow SOPs*
3. Hard landings	*5%*	*1. Inadequate SOP* *2. Adverse environmental conditions* *3. Inadequate supervision*	*1. Inadequate hazard detection* *2. Inadequate scan* *3. N/A*

* Refers to inadequacies in the system of performing the mission.
** Refers to an error on the part of an individual or crew.
*** Refers to accidents that do not cause damage to aircraft or crew but that occur during aircraft operations (rappel, hoist, etc.).

Table 2. Hazard probability

FREQUENT (A) Occurs very often, continuously experienced	
Single item	*Occurs very often in service life. Expected to occur several times over duration of a specific mission or operation. Always occurs.*
Fleet or inventory of items	*Occurs continuously during a specific mission or operation, or over a service life.*
Individual soldier	*Occurs very often in career. Expected to occur several times during mission or operation. Always occurs.*
All soldiers exposed	*Occurs continuously during a specific mission or operation.*
LIKELY (B) Occurs several times	
Single item	*Occurs several times in service life. Expected to occur during a specific mission or operation.*
Fleet or inventory of items	*Occurs at a high rate, but experienced intermittently (regular intervals, generally often).*
Individual soldier	*Occurs several times in career. Expected to occur during a specific mission or operation.*
All soldiers exposed	*Occurs at a high rate, but experienced intermittently.*
OCCASIONAL (C) Occurs sporadically	
Single item	*Occurs some time in service life. May occur about as often as not during a specific mission or operation.*
Fleet or inventory of items	*Occurs several times in service life.*
Individual soldier	*Occurs some time in career. May occur during a specific mission or operation, but not often.*
All soldiers exposed	*Occurs sporadically (irregularly, sparsely, or sometimes).*
SELDOM (D) Remotely possible; could occur at some time	
Single item	*Occurs in service life, but only remotely possible. Not expected to occur during a specific mission or operation.*
Fleet or inventory of items	*Occurs as isolated incidents. Possible to occur some time in service life, but rarely. Usually does not occur.*
Individual soldier	*Occurs as isolated incident during a career. Remotely possible, but not expected to occur during a specific mission or operation.*
All soldiers exposed	*Occurs rarely within exposed population as isolated incident.*
UNLIKELY (E) Can assume will not occur, but not impossible	
Single item	*Occurrence not impossible, but can assume will almost never occur in service life. Can assume will not occur during a specific mission or operation.*
Fleet or inventory of items	*Occurs very rarely (almost never or improbable). Incidents may occur over service life.*
Individual soldier	*Occurrence not impossible, but may assume will not occur in career or during a specific mission or operation.*
All soldiers exposed	*Occurs very rarely, but not impossible.*

Table 3. Hazard severity

CATASTROPHIC (I)	*Loss of ability to accomplish mission, or mission failure.* *Death or permanent total disability (accident risk).* *Loss of major or mission-critical system or equipment.* *Major property (facility) damage.* *Severe environmental damage.* *Mission-critical security failure.* *Unacceptable collateral damage.*
CRITICAL (II)	*Significantly (severely) degraded mission capability or unit readiness.* *Permanent partial disability.* *Temporary total disability exceeding 3 months' time (accident risk).* *Extensive (major) damage to equipment or systems.* *Significant damage to property or the environment.* *Security failure.* *Significant collateral damage.*
MARGINAL (III)	*Degraded mission capability or unit readiness.* *Minor damage to equipment or systems, property, or the environment.* *Lost day due to injury or illness not exceeding 3 months (accident risk).* *Minor damage to property or the environment.*
NEGLIGIBLE (IV)	*Little or no adverse impact on mission capability.* *First aid or minor medical treatment (accident risk).* *Slight equipment or system damage, but fully functional and serviceable.* *Little or no property or environmental damage.*

Step 3: Develop controls and make risk decisions

The task of developing controls for the collision hazard might be overwhelming without further definition of the hazard. We need to have an idea why the hazard is resulting in accidents. Another reason to better define the hazard is so we can prioritize our controls; i.e., which control will make us the most money?

Eliminating the collision hazard would require that we either (1) quit flying or (2) quit flying near any object. Neither is feasible. So, because we cannot eliminate the hazard, we must develop controls to mitigate the hazard.

Table 1 lists the top three system inadequacies and task errors associated with each hazard. These are going to help us define the controls that will attack the root of the problem. The controls suggested here will be geared toward what can be done at unit level, not what "the Army" needs to do.

As we consider the top three system inadequacies and task errors that result in collisions, we can sum them up into categories of controls such as improved aircraft training and crew-coordination training. Above and beyond what we are already doing, the following controls to mitigate the hazard of collisions are possibilities you might consider implementing. Let's evaluate the impact of the three options.

■ **Control option 1: Enhanced simulator program.** A structured simulator program that mandates flights that mirror real missions would increase aviators' positive habits in the conduct of those missions. This option might entail full and complete mission planning on every flight, METL-related mission scenarios, and mandated maneuver execution. In addition, a pilot acting as an observer that debriefs the pilots would enhance everyone's abilities. In the case of collisions, all of the prevalent system inadequacies and task errors could be addressed in the simulator, thereby mitigating the risk of collisions. However, such a program would have to be managed to be effective.

■ **Control option 2: Aircrew coordination sustainment program.** All Army aviators are qualified in aircrew coordination, but we have no standardized sustainment program. An official program at unit level conducted during simulator training periods, APARTs, and no-notice rides by independent observers (PI, PC, IP) would keep our aircrew-coordination skills fresh and viable. An observer with a simple checklist on a mission would give the commander an idea of the state of aircrew coordination in the unit. And, since crew-coordination errors are the leading task error for collisions, it makes sense that this control could mitigate the hazard.

■ **Control option 3: Improved crew-selection process.** Proficiency versus currency is at the heart of this control option. To mitigate the hazard of collisions, practiced and proficient aviators should conduct missions. This option would require that we define "proficiency" as it relates to our specific METL.

After developing controls, we must make decisions about which one or ones we will implement. This selection and prioritizing of controls will be based on resources available and residual risk left after the control is in place.

Step 4: Implement controls

Once we've made our risk-control decisions, it's time to implement the controls. We must ensure that they are integrated into SOPs, written and verbal orders, mission briefings, and staff estimates. The critical check for this step is to ensure that controls are converted into clear, simple execution orders that are understood by everyone involved. The risk-management work sheet at figure A-2 in FM 100-14 will help in this process.

Step 5: Supervise and evaluate

We must supervise mission rehearsals and execution to ensure that controls are implemented and remain effective. Once the mission is completed, we evaluate how well the controls worked and change them as necessary.

Summary

The five-step risk-management process can be used to manage hazards at any level. Although the example here dealt with an Armywide hazard, you may have identified other hazards that are more prevalent in your unit. Use the process to develop controls to mitigate them, and implement the ones you can at your level. Those you can't, refer to your higher headquarters.

That's risk management.

—CPT Stace W. Garrett, Aviation Systems & Investigation Division, DSN 558-2781 (334-255-2781), garretts@safety-emh1.army.mil

Table 4. Risk assessment matrix

SEVERITY		PROBABILITY: Frequent A	Likely B	Occasional C	Seldom D	Unlikely E
Catastrophic	I	E	E	H	H	M
Critical	II	E	H	H	M	L
Marginal	III	H	M	M	L	L
Negligible	IV	M	L	L	L	L

E – Extremely high risk H – High risk M – Moderate risk L – Low risk

An exercise in risk management

Below are three accident scenarios. Conduct a quick risk assessment by identifying the hazards of each mission and developing controls. Answer the following questions for each scenario and then check your answers at the end.

- *What hazards that affected the outcome should have been identified before the mission?*
- *What controls could have effectively mitigated the identified hazards?*

Scenario 1

On a day recon of an NVG route, a flight of two UH-60s enters a valley through the mountains. Visibility is good, and the two aircrews see high-tension wires crossing the valley from ridgeline to ridgeline. To cross the wires, the crews choose the lowest point in the wires. While crossing at 50 to 75 feet above the main wires, Chalk 1 strikes the second of two small static wires that cross above the main wires. The aircraft loses its tail rotor and spins into the trees below, injuring six occupants and destroying the aircraft.

Scenario 2

On a single–ship, day, photo recon mission, an ESSS-equipped Black Hawk with full ERFS tanks makes a turn in excess of 60 degrees bank and 90+ degrees of direction at 100 feet AHO. The aircraft loses altitude, dips down into the trees, and sustains a blade strike. The aircraft continues down in a level attitude to a hard landing on a road. The ERFS tanks separate from the aircraft, rupture, and explode, killing eight occupants and destroying the aircraft.

Scenario 3

A platoon leader and crew chief are preparing the aircraft to MOC a newly installed fuel filter on the No. 2 engine. They are using no communication equipment. Three blade tiedowns and all four aircraft tiedowns are attached. The platoon leader, wearing no protective equipment, climbs in and straps himself in the right seat. As he starts the No. 2 engine against the gust-lock, the crew chief on the cowling says to "bump it up." When the pilot increases the PCL to about 96 percent, the gust-lock breaks, and the blades begin to turn. Because the blades are tied down, one bends and breaks, causing a severe out-of-balance condition that shakes the aircraft apart. Both pilot and crew chief are killed, and the aircraft is destroyed.

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Answers

Scenario 1

- **Hazard**: Crossing wires in low-level flight
- **Control**: Cross wires in accordance with ATM

- **Hazard**: Loss of situation awareness; failing to perceive hazards (inability to detect small wire)
- **Control**: Altitude restriction (above all wires in area)

Scenario 2

- **Hazard**: Operating noncrashworthy ERFS
- **Control**: Risk manage use of ERFS (is the mission worth the risk?)

- **Hazard**: Improper power management leading to loss of situation awareness; failing to project effects of action
- **Control**: Power-management training; simulator scenarios of critical power-management situations

Scenario 3

- **Hazard**: Operating engines against gust-lock while aircraft is tied down
- **Control**: MOC training program for non-MTPs designated to conduct MOCs that require engine start

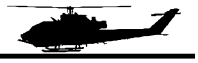
- **Hazard**: Loss of proper communication capability in coordinated-effort tasks
- **Control**: Require that MOCs be treated as "intent to fly" (use ALSE, prepare aircraft, and maintain crew communications)

- **Hazard**: Loss of situation awareness; failing to project effects of action, resulting in exceedance of aircraft limitations
- **Control**: Emphasize ATM and –10 training (monthly tests?)

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class C

F series

■ On landing following left anti-torque maneuver, front and rear crosstubes separated just above skid cuffs. Aircraft belly contacted ground, damaging fuselage, transmission, main drive shaft, WSPS, VHF and UHF antennas, and crosstube assemblies.

Class D

F series

■ Aircrew was performing simulated engine failure at a hover when aircraft hit ground hard and bounced back into air. IP took controls and recovered by advancing power and stabilized aircraft at hover. Postflight inspection found skids spread and lower WSPS tip broken.

Class E

F series

■ Master caution and transmission chip lights came on during cruise flight. Postflight inspection revealed that quantity and size of magnetic plug exceeded limits for ODDS-equipped aircraft. Transmission and mast were replaced.

■ After several days of rain, runup hydraulic check found pilot cyclic stiff in right quadrant. Maintenance cleaned cyclic support and adjusted friction.

AH64

Class C

A series

■ Aircraft was undergoing maintenance checks for engine replacement. After 5-minute hover following normal engine start and runup, aircraft was landed for troubleshooting of low cockpit pressure indications. Inspection revealed no oil in either engine nose gearbox. Residual oil in sight glass read normal prior to engine runup.

Class D

A series

■ VHF and UHF antennas were found broken during postflight inspection after nose-down slope training.

Class E

A series

■ APU fire pull handle illuminated at 500 feet agl and 110 knots. Crew pulled fire handle and made emergency landing. Inspection revealed moisture in electrical connector to fire pull handle.

■ No. 2 nose gearbox caution light came on during cruise flight. Gearbox was replaced.

■ Aircraft was on ground with engines running when ground personnel smelled strong odor and then saw ashes dropping from engine nacelle. Crew immediately shut down and exited aircraft. Inspection revealed that No. 1 engine exhaust nozzle V-band clamp had failed and scorched some anti-chaffing tape.

■ Pilot felt uncommanded yaw inputs along with slight pedal vibration during flight. During shutdown, a high frequency noise was heard. Postflight inspection revealed that No. 7 drive shaft was excessively scored.

CH47

Class C

D series

■ Center clevis hook released while aircraft was at 75-foot hover following takeoff. Slingloaded HMMWV fell to ground, sustaining extensive damage.

■ Fire emanated from No. 2 engine cone during shutdown after flight that included simulated engine failure. Upon seeing engine temperature exceed 940°C, crew initiated emergency procedures to complete shutdown. Investigation is under way.

■ Crew experienced No. 2 engine PTIT overtemp during engine shutdown.

Class E

D series

■ During ground taxi for takeoff, latch indicator for left combining transmission tripped. Flight engineer tried unsuccessfully to reset the latch. Aircraft was then returned to parking IAW instructions in a message about combining transmission cooling fan shaft failures. When maintenance removed cooling fan drive shaft, lower spline adapters were found to have numerous cracks and broken pieces. There was also unusual wear on cooling fan drive shaft. QDR and parts were submitted for analysis.

■ Just before liftoff to hover, SP in troop commander's seat heard change in aircraft noise and felt high-frequency vibration from vicinity of forward transmission. Aircraft was immediately shut down and towed to parking. Drive shaft assembly was replaced.

OH58

Class C

D(I) series

■ With 28-knot tailwind during hover, pilot inadvertently depressed SCAS-release switch, which disengaged stability and control augmentation system, increasing pilot workload. Pilot over-controlled, causing tail skid to strike ground. Tail skid scraped laterally along concrete ramp for 6 inches before contacting a tar expansion joint, causing overstress failure of vertical stabilizer.

■ Crew was performing simulated engine failure at altitude. Main rotors drooped during recovery with power, and aircraft landed hard, damaging main landing gear.

Class D

D(I) series

■ Postflight inspection found aft crosstube excessively spread. IP reported that training day had been uneventful, and at no time did he suspect damage.

D(R) series

■ After sending digital message during OGE hover, PI looked up and saw a few small pieces of a tree limb fly by aircraft. No abnormal vibration or noise was noted. He flew to nearby clearing and landed. Inspection found damage to both tail-rotor blades, which were replaced.

Class E

A series

■ During formation flight at 800 feet agl and 100 KIAS, crew felt lateral vibration, accompanied by thrashing sound from rotor system. Crew notified flight lead and turned toward airport less than 4 miles away. As aircraft turned, vibrations increased, and crew made

precautionary landing without incident. Postflight inspection revealed damage to rotor-blade tip that had debonded aft of tip cap, which had remained in place.

D series

■ After normal approach for landing, aircraft began to vibrate and rock side to side when skids touched down. As collective was lowered, rocking motion progressed to whirling motion that became more violent as collective was lowered. Whirling motion stopped when pilot raised collective and returned to a hover. Crew repositioned aircraft and landed without further incident. When maintenance test pilot duplicated event, vibrations stopped when SAS was disengaged. Suspect new software, which had been installed just before the incident, affected yaw SCAS channel; previous software version was reinstalled, and aircraft was released for flight.

UH1

Class C

H series

■ Half-inch wrench used for tail-rotor adjustment was left on vertical fin. Post-phase test flight was accomplished without incident, but damage to tail rotor was discovered during postflight inspection.

Class D

H series

■ During termination phase of run-on landing, forward crosstube failed at left attaching point, followed immediately by failure at right attaching point. As aircraft settled, lower wire cutter was forced up into belly, damaging sheet metal and breaking copilot's chin bubble.

Class E

H series

■ Crew noted stiffness in tail-rotor pedals during downwind segment of traffic pattern. Maintenance determined that stiffness was caused by paint overspray on tail-rotor control chain.

■ Crew began smelling fuel odor after 15 minutes of fuel transfer from left internal auxiliary tank during straight and level flight. When odor persisted even after windows were opened, aircraft was landed and fuel was seen draining from vent line under aircraft. After shutdown, crew plugged vent line with rags until maintenance arrived.

V series

■ Aircraft responded to civil aircraft crash in remote area and transported two injured personnel to hospital. After returning to home base, postflight inspection revealed irreparable damage to one main-rotor blade. Suspect FOD from flying debris in unimproved landing area.

■ After approach to 5-foot hover near accident site, crew decided to reposition tail rotor away from accident scene. After moving tail about 90 degrees to the right, crew felt unusual vibration, and PC took controls and landed. Postflight revealed 6-inch cut on one blade; tail rotor had hit tree branch.

UH60

Class C

A series

■ Main-rotor blades contacted tree during NOE terrain flight. Aircraft was returned to home base without incident. One blade required replacement; remainder sustained tip-cap damage.

L series

■ Collapsed tail strut was discovered during hot refueling following landing to dusty LZ at night.

Class D

A series

■ Prior to takeoff, two crewmembers checked and locked cowling, and PC checked all latches and found them secure. On takeoff, No. 1 engine cowling came open and tore off aircraft. Crew landed and ground taxied to parking without incident.

L series

■ During drug-interdiction support mission at night under NVGs, aircraft was at 100 feet tracking suspect boat. As aircraft descended parallel to boat to make positive identification, vessel slowed down and pilot lost visual contact. Boat turned toward aircraft and struck fuselage under left cabin door. Aircraft returned to home base and landed without incident. Postflight inspection revealed sheet-metal damage to fuselage and tail yoke.

Class E

A series

■ When PI applied aft cyclic while entering tight confined area, main-rotor tip contacted pine needles. Controllability check showed all responses normal, and mission was continued. Postflight inspection revealed broken tip cap.

■ Crew smelled burning odor just before landing. Upon entering FARP, they saw smoke coming from nose compartment and performed emergency engine shutdown. Caused by overheated wiper motor.

■ IP felt uncommanded cyclic roll during cruise flight. While verifying that PI did not bump controls, IP again felt cyclic roll left followed by aircraft shudder. Assuming a flight control malfunction, IP made precautionary landing. Maintenance replaced SAS computer.

■ Master caution light illuminated on downwind, and, upon touchdown, strong electrical odor was detected and battery fault light came on. Upon entering parking after ground taxi from runway, ground personnel reported that right main landing gear was on fire. Emergency shutdown was performed and fire was extinguished. Cause of fire not reported.

L series

■ While aircraft was slowing from 60 KIAS during approach to confined area, bottom of tail boom contacted tree branch. Vegetation caught in tail wheel section and bent actuator and damaged left rear APR-39 antenna.

C12

Class B

F series

■ Aircraft was struck by lightning after encountering IMC an hour after departure. Crew continued to their intended refuel point, where a cursory check revealed damage only to left aileron and right inboard flap. Subsequent inspection at home station revealed right propeller damage as well.

Class C

C series

■ Aircraft was struck by lightning while in cruise flight in IMC. Lightning entered left propeller, penetrated left inboard de-ice boot, and exited through trailing edge of left wing outboard flap. Postflight inspection also revealed damage to left and right horizontal stabilizers.

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-64-98-ASAM-06, 201811Z Jul 98, maintenance mandatory

Chaffed wires have been found on some aircraft that experienced uncommanded flight-control inputs. Although not confirmed, these wires are suspected to have contributed to the problem.

The purpose of this message is to require inspection, rerouting, and repair of certain wires identified in the message.

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

Safety-of-flight message

CH-47-98-SOF-02, 161231Z Jul 98, technical

In the recent past, three Chinook combining transmission cooling fan drive shafts have sheared. All three were the new shafts (P/N 145D5319-7) installed as part of MWO 1-1520-240-50-67. Failure of these shafts was contained by the "stovepipe" retaining shield, which prevented any collateral damage. However, because the cooling fan was no longer operating, temperature of the combining transmission and both engine transmissions exceeded limitations. These high-temperature conditions required replacement of all the transmissions that exceeded 140°C.

Investigation of the cause of the three fan-shaft failures is on going. The purpose of this message is to implement flight restrictions, additional preflight-inspection procedures, and a recurring inspection every 4 flight hours of the combining transmission cooling fan drive shaft in Chinook aircraft having MWO 1-1520-240-50-67 applied. The flight restrictions and inspections will continue until the cause of the combining transmission cooling fan drive shaft failures have been determined and corrective actions have been implemented.

AMCOM contact: Mr. Teng Ooi, DSN 897-2094 (256-313-2094), ooi-tk@redstone.army.mil

Maintenance-information message

GEN-98-MIM-02, 251625Z Jun 98

The purpose of this message is to notify users that DOD-L-85734 lubricant can be used as a direct replacement for MIL-L-23699 in all Army helicopter transmissions and gearboxes. The new lubricant contains an extreme-pressure additive that provides better wear protection and higher load-carrying capacity than the MIL-L-23699. When MIL-L-23699 is used in transmissions or gearboxes, it may elevate iron-particle readings in AOAP samples. This is due to corrosion-inhibiting/dispersing additives, which act as a solvent to clean residual oil debris from gearboxes or transmissions.

Although the two lubricants are compatible, they should not be mixed in service. MIL-L-23699 should be drained before refilling with DOD-L-85734. Flushing is not required unless debris is detected on the chip detector or oil filter.

Note that DOD-L-85734 should not be used in any helicopter turbine engine because turbine engines operate at higher temperatures than transmissions and gearboxes and may cause premature elastomeric seal deterioration.

AMCOM contact: Mr. Art Ather, DSN 897-1402 (205-313-1402), ather-im@exchange1.redstone.army.mil

POV-fatality update through July

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY97
100	71

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Class A Accidents through July

		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	1	2	0
	February	0	1	0	0
	March	2	1	1	0
3D QTR	April	2	0	2	0
	May	1	1	1	0
	June	3	2	0	4
4TH QTR	July	1	1	8	0
	August	0		0	
	September	0		0	
	TOTAL	12	12	14	6

U.S. ARMY SAFETY CENTER

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ARMY AVIATION RISK-MANAGEMENT INFORMATION

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The OH-58D community is flying more hours and going more places than ever before. Yes, we're having our share of mishaps, but we're also accomplishing our share of successful missions under very challenging conditions, night in and night out.

SPOTLIGHT

OH-58D

safety performance review

Spotlight: OH-58D safety performance review

Army aviation's Class A accident rate has climbed steadily from the best ever in FY96—0.74 accidents per 100,000 flying hours—to 1.57 through the first three quarters of FY98. We in the OH-58D community have contributed to this increase. Table 1 shows how we compare with the rest of the Army in terms of Class A accidents and flying hours.

Table 1. Class A accidents by type aircraft (first 3 quarters, FY98)

Type aircraft	Class A accidents	Flying hours
UH-60	5	161,749
OH-58D	3	63,322
AH-64	3	79,300
OH-58A/C	1	67,599
AH-1F	1	15,220

Table 2 tells the OH-58D Class A-C story. These figures reflect one ground-related Class A, a wire strike, two engine failures, two collisions with the ground, three tree strikes, a couple of hard landings resulting from simulated engine failure (SEF) at altitude, a broken oil line, a door falling off, one overtorque, and a hot start.

Table 2. OH-58D accidents (first 3 quarters, FY98)

Class	Number	Fatalities	Injuries	Cost
A	3	0	2	$10,190,122
B	1	0	0	$ 344,498
C	11	0	0	$ 535,548

A look back

The OH-58D has undergone significant changes over the past 10 years. Starting out as a slick aerial platform used mainly for directing artillery fire, the aircraft has become an armed reconnaissance aerial platform that can carry Hellfire missiles, 2.75-inch rockets, a .50-caliber machinegun, outside seats for troops, and sling loads. The OH-58D has outdistanced its former counterpart, the OH-58A/C, in systems technology by leaps and bounds, having gone from analog to digital in only a few years.

Has this leap in technology affected OH-58D safety performance? Table 3 displays 10 years' data that show that all this technology has not resulted in accident reductions. Such events as tree strikes, engine failures, and hard landings are still plaguing the OH-58D community.

Table 3. OH-58D Class A-C accident experience

Fiscal year	Flying hours	Class A	Class B	Class C	Total
89	22,852	2	2	2	6
90	25,852	4	1	4	9
91	18,619	4	1	4	9
92*	21,079	2	0	4	6
93	24,635	1	1	5	7
94	38,694	0	1	3	4
95	46,655	1	3	8	12
96	62,516	1	1	3	5
97	63,065	1	4	8	13
98**	63,322	3	1	11	15

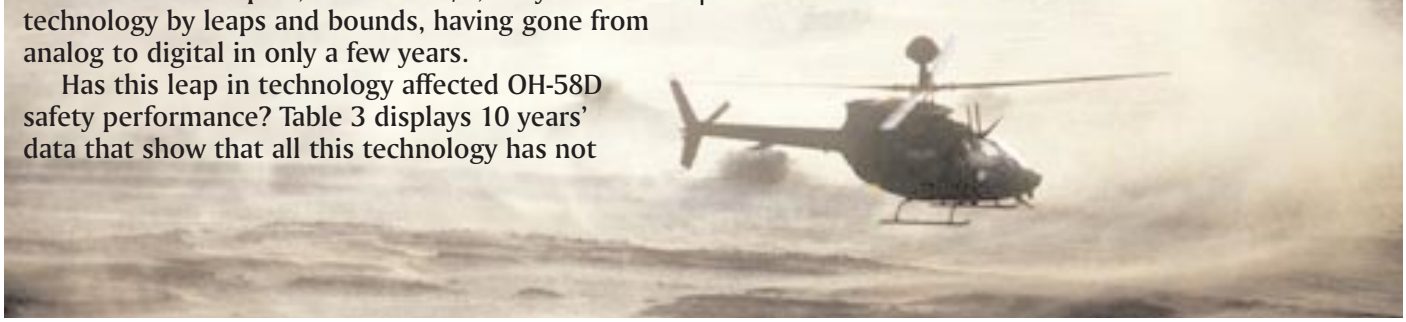
*Introduction of OH-58D(I)

**Through 3rd quarter

Workload

Although OH-58D technology has greatly enhanced our capabilities to find and destroy the enemy, that capability has come at a price in terms of pilot workload. More and more often we see "loss of situational awareness" or "task overload" cited as a factor in accident reports. For example, why did two OH-58Ds collide in midair during aerial gunnery operations? Both aircraft had instructor pilots on board. Was it because the IPs were busy conducting training? Or were they overwhelmed by the technology in the aircraft? Were they operating the mast-mounted sight, lazing targets, and putting rounds down range rather than flying the aircraft?

OH-58D drivers may be thinking, "But that's our mission." And that's true; all those things *are* part of our mission. However, we must never forget that flying the aircraft is the most important part of the mission. It does us no good to fly to a battle position ready to launch rounds at the enemy and then realize we're in a right spin because we just drifted into a tree.



Mishap trends

Tables 4 through 6 present a snapshot of OH-58D Class A-C accident experience over the past 4 years.

Table 4. OH-58D tree strikes

FY	Class A	Class B	Class C	Fatalities	Injuries
95	1	0	1	0	2
96	0	0	1	0	0
97	1	1	2	1	1
98*	1	0	2	0	0
Total	3	1	6	1	3

*Through 3rd quarter

Table 5. OH-58D engine failures

FY	Class A	Class B	Class C	Fatalities	Injuries
95	0	3*	0	0	0
96	0	0	0	0	0
97	0	0	1	0	0
98**	0	1	1	0	0
Total	0	4	2	0	0

*Two of the three occurred during simulated engine failure
**Through 3rd quarter

Table 6. OH-58D simulated engine failures

FY	Class A	Class B	Class C	Fatalities	Injuries
95	0	2	0	0	0
96	0	1	0	0	0
97	0	2	2	0	0
98*	0	0	4	0	0
Total	0	5	6	0	0

*Through 3rd quarter

Selected accident briefs

■ **Tree strike.** During an in-ground-effect stationary hover, the IP, using ANVIS NVGs, allowed the OH-58D to drift to the right rear approximately 182 feet. The main-rotor blades of the armed aircraft hit a lone tree at about 20 feet agl, and the aircraft descended to ground impact, coming to rest upright. The two crewmembers were not injured, but the aircraft sustained $2.9 million damage.

■ **Engine failure.** It was a routine flight until the aircraft shuddered and a "HIGH TORQUE LIMIT" message appeared and audio sounded. Moments later, the "AC GEN FAIL" message and audio came on, alerting the crew to a low-rotor condition. The PI, who was on the controls in the right seat, entered an autorotative descent and landed in a planted field. As the aircraft came to a halt, the main-rotor blades struck the tail boom, severing it from the fuselage.

■ **Simulated engine failure.** During ATM training, the IP (left seat) was demonstrating a simulated engine failure at altitude. When he applied initial collective pitch at 20 to 30 feet agl, the low rotor rpm audio sounded, alerting the crew that the throttle was still at the idle position. The IP leveled the aircraft and began to roll the throttle back on but then decided to roll the throttle back to the idle position. He applied all remaining collective pitch to cushion the landing, but the aircraft landed hard on the heels of the skids and slid 70 feet along the runway. The aircraft sustained damage to the main-rotor blades, tail-rotor drive shaft, drive-shaft cover, GPS antenna, and skid tubes.

Personnel challenges

Our experience level in the OH-58D community is not what it used to be. The initial fill of pilots into the OH-58D program during the mid 80's was mostly mid-level, experienced, high-time aviators. Many of these aviators have since retired or left the Army for other reasons, and their vacancies have been filled by less-experienced aviators.

Manpower reductions have also resulted in a reduction in pilot-in-command experience, not just in the OH-58D community but in Army aviation as a whole. Records show that PC flight hours of pilots involved in Class A and B accidents are lower than they used to be. In FY92, for instance, the average PC involved in a Class A or B accident had 1327 flight hours; in FY97, that number was down to 536.

Still another challenge involves "mentorship." The guidance that young pilots once received from senior warrants is not as prevalent as it used to be. New pilots are left on their own a lot more—they have less flight time to train (currency vs. proficiency) than in the past, not to mention the challenge of staying up with the fast pace of today's technology.

Materiel issues

The latest problem in the field stems from aircraft doors not staying on the aircraft during gunnery. During aerial gunnery (firing the .50-caliber machinegun) at Fort Rucker, a left door separated from the aircraft. This incident prompted a data search, which revealed that four left doors and one right door had reportedly fallen off OH-58Ds during gunnery operations. Kiowa PM is presently working this issue to come up with a fix for the doors.

In a recent Class E mishap, the .50-caliber gun fired a single cookoff round approximately 30 seconds after engagement. The crew had confirmed MASTER switch STBY, but had not placed the GUN switch in SAFE as instructed by the operators manual. Fortunately, no one was injured and no damage was sustained in this mishap.

Headspace and timing

The one self-induced mishap we see over and over again is associated with ATM Task 1053: Simulated engine failure at altitude (SEF). Indications are that

IPs are failing to recover the throttle to full operating rpm prior to termination with power. These mishaps have resulted in Class E through Class B mishaps, with damage ranging from engine overtorques to major aircraft damage.

An April 1997 message from the Aviation Branch Safety Office to OH-58D units addressed the number of mishaps related to Task 1053. The message modified the ATM task description in an effort to prevent further mishaps without affecting training. Unfortunately, despite this action, we had as many Class A-C SEF mishaps during the first three quarters of FY98 as we had during the entire year in FY97 (see table 6).

Risk management

Let's talk a bit about risk management—not in great detail, but as it applies in everyday scout operations. (For a detailed discussion of risk management, see last month's *Flightfax*). First, let's review the five steps of the process:

- **Step 1. Identify the hazards**
- **Step 2. Assess the hazards**
- **Step 3. Develop controls and make risk decisions**
- **Step 4. Implement controls**
- **Step 5. Supervise and evaluate**

As a community, we seem to be doing a pretty good job of completing steps 1, 2, 3, and 5. However, OH-58D accident experience suggests that we don't do as well with step 4. Even when controls are developed and briefed, they're not always fully implemented by the aircrews. For example, despite constant aircrew briefings about drift during hover, drift is the leading cause of tree strikes in the OH-58D. Factors such as "crew coordination," "loss of situational awareness," and "task overload" appear over and over in tree-strike-mishap reports.

Let's face it. We OH-58D pilots are very busy in the cockpit and can become overwhelmed, especially during night gunnery operations. However, until a fix comes along that will assist us in hovering the aircraft, we are going to have to implement all possible controls that will help us bring the aircraft and crew home. We may have to use the IR searchlight, drop chemical lights, or use other means to help maintain a steady hover.

Conclusion

The train is full speed ahead, and there's little relief in sight. We're operating our aircraft at max gross weight, and, just when we've learned the new version of software, here comes a newer version.

The OH-58D community is flying more hours and going more places than ever before. Yes, we're having our share of mishaps, but we're also accomplishing our share of successful missions under very challenging conditions, night in and night out.

—CW5 Bill Ramsey and CW5 Bill Altman, Aeroscout Branch, Aviation Systems & Investigation Division, DSN 558-2785 (334-255-2785), altmanw@safety-emh1.army.mil (CW5 Ramsey recently PCS'd from the Safety Center to Eighth Army in Korea)

Safety success or safety failure: Risk management makes the difference

A III/V platoon with an attached armament platoon was operating a 24-hour forward area rearm/refuel point (FARP) to support aerial gunnery operations. During these operations, a .50-caliber machinegun malfunctioned and accidentally discharged while an OH-58 was in the FARP. What could have been a safety failure turned out to be, instead, a safety success.

Good risk management during mission planning resulted in countermeasures being in place that made the difference between a serious accident and a minor incident with no injuries or property damage. The hazard of an accidental weapons discharge in the FARP had been identified during mission planning. As a result, the unit had developed and implemented the following controls:

- Select a FARP site that places a hill downrange of the FARP.
- Place ammunition and fuel on opposite sides of the FARP and outside the gun target line.
- Place fuel lines below the gun target line.
- Require copilots to stay inside the cockpit to avoid the .50-caliber machinegun.
- Require armament specialists to stay behind the machinegun and be supervised by an armament NCO, who will stay within arm's reach of the specialist.

The unit accepted the fact that they could not eliminate every hazard. But, by identifying the hazards and then developing, implementing, and supervising control measures, this unit prevented injury to soldiers and damage to property.

And that's how the risk-management process works in the real world.

—CW3 Stew Milligan, Operations Officer, USASC, DSN 558-2539 (558-255-2539), milligad@safety-emh1.army.mil

Drift during hover results in tree strike

THE OH-58D(I) was one of 10 aircraft conducting a multiship NVG area recon. The IP was on the controls in the right seat, establishing the aircraft in a stabilized out-of-ground-effect hover at 45 to 65 feet over trees. The PI, who was also the air mission commander for the flight, was planning for a mission change and preparing to move his platoon forward.

Suddenly, the aircrew heard a "weed-eater"-like sound coming from the rear of the aircraft. Realizing that they had drifted into a tree, the PI began to come on the controls with the IP to assist as needed. However, the IP was already moving the aircraft up and away from the trees. As he did so, the PI heard the noise again, but much louder than at first; this time, it did not stop.

The tail rotor and vertical fin assembly separated, and the aircraft began a right spin, descending out of control through the trees until impact. The aircraft came to rest in a right-side-low attitude, and a severed fuel line in the engine area immediately caused a postcrash fire. The PI had received only minor injuries and was able to extract himself from the aircraft. The IP, however, was killed during the crash sequence; the PI got him out before the aircraft was destroyed by fire.

Lessons learned

Lack of situational awareness played a major role in this accident. At the critical moment when the aircraft was closest to the obstacles, the IP's attention became diverted. Why? We'll never know for sure; that question only raises other questions, among them the following:

- Was he looking into the cockpit to help the platoon leader with the mission planning?
- Was he not scanning properly?
- Was he focused on a single hover reference point and not detecting the aircraft drift?
- Could it have been that he was intentionally repositioning the aircraft to a new location and simply did not see the trees that were struck by the tail rotor?

These questions will never be answered in this accident. However, lessons can be learned that can help others avoid such accidents in the future.

Crew coordination is, as always, a key ingredient in accident prevention. This crew functioned well and planned properly. Extensive mission briefings and rehearsals had been conducted before the mission, and, though not battle rostered, the crew had flown several missions together and were confident that each knew his responsibilities during the flight. However, as this accident proves again, the pilot on the controls must maintain awareness regarding the position of the aircraft and the location of all obstacles.

The bottom line is that, when performing operations at terrain-flight altitudes, the pilot on the controls must scan, scan, and scan some more to detect and avoid obstacles and prevent drift.

—MAJ Harry Trumbull, Aviation Systems & Investigation Division, DSN 558-9854 (334-255-9854), trumbulh@safety-emh1.army.mil

OH-58D digital transfer cartridge

Integrated into the OH-58D aircraft is a data transfer system (DTS). The system has several components, two of which are the data transfer unit (DTU) (or data receptacle) and a solid-state data transfer cartridge (DTC) (or data transfer module). DTU and DTC are the most familiar terms and will be used throughout this article.

Description

The DTU is an interface between the DTC and the military standard 1553 data bus. The DTU allows data to be retrieved from and stored to the DTC via 1553 commands. The DTC may have one of several versions of memory cartridge (a 64, 256, or 512 kilobyte or a 1 megabyte, 16 bit, CMOS memory cartridge) that allows temporary storage of data; however, visual inspection alone won't tell you which type you have.

The DTC is not a crash-hardened flight data recorder (FDR) and is not protected against impact, fire, or water damage.

Capabilities

The DTC is used to transport mission data between the aircraft and the Avionics Mission Planning Station (AMPS) on the ground. This data includes checklist, navigation way-points, communication frequencies, weapons data, laser codes, airborne target hand-over system data, engine history, and caution/warning/advisory history data.

Flight data is formatted, time-tagged, and stored so that the last 45 minutes of flight information are available on the DTC at any given time. Currently, only the Army Safety Center uses AMPS software to process DTC FDR information.

The DTC has an FDR component that handles sampling, compressing, and storage of 79 parameters—27 analog and 52 discrete (table 1). The DTC records and stores between 64 and 100 kilobytes of flight data. A continuous recorder, it is always overwriting the oldest recorded flight information.

A record is like a row on a spreadsheet with a sample or entry for each of the parameters (see table 2). Sometimes the entry for a particular parameter in a record is blank. That's because the DTC's recording algorithm records different parameters at different rates. For example, all the discrete (ON or OFF) parameters are sampled at 1 Hz or one sample every second while the analog parameters are sampled at 12.5 Hz.

Software

Two developments in the Kiowa Warrior system have necessitated changes in DTS software. First, the OH-58D program manager recently upgraded the aircraft's control display subsystem to version 7.0 (fielding completed in May 98). Second, the recently fielded OH-58D(R) uses a different version of the DTC, which requires a new version of software. The Army Safety Center recently upgraded its ground-station software and hardware to permit downloading of any version of the DTC or DTS software.

Maintenance & storage

Maintenance personnel should—-

- Always store the DTC in a dry, well-ventilated place free of dust and other contaminants.
- Replace batteries (two AAA alkaline) every 90 days of continuous use. A simple log organized by DTC serial number will help keep track of when to replace batteries.
- Remove batteries before shipping or storing the DTC for more than 30 days.

Operational checks

Before use, flight crews should—-

- Visually inspect the DTC for cracks or dents that could affect recording capability.
- Check the battery replacement date to ensure batteries have been replaced within the past 90 days.
- Ensure the 29 pin receptacles on the blue board are undamaged and free of obstructions. Do this by lifting the back cover and inspecting the pin connections. The two pins on either side of the blue board should be straight and undamaged.
- While holding the back cover open, ensure that the black toggle switch is set to the "0" position.

—Mr. Joseph Creekmore, Research Analysis and Maintenance, Inc., prime contractor on DSC Demonstration Program for U.S. Army Safety Center, DSN 558-2259 (334-255-2259), creekmoj@safety-emh1.army.mil

Table 1. DTC parameters list

Analog parameters (27)

Collective position
Engine torque
Fore and aft cyclic position
Free air temperature
Fuel quantity
Gas producer speed (Ng)
Heading (yaw attitude)
Indicated airspeed
Lateral acceleration
Lateral cyclic position
Left cyclic position feedback
Longitudinal acceleration
Mast torque
Measure gas temperature (tgt)
Pedal position
Pitch attitude
Pitch rate
Power turbine speed (Np)
Pressure altitude
Radar altitude
Right cyclic position feedback
Roll attitude
Roll rate
Rotor tachometer (Nr)
Vertical acceleration
Yaw position feedback
Yaw rate

Discrete parameters (52)

AC generator fail caution
ADU fail caution
AHRS fail caution
ATAS master arm switch arm
ATAS master arm switch safe
Chips, engine lower caution
Chips, engine upper caution
Chips, free-wheel caution
Chips, tail rotor gearbox caution
Chips, transmission mast caution
Chips, transmission sump caution
Communication emergency switch position
DC generator fail caution
Engine anti-ice
Engine oil bypass caution
Engine oil low caution
Engine oil pressure high caution
Engine oil pressure low caution
Engine oil temperature high caution
Engine out warning
Force trim switch position
Fuel boost fail caution
Fuel boost switch position
Fuel control caution
Fuel control fail advisory
Fuel filter bypass caution
Fuel low caution
Heading hold engage
Heater switch position
High rotor rpm warning
High temperature tail rotor gearbox caution
High tgt time limit caution
High torque time limit caution
Inverter fail caution
Low hydraulic pressure caution
Low rotor rpm warning
Master caution
Master warning
MCPU 1 fail caution
MCPU 2 fail caution
Pitch/roll disengage caution
Rectifier fail caution
SCAS disengage caution
SCAS failed
SCAS pitch/roll engage
SCAS release
SCAS yaw engage
Tgt over-temperature warning
Transmission oil pressure low caution
Transmission oil temperature caution
Transmission overtorque warning
Yaw disengage caution

Table 2. Sample DTC download (data fields continue downward and to right)

Time	Engine torque	Rotor rpm	Master caution	Force trim
			1=on, 0=off	1=on, 0=off
01:03:34.0000	93.45	99.56	0	1
01:03:34.0625	93.45	99.56	-	-
01:03:34.1250	93.45	99.56	-	1
01:03:34.1875	93.45	99.56	-	-
01:03:34.2500	93.45	99.56	-	-
01:03:34.3125	93.45	99.67	-	-
01:03:34.3750	93.45	99.67	1	-
01:03:34.4375	93.45	99.56	-	-
01:03:34.5000	93.45	99.56	-	-
01:03:34.5625	93.45	99.56	-	-
01:03:34.6250	94.05	99.56	-	-
01:03:34.6875	94.05	99.56	-	-
01:03:34.7500	94.05	99.84	-	0
01:03:34.8125	95.08	99.86	-	-
01:03:34.8750	95.22	99.92	-	-
01:03:34.9375	95.47	99.98	-	-
01:03:35.0000	96.78	100.00	1	1

Changes coming!

This is the last monthly Flightfax you'll see. Beginning with the November-December issue, Flightfax will be published every other month. More about this and other changes next month!

Technology-demonstration flights

As the Kiowa Warrior is being fielded, the need arises to familiarize leaders and soldiers with its unique capabilities—and its limitations. Technology-demonstration flights are good morale builders, foster better understanding among combat arms branches, and give commanders a close-up look at the combat capabilities of Kiowa Warrior equipped units.

Although it's a single-pilot aircraft, hazards arise when we bring nonrated passengers into the cockpit for demonstration rides. However, we can set this mission up for success by simply implementing a few controls.

All passengers should be thoroughly briefed, not just on the aircraft's capabilities, but also on their individual responsibilities as passengers. Aviation life support equipment, lap and shoulder restraints, entering and exiting the aircraft, and movement inside the cockpit should be addressed. Passengers should be escorted to the aircraft and assisted into and out of the cockpit. A crewmember should also ensure that doors and side panels are closed and latched and that restraints are properly adjusted and fastened. In addition, the copilot cyclic should be locked out and the copilot collective removed to reduce the risk of inadvertent manipulation by passengers.

—CW3 Stew Milligan, Operations Officer, USASC, DSN 558-2539 (334-255-2539), milligad@safety-emh1.army.mil

STACOM

STACOM 172 ◆ October 1998

Attention DES ME designees

DES ME Designees are required to keep their current military address on file with DES at all times. We are currently updating our data base, and we need for all ME Designees to send us the following by 15 January 1999:

- A copy of your ME Designee orders.
- Unit of assignment and location.
- Military address and phone number.

You may mail this information to Commander, USAAVNC, ATTN: ATZQ-ES, Fort Rucker, AL 36362-5000; or fax it to DSN 558-3113 (334-255-3113). Failure to update your records will result in revocation of your DES ME Designee status.

If you were previously a DES ME Designee but are no longer due to an aircraft transition, please notify us of your previous designation as well as your current aircraft type and duties performed.

The updated list will appear on the DES web site (www-rucker.army.mil/DES/DES/htm) when compiled, so be sure to check for your listing.

POC: CW3 Jim R. Burhans, DES, DSN 558-2532 (334-255-2532), james_burhans@rucker-emh4.army.mil

Similar aircraft

AR 95-1, paragraph 4-19 has generated several questions from the field concerning similar-aircraft currency. This paragraph states, "Currency in one series aircraft will satisfy the requirement for all aircraft within the series or group."

This paragraph applies only when the aviator meets the following requirements:

- Has completed qualification training in each aircraft for which currency is maintained.
- Is designated by the commander to perform duties in each aircraft for which currency is maintained.
- Has demonstrated proficiency to an IP/SP in all base tasks and selected mission/additional tasks that are different between the individual aircraft series during the aviator's previous APART evaluation or RL progression.

In addition, for the purposes of maintaining currency, the OH-58D(R) is considered to be in the same grouping as the OH-58D and the OH-58D(I).

POC: CW4 Alan Davis, DES, DSN 558-2531 (334-255-2531), alan_davis@rucker-emh4.army.mil

Standardization Communication ■ Prepared by the Division of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208, DSN 558-2603/2442. Information published in STACOM may precede formal staffing and distribution of Department of the Army official policy. Information is provided to commanders to enhance aviation operations and training support.

Shortfax
Keeping you up to date

Poster available

A crash-rescue poster for the OH-58D(I) is now available from the Army Safety Center. ASOs, crash-rescue personnel, and fire departments may request copies from Ms. Sharrel Forehand, DSN 558-2062 (334-255-2062), forehans@safety-emh1.army.mil, fax DSN 558-2266 (334-255-2266).

Apache web site online

For the past 18 months, the Army Aviation Logistics School at Fort Eustis, AMCOM, and PEO-Aviation have been working together to improve troubleshooting techniques and skills. Early on, we determined that an effective way to improve troubleshooting abilities in Army aviation was to implement some sort of information-sharing system. After several months of working out the details, we are pleased to announce the recent launching of the Apache Homepage. It's located at

http://www.peoavn.redstone.army.mil/aah/new/homepage/homepage.htm

The web site includes—or soon will include—the following:

- "Hot" news from various sources.
- Lessons learned.
- Aircraft, TADS, PNVS, and EGI troubleshooting tips.
- Current list of circuit breakers and their "hidden" functions.
- Maintenance-information and safety-of-flight messages for reading or downloading.
- Airworthiness releases.
- Material fielding plans.

Other areas will be added in the future. Please take advantage of the information available at this site, and help us improve it by submitting new lessons learned.

—CW3 Al Anderson, Department of Attack Helicopter Training, Fort Eustis, VA, DSN 927-1603 (757-878-1603), andersona@eustis.army.mil

ALSE user conference coming up

The 1998 ALSE User's Conference will be held at Redstone Arsenal, Alabama, 3-5 November. Commanders, ALSE officers and technicians, and unit safety officers are invited.

If you plan to attend, please notify Mr. Bernard Roberson by 16 October. You can reach him at Fort Rucker's Directorate of Combat Developments:

- Phone: DSN 558-9130 (334-255-9130)
- Fax: DSN 558-9191/2916 (334-255-9191/2916)
- E-mail: bernard_roberson@rucker-emh4.army.mil

Billeting arrangements, including statements of nonavailability, are being handled by Ms. Julia Story, Redstone Billeting Office, DSN 746-5713 (256-876-5713). Please contact her directly.

Survival-radio requirement delayed

AR 95-1, paragraph 8-12b, requires that each aircraft crewmember be equipped with a survival radio. However, an HQDA message dated 251202Z August 1998 authorized delay in complete implementation of this requirement until 30 September 2000. This action was taken to allow continued Armywide redistribution of AN/PRC-90 and AN/PRC-112 survival radios to alleviate shortages where possible.

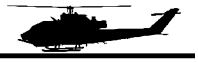
Pilots in command will continue to ensure that not less than one fully operational survival radio is on board the aircraft. In addition, PCs will ensure that crewmembers without radios have other means of signaling (flares, mirror, etc.). According to the message, crewmembers should carry additional radios on board aircraft as assets become available.

POCs: MAJ John E. James, Jr., HQDA, DSN 227-0487 (703-697-0487); and Mr. Jim MacElderry, CECOM, DSN 992-4605 (732-532-4605)

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1



Class C

F series

■ Aircraft landed hard during simulated engine failure to the runway. Aircraft was returned to ramp and, during normal shutdown, landing gear buckled and aircraft belly contacted runway. Inspection also revealed possible damage to tail rotor.

Class E

E series

■ After first flight period, aircraft was taken to hot refuel pad for fuel and student change. While aircraft was on pad, visual check revealed that crosstube was broken just above right-front skid cuff. Cause not reported.

■ As aircraft was sliding to stop during low-level, high-speed autorotation, front crosstube seemed to be vibrating more than normal and attitude felt left-front-skid low. Front-seat pilot opened door and noted that front crosstube was broken off at bottom of skid cuff and that crosstube was sitting on ground. Maintenance replaced front crosstube and skid cuff.

AH64

Class C

A series

■ Crew noted excessive vibration within speeds of 60 to 140 knots during limited test flight for replacement of lead-lag dampeners. After landing, No. 1 engine intake panel was found open. Damage still being assessed.

Class E

A series

■ No. 1 engine fuel caution light came on during formation flight at cruise altitude. Within 10 to 15 seconds, No. 1 engine-out light illuminated. Crew informed flight of situation and departed formation for home station. About 5 minutes later, No. 2 engine fuel caution light flickered. Crew selected nearby civilian airfield to make roll-on landing. At about 50 feet agl and 80 knots, No. 2 fuel light illuminated. Within 2 to 5 seconds, at 10 feet agl and 50 knots, No. 2 engine-out light came on. Crew made autorotative roll-on landing without further incident. Caused by fuel starvation.

■ During low-level cruise flight, crew attempted to transfer fuel from aft tank to forward tank. Fuel transfer green information status light came on briefly and extinguished. Immediately thereafter, amber fuel transfer caution light blinked, indicating transfer inoperative. Caused by low fuel in forward tank.

■ At flat pitch on ground with IP on controls, cyclic moved about ½-inch right of center without input from either pilot. IP disengaged DASE. When the uncommanded movement continued, IP turned off force trim, but movement continued. Force trim was re-engaged and aircraft was taxied to parking. Magnetic brake assembly was replaced.

CH47

Class E

D series

■ As aircraft picked up to hover, rotor wash caused unsecured tunnel cover panel on adjacent CH-47 to blow open, causing damage to strut assembly on tunnel cover.

■ While aircraft was hovering over external load, ground personnel noticed fluid leaking from bottom of aircraft. Caused by crack in hydraulic line leading to power-transfer unit. Line was replaced.

■ During hover over external load, CP misunderstood flight engineer's commands, resulting in aircraft bumping load. Postflight inspection found center hook adjustment bolt on keeper was bent.

■ During approach for landing, pilot noticed static torque indication of No. 2 engine. Pilot attempted normal engine beep trim without success, then performed emergency engine trim. Aircraft landed without further incident. Caused by failure of N2 control box.

OH58

Class C

D(I) series

■ As IP was terminating approach for completion of demonstrated simulated engine failure (SEF) at altitude, aircraft landed hard, damaging WSPS and landing gear. ECOD pending.

■ Aircraft landed hard during SEF to runway. Main-rotor blades flexed on touchdown and contacted tail-rotor drive shaft. Damage to one main-rotor blade, tail-rotor drive shaft and cover, GPS antenna, and aft crosstube.

■ Aircraft landed hard during SEF at altitude. Landing gear was damaged.

Class E

C series

■ Engine rumbled when throttle was increased after being at idle. Suspect defective five-stage bleed air control.

■ When amp meter increased to 50 amps during cruise flight, battery was turned off and amps went to zero. Aircraft landed and emergency shutdown was performed. Caused by broken wire on generator.

D(I) series

■ Maintenance test pilot was unable to determine source of high-frequency vibration while attempting to smooth tail rotor. Maintenance personnel inspected drive train while engine was running and saw oil cooler fan vibrating. Further inspection after shutdown found loose oil cooler fan, cracked structural panel, and delamination around oil cooler fan mounting bolts. Inspection of unit's other aircraft found similar cracks on 13 other aircraft. Maintenance notified Kiowa Warrior PM and submitted QDR to AMCOM.

■ During pre-combat checks at OGE hover, crew noted engine oil temperature in high range. After 10 minutes at hover, hot engine oil temperature caution light came on. When condition persisted after transitioning to forward flight, aircraft was landed and shut down. Maintenance replaced oil filter, drained and replaced oil, and flushed engine oil cooler.

■ Three minutes into OGE hover power check, hot engine oil temperature caution message displayed. Crew, unable to transition to forward flight due to other traffic, landed. Aircraft remained at flat pitch for 1 minute before message went away. Maintenance replaced oil filter, drained and replaced oil, and flushed engine oil cooler.

■ Aircraft was No. 2 in flight of four

when crew felt shudder followed by engine failure. PI lowered collective to enter autorotational descent, and other pilot confirmed throttle was full open. When crew decelerated and pulled initial pitch for autorotation, engine spooled back to 100 percent. Crew made emergency landing without further incident. Cause not reported.

D(R) series

■ Aircraft was hovering in steep terrain with swirling winds at 16 knots gusting to 27. Mast torque time limit caution began to momentarily display, and crew repositioned to find a more favorable wind condition. After fifth caution, transmission overtorque warning displayed. Crew landed without further incident. Peak mast torque was 108 percent; cumulative time above 100 percent was 13 seconds. Maintenance inspection did not find any damage, and aircraft was released for flight.

UH1

Class E

H series

■ On short final, smoke and boiling liquid began coming from transformer on left side of instrument pedestal and above left pedals. Crew executed electrical-fire emergency procedures with immediate landing and emergency shutdown. Caused by failure of voltage capacitor.

■ As aircraft came to hover, it began slowly rotating to right. Pilot increased left pedal to stop turn, but aircraft continued to slowly turn right even after reaching pedal limit. Pilot allowed aircraft to rotate approximately 270 degrees before putting it back on ground. Caused by malfunction of control assembly.

■ HIT check registered +36°C during runup. Caused by failure of engine de-ice solenoid valve .

UH60

Class C

A series

■ Upon activation of SAS No. 1 during engine runup with engines at 100 percent, crew noted flames emanating from No. 2 a.c. bus on overhead console. Flames were extinguished with onboard fire extinguishers following emergency shutdown.

■ Main-rotor blades contacted tree during departure from confined area. All four tip caps were damaged; one was destroyed, two were sent to depot for repair, and one was repaired locally.

Class D

L series

■ Postflight inspection revealed damage to one tail-rotor tip cap and blade and the stabilator. Suspect tail-rotor blade strike during previous night's NVG air assault training flight.

Class E

A series

■ During shutdown of No. 2 engine after landing, tail wheel strut failed. Caused by failure of upper strut assembly.

■ During postflight, 2-inch hole was discovered in tail-rotor gearbox cover, and six camlock fasteners in a row were disconnected. Maintenance replaced fasteners, and aircraft was released for flight.

■ During climbout, stabilator failed to process in auto mode. Crew initiated emergency procedures and returned to base. Inspection revealed that stabilator actuator cannon plug was loose.

L series

■ During cruise flight, copilot noticed cockpit door sliding window had vibrated open. When he attempted to close it, sliding Plexiglas portion of window broke in half. Window slide had been slightly modified (shaved) during previous maintenance to accommodate new door and window sliding bracket assembly. Suspect failure was caused by suction (pressure) created from forward flight combined with degraded window integrity.

■ During cruise at 120 KIAS, aircrew felt aircraft roll uncommanded to left and stop. Within 2 seconds, it happened again. SAS 1 was turned off, and aircraft returned to base. Caused by failure of pilot's vertical gyro.

C12

Class E

F series

■ When power levers were reversed during landing rollout, aircraft veered left and crew smelled burning odor. No. 2 propeller began to feather, and fire was seen coming out of exhaust stacks. Pilot was able to taxi clear of runway, and fire went out when engine was shut down. Engine was replaced. Cause is under investigation.

G series

■ At 1600 feet during descent from FL 180, elevator fluttered. Pilot reduced airspeed and flutter ceased. Controllability was confirmed, and inspection of viewable wing structure revealed that battery access cover on right wing was loose. Airspeed was reduced further and flaps were set to approach to check controllability. Landing was made at destination without incident. Postflight inspection revealed that panel was loose and distorted.

C26

Class C

B series

■ Right main landing gear left runway surface during landing at destination airport. Damage to gear noted on postflight inspection upon return to home station.

Class E

B series

■ During climbout after initial takeoff, No. 1 engine egt and torque fluctuated excessively, and aircraft yawed slightly. Aircraft was landed without further difficulty. Cause not reported.

O5

Class E

DHC-7

■ Aircraft was flying through area of light buildups and light to moderate rain. During descent for landing, aircraft was struck by lightning. Landing was completed without further incident.

■ During approach, cabin pressure dumped, and airstair-unlocked light came on. Flight attendant reported to cockpit crew that door had started to open and handle had raised about 15 to 20 degrees from the floor. She stepped on the handle and held it down for the rest of the flight. After landing, maintenance re-rigged airstair door handle and control linkage.

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

OH-58-98-ASAM-01, 251540Z Aug 98, maintenance mandatory

AMCOM has established new retirement change limits for the gas-producer turbine wheels on T703-AD-700, -700A, and -700B engines. This message changes the limit from 1250 to 1500 hours. It also clarifies the start cycle limits for all engine components and modifies other published engine component limits. It is imperative that units accurately track hours, cycles, and hot-section-factor counts as directed by this message.

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

Maintenance-information messages

AH-64-98-MIM-07, 192001Z Aug 98

Change 6 to TM 1-1520-238-PM introduced several discrepancies into the manual. This message corrects the following: phase interval, gearbox and main-transmission input and output flange inspections, tail-rotor gearbox mounting stud inspection, SDC oil filter replacement, hydraulic filter replacement, and decoupler shear pin inspection.

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

AH-64-98-MIM-08, 021607Z Sep 98

This message corrects errors in a 30 July 98 ISAQ regarding main transmission clutch assembly retirement interval. The correct retirement interval for main transmission clutch assembly is "on condition."

AMCOM contact: Mr. Larry Powitzky, DSN 897-4801 (205-313-4801), powitzkyl@avrdecr.redstone.army.mil

OH-58D-98-MIM-05, 181637Z Aug 98

Mishap data for the past 2 years shows an increase in door loss after gun firing. If a door is not recovered, replacement cost constitutes a Class C mishap. The purpose of this message is to emphasize preflight and maintenance inspections of the crew door jettison safety wire and jettison rod extension through hinge halves, especially before gun-firing missions. The message also changes progressive phase maintenance inspection interval for the door jettison mechanism.

AMCOM contact: Mr. Kevin Cahill, DSN 645-9802 (256-955-9802), cahill-kt@avrdecr.redstone.army.mil

GEN-98-MIM-03 (revised), 011538Z Sep 98

(This message rescinds 242100Z Aug 98 message with same number.) Maintenance documentation requires the use of methyl ethyl ketone (MEK) in the repair and overhaul of aviation weapons systems. However, due to new aerospace national emissions standards for hazardous air pollutants that became effective 1 September, AMCOM has identified interim substitutes for MEK that can be used in maintenance procedures. The use of these substitutes is not mandatory and authority to use them applies only to MEK; no deviation for other cleaning processes and chemicals is authorized without approval from AMCOM. The purpose of this MIM is to alert users to the approved interim substitutes for MEK in advance of TB 1-1500-351-23-1.

AMCOM contact: Mr. Edward Allen, DSN 645-0660 (256-955-0660), allen-ek@redstone.army.mil

POV-fatality update through August

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY97
108	81

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Class A Accidents through August

		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	1	2	0
	February	0	1	0	0
	March	2	1	1	0
3D QTR	April	2	0	2	0
	May	1	1	1	0
	June	3	2	0	4
4TH QTR	July	1	1	8	0
	August	0	0	0	0
	September	0		0	
	TOTAL	12	12	14	6

U.S. ARMY SAFETY CENTER

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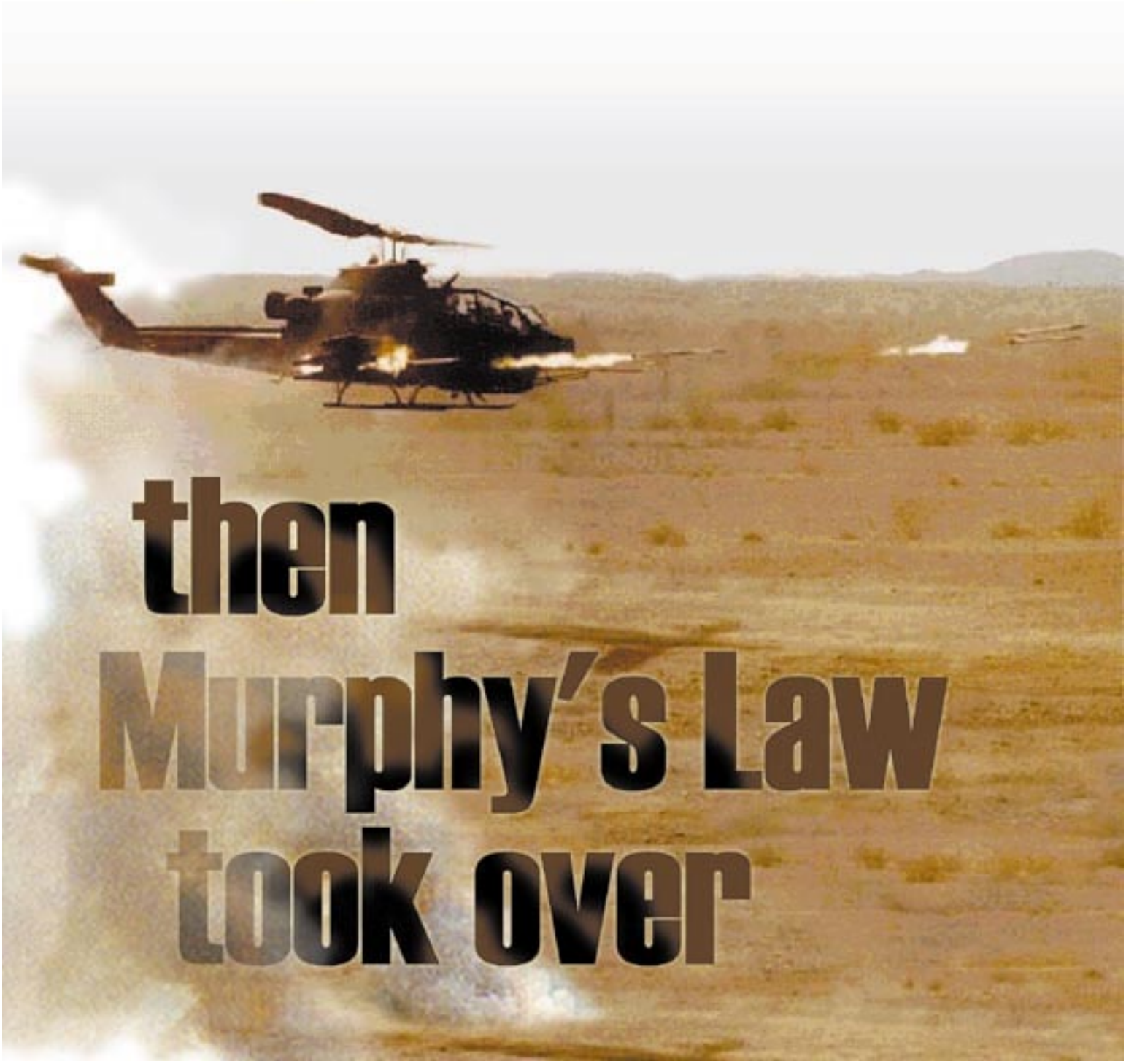
Burt S. Tackaberry
Brigadier General, USA
Commanding General

Flightfax

ARMY AVIATION
RISK-MANAGEMENT
INFORMATION

NOVEMBER 1998 ◆ VOL 26 ◆ NO 14 http://safety.army.mil

One range condition went undetected as a hazard . . .



RISK MANAGEMENT LESSONS LEARNED

WAR STORIES

Not-so-ready on the firing line

Just when you think you've seen it all, life throws another scenario into the mix.

Our squadron was deployed to Fort A.P. Hill, VA, for annual aerial gunnery qualification and other training requirements as part of our "summer camp." The range facility was well-equipped, and all the logistics (commo, ammo, maintenance, etc.) had been accomplished by the armament section, range OICs, range safety officers (RSOs), and other unit personnel.

At the outset, things were running smoothly. Even the weather was cooperating. Instead of the usual mid-August temperatures (mid to high 90's), we were enjoying low to mid 80's that week.

As we continued operations through the week, we found that our risk-reduction worksheet was working as advertised, and the controls we established to reduce high-risk conditions were effective. However, one range condition—dry vegetation from several weeks of no rain—went undetected as a hazard that could affect our operations. This would prove to be a critical oversight.

We had two active rearm pads; adjacent to them were three pads for parking and troubleshooting (figure 1). The first firing point (FP1) was located 300 meters east and in front of the two rearm pads; the other firing point (FP2) was 500 meters northeast of the tower. We were using both firing points for rockets and 20mm; for TOW, we used only FP2.

Small fires are not unusual on ranges; they are, in fact, anticipated and expected during annual gunnery. As the days progressed, small fires appeared in the target area 1000 to 3500 meters downrange. These fires were reported as required to range control, and they were monitored by tower personnel. The fires burned themselves out as they reached areas without grass or other vegetation.

On the fifth day, FP1 was being used for rocket engagements during coordinated firing with the aircraft positioned in FP2. During one rocket launch from FP1, a hot ignition wire or similar component caused a small fire at the point. The winds were in a westerly direction that day and, initially, the fire was significant neither in size or proximity to the rearm pads.

Then Murphy's Law took over.

The prevailing winds suddenly shifted back to the southwest, and wind velocity increased from 2 to about 10 knots. The fires grew in size and began moving from the firing point toward the rearm pad and the ammunition supply point.

As firing was discontinued at FP1 and the last aircraft was rolling into FP2 hot for engagements, I (acting as the RSO) left the tower upon hearing dudded ammo "cook off" in the fires, which were now only 150 meters in front of the rearm pads. I drove down to the rearm points to discuss the situation with the NCOIC. By the time I arrived, I could hear duds being cooked off directly in front of the rearm pads.

We decided it was time to evacuate ammo, personnel, and aircraft from the area. As the Rearm NCOIC and I directed movement of the ammo and personnel from the range, aircrews began to scramble toward the aircraft parked adjacent to the rearm pads. Smoke became more dense as the fires grew

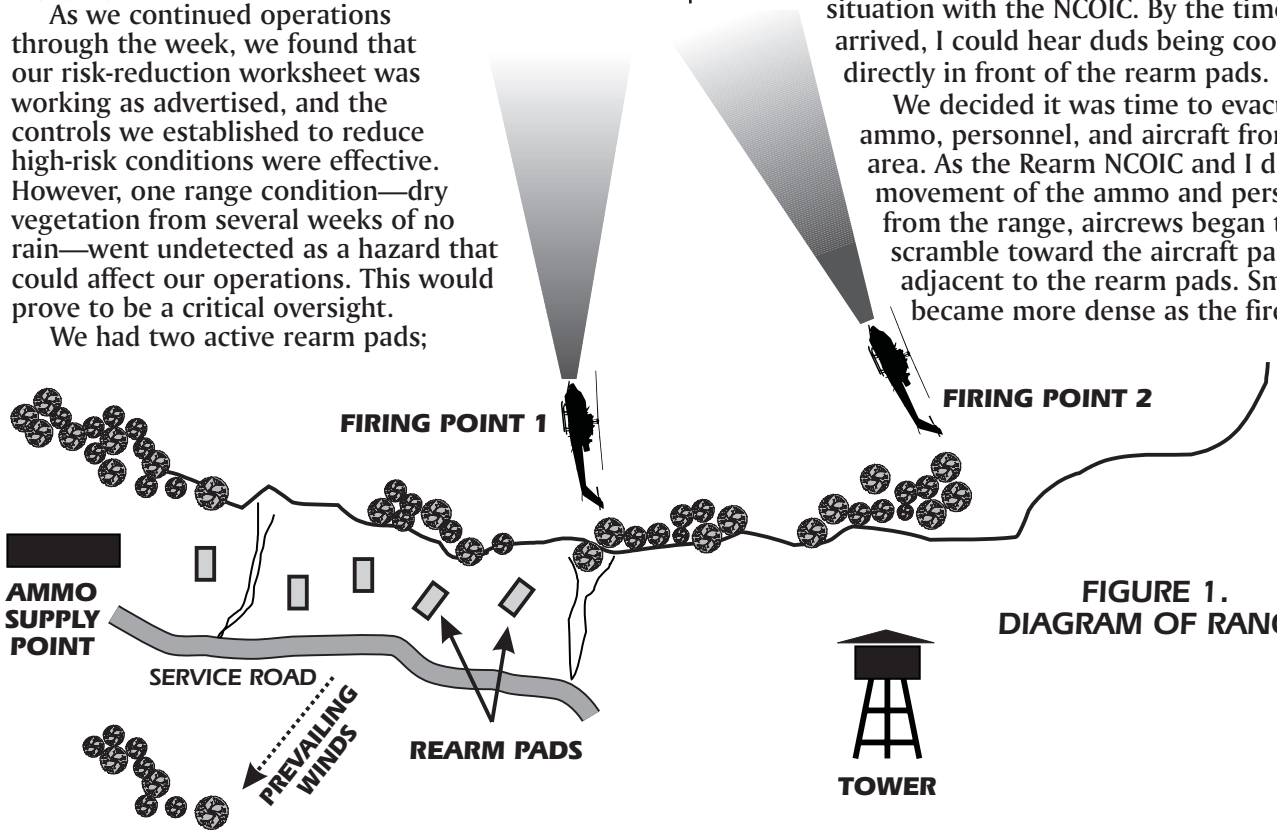


FIGURE 1. DIAGRAM OF RANGE

in intensity and speed. The last of the ammo was withdrawn a safe distance, and personnel were directed to leave the area. Range Control and the fire department were notified and began to respond to the training area.

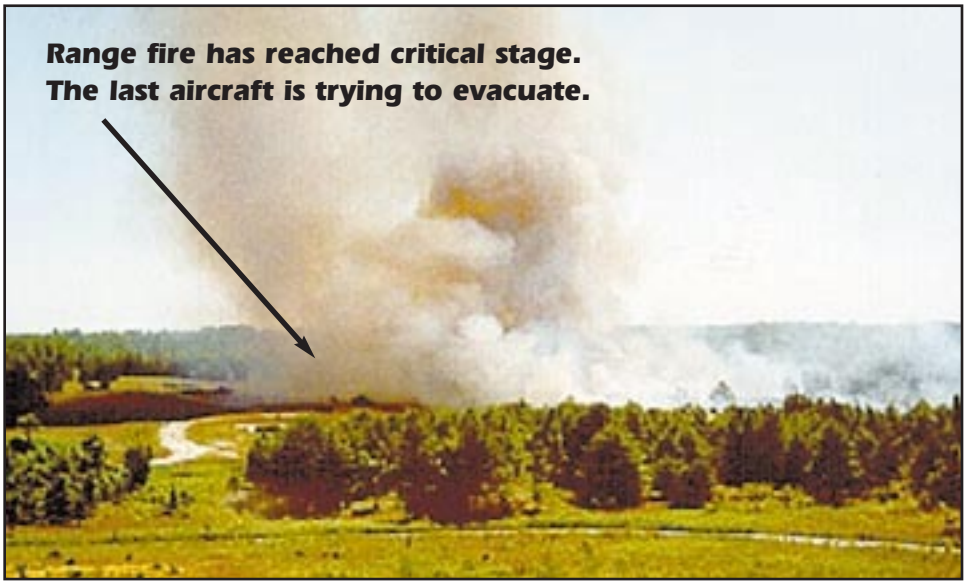
As the last two aircraft began to run up and accomplish their through-flight checklists, the fires were within 25 meters of the pads. The last aircraft to depart the area actually had to wait for a window of opportunity to present itself within the flurry of smoke in front of the pad. The aircraft departed with only minutes to spare before the fire covered the grass around that pad.

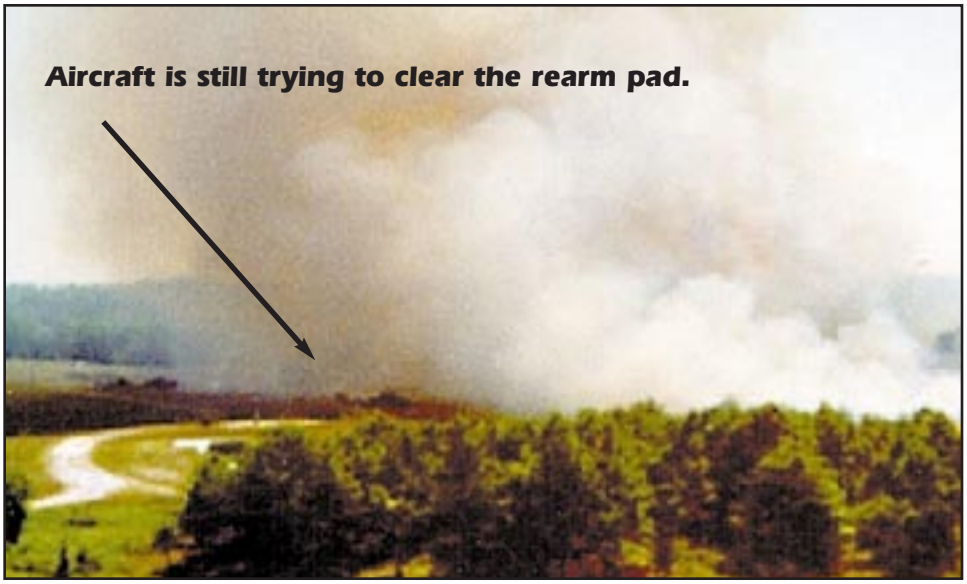
The fire continued to increase in size and intensity and was now moving toward the ammo supply point and the vegetation surrounding it. Personnel there were evacuated; a decision was made to leave the ammo in harm's way. As firefighting personnel were deciding whether to fight the fire or evacuate, the winds shifted again. The fire began to burn itself out and move away from the ammo supply point. Only 20 meters were left between the scorched earth and the ammo.

All the scenarios, circumstances, and inherent risks we thought we had covered and prepared for didn't consider this particular risk. Soldier endurance, supervision, planning levels, ammo handling, personal protective equipment, aircraft misfires/malfunctions, communication, time constraints, and site recovery were all considered and controlled to reduce the risk levels. As it turned out, the most critical risk was the one that was ultimately overlooked. Catastrophe had been averted only because of a little luck.

Will our unit learn from this? You bet. And it is our hope that telling this "war story" here will help others learn as well. Remember, nothing is too insignificant or too unrealistic to include as a risk when planning operations. Use your best imaginations and always include Murphy's Law in your planning. One other suggestion: Identify the most pessimistic person in the unit and include him or her in the planning and risk-reduction brainstorming effort.

—CW4 Tom Clarke, ASO, Troop E, 1/104th Cavalry, PA ARNG, DSN 757-2248 (301-757-2248), clarketc.nimitz@navair.navy.mil





Camouflage face paint

Once again aircrew concern about wearing camouflage face paint while performing flight duties has reared its ugly head—and for a valid reason. Aircrews take great care to minimize the hazard of burns in aircraft-related fires. We wear special fire-retardant clothes, boots, gloves, and helmet with visor. We fly helicopters with crash-worthy fuel systems that reduce the potential for postcrash fire. Then we smear camouflage paint on our faces. Seems like a conflicting idea, doesn't it?

Our friends at Natick Research, Development, and Engineering Center (NRDEC), in coordination with Mr. Richard Angerhofer, Office of The Surgeon General, checked out the ingredients of the face paint before approving it for use. Mr. Jim Fairneny at NRDEC identified the contents: in compact form (NSN 6850-01-262-0635), the face paint contains ceresin wax, caster wax, mineral oil, talc, and pigments. In stick form (NSN 6850-00-161-6202, green, light, or sand; NSN 6850-00-161-6203, loam or white; NSN 6850-00-161-6204, green, light, or loam), it contains hydrogenated castor oil, carnauba wax, mineral oil, lanolin, talc, and colorants. Review of the Material Safety Data Sheets (MSDS) for the face paint shows its melting point to be 158°F or above and its flash point to be 400°F or above. Health hazards are listed as "None."

Some aviators reportedly use insect repellant as a base before applying camouflage face paint. According to the MSDS for insect repellants listed in the FEDLOG, their flash points range between 74°F and 200+°F, depending on the type. Be sure to read the label.

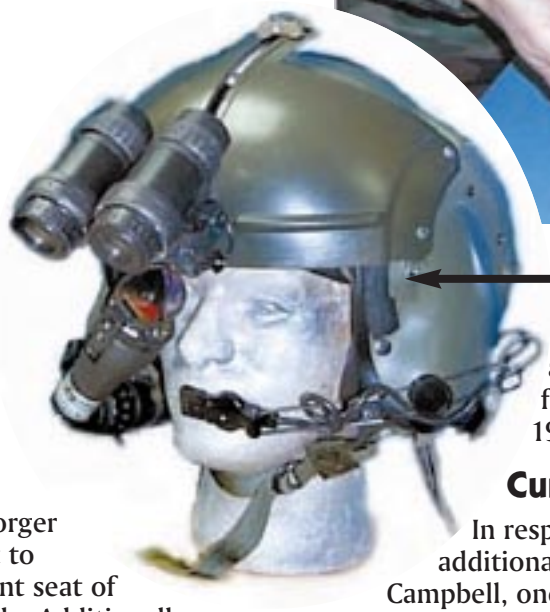
While the face paint available through the Army supply system doesn't pose a fire hazard, petroleum-based face paint obtained from commercial sources might. Therefore, be sure to use only the Army-supplied version for aircrew duties.

—CW5 Daniel W. Medina, ALSE Officer, USASC, DSN 558-9847 (334-255-9847), medinad@safety-emh1.army.mil

Attention Apache users

Adapters again available

More ANVIS/IHADSS adapters, the systems that allow ANVIS to be used in the front seat of the Apache, are now available from CECOM's Night Vision & Electronic Sensors Directorate (NVESD).



Adapter

Background

While getting ready for Reforger '87, there was a great effort to make the lighting in the front seat of the Apache ANVIS-compatible. Additionally, there was a need for a way to mount ANVIS on the IHADSS. NVESD developed an adapter and made up a few by hand. In response to requests for more, they pursued an injection-mold approach to manufacturing. Ultimately, 1350 adapter kits were produced and fielded, the last of them in August 1997.

Current status

In response to recent requests for additional adapter kits—several from Fort Campbell, one from Germany, and one from Korea—NVESD located the original mold and contracted and received a quote to manufacture additional kits. These kits are now available. To order, contact Mr. Clinton Thacker at NVESD, DSN 654-1328 (703-704-1328), cthacker@nvl.army.mil.

Lower that visor!

Researchers at the U.S. Army Aeromedical Research Laboratory (USAARL) surveyed aviators at Fort Hood, Fort Campbell, Fort Bragg, and Fort Rucker to determine the effectiveness of helmet visors. Here's what they found.

■ **Are we using our visors?** Survey responses revealed that 71 percent of all aviators questioned wore their visors during day flights. More than 75 percent of those responding did not wear their visor during night flights, mostly due to the use of ANVIS.

■ **How are we using visors?** Aviators appear to use visors much more frequently during the day, with tinted visors being preferred over clear. Dual visor assemblies are preferred over single.

■ **Are visors worth the hassle?** Yes. It is true that there are some gripes about visors. Nearly three-fourths of those questioned reported some type of mechanical problem with their visors. Sticking in the tracks (49%), difficulty locking and unlocking (29%), and coming off the track (22%) were the most commonly reported visor problems. Problems affecting visor deployment were reported by 43 percent, with inadvertent retraction (particularly with IHADSS) being the most common. In spite of all this, 85 percent of all aviators questioned reported that, when problems occurred, visor repair was easily accomplished and replacement parts were readily accessible.

When visors are used, they make a critical difference. A study of 1990-96 accident data collected from the ALSE Retrieval Program at USAARL revealed that the majority of accident victims (71%) experienced some degree of head, neck, or facial injury. Only 14 percent of the individuals studied were wearing their visors down at the time of the mishap. (Some visor-position data were unknown due to postcrash fires and other traumatic events.) For those whose visor position was known, it was of interest to note that the *frequency* of head, neck, and facial injuries experienced by both groups (visor up and visor down) was identical; however, they varied drastically in *severity*. Frequently, those who wore their visors down sustained minor injuries caused by the visor (often due to the visor edge impacting the cheek), but this group experienced fewer fatalities. In similar data collected from the Army Safety Center for the same period, the use of visors was credited with preventing or reducing injury severity in approximately 25 percent of the accidents in which visor position could be verified.

Due to advances in aircraft design, crashes are becoming more survivable. Aviation life support equipment also plays a key role. Unfortunately, the best equipment, even equipment with a proven record for reducing injuries, is effective only if it's used.

Where is your visor?

POC: Mr. Ed Rash, Research Physicist, USAARL, Fort Rucker, AL, DSN 558-6814 (334-255-6814), rash@rucker-emh2.army.mil

Cleaning your visor

Everyone's visor gets dirty. What should you do about it? According to the manufacturer's recommendation, visors are best cleaned with soapy water and a soft cloth. No special cleaning products. No paper towels. Nothing fancy.

Improper cleaning can contribute to scratches, and dirt in the tracks can keep the visor from coming down smoothly. Dirt may even cause the visor to come off its tracks. If your visor becomes badly scratched or will not deploy, see your ALSE technician.

And remember. Visors work only when they're worn!

Battery shelf-life management: A word to the wise

It's come to our attention lately that the shelf life of batteries doesn't get much respect. The result is that many units' readiness may be dependent on batteries whose shelf life has expired. Many of these won't last as long as expected, and some won't work at all. Some of them shouldn't even be used. It's time to fix the problem by screening your batteries for remaining shelf life. Determine the condition of expired batteries, and get rid of those you can't count on for your mission.

The first thing to do is to check your stock of batteries for expiration. If they're within their expected shelf life, you're okay. If they're not, check to see if the battery is coded with an extendible shelf-life code (Type II, noted by a numeric code) or a nonextendible code (Type I, noted by an alpha code). All expired Type I's must be disposed of. Period. No exceptions. Type II's are extendible, but they must be evaluated first. For lithium batteries, check out the shelf-life-extension data base through CECOM's LRC Home Page (http://www.monmouth.army.mil/cecom/lrc/index.html) or go straight to it (http://134.80.11.9/web/batterysl.nsf). At these sites, you can check out extension information by battery type, contract, and date code. If an extension is posted, you can use it. If it failed testing, it's out; process it for disposal. If you don't find the date code you're looking for, you still have two options: test them yourself or pay CECOM to test them for you.

U.S. Army Supply Bulletin SB 11-6 has the information you need to perform a shelf-life evaluation on your own. In addition, you can check out CECOM's Power Sources Home Page for the latest about new test sets (http://www.monmouth.army.mil/cecom/lrc/lrchq/power.html).

Still don't know if your batteries can be extended? One last option: Get CECOM to test them for you. You'll need to let us know what batteries you have, how many you have, and how old they are. We'll figure out how many samples are needed. There's a minimum fee of $390 for the testing; it could be more, depending both on how many lots and how many samples need to be tested. Extensions granted as a result of testing are for either 1 or 2 years, depending on how well the batteries perform.

Keep in mind that there's always a chance that the samples may not meet extension criteria. If that proves to be the case, how do you get rid of them? Refer to U.S. Army Technical Bulletin TB 43-0134, ask your local environmental office, or visit http://www.monmouth.army.mil/cecom/safety/spub/tb430134.htm.

How can you avoid the headache of expired batteries in the future? Rotate your stock. Issue them according to their expiration dates, with batteries with the soonest inspection date getting used first. It's also important to do the same with War Reserve or Contingency stock. If you don't use them, they will eventually expire, and you'll be stuck with disposing of them, costing your unit money.

Rotating your stock is something you can do all the time without extra effort, unlike the work required to determine if expired batteries can still be used. If you don't rotate your stock, it will cost you both time and money to evaluate your expired batteries.

Remember, "first in, first out."

—Mr. Patrick Lyman, CECOM LRC Power Sources Team, DSN 992-2270 (732-532-2270), lyman@doim6.monmouth.army.mil

Protective clothing for rearm and refuel personnel

What cold-weather thermal-protective clothing is authorized for rearm/refuel personnel?

Let's look at what's available. There's a nomex/gortex version of the Army's Extended Cold Weather Clothing System (ECWCS) parka and trousers, but it's expensive at $1200 to $1500 for each piece, depending on size. Unit commanders with a mission requirement—and the money—for the nomex/gortex clothing items must first obtain authorization to purchase and use it. Such authorization must come from Fort Rucker's Directorate of Combat Developments (POC: Mr. Bernie Roberson, DSN 558-9130, 334-255-9130).

For units that can't afford—or don't need—these expensive clothing items, Mr. Al Dassonville, PM-Soldier, reminds us that the Aircrew Cold Weather Clothing System (ACWCS) is currently being fielded to FP1&2 units. PM-Soldier expects the ACWCS to be available for requisition in FY00. The ACWCS consists of combat vehicle crewman balaclava (NSN 8415-01-111-1159), jacket (NSN 8415-01-394-3513s) with liner (NSN 8415-01-394-3816s) and hood (NSN 8415-01-394-5401); nomex liner (NSN 8415-01-448-4250s); overalls (NSN 8415-01-111-5020s); and mounted crewman intermediate cold weather gloves (NSN 8415-01-446-9247s). (NOTE: The "s" following the NSN indicates a separate NSN for each size.) The ABDU, a component of the ACWCS, already has been fielded.

Another option is identified in FM 1-111: *Aviation Brigades*. Annex J, FARP Operations, identifies rearm/refuel clothes as flight suit or battle dress uniform, helmet, gloves, goggles, and leather boots. This reference and FM 10-67-1: *Concepts and Equipment of Petroleum Operations* identify some of the hazards and recommended controls. This is likely the best option for most in the near future.

Static electricity as an ignition source remains a serious hazard with most clothing items. Personnel involved in rearm/refuel operations must develop and use controls to minimize fire hazards.

TRADOC recently approved a change to the Common Table of Allowances (CTA) 50-900 authorizing ABDUs for MOS 77F10, Petroleum Supply Specialist, "when authorized by the commanding officer." The flyers coverall (LIN F32055) or combat vehicle crewman's coverall (LIN C31189) was approved as alternative items for the ABDU.

Having said all this, the original question remains: Is there cold-weather thermal-protective clothing authorized for rearm/refuel personnel? The answer is, "Maybe." The nomex/gortex clothing items discussed earlier is one option, but it's expensive. Nomex underwear is another option (undershirt, NSN 8415-00-485-6547s, and drawers, NSN 9415-00-467-4075s). A third option is 100-percent-cotton underwear, which was approved for aviation use several years ago (CW drawers, NSN 8415-00-782-3226s, and CW undershirt, NSN 8415-00-270-2012s).

—CW5 Daniel W. Medina, ALSE Officer, USASC, DSN 558-9847 (334-255-9847), medinad@safety-emh1.army.mil

Words of wisdom from old aviators OR Lessons learned the hard way

"Fly it until the last piece stops moving."

"The only time you have too much fuel is when you're on fire."

"Scan, scan, scan; there's always something you missed."

"It's best to keep the pointed end going forward."

"Takeoffs are optional; landings are mandatory."

"Learn from the mistakes of others; you won't live long enough to make them all yourself."

What you've forgotten about aerodynamics can kill you

We rotary-wing aviators often take aerodynamics too lightly. Our fixed-wing counterparts tend to be sensitive to the laws of aerodynamics because their aircraft are more restricted by aerodynamics than are helicopters. Most of the Army's modernized rotary-wing aircraft have much higher structural and aerodynamic loading limits than legacy fleets such as the UH-1 Huey. However, several UH-60 Black Hawk accidents in the past few years resulted from aviators not fully understanding the relationship between aerodynamics and power-performance limitations. A complete and thorough understanding of aerodynamics and power management might have prevented these accidents.

Let's review basic aerodynamics.

Tilting the rotor system in the direction of the turn creates a coordinated turn (no descent). In a coordinated turn, horizontal thrust is the turning force, and vertical thrust is equal to opposite weight. Therefore, steeper bank angles produce greater horizontal force but require more power to maintain a constant altitude.

A direct correlation exists between angle of bank for turns and power required. Today's dual-engine helicopters can give aircrews a false sense of "power to spare." As aviators, we must understand how changes in angle of bank can affect power requirements. For example, entering an excessive bank angle at low altitude can have catastrophic results unless sufficient power is available to maintain that altitude.

In a coordinated level turn, an increase in collective pitch increases both the angle of attack and horizontal and vertical forces, requiring additional power to maintain altitude. Placing an aircraft in a level turn does not by itself change the amount of lift. The division of lift into horizontal and vertical components reduces the amount of lift supporting the weight of the aircraft. Therefore, altitude will be lost when horizontal force is increased unless lift is increased by increasing collective pitch.

During pre-mission performance planning, determine your angle-of-bank limitations at cruise flight based on power available. Sufficient power to sustain a steep turn may not be available at very low or very high airspeeds. For example, a 60-degree bank angle creates 2 G's of acceleration (doubling the load factor) and will require a 100-percent increase in power to maintain altitude.

The following chart below illustrates the correlation between angle of bank and increases in power required to maintain altitude.

Bank angle	Increase in power
0°	0.0%
15°	3.6%
30°	15.4%
45°	41.4%
60°	100.0%

Next time you are in the flight simulator, at 1000 feet agl make a coordinated turn with a bank angle of 45 degrees for a total 360-degree turn. Be sure to maintain selected airspeed, and note the increase in power required to maintain altitude. Then have the I/O increase your gross weight to a heavy mission load, descend to 200 feet agl, increase airspeed to normal cruise airspeed, and establish a bank angle of 60 degrees. Unless immediate corrective action is taken, a crash is imminent.

During terrain flight, a steep turn that results in a sudden loss of altitude can be catastrophic. Remember your aerodynamics, and don't let it happen to you.

—MAJ Edward McKee, Aviation Safety Officer, National Guard Bureau, DSN 327-7735 (703-607-7735), mckeee@ngb-arng.ngb.army.mil

Army Safety Center Aviation POCs DSN 558-xxxx (334-255-xxxx)

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Shortfax
Keeping you up to date

New fuel-card procedures

Phase two of the Aviation Into-plane Reimbursement (AIR) Card Program began on 1 October. Government aircrews will now present their AIR Cards at DESC Into-plane contract locations in lieu of the blue and white Identaplates formerly used to process payment. The AIR Card also can be used to purchase authorized ground services as well as fuel, eliminating the need for aircrews to use manual Standard Form 44. Information on Into-plane locations is available on the web at www.avcard.com or www.desc.dla.mil. Identaplates are being phased out from use at commercial airports worldwide; however, they must be retained for use at military installations. In addition, units using WEX/Multi-Service cards under the GSA bridge contract are reminded that those cards expire in November.

—Mr. Philip Richards, U.S. Army Petroleum Center, DSN 977-7040 (717-770-7040), aircard@usapc-emh1.army.mil

Clarification of reporting requirements

Current reporting requirements for block 47 of DA Form 285: *U.S. Army Accident Report* imply that an incorrectly performed activity or task leading to an accident (block 46) can have one, and only one, root cause. This implication does not reflect the intent of the requirement or the reality of accident causation.

Effective immediately, block 47 may contain up to three of the most important root causes of the incorrectly performed activities or tasks identified in block 46. However, if more than one root cause is identified, the causes must be numbered in order of importance.

—Mr. John Crossette, Policy Branch, USASC, DSN 558-2643 (334-255-2643), crossetj@safety-emh1.army.mil

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1

Class E

F series

■ During main rotor track and balance, main rotor pitch change links were adjusted 2 inches longer than nominal settings, causing main blades to have a negative pitch angle of incidence. When aircraft was subsequently run up to 100-percent rpm with negative pitch, "TT" straps were damaged. Aircraft was shut down without incident, and "TT" straps were replaced.

E series

■ All gauges became erratic during flight, and crew heard a loud tone, and saw battery acid in the cockpit. Aircraft was landed and shut down. Battery, which had overheated, was replaced.

AH64

Class C

A series

■ Postflight inspection after numerous landings to improved and unimproved areas revealed bent transponder antenna mount and damage to three tail-rotor blades.

Class D

A series

■ Crew heard noise and felt bump in pedals during climbout, and left pedal stuck. After verifying that nothing was jamming pedals in cockpit, pilot applied additional pressure, and SPAD sheared. BUCs came on, pedal control returned, and crew made roll-on landing at airport. Postflight revealed that left-side transmission panel had come loose and jammed antitorque control tube.

Class E

A series

■ Aircrew smelled burning odor, and smoke entered cockpit during low-level flight. PC felt vibration in transmission area, and made immediate precautionary landing followed by emergency shutdown. Maintenance inspection revealed that No. 2 generator internal bearing failed, causing excessive friction and heat. Generator was replaced.

■ After completing live fire, aircraft was landed at FARP and shut down. Postflight inspection revealed damage to trailing edge of one tail-rotor blade. Suspect damage came from back-blast and propellant debris while firing 2.75mm FFAR. Tail-rotor blade was replaced.

■ PI was attempting to stabilize at 400-foot OGE hover. Aircraft was at 6 knots ground speed and 350 feet agl when No. 1 engine-out light illuminated and engine-out audio sounded. IP took controls and established single-engine speed of 32 knots after checking engine. Caused by failure of No. 1 engine alternator.

■ Preparing to ground taxi, crew received radio report that smoke was emanating from catwalk area. Caused by transmission leak.

■ Aircraft was in level flight when PI heard thumping noise that soon ceased. Postflight inspection found that skin on upper surface of No. 1 main-rotor blade had debonded and was peeling. QDR was submitted.

Class F

A series

■ During engine runup for maintenance test flight, MP noticed that No. 1 engine tgt was higher than normal for the day's conditions. When he advanced power lever to fly, tgt climbed to 888° at 94 percent Np. Engine was shut down. Inspection revealed dime-sized hole on metallic scroll of inlet particle separator. Engine borescope revealed damage to internal components, and upon disassembly, main-rotor retention cover bolt was found in IPS blower.

CH47

Class C

D series

■ Aircraft with dual-point tandem load was at a hover. When it settled, soldier positioned on the load was pinned between aircraft belly and load. He suffered no significant injuries but was placed on 30 days' convalescent leave for bruising.

Class E

D series

■ During final approach for roll-on landing, cyclic gave feedback then froze and released intermittently. Cause not reported.

■ During external load operations, center cargo hook opened as load began to apply weight to hook. Hook would not properly reset after opening. Maintenance replaced cargo hook, and aircraft returned to service.

■ No. 1 engine chip detector and master caution lights came on during final approach for landing. Pilot completed landing and shutdown without incident. No. 1 engine was found to be defective and was replaced.

■ Aircraft experienced severe vertical vibrations in cruise flight. Caused by failure of dual feedback transducer.

OH6

Class C

C series

■ Engine failed in flight. PC initiated autorotation upon activation of audio and warning light, landing in a downwind condition. Aircraft landed hard, severing tail boom and damaging landing gear.

OH58

Class B

D(I) series

■ Aircraft landed hard during simulated engine failure from hover. Aircraft rocked forward, striking lower WSPS, then rearward, striking tail rotor and damaging tail-rotor drive shaft.

Class C

C series

■ During engine start, turbine operating temperature reached 1000°C for 1 second. Engine replacement required.

Class E

C series

■ During touchdown phase of standard autorotation at stagefield, aircraft tail stinger struck ground and aircraft landed hard on skids. During slide to full stop,

crew heard loud popping sound. Postflight inspection revealed broken aft crosstube.

UH1

Class E

H series

■ Front crosstube broke on both sides during antitorque run-on landing. Crosstube was replaced.

V series

■ Engine failed when throttle was rolled to idle detent. Engine would not restart. Suspect failure of fuel control in main metering section. Fuel control was replaced.

■ Pilot heard pop when aircraft touched down during NVG blowing-snow landing. Postflight inspection revealed that lower WSPS was sheared. Maintenance determined that skid spread was ½-inch out of tolerance as the result of a bent forward crosstube.

UH60

Class C

L series

■ Cargo strap securing ammo boxes on armament pad separated while aircraft was still on ground with rotor rpm at 100 percent. Strap was subsequently caught in rotor wash, damaging three main-rotor blades. One blade required replacement.

Class D

A series

■ Main-rotor blades hit tree during takeoff from confined area. All four tip caps required replacement.

Class E

A series

■ Just before takeoff, sparks shot out from left-side windshield. Crew shut down aircraft and exited. Windshield internal copper wire shorted out, causing system to short and windscreen to crack. Windshield was replaced, and QDR was submitted.

■ Postflight inspection revealed damage to left fuel door and Fiberglas cover on fuselage below door. Suspect fuel door came open during flight and slipstream caused door to slap excessively. Maintenance replaced door and repaired damage to fuselage skin.

■ While conducting sling-load training under NVGs at 12-foot hover, aircraft contacted load, puncturing underside of aircraft. Damage was limited to a 5x7-inch hole in outer skin.

■ During hover check at 10 feet prior to departure, aircraft experienced uncommanded yaw input. Caused by failure of SAS actuator.

■ Aircraft was in cruise flight at 120 KIAS when hawk impacted No. 1 engine cowling. Crew made precautionary landing and found bird lodged in particle separator swirl vanes.

■ Upon landing after training flight, crew chief noticed upper anti-collision light missing all but white bulb and base. Cause not reported.

■ During roll-on landing, brakes were not released. Aircraft skidded on runway for about 20 feet before returning to hover. Aircraft taxied to parking and shut down without further incident.

■ Aircraft at 100 feet msl and 140 knots encountered flock of birds. Pilot initiated climb to avoid flock, but one bird struck right-hand window panel chin bubble, cracking it.

■ No. 1 engine chip light flickered then went out during runup. As aircraft was preparing to depart, chip light flickered again, and pilot returned to parking. Subsequent oil analysis and inspection of chip detector revealed high magnetic content. Engine was replaced.

C12

Class C

F series

■ Aircraft propeller and main landing gear struck deer during takeoff roll. Aircraft engine will require sudden-stoppage inspection.

N series

■ Damage to both engines was found during postflight inspection. Suspect lightning strike.

Class E

R series

■ When power was applied for takeoff, No. 2 engine did not produce power. Torque indicated 20 percent, and N1 was around 60 percent. During taxi back to ramp, prop rpm slipped back to about 300 to 400 rpm. Caused by fuel control failure.

F series

■ Crew found evidence of lightning strike during postflight. Further inspection by maintenance revealed damage to No. 1 prop, left outboard flap, and right elevator tip.

■ During engine start, pilot saw fire developing in engine exhaust stack and in burner can. He place condition lever in fuel cutoff, closed firewall shutoff valves, and continued to motor starter. Fire continued, seeming to receive fuel even after all fuel had been shut off. In an effort to save the engine, pilot continued to motor starter until battery ran down. Cause not reported.

C23

Class E

B series

■ Anti-skid system on left main gear failed on rollout after landing, causing left brake to lock up. Left main tire was damaged.

■ During control checks prior to takeoff, rudder pedals were extremely stiff and hard to move, and binding was felt throughout full range of movement from pilot and copilot station. Flight was terminated. Suspect failure of locking mechanism.

C26

Class E

B series

■ Left engine started to make squealing sound as aircraft was being vectored for approach at 4000 feet and 180 knots in light to moderate icing with all anti-ice systems on. Engine gauges appeared normal, and aircraft landed with no further problems. Postflight revealed bent No. 1 compressor blade to left engine. Suspect FOD induced.

O5

Class B

DHC-7

■ Manhole cover gave way under weight of right landing gear as aircraft was being towed by maintenance personnel. Sustaining damage were right and left landing gears, nose gear, right aileron, and various antennas and sensors.

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-64-98-ASAM-07, 171521Z Sep 98, operational

The Apache operators manual warns of turning off the hover augmentation system (HAS) in the description of attitude/hover hold, but it is not addressed in any of the before-landing check sections. If the HAS is activated on the ground, uncommanded aircraft attitude changes may occur. The purpose of this message is to outline and direct insertion of redline changes into AH-64A/D operators manuals, checklists, and maintenance test flight manuals.

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

CH-47-98-ASAM-05, 171543Z Sep 98, maintenance mandatory

The purpose of this message is to rescind practice roll-on landing restrictions imposed by CH-47-98-ASAM-02. It has been determined that the likelihood of a rotor-blade/fuselage strike is improbable if a landing gear drag link failure occurs during a roll-on landing.

AMCOM contact: Mr. Teng Ooi, DSN 897-2094 (256-313-2094), ooi-tk@redstone.army.mil

UH-60-98-ASAM-07, 151518Z Sep 98, maintenance mandatory

The purpose of this message is to remove from service all left tie rods, P/N 70400-08115-043, NSN 1560-01-083-2954, manufactured by Argencord. A visual inspection is required.

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

Safety-of-flight messages

OH-58-98-SOF-01, 251912Z Sep 98, technical

Due to cracking of the OH-58D tail boom in the area of the gearbox support assembly attachment, safety-of-flight message OH-58-96-01 required a fluorescent-penetrant inspection every 10 hours after installation of vibration-reducing hardware. The purpose of this message is to supersede that requirement and increase the inspection interval to 10-hour visual and 40-hour fluorescent-penetrant inspection.

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

OH-58-99-SOF-01, 071257Z Oct 98, technical

See OH-58-98-SOF-01 above. This message supersedes OH-58-95-SOF-02 and OH-58-96-SOF-01 and adds four part numbers to paragraph 6 of OH-58-98-SOF-01.

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

UH-1-98-SOF-08, 171531Z Sep 98, technical

This message establishes a 60-day limitation for compliance with the correction procedures of UH-1-96-SOF-03. It also extends recurring AVA inspection intervals.

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

POV fatalities: FY98 vs. FY97

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY98	FY97
117	93

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Class A Accidents

FY97 vs. FY98		Class A Flight Accidents		Army Military Fatalities	
		97	98	97	98
1ST QTR	October	0	2	0	0
	November	0	1	0	0
	December	1	2	0	2
2D QTR	January	2	1	2	0
	February	0	1	0	0
	March	2	1	1	0
3D QTR	April	2	0	2	0
	May	1	1	1	0
	June	3	2	0	4
4TH QTR	July	1	1	8	0
	August	0	0	0	0
	September	0	0	0	0
	TOTAL	12	12	14	6

U.S. ARMY SAFETY CENTER

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ARMY AVIATION
RISK-MANAGEMENT
INFORMATION

DECEMBER 1998 ◆ VOL 26 ◆ NO 15 http://safety.army.mil

SPOTLIGHT: CH-47 safety performance review

A look at the issues

Uncommanded flight-control inputs

The May 1998 issue of *Flightfax* contained the first-person accounts of the crew of a CH-47 that did a barrel roll. As a result of that incident, Aviation Safety Action Message CH-47-98-ASAM-01 (151327Z Oct 98) requested information from users on uncommanded control inputs. Input from users confirmed that this was not the only incident of uncommanded flight-control input experienced in the CH-47 community in the last several years. According to the Analytical Investigation Branch at Corpus Christi Army Depot, 21 activities responded to the ASAM, reporting 27 AFCS/electrical malfunctions, 4 hydraulic-related malfunctions, 4 unknown causes, and 3 suspected ice-and-water contamination incidents. Following are some examples.

■ While in cruise flight at 10,000 feet msl and 126 KIAS, the aircraft experienced an uncommanded pitch down of 20 to 25 degrees. When the PC applied aft cyclic, the aircraft pitched up then down before the PC regained control. The aircraft lost 500 to 1,000 feet of altitude during the sequence. When there were no additional problems, the crew elected to continue flight to their destination; they flew another 2 hours without further incident. It was later determined that the incident was caused by failure of the pitch axis portion of the AFCS. It is suspected that, during the sequence, excessive control inputs led to excessive flapping and lead-lag, resulting in failure of the shock-absorber mounts.

■ During flight-control check, the crew experienced control binding, with the cyclic limited to 4 inches forward movement and 1.5 inches lateral movement. The crew chief stated that the forward head was moving while the aft head was stationary. Pressure was in normal ranges, and the problem persisted for 5 minutes. The situation could not be duplicated by maintenance, but an actuator problem was suspected.

Update

Last year, a CH-47 miraculously returned to a wheels-down attitude at 250 feet agl after rolling 360 degrees in flight. The Army Safety Center, the CCAD Investigative Analysis Unit, AMCOM, and Boeing continue to monitor and evaluate all CH-47 flight-control anomalies to determine the cause of the incident. Following is a recap of ongoing actions:

■ AMCOM's Systems Engineering Department and CH-47 PEO/PM are currently preparing an ASAM that addresses findings, recommendations, and corrective actions developed to date.

■ A dehydrator will be issued in the near future to remove contaminants from flight hydraulic systems.

■ All chrome-plated aluminum end caps on servo-cylinders will be removed and replaced with chrome-plated stainless-steel end caps.

■ Several operational controls will be implemented to enhance early detection of flight-control lockup.

■ By-the-book maintenance is being emphasized. For example, mechanics must ensure that all hydraulic lines or components are capped and plugged as soon they are disconnected; all previously used or leftover hydraulic containers must be disposed of; and all hydraulic components received from the supply system must be drained properly.

—MSG Ruben Burgos, Aviation Systems & Investigation Division, DSN 558-3703 (334-255-3703), burgosr@safety-emh1.army.mil

■ While attempting to lift to a hover during slope operations, the SP noted control binding. When the other pilot tried his controls, he got the same outcome. They found no binding when they checked the cyclic boot, so they shut down the aircraft. Maintenance could not duplicate the problem, and the aircraft was released for flight. Several weeks later, another IP was flying the aircraft when it experienced severe vibrations to the point that cockpit instruments could not be read. The crew conducted an emergency shutdown without further damage. Transmission problems were suspected.

■ While conducting a flight-control check during run-up, the crew experienced control binding, grinding noise was heard in the forward transmission, and the forward blade bounced up 6 inches. This event occurred primarily when the cyclic was in the full right position and the crew was moving the cyclic from full forward back through the 4-inch forward to neutral position. Further examination revealed the lower part of the swashplate would make a bouncing movement, accompanied by a loud popping sound. No control stops were reached during movement, and the anomaly was repeatable. When the forward swiveling actuator was replaced, the problem could not be duplicated, so the aircraft was released for flight.

■ While transitioning through an airfield corridor at 700 feet agl and 100 KIAS, the aircraft began uncommanded left and right yaws starting at 5 degrees and increasing to 15 degrees. When the aircraft reached a 15-degree left bank, the PC applied right pedal and started a left, 10-degree bank to set up for landing. As pressure was applied, both pedal and cyclic froze in a left-bank attitude. Airspeed dissipated to zero; the crew described the aircraft's reaction as similar to that of a Huey with hydraulics off. The thrust was functioning, and, suddenly, all controls were free and functioning properly. As the crew set up for landing, the aircraft began to yaw again, and cyclic and pedals froze. At 100 feet agl, the controls released and functioned properly and the crew executed a roll-on landing. Everything was working properly, so the crew began a normal shutdown. Three steps into the checklist, the aircraft began to vibrate to the point that the gauges were unreadable, and things were flying around in the cockpit. The crew conducted an emergency shutdown as the aircraft continued to vibrate violently. A CH-47 maintenance officer witnessed the shutdown, and reported that the rotor system looked as though the pedal were displaced. After shutdown, the aft pivoting actuator was excessively hot, and the No. 1 jam indicator was popped.

Cooling fan drive shaft

The Chinook community has been experiencing problems with the oil cooler fan shaft in the combining transmission area. Safety-of-flight message CH-47-98-SOF-02 (161231Z Jul 98) imposed flight restrictions, additional preflight-inspection procedures, and a recurring inspection every 4 flight hours. These requirements remain in effect, and all personnel should review the message to ensure that it is being complied with.

Let's take a look at a couple of the incidents that led to release of this SOF message.

■ During taxi for takeoff, the IP noticed illumination of master caution with associated transmission hot capsule. After isolating the problem to the No. 1 engine transmission, the IP immediately performed emergency shutdown of both engines. Postflight inspection revealed a severed transmission cooling fan drive shaft and metal flakes on the combining transmission filter.

■ No. 1 engine transmission oil temperature rose rapidly through 130°C. When power was reduced, the temperature was passing 140°C. An emergency engine shutdown was completed with the temperature peaking at 145°C. At shutdown, the No. 2 engine and combining transmission oil temperatures were 120°C and rising. Maintenance found the combining transmission cooling fan shaft was sheared.

—CW4 Keith B. Freitag, Aviation Systems & Investigation Division, DSN 558-3262 (334-255-3262), freitagk@safety-emh1.army.mil

A look at the numbers

FY98 was a good year for the Chinook community. We had no Class A accidents—and, therefore, no fatalities (for the second year in a row), 3 Class B, 16 Class C, 3 Class D, 116 Class E, and 1 Class F. Damage costs totaled $1,887,015 and injury cost was $24,631, for a total cost of $1,911,646.

Table 1. CH-47 accident experience

FY	A	B	C	D	E	Fatalities	Total Cost
94	2	2	8	21	242	5	$28,045,061
95	2	0	7	8	218	6	18,971,713
96	2	0	15	9	192	5	36,151,899
97	1	3	11	3	182	0	13,936,699
98	0	3	16	3	116	0	1,911,646
Total	7	8	57	44	950	16	$99,017,018

Analysis indicates that the top three areas that require attention are engines, electrical systems, and flight-related incidents (mostly inadvertent cargo release).

Engines

Engine problems accounted for nearly a fourth of all Chinook mishaps during FY98. The areas that most need attention are the torque-metering system and the power controls. The Chinook community is anxiously waiting the fielding of the T55-GA-714A engine, which will bring improvements to all areas of the power plant, including the fuel authority digital electronic control (FADEC) system. The T55-GA-714A has proved itself on special-operations aircraft, where it drastically reduced the number of engine-related accidents.

Electrical systems

The one Class A accident attributed to the electrical system during the past 5 years accounted for five fatalities. Electrical-system problems also accounted for 36 Class E mishaps during the period. CH-47-97-ASAM-07 (141323Z Apr 97) outlined measures to reduce the possibility of electrical-power loss. Consideration also is being given to introducing an improved circuit-breaker panel for the improved cargo helicopter (ICH) and current models. Further, Boeing has recommended several options to reduce water entry into the electrical system, which is also a source of H-47 electrical problems.

Flight-related incidents

Inadvertent release of external loads accounts for a relatively large number of H-47 accidents. Analysis shows that the majority of these accidents are attributable to flight-crew actions and that most of them occur during hover or transitional flight.

Table 2. Inadvertent-cargo-release mishaps

FY	A	B	C	D	Injuries	Total cost
96	0	0	5	5	2	$274,631
97	0	1	3	0	1	781,039
98	0	1	7	2	4	311,907
Total	0	2	15	7	7	$1,367,577

The relatively high number of mishaps helped determine that improvements are needed. Removing the human element from a system through engineering improvement is always the preferred solution. Operational controls are a good short-term solution, but engineering controls will bring forth long-term results.

The external-load-control grip on the flight-engineer station is not only next to but is identical to the press-to-talk button. With the added factors of no illumination and heavy workload, crews are inadvertently releasing loads. In some cases, loads are released when the control grip is accidentally bumped or dropped.

A few years ago, a modification work order (MWO) was introduced to recess the cargo-release button to prevent accidental release of loads. However, that MWO did not solve the problem. Some believe that the MWO does not protect the button from being activated.

It is evident that we are dropping cargo due to a design flaw. There are operational controls to prevent this from happening, such as not using the control grip for communication. However, operational controls cannot guarantee that this won't happen again. So, the program managers are considering replacing the current switch with a covered switch that can be activated only by flipping the cover to expose the switch.

Many of these incidents occur during night and/or NVG operations. One cannot prevent inadvertent activation of the cargo-release switch when feeling to locate the right button to push. Sometimes one can inadvertently activate the switch when trying to locate the control grip itself. The Program Manager is considering requiring that the Flight Engineer School stress the correct procedure as an interim control. This would require that the flight engineer stay away from the control grip during flight and reach for the control grip only when release of the load is desired.

Several months ago, Fort Bragg's 18th Airborne Corps Safety Office was notified of an unusual finding that proved to trigger inadvertent cargo release. Following is a synopsis:

Hazard: Corrosion on the cargo-hook emergency-release switch can cause inadvertent jettison of external loads on C/MH-47D/E helicopters

Description: A CH-47 unit found corrosion on the overhead control panel for the "cargo hook emergency release all switch." Improper installation of three connectors (2 on pin 5, 1 on pin 6) leaves a paper-thin gap between connections on pins 5 and 6. Corrosion buildup on these two pins allows for a path of electrical conduction, needing only a single drop of water to complete the circuit. A detailed review of TM 55-1520-240-T3, page 16-2.8, confirmed that all three cargo hooks will open if the electrical connection between pins 5 and 6 of the cargo-hook emergency-release switch is shunted. Corrosion in this control panel exists in varying degrees across the unit fleet. It is a fact of life that moisture is going to get into these areas, either from rain or condensation. Improperly applied corrosion preventing compound (CPC) can contribute to the problem as well.

Control measures:

- Perform a visual inspection of the overhead control switches for possible corrosion and correct installation stack-up.
- Correctly apply CPC in accordance with TM 1-1500-344-23, paragraph 3-7 and table 3-5, or TM 55-1520-240-23-2, task 2-374. Proper use of MIL-C-81309 Type II CPC normally requires a follow-up coat of additional CPC.

—MSG Ruben Burgos, Aviation Systems & Investigation Division, DSN 558-3703 (334-255-3703), burgosr@safety-emh1.army.mil

A look at the mishaps

Class B

■ **During taxi to parking, the aft rotor blades contacted a windsock as the Chinook turned left onto the parking pad.** All three blades were damaged. This is nothing new; we've been doing this with aircraft since there have been aircraft. The recurring theme is the need to have ground guides in appropriate places. The operators' manual contains guidance on ground-guide positions; take the time to use them.

Class C

■ **As the Chinook exited the water during NVG amphibious operations, the loading ramp tore free and sank.** The operation was being conducted in a higher-than-authorized sea state, and the pilot allowed the aircraft to drift aft. Proper crew coordination might have prevented this accident. Crew coordination is more than positive transfer of the flight controls and checklist call-and-response. It's also any member of the crew—in both the cockpit and the cabin—speaking up whenever they see something that doesn't look right.

■ **During a left cross-slope landing, the left drag link assembly (P/N 114l2329-2) failed, allowing the left landing gear to collapse, further damaging the airframe and components.** Previous Aviation Safety-Action Messages (ASAMs) (CH-47-96-ASAM-01 and CH-47-98-ASAM-02) had identified the cause of drag-link failures as stress corrosion cracking (SCC). All CH-47D aircraft in salt-water areas operate in a highly corrosive environment that contributes to SCC and premature failure of the drag link. Units in such areas should ensure they are complying with appropriate inspections and maintenance procedures.

■ **Senior instructor (SI) suffered back injury during live rescue-hoist training.** The crew was conducting qualification training for two flight engineers in preparation for an upcoming support mission. The SI was required to lift and pull the hoisted person into the aircraft. After assisting 14 individuals, the SI noted that his back was sore, but he completed the mission. Seven days later, he went on sick call, at which time he was placed on quarters for 48 hours and restricted duty for 10 days due to pulled back muscles. It might seem easier to do the job yourself, but if you press beyond your limits, you can take yourself out of the picture for a long time.

■ **The Chinook encountered turbulence during terrain flight, and a crewmember fell and struck his head on the cabin floor.** The safest place for all crewmembers to be is strapped into a seat. In the cabin, being attached to the safety restraint harness pigtail is not enough. Even when attached, if it's extended all the way, a crewmember will still be bounced off the cabin floor and ceiling in the event of a crash.

Class D

■ **An M119A artillery piece was damaged during rehearsal for an air-assault demonstration.** The PI allowed the external load to touch down before the aircraft came to a stabilized hover. The artillery piece turned over and was damaged before the crew chief was able to release it. During demonstrations and air shows, aviators are sometimes tempted to try to get just a little more out of the aircraft or push their own limits a bit further. History, however, has proved that demos and air shows are not the places to push the envelope.

—CW4 Keith B. Freitag, Aviation Systems & Investigation Division, DSN 558-3262 (334-255-3262), freitagk@safety-emh1.army.mil

Shortfax
Keeping you up to date

No rides for Santa

A unit recently asked about using Army aviation assets for Santa to make an appearance at a military installation. Sorry, it's against regulations. According to AR 360-61: *Community Relations*, paragraph 13-7c, units may "not use Army aviation assets to transport persons costumed as Santa Claus, Easter bunnies, witches, or any other holiday-related character, whether the person is military or civilian, on or off a military installation."

So, if your unit gets a request to fly Santa or to provide a paratrooper to be Santa and make a grand entrance to the local tree-lighting ceremony, you will have to decline.

—MAJ Cindy Gleisberg, Command Judge Advocate, USASC, DSN 558-2924 (334-255-2924), gleisberc@safety-emh1.army.mil

CH-47 individual training: DES observations

In the numerous aviation assessments the Cargo Branch of DES conducted during FY98, most units performed well during the flight-evaluation portion. Those problems encountered centered on the administrative portion of the Aircrew Training Program (ATP). Assessments revealed a need for cargo units to focus attention in the following areas: FAC levels, RL progression, the commander's evaluation, and training documentation. Let's look at those areas more closely.

Flight activity categories

Unit commanders designate each position FAC 1, FAC 2, or FAC 3 based on the proficiency level required by the position. TC 1-210 prohibits the changing of FAC levels merely to reduce individual or unit flying-hour requirements. However, review of training records have revealed cases of FAC level assignments not being based on position requirements but, rather, to relieve individuals of their ATP requirements.

Another problem has to do with FAC 3 designations. Aviators designated FAC 3 must be qualified in their primary aircraft. Some units are assigning FAC 3 designation to aviators who are awaiting the qualification course although they are not yet qualified in the unit's primary aircraft. Other units are assigning FAC 3 designation to recent graduates of the Initial Entry Rotary Wing Course or aircraft qualification course who are on their first utilization tour. These individuals require training and evaluation on base tasks (geographical/environmental considerations), mission tasks, applicable special-mission tasks, and local-area orientation. DES recommends that these individuals be assigned to a flight/crewmember position as soon as possible after arrival in the unit.

Readiness-level progression

Readiness levels (RLs) identify the training phase in which crewmembers are participating and measure crewmember readiness. RLs provide a logical progression based on task and mission proficiency. Assessment of unit training records and folders revealed the following deficiencies:

- Rated and nonrated crewmembers are not progressed within established guidelines.
- Academic training (when required) is not conducted or documented.
- Minimum training hours are not accomplished.
- Required tasks and maneuvers are not trained and evaluated.
- Progression to the next readiness level is not accomplished in the designated period.

In addition, commanders should establish and publish policy that spells out night-orientation requirements. This may be done in the standardization SOP or in a separate policy letter. TC 1-210 specifically requires that—

- Night-vision goggle RL progression must start no later than the day/night RL1 progression date for aviators in NVG-designated positions.
- Aviators assigned to maintenance officer or maintenance technician positions or designated as MPs or MEs must pass a maintenance test pilot evaluation before being designated RL1.
- All aviators must complete a day and night local-area orientation flight before progressing to RL1.

Commander's evaluation

The purpose of this evaluation is to determine the initial readiness level of newly assigned crewmembers. This evaluation consists of a records review and possibly a proficiency flight evaluation. The records review must include the Individual Flight Record Folder to determine whether the crewmember is qualified for the duties assigned and to ensure that previous ATP requirements (to include APART) have been completed. The records must also be reviewed for waivers, extensions, and medical certification. The crewmember's previous CTL also should be reviewed to compare previous mission tasks to those of the current unit to aid in determining training requirements.

Training documentation

Assessments have revealed that graduates of the Instructor Pilot Course and Instrument Flight Examiner Course have been progressed to RL1 and designated D/N/NVG IP or IE based only on a records check.

A course-completion certificate does not provide documentation that all base tasks and required unit-mission tasks were trained and evaluated during the course of instruction, nor does it document an individual's ability to conduct mission equipment and geographical/installation-specific training and evaluations. In addition, for NVG IP designation, a new IP must complete an NVG IP evaluation given at night in the aircraft by an NVG SP. Refer to MACOM, installation, and unit regulations for additional evaluation requirements.

DES recommends that the initial instructor/evaluator evaluation take place in the aircraft (or simulator if applicable) in the modes and conditions associated with the duty performed.

Summary

- FAC levels should not be changed to reduce unit or individual flying-hour requirements.
- Commanders should carefully consider which aviators will be designated FAC 3. FAC 3 positions should be reserved for staff personnel who are not expected to maintain a high state of proficiency.
- RL progressions must be properly conducted and accurately documented.
- Flight records and training folders of newly assigned aviators should be reviewed in detail to ensure all previous requirements were met and to determine the aviator's training requirements for the assigned position.
- Recent IP/IE graduates are not qualified to perform IP/IE duties until they demonstrate to an SP their ability to train and evaluate the unit's mission tasks and local-area requirements.

Developing, implementing, and maintaining an aircrew-training program is a challenging requirement, and DES stands ready to assist. Call or e-mail us.

—CW4 John Smolka; Directorate of Evaluation and Standardization, Fort Rucker, AL; DSN 558-3475 (334-255-3475), smolkaj@rucker.army.mil

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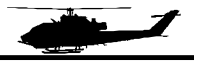
AH1



Class B

F series

■ Aircraft landed hard during APART simulated engine failure from a hover. Post-accident inspection revealed damage to transmission and main-rotor-blade grips.

Class E

F series

■ During OGE hover, rectifier caution light illuminated momentarily, then went out. When aircraft was brought to 3-foot hover, alternator and master caution lights illuminated. Aircraft was landed, and maintenance was called. Cause of problem was not reported.

AH64

Class C

A series

■ While firing during a CALFEX, crew misidentified Hellfire target array and subsequently fired two missiles outside the prescribed range azimuth. One of the missiles destroyed four HMMWVs located in parking area; the other missile landed in the vicinity of a nearby firing range, causing no damage.

Class D

A series

■ While turning crosswind in formation flight, aircrew was notified that No. 1 engine cowling door was open. Aircraft returned to airfield and landed without incident. Postflight revealed damage to No. 1 engine cowling door.

Class E

A series

■ Utility low caution light came on during cruise flight. About 3 minutes later, as aircraft was maneuvering for precautionary landing, utility hydraulic psi caution light came on. Aircraft was landed in highway median without incident. Caused by failure of hydraulic line.

■ During gunnery operations at OGE hover, aircraft experienced uncommanded control inputs. Crew identified the inputs as DASE failure and executed emergency procedures. With DASE off-line, uncommanded control inputs subsided, and aircraft was flown to FARP pad without further difficulty. Maintenance could not duplicate the malfunction; suspected cause was heading and attitude reference system (A-17 series) malfunction.

■ While at a hover, aircraft made sudden, violent, uncommanded forward pitch-down movement. PC applied full aft cyclic with no response. After about 2 seconds, PC regained cyclic control for 5 seconds before aircraft pitched up again. No caution lights came on, and DASE panel switches were all engaged. PC disengaged DASE as aircraft made violent right roll, pitching up simultaneously, and he applied full left forward cyclic with no effect. After 3 to 4 seconds, aircraft rolled back to left. PC then initiated descent to land, continuing to engage DASE with no response. Aircraft landed right-wheel low and tail low, and PC lowered collective until main rotor appeared level. As he began shutdown, cyclic began uncommanded movement again, and PC initiated emergency shutdown. Main rotor continued uncontrolled movement as rotor brake was applied. CPG attitude indicator and RMI were moving and spinning with the generators still on. Subsequent inspection revealed no noticeable damage except to main-rotor seal retaining ring. Investigation is on going.

■ Aircraft was on ground with engines idling when PI heard popping noise from right side. Slight odor of exhaust fumes was noticed just before APU failed. After emergency shutdown, maintenance checked aircraft and found that shaft-driven compressor shaft had sheared. Transmission was flushed and SDC was replaced.

CH47

Class C

E series

■ As aircraft was being back-taxied to parking after hot refueling, right aft landing gear collapsed. Crew raised aircraft and hovered to parking. Wooden pallets were positioned to cushion/support collapsed gear, and aircraft landed without additional damage.

■ Upon touchdown, slingloaded M119 howitzer overturned and rolled. Investigation under way.

Class D

D series

■ During slingload operations, aircraft was being hovered over load from tandem hookup. Hookup team of artillery soldiers misidentified VHF antenna as forward cargo hook and attempted to sling clevis to antenna, which broke at its mount. Maintenance replaced antenna.

Class E

D series

■ Master caution and transmission hot caution lights came on in cruise flight, followed by rise in oil temperature for combining transmission and Nos. 1 and 2 engine transmissions. Crew landed and performed emergency engine shutdown. Caused by failure of combining transmission cooling fan drive shaft. QDR was submitted.

■ While performing flight control hydraulic check, flight engineer noticed aft red blade swing aft significantly. Caused by failure of rotor blade shock absorber outer rod end where it attaches to blade.

■ During hover, crew chief noticed hydraulic fluid leaking from soundproofing in forward pylon area. Inspection revealed that fitting on hydraulic pressure line to winch had come loose. Aircraft was landed and shut down, and crew chief tightened fitting and serviced reservoir.

OH58

Class C

D(I) series

■ During engine start in preparation for RADS check, hot start was experienced, and engine limits were exceeded. Maintenance determined that engine must be replaced.

Class D

D(I) series

■ While demonstrating simulated engine failure (SEF) at altitude with minimum rate of descent airspeed, IP failed to roll throttle back up to 100 percent. Throttle remained at engine idle

through the decel and initial pitch pull. At around 40 feet, IP attempted to roll throttle back up to 100 percent as he applied collective, causing aircraft to land hard, bounce, and rotate about 155 degrees to the right as it slid on runway. Aircraft sustained hard landing, mast overtorque of 124 percent, and engine overtorque of 130 percent.

Class E

A series

■ During downwind, crew noted lateral vibration and aircraft experienced side slip at 800 feet agl. Pilot evaluated it to be a slight wind gust. However, upon turning base leg, vibrations were again felt, torque became erratic, and low rotor rpm light and audio came on. As collective was lowered, both indications ceased, but returned when collective was increased. Pilot made run-on landing to sod and completed emergency shutdown with no injuries or damage. Caused by governor failure.

C series

■ During low-level autorotation, crew heard high-pitched whine, hydraulic caution light came on, and controls became stiff. Crew performed power recovery and hydraulic failure emergency procedures and landed without further incident.

■ During terrain flight takeoff, aircraft logbook fell off glare shield and into pilot's side chin bubble, breaking it. Aircraft was landed without further incident. Cabin bubble was replaced.

D(I) series

■ During runup, tgt overtemp warning message and audio came on. Engine monitor page read 1180°, and tgt vertical scale displayed 0°. Aircraft was shut down without incident. Caused by faulty tgt wiring harness, which was replaced.

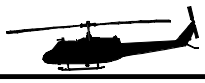
TH67

Class C

A series

■ Aircraft engine temperature reached 930°F for 2 seconds during engine start, exceeding operating limits of 927°F for 1 second.

UH1



Class E

H series

■ Crew heard loud bang, and aircraft yawed right; all instruments read normal. PC declared precautionary landing and landed. Maintenance found that one blade on first stage of compressor section was bent. Suspect FOD.

■ As aircraft touched down on parking pad, crew felt moderate high-frequency vibration accompanied by loud noise. Emergency shutdown was performed. Caused by failure of hanger bearing.

■ Left fuel tank began leaking fuel and landed without incident. Maintenance replaced auxiliary fuel hose to lower fuel cell.

■ N2 rpm indicator went to zero on short final. Aircraft was landed, hovered to parking, and shut down by checklist. Caused by failure of N2 generator.

■ After departing battle position, aircraft experienced uncommanded right yaw with loud popping sound from engine area. Emergency procedures for compressor stall were initiated, and aircraft landed without further incident. Inspection revealed that variable inlet guide vane (VIGV) actuator was out of adjustment.

■ Just after runup, mechanic on flight line noticed smoke coming from engine cowling around combustion section. Operations contacted crew, and emergency engine shutdown was completed. Troubleshooting found moisture around start fuel nozzle.

UH60

Class C

A series

■ Broken landing gear was noted on takeoff from snow landing. Crew elected to return to home station for crash-rescue-assisted landing (air pillows). Post-landing inspection revealed that left main landing gear drag brace was broken. Local board is investigating.

L series

■ Through-flight inspection revealed that tail-rotor de-ice cannon plug on blue blade had separated during flight, damaging tail rotor and one main rotor blade. No indications of separation were noticed during flight, and preflight the day before did not reveal any deficiencies. Further inspection found that bracket assembly had broken off; most likely, it tore the tail rotor de-ice cannon plug off with it.

Class D

A series

■ After MAST mission, PC directed PI to taxi aircraft next to pumping unit for refuel. As rotors slowed during shutdown, blade droop caused three main rotor tip caps to contact apex of hose reel on pumping unit. One tip cap was destroyed.

Class E

A series

■ After HIT check and just before takeoff, crew smelled smoke and determined that the odor was coming from the overhead console. PI saw wisp of smoke near No. 1 a.c. circuit breaker panel. All electrical power was turned off, and aircraft was taxied to nearest pad for termination. Aircraft was shut down without electrical power or APU power. Caused by rheostat failure.

L series

■ During landing to helipad, right-hand drag beam and shock strut broke at wheel, causing wheel to separate from aircraft. Crew returned to hover and flew back to home airfield, where ground personnel assembled landing platform of wood and mattresses to support right side of aircraft. Aircraft landed with no further damage.

■ During NVG formation flight, aircraft struck bird. Aircraft departed the flight and landed at airport 1 mile away. Inspection revealed damage to left cockpit door sliding window upper control cam.

C12

Class E

C series

Postflight inspection after uneventful night flight revealed damage to right wing tip navigation light lens cover, engine inlet lips, and leading edges of both wings beneath de-ice boots. Suspect damage was caused by hail during flight.

F series

■ Aircraft encountered unforecast moderate icing during cruise flight at 8000 feet. Crew could hear ice shedding from propeller blades as it impacted sides of aircraft. Aircraft departed icing conditions after about 10 minutes. On postflight, crew discovered numerous dents and missing paint chips on left and right front avionics compartment access panel along propeller line.

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-1-99-ASAM-01, 021402Z Nov 98, maintenance mandatory

The purpose of this message, which revises UH-1-98-ASAM-02 (181421Z Nov 97), is to require mandatory removal of elevators manufactured by Chem Fab Corporation upon reaching the retirement life of 3,600 flight hours or no later than 15 October 2000.

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

UH-60-99-ASAM-01, 021408Z Nov 98, maintenance mandatory

ASAMs UH-60-98-ASAM-03 (302108Z Oct 97) and UH-60-98-ASAM-05 (301445Z Apr 98) directed removal of swashplate link, P/N 70400-08110-054 or 70400-08110-61, manufactured by TEK Precision Corporation due to analysis indicating that the parts did not conform to process specifications of the original manufactured component. Subsequent analysis revealed that the parts were actually in conformance with specifications and that removing them from service is not necessary. The purpose of this message is to stop any further removal and demilitarization of the parts, which are fully qualified with no limitation on life

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

UH-60-99-ASAM-02, 021746Z Nov 98, maintenance mandatory

The purpose of this message is to—

- Direct inspection of all external rescue hoists manufactured by Breeze-Eastern to ensure that correct tension rollers are installed.
- Inspect for corrosion and correct all external hoist installations to allow proper drainage.

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

Safety-of-flight messages

AH-1-99-SOF-01, 081224Z Oct 98, technical

This message extends the recurring AVA inspection interval from 25 hours to 150 hours for engines with a coated spur gear installed and to 50 hours for engines with a noncoated spur gear (after at least one successful retest has been completed). In addition, the message prohibits the use of the obsolete lock-cup (NSN 5340-00-916-2592) when replacing the spur gear. The improved lock-cup (NSN 5340-01-430-0385) is the only authorized replacement for use on the spur gear.

AMCOM contacts: Mr. Robert Brock, DSN 788-8632 (256-842-8632), brock-rd@redstone.army.mil; or Mr. Howard Chilton, DSN 897-2068 (256-313-2068), chilton-hl@redstone.army.mil

AH-64-99-SOF-01, 191944Z Oct 98, technical

The manufacturer has reduced the service life of some rotating components in the T-700-GE-701 engine. Continued operation beyond the newly established limits could result in engine failure. The purpose of this message is to—

- Identify gas generator rotor modules having Stage 2 aft cooling plates with more than 4000 operating hours and remove them from service.
- Collect operating time data on other affected components. This data will be used to establish revised life limits, which will be published in a future message.

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

POV fatality update through October

Speed ⊙
Fatigue ⊙
No seatbelt ⊙

No new causes, just new victims

FY99	FY98
13	13

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Class A Accidents through October

		Class A Flight Accidents		Army Military Fatalities	
		98	99	98	99
1ST QTR	October	2	1	0	0
	November	1		0	
	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	1	6	0

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