FLIGHTFAX

Volume 19 Number 1 REPORT OF ARMY AIRCRAFT ACCIDENTS 10 October 1990

Within a few short minutes, two Army helicopters crashed after entering a localized heavy rain shower, killing 11 soldiers and destroying both aircraft. Like most other accidents, these seemingly happened very quickly and very unexpectedly. But the fact is, they had been in the making for some time.

There are many lessons to be learned from these accidents. The most obvious is what can happen when aviators fail to immediately execute inadvertent IMC procedures when they find themselves in this situation. Another is what happens when an aviator gets away with breaking the rules time after time. Less obvious—but just as valuable a lesson—is what happens when the pace of an operation gets out of control.

It all caught up with him

He was an enthusiastic pilot, confident in his abilities, and eager to support the ground unit commander. But in his eagerness, he sometimes bent the rules, and he didn't always follow procedures.

It all finally caught up with him on a night when he shouldn't have been flying at all, and he flew his OH-58 into the side of a hill. The ground unit commander he was so enthusiastically supporting was with him. They were both killed.

The pilot had been assigned to his current unit about 5 months when the accident happened. About a month after his arrival, he had progressed to readiness level (RL) 1 for day and night-unaided operations and to RL 2 for NVG operations. Three months later, he was designated a PIC in the OH-58A for day or night-unaided operations in either pilot seat.

During five satisfactory training evaluation flights with a unit instructor, he had performed vertical helicopter instrument recovery procedures (VHIRP) three times. According to the unit training program, he was required to perform inadvertent IMC procedures 10 times in the 7-month period following his last evaluation. But 4 months had passed, and he had not performed the procedure even once.

At the time of the accident, the pilot was under the operational control of the supported infantry battalion and received his specific taskings from that unit. But he was supposed to coordinate his daily operations with his aviation platoon leader by telephone. And he did, most of the time. On this day, he didn't. On this day, he was operating pretty much as he pleased. He violated procedures several times, but he got away with it . . . until he did it one time too many.

On the day of the accident, he flew five command and control missions, a total of about 8 hours. This means he would have had to refuel twice, but only one refueling was recorded. It was possible, and, under the circumstances, probable, that he refueled his own aircraft and didn't record it—a violation of procedures. But he got away with it.

This wasn't the first time he had used poor judgment. Two days before, he was briefed for a night-unaided flight, yet he used NVGs part of the time even though he was flying single pilot. He knew this violated the unit SOP, and it also violated FC 1-219. But he got away with it.

On the day of the accident, he flew with three passengers on board, exceeding the aircraft's maximum gross weight by 86 pounds. Another violation, but he got away with it.

That afternoon, he flew NOE at 90 KIAS on a mission for which he was cleared only for low-level flight. Not only did this violate the mission brief, it greatly reduced his reaction time in case of an emergency. Again, he got away with it. But this would be the last time. From here on, his violations would begin to catch up with him.

Just before noon, the ground unit commander asked him about flying a night mission. The commander wanted to observe his troops during an air-mobile operation. The pilot knew that he wasn't supposed to fly at night and that he wasn't supposed to fly more than 4 hours a day, but he accepted the mission anyway.

He had plenty of time to plan that night mission,

to obtain weather information, to file a flight plan, and to coordinate with and get an air mission briefing from his aviation platoon leader. But he didn't file a flight plan, and there's no evidence that he asked for an update to the weather briefing he had received that morning, which had expired at 1700 hours. He also did not coordinate the mission with his aviation platoon leader, so there was no mission briefing.

He took off at 1940 with the ground unit commander on board. About an hour later, after watching the initial insertion of the airmobile operation, the OH-58 began escorting a UH-1 back to the PZ. The OH-58 never made it.

The OH-58 was at about 300 feet agl when it flew into a heavy rain shower. The pilot couldn't see the ground or the other aircraft. He continued flying, entered inadvertent IMC, and crashed into a 20-degree upslope at 140 knots, killing both occupants.

Soldiers at the ground unit command post reported hearing what sounded like a crash at about 2050. Army and Air Force aircraft searched throughout the night, but it was 0830 the next day when ground personnel found the wreckage.

When the OH-58 flew into the unforecast rain shower and the pilot lost sight of the ground, he failed to immediately execute inadvertent IMC procedures. There were two things that could account for this failure:

- Fatigue brought on by his long day could have caused him to be slow in cross-checking his instruments or delayed his decision to execute the procedures.
- He lacked recent experience in executing inadvertent IMC procedures.

This pilot was setting his own pace, and he exceeded his endurance and capabilities. He violated procedures one time too many, and it all finally caught up with him. The tragic thing is that it cost two lives. ■

The pace never slowed

It had been only 3 weeks since a major operation had taken place in the area. During the operation, mission requirements had taken precedence over training. But the operation was over. In some units, however, the pace hadn't slowed. Some of the training that had been shelved as a result of the operation still had not been completed. Here's what happened in one of those units.

The mission

The mission called for four UH-1s to provide support to an infantry battalion during an airmobile operation. On the first day, one of the Hueys flew command and control missions while the other three transported troops. When the crews were released, they expected to fly only day missions the following day.

The next day, there was an unexpected change, and the crews learned that they would be flying night missions. The platoon leader had reached his crew endurance limits, and he designated one of the other PICs to be the air mission commander (AMC).

One of the three remaining UH-1s had to go in for some preventive maintenance, and when the crew returned to the operations area, the new AMC told them they could "sit this one out." Since this aircraft wouldn't be flying, the AMC decided to use its two observers for the two aircraft that would be flying the missions. This would give aircraft No. 1 and aircraft No. 2 (the AMC's aircraft) two observers, each equipped with AN/PVS-5 NVGs, in addition to the pilots with their AN/AVS-6s.

At the final coordination meeting, it was decided that after making one lift, aircraft No. 1 would pick up a passenger and drop him off at one of the LZs. Aircraft No. 2 would return to the PZ for another load of troops.

Six soldiers were loaded on each aircraft, and the UH-1s left for the DZ. After the troops were unloaded, aircraft No. 1 (accompanied by an OH-58 from another unit) left to pick up the passenger. It was now about 2035 hours.

The aircraft were about 2 or 3 kilometers from their destination when the OH-58 pilot, who was flying unaided, asked the UH-1 crew to turn on their lights to give him a visual reference point. As they complied, they noticed video noise (which they described as "sparkle") in their NVGs, a telltale sign of rain. To avoid the rain shower, the UH-1 crew turned back toward the west. After circling two or three times, while attempting unsuccessfully to contact the pilot of the OH-58, they returned to the PZ and told the AMC that they thought the OH-58 was missing.

The AMC told them to pick up five more troops who were waiting to be transported to the DZ. While they were landing, a call came in confirming there was a downed aircraft.

The AMC in aircraft No. 2

had taken off with another load of troops. When he heard the radio call about the missing OH-58, he reversed course and headed east.

As his aircraft passed north of aircraft No. 1, which was still loading troops, the crew of aircraft No. 1 radioed the AMC that there was heavy rain in the direction he was heading and that was where they had lost the OH-58. The reply was, "No problem."

The crew of aircraft No. 1 began offloading troops so that they could follow aircraft No. 2. At about 2055, aircraft No. 2 reported it was inadvertent IMC. The crew was initiating inadvertent IMC procedures and starting a climb.

By now, aircraft No. 1 was in the air, and it began a slow right turn to the west to again avoid the rain. A couple of seconds later, the crew heard the copilot of aircraft No. 2 on a "hot mike." His voice clearly showed his apprehension about their situation.

Realizing aircraft No. 2 was in trouble, and knowing the OH-58 was probably down, the crew of aircraft No. 1 decided to return to the PZ until the weather improved. While they were waiting, they used the radios to try to find out the status of both missing aircraft.

At 2120, the heavy rain into which the OH-58 and the UH-1 had disappeared, passed over the PZ. When it had moved on to the west, the crew of aircraft No. 1 took off to look for the missing aircraft.

The UH-1 wasn't found until 2 days later. It had crashed in dense trees and undergrowth, killing all nine occupants (four crewmembers and five passengers).

Contributing factors

There were several factors that could have had a bearing on what happened:

- The PIC was not occupying the primary pilot's station. Because he was flying the aircraft from the left seat, he was deprived of instruments that could have made his job easier.
- His attitude indicator was registering 5 degrees high, giving an erroneous reading of the aircraft's attitude. This condition had been written up in the aircraft's logbook.
- Although he was on orders as a PIC in both seats, the AMC had not been trained to the standard required for executing inadvertent IMC procedures under NVGs. He had successfully completed all flying hour and task requirements for readiness level (RL) 3 and RL 2 NVG training. But, because of mission support and tactical requirements during the major operation that had recently taken place in the area, he had not received an NVG PIC evaluation. A waiver had been granted with the stipulation that an evaluation would be done at the earliest possible time. It had been 40 days since the waiver was granted and 3 weeks since the major operation ended, but the pace in the unit had not slowed, and the evaluation was never done.

The combination of fast unit pace and operational requirements that lingered after a major operation had ended resulted in a situation where training was not receiving the priority it should have. As a result, low-time aviators were being stretched to the limits, and, in their eagerness to perform, they made judgment errors and lives were lost. ■

There could have been another accident

The platoon leader had told all the UH-1 crews that if they weren't needed for the mission they could conduct up to 3 hours of ATM training daily. When the crew of the UH-1 that was in for preventive maintenance (aircraft No. 3) found out they wouldn't be needed, that's what they decided to do.

They took off and performed several ATM maneuvers, but they didn't file a flight plan or get a weather briefing. After landing to refuel and eat, they were told by an infantry lieutenant that an aircraft had crashed. He also told them the battalion commander needed transportation out to the operations area.

The crew agreed to fly the mission. They did not conduct a crew briefing, and, again, they did not file a flight plan or get a weather briefing. Although they were using AN/AVS-6 NVGs and knew they were supposed to have NVG-equipped observers on board, they took off without them.

When they arrived at the operations area, the infantry battalion commander asked the crews of aircraft No. 1, aircraft No. 3, and a medevac aircraft to coordinate a search for the downed aircraft. They agreed and decided that the medevac aircraft and aircraft No. 1 would initiate an air search while aircraft No. 3 remained on the ground because there were no NVG-equipped observers on board.

Sometime around 2345, the crew of aircraft No. 3 was awakened by two members of the ground unit. The ground unit people had AN-AVS-7 NVDs with them, and the aircrew decided that fulfilled the requirement to have an NVD-equipped observer on board. They took off at about 2400 with the ground unit people on board.

They searched for the downed aircraft for about 1½ hours, during which they flew through a light rain shower. When the UH-1 flew into the rain, the NVDs the infantry people were using blacked out. (The AN-AVS-7 NVDs are monocular tubes designed for use by ground units; they were never intended for aviation use.)

When the aircraft began getting low on fuel, the PIC told his passengers they were going with him to refuel. By the time the aircraft landed, refueled, and returned to the field it had taken off from earlier that night, the aircrew's duty day had extended to 19½ hours. The copilot had complained of being tired, but the PIC was calling the shots.

Nobody really knew where this aircraft was. There was no flight plan on file, and the PIC of aircraft No. 1, who knew where they were earlier that night, thought they had returned to the Army installation.

These crewmembers were making decisions on their own and assuming risks they had no right to assume. Two aircraft were missing, and people they knew were on board the downed UH-1. They wanted to help, but they were taking too many chances. They knew that the unit SOP said to leave search and rescue operations to the experts. Without a great deal of luck, that easily could have been their epitaph. ■

What can be done?

There are many parts of the world in which unforecast weather can occur. We can't control the weather, but we can control what happens before or during such encounters. The key is training—training aviators to assess the risks and avoid such encounters, and training in what to do during an inadvertent encounter.

Several things should be done within this unit to prevent this kind of accident from happening again. Most of them also apply to other Army units. For example:

- Ensure that other aviators know about the judgment errors these PICs made.
- Teach them to correctly evaluate situations and choose the right courses of action.
- Train aviators in how to conduct risk assessments before attempting rescue operations in poor weather and poor light conditions.
- Provide training on crew coordination in advertent IMC situations.
- Ensure that aviators who are PICs in either pilot station are fully trained and evaluated.
- Adjust the pace in the unit to provide a better balance between aviator mission support and aviator training. ■

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class E

H series - During straight and level flight, torque was increased and stabilized at 31 psi. Acceleration was begun from 80 knots to VNE to complete vibration check. Engine power fluctuated slightly, and crew completed compressor stall emergency procedure. When engine was removed for test cell evaluation, bleed band was found slightly out of adjustment. Suspect installation error caused bleed band cycling.

H series - Cracked hydraulic line caused aircraft to lose hydraulic power during cruise flight.

H series - During hover for takeoff, crew felt cyclic feedback. Caused by leaking irreversible valve on right cyclic servo.

UH-60 Class E

A series - During flight using external stores support system (ESSS), auxiliary fuel and no-fuel-flow lights came on. Visual check confirmed fuel was not transferring. Crew shut off ESSS, then noticed 92 fuel indicator was not showing any decrease in fuel. Both fuel system selectors were in direct position. PIC placed 92 fuel system selector into crossfeed, and No. 2 fuel indicator began showing decrease. Cause has not been determined.

A series - During hover, caution lights came on showing No. 2 reservoir-low boost servo and stability augmentation system were off. There was no hydraulic power to flight controls. Caused by failure of second-stage module assembly.

A series - During flight, master caution light came on and oil temperature on No. 2 engine went to maximum. Crew performed emergency procedure for high engine oil temperature and landed aircraft. Caused by failure of oil temperature transmitter.

A series - During power-on and subsequent hydraulic leak detection test, only four out of six warning lights came on: No. 2 reservoir-low, stability augmentation system, boost, and backup reservoir. No. 1 and No. 2 servo control circuit breakers had also popped out. When test was repeated, results were the same. Caused by short to ground of No. 1 reservoir-low switch.

Attack

AH-1 Class D

F series - Crew discovered damage to tail rotor blades during post-flight inspection. Suspect crew misjudged clearance during pinnacle landing, allowing tail rotor to strike vegetation.

AH-1 Class E

F series - When POL handler applied pressure while inserting CCR nozzle, retaining ring was broken.

F series - Excessive stiffness in cyclic was noted during approach with right crosswind. Aircraft slid slightly left during landing, but there was no damage. Felt strip from gunner cyclic radio/ICS switch had unwound and wrapped around cyclic.

AH-64 Class B

A series - Aircraft was at low altitude during filming mission. When pilot turned to left, main rotor blades struck a dead tree crew had not seen. 9041

Cargo

CH-47 Class D

C series - During pinnacle landing to resupply firefighters, ramp was damaged when it was lowered onto tree stumps in landing area.

C series - During taxi following mission, FE noticed aft pylon work station was open. Locking pin on forward latch broke, allowing work platform to open.

D series - During final, crewmember noticed high indication on No. 1 power turbine inlet temperature and emergency power light came on. Caused by failure of power temperature indicator.

CH-47 Class E

D series - While performing ramp check during cruise flight, FE noticed oil level of No. 1 flight boost hydraulic system was low. He began refilling system while crew chief checked for leakage. A few minutes later, FE noticed oil level was again low. CE found hydraulic fluid throughout flight control closet. FE continuously serviced

Class A Accidents through 10 October

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	1	2	0
	November	2		1	
	December	3		4	
2nd Qtr	January	2		4	
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	1	33	0

[illegible] skids [illegible] spread during hard landing to lake bed.

OH-58 Class E

A series - Aircraft was refueled from a USMC 5,000-gallon tanker after a 2.7-hour flight. Aircraft was started, and when generators came on line during runup, fuel quantity indicated 600 pounds. About 10 seconds later, master caution and fuel filter light came on. After another 10 seconds, engine failed. Fuel sample revealed between 10 and 15 gallons of water had been pumped into tank. Investigation revealed fuel truck had not been used for about 2 weeks. Aqua-Glo tests had not been conducted on fuel.

C series - During flight at 20 KIAS, low rotor rpm light and audio came on. N2 remained at 100 rpm. Reacting to what he thought was an engine failure, PIC failed to heed warning in operator's manual and overtorqued air-[illegible] series - During landing rollout, power levers initially would not come out of reverse. Then power levers released, but No. 1 lever would only advance 1/4 inch. Power lever cable was jammed between console and engine.

Safety messages

•Safety-of-flight maintenance mandatory message concerning one-time inspection and modification to hydraulic line clamps on CH-47D aircraft (CH-47-90-12, 112000Z Sep 90). Summary: Category I deficiency reports state that hydraulic line clamps have broken and fallen into an area that caused scoring of the No. 1 synchronized shaft. Purpose of this message is to direct a one-time inspection of these clamps and modify the stack-up to preclude future failures. Contact: Lyell Myers, AV 693-9089, commercial [illegible] flight. Contact: Brad Meyer, AV 693-9089, commercial 314-263-9089.

•Safety-of-flight maintenance mandatory message concerning one-time inspection of OH-58A and OH-6A aircraft equipped with the Casey heater used with T63-A-700 engines (OH-58-90-11 and OH-6-90-09, 111800Z Sep 90). Summary: A trend has been identified regarding failure of T63-A-700 engine exhaust collector support assemblies. Cracks occurring in the collector are due to material used in manufacture prior to 1969. Failure of the exhaust collector on aircraft equipped with the Casey heater system could allow hazardous exhaust gases to be introduced into the cabin area. Previously, exhaust assemblies have been replaced during overhaul on an "as-required" basis, but replacement is now mandatory. Purpose of this message is to require a one-time inspection of T63-A-700 engines on aircraft with the Casey [illegible] defective [illegible]ade on a similar aircraft. Purpose of this message is to locate and remove 52 suspected defective tail rotor blades from service. Contact: Lyell Myers, AV 693-9089, commercial 314-263-9089.

For more information on selected accident briefs, call AV 558-4198/3901, commercial 205-255-4198/3901.

U.S. ARMY SAFETY CENTER

Report of Army aircraft accidents published by the U.S. Army Safety Center, Fort Rucker, AL 36362-5363, AUTOVON 558-2062. Information is for accident prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition. Direct communication is authorized by AR 10-29.

C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center

COORDINATION

Pilot concentrates on instruments; copilot looks outside

CLEARANCE

Clear highest obstacles with straight controlled climb

COURSE

Select and turn to appropriate heading

CALL

Make required radio call for assistance

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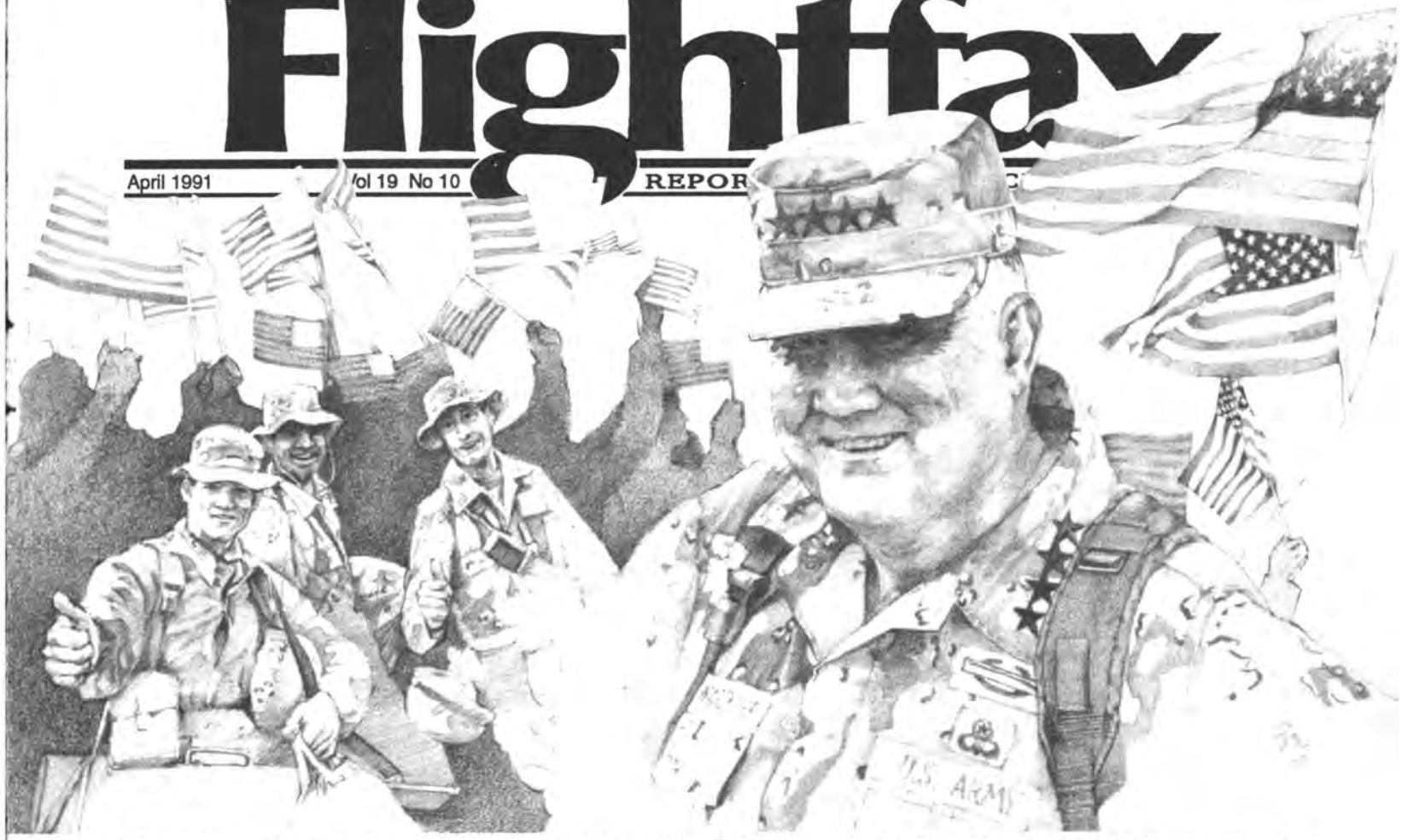
Flightfax
April 1991 Vol 19 No 10 REPORT



DESERT STORM

Not one more life

Through the medium of television, the 7 months of Operations Desert Shield and Desert Storm became a part of our daily lives. Many Americans who previously had scant knowledge of military operations became intimately familiar with the kinds of aircraft, tanks, and vehicles being employed in the sands of Saudi Arabia, Kuwait, and Iraq, and words like Scud and Patriot were added to our vocabulary. In the faces of soldiers, airmen, sailors, and marines that appeared on our TV screens, we saw the faces of our own sons and daughters, husbands and wives, sisters and brothers.

One of the faces that became so familiar to all of us was that of General H. Norman Schwarzkopf, Commander in Chief, U.S. Central Command, a tough, caring leader who pulled no punches about what we were there to do and assured us all that we not only could, we would do it.

General Schwarzkopf's strong and confident demeanor was reflected in the high state of morale and determination of our forces in the Middle East. It also, no doubt, contributed greatly to the incredible level of support throughout this country for what those troops were doing.

This kind of leadership and holding people accountable for the soldiers entrusted to them did not stop with the cease fire. That is very clear in the following message from General Schwarzkopf:

"During Operation Desert Shield, we were called

upon to rapidly deploy and prepare for battle. Understandably, some risks were taken in the largest, most rapid movement of military forces in U.N. history. We took chances and 60 servicemembers' lives were lost during that operation, some directly related to the urgency of the task at hand.

"In battle, we know lives will be lost, but we never fail to believe that if we fight with skill and daring, our casualties will be minimized. Desert Storm has been executed on precisely those terms, and our casualties have been miraculously low.

"We are now preparing for the last phase—returning home. The urgency of combat operations is no longer present. It would be absolutely criminal if after this historically successful campaign, with minimum loss of life, we accepted additional losses through carelessness, poor leadership, or negligence. I, therefore, charge every unit, down to the lowest level, to adopt the motto 'Not one more life.' It must be a motto jawboned by every leader and printed and displayed as a constant reminder to all of us. Everyone from four-star general to fire-team leader, section chief, and section leader must personally appoint himself or herself as safety officer and safety NCO and pledge to never walk by a safety mistake.

"I hereby appoint myself as CENTCOM safety officer and I expect component commanders to do the same. Let us get our troops home quickly but safely. **Not one more life.**" ■

The cost of flying in the desert

During the mobilization and buildup of Desert Shield before the war began, there were seven Class A aviation accidents, many of them caused by the difficulties of flying in the shifting sand dunes and featureless terrain of the Saudi desert.

From the beginning of combat in January through the end of March, there were an additional 18 Class A aviation accidents. Most tragic of all, 14 people lost their lives in these accidents.

As General Schwarzkopf's message so eloquently says, we must not let

our guard down now. Every leader, from the highest ranking to the lowest, must personally be responsible for safety, their own and that of the people entrusted to them.

In our joy and thankfulness that the guns have fallen silent, let us all resolve anew that not one more life will be lost because we didn't do our job to prevent it.

—BG C. A. Hennies, Director of Army Safety

Class A Accidents through 31 March

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	4	2	2
	November	2	4	1	5
	December	3	2	4	3
2nd Qtr	January	2	7	4	1
	February	3	13	11	10
	March	4	4	1	8
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	34	33	29

NVG desert operations

Army aviation units deploying to Saudi Arabia during Operations Desert Shield and Desert Storm found an environment like none they had before encountered.

Pilots who have trained in the deserts of Arizona and the National Training Center may have noted some similarities in the dry lake beds and scrub terrain. But the shifting sand dunes of the Saudi desert presented totally new hazards to helicopter crews, particularly during NVG operations.

The combination of visual illusions, featureless terrain, and extreme temperatures creates unforgiving situations for night vision goggle crews not trained in this environment. The need to assess the hazards and provide additional training guidance for units already in the region and those who continued to deploy led the Army Aviation Center to send a team comprising representatives from the Army Safety Center, Army Research Institute, Aviation Training Brigade, and Center for Night Vision Electro Optics to Saudi Arabia. Once there, team members flew with Army aviators who were experienced in flying in the Saudi desert and knew the terrain.

Because of accidents during the early days of Desert Shield, many aviators were being restricted to flight above 150 feet. The primary purpose of this evaluation was to establish airspeed and altitude guidelines for flying over Southwest Asian terrain. Evaluators were also trying to identify the kind of visual cues aviators could expect to find in the Saudi desert.

Two teams, each with a USAAVNC instructor pilot (IP) and one IP from a unit in Saudi Arabia, flew two UH-1 helicopters at different altitudes and illumination levels over the three types of desert terrain: scrub, dry lake bed, and sand dunes.

From actual flights, analysis of audio and video tapes, and interviews with other pilots, the teams determined and recommended maximum airspeeds and altitudes for the different types of desert terrain. (*Note*: There are no built-in safety margins for the altitudes and airspeeds. When visibility conditions are less than optimum, pilots must adjust the figures downward.) Mission planning charts were developed and published in the Aviation NVG Desert Training and Operations Planning Guide (draft Appendix E to TC 1-204), which has been distributed to aviation units Armywide. This guide is for use in operational planning with the crawl-walk-run progression of unit night vision goggle training programs in desert operations.

Preliminary findings and a quickly developed training video were provided to the Army Central Command (ARCENT). Copies also were distributed to deploying units. Production of a final training video, including crew coordination aspects of desert operations, is under way at the Army Safety Center.

Sand dunes

Of the three types of desert terrain, the one found to be most hazardous to helicopter NVG operations are the sand dunes. The evaluation teams found that in some modes of flight over sand dunes, the aircrew training manual (ATM) authorized airspeeds are too fast.

NOE. For example, the authorized airspeed for NOE flight is 40 knots, but an aircraft flying in zero illumination at 25 feet in sand dunes should not exceed 15 knots (figure 1). In fact, as the chart indicates, NOE flight at 40 knots in the dunes is not recommended even at the highest illumination levels. The watchword is—when low, go slow.

This might bring up a question of whether NOE flight should be conducted at all in the dunes. The answer is, yes. By flying low, aviators will be able to see visual cues (such as camel or vehicle tracks) that are not visible at higher altitudes.

Flying in a straight line NOE over dunes is extremely hazardous. Aircrews should follow low ground between the dunes—using scrub, contrast, and texture for cues—instead of trying to go over the tops of the dunes.

Contour. Flying contour in the dunes is not recommended. It is difficult to judge dune height and adequately assess obstacle clearance.

Low level. Ground references may be lost when flying low level (above 80 feet AHO). For this reason, it is imperative that all obstacles in the area of operation or route of flight be identified. However, local maps of the region often lack detail, and hazards may not be marked. That means aviators may have to conduct a

day reconnaissance.

Hazard maps should also identify terrain transition areas. Terrain transitions can be identified by watching for changes in contrast, texture, and other visual cues.

Another important point that must be kept in mind is that hazards in the desert are constantly changing. The sand dune that was located and marked one day may be in an entirely different place and a different height a few days later.

Because ground references may be lost when flying *low level*, the pilot on the flight controls may be required to refer to basic flight instruments (a situation similar to flying IFR). It is extremely important that, during prebriefing before every flight, all crewmembers are told what their specific duties and responsibilities are, where they're supposed to be scanning, and what they're supposed to be looking for. This is true regardless of the mode of flight. Again, crew coordination and scanning are critical for safe flight.

The airspeeds for low level flight shown on the chart are higher than the current ATM maximum. Recognizing that helicopters will likely have to fly faster during combat, aviation commanders in Saudi Arabia asked that the evaluation teams take a close look at the ATM maximum airspeeds. After receiving special permission, the teams flew at the higher airspeeds and found that at 80 feet and higher the ATM maximum airspeeds can be safely exceeded. For example, an aircraft flying low level at 100 feet AHO in the dunes with 70 percent illumination can, as shown on the chart (figure 1), safely be flown at 110 knots. This is, of course, provided that detailed mission planning and route selection take place where the highest obstacle is known and visibility is unrestricted. It also allows for *no safety margin*. Units should establish a training program that ensures a progression from slower (standard) NVG airspeeds toward these faster airspeeds that may be used in combat operations.

As in any operation, the risks of flying at higher airspeeds have to be weighed against the risks of not getting to the objective as fast. A USAAVNC message, dated 081930Z Feb 91, permitting aviators to exceed the ATM maximum at 80 feet AHO and above has been distributed to aviation units worldwide.

Approach to visibility altitude is recommended when descending from low level or greater altitudes. Aviators flying in the Saudi desert have found the safest technique is to step down to an altitude where ground reference can be regained (approximately 80 feet, depending on terrain and illumination). Recommend an approach airspeed of 40 to 50 knots be maintained until the visibility altitude is reached. After reaching that altitude, continue the approach or transition to another mode of flight; e.g., contour or NOE. In other words, use a stepped-down approach.

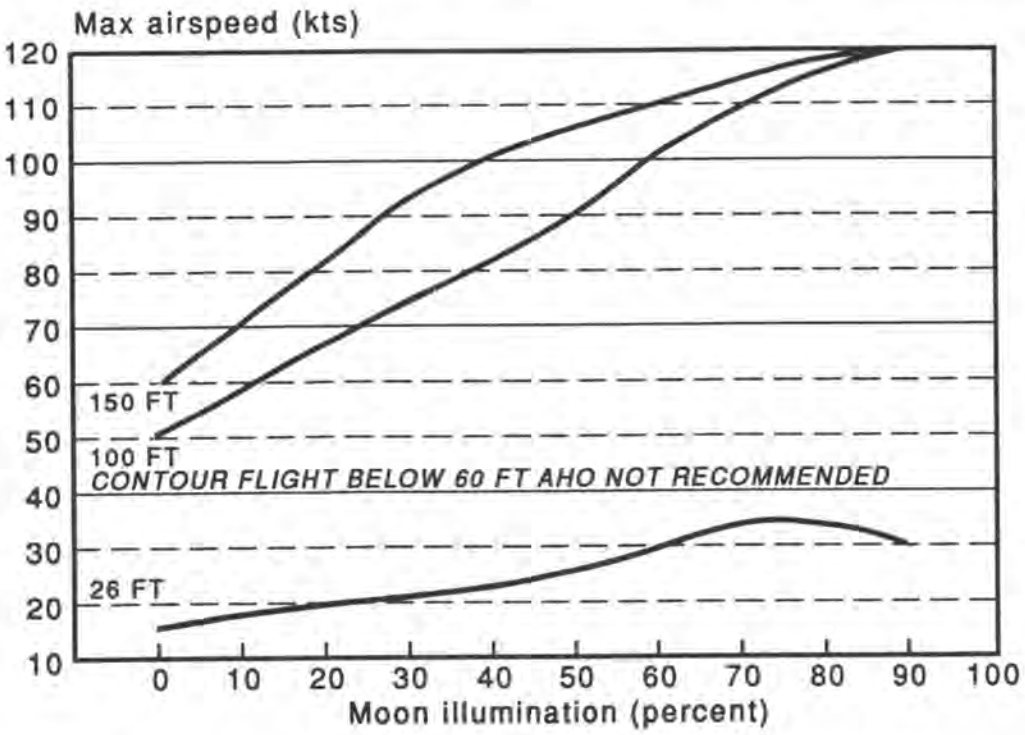


Figure 1. Mission planning chart for flying in sand dunes. Numbers include no safety margins; altitude and airspeed must be adjusted for less than optimum conditions.

Visual illusions

It is critical that pilots be familiar with visual illusions that may affect safe NVG flight. All of the visual illusions listed in chapter 1 of TC 1-204 can occur in the desert environment. The illusions shown in the sidebar to this article (page 5) are the ones most frequently encountered in Southwest Asia.

Visual illusions

False horizon or lack of horizon. Light-colored areas of sand surrounding a dark area—for example, sand dunes bordering a dry lake bed blending with the night sky—can create a false horizon. Sand, dust, haze, or fog may also obscure the horizon.

Height perception illusion. This sensation of being higher or lower than you actually are is due to poor contrast and lack of visual references. It may result in a tendency to inadvertently descend to acquire visual cues.

Ground light misinterpretation. This illusion can occur when ground lights are confused with stars or other aircraft. An aviator who confuses ground lights with stars will unknowingly position the aircraft in unusual attitudes to keep what he perceives as stars above the aircraft. When ground lights are confused with other aircraft, aviators adjust attitude incorrectly based on relative position of misinterpreted ground light.

Fixation. When an aviator fixes attention on high-interest targets/objects and stops scanning, the result may be an aircraft flown into the ground.

Crater illusion. Viewing the periphery of the IR band-pass filter (pink light) or IR searchlight gives the illusion that flat terrain, such as that found in a dry lake bed, slopes upward. Viewing another aircraft landing using these lights can give the illusion that the observed aircraft is descending into a crater when it is actually in straight and level flight over flat terrain. (This illusion is not covered in TC 1-204.)

Lack of motion perception (motion parallax). At low level flight altitudes at relatively slow airspeeds, the lack of discernible terrain features may make the pilot think his aircraft is at near-zero groundspeed when it is actually moving forward.

The desert training guide discusses these illusions and gives ways to combat them.

Although these illusions can, and do, occur over all types of desert terrain, they occur frequently at all altitudes in the dunes. It is vital that aviators are aware of such illusions and that they cross check each other during flight to be sure illusions are not being experienced. Crewmembers can also assist each other by calling out altitude, airspeed, and attitude.

Equipment

The kind of equipment available and the crewmembers' understanding of its capabilities and limitations can greatly affect the safety of desert operations.

Navigation. The most accurate navigation tool available is the GPS (global positioning system), which is based on a satellite system. Unfortunately, there are not enough of these to fulfill all of the requirements. They are in such demand that the teams were unable to obtain a portable GPS to use in their test flights.

The next best navigation systems are the LORAN and OMEGA. The Doppler works well if update points can be identified.

Band-pass filter (pink light). This light is most effective at near-zero illumination levels; it can cause terrain washout at illumination levels of 30 percent and above. The best bulb for use is 150w, 7,000cp, P/N 4571, NSN 6240-00-690-1094 (if rheostat light control is not available). Use of the light tends to limit pilots' scan to within the area of beam spread. Pilots need to be aware of this tendency and consciously expand their scan to either side of the light beam. The light may cause brownout when used below effective translational lift because of reflection from dust in rotorwash. In dusty terrain, the light should be switched off before approach/takeoff to avoid brownout. A risk that must be kept in mind during combat operations is that this is a light- and heat-emitting active source that persists after the light is extinguished, providing a target for enemy sensors.

Radar altimeter. The radar altimeter is the most critical flight instrument during contour flight, approaches, and OGE maneuvers. Pilots have been known to misjudge altitude by plus or minus 70 feet when not using a radar altimeter,

and it should be required for all flights below 150 feet agl. Aircrews should remember that the radar altimeter only gives altitude directly beneath the aircraft; it provides no direct measure of terrain ahead.

Terrain perception enhancement kit (TPEK): aiming lights. The TPEK gets its name, "aiming light," from the fact that it was designed for use on the M16 rifle. Although not designed as an obstacle avoidance system, when used in conjunction with NVGs it can provide aviators with visual cues of terrain features in the aircraft's flight path. The manufacturer reports illumination out to a distance of 150 meters. During NVG evaluation in the Southwest Asian desert, TPEK illuminated obstacles out to a distance of 400 meters. However, an enemy using night vision equipment may be able to detect the IR light source used in the aiming lights.

A pre-mission flight is required to adjust the aiming lights to the anticipated mission airspeed, and when airspeed changes, the aiming lights must be readjusted. If the light is properly adjusted, when a TPEK-equipped aircraft approaches an object in the flight path, one or both aiming light spots become visible on the object. Two light spots indicate that the aircraft is on a collision course with the object. At high airspeeds, pilots may have little if any response time to react to an obstacle illuminated by the aiming lights.

Night vision goggles. During desert operations, AN/AVS-6s should be used for all crewmembers when possible instead of AN/PVS-5s. The goggles must be strictly maintained and lenses kept clean.

Crew coordination and scanning

One of the most critical aspects of safe desert NVG terrain flight is effective crew coordination and scanning. The desert training guide provides examples of how effective crew communication and proper sequence or timing of crew actions are addressed during mission planning; how crew responsibilities are assigned, discussed, and possibly rehearsed during the pre-mission brief; and amending responsibilities as necessary during the mission. Procedures for positive communication, directing and offering assistance, announcing decisions, and action sequence/timing are provided along with examples of each element in the procedures.

Crewmember scanning responsibilities for the pilot on the controls, the pilot not on the controls, and nonrated crewmembers are condensed into a table covering the three modes of flight: NOE, contour, and low level.

Adjusting seat position for optimum field of view and scanning procedures are discussed as well as the effects of pink-light usage on aircrewmembers' scanning. (See USAAVNC message, dated 032330Z Jan 91, for additional information.)

Battle-rostering

Battle-rostering crews—keeping the same crews together—becomes increasingly important in harsh environments like the deserts of Southwest Asia. Coordination is much easier for crews who have learned to work together than for those who must constantly integrate and train new crewmembers. While keeping the same crew together may present some difficulties for aviation units, it pays off with more effective crews and improved safety.

Risk management

Risk management is the process of identifying risks associated with a particular operation, weighing these risks against the overall value to be gained, and making risk acceptance decisions. Three major rules govern this process:

- Accept no unnecessary risks (i.e., risk that, if eliminated, still allows mission accomplishment).
- Make decisions at the proper level. Leader responsible for the mission should make risk decisions.
- Accept risks if benefits outweigh costs. Risk-taking requires a decision-making process that balances mission benefits with costs.

The desert training guide provides steps to be used in the risk management process and an overall comparative risk analysis of the most critical NVG mission considerations in the Southwest Asian environment. Also included are METT-T considerations specific to night/NVG desert operations.

Conclusions

Long after the dust of Desert Storm has settled, we will be reaping the benefits of experience gained in the desert environments of Southwest Asia. Aviators whose training is based on lessons learned during the months of flying under extremely treacherous conditions will be better-trained pilots, and better-trained pilots are safer pilots. ■

Requests for information

Requests for the NVG training video on desert operations should be directed to: Commander, Aviation Training Brigade, ATTN: ATZQ-ATB-NS (CW4 Osterlund) Fort Rucker, AL 36362-5000. Telephone numbers are: AV 558-5858, commercial 205-255-5858.

Requests for draft Appendix E to TC 1-204 Desert Planning Guide should be directed to: Director, Department of Tactics and Simulation, ATTN: ATZQ-DOT-DD (MAJ Burton), Fort Rucker, AL 36362-5000. Telephone numbers are: AV 558-5626, commercial 205-255-5626.

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - During cruise flight, aircraft experienced tail rotor problems. Crew of trail aircraft could see that tail rotor blades on lead aircraft had stopped turning. While attempting to return to airfield, aircraft flew into large lake about 500 feet from shore line and sank in 270 feet of water. There were no survivors. 9120

Attack

AH-1 Class C

F series - As aircraft passed through 20 feet agl during takeoff, anti-erosion paint peeled off tail rotor blade. Resulting severe high-frequency vibration caused 90-degree gearbox and tail rotor assembly to separate. MTP executed hovering autorotation and landed aircraft with no further damage. Tail rotor blade surface had not been correctly prepared before paint was applied.

S series - When aircraft came to a stop after termination of low-level autorotation, landing gear collapsed. Aircraft rocked, but remained upright. Fuel was seen leaking from tank; probably caused by impact when skids and crosstubes collapsed.

AH-1 Class D

F series - During contour flight, pilot placed aircraft in right turn and allowed it to descend. Right skid was broken off when aircraft struck rising terrain. Aircraft came to rest on right side, causing minor damage to wing and fuselage.

AH-1 Class E

F series - Pilot terminated to firing position at 30-foot hover, maintaining high hover because of blowing snow. Collective was increased to 104 percent.

F series - During range firing, 2.75-inch rocket engine ignited, but rocket failed to launch. Rocket and pod caught fire. Fire was extinguished, but rocket pod was destroyed. Suspect materiel failure or malfunction of rocket pod.

AH-64 Class C

A series - Copilot was on controls and pilot's attention was diverted when aircraft entered high rate of descent and landed hard.

AH-64 Class D

A series - Two crew chiefs were performing MOC after servicing utility hydraulic manifold set. When outside safety checks and cockpit checks had been completed, one crew chief started APU while the other stood fireguard. After APU came on line, generators were turned on, and fireguard saw a flash coming from side of open transmission deck cowling. Signalling for the APU to be shut down, he yelled "fire." Using aircraft portable fire extinguisher, he extinguished an electrical fire on No. 1 generator wire bundle. Wires had shorted out on clip holding fire detection harness. There had been no caution or warning lights. Inspection of other AH-64s revealed no other chafed wires.

Observation

OH-58 Class A

C series - During return to base with copilot on controls, PIC attempted to stow M16 rifle in rear seat. Suspect rifle bumped or pulled cyclic out of copilot's hand while he was looking out door, clearing aircraft. Aircraft immediately banked right to about 130 degrees in extremely nose-low attitude. As aircraft accelerated rapidly, pilot regained controls and pulled aft cyclic and maximum power to recover aircraft. Aircraft leveled out in nose-high attitude, striking ground tail first, followed by skids. Bouncing back into the air in a nose-high attitude, aircraft started spinning to right, making two full rotations. With both pilots on controls, throttle was rolled off. Collective cushioning was ineffective, and aircraft hit ground with crash force in excess of 20 Gs. Although severely damaged, aircraft remained upright. Both pilots were injured. 9121

OH-58 Class C

C series - During takeoff for multiship NVG mission, Chalk 2 slowed, causing aircrafts 3, 4, and 5 to reduce airspeed to about 20 knots at 300 feet agl. PIC of aircraft No. 5 directed pilot, who was on controls, to orbit right out of formation, allowing better spacing of aircraft. Aircraft No. 5 began drifting backwards and

slowly descending. PIC directed pilot to apply forward cyclic and additional power to regain forward airspeed. Pilot was slow to increase power, and PIC, who was scanning instruments and maintaining visual separation from other aircraft, noted increasing rate of descent and near zero airspeed. Looking back outside to ensure aircraft separation, PIC announced they were clear of the formation. When he looked back at aircraft instruments, he noted rate of descent had been arrested and airspeed was increasing, but torque was at 120 percent. Calling out instrument readings, he told pilot aircraft was stable but overtorqued. PIC told pilot to continue forward flight with climb-out and slowly reduce torque. Overtorque lasted about 4 seconds. Main transmission and drive shaft were replaced.

OH-58 Class D

C series - Aircraft entered battle position on southwesterly heading. Pilot performed NOE deceleration, and aircraft began to spin to right. Winds were from right rear. Pilot applied left pedal, arresting spin. Aircraft was sliding left and descending into rising terrain. During attempt to fly out of situation and avoid hitting ground, aircraft was overtorqued.

D series - During flight, PIC noticed normal mast-mounted sight (MMS) noise stop and verified MMS control switch was in AO position. Detecting smoke and fumes and seeing reflection of fire in rear door window, he announced "Fire." Pilot confirmed fire was in MMS power supply line replaceable unit. PIC turned off MMS power switch and landed. Standpipe wiring harness was replaced.

OH-58 Class E

A series - Aircraft was making tactical dash from one ridgeline to another. As aircraft approached ridge, AO shouted "Wires." Aircraft struck wire, which slid up front of aircraft and was cut by upper WSPS.

A series - After start and completion of HIT check and before-takeoff checks, collective was increased to bring aircraft to hover. Before aircraft was brought to hover, engine N2 drooped to 95 percent and low rpm audio sounded. When collective was placed in full-down position, rpm recovered to original setting of 102.5 percent N2. Pneumatic system was checked for leaks, fuel nozzle and bleed fuel system were cleaned, and aircraft was test flown and released.

A series - During takeoff at night in blowing snow, aircraft hit bare treetop.

C series - Aircraft was flying NOE at low airspeed during gunnery exercise. As pilot began slow left turn to follow an AH-1, OH-58 experienced turbulence from Cobra's rotorwash. OH-58 pilot had also positioned aircraft with a right quartering 1- to 12-knot tail wind. As pilot applied left pedal, torque increased to 110 percent for 1 second.

C series - During gunnery exercise, aircraft was at NOE altitude near tree line. Pilot felt aircraft abruptly pause, and tail rose about 4 feet. As pilot applied power, he saw commo wire spring away as it was cut by upper WSPS. Crew failed to see wire strung in trees.

Fixed wing

OV-1 Class B

D series - During approach following night mission, landing gear would not lower. Attempt at emergency extension was unsuccessful. After remaining fuel had been expended PIC made a gear-up landing. 9122

Safety messages

•Aviation safety action informational message concerning reduction of field inspection requirements on certain OH-58A/C main rotor heads (OH-58-91-ASAM-07, 272200Z Feb 91). Purpose of this message is to reduce field inspection requirements on certain OH-58A/C main rotor hubs. Summary: Supply shortages are being experienced with OH-58A/C main rotor hubs and parts, particularly main rotor strap fittings. Some of the current parts usage is related to the 600-hour intermediate inspection, required as a special inspection in the maintenance manuals. This inspection was introduced primarily as a result of problems with strap deterioration and corrosion on the older oil-lubricated hubs. Problems do not occur to the same extent with current rotor hubs. Field parts and manpower usage can be reduced by eliminating the intermediate inspection. Changes in inspection and replacement intervals are included for the same reason. Contact: Lyell Myers, DSN 693-9089, commercial 314-263-9089.

•Aviation safety action operational message concerning deletion of AH-1S/P aircraft from portions of previous AVSCOM message AH-1-91-ASAM-01 (AH-1-91-ASAM-05, 271500Z Feb 91). Summary: AH-1S/P series aircraft are to be deleted from portions of AH-1-91-ASAM-01, 111630Z Jan 91. Because there is no alternator on AH-1S/P aircraft, damage to the stabilization control amplifier is unlikely. Contact: Roger Heidenreich, DSN 693-9089, commercial 314-263-9089.

For more information on selected accident briefs, call AV 558-4198/3901, commercial 205-255-4198/3901.

nitive purposes or matters of liability, litigation, or competition. Direct communication is authorized by AR 10-29. Address questions about content to AUTOVON 558-4198/3901. Address distribution questions to AUTOVON 558-2062/4806.

C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center

Change in frequency of publication. Beginning with this issue, Flightfax will be published monthly.

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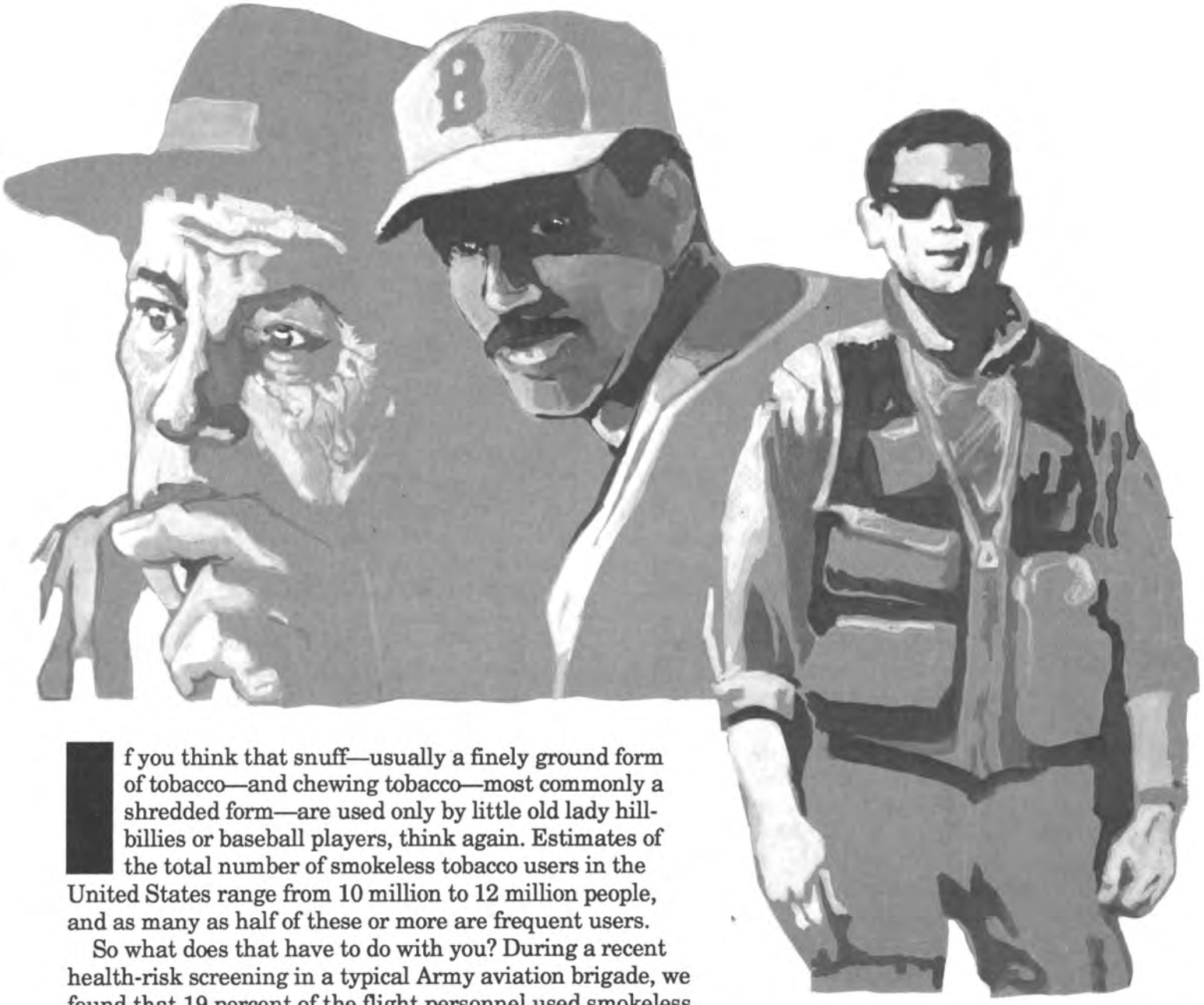
Fort Rucker, AL 36362-5163

Flightfax

May 1991 Vol 19 No 11 REPORT OF ARMY AIRCRAFT ACCIDENTS



If you think that snuff—usually a finely ground form of tobacco—and chewing tobacco—most commonly a shredded form—are used only by little old lady hillbillies or baseball players, think again. Estimates of the total number of smokeless tobacco users in the United States range from 10 million to 12 million people, and as many as half of these or more are frequent users.

So what does that have to do with you? During a recent health-risk screening in a typical Army aviation brigade, we found that 19 percent of the flight personnel used smokeless

Smokeless can be hazardous

tobacco. Forty percent of them were under the age of 25. That may indicate that as the hazards of smoking become more widely known, and cigarette smoking becomes less socially acceptable, aviators who smoke may be trying to quit by using alternative forms of nicotine such as snuff and chewing tobacco.

If that is true, people who do this need to know that they are simply trading one set of hazards for another. A typical smokeless tobacco user is exposed to the same amount of nicotine each day as a person smoking a pack of cigarettes. Although the danger of lung cancer may be dramatically lessened by quitting smoking, there are a whole lot of nasty possibilities in store for users of smokeless tobacco. Smokeless doesn't mean hazardless.

Smokeless tobacco use can—

- **Increase risk of cancer in the mouth, larynx, throat, and esophagus.**
- **Result in loss of bone support structure, leading to loss of teeth.**
- **Cause gum recession and tooth sensitivity.**
- **Contribute to accelerated heart disease.**
- **Reduce exercise capacity.**
- **Contribute to stomach irritation or ulcers.**
- **Delay wound healing.**
- **Result in reproduction problems.**

Effects of smokeless tobacco on the body

The nicotine in smokeless tobacco produces many adverse effects on the body. Immediately after use, heart rate and blood pressure usually increase, and blood vessels in the extremities constrict. There is decreased oxygen supply to the heart, resulting in reduced exercise capacity. Long-term exposure may contribute to accelerated heart disease, delayed wound healing, reproduction problems, and stomach irritation or ulcers.

If that isn't enough, oral heath problems associated with use of smokeless tobacco include bad breath, abrasion of teeth, gum recession, and tooth loss. This damage is due to direct and prolonged contact of teeth and gums with the tobacco, its juices, and its chemical by-products. As many as 60 percent of smokeless tobacco users suffer from gum recession, resulting in increased tooth sensitivity. Continual exposure also causes extensive loss of surrounding bone structure, which normally provides support for the teeth. This ultimately leads to tooth loss. In addition, affected gums do not grow back, frequently requiring surgery.

The most harmful potential consequence of using smokeless tobacco is oral cancer. Scientific studies show that chronic smokeless tobacco use is directly correlated to an increased risk of cancer of the mouth, larynx, throat, and esophagus. The risk of cancer increases with duration of use, and these cancers are usually found in those locations in the mouth where smokeless tobacco was placed. Lesions may first appear as a white patch or plaque on the gums called leukoplakia, which cannot be removed by scraping. Long-term users of smokeless tobacco are at 50 times greater risk of developing cancer of the cheek and gum.

Additional risks to aviators

In addition to these increased health risks, aviators who use smokeless tobacco subject themselves to other hazards because of the nature of their work.

We know that to survive on the modern battlefield, helicopters will have to fly at night, and they will have to fly low. This kind of flying significantly increases hazard risks and requires greater pilot concentration and crew coordination. An aviator who is addicted to nicotine may suffer from tobacco withdrawal when the chewing tobacco or snuff he is accustomed to using is not available. Withdrawal symptoms include increased irritability, anxiety, impaired concentration, headache, and drowsiness. These disruptive effects begin within hours of the last nicotine dose and could adversely affect pilot performance, especially during critical flight events.

Prolonged use of smokeless tobacco by aircrewmembers could also result in excessive periods of grounding or even early termination of flight careers. Army regulations require pilots to maintain dental Class I or II standards to continue flying. Dental problems that commonly occur as a result of smokeless tobacco use place pilots below the standards, resulting in suspension of flying duties until they are corrected.

Aircrewmembers who are diagnosed as having oral cancer are immediately restricted from aviation duties. Evaluation and treatment could result in a suspension from flying duties lasting

from months to years. Depending on the type and location of the cancer, treatment may include surgery, radiation, and chemotherapy. Lesions often spread to lymph nodes and bone, resulting in early death. If the cancer is successfully treated, aviators may return to flying duties only with a waiver based on likelihood of recurrence, risk of sudden incapacitation, and deployability.

Blood pressure elevations associated with nicotine could result in mild high blood pressure in aviators, requiring a period of grounding, medical evaluation, and waiver approval to remain on flight status. The additional burden on the heart imposed by tobacco use could cause ischemia (reduced blood flow to the heart) in aircrewmembers with coronary heart disease. Once symptomatic, an aviator will have to have a full medical evaluation, including waiver approval, to continue flying. If significant heart disease is discovered, the aviator will not be allowed to resume flight duties.

What can be done?

While the ideal thing is never to start chewing tobacco or dipping snuff, millions of people already have. That doesn't mean, however, that it's too late to do anything. No matter how long a person has been a smokeless tobacco user, there are benefits to be derived from quitting. When someone stops using chewing tobacco or snuff, existing lesions frequently heal, and the risk of oral cancer is reduced. In addition, the cardiovascular system will benefit, and blood pressure will be reduced.

It won't be easy

Like those who smoke, people who attempt to quit using smokeless tobacco may find the going hard. This is because of the addictive nature of all tobacco products. Breaking such an addiction, especially by long-term users, is extremely difficult, but not impossible.

There is an important role for Army flight surgeons in influencing aviators who use smokeless tobacco. They can let aircrewmembers know about the systemic and oral health risks of continued use and the adverse effects it can have on their ability to perform flying duties. Flight surgeons can also provide educational material as well as information on cessation programs.

If at first you don't succeed...

Individuals who attempt to quit using smokeless

Attention flight surgeons

The Army Safety Center has produced a slide presentation for use by flight surgeons on the effects of smokeless tobacco use. The presentation is available on a loan basis and may be locally reproduced. To request a copy, write to: Commander, U.S. Army Safety Center, ATTN: CSSC-ZM, Fort Rucker, AL 36362-5363 or call AV 558-2763, commercial 205-255-2763.

tobacco should be prepared for a possible relapse. Like those who smoke, people who are successful at quitting often do so only after several attempts. Encouragement from fellow aviators, friends, family members, and the flight surgeon is very important. Organized cessation programs and support groups can provide additional assistance for people who want to quit.

Relief for withdrawal symptoms

Use of nicotine gum may relieve withdrawal symptoms for smokeless tobacco users. Use of nicotine gum by Army aviation personnel, including air traffic controllers, who are trying to quit using tobacco products must be under a treatment program prescribed and managed by a flight surgeon. The gum may not be used while flying and requires an initial 72-hour medical restriction.

Smokeless tobacco use has become increasingly popular in recent years among millions of young people. The adverse effects on health and flying duties clearly show that *smokeless can be hazardous.* ■

—POC: MAJ Daniel T. Fitzpatrick, Flight Surgeon, USASC

Class A Accidents through 30 April

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	3	2	2
	November	2	4	1	5
	December	3	3	4	3
2nd Qtr	January	2	7	4	1
	February	3	13	11	10
	March	4	4	1	8
3rd Qtr	April	1	2	0	2
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	36	33	31

New Crashfax Video available

The following Crashfax Video has been distributed to visual information libraries throughout the Army. You may obtain a copy by asking your local audio-visual library for—

Crew Error in Night Rotary Wing Accidents (TVT 20-943, PIN 709224).

This video identifies major causes of night rotary wing aircraft accidents. Four major operational situations are emphasized in which crew-error accidents occurred:

- Improper scanning
- Improper decision making
- Improper crew coordination
- Improper scanning and crew coordination

Four common factors emerge from these crew errors and operational profiles: 1) The primary crew failure is when the pilot on the controls stops scanning to focus attention either inside or outside the aircraft and fails to coordinate with other crewmembers to maintain obstacle clearance. 2) Most accidents occurred while operating at low altitude: hover, taxi, landing, or en route at terrain flight altitudes. 3) Most accidents occurred when illumination was low, and more than half happened when environmental conditions such as haze, dust, fog, rain, and snow were present. 4) Accidents experienced en route in terrain flight showed median altitude has decreased without a corresponding decrease in airspeed. ■

Clarification on AH-1 fuel control assembly

Questions from the field indicate that information in an article regarding adjustment of AH-1 fuel control assemblies in the 5 December 1990 issue of *Flightfax* needs to be clarified. The same fuel control assembly is used on both UH-1 and AH-1 aircraft; therefore, any restrictions to its operation and maintenance would apply to both aircraft.

Fuel control adjustments must be made at the AVUM level during installation of the fuel control or a quick change assembly engine. Adjustments commonly made to the fuel control at this level include: military trim, idle trim, bleed band trigger, and fuel control arm positioning. Additional information regarding fuel control adjustments can be found in TM 55-2840-229-23.

The description of the incident that prompted this article says that the student pilot was unable to maintain rpm at 6400 to 6600 with the throttle full open. This is a normal condition if the outside air temperature is above 29°C. If the temperature is below 29°C, this would indicate that the manual maximum flow adjustment was not properly set.

The engine normally idles at 68 to 72 percent N1 in the automatic mode with the throttle against the idle stop—this is known as flight idle. In the emergency mode, the engine will normally idle at 40 percent N1 with the throttle against the idle stop—this is commonly referred to as ground idle.

The reason for this lower N1 speed is that with the governor switch in the automatic position, fuel flow is 260 pounds per hour (flight idle) and produces approximately 150 shaft horse power (SHP) to turn the main rotor system. In the emergency mode, fuel flow is only 160 pounds per hour (ground idle) which produces only about 40 SHP to turn the main rotor.

When advancing the throttle from ground idle, with the governor switch in emergency and throttle against the idle stop, extreme care must be taken or the engine will perform exactly as it did in the incident described in the article. Both UH-1 and AH-1 dash 10, ATM, and MTF manuals warn against rapid movement of the throttle in the emergency mode. If the throttle is advanced rapidly, more fuel will be allowed to enter the combustion section than there is air to cool it, causing a rapid temperature rise. Further, the pressure in the combustion section will build faster than in the compressor section, and a surge or stall will normally occur.

The analysis of the fuel control assembly conducted by Corpus Christi Army Depot says that the T1 bellows spring holder (P/N 80153) had been installed upside down, and the turnbuckle lockwire was rubbing against the spring (P/N 85688). As stated, this could have an effect on the hydromechanical computer operations. But in the emergency mode, fuel scheduling is not compensated for altitude, temperature, or pressure, and there are no automatic features to avoid surge, overtemperature, flameout, or overspeed. In short, the T1 sensor does not affect fuel flow in the emergency mode, and that is what the aircraft was operating in when the malfunction occurred.

It is important that maintenance personnel understand that field maintenance activities are not authorized to remove or tamper with the T1 bellows spring holder. ■

—POC: Mr. Dong K. Nguyen, Aviation Systems Command Safety Office, DSN 693-9089, commercial 314-263-9089.

Airborne use of cellular phone verbo en

A recent question regarding use of cellular phones by passengers in Army aircraft sent us on a hunt for information.

The questioner, a CW4 attending the Army Safety Officer Course, said that passenger use of cellular phones while in flight has greatly increased over the past 2 years, and he wanted to know if there is any data available that would indicate such use is a hazard to safe flight.

We found nothing to indicate there have been any problems associated with use of cellular phones in Army aircraft. The FAA, however, has reported two separate incidents where problems with navigation instruments were traced to portable cellular phones being used in the aircraft. They also advise that use of cellular telephone equipment in airplanes may be contrary to FAR 91.21(b)(5).

A check with the FCC verified that use of cellular phones while in flight is *not* permitted. They have discovered that airborne use of cellular phones can cause serious interference with ground-based units.

If your unit is one that carries passengers who may have cellular phones with them, you should include in passenger briefings that the use of these phones during flight is not permitted. ■

—POC: MAJ David Regan, Aviation Division, AV 558-4198/3901, commercial 205-255-4198/3901

Broken Wing Award

CW2 Cynthia Marie Trotter, C Company, 2d Battalion, 9th Aviation Regiment, Fort Lewis.

The UH-60 on which CW2 Trotter was serving as PIC was conducting a tactical troop movement. The mission had been scheduled for early morning, and visibility was limited by fog and low light levels. After 11 soldiers and their equipment were loaded, the aircraft took off from a PZ surrounded by trees. The other pilot was on the controls; CW2 Trotter was navigating.

As the aircraft began climbing to clear the trees, one of its engines experienced a compressor stall. The crew heard a series of rapid popping sounds, the low rotor caution light came on, and the low rotor rpm audio sounded. The pilot on the controls reduced power, but, because of the trees in his flightpath, he was unable to decrease power enough to clear the engine stall. The other engine did not compensate for loss of power, preventing continued forward flight. The pilot managed to maintain control of the aircraft with airspeed near etl at about 20 feet above the trees. Then engine noise decreased, and the aircraft yawed left and right and began to lose altitude.

CW2 Trotter took the controls. Unable to continue forward flight because of the wooded terrain, she placed the aircraft in a left autorotative turn to regain main rotor rpm and positioned the aircraft in a landing attitude. At about 40 feet agl, the engines produced enough power to allow her to make a roll-on landing. There was no damage to the aircraft as it came to stop on the sloping, rolling terrain. ■

Accident Briefs

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class E

H series - During rearward hover check, student maintenance test pilot used cyclic to control pitch and went through etl, overtorquing aircraft and using excessive collective to compensate. Maintenance evaluator had failed to inform student of torque.

H series - Departing from dusty field site, copilot pulled 58 psi torque before pilot noticed and informed copilot of torque.

H series - During preflight inspection, crew found damage to crosstubes. Damage probably occurred on previous flight. Crosstubes replaced.

H series - During climbout, master caution and transmission oil pressure lights came on. Transmission oil pressure was below 25 psi and decreasing. By the time aircraft landed, oil pressure was zero. Internal transmission oil filter gasket had blown, allowing transmission oil to leak out.

H series - PIC noted compressor stall and made precautionary landing. Maintenance adjusted variable inlet guide vane and bleed band.

UH-60 Class D

A series - Bird struck aircraft rotor tip cap during cruise flight.

A series - Postflight inspection revealed 4-inch crack on bottom side of all main rotor blades. Crew had heard no unusual noises. Suspect damage occurred during pinnacle landing in zero illumination while conducting night training. PIC or pilot applied excessive aft cyclic, causing all main rotor blades to strike AN-ALQ-144.

UH-60 Class E

A series - During pinnacle approach, aircraft encountered 10- to 20-knot winds at 20 degrees. At 5,600 feet msl and about 200 feet from touchdown point, aircraft experienced strong updraft. To maintain approach angle, IP reduced collective. IP observed torque setting at 1 percent on No. 1 engine and 2 percent on No. 2 engine. The No. 1 engine flamed out. IP aborted approach, turned left into wind, and descended to lower altitude. Flight indications stabilized, No. 1 engine was restarted, and aircraft was landed. Investigation continues.

A series - During approach to 3,500-foot pinnacle, No. 2 engine failed. Pilot reduced collective, and IP took controls. Pilot confirmed engine failure as IP glided to lower altitude. Pilot then confirmed No. 1 engine was functioning properly. No. 2 engine was restarted, and aircraft was landed without further incident. Inspection revealed anti-ice valve assembly had stuck in open position.

A series - On takeoff, crew heard loud bang and rattling noise. NR dropped to 90 percent, aircraft shook violently, and low rotor audio was followed by tgt spiking to maximum. IP landed aircraft in field and performed emergency shutdown. No. 1 engine had failed, damaging inlet guide vanes.

A series - While crew was performing hydraulic leak test during engine runup, APU generator failed.

A series - Aircraft was on approach to FARP with HMMWV as slingload. When aircraft was brought to 40-foot hover, it lost altitude rapidly, and HMMWV landed hard and bounced. Aircraft drifted, turning HMMWV onto its side. PIC took controls, and pilot released load.

A series - During formation flight in Chalk 3 position, PIC detected flight control malfunction in fore and aft quadrants of cyclic. Aircraft returned to station and landed. Inspection revealed possible pitch boost servo malfunction.

Attack

AH-1 Class B

F series - Aircraft took off and reached 15 feet at 100 percent torque. Predicted available torque was 102 percent. Pilot continued to pull collective, but torque did not increase. Aircraft hit ground, rolled left, and came to rest inverted. No injuries. 9123

AH-1 Class E

F series - During contour flight and subsequently during approach, crew heard loud popping sounds. Caused by operating in dusty environment without improved particle separator MWO applied.

F series - During approach, copilot told pilot left pedal was at stop. Pilot took controls and landed aircraft with forward speed of 20 knots. Aircraft pitched down, skids settled into sand, and M197 struck sand. PIC failed to anticipate effects of landing direct with wind, which caused aircraft to pivot after ground contact.

S series - While performing NOE deceleration, pilot noticed something hanging from aircraft. After landing, pilot found right ammo bay door open. Inlet pillows, TSU optic cover, and plastic jettison tag were missing. PIC had ensured ammo bay doors were closed; but, he wasn't sure the latches were secured.

AH-64 Class C

A series - PIC had attention on operating radios during night gunnery mission and allowed copilot to make 180-degree right descending turn to a hover. Losing sight of flight symbology and ground, copilot allowed aircraft to hit ground in a level attitude with right lateral drift. Aircraft bounced 30 feet and came to rest upright.

AH-64 Class D

A series - While conducting roll-on landing, pilot misjudged environmental conditions and encountered brownout. Aircraft struck ground tail-wheel first, damaging tail wheel strut and stabilator.

AH-64 Class E

A series - While conducting roll-on landing to avoid brownout, PIC misjudged clearance and aircraft tail wheel struck rock. Tail wheel strut collapsed.

A series - During NVG approach to FARP, pilot experienced brownout. At 3 feet agl, aircraft drifted left, and left main landing gear contacted ground. Pilot pulled excessive collective to initiate go-around, causing torque to reach 119 percent for about 2 seconds.

A series - During night landing to refueling point, pilot experienced brownout, and aircraft rolled over refueling hose. Inspection revealed POL grounding rod had punctured underside of aircraft between Doppler antenna brace mounting and antenna panel. Crew failed to anticipate brownout conditions.

Cargo

CH-47 Class C

D series - On final approach at 20 to 30 knots and 70 feet agl, load was inadvertently released.

CH-47 Class D

D series - Emergency escape panel came off in flight. Panel had been properly installed. Suspect cold weather affected panel's rubber seal.

Observation

OH-58 Class A

A series - After taking off from field site, aircraft went into uncontrollable right spin and hit side of mountain. Pilot in left seat applied full left pedal and forward cyclic, but aircraft continued to spin. Just before impact, PIC (who was on controls from right seat) pulled all remaining collective. Aircraft hit ground on its right side, rolled onto its left side, and came to a stop. No injuries. 9124

OH-58 Class E

C series - During NVG training flight, crew became disoriented and flew out of training area. At 20 knots and 15 feet agl, aircraft struck and cut unmarked wires.

C series - During approach to parking in excessively dusty area, PIC experienced brownout. PIC pulled torque to 110 percent for 1 second. PIC did not make approach into wind.

D series - Aircraft was positioned to parking with 20-knot tailwind. When IP opened door, it was caught by wind and twisted off top hinge. Damage caused by failure to position aircraft into wind.

Fixed wing

C-12 Class D

C series - Crew detected change in sound of headset sidetone, followed by failure of No. 1 avionics bus equipment, and aborted mission. Landing gear failed to extend electrically. After manual extension of gear, aircraft made normal landing.

H series - At cruise altitude with FAT of minus 45°C, crew turned on windshield heater. About 10 minutes later, windshield outer panel cracked top to bottom. Aircraft returned to base.

OV-1 Class A

D series - On return from night mission, aircraft encountered unforecast conditions caused by smoke from burning oil wells. After making several approach attempts, aircraft was vectored to an ejection area. Both crewmembers ejected and landed uninjured. 9125

OV-1 Class C

D series - During night cruise flight, crew heard loud bang and aircraft yawed right. Pilot noted maximum rpm indication on No. 2 propeller VIDS and reduced No. 2 power lever to idle and No. 2 propeller lever to minimum. Within seconds, the No. 2 engine chip detector light came on. Mission was aborted, and aircraft turned toward base. About 1½ minutes later, No. 2 engine oil pressure dropped to zero. Suspect failure of engine reduction gear or gear carrier assembly.

D series - During MOC to determine cause of faulty torque indications, aircraft propellers were put into reverse thrust. Left drop tank fuel cap came off. After striking propeller, fuel cap shattered and pieces struck and penetrated left 300-gallon drop tank. Aircraft was shut down. Suspect cam locking portion of fuel cap failed. Locking tab may have been adjusted too tight, causing undue stress on cap's internal mechanism.

Maintenance

UH-60 Class E

A series - After landing at laager site, aircraft's right side was 5 degrees low. Upper oleo strut of right landing gear had partially collapsed. Although no fluid was found around strut, inspector determined nitrogen charge had completely seeped out. Caused by servicing upper strut with improper charge of nitrogen.

CH-47 Class E

D series - During preflight, crewmember found holes in forward transmission oil cooler fan shroud. Inspection revealed damage to fan blades. Caused by screwdriver left in area.

Safety messages

•Safety-of-flight technical message concerning recall of the T63 engine compressor assemblies on all OH-58A/C and H-6 series aircraft (OH-58-91-04 and OH-6-91-01, 150200Z Mar 91). Summary: Approximately 136 T63-A-720 engines and 35 compressor case assemblies may have been manufactured incorrectly, resulting in cracks in the third stage vane airfoils just outside the case's plastic coating. These cracks could cause a fatigue failure of the vane and subsequent engine power loss. The purpose of this message is to ensure that suspect compressor case assemblies installed in engines are removed. Message also provides disposition instructions. Contact: Lyell Myers, DSN 693-9089, commercial 314-263-9089.

U.S. ARMY SAFETY CENTER

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FLIGHTFAX
Volume 19 Number 2 REPORT OF ARMY AIRCRAFT ACCIDENTS 24 October 1990

Crew error in night rotary wing accidents

We have just completed one of the safest years on record in Army aviation. The Class A rate of 1.83 is the lowest, and the Class A through C rate the second lowest ever. This accomplishment reflects the general decrease in the number of daytime flight accidents over the past 6 years and, more specifically, the reduction by about three accidents per year in the number of daytime accidents caused by crew error.

On the other hand, the number of night flight accidents has been increasing. Night accidents currently account for about one-third of the total rotary wing accidents in terms of number of accidents, fatalitites, disabling injuries, and cost. In fact, the number of these accidents caused by crew error has been increasing at approximately the same rate daytime accidents have been decreasing. Over the last 15 months, the crew error accident rate at night was almost three times higher than the day rate.

Because this increasing trend was out of proportion with the amount of night flying being done, the Army Safety Center initiated a study to investigate the problem of night flight accidents caused by crew error.

The study found that eight types of errors were causing all of the night crew-error accidents.

These crew errors, or failures, involve the most

Crew Errors

Scanning. Improper direction of visual attention inside or outside the aircraft, such as too much or too little time on one object or area, or use of a scan pattern that is not thorough or systematic or with crew overlap.

Crew coordination. Failure of crewmembers to properly interact (communicate) and act (sequence and timing) in performance of flight tasks.

Maintain/recover orientation. Failure to properly execute procedures necessary to maintain or recover orientation in flight environments known to restrict visibility; for example: snow, dust, IMC, black hole, and over black water.

Preflight planning. Failure to choose appropriate flight options for known conditions and contingencies and develop these into a course of action to maximize probability of mission accomplishment.

Inflight planning. Improper modification of flight plan during flight or failure to properly modify flight plan in response to unanticipated events or conditions.

Estimate. Inaccurate estimation of distance between objects or rate of closure with objects.

Detect. Failing to identify obstacles or recognize other hazardous conditions such as obstacles in landing area, unsecured equipment in aircraft, and improper control/switch position.

Diagnose/respond to emergency. Improper identification of or response to an actual, simulated, or perceived emergency.

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basic of aviator skills. But as simple and basic as they may appear, these errors persistently show up in accident reports year after year.

When the accidents were analyzed to see if any type of crew error showed up more during aided flight than during unaided flight, none did.

It was not until researchers began looking into what the crews and the aircraft were doing when the error occurred that differences began to show up. They found that it is the *circumstances* under which the missions are being flown that are reducing the margin for error and causing the increase in accidents. The following eight operational situations under low illumination levels account for all of the night crew-error accidents occurring during the 6-year period studied:

Operational situation No. 1
An aided tactical mission at low altitude and low airspeed with low illumination conditions and visibility restricted to some extent by environmental conditions.

The most frequent error causing accidents in this situation was improper scanning. The pilot on the controls stopped scanning to channelize his attention inside or outside the aircraft.

• In the UH-60, this situation most often involved the flight phases of landing, hovering, or taxiing. For example, a UH-60 pilot on a night-aided training mission was taxiing from parking on an uncontrolled airfield. Because he limited his scan to only the inside and front of the aircraft, he failed to see another aircraft approaching from his left side, and the two aircraft collided.

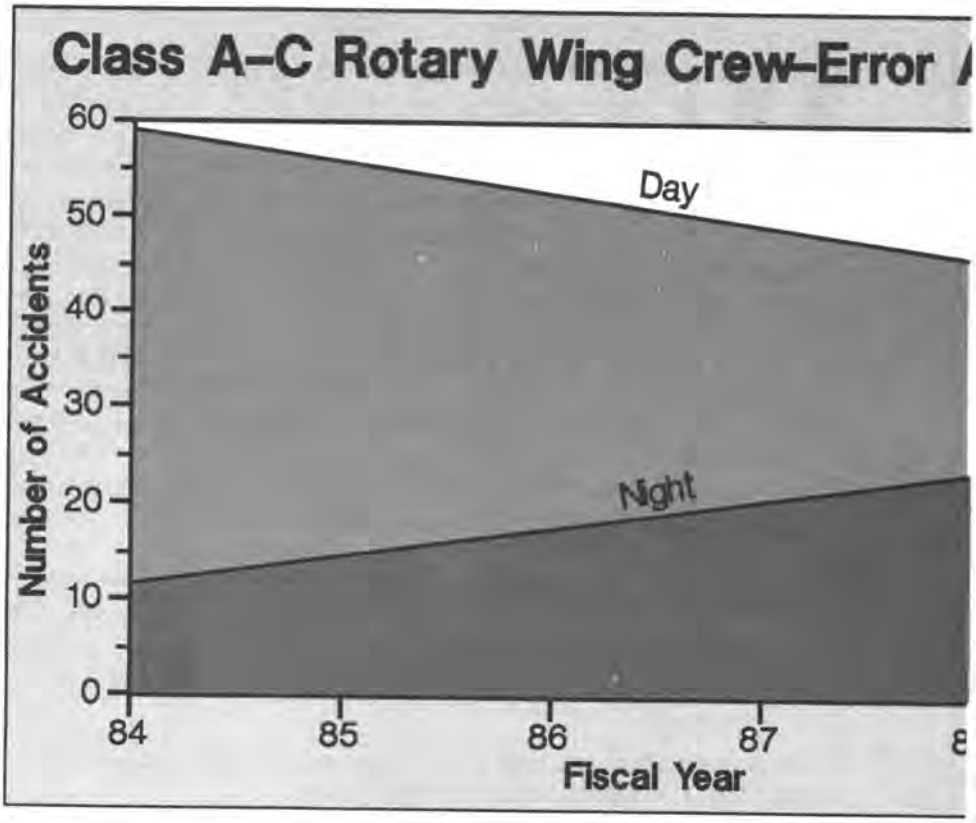
• In the OH-6, this situation most often involved the flight phases of hovering or en route at terrain levels. For example, an MH-6 pilot on a night-aided mission over water and with near-zero illumination, channelized his attention to reprogramming navigational equipment. His failure to monitor outside references and cross check the radar altimeter resulted in the aircraft crashing into the water.

• In the OH-58, this situation most often involved the en route flight phase at terrain flight altitude and relatively high airspeed. In fact, of the first accidents occurring in Operation Desert Shield, three were night-aided OH-58 accidents, and one was a night-aided UH-60. Each of them hit sand dunes while en route at terrain flight altitudes.

Operational situation No. 2
An unaided admin / support mission with low illumination conditions and visibility restricted by environmental conditions.

The most frequent error causing accidents in this situation was improper decision making. The pilot on the controls, generally having already exceeded a 12-hour workday with greater than 4 hours flying, failed to make proper decisions while landing the aircraft.

• A UH-1 pilot on a night-unaided medevac mission elected to land to a dusty road instead of to an adjacent large, open grassy field. On short final to the intended landing area, he realized it was unsuitable but couldn't decide whether to continue the approach to the ground or execute a go-around. During this period of indecision, the aircraft browned out and crashed.



Operational situation No. 3
Climbing or descending during an aided tactical mission, with low illumination conditions and visibility restricted by environmental conditions.

The error most frequently causing accidents in this situation was improper crew coordination. The pilot at the controls failed to coordinate or communicate with his copilot while climbing or descending.

• A UH-60 pilot did not tell his copilot to maintain terrain clearance while he looked for

another aircraft in their flight. As a result, neither pilot nor copilot was monitoring terrain clearance, and the main rotor struck a tree.

Operational situation No. 4
A hovering aircraft on an aided tactical mission with low illumination conditions.

The errors most frequently causing accidents in this situation were improper scanning and crew coordination. The pilot at the controls stopped scanning to channelize his attention inside or outside the aircraft but failed to coordinate this action with his copilot.

•While attempting to maintain a stationary 150-foot hover in a firing position, an AH-64 pilot stopped scanning in order to enter range information into the ARCS panel. He failed to coordinate this action so the gunner could assist in maintaining obstacle clearance. As a result, neither crewmember noticed the aircraft descending and drifting until it crashed into a tree.

Operational situation No. 5
An aided tactical mission at low altitude and low airspeed. Visibility is restricted by environmental conditions and illumination is low.

The error that most often caused accidents in this situation was failure of the pilot on the controls to use proper procedures to maintain or recover orientation.

•A UH-1 pilot continued to descend in an attempt to maintain visual reference in known IFR conditions instead of turning back or filing an IFR flight plan en route. As a result, the aircraft descended so low that it struck wires and crashed.

•Another UH-1 pilot was on an NVG training flight in the mountains. When the aircraft dusted out, the pilot elected to continue his descent down a mountain draw rather than executing a climb to recover the aircraft as stipulated in FM 1-204. As a result, the pilot lost visual reference and flew the aircraft into the ground.

Operational situation No. 6
An aided tactical mission with low illumination conditions. The aircraft is landing.

The error that most often caused accidents in this situation was failure of the pilot on the controls to accurately estimate distance or closure rate when landing.

•While landing from a hover at a laager site during an NVG night tactical training mission, a UH-60 pilot misjudged clearance between his main rotor and a tree. He saw the 25-foot-tall dead tree and attempted to maneuver around it, but the aircraft's main rotor hit the tree.

Operational situation No. 7
Preparing for an unaided tactical mission.

The error that most often caused accidents in this situation was failure of the pilot-in-command to properly conduct pre-mission planning and checks.

•An OH-58 pilot inadequately planned for an unaided VFR flight to return an aircraft to a field site. He elected not to perform the required flight planning by using maps and other information to become familiar with obstacles along the proposed flightpath. He also did not plan for the 300-foot agl minimum altitude established for the area of operations and published in the unit's standardization bulletin. As a result, the pilot flew below the 300-foot minimum altitude and hit trees.

Operational situation No. 8
A proficiency or transition mission with low illumination conditions.

The error that most often caused accidents in this situation was failure of the pilot on the controls to correctly diagnose or respond to an actual emergency.

•A UH-1 IP was at the controls on an unaided night training mission. He was flying a right crosswind departure from a base field when he heard a loud banging from the rear of the aircraft. Believing that he had experienced a tail rotor failure, the IP executed an autorotation, resulting in a hard landing and more than $138,000 in damage to the aircraft. The banging he heard was an unsecured seatbelt striking the side of the aircraft.

Common factors

Four common factors emerge from these crew errors and operational profiles:

•The primary crew failure is that the pilot on the controls stops scanning to focus his attention either inside or outside the aircraft and fails to coordinate with the other crewmembers to maintain obstacle clearance.

•Most accidents occurred while operating at low altitude: hover, taxi, landing, or en route at terrain flight altitudes.

•Most accidents occurred when illumination was low. In addition, over half of the accidents happened when environmental conditions such as haze, dust, fog, rain, and snow were present.

•The accidents experienced en route in terrain

flight showed the median altitude has decreased. However, *there has not been a corresponding decrease in airspeed.*

Lessons learned

• Don't stop scanning to channelize attention inside or outside the aircraft. Scan stop of more than 3 seconds is risky. If you're on the controls and must stop scanning, transfer the controls or coordinate with other crewmembers so that a member of the crew is looking outside at all times to maintain obstacle clearance. If your crewmembers not on the controls decide to stop scanning, they should announce the decision so that appropriate actions can be taken by you and other crewmembers. These procedures are even more critical when you're operating close to obstacles—as is usually the case when performing terrain flight—and under reduced visibility conditions.

• As the operating altitude for terrain flight is decreased, especially en route, the operating airspeed must also be reduced. This principle for safe operations was learned a long time ago when helicopters first began flying nap-of-the-earth. As with scanning, going slow when you are low is even more critical under conditions of reduced visibility.

STACOM

Documenting NVD qualification and flight time for nonrated crewmembers

STACOM 136 (22 Feb 89 *Flightfax*) clarified the requirements for documenting night vision device (NVD) training while the training is in progress. However, some confusion still exists about documenting nonrated crewmember qualifications and recording NVD flight time for these crewmembers. Following are the most frequently asked questions received by Directorate of Evaluation and Standardization (DES) concerning documentation of NVD qualification and flight time for nonrated crewmembers.

Q. How is the initial NVD qualification documented?

A. After the nonrated crewmember has successfully completed the required training, the exportable training packet test, and the proficiency flight evaluation, the completion date will be recorded in the remarks section of part V of the DA Form 759; e.g., "Initial qualification completed 1 October 1990."

Q. Should NVD flight time for nonrated crewmembers be recorded?

A. Yes. USAAVNC message 261802Z Jul 88 regarding NVDs requires crewmembers to maintain currency by flying 1 hour every 60 days, at night, while wearing NVDs. The best method for maintaining control of the individual crewmembers' NVD flight time is by using DA Forms 759 and 759-3.

FM 1-300 currently addresses these requirements for aviators and aeroscout observers. But the manual includes no requirement to document NVD qualification or NVD flight time for nonrated crewmembers. The need for a permanent record has been recognized because of the possibility that training and qualification gradeslips may become lost. This would require repeating the entire qualification procedure.

DA Forms 2028 have been submitted, and these requirements will be addressed in the new TC 1-300: Flight Operations and Airfield Management.

Submission of additional tasks (3000 series) to DES

Some aircrew training manuals (ATMs) require that commanders submit additional tasks (3000 series) to Commander, USAAVNC, ATTN: ATZQ-ES, Fort Rucker, AL 36362, prior to implementation.

This requirement has been superseded, and the Department of Training and Simulation will not include it in the new *Commander's Guide* or updated ATMs. Commanders may submit tasks to DES for evaluation on a case-by-case basis if assistance is desired.

STACOM 145 **24 Oct 90**

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5209, AV 558-6309/3504. Information published here generally precedes the formal staffing and distribution of Department of the Army official policy. This information is provided to all commanders to enhance aviation operations and training support.

Immanuel C. Sieving III
Lieutenant Colonel, Aviation
Director, DES

Summary

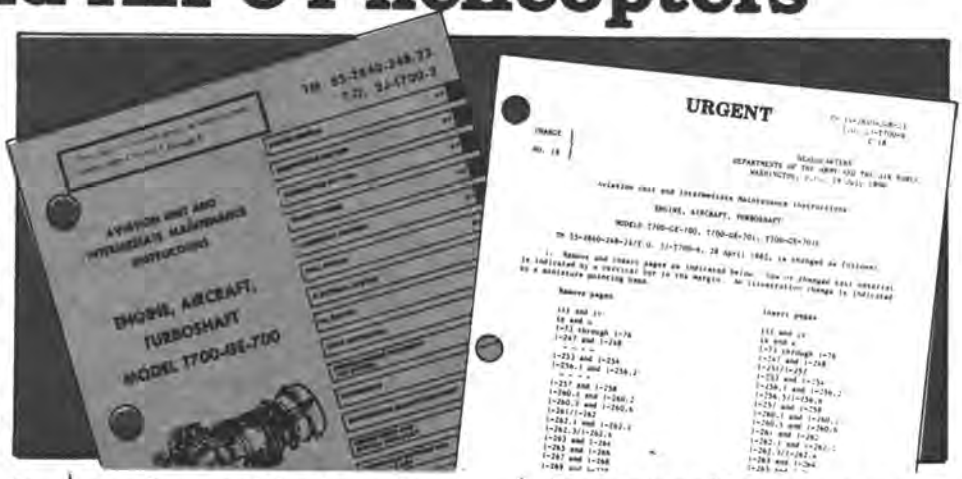
The solution to the night accident problem requires a combined effort from everyone involved with Army aviation. The Army aviation system is doing its part by improving training, procedures, and equipment, and by making commanders—both air and ground—more aware of the hazardous situations in which we are operating. The goal is to make these commanders more attuned to what the requirements are and what Army aviation can do and, just as important, what it can't do to support them. Each mission has to be assessed as to its safety margins.

The Aviation Center has already begun addressing its part of the solution. At the same time, in order to reduce accidents, it is imperative that every Army aviator be fully aware of the kinds of situations in which errors are taking place and causing these accidents.

This article has shown you the situations in which other aviators made mistakes that led to accidents. When you find yourself in the same operational situations, remember these examples, and don't make the same mistakes.

—POC: LTC Jack Fuson, Research and Analysis Division, AV 558-3842/5916, commercial 205-255-3842/5916.

Engine anti-ice valve check on UH-60 and AH-64 helicopters



Change 18 to TM-55-2840-248-23, the engine manual for UH-60 and AH-64 aircraft, addresses the problem of sticking anti-ice bleed valves on the Black Hawk and Apache. The following information has been furnished by the Black Hawk project manager's office to emphasize the importance of carefully performing the engine anti-ice start bleed valve check and taking the appropriate action when a stuck valve is encountered.

As PIC of a UH-60 Black Hawk or AH-64 Apache helicopter, you are going through the engine runup procedures and are about to perform the engine anti-ice start bleed valve check. As you move the appropriate ENG ANTI-ICE switch to the on position, you check for a rise in turbine gas temperature of at least 30°C . . . but no increase in temperature occurs. What should you do next?

Your check has told you that you have a defective valve, and that means the potential exists for an engine shutdown. You should not cycle the ENG ANTI-ICE switch more than once. Repeated cycling of the switch might free up the stuck valve, but that will not alter the fact that you have a defective valve.

Change 18 to the technical manual states that valves failing the anti-ice valve check must be replaced before further flight. Technical analysis has revealed that when anti-ice start bleed valves stick, there is a chance of uncommanded inflight shutdown of the engine at low power settings or when abrupt collective inputs are made.

Aviators should ensure that the information contained in Change 18—table 1-13.3 for the Black Hawk, and table 1-13.4 for the Apache T701C engine, and table 1-13.5 for the Apache T701 engine—for performance of HIT checks is included in the applicable aircraft logbook. ■

—POC: Mr. Michael Lupo and Mr. Dennis Menckowski, Black Hawk Project Manager's Office, AV 693-3210, commercial 314-263-3210.

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class E

H series - While hovering aircraft in confined area, crew heard loud noises coming from engine area. As aircraft was hovered to suitable landing area, additional bangs from engine were heard. Caused by compressor stall.

H series - PIC noticed stiffness in pedals when he began acceleration during OGE hover, and No. 1 hydraulic light came on. PIC accelerated aircraft above etl, and crew performed emergency procedures and made a running landing. Caused by chafed hydraulic line.

M series - As enlisted crewmember attempted to secure left cargo door during climbout, lower leading edge came out of track. Slipstream and air pressure caused door to separate from aircraft. Door was recovered.

UH-60 Class A

A series - While about 25 feet agl during single-ship NVG orientation mission, aircraft hit 30-foot sand dune. Five people were injured. 9043.

UH-60 Class E

A series - Stabilator light and audio came on during takeoff and would not reset. Caused by stabilator actuator failure.

A series - During takeoff, crew heard loud bang and flight controls jerked momentarily. Crewmember in back reported transmission fluid all over left side of aircraft. Aircraft was landed, and IP performed emergency engine shutdown. Postflight revealed left upper and lower struts had separated.

Attack

AH-64 Class C

A series - Aircraft was returning to unit FARP following a day aerial-gunnery mission. While maneuvering aircraft for final approach, pilot twice reset automatic stabilator. When he again attempted to reset the automatic stabilator, he inadvertently jettisoned all wing stores.

AH-64 Class D

A series - MTP found damage to one tail rotor blade and stabilator following maintenance test flight. Caused by flying debris.

AH-64 Class E

A series - No. 2 engine cowling was damaged when it came open during flight. Pilot failed to perform adequate preflight. Suspect door latches were in locked position and door was closed, causing pilot to think it was secure.

A series - During maintenance test flight, No. 2 engine cowling door came open. Pilots failed to ensure cowling was properly secured.

A series - Cotter pin on bottom part of CPG cyclic was protruding slightly. When aircraft was placed in right crosswind turn, cotter pin penetrated wire bundle on right side of cyclic, causing minor electrical shock to enlisted crewmember occupying CPG seat. Aircraft landed, and crewmember was sent to hospital for EKG. Cotter pin was trimmed and wire bundle repaired.

Cargo

CH-47 Class D

D series - While closing cargo ramp, crew chief noticed his mike cord was hanging on edge of ramp. Trying to prevent the cord from being pinched in the closing ramp, he stepped toward the left side of the ramp, leaving the ramp control lever in the up position. The toes on his right foot were severely pinched when his foot was caught in the ramp joint as the ramp closed. The crew chief couldn't reach the control lever, and the flight engineer had to lower the ramp to release his foot.

D series - During external load operation at cruise flight, copilot saw large bird dive through rotor system and break through left chin bubble.

Class A Accidents through 24 October

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	3	2	0
	November	2		1	
	December	3		4	
2nd Qtr	January	2		4	
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	3	33	0

CH-47 Class E

D series - Copilot's jettisonable door jarred loose during takeoff. All pins and safety devices were properly installed, but lower pin showed signs of wear. After landing, outside handle was found in and locked.

Observation

OH-58 Class A

D series - Aircraft was on an NVG mission when it flew into a sand dune. One crewmember received minor injuries. 9044

Fixed wing

C-12 Class C

H series - While climbing through 14,000 feet, crew saw bright flash of light and heard thunder. There was no immediate indication of lightning strike, and mission continued. During postflight, damage to engine, right prop, and right inboard flap was found. Weather radar had shown no signs of thunderstorm activity at time of incident.

C-12 Class D

C series - Engine chip light came on while aircraft was in cruise flight at 11,000 feet agl. During final at low power setting, light went out. Caused by bearing failure in power section of engine.

D series - Left wing inboard deice and sheet metal were torn when aircraft struck large bird during descent. Bird was not seen in time for pilot to take evasive action.

C-12 Class E

L series - While aircraft was climbing through 13,000 feet, passenger told pilot window had cracked. Pilot depressurized cabin and descended to 9,000 feet for remainder of flight.

OV-1 Class B

D series - Following instrument approach to commercial airfield, aircraft was landed with gear up. No injuries. 9045

Maintenance

UH-1 Class E

H series - During cruise flight and approach, crew felt unusual vibration (resembling collective bounce) throughout airframe and flight controls. Caused by failure of bearing attaching collective levers to scissors and sleeve assembly. One of the bearing units was installed backwards, allowing the bearing to slip out of the retaining plate. Aircraft had been flown 16.9 hours with the improperly installed bearing unit.

H series - While hovering after normal approach, pilot felt binding in cyclic just aft of center position. Civilian contractor personnel failed to properly secure wire bundle while performing maintenance. Connector came in contact with fore and aft jack shaft, causing cyclic binding and limited travel.

H series - As aircraft was landed after 1½-hour flight, tower personnel told aircrew both sections of horizonal tail rotor drive shaft cover were open. Postflight inspection revealed a 1-inch hole in cover over No. 5 clamp, and No. 5 clamp was scored. Three Dzus fasteners were missing. Mechanic failed to secure drive shaft cover, and PIC and crew chief failed to ensure cover was secured.

UH-60 Class E

A series - During cruise flight, No. 1 hydraulic reservoir, No. 1 tail rotor primary servo caution light, and No. 2 tail rotor servo and backup pump advisory lights came on. Aircraft landed, and maintenance found chafed hydraulic line. Caused by failure to install rubber grommets.

AH-1 Class E

F series - During steep approach into parking area, AH-1's rotorwash caused unsecured door on a parked OH-58 to blow off. Maintenance personnel had failed to secure door.

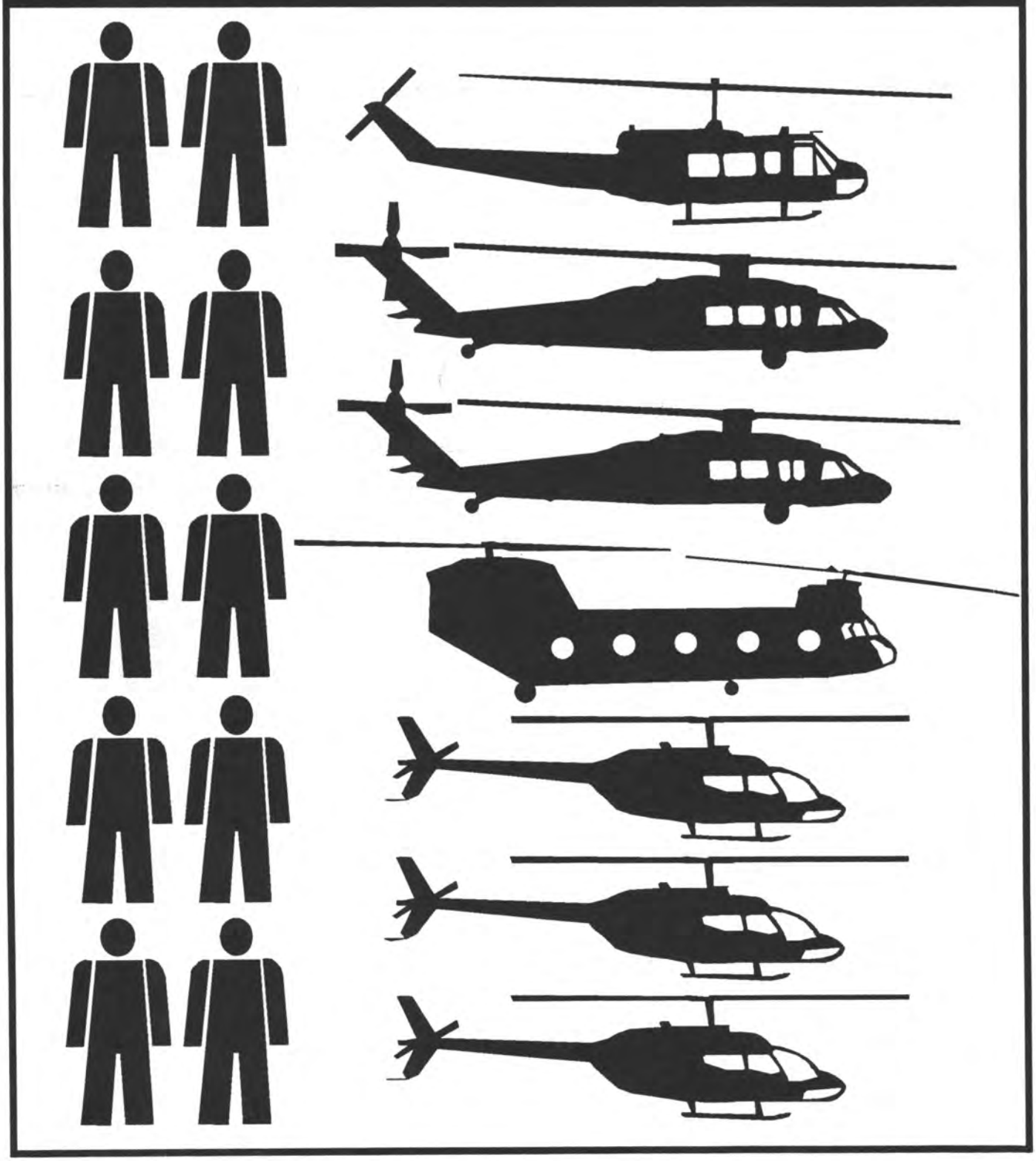
Safety messages

•Safety-of-flight technical message concerning fluorescent penetrant inspection of elevator trim tab attachment hinge brackets on OV-1D/RV-1D aircraft (OV-1-91-01, 041800Z Oct 90). Summary: While in cruise flight, an RV-1D experienced vibrations, and the nose pitched up. Condition was corrected when autopilot was disengaged. About 45 minutes later, with autopilot again engaged, the same thing happened. But, this time, the aircraft became inverted, began spinning, and lost 8,500 feet of altitude before it could be recovered. Flight continued without use of autopilot. After another 15 minutes, aircraft again experienced severe vibrations and binding of controls, which ceased when the failed elevator trim tab separated from the aircraft. Aircraft continued to its destination and landed. Elevator assembly had been damaged when left elevator trim tab separated from aircraft. Purpose of this message is to require fluorescent penetrant or eddy current inspection of elevator trim tab hinges and actuator rod ends on all OV-1D/RV-1D aircraft for evidence of cracks. Successful accomplishment of this inspection will ensure airworthiness of these parts while more detailed analyses are being conducted to determine if any additional corrective actions are necessary. Contact Lyell Myers, AV 693-9089, commercial 314-263-9089.

Center, Fort Rucker, AL 36362-5363, AUTOVON 558-2062. Information is for accident prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition. Direct communication is authorized by AR 10-29.

C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center

Fourth Quarter FY90 Accident Losses



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Flightfax

July 1991 Vol 19 No 13 REPORT OF ARMY AIRCRAFT ACCIDENTS

An uneventful flight, just routine. And then it happens. This one's going in—into the water, that is.

It happened to two UH-1 crews within a 2-week span: one aircraft went down in a lake just a short distance from shore; the other went down miles from land in the open sea. In one case, the emergency resulted in the death of an aviator. In the other, training and preparedness made all the difference.

Routine details + training program = seven lives saved

The mission was routine in this unit: to transport personnel and documents over open sea waters between two headquarters. For more than a decade, this unit had flown 98 percent of its missions over the open sea. So there was nothing special about this mission; it was routine right up to the end—when routine performance to standards resulted in a good end to a bad situation.

The preparations

For this mission, the routine details were handled with near perfection. The pilot-in-command filed a flight plan, obtained a current weather briefing, computed performance planning data, and checked weight and balance forms; the pilot preflighted the aircraft and supervised the crew chief's inspection of the survival equipment and passenger briefing; and the crew chief inspected the LPUs (life preserver units), liferafts, seatbelts, and ELT (emergency locator transmitter), conducted the passenger briefing, and issued each of the four passengers an LPU. The passenger briefing included use of LPUs and liferafts, ditching procedures, and emergency exits—all standard procedures for this unit's recurring overwater flights.

The flight

With the pilot on the controls, the UH-1H departed about 0840 under VFR conditions on its courier mission. About 11 minutes after takeoff, during cruise flight at 2,000 feet msl, the crew and passengers heard a loud bang from the engine area. The aircraft yawed, lost engine power, and started to descend. The PC immediately made a mayday call, took the controls, and made a second mayday call.

The ditching

Determining that an engine failure had, in fact, occurred, the PC turned the aircraft into the wind, searching for a touchdown site. Rough water with 6- to 8-foot waves was his only option.

Meanwhile, the pilot informed the crew chief and passengers of the impending ditching. The crew chief and a passenger prepared the two seven-man liferafts. The crew chief again quickly briefed the passengers on use of their LPUs and liferafts and ditching and emergency egress procedures.

Having selected the back side of a wave crest as his touchdown point, the PC zeroed forward airspeed and set the helicopter down vertically into the water, using full collective pitch to reduce rotor rpm.

The egress

As the aircraft settled into the water, it rolled left. The main rotor blades hit the water and stopped, and the pilot jettisoned his door. In the rear of the aircraft, the crew chief threw his liferaft out the right cargo door, holding tightly to the raft's attached rope. He then exited the helicopter, inflated the raft, and helped two passengers exit.

Still inside the aircraft, one passenger needed the assistance of the other passenger in getting out of her seat because of the aircraft's incline. By this time, the water was waist deep and rising rapidly. Both passengers exited through the right cargo door, while the pilot and PC got out through the right pilot door. As the crew chief conducted a head count and assisted the others into the liferaft, the aircraft sank abruptly in about 12,000 feet of water.

The rescue

Using his survival radio, the pilot tried unsuccessfully to establish radio contact with search and rescue aircraft; the PC's survival radio also failed to establish contact. However, the UH-1 had been under radar contact when it went down, which assisted in directing search and rescue aircraft to the scene. Soon after the UH-1 ditched, a commercial airplane flew over the site and began circling. Then a helicopter arrived and circled until three Navy helicopters arrived to begin the rescue operation.

One extraction was attempted from the water, but the high winds and waves made that impossible. So all seven extractions were made from the liferaft. In all, the passengers and crew were in the water about 1.5 hours. The four passengers and three crewmembers were flown to a nearby hospital, checked for injuries and exposure, given dry clothing, and released.

The training program

Because of its frequent overwater flights, this unit had established an annual ditching and water survival training program. In addition, this was an experienced crew—the PC had 9,450 hours of flight time; the pilot had 527 rotary-wing flight hours, 505 of which were in the UH-1; and the crew chief had crewed this helicopter for more than a year. Their experience, coupled with ditching, egress, and water survival training, contributed to the aircrew's prompt and efficient reactions. Extraordinary crew coordination, coupled with radio and radar coverage before ditching, allowed for recovery of all personnel.

Having been thoroughly briefed *twice,* the passengers—two of whom were nonswimmers—followed directions without panic. Even the two nonswimmers stated that the survival briefings, the calmness of the crew, and the circling aircraft kept them reassured.

Amazingly, there were no major injuries—only one minor cut. Crew professionalism, proper briefings, survival training, and performance to standards that require attention to routine details combined to result in a good end to a bad situation. ❑

Water survival video available

An 18-minute video on surviving in the water after ditching is available at audiovisual libraries throughout the Army.

How to Survive in Water—Prepare to Ditch (TF/VT 46-6074, PIN 30362) depicts methods of preparing for aircraft ditching and of escape and survival after ditching.

Filmed at the Naval Aviation Training Station at Pensacola, FL, the video demonstrates swimming strokes most effective for survival, how to tread water, and how to maneuver through surface debris and under a burning surface. An underwater tank is used to demonstrate how to exit a submerged aircraft, and a helicopter is used to demonstrate an air rescue.

Overconfidence + lack of training = one life lost

Urgency surrounded the mission; the unit was to deploy in less than a week. The purpose of the training mission, which would include overwater flight, was to complete NVG currency for the pilot and familiarize enlisted crewmembers with the ANVIS-6 before deployment. But before the flight was over, inadequate preparation and training would result in tragedy.

The preparations

The commander looked over the mission brief, signed it, and talked with the crew very briefly. The IP did the flight planning, and the pilot completed the preflight. The IP then briefed the crew on some things he wanted to do differently on this flight. For instance, he wanted the medics to offload litters and pretend to load patients to get the feel of getting off and working around the aircraft while wearing NVGs.

During the preflight briefing, little mention was made of weather conditions, existent lighting, or emergency or egress procedures, including the need for life preserver units during the overwater portion of the flight.

The flight was delayed when the aircraft scheduled for the mission was found to be in a nonflyable status. The replacement aircraft did not have a radar altimeter as required for overwater flights; however, the IP considered it adequate and accepted it although he knew a portion of the mission would be flown over water.

The flight

With the IP on the controls and the pilot and four enlisted crewmembers on board, the UH-1H departed at 2040 and flew north to a training strip and landed. There the pilot took the controls. Following some hover work and a couple of traffic patterns, the IP decided the pilot was ready to do overwater training.

Upon reaching the lake, the pilot was still on the controls. To complete his NVG checkout with a low-level, overwater flight, the pilot made the first run south to north at about 100 feet above the water. About halfway through the run, the IP directed the pilot to fly to the south end of the lake to conduct a hover check. The pilot hovered the aircraft to the altitude the IP wanted to fly, and they compared altimeter settings. The crew then continued the flight to the far east end of the lake, made a turn, and started back up on a run from north to south.

The crash

About 3 minutes into the run, the IP took the controls, and the pilot began giving altitude readings. Moments later, the aircraft hit the water in a 5-degree left bank and 5 degrees nose-low attitude. The aircraft then rolled tail over nose until the tail boom and tail rotor hit the water inverted.

The egress

The exact order of exit by the crewmembers is unknown. Three of the four enlisted crewmembers surfaced relatively quickly, although one crew chief was initially entangled in radio and helmet cord. Most likely, one of the medics was the last

crewmember to exit the passenger compartment, surface, and join the other three. The enlisted crewmembers found what they thought was some type of marker about 50 meters away and swam to it.

The pilot was delayed attempting to open the door. He ultimately had to exit through the broken roof window panel (greenhouse window). He surfaced some distance away from the others. The crewmembers heard the pilot and started yelling to him, trying to get him to follow their voices. But the pilot was having trouble staying afloat, and one crewmember swam out to him and started dragging him back. Another crewmember reached out and helped pull the pilot into the center of the group.

The crew continued to call for the IP, but he never surfaced. In about 15 to 20 seconds, the aircraft sank in 16 feet of water.

The rescue

With no emergency signal being transmitted before impact and no survival radios to call for assistance, the five surviving crewmembers began yelling for help. The crash and the crewmembers' calls for help were heard by local civilians, who launched a fishing boat and rescued the survivors.

The IP's body was recovered 2 days later. His lap belt had been released, and his survival vest had been removed, indicating he had been physically able to exit the aircraft and shed his vest but had drowned while attempting to surface.

Analysis

■ *Rules and limitations.* The IP failed to follow general rules and principles when he attempted to fly below 50 feet agl using a barometric altimeter. The replacement aircraft he selected did not have the required radar altimeter. The IP failed to maintain adequate terrain clearance due to overconfidence in his flying ability and overconfidence in the ability of the aircraft's barometric altimeter to ensure a safe altitude during low-level, overwater night flight. TC 1-204: Night Flight Techniques and Procedures recommends that all aircraft conducting low-level, overwater night flights be equipped with radar altimeters.

■ *Life preserver units (LPUs).* Although he knew a portion of this flight would be over water, the IP did not wear his LPU and he did not require his crewmembers to wear theirs. The unit mission briefing officer also knew that a portion of this flight would be overwater, yet he, too, did not require the crew to wear their LPUs. After the crash and successful egress by all personnel, one crewmember drowned and one had to be assisted to a more secure area. None of the crewmembers, including the one who drowned, incurred any incapacitating injury. The life preserver vests were available but were not worn because it was never considered that a few minutes over water constituted a hazard.

■ *Emergency locator transmitters (ELTs).* The aircraft was not equipped with an ELT. Consequently, when the aircraft crashed into the lake, no emergency signal was transmitted. The possible loss of five additional lives was prevented by local civilians who immediately came to the aid of the survivors. Addition of an ELT to the aircraft would have reduced the potential for increased loss of life.

■ *Survival radios.* The requirement for each aircraft crewmember to be equipped with a survival radio was not met. The two survival radios on board the aircraft were lost when the IP drowned and the pilot lost his survival vest trying to exit the aircraft. Although the Army has a shortage of survival radios and has waived the requirement for more than one radio per aircraft, this accident stresses the need for each crewmember to have a survival radio.

■ *Underwater egress and water survival.* Five of the six crewmembers had not been trained in underwater aircraft egress. As a result, the crewmembers had problems egressing because of disorientation, water pressure, and darkness. The one crewmember who had previously had water egress and survival training had no trouble exiting the aircraft although it had been 4 years since his training. The crew's problems in egressing and the IP's death by drowning indicate a need for a training program to ensure each aviation crewmember is able to egress an aircraft underwater and survive in the water. A model program is conducted by the Naval Aviation School Command Survival Department, Water, located at the Naval Air Station, Pensacola, Florida.

One crewmember stated that he kept bumping into things while trying to get out and started to get low on air. Just moments before breaking the surface, his thought was "Well, this is it for me." Fortunately, it wasn't "it" for him; unfortunately, it was for the IP. Although the IP had accumulated 7,344 military flight hours, he had not received aircraft underwater egress or water survival training—and it cost him his life. ❑

Water survival training program

Risk assessment in the unit that routinely flew overwater missions indicated a need for an ongoing water survival training program. And this unit developed one to be emulated by all aviation units.

As a result of the ditching described on page 2, the unit has increased the frequency of water survival training from annual to semiannual. The unit's water survival training program is divided into 14 separate tasks, consisting of deployment of survival equipment, identification of survival equipment, use of individual survival equipment, operation of survival equipment, and hoist operations performed in conjunction with the Coast Guard. Aviation life support equipment (ALSE) technicians and selected aviators and crew chiefs serve as instructors for this primarily hands-on training.

All aviators and crew chiefs undergo an overwater evaluation, either orally or in flight, during their APART standardization checkride. The evaluation includes discussion of individual and aircraft survival equipment, emergency procedures, survival and recovery techniques, and deployment of survival equipment. This evaluation is documented on the checkride grade slip. Aviators and crew chiefs who miss the semiannual training are restricted from performing overwater flight until training has been completed.

Some other things this unit is doing that might be of benefit to other units include the following:

- They discuss ditching procedures at safety meetings, giving everyone a chance to put forth ideas. The procedures outlined in FM 20-151: Aircraft Emergency Procedures Over Water (see page 7) are based on actual ditching experience in single-rotor helicopters. They proved to be valid during this unit's recent power-off ditching.
- They require all crewmembers to attend the Navy water survival course.
- The crew chief is responsible for passenger briefings and deployment of the liferaft during ditching. Special emphasis is placed on the crew chief holding onto the raft after inflation to keep it from blowing away. The crew chief is also responsible for preflighting the raft and all water survival equipment.
- They purchased a helicopter emergency egress device (HEED) for each crewmember. The unit ALSE technician has made minor modifications to the SRU-21 survival vest to hold the HEED bottle next to the survival radio pocket. (See description of HEED and its use on page 7.)
- They fasten a packet of fluorescent sea dye marker to the left shoulder of the survival vest with a strip of velcro. The dye starts turning the sea a fluorescent green shortly after the crewmember enters the water, making it easier to spot crewmembers from the air. During the recent ditching, the search pilot stated that he saw the dye marker before he spotted the orange liferaft.
- They replaced the individual overwater survival kits with two seven-man liferafts with accessory kits to avoid clutter in the aircraft cabin. Each accessory kit contains all required survival items. The ALSE technician secures the rafts inside the small cargo doors with web straps and quick-release velcro fasteners, easily identifiable by their red pull handles.

Good ideas, you might say, but they don't really apply to my unit. Maybe you don't *routinely* fly missions over water. However, AR 95-3: Aviation: General Provisions, Training, Standardization, and Resource Management states that the commander will ensure that personnel are equipped with ALSE appropriate for the mission, topography, and climate *along the proposed route of flight.* Are there lakes and rivers along your unit's flight routes? Perhaps your unit *does* occasionally fly over water.

A couple of years ago, an OH-58A was on an aviation training mission when the aircraft crashed into the center of a large, deep, freshwater lake and sank within seconds. The copilot surfaced and was picked up by local personnel. The pilot was not as fortunate; his body was recovered from the bottom of the lake. If this aviator and others like him who have lost their lives in rivers and lakes when their aircraft went down unexpectedly had participated in water survival training, they, too, might have survived. And, most likely, they would agree that water survival training is a must even for units that do not *routinely* fly over water.❑

Basic ditching procedures and techniques

If you are over water, unable to reach shore, and ditching of the aircraft becomes necessary, what should you do? FM 20-151: Aircraft Emergency Procedures Over Water describes basic ditching procedures and techniques.

Ditching a helicopter should pose no serious problems since it can be landed with little or no groundspeed and, therefore, with negligible decelerative violence. However, without built-in flotation characteristics, the aircraft may sink rapidly, making timely evacuation a major problem. This problem is compounded by the fact that evacuation often cannot be started until rotating components have come to a stop; in the meantime, cabin spaces are filling with water.

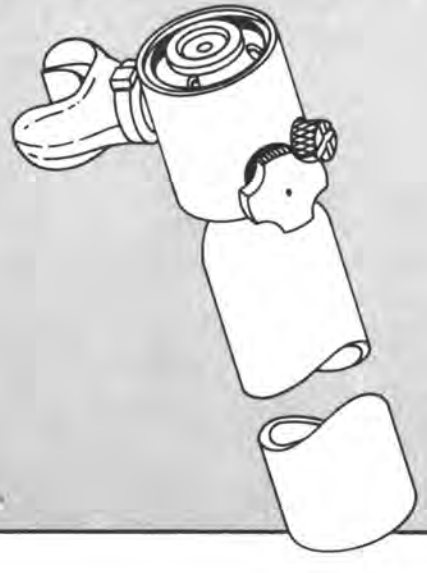
Actual ditching experience in single-rotor helicopters without built-in flotation has yielded the following general conclusions:

- At or just before initial water contact, jettison all exit hatches without unstrapping. Premature hatch jettison can endanger aircraft control. For example, objects being jettisoned can damage tail or main rotors.
- Make a normal landing at zero groundspeed into the wind and minimum rate of sink. Avoid excessive tail flare; premature water contact of the tail rotor may result in loss of antitorque control before the main fuselage settles in the water. If ditching under power, rotorwash may create substantial amounts of water spray, somewhat reducing visibility.
- Apply main rotor brake, when available, and keep the aircraft level while rotor rpm decays. As the fuselage settles in the water, keep pulling pitch until the aircraft shows a tendency to roll. At that time, apply cyclic in the same direction so that water contact will now stop the main rotor without violent reaction or the chance of flipping the aircraft in the opposite direction. If one side of the aircraft provides a better exit opportunity, roll the aircraft in the opposite direction before effective rotor control is completely lost.
- It is extremely important that all occupants remain strapped in their seats until the main rotor has stopped and evacuation can start. This will minimize disorientation with respect to the nearest exit regardless of aircraft attitude after submersion. If possible, assist other occupants to exits.

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

Helicopter emergency egress device

The helicopter emergency egress device (HEED), SRU-36/P, is a compact, lightweight breathing apparatus intended for use by helicopter aircrews during emergency ditching. The device provides emergency breathing air to aid in egress from a submerged helicopter. The device will provide 2 to 4 minutes of breathing air at a water depth of 20 feet. Aircrews must be properly trained to use the HEED, because failure to exhale freely on ascent may cause a fatal air embolism. NAVAIR 13-1-6.5, chapter 15, covers operation and maintenance of the HEED.



Avoiding attitude problems and postwar mishaps

The cease fire has been signed, and we can all take great pride in the tremendous success of Operations Desert Shield and Storm. We've gotten most of our aircrews home, and we've had our victory celebrations. Caution is warranted, however, since hard lessons may lie ahead. As aircrews return to their units, new challenges await them. And not only are there new challenges to the aircrews who served in the Gulf War, there are also new challenges facing those who remained behind in support roles.

Operations Desert Shield and Storm fragmented many units. Differing perspectives yielded a wide array of stresses, attitudes, mindsets, and perceptions. As our aircrews and maintainers return home and reintegrate with those who didn't go, these factors may create a variety of tensions and increase the potential for human-error mishaps. Commanders need to recognize these problems and how they affect those who were there and those who were not.

Hazardous attitudes

In coming months, commanders should watch for the following hazardous attitudes that may surface in aviators and maintainers who deployed to the Gulf:

■ *I'm bullet proof.* What can hurt us when no one is shooting at us? Plenty. We lose crewmembers and aircraft every year to peacetime accidents.

■ *This is the way we did it in the Gulf.* This attitude doesn't wash, either during or after the war. While in combat, options were often limited and forced upon us quickly. In peacetime, we have the luxury of time to assess options in a slower-paced environment. But in both cases, the tactically sound way is the right way.

■ *My boss wasn't there; what does he know?* There's no substitute for discipline in war or peace. Insubordination cannot be tolerated.

■ *I'm better than this young pilot/old warrant officer.* Keep egos in check—we're all on the same team.

■ *I flew in Desert Shield and Desert Storm, so I know what I'm doing.* Don't neglect training even if your crews got it in the war. Maybe they didn't. And even if they did, they still have currency requirements.

We trained the way we planned to fight, and when we fought we won. However, hard lessons may be ahead.

■ *I can handle anything they throw at me.* Proficiency levels change; crews may not be flying the high number of missions they did in Operations Desert Shield and Storm. Don't assume proficiency!

■ *No sweat; I do this all the time.* Back home, other demands on time—additional duties, family, etc.—can distract from safe mission accomplishment. Adjust mission demands to a daily comfort level.

■ *During the war, lives depended on my putting bombs on target and supplies in the drop zone.* Mission accomplishment is still important, but exercise sound judgment and know personal limits. In peacetime, we can try it again tomorrow if things aren't right today.

In addition to the above hazardous attitudes, some aviators may feel guilt. Although not widespread, guilt may exist over actions taken or not taken during combat operations. Commanders need to be aware of this and provide confidential avenues to address these concerns.

Unproductive attitudes

Not only may commanders encounter hazardous attitudes by those who deployed to the Gulf, commanders may also encounter the following unproductive attitudes by those who were not deployed:

■ *They got the glory, and we got left holding the bag.* Those holding down the fort, pulling extra duties, and helping out with families left behind may not have received as much recognition nor as great a sense of satisfaction.

■ *I'm supposed to train this guy, but he's seen combat and may not believe what I'm telling him really matters.* This could be a problem at training bases. Those with combat experience may sooner or later be trained by those without.

■ *There's an A-team and a B-team, and I'm on the wrong one.* Concerns may exist over being competitive for promotion/retention with peers who deployed.

Some solutions

Awareness is the key. Commanders should acknowledge the potential for problems, break the ice, and provide a forum for discussion. Be sure to recognize the efforts and sacrifices of those who did and those who didn't deploy.

Following the heightened state of combat awareness, there is a

potential for an emotional letdown during training missions. Reinforce the fact that success in the war was based on the execution of sound fundamentals practiced during training.

Share Desert Shield and Desert Storm lessons learned with everyone, and help bridge the experience gap resulting from the fragmented deployment of units. It may help eliminate the A-team/B-team perception.

Different behavior styles may exist between deployed and nondeployed troops, and even between spouses and families of deployed and nondeployed troops. Resentment and jealousy can grow. Be sensitive to this potential, and provide empathetic listening for those needing to express such feelings.

We trained the way we planned to fight. And when we fought, we won. As we reassemble units into their prewar form, take the time to be sure they *all* know the value of their support during Operations Desert Shield and Storm and your appreciation of their efforts. Keep training in perspective, stick with fundamentals, and do it right the first time, every time.

Now that we've won the war, it would be a shame to suffer postwar accidents because of hazardous or unproductive attitudes. ❑

—Adapted from Air Force Information Safety Office message 132110Z May 91

Requests for accident statistics

Units have traditionally based their safety programs on accident trends, and they get that information directly from the Safety Center. Telephone logs show that in recent months these requests have become an unmanageable flood because units are bypassing their installation and MACOM safety offices. While the Safety Center fully supports units in the field and their accident prevention programs, most of the information requested is already out there.

Units should begin their data search at their own installation safety office with a request for the specific information desired and an explanation of how the information will be used. If necessary, the installation safety office will forward the request to the MACOM safety office. If the MACOM safety office cannot provide the information, the request will then be forwarded to the Safety Center.

We hope this procedure will not only provide timely and accurate information but also keep installation and MACOM safety offices aware of your concerns in the field. ❑

POC: LTC Jack E. Fuson, ORSA/Stats Branch, AV 558-6566, commercial 205-255-6566

Recap of 2d quarter FY91 AVSCOM SOF messages

AH-1-91-01 SOF operational message concerning removal of firing restrictions when launching Mark 66 powered 2.75-inch folding fin aerial rocket (FFAR) with engine inlet shield installed on all AH-1 series aircraft.

AH-64-91-01 SOF technical message concerning one-time inspection of all servocylinders for nonconforming hardware on all AH-64 aircraft.

AH-64-91-02 SOF technical message concerning addendum to one-time inspection of servocylinders for nonconforming hardware on all AH-64 aircraft.

AH-64-91-03 SOF technical message concerning inspection/replacement of mixer support assemblies on all AH-64 aircraft.

OH-6-91-01 SOF technical message concerning recall of T63 engine compressor assemblies on all OH-58 A/C and H-6 series aircraft.

OH-58-91-01 SOF operational message concerning fuel boost pump procedure change on all OH-58D aircraft.

OH-58-91-02 SOF technical message concerning visual inspection of tail rotor gearbox support on all OH-58D aircraft.

OH-58-91-03 SOF technical message concerning revision to SOF message OH-58-91-02.

OH-58-91-04 SOF technical message concerning recall of T63 engine compressor assemblies on all OH-58 A/C and H-6 series aircraft. ❑

Flightfax needs *your* help

Yes, you. Don't look around to your commander, your platoon leader, or your safety officer. We want *you* to share your aviation experiences and your ideas on how to do things better. By sharing your experiences—the what, when, where, how, and why of the accident that happened and the ones that almost happened but didn't—you can assist others who find themselves in similar situations. If you've found a workable solution to a common aviation problem, tell us. It may be something that other units could adapt for their use.

Lessons learned can be much more beneficial if they are shared. In sharing the lessons you've learned, you just might contribute some small piece of information that could help a fellow aviator save an aircraft or, more important, a life. If so, surely it would be worth your time to jot down the information and send it to *Flightfax*. Jot it down on whatever is available—a brown-bag note will do. And don't worry if your sentence-structuring ability is a little rusty; we'll fix it.

Don't want the world to know about the "skeletons in your aviation closet"? Okay, we understand. If you want anonymity, just tell us so; we'll respect your request. However, be sure to include your name and telephone number so we can contact you if we have any questions about the article.

Please send your experiences, lessons learned, workable solutions, and comments to: Commander, U.S. Army Safety Center, ATTN: CSSC-SPP (*Flightfax*), Fort Rucker, AL 36362-5363. ❑

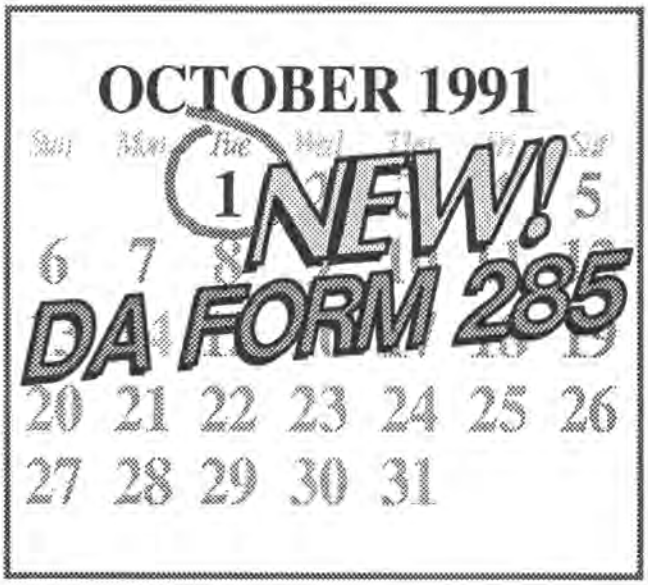
New DA Form 285 means better ground accident tracking

A new and completely revamped DA Form 285: U.S. Army Accident Report—used to report Army ground accidents—will be in the field this fall.

The new 5-page form is user friendly, with sections for information on the accident and personnel, property or materiel involved, and environmental conditions. A section on corrective action is intended to be completed by the commander. The sections are further broken down into multiple-choice blocks that lead the user through a host of essential accident information. The form still contains a block for a narrative description of the accident, but the block is much larger than on the old form.

The new 285 was developed because information on the old form was not sufficient for accident prevention purposes. The new form is much easier to complete, better targets countermeasures, and aids in development of accident prevention programs.

Use of the new 285 will be mandatory for reporting accidents occurring on or after 1 October. The new forms, dated May 91, may be requisitioned from the Baltimore Publications Center beginning 1 August. Orders should go through normal publications resupply channels. The nomenclature is DA Form 285; unit of issue is CS (cut sheet). ❑



POC: Mr. Lee McCown, Directorate of Doctrine, Training, and Evaluation, AV 558-3367

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - During return from combat mission, crew heard loud bang, followed by two more bangs during approach for precautionary landing. Before touchdown, engine failed and aircraft yawed severely. Aircraft browned out, right skid hit ground, and aircraft rolled onto its right side. Aircraft was destroyed in crash and postcrash engine fire. No injuries. 9128

UH-1 Class B

H series - About 50 feet agl during takeoff, crew heard loud bang and aircraft yawed left. Aircraft landed hard, bounced, and came to rest upright 20 feet away. Tail boom, pilot and copilot seats, skids, and under fuselage and upper forward cabin areas were damaged. Suspect internal engine failure caused power turbine section to explode. 9129

UH-60 Class A

A series - At about 70 knots during night medical transport mission, aircraft struck ground in wings-level, nose-low attitude. Four crewmembers and two patients were killed. 9130

A series - During NVG low-level combat support mission, crew lost visual reference to ground and allowed aircraft to hit ground in near-level attitude but in excessive rate of descent. Aircraft received extensive structural damage. No injuries. 9131

Attack

AH-1 Class A

F series - While relocating for takeoff, crew encountered brownout. Aircraft descended, and right skid, tail rotor, and main rotor struck ground. Aircraft rebounded, spun right twice, and came to rest upright. Crew received only minor injuries. 9132

S series - Aircraft experienced brownout during takeoff. Aircraft rolled onto its side and caught fire. Ammo exploded. No injuries. 9133

AH-64 Class A

A series - On return from mission, crew made night vision system approach to rear assembly area. On short final, crew extended approach because of a foxhole and then became distracted while looking for armament grounding stakes. Aircraft experienced brownout and drifted left, where it hit another aircraft on the ground. Both aircraft received major damage. No injuries. 9134

AH-64 Class B

A series - During landing, main rotors struck tree, damaging four main rotor blades extensively. 9135

Cargo

CH-47 Class A

D series - During night flight at 250 feet agl and 120 knots, crew failed to see or anticipate microwave tower, which was marked on their map. Aircraft struck tower and crashed. Four fatalities; aircraft destroyed. 9136

CH-47 Class B

D series - During cruise flight at 550 feet agl and 110 knots, both forward and aft cargo hooks opened uncommanded and three engine containers fell to ground. 9137

Observation

OH-6 Class B

A series - While hovering into parking, aircraft drifted into parked OH-6. 9138

OH-58 Class A

A series - About 50 feet agl and 55 to 60 knots on short final, low rotor rpm light and audio activated. Pilot noted rotor and N2 needles at 82 percent and aircraft descending at increasing rate. He rolled throttle off and held collective in same position. Aircraft hit ground, lost both tail rotor blades, and began right spin. After skidding 254 feet and spinning 155 degrees, aircraft came to rest upright with engine running. Pilot completed emergency shutdown, and crew exited

Class A Accidents through 30 June

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	3	2	2
	November	2	4	1	5
	December	3	3	4	3
2nd Qtr	January	2	7	4	1
	February	3	14	11	10
	March	4	4	1	8
3rd Qtr	April	1	2	0	2
	May	1	4	0	3
	June	3	0	0	0
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	41	33	34

with assistance from ground personnel. 9139

C series - During NVG service mission, aircraft descended from cruise flight altitude of 200 feet agl and 100 knots and hit ground in 3-degree nose-up, 5-degree left-roll attitude. Two fatalities. 9140

D series - While pilot was attempting to accelerate to 100 knots at 400 feet agl, engine failed. Pilot confirmed engine out and entered autorotation, touching down into wind with about 25 knots groundspeed. Skid dug into loose, soft sand, allowing nose-mounted WSPS cutter to dig into ground. Aircraft nosed forward, main rotor blades struck ground, and tail boom was severed. Aircraft came to rest on left side. No injuries. 9141

D series - While returning to AO under NVGs, crew encountered patches of unforecast ground fog. Attempting to maintain visual contact with ground, pilot in right seat made left turn to selected landing site and entered IMC. Since this was a single-pilot mission, pilot should have made turn to side of aircraft he was occupying to maximize visibility. Aerial observer informed pilot that aircraft was in rapid descent. Pilot increased power and heard torque audio warning. Pilot failed to maintain aircraft control and failed to commit to instruments as soon as outside visual reference was lost. Aircraft impacted ground. 9142

Safety messages

■ Safety-of-flight operational message concerning operational restriction on all UH-1 and EH-1 series aircraft with T53-L-13B, P/N 1-000-060-22, installed engines (UH-1-91-01, 042140Z June 91). Summary: There have been N2 accessory drive assembly failures in rebuilt T53-L-13B, P/N 1-000-060-22, engines. This assembly drives the overspeed governor/tachometer drive gearbox. In general, all failure modes result in a failed N2 spur gear and subsequent loss of drive to some of the accessories in the gearbox. The P/N 1-000-060-22 rebuilt engines with 500 or more engine operating hours are restricted from certain aircraft operations until inspected. Inspection teams will be dispatched to inspect engines on a priority basis. Pilots should be alerted that the first indication of failure in the aircraft is when both the engine N2 rpm and torquemeter pressure indicators drop to zero and rotor rpm increases. The pilot must retard the throttle back to control rotor speed per the dash 10 operators manual and then proceed to make a powered precautionary landing. Additional indications that may occur are engine chip detector illumination and engine oil pressure gauge indicating zero. The purpose of this message is to—

- Alert users to this engine problem and procedures for corrective action.
- Restrict certain aircraft operations on installed T53-L-13B, P/N 1-000-060-22, engines rebuilt before 1 May 1991 with 500 or more engine operating hours.
- Require units with T53-L-13B, P/N 1-000-060-22, engines rebuilt before 1 May 1991 to report them and send copy 3 of DA Form 2410 to AVSCOM. Contact: Brad Meyer, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning records inspection of T53 engine fuel controls for undersized pins on all UH-1, AH-1, and OV-1 aircraft (UH-1-91-ASAM-09, AH-1-91-ASAM-10, and OV-1-91-ASAM-03, 081800Z May 91). Summary: During overhaul process, it was discovered that some undersized pins had been installed during repair of the T53 series main fuel control. There have been no reported field failures or in-flight failures to date. However, the potential exists for a main fuel control malfunction if the undersized pin comes loose. The purpose of this message is to direct a records check for suspect fuel controls. Suspect fuel controls will be returned to Corpus Christi Army Depot for inspection of the undersized pins. Contact: Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of installed main recovery parachutes, P/N 11-1-1861, NSN 1670-00-200-4429, for the MK-J5D ejection seats on all OV-1D/RV-1D aircraft (OV-1-91-ASAM-04, 302230Z May 91). Summary: U.S. Army parachute repack facilities have reported occasions where pull tests of the main recovery parachute pack, P/N 11-1-1861, manual deployment ripcord handle, P/N 11-1-1946, have exceeded the prescribed 10-pound minimum to 20-pound maximum pull force. Pull forces greater than 20 pounds will make manual deployment of the canopy impossible in a free-falling state, such as that caused by a malfunction of the automatic parachute deployment system. Extreme ripcord handle pull forces do not have any adverse effect on the normal automatic parachute deployment features of the MK-J5D ejection seat escape system. The purpose of this message is to verify the pull force of each installed main recovery parachute ripcord handle. Those parachutes having ripcord handle pull forces that exceed the 10-pound minimum to 20-pound maximum pull force should be removed from service. Contact: Terese McGrew, DSN 693-9089, commercial 314-263-9089.

For more information on selected accident briefs, call AV 558-3746/4631, commercial 205-255-3746/4631.

U.S. ARMY SAFETY CENTER

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Flightfax
August 1991 Vol 19 No 14 REPORT OF ARMY AIRCRAFT ACCIDENTS

A proud tradition of Army aviation

The Commandant's Broken Wing Safety Award was established in June 1967 at the Army Aviation School, Fort Rucker, Alabama, to recognize aviators who demonstrated exceptional and professional knowledge, judgment, and skill in recovering aircraft from in-flight emergencies. A safety award committee, chaired by the Aviation Center Safety Director, was convened to review nominations.

The Commandant of the Aviation School, Major General Delk M. Oden, presented the first five awards in February 1968 to LTC Atsuki A. Miyamoto, 2LT Jay E. Gillman, and CWOs Ralph A. Valentine, Maurice N. Bradford, and Richard J. Whatley. Two additional awards were sent to Vietnam and Korea for presentation to CWO George B. Lesnick and CWO Freddie L. Waters.

Publicity about the award brought questions on how it could be used in other geographic areas. The Director of Army Aviation tasked the U.S. Army Board for Aviation Accident Research (USABAAR), now the U.S. Army Safety Center (USASC), to conduct a study for initiating the award Armywide. USABAAR presented the study to the Assistant Chief of Staff for Force Development in April 1969. Appendix IV, AR 385-10: Army Safety Program, dated 16 September 1968, implemented the Broken Wing Aviation Safety Award Program Armywide with USABAAR administering the program. Today, AR 672-74: Army Accident Prevention Awards Program governs the award.

During the almost quarter of a century since its inception, more than 1,000 Broken Wing awards have been presented to aviators and enlisted crewmembers whose extraordinary skill enabled recovery of an aircraft from an in-flight emergency. While their actions have prevented the loss of millions of dollars in equipment, far more important are the lives that have been saved. By their superior airmanship, these aircrewmembers have earned a place in the proud ranks of those who wear the Army Aviation Broken Wing Award. ❑

When a soldier dies in an accident... every supervisor and contemporary who ever spoke to him had an opportunity to influence his judgment, so a little bit of all of us goes in with every troop we lose.

—Author Unknown

First student aviator to receive Broken Wing Award

Whether it's the first-born child of eager parents, first-place winner in a sporting event, or first individual to accomplish a specific feat, first catches attention. And on 24 March 1969 after being sworn in as an aviation warrant officer, WO1 Edward F. Ferguson, indeed, caught the attention of the aviation community when he became the first student aviator to receive the prestigious Broken Wing Aviation Safety Award.

On the night of 16 October 1968, Ferguson, then a warrant officer candidate (WOC), was on the last leg of a solo cross-country flight under restricted visibility. During the return flight to Dempsey Army Heliport, Fort Wolters, Texas, WOC Ferguson was flying a "buddy ride" with another student pilot. At altitude under normal cruise instrument settings, WOC Ferguson heard a loud noise, followed by engine roughness, severe vibrations, and extreme power loss.

Unable to keep sufficient engine power to maintain flight and with the engine and rotor needles intermittently disengaging, WOC Ferguson entered autorotation, turned on the landing light, and selected the only available landing area—a small brush-covered area surrounded by tall trees. Maneuvering the aircraft by a series of S-turns, he autorotated and made a successful landing on a 6- to 7-degree slope. There was no damage to the aircraft, and neither pilot was injured.

Inspection revealed that the OH-23D had sustained a broken exhaust valve on the No. 6 cylinder. Making a successful night forced landing into such a difficult area under restricted visibility would have taxed the abilities of a seasoned aviator. WOC Ferguson had only 85 hours of training when this in-flight emergency occurred. ❑

Nomination requirements

AR 672-74: Army Accident Prevention Awards Program specifies that nominations for the U.S. Army Aviation Broken Wing Award must include the following information:

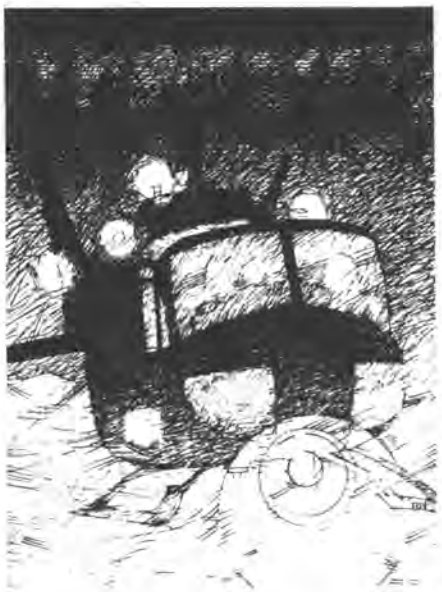
- Full name, SSN, and crew duty of the person actually on the controls during the emergency.
- Date, time, and location of the emergency.
- Mission type, design, and series of the aircraft involved.
- Type of mission.
- Phase of flight when the emergency occurred.
- Kind of terrain over which the emergency occurred.
- Obstructions, dimensions, type, and condition of the landing area.
- Altitude above ground level.
- Density altitude.
- Wind condition (direction and velocity).
- Gross weight of the aircraft when landing.
- Concise description of the emergency from inception to termination.
- Action taken by the nominee to cope with the emergency and what was done to recover from the emergency or minimize damage or injury. The circumstances surrounding the occurrence must be documented to show the skill, knowledge, judgment, and technique required and used in recovering from the emergency.
- Lapsed time from onset of emergency to termination.
- Drawings, other supporting documentation, and photographs, if available.
- Copy of the preliminary report of aircraft mishap message, if required and submitted.

Normally, only one person will be nominated to receive the award for a single in-flight emergency. However, if more than one crewmember materially contributed to successful recovery from the emergency, all those involved should be considered for nomination.

Forward nominations for the Army Aviation Broken Wing Award through command channels to U.S. Army Safety Center, ATTN: CSSC-PE (Broken Wing Award), Fort Rucker, AL 36362-5363.

More aircrewmembers receive Broken Wings

By demonstrating a high degree of professional skill while actually recovering an aircraft from an in-flight failure or malfunction necessitating an emergency landing, the following 22 aviators and crewmembers have earned the honor of wearing the Broken Wing lapel pin:



■ **DAC James E. Bias, Company B, 1st Battalion, 14th Aviation, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker.** During basic combat skills training with a nonrated student pilot, Mr. Bias told the student to demonstrate an out-of-ground effect power and controllability check. As the student brought the OH-58A to a 70-foot stationary hover and began the left-pedal turn to verify controllability, the engine failed. Mr. Bias took the controls and lowered the collective to preserve rapidly decaying rotor rpm. Before the aircraft hit the ground, he applied collective pitch to arrest the rapid rate of descent. The aircraft hit the ground nose-down on sloping terrain and then became airborne again, bouncing about 10 feet high and 10 feet forward. Mr. Bias applied the remaining collective pitch and landed the aircraft upright on a 4-degree nose-low slope.

■ **CW2 Scott W. Clark, Company B, 4th Battalion, 123d Aviation, Fort Richardson.** During an NVG training flight at contour altitude over 40- to 50-foot trees, the crew chief informed CW2 Clark that he heard grinding noises coming from the pylon area. CW2 Clark located a nearby clearing on the map, and the pilot made a right turn toward it. After a few seconds, the pilot reported stiffness in the flight controls, followed by several sharp surges. Almost immediately, the master caution and hydraulic segment lights came on. The pilot leveled the aircraft and began a climb. CW2 Clark took the controls and initiated emergency procedures for hydraulic power failure. He had the crew degoggle and set the aircraft lighting for night unaided. During the approach, he experienced increasing stiffness in the flight controls. On short final, illumination from the searchlight revealed 3- to 4-foot snow berms on either side of the runway, and the runway itself was covered by a layer of snow on top of ice. CW2 Clark had extreme difficulty keeping the UH-1H lined up with the center line before the aircraft's skis contacted the runway. As blowing snow engulfed the aircraft, he turned off the searchlight to reduce reflection from the snow. CW2 Clark kept a slight amount of collective pitch applied and used rear cyclic to slow the aircraft as it slid to a stop on the icy surface.

■ **CW4 John C. Fowler, 224th Military Intelligence Battalion (Aerial Exploitation), Hunter Army Airfield.** During an overwater ferry flight of RV-1D aircraft, CW4 Fowler was flying VMC on an international IFR flight plan when the aircraft's elevator trim tab failed. The RV-1D entered an uncommanded pitchup and rolled into an inverted flat spin. Upon initial loss of control, CW4 Fowler immediately reduced power on both engines to minimize altitude loss and to reduce G-loading. At that time, the instruments in the cockpit were unreadable due to vibration. The aircraft spun completely around four to six times while rapidly descending. Using outside references, CW4 Fowler determined the spin direction and applied full right rudder and neutral stick to stop the spin. To reduce aircraft weight and rotation, he considered jettisoning the two 300-gallon drop tanks but decided not to because the main tank would not have enough fuel to reach the nearest landing area. Sensing the mandatory ejection altitude of 5,000 feet agl for uncontrolled flight was approaching, he yelled to the crew chief that if one more revolution occurred, they would eject. However, the aircraft stopped spinning

and vibrations lessened. Even though spin recovery procedures may not be practiced in a Mohawk, CW4 Fowler's superior knowledge of these procedures enabled him to pull out of the dive and begin a gradual climb from 4,500 feet agl back to flight level 130. Although the severe vibrations resumed a few minutes later, CW4 Fowler held the aircraft as steady as possible, continued flight, and completed a safe landing.

■ **CW4 Raymond Frank, Company A, 3d Battalion, 160th Special Operations Aviation Regiment (Airborne), Hunter Army Airfield.** During an NVG final approach into an LZ, the UH-60A experienced an uncommanded right yaw that could not be corrected by increasing left pedal. While making control inputs to follow the turn, the pilot transferred the controls to CW4 Frank. The aircraft began spinning, and for about 1½ minutes, CW4 Frank fought to regain control. He was able to maintain the aircraft's position over the only suitable landing area, and on two occasions, he almost succeeded in regaining the control needed to fly out of the situation. Then the malfunction progressively worsened, and after spinning more than 15 times, CW4 Frank announced that he would autorotate. The pilot immediately brought both engine power control levers to the off position, which stopped the spinning. CW4 Frank lowered the collective and noted that the radar altimeter read 186 feet. As the engines stopped, both engine-out, low rotor, and master caution lights came on, causing CW4 Frank's NVGs to shut down. He pulled in all remaining collective pitch before impact. The aircraft landed upright on a down slope with left lateral drift. Although five lives were lost in this accident, CW4 Frank's heroic efforts to regain control of the aircraft directly resulted in seven additional lives being saved. Had he not made the decision to order the engines shut down to stop the spin, it is suspected that no one would have survived the crash.

■ **CW4 James S. Graham, Army Aviation Support Facility, Mississippi National Guard, Jackson, Mississippi.** During a 3-day mission in support of officer candidate school, three UH-1 aircraft were conducting troop insertions and extractions. About 150 feet agl, the flight leveled off and the aircraft began slowing to establish proper spacing for landing at the next LZ. CW4 Graham was pilot-in-command of the trail aircraft with eight people on board. About 70 knots and 150 feet agl over a heavily wooded area, the low rotor rpm audio and light came on and the aircraft experienced a complete engine failure. CW4 Graham immediately executed an autorotation with a turn and told the pilot to place the governor switch in the emergency position. Having just flown over the only available open landing area, CW4 Graham had to bank the aircraft about 80 degrees to reach the landing area. Judicious use of rotor rpm enabled him to complete the turn, clear the obstacles, and land the aircraft with only minor damage to the skids. As the aircraft touched down, it slid about 45 feet.

■ **1LT Richard A. Hammond, Company D, 1st Battalion, 223d Aviation, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker.** As command and control aircraft in support of NVG NOE training, the UH-1H had been flown for 3 continuous hours when the crew heard a loud grinding noise from the transmission area. Simultaneously, the flight controls began moving erratically and became difficult to operate. 1LT Hammond took the controls, stabilized the aircraft, and determined the hydraulic pump was cavitating. Intermittent hydraulic power surges resulted in loss of controllability, and the hydraulic pressure low and master caution lights flashed in conjunction with the surges, confirming hydraulic system failure. As 1LT Hammond completed emergency procedures, aircraft controllability remained unimproved. Battling extreme control stiffness and binding, he flew the aircraft toward the nearest suitable airfield. During approach, it took both crewmembers on the controls to keep the aircraft in a shallow descent profile. While completing the before-landing check, 1LT Hammond discovered the landing lights and searchlights were not working, causing his depth perception to be greatly decreased. However, using proper scanning techniques, he was able to identify the touchdown zone and judge barriers in his path. Before touchdown, the controls became even more difficult to manipulate. Attempting to bring the aircraft closer to runway heading, 1LT Hammond slowed approach speed to 40 knots, which brought the nose right. Still in a 15-degree left yaw, the aircraft touched down. Again 1LT Hammond decreased airspeed, this time bringing the aircraft within 10 degrees of the runway heading. After skidding 1,000 to 1,500 feet, the aircraft came to rest. The elbow fitting on the hydraulic pressure line at the hydraulic pump had cracked, resulting in rapid loss of all hydraulic fluid. Although he had never performed hydraulics-off maneuvers in the UH-1H, proper use of cockpit teamwork, flight

techniques, and emergency procedures enabled 1LT Hammond to land the aircraft safely.

■ **1LT Michael A. Johnson, Company A, 5th Battalion, 501st Aviation Regiment, APO San Francisco 96397-0420.** The OH-58A crew was conducting a communications check at 2,000 feet msl with the pilot flying the aircraft from the right seat and 1LT Johnson, PC, navigating from the left seat. They had climbed to 2,000 feet to contact flight following and were descending at 500 feet per minute when both pilots saw the master caution light come on, followed by the low rotor rpm audio, engine-out light, and N1 passing through 55 percent. The pilot lowered the collective to maintain rotor rpm. 1LT Johnson immediately took the controls and began searching for a place to land. Finding the only available area was a 100- by 75-meter rice paddy directly below the aircraft, he made two 360-degree turns to set up for an autorotational landing. While the pilot made mayday calls and set the transponder to emergency, 1LT Johnson maneuvered the aircraft to avoid telephone lines on short final and successfully autorotated the aircraft to the ground, landing with zero ground run.

■ **CPT Cory W. Mahanna, Company A, 2d Battalion, 159th Aviation Regiment, 18th Aviation Brigade (Corps) (Airborne), Fort Bragg.** The CH-47D had completed three uneventful sorties during a March 1990 support mission and returned to the PZ for another load of soldiers and equipment. With 15 people on board and carrying a slingloaded 30kw generator, the aircraft moved tactically at an altitude of 150 feet agl and 70 knots. A crewmember heard a loud grinding noise in the rear of the aircraft, saw dark smoke in the aft pylon area, and immediately notified CPT Mahanna, the PC. CPT Mahanna instantly began an approach to the nearest suitable landing area near a small road. He turned on the vent blower, told the pilot to close the cockpit windows, and directed the flight engineer to alert the passengers and ready them for an emergency landing. During the approach, CPT Mahanna made a mayday call, switched the transponder to emergency, and went over the emergency checklist. While on short final, he told the flight engineer to release the slingload, resulting in only minor damage to the load. After touchdown, CPT Mahanna directed passengers and crew to evacuate while he remained on board and performed an emergency shutdown. Inspection revealed that the aircraft transmission oil cooler fan had suffered catastrophic failure and that fire was present in the aircraft transmission area.

■ **CW4 Francisco J. Monroy, C Troop, 2d Squadron (Recon), 9th Cavalry, 7th Infantry Division (Light), Fort Ord.** At cruise altitude during an instrument training flight, the AH-1E crew heard a loud report and felt strong vibrations, followed by a rapid right rotation about the aircraft axis and a dive. With the horizon a blur, CW4 Monroy, the PC, reduced collective pitch and made a mayday call. Regaining control of the aircraft, he turned away from nearby mountains and attempted to reduce rate of descent with power. Each time he applied power, however, the aircraft rotated 90 to 360 degrees. Noting high-tension wires and mountains nearby, CW4 Monroy again applied power to arrest descent, cross power wires, and land in a nearby field. About 2,000 feet agl, with a descent rate of more than 3,000 feet per minute, he entered autorotation, attempting to reach a level landing area. Because of the high rate of descent, he chose not to pull initial pitch, saving all pitch to cushion a landing with a vertical descent to reduce rotation on the ground. The aircraft landed level and bounced forward about 50 feet, coming to rest upright. The complete loss of tail rotor thrust resulted when the No. 1 hanger bearing failed.

■ **CW2 Gregory P. Morgan, Company E, 1st Battalion, 14th Aviation, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker.** While inbound in an OH-58A during an NVG training mission, CW2 Morgan heard the low rotor rpm audio. The aircraft was over heavily wooded terrain, and he made an immediate 180-degree right turn toward a field. As he turned the aircraft, CW2 Morgan completed a cross-check of engine instruments and noted rapidly decreasing N1, N2, and rotor indications. He placed the aircraft in full autorotation, attempting to regain dangerously low rotor rpm. As he completed the turn, he could make out some details in the intended landing area. He made the first mayday call and instructed the enlisted aerial observer, who was not trained in emergency procedures, to prepare for a power-off landing. About 200 feet agl, CW2 Morgan made a left turn toward the selected field and made a second mayday call, this time giving the aircraft's precise location. With the inherent limitations of the AN/PVS-5s, he was unable to determine surface conditions. About 100 feet agl, he made a 30-degree right turn to miss a planted portion of the field and to align the aircraft with the

field's furrows. Realizing he could not determine the slope or surface conditions until he was too low for corrections, CW2 Morgan immediately initiated a greater than normal decelerative attitude to reduce forward airspeed to a minimum. About 20 feet agl with zero airspeed, he aligned the aircraft skids with the furrows and made a rapid pitch application just before touchdown. As the aircraft settled in the plowed field, CW2 Morgan completed emergency shutdown and notified another aircraft that they were down and safe.

■ **CW3 Paul E. Pence and PFC Robert D. Brown, Army Air Operations Directorate, U.S. Army White Sands Missile Range, New Mexico.** The UH-1H was about 500 feet agl during the final 20-minute leg of a 2-hour service mission when the master caution and hydraulics caution panel segment lights came on. Recognizing the stiffness of the cyclic, collective, and tail rotor controls as a hydraulics failure, CW3 Pence slowed the aircraft. PFC Brown, who was occupying the other pilot seat, realized CW3 Pence's attention was focused on controlling the aircraft, and he selected the appropriate radio frequency and ICS position for CW3 Pence to report the emergency. CW3 Pence was directed to Holloman AFB to attempt a running landing. Moments later, two of the five passengers aboard reported what they believed to be a fire. The aircraft's cargo doors were closed, and a fine red mist was forming inside the aircraft. CW3 Pence realized the passengers were being sprayed with hydraulic fluid, which was causing a burning sensation in their eyes and on their skin. Flight to Holloman AFB would take about 20 minutes, and recognizing the high toxicity of the hydraulic mist, CW3 Pence elected to attempt a running landing to an alkali lake bed. Because of the extreme stiffness in the controls, CW3 Pence directed PFC Brown to assist him in manipulating them. Together, they accomplished a successful running landing to the lake bed. Using sound crew coordination skills, CW3 Pence and PFC Brown not only saved the aircraft but also reduced their passengers' exposure to a chemical hazard.

■ **DAC Michael S. Porterfield, Company B, 1st Battalion, 14th Aviation, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker.** At 450 feet agl and 80 knots during an NVG training mission, the OH-58A yawed left and the engine failed. Mr. Porterfield immediately lowered the collective, trimmed the aircraft, and turned left 70 to 80 degrees away from a swampy area and into prevailing winds. Glancing under his NVGs, he saw the rotor rpm light come on, the rotor in the low green area, and N1 passing through 55 percent. When questioned, the student pilot confirmed that N1 was continuing to decrease. Mr. Porterfield declared an engine failure, and the student placed the transponder switch to emergency. Mr. Porterfield began making mayday calls and searching for an open landing area. As he continued scanning, he saw an area of lighter contrast 45 degrees left. He quickly turned toward the area as the aircraft passed through 250 feet agl. He instructed the student to turn on the pink light; however, the student inadvertently placed the switch to the landing light position. Because the light was rotated 180 degrees for pink light operation, no light came on; therefore, Mr. Porterfield continued rapid descent with no supplemental lighting. As the aircraft neared the intended touchdown area, he was able to see that it was a reforested area covered with 40- to 50-foot pine trees. As he passed through 100 feet agl, he initiated a smooth deceleration to enter the trees with minimum forward speed. Continuing to rapidly scan, he spotted an open area to his left front and pushed full left pedal, using the dwindling airspeed and collective to clear the tall pines. Once clear of the trees, he lowered the collective to maintain rotor rpm and initiated a large deceleration attitude to slow forward speed and stay within the small clearing. Mr. Porterfield applied positive pitch to slow the rate of descent, leveled the aircraft, and cushioned the landing with the remaining collective. The aircraft shuddered as it touched down on a 10- to 15-degree slope with no forward speed and came to rest upright.

■ **CW2 L. Poth, Company A, 3d Battalion, 4th Aviation Regiment, 4th Aviation Brigade, 8th Infantry Division (Mechanized), APO New York 09185.** The flight of two OH-58s was heading east at about 100 feet agl and 40 knots through a valley in a forest of 100-foot trees. Realizing they were slightly south of their intended course and destination, the lead aircraft crew initiated a left turn into a strong and direct tailwind. CW2 Poth, pilot of the second OH-58, followed the lead aircraft into the left turn. He reduced airspeed to maintain a safe separation and was just passing over the corner of a small opening in the trees when he heard the low rotor audio. He immediately scanned the instruments, noting that the low rotor caution light was on and N2 and rotor were both decaying with

N2 at 80 percent and N1 spinning down past 80 percent. CW2 Poth instantly rolled level to get away from the trees and entered autorotation. Due to the time available during descent, he did not attempt to roll the throttle past the engine idle detent before touching down. He applied initial pitch, added slight aft cyclic, and touched down level on sloping terrain. After touchdown, CW2 Poth made a mayday call to the lead aircraft.

■ **CW3 Michael W. Stevens and WO1 Keith C. Anderson, Company A, 3d Battalion, 101st Aviation Regiment, Fort Campbell.** During an NVG training mission, two AH-1F aircraft departed Sabre Army Heliport and flew to Campbell Army Airfield. Because of threatening weather conditions, the pilots of both aircraft decided to return to base and conduct closed traffic training. The lead aircraft gained spacing from the second aircraft, made a normal approach to the middle of the runway, and was beginning a takeoff as the second aircraft made its approach. On climbout, the lead aircraft pilots, CW3 Stevens and WO1 Anderson, heard a loud popping sound and saw the master caution and No. 1 hydraulic pressure segment lights come on. WO1 Anderson transferred the controls to CW3 Stevens. The crew leveled the aircraft and notified the tower of the emergency. The second aircraft cleared while CW3 Stevens and WO1 Anderson began executing dash 10 checklist procedures for a hydraulics failure below 40 knots. CW3 Stevens tried to circle to land, but due to loss of hydraulic pressure, the pedals became unmanageable. CW3 Stevens then decided to extend the downwind and attempt a run-on landing above 50 knots. Visibility was poor, and CW3 Stevens requested that the intensity of the runway lights be turned up; however, the tower was unable to comply. On final, CW3 Stevens executed a run-on landing as WO1 Anderson continuously updated altitude, airspeed, and rate of descent. The team effort allowed CW3 Stevens and WO1 Anderson to make a safe run-on landing at 50 knots.

■ **CW2 Ivan D. Thomas, Company C, 1st Battalion, 228th Aviation, APO Miami 34004.** The mission was to transport 28 medical personnel, baggage, and external fuel blivets for a medical readiness training exercise. While en route to destination, the aircraft had to be diverted around numerous thunderstorms and the right fuel pumps were not transferring fuel as fast as the left fuel pumps. When the CH-47D departed on the return flight, it had 1,850 pounds of fuel on board, of which all but 400 pounds was in the right fuel tanks. With a fuel flow of 2,400 pounds per hour, CW2 Thomas ensured the aircraft had enough fuel to complete the mission. After about 6 minutes of flight, the No. 1 engine fuel flow indicator dropped abruptly and the left fuel low and left fuel pressure caution lights came on, with a corresponding drop in N1 and No. 1 torque indicators. When the No. 1 engine dropped off line, the rotor rpm immediately dropped to about 93 percent. With smooth and precise control inputs, CW2 Thomas immediately and simultaneously lowered thrust to return the rotor to normal operating range, reduced airspeed to 80 knots, and initiated a left shallow turn to a landing site about 2 to 3 nautical miles away. About 300 feet agl, the right fuel low-pressure light came on, followed immediately by the No. 2 engine falling off line. The No. 2 engine fell off line so abruptly that CW2 Thomas's immediate reduction of thrust could not prevent the rotor rpm from decaying below 80 percent. Because of his low altitude and vegetation below, CW2 Thomas elected not to lower the nose in an attempt to regain rotor rpm. During the autorotational descent, he maintained a constant 80 knots and touched down initially on the left aft gear. The forward landing gear then impacted and rolled into a small gully, causing the aircraft nose to pitch down and then up again. Even though CW2 Thomas experienced a single-engine failure at altitude and a second engine failure at low altitude, his execution of emergency procedures was flawless.

■ **CW3 Layton E. Timmons, Virgin Islands National Guard, St. Croix, U.S. Virgin Islands.** The UH-1 was in cruise flight at 2,000 feet agl during a routine overwater service mission when the crew heard a loud bang from the engine compartment and the aircraft yawed nose left. The master caution, engine oil, and chip lights came on. CW3 Timmons took the controls, verified engine failure, and made mayday calls. He then performed a zero-airspeed autorotation to the back side of an 8- to 10-foot swell. As the aircraft filled with water, it rolled left and the main rotor blades struck the water. The soft touchdown enabled the crew and all seven passengers, two of whom were nonswimmers, to maintain orientation, exit the aircraft safely, and climb into a liferaft. They were later rescued by a Navy helicopter.

■ **CW2 Joseph R. Walsingham, Company G, 4th Aviation Regiment, 8th Infantry Division (Mechanized), APO New York 09111-2382.** As

CW2 Walsingham brought the OH-58A to about 50 to 60 feet agl during a terrain flight takeoff, the crew heard a loud bang from the rear of the aircraft, followed by complete engine silence. The aircraft yawed hard left, about 60 degrees. CW2 Walsingham recognized an engine failure as the aircraft began an immediate vertical 1,500-foot-per-minute rate of descent. He simultaneously adjusted the collective, pedals, and cyclic to correct the spin, brought the nose back to about 200 degrees, adjusted and held available collective, and arrested forward movement, which would have carried the aircraft into trees about 20 feet to its front. As the aircraft neared the ground, he cushioned the landing with all available pitch. Although the autorotation was almost flawless, the aircraft skids hit a large flat rock as they touched down on the sloping terrain, causing both crosstubes to break. Holding left cyclic to prevent the main rotor from hitting the ground, CW2 Walsingham maintained control of the aircraft as it came to rest in a right-skid-low attitude.

■ **CW4 Randolph B. Welch, Army Aviation Support Facility #2, Ohio Army National Guard, Columbus, Ohio.** During an instrument training flight at 1,800 feet agl and 90 knots, the OH-58A crew noticed two very slight, quick left yaws. Then the master caution and low rotor rpm lights came on. CW4 Welch took the controls and lowered the collective. The engine dropped to 95 percent N2 for about 2 seconds and then completely failed. He executed a 180-degree turn into the wind and started looking for a place to land. The only landing area was a small, north-to-south field located almost directly underneath the aircraft. He immediately began S-turning the aircraft to reach the field and instructed the pilot to turn the transponder to emergency. CW4 Welch continued S-turning and varying airspeed to reduce the critically steep angle between the aircraft and the small clearing, rolling out of the final turn just 20 feet above power lines bordering the east side of the landing area and beginning a progressive deceleration. Because of the uneven terrain, CW4 Welch zeroed forward groundspeed and descended vertically, applying cushioning pitch and touching down on an 8-degree right slope, just 100 feet short of a sharp dropoff to a creek channel.

■ **CW2 Robert Eddie White, Company C, 2d Aviation Regiment, 2d Infantry Division, APO San Francisco 96524-0456.** The OH-58A was experiencing a problem with transmission oil transferring to the engine oil system. The aircraft was cleared for a one-time flight, and CW2 White was the maintenance test pilot assigned to ferry the aircraft to a support maintenance facility where the problem could be corrected. About 30 minutes into the flight, he noted an increase in control friction in the cyclic control. Almost immediately, the cyclic became extremely difficult to move, requiring CW2 White to use both hands to make control input. Although he had very little ability to move the cyclic, he placed the aircraft in a landing attitude, and the aircraft entered a 5-degree right turn, which he could not correct. Using the collective and throttle, he could control the rate of closure and descent. The aircraft touched down in a frozen rice paddy and slid 15 feet with no damage. Postflight inspection revealed extreme buildup of metal shavings on the swashplate and surrounding area.

■ **CW3 Larry Dewayne Willett, Company A, 78th Aviation Battalion, APO San Francisco.** About 1,500 feet msl on final approach during an aviator readiness level progression training mission, the pilot reduced power and began a descent. Moments later, the UH-1H shook and the engine N2 dropped 600 rpm and fluctuated several times before returning to 6600 rpm. CW3 Willett took the controls, reduced power slightly, turned the aircraft left, and within seconds, the engine failed. The low rotor rpm light and audio came on, and the aircraft shook again. CW3 Willett entered autorotation and again turned the aircraft left to search for a forced landing area. The pilot placed the emergency governor switch to emergency, but the N2 tachometer was reading 1200 rpm and not increasing. Rotor rpm was in the green area. CW3 Willett saw that he could not make a glide to an open area, but he spotted a smaller tree-covered area and made a slight right turn on short final to go between trees. He decelerated at a low altitude and cushioned with collective, using most of the collective travel. During landing, the aircraft hit the tops of several trees, damaging both main rotor blades.

Wear them with pride

There's an old Army aviation saying that "accidents are measured in inches and seconds." These people who wear the Army Broken Wing have proved that thorough training and skillful flying can stretch those few precious seconds and inches far enough to save their aircraft and the lives of the people they carry. ❑

STACOM

Certified true copies of DA Form 2408-12

There has been some confusion in the field regarding the requirement for certified true copies of DA Form 2408-12: Army Aviator's Flight Record. The final draft of DA Pamphlet 738-751: Functional Users Manual for the Army Maintenance Management System—Aviation (TAMMS—A) outlines requirements for certified true copies of DA Form 2408-12. Effective immediately, the following guidance is provided:

When an aircrewmember has performed flying duties in an aircraft not assigned to his or her unit or activity, a copy of the DA Form 2408-12 will be provided to that aircrewmember. The pilot-in-command of the flight will annotate the DA Form 2408-12 with a remark "I certify that this is a true copy of the DA Form 2408-12" and the day, month, and year of the flight. The signature of the pilot-in-command will be entered following the certification and date.

USAAVNC point of contact is CPT Robert Mitchell, ATZQ-ESF, AV 558-6309/3504, commercial 205-255-6309/3504. ❑

STACOM 147 **August 1991**

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208, AV 558-6309/3504. Information published here generally precedes the formal staffing and distribution of Department of the Army official policy. This information is provided to all commanders to enhance aviation operations and training support.

Don Cumbie

Donovan R. Cumbie
LTC (P), Aviation
Director, DES

Accident briefs

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - About 50 feet agl and 45 to 50 knots during takeoff from field site, crew heard several loud reports. PC took controls and entered autorotation. With almost no rotor rpm, aircraft crashed in tail-low attitude and came to rest upright. Suspect failure of No. 2 engine bearing. No fatalities. 9143

H series - Shortly after takeoff, while still hovering, crew heard loud bang. No. 2 FM radio antenna mast assembly separated from mounting structure and contacted tail rotor assembly. Aircraft rolled left about 120 degrees. Two injuries and destroyed aircraft. 9144

H series - At 1,000 feet agl and 90 knots, master caution light flickered and engine chip detector light came on. Crew initiated descent, engine made popping sound along with grinding noise, aircraft yawed two to three times, and pilot rolled throttle off and entered autorotation. At 20 feet agl, pilot pulled initial pitch. Realizing aircraft was still too fast, pilot made another deceleration and continued to pull pitch until running out of collective at 10 feet agl. Aircraft hit ground level, pitched forward, and rolled on right side. Minor injuries. 9145

H series - During night medevac mission in mountainous terrain, aircraft hit ground and was destroyed in postcrash fire. Three fatalities. 9146

V series - During night-aided flight at 75 feet agl and 60 knots, pilot made evasive right turn to avoid another aircraft. Pilot failed to recognize aircraft was in descent before it hit 10-foot berm. One fatality. 9147

UH-1 Class B

H series - About 300 feet agl and 70 knots during normal takeoff on instrument training flight, engine rpm increased rapidly while rotor rpm decayed. IP took controls and entered autorotation. Aircraft landed level and hard with no ground run and bounced on right side. Suspect Kaflex shaft failure. No injuries. 9148

UH-1 Class C

H series - Shortly after takeoff during NVG mission, aircraft attempted to join formation, descended, and hit ground. Aircraft skids were torn off, lower wire cutter assembly was broken off, and aircraft underside sustained extensive sheet metal damage.

H series - At 5-foot hover, crew heard loud bang from rear. Aircraft yawed left, rpm dropped, and crew heard another loud report from rear. IP took controls and performed hovering autorotation. Internal part of compressor section had broken loose.

UH-60 Class B

A series - With 15 combat-equipped troops on board, Chalk 5 took off as trail in flight of

five. Mission spare aircraft with five combat-equipped troops on board was located about 50 meters right of Chalk 5. Although both aircraft took off about the same time and climbed through brownout, mission spare aircraft was lighter and climbed faster. To avoid large dust cloud main flight was creating, mission spare aircraft made early left turn, flew directly over Chalk 5, and was only about 3 feet above Chalk 5's main rotor when crew saw it. About 60 feet agl and 18 to 20 knots, Chalk 5 crew reduced collective to avoid mission spare aircraft and descended back into brownout, hit ground, bounced back into air, and hit ground again. Mission spare aircraft crew continued with mission, unaware they had forced Chalk 5 into ground. No fatalities. 9149

UH-60 Class C

A series - During velocity horizontal check, aircraft developed severe vibration at 150 knots. Crew reduced airspeed and performed roll-on landing. Black main rotor tip cap was missing, and two main rotor blades and two tail rotor paddles were damaged.

L series - At first destination, crew smelled electrical fumes, checked all electrical equipment, and found no malfunctions or abnormal indications. After takeoff, crew noted stronger smell and smoke accumulating in rear cabin area. Crew landed and shut down aircraft. Inspection revealed heat damage to No. 1 engine and sheet metal.

L series - On final approach to helipad, aircraft flew low and slow over parking lot where commercial tents were located. Rotorwash caused tents to balloon and support poles to be blown around, damaging tents, merchandise, and POVs.

UH-60 Class D

A series - During aircraft runup, stabilator failed self-test. MP opened tail rotor drive shaft cover to check stabilator actuator connections, and maintenance personnel completed work. Crew obtained clearance to conduct night test flight. After test flight, maintenance personnel found damage to tail rotor drive shaft. Crew failed to notice open tail rotor drive shaft cover during night preflight.

Attack

AH-1 Class C

F series - Fully armed and fueled, aircraft was in trail position. Pilot made climbing right turn to clear rear of flight and then made descending left turn to regain position in flight. Flat terrain hampered pilot's depth perception, and he failed to anticipate power requirements to stop aircraft's descent in its high gross weight configuration. Aircraft hit ground, tearing left skid and crosstube from aircraft.

AH-64 Class C

A series - During hover clearing turn, crew noticed tree near where aircraft tail had been. Postflight inspection confirmed tail rotor strike.

A series - About 10 feet agl and 10 to 20 knots while maneuvering NOE into battle position, pilot noticed section of concertina wire below aircraft. Rotorwash lifted wire about 3 feet, and pilot banked slightly left and increased power to avoid wire. Pilot noticed vibration and immediately landed aircraft. Inspection revealed damage to three main rotor blades and one tail rotor blade. Attempting to avoid wire, pilot had allowed aircraft to strike tree.

Cargo

CH-47 Class C

D series - During NVG hovering flight with a slingloaded M198 howitzer on a reach-pendant system, crew attempted electrically and manually to release load, but forward hook would not release pendant. Aircraft drifted forward, dragging howitzer about 200 feet and lifting it about 8 feet off ground. Crew was finally able to manually release forward hook, allowing howitzer to fall to ground.

D series - While slingloading AH-64 at 130-foot hover, crew chief realized load was tipping over. AH-64 rolled right, righted itself, moved right 3 feet, and rolled right again, damaging shock strut assembly and pylon actuator and stabilator. Crew released load.

CH-47 Class D

D series - Slingloaded HMMWV was released in wrong LZ, and crew returned to pick up load. No hookup person was available, so PC used extra crewmember as ground hookup person. While pilot was attempting to maneuver over load for hookup, brownout occurred. PC took controls and made immediate takeoff. Hookup person was blown off load, spraining right ankle.

D series - During slingload of truck, load became unstable and truck turned over. As PC attempted to put load on ground, large fuel line on truck burst, spraying diesel on aircraft and crew chief. Load was released inverted.

Observation

OH-6 Class B

A series - During simulated engine failure, IP told student to make power recovery. Aircraft lost power, and IP took controls and continued autorotation to ground. Main rotor flexed down and struck tail boom. 9150

OH-6 Class D

G series - During aerial gunnery training, bolt came off flash suppressor, allowing flash suppressor to come off. Rounds hit suppressor during firing and deflected off aircraft frame, causing minor damage to airframe and one blade.

OH-58 Class A

A series - During combat skills training, crew had landed on 1- to 2-degree slope in confined area and was preparing for takeoff. As student pilot increased collective, aircraft entered dynamic rollover condition and came to rest on right side. 9151

C series - At 10 to 20 feet agl during day VFR combat mission, crew heard loud pop from rear of aircraft, followed by engine failure. Pilot applied aft cyclic, but aircraft continued descent, hitting ground in near-level attitude. Engine failed because of sand adhesion on lead-

ing edge of first-stage gas producer nozzle, causing burning of first- and second-stage blade tips. No injuries. 9152

OH-58 Class C

A series - Aircraft experienced unexpected left yaw and lost engine and rotor rpm. Pilot reduced collective pitch, rotor and engine rpm returned to green, and pilot initiated shallow approach from 200 feet agl. At 50 feet agl, low rotor rpm light came on, accompanied by reduction in engine noise. Pilot closed throttle and entered autorotation. As aircraft touched down, toe of left skid dug into sand, causing aircraft to roll onto right side.

A series - During postflight inspection, PC discovered damage to both main rotor blades. Pilot had noticed no abnormal indications or vibrations during flight. Investigation continues.

C series - While repositioning for landing during NVG area recon, aircraft struck power line, severing 1-inch aluminum cable with main rotor blade. Crew felt jolt, low rotor rpm audio sounded, and aircraft began settling. Pilot made controlled landing about 190 feet from impact point.

D series - IP was demonstrating autorotation with turn. During landing, two main rotor blades flexed down and severed tail boom about 24 inches aft of horizontal stabilizer. No injuries.

Class A Accidents through 31 July

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	3	2	2
	November	2	4	1	5
	December	3	3	4	3
2nd Qtr	January	2	7	4	1
	February	3	14	11	10
	March	4	4	1	8
3rd Qtr	April	1	2	0	2
	May	1	4	0	3
	June	3	0	0	0
4th Qtr	July	2	2	8	0
	August	3		2	
	September	3		0	
	Total	31	43	33	34

OH-58 Class D

D series - During NVG approach to ground, aircraft experienced brownout, drifted right, and hit ground, damaging vertical stabilizer.

OH-58 Class E

A series - During NVG mission, aircraft departed confined area and entered inadvertent IMC. PC performed IMC recovery procedures and landed aircraft.

C series - During NVG zone recon, IP crossed low area. Pilot was reading map and failed to inform IP of wires. Aircraft struck upper wire at about 40 feet. WSPS cut wire, aircraft landed, and no damage was found.

Fixed wing

C-12 Class E

D series - As aircraft passed through 9,000 feet on climbout, No. 1 engine torque decreased by 20 percent, No. 1 engine tgt increased 30°C, engine noise decreased, and aircraft yawed left. Crew reduced power and landed aircraft. Inspection revealed low-pressure bleed valve on No. 1 engine had failed.

Maintenance

UH-1 Class E

H series - During instrument takeoff, neither airspeed indicator was functioning. Crew aborted takeoff. During routine maintenance, pneumatic lines had been reattached incorrectly.

Safety messages

■ Safety-of-flight technical message concerning update to CH-47-91-01 to identify serviceable combiner transmissions and engine transmissions on all CH-47D, MH-47D, and MH-47E aircraft (CH-47-91-02, 151500Z May 91). Summary: Safety-of-flight message CH-47-91-01 directed that combiner transmissions and engine transmissions with specified serial numbers and gears with a "P" prefix were unserviceable. All requirements of SOF message CH-47-91-01 remain valid. Inspection procedures have now been developed to inspect gears in these transmissions at depot level. Gears that pass inspections will have a DG, DGC, or DGS at the end of the gear serial number. The transmission historical record will state the installed gear serial number. All transmissions with an "M" in front of the gear serial number are considered serviceable. The transmission list in SOF message CH-47-91-01 is now updated. Some transmissions have been deleted because they are not in the Army inventory. And some transmissions have been added because units have reported additional transmissions containing gears having a serial number with a prefix "P" IAW SOF message CH-47-91-01. The purpose of this message is to inform units that transmissions with DG, DGC, or DGS at the end of the gear serial number are considered serviceable even though the gear has a "P" prefix. Contact: Brad Meyer, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning installation of new forward transmis-

sion oil cooler air inlet duct (P/N 145S1981-2, -3, or -4) on all CH-47D and MH-47D aircraft operating in Southwest Asia (CH-47-91-ASAM-06, 251900Z Apr 91). Summary: A Category I deficiency report was received from Southwest Asia reporting that the forward transmission oil cooler air inlet duct had collapsed due to the excessive heat. The collapsed duct scored the forward sync shaft. The purpose of this message is to direct removal of the old Kydex (plastic) duct segments (P/N 145S1651-2, -3, or -4) and provide authorization for installation of new fiberglass duct segments (P/N 145S1981-2, -3, or -4). Aircraft operating in Southwest Asia can be flown without duct segments until new duct segments are installed. Contact: Dong Nguyen, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning alternate method of tracking tail rotor blades using fixed length tail rotor pitch change links on all UH-1 series aircraft (UH-1-91-ASAM-08, 292000Z Apr 91). Summary: The new rotor blade track and balance equipment currently being issued to the field does not include strobe light provisions to allow visual tracking of the UH-1 tail rotor. Therefore, an alternate method for setting the pitch links on the tail rotor blades has been developed. Research and tests have shown that setting the pitch links to a fixed length accomplishes tail rotor tracking. The purpose of this message is to advise the field of an alternate procedure for setting the tail rotor pitch change links. Contact: Terese McGrew, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning elevator assemblies with misaligned attachment holes on all UH-1H/V aircraft (UH-1-91-ASAM-10, 091530Z May 91). Summary: Deficiency reports from field units have indicated a problem installing some elevators received from supply on UH-1 aircraft. The elevators were manufactured by Chem Fab Corp. Some of these elevator assemblies have attachment holes that are misaligned, not allowing proper insertion of the attachment bolt. Therefore, the elevator assemblies cannot be properly installed. The purpose of this message is to inform units of potentially discrepant elevator assemblies. This message also provides disposition instructions for elevator assemblies that cannot be properly installed. Contact: Roger Heidenreich, DSN 693-9089, commercial 314-263-9089.

■ Safety-of-use mandatory operational message concerning AN/AVS-6(V1), NSN 5855-01-138-4749, and AN/AVS-6(V2), NSN 5855-01-138-4748 (ANVIS) night vision goggles (NVG) (CECOM 91-05-03, 052100Z June 91). Summary: ANVIS NVG systems and some spares recently delivered may have a manufacturing defect that could cause the monocular housing to separate from the pivot and adjustment shelf assembly with minimal force. The manufacturer delivered some ANVIS systems and some spare monocular housings that incorporate two different types of plastic. Separation of the monocular housing from the pivot and adjustment shelf assembly could result if the two pieces are not properly bonded together. This will result in a loss of function of the NVG and a potential safety hazard to users. NVG monocular assembly spares, NSN 5855-01-149-4097, and monocular housing spares, NSN 5855-01-149-4100, requisitioned from January 1991 to June 1991 are also suspect. Use of ANVIS NVG systems with serial numbers 00001 through 00400 on contract DAAB07-90-C-E103 and serial numbers 00977A through 001136A on contract DAAB07-85-C-E032 or systems that have had maintenance action to incorporate the above spare parts within the January 1991 to June 1991 timeframe should be discontinued until further screening has been performed. The serial number is located on the ID plate on the top of the pivot and adjustment shelf assembly. Screening procedures and methods of inspection, which will incorporate use of an ultraviolet light to determine whether the two different types of plastic are present, are currently being developed and will be available shortly. Additional direction will be provided as soon as possible. The purpose of this message is to request that all ANVIS NVG systems containing the above serial numbers and those systems that have received maintenance in which the monocular housing was changed *not* be used. They should be secured at the AVUM/AVIM until the inspection can be performed. If maintenance records are not sufficient to determine whether the parts in question have been replaced, the ANVIS should not be used until the parts can be inspected according to the one-time procedures being developed. These assets should be held at the AVUM/AVIM, and a message containing their serial numbers and a point of contact should be sent to Project Manager, Night Vision Electro-Optics (PM-NVEO), Fort Belvoir, VA, SFAE-IEW-NV-IID. Contact: Andrew Hermann, DSN 345-7487/7492, commercial 703-355-7487/7492.

For more information on selected accident briefs, call AV 558-3746/4631, commercial 205-255-3746/4631.

U.S. ARMY SAFETY CENTER

Report of Army aircraft accidents published by the U.S. Army Safety Center, Fort Rucker, AL 36362-5363. Information is for accident prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition. Direct communication is authorized by AR 10-29. Address

Flightfax
September 1991 Vol 19 No 15 REPORT OF ARMY AIRCRAFT ACCIDENTS

Be prepared
Good advice for aircrews too

It's hard to believe that summer vacations and backyard get-togethers are over and the children are home from summer camp and back in school. Although in some areas warm temperatures linger, winter is just around the corner. For aircrews facing the hazards that cold-weather operations can bring, the Boy Scout motto "Be Prepared" is a good one.

Operating an aircraft over snow-covered terrain can be difficult even for experienced aviators. Ice, snow, and high winds are especially treacherous for helicopter operations. And during the warmer months, skills needed during taxi, takeoff, en route and terrain flight, and landing in winter conditions may have grown a little rusty. If your unit hasn't provided a review of the techniques needed to sharpen these special skills, now is the time to incorporate them into aircrew briefings and safety meetings.

Taxiing

Helicopters produce the greatest amount of rotorwash when hovering, creating a hazardous condition for taxiing skid-mounted aircraft. The hazard is not as serious for aircraft with wheels. They can be ground taxied safely to the takeoff point with only minimum blade pitch, thus reducing rotorwash.

In one taxiing accident, a UH-1H pilot-in-command (PC) picked up the aircraft to a 3-foot hover to reposition in loose blowing snow and lost his outside visual reference. The aircraft drifted left 295 feet and rolled over, destroying the aircraft and causing one minor injury. Had the PC been prepared to follow the taxiing or repositioning procedures outlined in FM 1-202: Environmental Flight, he would have known to ground taxi the aircraft or high hover at 5 to 8 feet and then air taxi at a faster than normal taxi speed to the reposition area.

When a soldier dies in an accident...every supervisor and contemporary who ever spoke to him had an opportunity to influence his judgment, so a little bit of all of us goes in with every troop we lose. — *Author Unknown*

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Takeoff

Takeoffs in snow-covered areas also pose a hazard. Aircrews need to be alert at all times, especially during takeoffs when snow results in a lack of visual cues for peripheral vision. The following accident shows what can happen during a takeoff from snow-covered terrain when pilots channelize their attention.

While hovering out-of-ground effect at 25 feet above ground level over snow-covered terrain, the UH-1H copilot failed to notice that the aircraft was drifting backward and descending. The copilot's attention was on another aircraft passing to his front. The PC had his attention focused inside the cockpit. With inadequate time to acquire visual cues, reference points, or aircraft instrument indications, the PC took the controls and overcontrolled the aircraft by applying abrupt and excessive collective inputs. The aircraft ascended to about 50 feet and started to spin. The PC was unable to regain control of the aircraft before it hit the ground.

In another case, a UH-1H PC picked the aircraft up to a hover and moved it right to get around an aircraft parked to his front. He paused briefly to check hover power and began a normal takeoff using airspeed over altitude. As the aircraft moved forward, it was engulfed in a cloud of blowing snow. The aircraft climbed to about 15 feet, then descended back toward the ground, leveled off, and drifted left. As the aircraft continued drifting left, it hit the ground left skid low and rolled over onto its top.

The PC failed to use a maximum performance takeoff, altitude over airspeed, as stipulated in FM 1-202 and the commander's designated additional aircrew training manual task 2104. The PC's error was due to a combination of inexperience and insufficient unit training to prepare him for flight in blowing snow. His haste to get to the field site after an overnight delay also contributed to his error. Inexperience, inadequate unit training, haste, and overconfidence left this PC unprepared to select the correct takeoff technique.

FM 1-202 recommends pilots use the following techniques when taking off from snow-covered areas:

- Ensure skids are free from obstruction.
- If snow is only a few inches thick, apply pitch to the blades before takeoff to blow away snow, thus reducing the density of snow that will be lifted on takeoff.
- Stabilize the aircraft on the ground until the snow cloud dissipates.
- When ready for takeoff, position the cyclic for takeoff. If there are no obstacles along the takeoff route, position the cyclic for a maximum performance takeoff attitude. If the takeoff is to be made over an obstacle, make a near-vertical ascent.
- The aircraft should have no forward movement until clear of the ground. Apply sufficient torque for a positive rate of climb.
- As the aircraft begins to climb, blowing snow will increase and ground references may be temporarily lost. Maintain heading and flight attitude.
- When clear of the snow cloud, or whiteout, adjust flight attitude and torque to achieve normal climb airspeed and rate of climb.

En route and terrain flight

When flying at terrain altitudes over snow-covered areas, rotorwash creates a signature that is identifiable for some distance, especially when conducting nap-of-the-earth (NOE) flight. En route considerations for NOE flight over snow-covered terrain are as follows:

- Maintain an airspeed of 40 knots or greater to minimize the effect of rotorwash on loose snow.
- Avoid flights over forested areas when airspeed is below 40 knots. Snow in the trees is more easily disturbed than snow on the ground.
- Avoid flying close formations over snow.
- Avoid flying through narrow valleys or crevasses during multiaircraft operations.
- Snowstorms or winds can change the appearance of a snow-covered area within a few hours. Awareness of this is essential to ensure accurate navigation.
- Do not fly under wires when the ground is covered by snow—whiteout can occur.

Landing

Unless aircrews perform proper landing procedures, they can expect to be engulfed in whiteout when landing an aircraft on snow-covered terrain. Selecting an incorrect landing technique is a common error, and a lack of visual cues almost always compounds the problem.

During an approach to a sloping, snow-covered forward arming and refueling point, an AH-1F unit IP selected an approach to the ground landing technique that was not suitable for landing in snow. After touching

down, he felt uncomfortable with the slope and attempted to abort the landing while engulfed in whiteout. As he tried to fly out of the whiteout condition, he lost all visual references and the aircraft drifted left into a tree line. Had he prepared for this mission by reviewing FM 1-202, he would have been reminded that an approach to the ground should not be attempted in dry-powdered snow unless the touchdown area is known to be level and free of obstruction.

In a recent accident, an OH-58A PC conducted a high and low recon of the intended landing area before beginning a blowing-snow approach, intending to terminate with a run-on landing. The aircraft touched down level and slid forward until the right ski-equipped skid dropped into a rut. The aircraft rolled right, causing the main rotor blades to hit the ground. The pilot's lack of visual cues prevented him from correctly anticipating the depth of the rut. And a lack of recent flight experience in the local ice and snow conditions—skill decay—also contributed to the pilot's failure. Commanders should consider requiring a refamiliarization flight following a pilot's extended absence from this kind of environment.

Other considerations

A present but not contributing factor in one cold-weather accident was the presence of antihistamine in samples provided by the copilot, indicating the copilot was taking medication not prescribed by a flight surgeon—a violation of AR 40-8: Temporary Flying Restrictions Due to Exogenous Factors. Aviation personnel should fully understand the implications of self-medication for minor ailments aggravated by operating in cold-weather environments.

Aircrews must also remember that alertness decreases with extended periods of duty. Fatigue can easily contribute to errors while operating in snow-covered terrain where there are few or no visual cues and references. Proper monitoring of crew endurance status is a must for safe operations in snow-covered terrain.

The best defense against unnecessary risks while operating in cold-weather environments is to do a mission risk assessment. Identify the risks, consider the alternatives, and make smart risk decisions. You can't control or eliminate all risks associated with cold-weather operations, but you can be prepared for them. For more than 80 years, preparedness has served the Boy Scouts well. And it's good advice for aircrews too. Now, before those cold winds and snow arrive, is the time to get prepared. ❑

Checklist for cold-weather operations

Cold-weather operations present special challenges to aircrews. To help reduce the hazards of cold-weather flying, FM 1-230: Meteorology for Army Aviators suggests that aircrews abide by the following checklist:

- Check weather carefully. It's a good idea to ask the aviator who just came through what conditions were like.
- Check notice to airmen (NOTAM).
- Remove all frost and snow from aircraft before takeoff.
- Check controls for restrictions of movement.
- Hover or taxi slowly. Use brakes with caution.
- Check for ice in rotor or propeller wash areas after runup in fog or rain.
- Wear sunglasses if glare is bad.
- Avoid taking off in slush or wet snow and avoid snowbanks in fixed wing aircraft. Rotary wing aircraft crews should maintain a high hover over such surfaces to reduce blowing snow.
- Use pitot heater when flying in rain, snow, clouds, or known icing zones.
- When flying in freezing rain conditions, climb into the clouds where the temperatures will be above freezing, unless the temperature at a lower altitude is known to be high enough to prevent ice.
- Report all in-flight weather hazards.
- Choose the altitude of least icing if icing cannot be avoided.
- Watch airspeed. Airfoil stalling speed increases with the formation of ice. Higher revolutions per minute are required for safe autorotation of helicopters when blades are covered with ice. Maintain an appropriate amount of extra airspeed while landing fixed wing aircraft.
- Avoid making steep turns if the aircraft is heavily coated with ice.
- Before takeoff, ensure that anti-icing and deicing equipment are operating properly.
- On aircraft with reciprocating engines, use carburetor preheat to prevent ice formation.
- On fixed wing aircraft, check wing deicers; use them properly. Do not land with deicers on.

Preventing cold-weather injuries

Whether you're a crew chief performing the daily, an aviator preflighting your aircraft, or a ground guide directing aircraft movement, most members of the aviation team are at one time or another subjected to the harsh elements of operating in the cold. And make no mistake about it—the cold can cripple or disable you, if you let it. Now is your chance to get some winter "know how" before the onset of the winter season. By knowing more about cold-weather injuries and how to prevent them, you can keep yourself and others from becoming cold-weather casualties.

Frostbite

Frostbite happens when parts of the body are exposed to temperatures below freezing, especially when the wind is strong. It can affect feet, hands, ears, and other exposed areas. Frostbite is classified as "superficial" when it involves only the skin and as "deep" when it goes below the surface of the skin. And a previous episode of cold injury increases the risk of recurrence.

Frostbite starts with a very cold feeling, followed by numbness or loss of sensation in the affected area. There may be a tingling, stinging, or aching sensation or even a cramping pain. The exposed skin initially becomes red and later turns pale gray or waxy white. In some cases, the sense of coldness turns into a warm feeling.

It is easier to prevent frostbite or stop it in its early stages—superficial frostbite—than to thaw and take care of badly frozen flesh—deep frostbite. To prevent frostbite—

- Wear protective clothing, including your gloves, ear protection, and headgear. Basic principles of cold-weather protection are spelled out in one word, C-O-L-D (see sidebar).
- Keep socks dry. Although this is often difficult, it is a must. Carry an extra pair of socks and keep them warm and dry. A good place to carry them would be under your shirt.
- Keep hands covered. Never put bare hands on metal in extreme cold. Wear gloves or mittens that fit properly.
- Exercise your face, fingers, and toes to keep them warm.
- Warm face, ears, feet, or hands immediately if you detect any signs such as sudden blanching or tingling. Your face and ears can be warmed by holding a warm hand over the area. Hands and fingers can be warmed by placing them inside clothes in the armpits, against the stomach, or between the thighs.
- Use the "buddy system." Check each other frequently for signs of frostbite.

Should frostbite occur, the best course of action is to seek medical treatment. Minor cases with short exposure time are best treated by warming the affected area with direct body heat. People should be relieved of their duties long enough to rewarm in a sheltered area. Do not massage frostbitten areas. And remember, when skin starts to thaw, it hurts.

Do *not* attempt to thaw more serious frostbite injuries in the field. Get to a hospital or aid station as quickly as possible. Frostbite injuries must *not* be massaged, rubbed or packed with snow, covered with ointments, dressed tightly, warmed with uncontrollable heat sources—such as open fires or engine exhausts—or soaked in either cold or warm water.

Hypothermia

Hypothermia is a cold-weather injury that results from a drop in the temperature of the entire body, not just a part of it. It may occur at temperatures well above freezing, especially when a person is immersed in cold water or wearing wet clothing. Remember, proper dress is must protection against hypothermia.

Hypothermia victims shiver uncontrollably. And although shivering produces heat, it also speeds

up the loss of heat. Gradually, as the body temperature decreases further, shivering stops. The victim becomes drowsy, mentally slow, and uncoordinated. Treatment consists of reducing heat loss from the victim's body and slowly adding heat to the victim's system. Remove wet clothing, and wrap the victim in a blanket or sleeping bag. Apply body warmth by direct contact with the body of a nonaffected person. Move to a heated location as soon as possible and evacuate to a medical facility.

Immersion foot

Immersion foot, or trench foot, results from prolonged exposure to wet cold at temperatures above freezing. Initially, the feet will feel cold and painless and may be numb. Later, they become red, hot, swollen, and very painful. Walking becomes difficult, if not impossible.

Treatment involves removing wet footgear, carefully drying the feet, and rewarming by exposure to warm air. Do *not* massage the area, immerse in water, or rapidly rewarm. After feet are warm, apply powder and put on clean socks and dry boots.

Immersion foot is prevented by keeping feet dry. Change to dry socks and use powder every 8 hours. Good blood circulation helps keep feet warm, so avoid wearing tight-fitting boots and socks.

Snow blindness

Snow blindness is a temporary visual injury caused by reflection of the sun's ultraviolet rays from snow. The greatest risk of occurrence is not on a clear, bright day but rather on a dull, cloudy day during snowfall or flight over snow-covered terrain. There is no immediate indication of injury. Symptoms may not appear until 2 to 12 hours after exposure.

Injured eyes will feel as though they are filled with sand or grit. There will be severe pain, tearing, sensitivity to light, and blurred vision. The most effective treatment is rest and darkness. First aid is to cover the eyes with a dark cloth and evacuate to a medical facility. Most people recover in about 18 hours. Use of sunglasses or tinted visors on hazardous days will prevent this problem.

Dehydration

Dehydration is normally thought of as occurring in hot weather as a result of extreme perspiration. However, dehydration is just as common in cold weather. In extreme cold, the air loses most of its ability to hold moisture. Be alert for signs of dehydration such as nausea, dizziness, weakness, and blurred vision. Prevent dehydration by drinking water whether or not you feel thirsty.

Slips and falls

Snowy and icy conditions increase the risk of slips and falls that can result in nasty cuts, bruises, and even broken bones. This is especially true on icy flight ramps or when climbing around on ice-coated aircraft. Those heavy gloves needed to protect hands from cold can make it harder to hold onto aircraft handgrips. And heavy boots and bulky clothing increase clumsiness. So watch those reaches and steps carefully! Work in teams, especially at night. A fall when no one else is around can lead to hypothermia or even death.

By brushing up on your knowledge about cold-weather injuries—while there's still time—and taking a few precautions, you can prevent injuries to yourself and your fellow crewmembers. One cold-weather injury is too many, especially when it can be avoided.

Cold-weather protection: C-O-L-D

Cold and warm, two words that are almost opposite in meaning, but one good way to keep warm in the winter is to remember what C-O-L-D stands for.

- Keep clothing **C**lean. If clothes are matted with dirt and grease, much of their insulation property is destroyed.
- Avoid **O**verheating. Overheating causes perspiration, which causes clothing to become damp. And dampness lessens the insulating quality of clothing.
- Wear clothing **L**oose and in layers. Tight garments lessen the volume of trapped air layers, thereby reducing the insulation and ventilation available.
- Keep clothing **D**ry. In winter conditions, moisture will soak into clothing from two directions—inside and outside. Dry snow and frost that collect on clothing will be melted by radiated body heat.

Remember **C-O-L-D** to keep warm in the winter!

POC: MAJ B. McMahan, Aviation Branch, AV 558-3746, commercial 205-255-3746 or MAJ D. Fitzpatrick, Flight Surgeon, AV 558-2763, commercial 205-255-2763

Minor congestion—a major hazard

The UH-60 crew was scheduled to fly a three-part logistical support mission lasting 6 hours, with 15 minutes of ground time after each of the first two flights. Three days before the flight, the pilot developed a mild "cold" with a stuffy nose and head congestion. After self-medicating, symptoms improved so he felt there was no need to see the flight surgeon with such a minor problem.

En route altitudes for the mission would vary from 1,000 to 3,000 feet msl. During the first flight, the pilot developed a feeling of fullness in the area above and below his eyes, which went away after he landed. During the second flight, the congestion returned, followed by a sudden onset of sinus pressure and a severe frontal headache. The copilot completed the second flight, and the mission was terminated.

A medical evaluation revealed that the pilot had a blockage of his sinuses as a result of his previous congestion. Following several days of treatment, which resulted in the pilot being placed on nonflight status for 10 days, all symptoms resolved.

Pilot errors

In this case, the pilot made two errors that resulted in a failure to complete the mission. First, he flew with a medical problem serious enough to require the use of medication. And then he resorted to self-medication to treat his problem. Self-medication is in violation of AR 40-8: Temporary Flying Restrictions Due to Exogenous Factors, which requires that all medications "be dispensed by or with the knowledge of a flight surgeon."

Respiratory infections

Respiratory infections, often referred to as a "cold," are the most common illnesses that people suffer. These illnesses include combinations of symptoms such as cough, sore throat, sinus pressure, fever, stuffy nose, blocked ears, and head congestion. In the aviation environment, these relatively minor infections can serve as the basis for more serious health problems.

These infections cause inflammation and swelling of the nasal passages and sinus openings that may result in increasing negative pressure to the middle ear and sinuses, especially as an aircraft descends. The swelling may be so severe that even forceful maneuvers, Valsalva, will not reduce pressure. As a result, serious health problems such as sinus block, ear block, and vertigo may occur. Although symptoms vary depending upon the circumstances, there is the possibility of sudden, severe pain that can be incapacitating.

Medications

Many of the systemic decongestants used to treat respiratory infections contain drowsiness-inducing antihistamines that can adversely affect both mental and physical functions. This, in turn, impacts flight safety, pilot judgment, and flight performance.

Many over-the-counter drugs have unwanted side effects that vary from person to person. There are the known or predictable side effects, which aircrews may or may not experience. And there are also unpredictable responses or allergic reactions that may result in sudden incapacitation and life-threatening illness.

Flight surgeons are responsible for the health and well-being of aircrews and are aware of any illnesses that might interfere with flight safety. Flight surgeons want aircrews to return *safely* to flying in the shortest possible time. Therefore, if you should develop a "cold," consult your flight surgeon and avoid self-medication. ❑

POC: MAJ. D. Fitzpatrick, Flight Surgeon, AV 558-2763, commercial 205-255-2763

Holding Mode 4

Proper operation of the MARK XII IFF Mode 4 has been debated in aviation circles for many years. One only has to look at the procedures in the aircraft operators manuals, the MARK XII IFF system technical manual, and other training publications to discover there is no standardization on how to use and maintain Mode 4 codes.

The Army Aviation Center hosted a conference to dispel misconceptions that permeate the Army aviation community and to take steps to correct and standardize the publications. Subject matter experts from the Air Traffic Control Identify Friend or Foe MARK XII System (AIMS) program office, the National Security Agency, and the Naval Electronic Systems Engineering Activity were tasked by the Department of Defense to develop a Mode 4 handbook standardizing the operational characteristics of this system for the tri-services. The handbook is DOD AIMS 86-100: Mode 4 Handbook and is available upon request.

One misconception has been that the CODE control switch should be held for 15 seconds. Another misconception has been that the power needed to be turned off within 15 seconds to maintain or hold the Mode 4 codes. These are both false!

Until publication changes can be made to standardize the MARK XII procedures, the proper Mode 4 code holding procedures are as follows:

- For aircraft with an IFF CODE HOLD switch, the CODE HOLD switch must be placed in the HOLD or ON position before aircraft shutdown to properly retain the Mode 4 codes. The IFF CODE HOLD caution light should come on once the switch is placed in the HOLD or ON position.
- For aircraft with retractable- or compressible-type landing gear, a squat switch is incorporated into the landing gear and will perform this function automatically when the aircraft is on the ground.
- For both types of configuration, the next step is to place the CODE control switch on the transponder to the HOLD position momentarily and return the switch to the A or B position as required. Once this is completed, the computer goes from an electrical hold to a mechanical hold. The Mode 4 codes are now held and power to the transponder can be turned off at leisure, along with the aircraft's main power source.

To request copies of DOD AIMS 86-100: Mode 4 Handbook, write to the following address: Commanding Officer, ATTN: Code 2111, Naval Electronic Systems Engineering Activity, St. Inigoes, MD 20684-0010.

If additional information is required, DES POCs are Mr. Cameron or Mr. Harris, ATTN: ATZQ-ESO-L, Fort Rucker, AL 36362, AV 558-6066, commercial 205-255-6066.

STACOM 148 September 1991

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208, AV 558-6309/3504. Information published here generally precedes the formal staffing and distribution of Department of the Army official policy. This information is provided to all commanders to enhance aviation operations and training support.

Donovan R. Cumble
LTC (P), Aviation
Director, DES

Crashfax video available

The latest Crashfax video has been distributed to visual information libraries throughout the Army. You may obtain a copy by asking your local audiovisual library for **Performance Planning: What The Aircraft Can and Can't Do** (CFV 46-5, PIN 708403). This video shows the results of poor performance planning in two helicopter accidents: a UH-1 accident in which the pilot misfigured performance data and a CH-47 accident in which the pilot used the wrong charts. The dangers of ignoring established safety practices and the importance of correctly filling out the log are also emphasized in this video.

Accident briefs

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - During simulated engine failure at altitude terminating with power, IP decelerated until tail rotor hit ground. Aircraft yawed right, continued forward about 200 feet, and began right spin. IP simultaneously decreased throttle and lowered collective. Aircraft descended vertically and turned right, impacting upright in open field. Tail rotor drive shaft was severed at No. 4 hanger bearing assembly.

UH-1 Class D

H series - At 700 feet agl and 90 knots on final for ground controlled approach during instrument training flight, master caution and engine chip detector lights came on. IP took controls and prepared for precautionary landing. During descent to open field, crew heard grinding noise and smelled something burning. At 50 to 75 feet agl and 60 knots, rpm warning light came on and engine failed. IP initiated autorotative descent and executed smooth touchdown in terraced, boggy pasture. Aircraft was equipped with auxiliary fuel tank, creating high gross weight. Friction on skids caused aircraft to pitch forward onto toes of skids, and main rotor contacted top of tail boom. Suspect engine failed because No. 2 or No. 3 bearing disintegrated.

UH-1 Class E

H series - While performing turbine engine analysis check during postphase maintenance test flight, crew heard single loud bang from rear. There were no segment or caution lights; no unusual yaw, pitch, or vibration was experienced; and instruments remained stable. Aircraft was landed, and inspection revealed valve diaphragm had failed inside bleed-band actuator.

H series - During low-level flight, master caution and transmission oil pressure lights came on. Crew landed aircraft with zero transmission oil pressure. Internal transmission oil filter gasket had blown.

H series - While repositioning to join ground formation, aircraft experienced brownout. Pilot elected not to execute go-around and allowed aircraft to land hard, damaging WSPS and skids.

H series - Hydraulic system failed during HIT. Hydraulic cyclic servo and pump replaced.

H series - During hover, crew heard grinding noise in engine compartment; moments later, engine failed. IP entered hovering autorotation and landed aircraft without incident. Teardown analysis is being conducted.

H series - During cruise flight at 1,000 feet msl and 90 knots, crew heard loud bang. Engine tachometer dropped to zero, and N1 dropped to about 60 percent. IP entered autorotative descent. Although engine ran rough and developed vibrations, IP made uneventful landing in open field.

H series - During day flight, master caution and hydraulic segment lights flashed and then remained on. Crew smelled hydraulic fluid and turned off hydraulic control switch. Crew completed running landing with no further incident. Hydraulic line ID tag had loosened and vibrated, wearing hole in line.

H series - After engine shutdown, PC noted loss of electrical power. System check revealed fluctuating battery voltage. Battery connector had corroded female receiver. Suspect damage was result of unit's missions being flown over salt water.

V series - While on night MAST mission, PC was repositioning aircraft and noticed egt fluctuating. Inspection revealed broken wire on resistor spool coil.

UH-60 Class A

A series - While slingloading HMMWV during NVG air assault insertion, pilot radioed that he was making a go-around on final sortie into LZ. Aircraft crashed upright on civilian automobile in small town 200 meters from LZ. Postcrash fire destroyed aircraft, civilian automobile, and several buildings. 9153

UH-60 Class C

A series - During NVG takeoff from dusty area, pilot initiated climb and started left turn. PC began tuning radios and failed to notice aircraft descending. Aircraft entered sandstorm, and crew lost visual reference. As crew exchanged controls, aircraft continued descent and struck ground, destroying left main landing gear. PC recovered aircraft and made emergency landing with no further damage to aircraft.

A series - During slingload operation at 20-foot hover, poncho was sucked into main rotor blades and then discharged into tail rotor system, damaging main and tail rotor blades.

UH-60 Class D

A series - During initial approach to unimproved LZ, lead aircraft in flight of three experienced brownout. PC on controls from left seat executed go-around. On second approach, brownout was less severe and PC executed roll-on landing. PC kept aircraft to left side of LZ near hilly and tree-covered terrain to avoid utility pole on right side of LZ. Postflight inspection revealed damage to main rotor blades; however, it could not be determined whether damage occurred on initial or second approach.

A series - At field site, UH-60 made approach from parked UH-1's left front. UH-60 stopped about 75 feet in front of UH-1, and blowing debris from UH-60's rotorwash struck and caused 4-inch crack in UH-1 copilot's windscreen.

A series - After short ground taxi at remote LZ, pilot attempted 90-degree left pedal turn to reposition aircraft into parking. Crew failed to properly clear aircraft, and crew chief gave incorrect response in clearing, resulting in aircraft stabilator striking a

2-inch bamboo pole. After unsuccessfully attempting to contact higher headquarters, PC performed numerous aircraft control checks and determined flight characteristics of stabilator were not affected. Aircraft made uneventful flight back to home station.

L series - Postflight inspection revealed damage to black main rotor tip. Suspect damage was caused by bird strike.

L series - PC made improper decision to land downwind in dusty conditions and misjudged speed on final approach, requiring excessive deceleration at low altitude. Tail wheel struck large rock, breaking tail wheel rim, puncturing tire and inner tube, and tearing hole in underside of stabilator.

UH-60 Class E

A series - After aircraft landed at stagefield, torque began splitting and rpm percent R, NP, and NG were fluctuating with split. Aircraft was shut down, and ECU was replaced.

A series - During NVG NOE training flight, master caution and No. 1 generator caution lights came on. IP unsuccessfully attempted to reset No. 1 generator. Crew started APU (APU should *not* be operated during flight) and landed aircraft without further incident. Generator control unit was replaced.

A series - During desert slingload operation, crew was looking outside cockpit to locate LZ and failed to maintain clearance of rising terrain. Slingload hit ground twice. Pilot applied power and climbed to clear terrain, aircraft continued to LZ, and load was released.

A series - During dawn flight, aircraft was Chalk 3 in flight of 3. While landing to unimproved area, crew failed to maintain clearance and allowed aircraft to hit small berm, breaking lower anticollision light.

L series - During takeoff from field site with 10 troops on board, No. 1 engine failed at 35 feet agl. Aircraft was landed without further incident.

Attack

AH-1 Class C

F series - During NVG takeoff, aircraft experienced brownout. As airspeed increased, radar altimeter indicated descent. IP called out 101-percent torque and radar altimeter indication of 5 feet agl. Aircraft struck ground, rolling and pitching right forward. Pilot pulled power to avoid further aggravating roll condition and overtorqued aircraft to 119 percent. Aircraft is under evaluation.

F series - Another crew saw green marks on vertical fin of accident aircraft and informed PC. PC landed aircraft in open field, and inspection revealed damage from tree strike. Crewmembers had misjudged clearance and allowed tail rotor to strike trees. Crew had performed security mission at NOE altitudes and had no indications that strike had occurred. Investigation continues.

S series - While performing low-level autorotation, pilot failed to apply initial pitch until aircraft was 9 to 10 feet agl. Aircraft hit runway and bounced 10 feet into air. IP took controls, rapidly increasing throttle and collective. Aircraft was in level pitch attitude with 15-degree left roll and 60-degree right yaw. IP applied full right cyclic to straighten aircraft, flew aircraft off right side of runway, and made running landing to sod.

AH-1 Class D

F series - While attempting MILES engagement of enemy aircraft, pilot elevated aircraft nose and allowed aircraft to drift backwards into small tree, damaging both tail rotor blades.

AH-1 Class E

F series - While executing left turn during NOE flight, pilot applied excessive left pedal, causing torque to increase and overtorque light to come on for about 2 seconds.

F series - During NOE flight, PC looked up from reading kneeboard and saw pilot was maneuvering between trees. PC did not believe aircraft would clear trees and pulled collective while pilot was still on controls. Main rotor struck tree branch on right side of aircraft, making small dent in erosion guard.

AH-64 Class A

A series - During hover at 50 feet agl, No. 2 engine lost power and aircraft began to descend. IP started acceleration to achieve single-engine airspeed. While IP was monitoring instruments, aircraft continued to descend and hit trees at 31 feet agl. PNVS/TADS were damaged and became inoperative during initial tree strike. After aircraft passed through trees, IP moved No. 2 engine power lever to lockout and jettisoned wing stores, attempting to regain power in No. 2 engine and lost rotor rpm. Aircraft continued about 1,000 meters across open field and into trees again. Aircraft landed hard, tail boom separated, and fuselage came to rest on left side. Crew sustained minor injuries. 9154

A series - During egress of battle position, aircraft descended on normal to shallow approach angle at about 10 to 20 KIAS. While in level attitude, aircraft impacted trees and then hit ground in level attitude. 9155

AH-64 Class C

A series - During MOC at 100-percent NR, crew noticed excessive vibrations and shut down aircraft. Inspection revealed 90-degree gearbox was cracked, and stabilator was damaged at attaching point. Vibrations were caused by tail rotor out-of-balance condition.

AH-64 Class D

A series - During cruise flight, bird struck aircraft and cracked CPG's windscreen. Aircraft was landed without further incident.

A series - During engagement of enemy, 2.75-inch rockets jammed in launcher tubes, catching tubes on fire. Crew jettisoned burning pods.

Cargo

CH-47 Class C

D series - While performing four-wheel taxi, pilot executed sharp right turn into parking. Aft rotor blades struck utility pole.

D series - While repositioning aircraft to parking following routine training mission, crew was notified by ground control that

something had fallen off aircraft. Crew chief confirmed two C-box clamshell doors were missing. Investigation continues.

CH-47 Class D

D series - On takeoff, crew heard loud pop. Crew had failed to secure side cabin door properly. Flight engineer found door had come open and sustained sheet metal damage.

D series - During cruise flight, aircraft encountered turbulence and cabin escape panel separated from aircraft. Aircraft continued mission and returned to base without further incident.

CH-47 Class E

D series - Crew was executing autorotational rpm maintenance check when master caution and No. 1 engine transmission hot lights came on. No. 1 engine was shut down, and aircraft was landed single engine.

D series - During overwater cruise flight, No. 1 engine chip light came on. Both engines were required for flight, and PC elected to continue dual engine to shore. Large chips were found on No. 1 engine chip detector. Engine was removed for inspection and oil samples.

D series - While in LZ during night air assault mission, crew chief noticed irregular bleed band noise from No. 2 engine. Upon return to home base, inspection revealed FOD to No. 2 engine inlet blades. Suspect drying concrete at new LZ was ingested.

Observation

OH-6 Class C

G series - During aircraft transition training flight, pilot was performing standard autorotation and allowed tail rotor to strike runway. Tail rotor blades, gearbox, drive shaft, and couplings were damaged.

OH-58 Class A

A series - During NVG NOE training, crew allowed aircraft skid to contact tree. Aircraft rolled over and landed on left side. Crew sustained minor injuries. 9156

D series - During NVG training mission, IP was hovering to reposition aircraft. Glare from pink light was affecting NVG. IP reached with right hand to reposition light and returned hand to controls. Aircraft yawed right and rolled left, coming to rest on left side. No injuries. 9157

OH-58 Class C

A series - After landing on rocky embankment, PC rolled throttle to idle and aircraft settled. Tail rotor struck steel rod protruding from ground. PC felt no control feedback but heard loud popping noise and completed emergency shutdown. During blade coastdown, crew felt vibrations in airframe. Postflight inspection revealed about last 1½ inches of each tail rotor blade was torn, tail rotor gearbox was held in place by one bolt, and Thomas coupling had torn through last section of drive shaft cover.

C series - Aircraft was in normal autorotative descent, and IP made control inputs to bring aircraft into decelerative attitude. As aircraft approached 10 feet agl and 20 knots, IP realized throttle was in idle position. As IP rolled on throttle and increased collective, torque exceeded 120 percent for 4 seconds. Aircraft hit ground hard. Investigation continues.

C series - During night-unaided approach to unimproved LZ, pilot misjudged rate of closure and rate of descent while on short final and allowed skids to contact ground in unperceived left lateral drift. Aircraft became airborne and landed hard, impacting ground in nose-low, left-side-low attitude. Main rotor struck ground and displaced main transmission forward and left. Aircraft came to rest upright. Crew was uninjured.

D series - During NVG approach, aerial observer was calling out altitude from 50 feet agl. As radar altimeter indicated 10 feet, aircraft hit ground. Upon impact, aircraft started to roll forward onto nose. Pilot applied aft cyclic, increased collective, and leveled aircraft. Aircraft was shut down without further incident.

OH-58 Class D

A series - While on short final to congested LZ, rotorwash blew unsecured right rear passenger door off parked OH-58.

A series - As lead aircraft in flight of six, crew landed aircraft in narrow LZ. While hovering, PC made right-pedal turn, misjudged clearance, and allowed tail rotor to strike tree branch.

OH-58 Class E

A series - During hot start, pilot attempted to roll off throttle without pressing idle stop release. Turbine outlet temperature reached 970°C before shutdown was completed. As aircraft was being secured, left rear door was left open and was blown off by hovering AH-1.

A series - During tactical movement from holding area to battle position, aircraft struck unmarked wires in tree line. Lower WSPS cut wires cleanly. No damage to aircraft.

C series - While conducting security mission at NOE altitude, crew observed OPFOR aircraft. PC maneuvered to avoid detection, misjudged clearance, and allowed main rotor blade to strike tree branch.

Fixed wing

C-12 Class C

C series - During taxi, crew felt bump and slight vibration. Taxiing forward and completing 180-degree turn to investigate, crew saw nothing and elected to continue return flight to home base. Following takeoff, crew noted vibration, along with a slight torque fluctuation in No. 1 engine. Postlanding inspection revealed damage to all propeller blades. Suspect maintenance stand was struck by one propeller and thrown into second propeller.

C series - Nose gear failed to extend. Crew burned off fuel and made emergency landing, nose gear up. Investigation in progress.

C-12 Class D

C series - During left engine start, solvent was spit out of exhaust and ignited, catching inboard deice boot and paint on fire. Engine was advanced to full power, extinguishing fire on left inboard leading edge panel and in engine exhaust. Crew completed engine shutdown.

C series - While repositioning aircraft to parking, pilot in left seat misjudged clear-

ance as he was turning right. No. 1 engine propeller struck handle of Halon fire extinguisher, bending one blade of propeller.

C-12 Class E

C series - During runup, No. 2 fire pull handle light came on. No visible signs of fire were found, and instrument gauges indicated normal. Light went out during ground check. During subsequent engine start, fire warning light again came on with no accompanying fire. Forward fire detector on No. 2 engine was replaced.

F series - During descent for landing, trim wheel would not operate freely. Aircraft landed without incident. Trim cable had jumped off pulley in tail of aircraft.

OV-1 Class E

D series - During recovery from inverted flight, aircraft yawed left and crew heard loud banging noise. No. 1 engine torque dropped from 60 percent to 35 percent. Left yaw and banging were again experienced while in level flight and during descent with reduced power and airspeed. However, egt remained stable throughout. Engine compressor was cleaned.

D series - During cruise flight, No. 2 engine oil pressure fluctuated, followed by drop in oil pressure. Pilot secured engine and landed aircraft single engine. Inspection revealed elbow fitting on oil line had loosened and allowed oil to escape.

Maintenance

UH-60 Class E

A series - During shutdown, crew heard grinding noise. Pilot noticed No. 2 engine tgt climbing through 856° and immediately shut down engine. Aircraft had encountered periodic problems. Investigation revealed phase team had installed bleed air shutoff valve backwards.

OH-58 Class C

D series - After engine flush, avionics technician left link pitch lock on induction cowling. While inspecting aircraft before engine start, TI failed to perform FOD check of rotor drive system area; therefore, link pitch lock remained undetected before engine start. During MOC, link pitch lock contacted rotating components of main rotor and drive train systems.

OH-58 Class E

C series - During runup, ground guide noticed engine oil running out engine deck drain. Aircraft was shut down. Pre-formed packing was pinched when installed.

C-12 Class E

H series - During climbout, crew noticed object streaming from No. 1 engine nacelle top cooling louver. Aircraft was landed without incident. Inspection revealed remnant of shop towel inside nacelle near oil filler port.

OV-1 Class C

D series - As aircraft was being taxied for engine runup, overhead jettisonable canopy came off and entered No. 1 propeller. Canopy had been installed improperly.

Safety messages

■ Aviation safety action informational message concerning changes to inspection procedures for main rotor elastomeric bearings on all UH-60 series aircraft (UH-60-91-ASAM-09, 022030Z May 91). Summary: Some UH-60 main rotor elastomeric bearings have experienced elastomer wear and separations between the rubber layers and metal shims or endplates, which may lead to a permanent vertical displacement of the middle laminates of the bearing relative to the endplates. This permanent displacement can continue until the metal shims of the thrust bearing contact and damage the spindle. The purpose of this message is to replace the current 10-hour/14-day inspection of the main rotor elastomeric bearings with an enhanced inspection of these bearings at the 30-hour special inspection interval. This message also provides authority to include revised inspection and replacement criteria in TM 55-1520-237-23-3 until the printed change is received. Contact: Lyell Myers, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning maintenance information on T55-L-712 engines in all CH-47 series aircraft (CH-47-91-ASAM-07, 091600Z August 91). Summary: There have been numerous incidents of hung starts—failure of the engine to accelerate to ground idle with high power turbine inlet temperature—and N1 rollbacks—uncommanded deceleration of gas producer turbine—on T55-L-712 engines. The purpose of this message is to inform users of maintenance and operational procedures concerning hung starts, N1 rollbacks and other T55-L-712 engine maintenance. The cause of

Class A Accidents through 31 August

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	3	2	2
	November	2	4	1	5
	December	3	3	4	3
2nd Qtr	January	2	7	4	1
	February	3	14	11	10
	March	4	5	1	8
3rd Qtr	April	1	2	0	2
	May	1	4	0	3
	June	3	1	0	0
4th Qtr	July	2	2	8	0
	August	3	2	2	0
	September	3		0	
	Total	31	47	33	34

hung starts can be attributed to a number of items, but mainly hung starts can be attributed to the condition of the compressor and the fuel flow during the starting sequence. A troubleshooting guide (page 1-218, change 7) to enhance maintenance actions and a procedure to adjust the JP-4 or JP-5 fuel selector switch (page 1-528, change 7) has been added to TM 55-2840-254-23. A revised starting procedure has been added to TM 55-1520-240-10 and the maintenance test flight manual. In addition to the added procedures, special attention should be given to the following: (1) Assure that the compressor bleed band is closed during compressor washes and comply with specified soaking period. Failure to close the bleed band greatly reduces the effectiveness of the wash, especially the last few stages of the compressor. (2) Assure that the bleed band stroke is at least 1 inch. The compressor is sensitive to proper bleed flow during starting, and a short bleed band stroke may induce a hung start. (3) Adjust the bleed band stroke to maximum possible (provided the bleed band closes completely) to allow as much bleed flow as possible. The cause of recent N1 rollbacks has been attributed to bleed band actuators with internal leakage that allows the bleed band actuator to remain closed, or open very slowly, when the bleed band should be opening upon deceleration. A manual change is upcoming to add the following inspection of the bleed band actuator: (1) Disconnect the P3 line from the air diffuser that connects to the actuator. (2) Install a 0 to 100 psi gauge and 50 psi air pressure source in the P3 line. (3) Connect a second 0 to 100 psi gauge in the PM trigger line from the actuator to the fuel control unit, assuring no leakage at the second gauge. (4) With 50 psi pressure at the P3 source, the second gauge must read less than 45 psi. (5) If the second gauge reads 45 psi or higher, replace the bleed band actuator. In addition, an N1 rollback is possible if the older configuration fuel controls (before the 2-161-620-64/68 configurations) are rigged so that the minimum N2 stop is less than 10 degrees, as is sometimes necessary on CH-47C aircraft. The latest configurations (2-161-620-64/68) are calibrated at the 5-degree stop to be acceptable on either CH-47C or D aircraft. The older configurations were calibrated at the 15-degree setting for the CH-47D aircraft. In addition to these procedures, AVSCOM is currently developing and qualifying a fuel control that has a reduced fuel flow schedule during starting as well as an enhanced bleed band actuator. A detailed analysis of the low-speed compressor characteristics of the T55 is also being performed in an effort to enhance the starting capabilities of the T55. In addition, CH-47-91-ASAM-07 also describes other manual changes for informational purposes. Users should acquire and insert a copy of CH-47-91-ASAM-07 in the appropriate TM as authority to implement these changes until the printed change is received. Contact: Brad Meyer, DSN 693-9089, commercial 314-263-9089.

■ Safety-of-use operational message concerning AN/AVS-6(V1), NSN 5855-01-138-4749, and AN/AVS-6(V2), NSN 5855-01-138-4748, ANVIS night vision goggles (NVG) (CECOM 91-07-04, 301800Z Jul 91). Summary: This message contains important new information regarding the ANVIS monocular housing assembly (MHA) bonding problem. This message supersedes and takes precedence over CECOM safety-of-use messages 91-05-03, dated 052100Z Jun 91; 91-06-04, dated 061900Z Jun 91; and followup to 91-06-04, dated 071900Z Jun 91, which informed users that a number of ANVIS spare MHAs were produced incorporating two different types of plastic and required users to perform a screening of ANVIS systems and spare MHAs. The bonding problem could result in a safety hazard due to separation of the MHA from the pivot and adjustment shelf. Since CECOM safety-of-use message 91-05-03 was issued, we have learned that additional MHAs and some ANVIS systems have been fielded that were manufactured using the two different materials. This problem has been corrected at the source, but it is necessary to purge all the affected items from field inventory. The purpose of this message is to direct users to inspect all ANVIS systems—not just the specific items listed in CECOM safety-of-use messages 91-05-03, 91-06-04, and followup to 91-06-04—all spare monocular assemblies, NSN 5855-01-149-4097, and all spare MHAs, NSN 5855-01-149-4100, using the blacklight procedure described in CECOM safety-of-use message 91-06-04. This inspection must be continued on all ANVIS systems and spare MHAs received over the next 3 months to ensure identification of any defective MHAs currently in the supply system. All MHAs failing this test must be removed from service immediately and replaced with an acceptable MHA before use. This message also provides disposition and reporting instructions for defective MHAs. Contact: Andrew Hermann, DSN 345-7487/7492, commercial 703-355-7487/7492.

For more information on selected accident briefs, call AV 558-3746/4631, commercial 205-255-3746/4631

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Address questions about content to AV 558-3746. Address distribution questions to AV 558-2062/4806.

C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center

*U.S. Government Printing Office: 1991 — 631-026/60001

FLIGHTFAX
Volume 19 Number 2 REPORT OF ARMY AIRCRAFT ACCIDENTS 24 October 1990

Crew error in night rotary wing accidents

We have just completed one of the safest years on record in Army aviation. The Class A rate of 1.83 is the lowest, and the Class A through C rate the second lowest ever. This accomplishment reflects the general decrease in the number of daytime flight accidents over the past 6 years and, more specifically, the reduction by about three accidents per year in the number of daytime accidents caused by crew error.

On the other hand, the number of night flight accidents has been increasing. Night accidents currently account for about one-third of the total rotary wing accidents in terms of number of accidents, fatalitites, disabling injuries, and cost. In fact, the number of these accidents caused by crew error has been increasing at approximately the same rate daytime accidents have been decreasing. Over the last 15 months, the crew error accident rate at night was almost three times higher than the day rate.

Because this increasing trend was out of proportion with the amount of night flying being done, the Army Safety Center initiated a study to investigate the problem of night flight accidents caused by crew error.

The study found that eight types of errors were causing all of the night crew-error accidents.

These crew errors, or failures, involve the most

Crew Errors

Scanning. Improper direction of visual attention inside or outside the aircraft, such as too much or too little time on one object or area, or use of a scan pattern that is not thorough or systematic or with crew overlap.

Crew coordination. Failure of crewmembers to properly interact (communicate) and act (sequence and timing) in performance of flight tasks.

Maintain/recover orientation. Failure to properly execute procedures necessary to maintain or recover orientation in flight environments known to restrict visibility; for example: snow, dust, IMC, black hole, and over black water.

Preflight planning. Failure to choose appropriate flight options for known conditions and contingencies and develop these into a course of action to maximize probability of mission accomplishment.

Inflight planning. Improper modification of flight plan during flight or failure to properly modify flight plan in response to unanticipated events or conditions.

Estimate. Inaccurate estimation of distance between objects or rate of closure with objects.

Detect. Failing to identify obstacles or recognize other hazardous conditions such as obstacles in landing area, unsecured equipment in aircraft, and improper control/switch position.

Diagnose/respond to emergency. Improper identification of or response to an actual, simulated, or perceived emergency.

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basic of aviator skills. But as simple and basic as they may appear, these errors persistently show up in accident reports year after year.

When the accidents were analyzed to see if any type of crew error showed up more during aided flight than during unaided flight, none did.

It was not until researchers began looking into what the crews and the aircraft were doing when the error occurred that differences began to show up. They found that it is the *circumstances* under which the missions are being flown that are reducing the margin for error and causing the increase in accidents. The following eight operational situations under low illumination levels account for all of the night crew-error accidents occurring during the 6-year period studied:

Operational situation No. 1
An aided tactical mission at low altitude and low airspeed with low illumination conditions and visibility restricted to some extent by environmental conditions.

The most frequent error causing accidents in this situation was improper scanning. The pilot on the controls stopped scanning to channelize his attention inside or outside the aircraft.

• In the UH-60, this situation most often involved the flight phases of landing, hovering, or taxiing. For example, a UH-60 pilot on a night-aided training mission was taxiing from parking on an uncontrolled airfield. Because he limited his scan to only the inside and front of the aircraft, he failed to see another aircraft approaching from his left side, and the two aircraft collided.

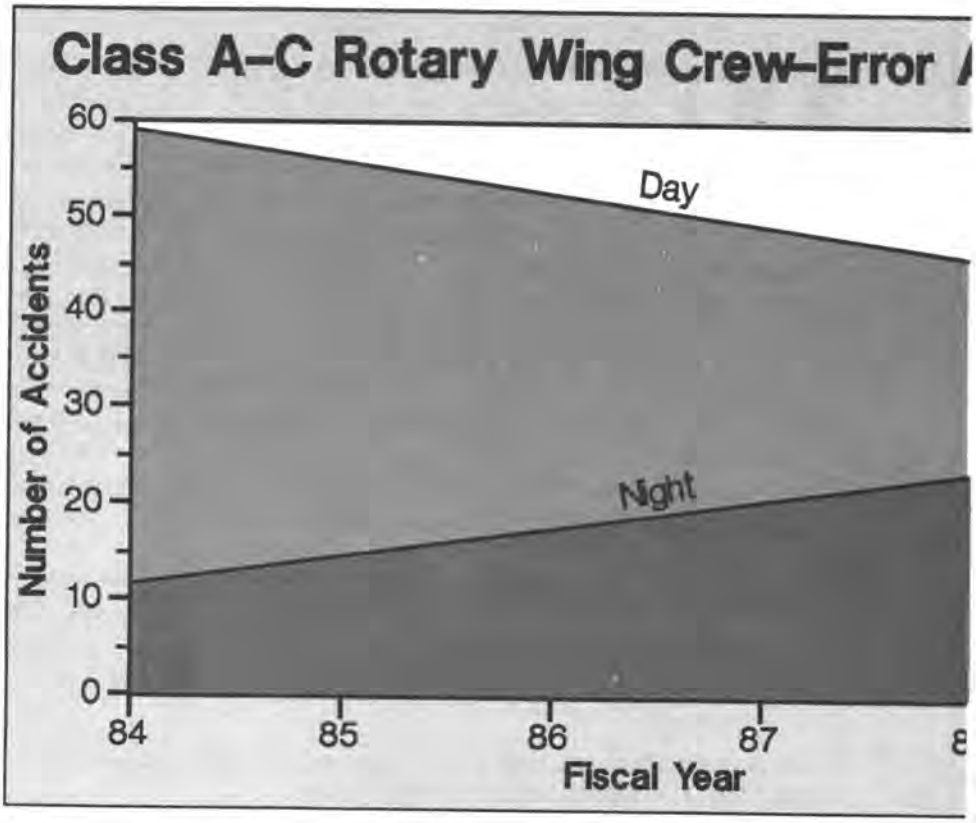
• In the OH-6, this situation most often involved the flight phases of hovering or en route at terrain levels. For example, an MH-6 pilot on a night-aided mission over water and with near-zero illumination, channelized his attention to reprogramming navigational equipment. His failure to monitor outside references and cross check the radar altimeter resulted in the aircraft crashing into the water.

• In the OH-58, this situation most often involved the en route flight phase at terrain flight altitude and relatively high airspeed. In fact, of the first accidents occurring in Operation Desert Shield, three were night-aided OH-58 accidents, and one was a night-aided UH-60. Each of them hit sand dunes while en route at terrain flight altitudes.

Operational situation No. 2
An unaided admin / support mission with low illumination conditions and visibility restricted by environmental conditions.

The most frequent error causing accidents in this situation was improper decision making. The pilot on the controls, generally having already exceeded a 12-hour workday with greater than 4 hours flying, failed to make proper decisions while landing the aircraft.

• A UH-1 pilot on a night-unaided medevac mission elected to land to a dusty road instead of to an adjacent large, open grassy field. On short final to the intended landing area, he realized it was unsuitable but couldn't decide whether to continue the approach to the ground or execute a go-around. During this period of indecision, the aircraft browned out and crashed.



Operational situation No. 3
Climbing or descending during an aided tactical mission, with low illumination conditions and visibility restricted by environmental conditions.

The error most frequently causing accidents in this situation was improper crew coordination. The pilot at the controls failed to coordinate or communicate with his copilot while climbing or descending.

• A UH-60 pilot did not tell his copilot to maintain terrain clearance while he looked for

another aircraft in their flight. As a result, neither pilot nor copilot was monitoring terrain clearance, and the main rotor struck a tree.

Operational situation No. 4
A hovering aircraft on an aided tactical mission with low illumination conditions.

The errors most frequently causing accidents in this situation were improper scanning and crew coordination. The pilot at the controls stopped scanning to channelize his attention inside or outside the aircraft but failed to coordinate this action with his copilot.

•While attempting to maintain a stationary 150-foot hover in a firing position, an AH-64 pilot stopped scanning in order to enter range information into the ARCS panel. He failed to coordinate this action so the gunner could assist in maintaining obstacle clearance. As a result, neither crewmember noticed the aircraft descending and drifting until it crashed into a tree.

Operational situation No. 5
An aided tactical mission at low altitude and low airspeed. Visibility is restricted by environmental conditions and illumination is low.

The error that most often caused accidents in this situation was failure of the pilot on the controls to use proper procedures to maintain or recover orientation.

•A UH-1 pilot continued to descend in an attempt to maintain visual reference in known IFR conditions instead of turning back or filing an IFR flight plan en route. As a result, the aircraft descended so low that it struck wires and crashed.

•Another UH-1 pilot was on an NVG training flight in the mountains. When the aircraft dusted out, the pilot elected to continue his descent down a mountain draw rather than executing a climb to recover the aircraft as stipulated in FM 1-204. As a result, the pilot lost visual reference and flew the aircraft into the ground.

Operational situation No. 6
An aided tactical mission with low illumination conditions. The aircraft is landing.

The error that most often caused accidents in this situation was failure of the pilot on the controls to accurately estimate distance or closure rate when landing.

•While landing from a hover at a laager site during an NVG night tactical training mission, a UH-60 pilot misjudged clearance between his main rotor and a tree. He saw the 25-foot-tall dead tree and attempted to maneuver around it, but the aircraft's main rotor hit the tree.

Operational situation No. 7
Preparing for an unaided tactical mission.

The error that most often caused accidents in this situation was failure of the pilot-in-command to properly conduct pre-mission planning and checks.

•An OH-58 pilot inadequately planned for an unaided VFR flight to return an aircraft to a field site. He elected not to perform the required flight planning by using maps and other information to become familiar with obstacles along the proposed flightpath. He also did not plan for the 300-foot agl minimum altitude established for the area of operations and published in the unit's standardization bulletin. As a result, the pilot flew below the 300-foot minimum altitude and hit trees.

Operational situation No. 8
A proficiency or transition mission with low illumination conditions.

The error that most often caused accidents in this situation was failure of the pilot on the controls to correctly diagnose or respond to an actual emergency.

•A UH-1 IP was at the controls on an unaided night training mission. He was flying a right crosswind departure from a base field when he heard a loud banging from the rear of the aircraft. Believing that he had experienced a tail rotor failure, the IP executed an autorotation, resulting in a hard landing and more than $138,000 in damage to the aircraft. The banging he heard was an unsecured seatbelt striking the side of the aircraft.

Common factors

Four common factors emerge from these crew errors and operational profiles:

•The primary crew failure is that the pilot on the controls stops scanning to focus his attention either inside or outside the aircraft and fails to coordinate with the other crewmembers to maintain obstacle clearance.

•Most accidents occurred while operating at low altitude: hover, taxi, landing, or en route at terrain flight altitudes.

•Most accidents occurred when illumination was low. In addition, over half of the accidents happened when environmental conditions such as haze, dust, fog, rain, and snow were present.

•The accidents experienced en route in terrain

flight showed the median altitude has decreased. However, *there has not been a corresponding decrease in airspeed.*

Lessons learned

• Don't stop scanning to channelize attention inside or outside the aircraft. Scan stop of more than 3 seconds is risky. If you're on the controls and must stop scanning, transfer the controls or coordinate with other crewmembers so that a member of the crew is looking outside at all times to maintain obstacle clearance. If your crewmembers not on the controls decide to stop scanning, they should announce the decision so that appropriate actions can be taken by you and other crewmembers. These procedures are even more critical when you're operating close to obstacles—as is usually the case when performing terrain flight—and under reduced visibility conditions.

• As the operating altitude for terrain flight is decreased, especially en route, the operating airspeed must also be reduced. This principle for safe operations was learned a long time ago when helicopters first began flying nap-of-the-earth. As with scanning, going slow when you are low is even more critical under conditions of reduced visibility.

STACOM

Documenting NVD qualification and flight time for nonrated crewmembers

STACOM 136 (22 Feb 89 *Flightfax*) clarified the requirements for documenting night vision device (NVD) training while the training is in progress. However, some confusion still exists about documenting nonrated crewmember qualifications and recording NVD flight time for these crewmembers. Following are the most frequently asked questions received by Directorate of Evaluation and Standardization (DES) concerning documentation of NVD qualification and flight time for nonrated crewmembers.

Q. How is the initial NVD qualification documented?

A. After the nonrated crewmember has successfully completed the required training, the exportable training packet test, and the proficiency flight evaluation, the completion date will be recorded in the remarks section of part V of the DA Form 759; e.g., "Initial qualification completed 1 October 1990."

Q. Should NVD flight time for nonrated crewmembers be recorded?

A. Yes. USAAVNC message 261802Z Jul 88 regarding NVDs requires crewmembers to maintain currency by flying 1 hour every 60 days, at night, while wearing NVDs. The best method for maintaining control of the individual crewmembers' NVD flight time is by using DA Forms 759 and 759-3.

FM 1-300 currently addresses these requirements for aviators and aeroscout observers. But the manual includes no requirement to document NVD qualification or NVD flight time for nonrated crewmembers. The need for a permanent record has been recognized because of the possibility that training and qualification gradeslips may become lost. This would require repeating the entire qualification procedure.

DA Forms 2028 have been submitted, and these requirements will be addressed in the new TC 1-300: Flight Operations and Airfield Management.

Submission of additional tasks (3000 series) to DES

Some aircrew training manuals (ATMs) require that commanders submit additional tasks (3000 series) to Commander, USAAVNC, ATTN: ATZQ-ES, Fort Rucker, AL 36362, prior to implementation.

This requirement has been superseded, and the Department of Training and Simulation will not include it in the new *Commander's Guide* or updated ATMs. Commanders may submit tasks to DES for evaluation on a case-by-case basis if assistance is desired.

STACOM 145 **24 Oct 90**

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5209, AV 558-6309/3504. Information published here generally precedes the formal staffing and distribution of Department of the Army official policy. This information is provided to all commanders to enhance aviation operations and training support.

Immanuel C. Sieving III
Lieutenant Colonel, Aviation
Director, DES

Summary

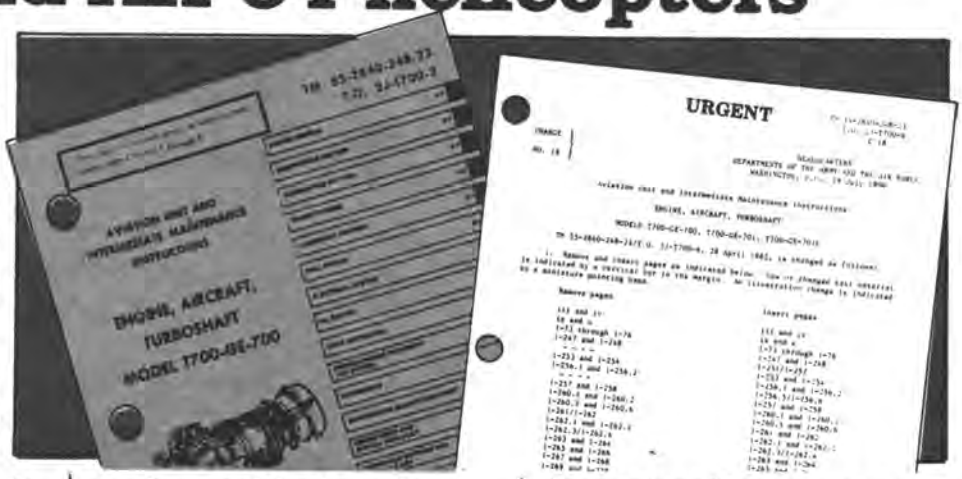
The solution to the night accident problem requires a combined effort from everyone involved with Army aviation. The Army aviation system is doing its part by improving training, procedures, and equipment, and by making commanders—both air and ground—more aware of the hazardous situations in which we are operating. The goal is to make these commanders more attuned to what the requirements are and what Army aviation can do and, just as important, what it can't do to support them. Each mission has to be assessed as to its safety margins.

The Aviation Center has already begun addressing its part of the solution. At the same time, in order to reduce accidents, it is imperative that every Army aviator be fully aware of the kinds of situations in which errors are taking place and causing these accidents.

This article has shown you the situations in which other aviators made mistakes that led to accidents. When you find yourself in the same operational situations, remember these examples, and don't make the same mistakes.

—POC: LTC Jack Fuson, Research and Analysis Division, AV 558-3842/5916, commercial 205-255-3842/5916.

Engine anti-ice valve check on UH-60 and AH-64 helicopters



Change 18 to TM-55-2840-248-23, the engine manual for UH-60 and AH-64 aircraft, addresses the problem of sticking anti-ice bleed valves on the Black Hawk and Apache. The following information has been furnished by the Black Hawk project manager's office to emphasize the importance of carefully performing the engine anti-ice start bleed valve check and taking the appropriate action when a stuck valve is encountered.

As PIC of a UH-60 Black Hawk or AH-64 Apache helicopter, you are going through the engine runup procedures and are about to perform the engine anti-ice start bleed valve check. As you move the appropriate ENG ANTI-ICE switch to the on position, you check for a rise in turbine gas temperature of at least 30°C . . . but no increase in temperature occurs. What should you do next?

Your check has told you that you have a defective valve, and that means the potential exists for an engine shutdown. You should not cycle the ENG ANTI-ICE switch more than once. Repeated cycling of the switch might free up the stuck valve, but that will not alter the fact that you have a defective valve.

Change 18 to the technical manual states that valves failing the anti-ice valve check must be replaced before further flight. Technical analysis has revealed that when anti-ice start bleed valves stick, there is a chance of uncommanded inflight shutdown of the engine at low power settings or when abrupt collective inputs are made.

Aviators should ensure that the information contained in Change 18—table 1-13.3 for the Black Hawk, and table 1-13.4 for the Apache T701C engine, and table 1-13.5 for the Apache T701 engine—for performance of HIT checks is included in the applicable aircraft logbook. ■

—POC: Mr. Michael Lupo and Mr. Dennis Menckowski, Black Hawk Project Manager's Office, AV 693-3210, commercial 314-263-3210.

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class E

H series - While hovering aircraft in confined area, crew heard loud noises coming from engine area. As aircraft was hovered to suitable landing area, additional bangs from engine were heard. Caused by compressor stall.

H series - PIC noticed stiffness in pedals when he began acceleration during OGE hover, and No. 1 hydraulic light came on. PIC accelerated aircraft above etl, and crew performed emergency procedures and made a running landing. Caused by chafed hydraulic line.

M series - As enlisted crewmember attempted to secure left cargo door during climbout, lower leading edge came out of track. Slipstream and air pressure caused door to separate from aircraft. Door was recovered.

UH-60 Class A

A series - While about 25 feet agl during single-ship NVG orientation mission, aircraft hit 30-foot sand dune. Five people were injured. 9043.

UH-60 Class E

A series - Stabilator light and audio came on during takeoff and would not reset. Caused by stabilator actuator failure.

A series - During takeoff, crew heard loud bang and flight controls jerked momentarily. Crewmember in back reported transmission fluid all over left side of aircraft. Aircraft was landed, and IP performed emergency engine shutdown. Postflight revealed left upper and lower struts had separated.

Attack

AH-64 Class C

A series - Aircraft was returning to unit FARP following a day aerial-gunnery mission. While maneuvering aircraft for final approach, pilot twice reset automatic stabilator. When he again attempted to reset the automatic stabilator, he inadvertently jettisoned all wing stores.

AH-64 Class D

A series - MTP found damage to one tail rotor blade and stabilator following maintenance test flight. Caused by flying debris.

AH-64 Class E

A series - No. 2 engine cowling was damaged when it came open during flight. Pilot failed to perform adequate preflight. Suspect door latches were in locked position and door was closed, causing pilot to think it was secure.

A series - During maintenance test flight, No. 2 engine cowling door came open. Pilots failed to ensure cowling was properly secured.

A series - Cotter pin on bottom part of CPG cyclic was protruding slightly. When aircraft was placed in right crosswind turn, cotter pin penetrated wire bundle on right side of cyclic, causing minor electrical shock to enlisted crewmember occupying CPG seat. Aircraft landed, and crewmember was sent to hospital for EKG. Cotter pin was trimmed and wire bundle repaired.

Cargo

CH-47 Class D

D series - While closing cargo ramp, crew chief noticed his mike cord was hanging on edge of ramp. Trying to prevent the cord from being pinched in the closing ramp, he stepped toward the left side of the ramp, leaving the ramp control lever in the up position. The toes on his right foot were severely pinched when his foot was caught in the ramp joint as the ramp closed. The crew chief couldn't reach the control lever, and the flight engineer had to lower the ramp to release his foot.

D series - During external load operation at cruise flight, copilot saw large bird dive through rotor system and break through left chin bubble.

Class A Accidents through 24 October

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	3	2	0
	November	2		1	
	December	3		4	
2nd Qtr	January	2		4	
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	3	33	0

CH-47 Class E

D series - Copilot's jettisonable door jarred loose during takeoff. All pins and safety devices were properly installed, but lower pin showed signs of wear. After landing, outside handle was found in and locked.

Observation

OH-58 Class A

D series - Aircraft was on an NVG mission when it flew into a sand dune. One crewmember received minor injuries. 9044

Fixed wing

C-12 Class C

H series - While climbing through 14,000 feet, crew saw bright flash of light and heard thunder. There was no immediate indication of lightning strike, and mission continued. During postflight, damage to engine, right prop, and right inboard flap was found. Weather radar had shown no signs of thunderstorm activity at time of incident.

C-12 Class D

C series - Engine chip light came on while aircraft was in cruise flight at 11,000 feet agl. During final at low power setting, light went out. Caused by bearing failure in power section of engine.

D series - Left wing inboard deice and sheet metal were torn when aircraft struck large bird during descent. Bird was not seen in time for pilot to take evasive action.

C-12 Class E

L series - While aircraft was climbing through 13,000 feet, passenger told pilot window had cracked. Pilot depressurized cabin and descended to 9,000 feet for remainder of flight.

OV-1 Class B

D series - Following instrument approach to commercial airfield, aircraft was landed with gear up. No injuries. 9045

Maintenance

UH-1 Class E

H series - During cruise flight and approach, crew felt unusual vibration (resembling collective bounce) throughout airframe and flight controls. Caused by failure of bearing attaching collective levers to scissors and sleeve assembly. One of the bearing units was installed backwards, allowing the bearing to slip out of the retaining plate. Aircraft had been flown 16.9 hours with the improperly installed bearing unit.

H series - While hovering after normal approach, pilot felt binding in cyclic just aft of center position. Civilian contractor personnel failed to properly secure wire bundle while performing maintenance. Connector came in contact with fore and aft jack shaft, causing cyclic binding and limited travel.

H series - As aircraft was landed after 1½-hour flight, tower personnel told aircrew both sections of horizonal tail rotor drive shaft cover were open. Postflight inspection revealed a 1-inch hole in cover over No. 5 clamp, and No. 5 clamp was scored. Three Dzus fasteners were missing. Mechanic failed to secure drive shaft cover, and PIC and crew chief failed to ensure cover was secured.

UH-60 Class E

A series - During cruise flight, No. 1 hydraulic reservoir, No. 1 tail rotor primary servo caution light, and No. 2 tail rotor servo and backup pump advisory lights came on. Aircraft landed, and maintenance found chafed hydraulic line. Caused by failure to install rubber grommets.

AH-1 Class E

F series - During steep approach into parking area, AH-1's rotorwash caused unsecured door on a parked OH-58 to blow off. Maintenance personnel had failed to secure door.

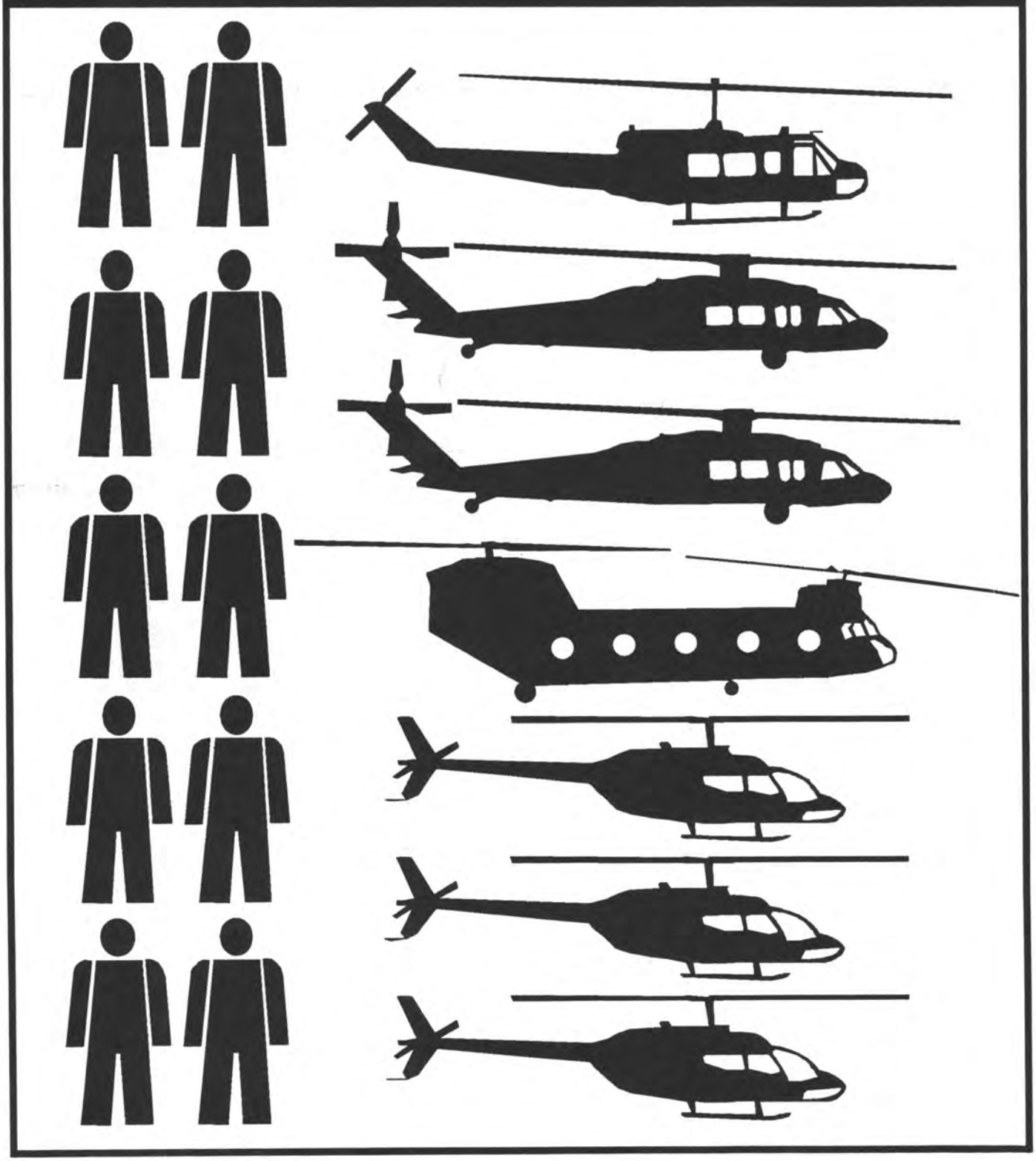
Safety messages

•Safety-of-flight technical message concerning fluorescent penetrant inspection of elevator trim tab attachment hinge brackets on OV-1D/RV-1D aircraft (OV-1-91-01, 041800Z Oct 90). Summary: While in cruise flight, an RV-1D experienced vibrations, and the nose pitched up. Condition was corrected when autopilot was disengaged. About 45 minutes later, with autopilot again engaged, the same thing happened. But, this time, the aircraft became inverted, began spinning, and lost 8,500 feet of altitude before it could be recovered. Flight continued without use of autopilot. After another 15 minutes, aircraft again experienced severe vibrations and binding of controls, which ceased when the failed elevator trim tab separated from the aircraft. Aircraft continued to its destination and landed. Elevator assembly had been damaged when left elevator trim tab separated from aircraft. Purpose of this message is to require fluorescent penetrant or eddy current inspection of elevator trim tab hinges and actuator rod ends on all OV-1D/RV-1D aircraft for evidence of cracks. Successful accomplishment of this inspection will ensure airworthiness of these parts while more detailed analyses are being conducted to determine if any additional corrective actions are necessary. Contact Lyell Myers, AV 693-9089, commercial 314-263-9089.

Center, Fort Rucker, AL 36362-5363, AUTOVON 558-2062. Information is for accident prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition. Direct communication is authorized by AR 10-29.

C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center

Fourth Quarter FY90 Accident Losses



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FLIGHTFAX

Volume 19 Number 3 OF ARMY AIRCRAFT ACCIDENTS 7 November 1990

SO YOU THINK YOU KNOW THE ENEMY...

The Army's number one peacetime enemy is one that soldiers face every day on every street, road, and highway. Last year, that enemy killed 221 soldiers and injured 958 more. It is war, but it's not fought with bullets. It's fought in privately owned vehicles (POVs) with recklessness, alcohol, speed, and a lack of safety belt use.

The enemy. Unfortunately, he (or she) is difficult to identify. A master of disguise, the enemy is often present in seemingly innocent situations: inexperienced teenage-drivers out to impress their friends or tired soldiers traveling too far, too fast, in too short a time. He could be the buddy who only had "a few" beers,

the businessman late for a meeting. She could be the distracted mother on her way to the store.

The enemy's tactics. Be aware that the advantage of surprise will always be on the enemy's side. Don't expect him to wait until you're out of town; 70 percent of the time the enemy attacks within 25 miles of home.

Think that he's only after the other guy? Think again. Better yet, find out for yourself. The next time you're in a group, ask how many have ever had a friend or loved one injured in a vehicle accident. Don't be surprised if 75 percent of them have. In the U.S. alone, the enemy snags 33 million "other guys" every year. So odds are you could become one of the other guys, too. But there are some ways you can lower those odds.

Defensive strategies. Never underestimate the enemy's strength. Expect high-speed crashes to be deadly; they are. But eight times out of ten, the enemy will strike when you're traveling slower than 40 mph. Low-speed crashes can be devastating. The enemy is capable of killing an unrestrained occupant in a crash even slower than 12 mph. The enemy's power is equal to your body weight times the speed of your car. Even a muscular, 200-pound soldier traveling at 30 mph is no match for three tons of force.

To help even the score, the Army requires soldiers to use their protective gear—safety belts are just as important in this war as kevlar helmets and M16s on the field of battle. Simply put, safety belts save lives. When used, they allow a ride-down advantage for the wearer as the car absorbs most of the impact forces. They also prevent deadly secondary collisions in which occupants are thrown forward, striking the car's interior. During evasive maneuvers, safety belts hold drivers behind the wheel so they can maintain control of the vehicle and possibly avoid a crash. In comparison, unbelted passengers receive the full force of impact or are ejected, in which case they're 25 times more likely to be seriously injured or killed.

What about people who have a few beers and then push the speed limit? The enemy already

Strategy

It doesn't matter if you're the best driver in the world; you can't control the other guy. You can, however, do some things to lessen your chances of being in an accident and to lessen the severity of injuries when an accident can't be avoided.

Don't drink and drive. Forget the BAC charts; it only takes one beer to mess up your life.

Use a designated driver or take a taxi if your activities will include drinking.

Always buckle up and insist that your passengers do too.

Drive defensively; your life depends on it.

Be prepared to take evasive action when other drivers make mistakes, because they will.

Check your mirrors and monitor the traffic situation frequently; it can change quickly.

Stack the odds in your favor; when the weather is bad, slow down.

Maintain your vehicle as diligently as you'd maintain your weapon.

Buy the best tires you can afford. Your life depends on those four small rounds of rubber.

If possible, avoid driving when drunk drivers are likely to be on the road: late Friday and Saturday nights and early morning. Be especially vigilant during holiday periods.

has them in his crosshairs. With every mile per hour increase or ounce of alcohol, chances of survival dramatically decrease. Remember the enemy's power formula: body weight times vehicle speed. Why assist him by downing a few beers or tempt him by speeding?

If you don't want to think about dying, think about this: POV accidents are also the leading cause of paraplegia, quadriplegia, and severe head injuries. If the enemy doesn't put you in a coffin, he could put you in a hospital room, a nursing home, or a wheelchair. He could also cost you your drivers license, a prison term if you're found guilty of negligence, or your career. The possibilities are endless.

Preparation. Good soldiers know their enemy. Study his tactics. Develop defensive strategies. Then use them. ■

—Robyn McCown, Installation Safety Division, AV 558-3075

Army joins honor roll

In May, the Army began participating in the "70 Percent Plus Honor Roll," a recognition program for agencies that achieve at least 70-percent safety belt use by 1992. DOD has endorsed the program established by the Department of Transportation (DOT) and the National Highway Traffic Safety Administration (NHTSA) to meet the goal set by President Bush.

Initial response to this program shows that safety belt use is directly related to the intensity of local enforcement. Of the installations that have reported, use varies from 70 to 92 percent. On installations where enforcement is weak, rates are less than 50 percent.

To qualify for the honor roll, an installation must conduct two observational surveys at least 30 days apart to verify at least 70 percent safety belt use. Upon approval, DOT and NHTSA officials, through state governors' highway safety representatives, will award commanders a commemorative plaque, and the name of the installation will be added to the honor roll located at the NHTSA regional office. ■

Army honor roll members

Corps of Engineers
- Mobile, AL
- New Orleans, LA
- Omaha District, NE
- Vicksburg, MS

Draper Army National Guard, UT
Dugway Proving Ground, UT
Fort Benning, GA
Fort Bragg, NC
Fort Campbell, KY
Fort Carson, CO
Fort Dix, NJ
Fort Leavenworth, KS
Fort Leonard Wood, MO
Fort Monroe, VA
Fort Sam Houston, TX
Fort Sill, OK
Fort Wainwright, AK
McAllester AAP, OK
Military Ocean Terminal, Sunny Southport, NC
Picatinny Arsenal, NJ
Pine Bluff Arsenal, AR
Presidio of San Francisco, CA
Ravenna AAP, OH
Sunflower AAP, KS
Tripler AMC, HI
Twin Cities AAP, MN
U.S. Army Berlin, Germany

Reconstruction of a crash

This is the slow-motion, split second reconstruction of what happens when an unbelted driver crashes into a solid, immovable tree at 55 mph.

One-tenth of a second. The front bumper and chrome "frosting" of the grillwork collapse. Slivers of steel penetrate the tree to a depth of 1 1/2 inches or more.

Two-tenths of a second. The hood crumbles as it rises, smashing into the windshield. Spinning rear wheels leave the ground. The front fenders come into contact with the tree, forcing the rear parts out over the front door. The heavy structural members of the car begin to act as a brake on the terrific forward momentum of the 2 1/2-ton car. But the driver's body continues to move forward at the vehicle's original speed—20 times the normal force of gravity; his body weighs approximately 3,200 pounds. His legs, ramrod straight, snap at the knee joints.

Three-tenths of a second. The driver's body is now off the seat, torso upright, broken knees pressing against the dashboard. The plastic and steel frame of the steering wheel begins to bend under his terrible death grip. His head is now near the sun visor, his chest above the steering column.

Four-tenths of a second. The car's front 24 inches have been demolished, but the rear end is still traveling at an estimated speed of 35 mph. The body of the driver is still traveling 55 mph. The rear end of the car, like a bucking horse, rises high enough to scrape bark off low branches.

Five-tenths of a second. The driver's near-frozen hands bend the steering column into an almost vertical position. The force of gravity crushes his chest against the steering wheel, rupturing arteries. Blood spurts into his lungs.

Six-tenths of a second. The driver's feet are ripped from his shoes. The brake pedal shears off at the floor board. The chassis bends in the middle, shearing body bolts. The driver's head smashes into the windshield. The rear of the car begins its downward fall, spinning wheels digging into the ground.

Seven-tenths of a second. The entire writhing body of the car is forced out of shape. Hinges tear, doors spring open. In one last convulsion, the seat rams forward, pinning the driver against the cruel steel of the steering shaft. Blood leaps from his mouth; shock has frozen his heart. The driver is now dead.

Elapsed time: only seven-tenths of a second.

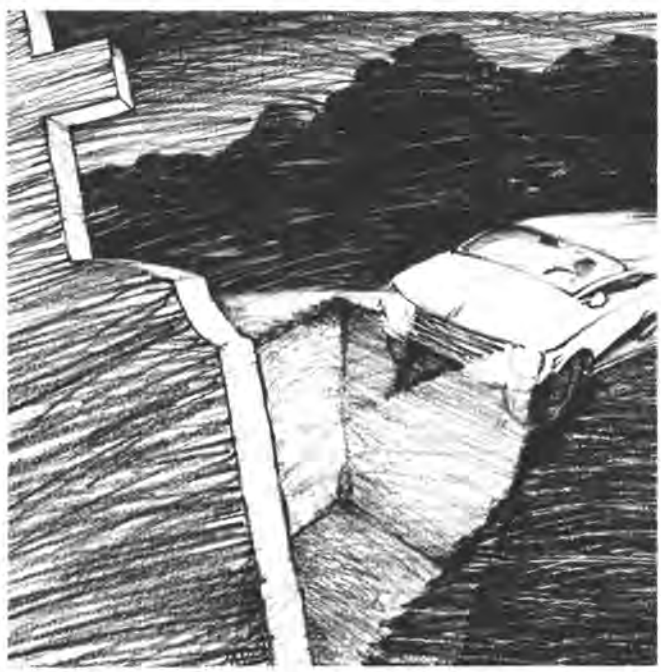
At least it's not a long time to suffer.

Everybody knew, but where were the leaders?

The soldier left his barracks late one evening to play pinball for shots of whiskey. He followed his third shot with beer and wine, then left the club with a friend in a borrowed car. As the car was speeding around a curve, it ran off onto the shoulder, jumped an embankment, sideswiped a tree, and hit a 2-foot-high concrete wall. The car was destroyed and the soldier, who was driving, was killed instantly. The passenger was seriously injured.

Analysis

The soldier, who was getting ready to PCS in 2 weeks, had been under a great deal of stress. He had a new supervisor whom he considered incompetent, and he was undergoing investigation concerning a fight at a local club. He had insurance company problems because of a minor traffic accident he'd had recently, and he had just broken up with his girlfriend. He had a short fuse and all his friends knew it. He'd had no more than 4 or 5 hours' sleep the previous night and had been going for approximately 20 hours that day. *And he was a well-known high-risk driver.*



Within one year's time, this soldier had five POV-related incidents. They ranged from driving while intoxicated to allowing an unlicensed driver to operate a POV, and operate it recklessly, to failure to use his safety belt, to speeding, to passing in a no-passing zone. He had received three written counseling statements, an oral reprimand, and had his license suspended once for 120 days. He had also been counseled for drinking problems. Although the soldier's unit had recently been reorganized and had a new commander and a new platoon leader, his first sergeant had been with the unit as long as the soldier had. His drinking and driving habits were well known.

The night of the accident, several friends saw the soldier drink at least seven or eight alcoholic drinks within a 3-hour time period, yet one of those friends loaned him a car. His blood alcohol content was .222—almost the level at which most people pass out.

In addition, the car, which had recently passed a unit inspection, had bald tires. Its owner had promised to have the tires replaced immediately if the car could just be approved that day.

While the company commander had made emergency telephone number cards available to the soldiers and even emphasized that they could call for a ride after an evening of drinking, the soldiers' perception was that they would get in trouble if they called. In addition, although the soldiers were aware of the command's designated driver program, their interpretation of the designated driver was the one who had consumed the *least* amount of alcohol.

In this one tragic instance, a soldier who seemed to be courting disaster found it. Despite a dozen friends and a first sergeant who knew he was a risk taker behind the wheel, no one tried to help him save his own life.

Countermeasures

• Phone card programs are a good starting point for the command to use in dealing with soldiers who need transportation after drinking. Better are programs that create a taxi fund at the CQ desk. This encourages soldiers to use the phone

instead of the car keys because there's no supervisor to get in trouble with. Taxi fare is paid out of the fund on the spot, and the soldier repays the fund the next day or payday.

•Designated driver programs are also a good start. Young soldiers and new drinkers don't always recognize their drinking limitations. To help young and old timers alike, the designated driver should be appropriately pinned or otherwise visually identified and served free soft drinks. Even better are those programs that require the driver to swap his keys for a ribbon or pin upon entering the club. To get those keys back, he would have to redeem the ID from someone in a position to judge whether the designated driver has been drinking.

•Unit on-the-spot safety inspections will result in finding undetected or unsolved safety problems on soldiers' cars.

•Commanders and other leaders have a responsibility to not only know their soldiers, but to require disciplined, legal behavior from their soldiers. New commanders should make sure they have designated someone in their unit to do a records inspection and let them know if they have an accident waiting to happen in their unit.

•Driving is a privilege, not a right. When that privilege is abused, commanders must put a stop to it. In OCONUS locations, commanders may suspend or revoke driving privileges. Stateside, commanders can suspend on-post driving privileges and require soldiers to get counseling.

•Squad leaders and platoon sergeants should be the first line of defense in knowing their soldiers and recommending when driving privileges should be revoked. All leaders, however, should raise a flag when they know a soldier is a risky driver. ■

Gear up for the battle

Personal protective gear is designed to reduce injuries and deaths. For combat, a soldier's personal protective gear includes camouflage BDUs, helmet, vest, and boots. For driving, it's safety belts, airbags, and head restraints.

The Army requires safety belt use by all drivers and passengers in vehicles on military installations and by soldiers both on and off installations, both on and off duty. This requirement is standard Armywide. There was a time— and not too long ago— when safety belts were also pretty much standard. Not so anymore. Different vehicles now can have very different restraint systems. Here's a quick rundown on what are available and how they work.

Safety belts

There are three basic types of safety belts in use today:

• The *manual shoulder / lap-belt combination* is fastened by the user in one step.

•The *automatic shoulder / lapbelt* is attached to the door frame and automatically moves into place when the door is closed.

•The *automatic shoulder belt* is attached to the door or door frame in a motorized track and automatically slides into place when the door is closed. However, *the lapbelt is separate from the shoulder belt and must be fastened manually.* To be effective, both shoulder and lapbelts must be securely fastened. This takes a special effort on the part of the user, who must remember that this system is a two-step process. Several soldiers who were not familiar with this system have been seriously injured because they failed to manually fasten the lapbelt.

Airbags

In airbag-equipped vehicles, airbags are concealed in the steering wheel (and in the passenger-side dashboard in some models). They are fully automatic and instantly inflate with a harmless gas on impact to protect occupants. Airbags deflate instantly after impact so they won't interfere with driver control.

It's important to know that *airbags do not replace safety belts.* They are designed to work *with* belts to further reduce severe impact forces during frontal crashes.

Head restraints

Head restraints (or headrests) are also an important part of vehicle safety gear, providing a cushion to protect against neck injuries and whiplash. Some head restraints must be manually adjusted to work properly. They are in the correct position when they're adjusted to the middle of the back of the head, roughly even with the occupant's ears.

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - When crew felt aircraft shudder during startup, they assumed it was caused by normal settling after refueling. When aircraft landed, after a little over an hour of uneventful flight, crew found main rotor tiedown missing. Impact from tiedown had damaged one tail rotor blade, hub assembly, and sheet metal of tail boom. Although no damage to 42- and 90-degree gearboxes was found, gearboxes were replaced because of sudden stoppage of tail rotor.

UH-1 Class D

H series - Aircraft was flying NOE into low-angle sun when pilot spotted dead tree in flightpath. He increased collective and attempted to climb over tree, but right skid struck top of tree. Window panel in right small troop door broke when struck by piece of tree.

H series - PIC encountered brownout while making a shallow approach to landing. WSPS contacted ground, and tip was broken off when aircraft was landed with forward movement in attempt to outrun dust cloud.

UH-60 Class D

A series - Aircraft was lead in a flight of two Black Hawks. Chalk 2 reported smoke or fluid trailing from left side of lead aircraft. Master caution light flickered, then all caution lights in No. 1 hydraulic system came on except for No. 1 reservoir-low light. In the next second or so, the backup pump and No. 2 tail rotor servo advisory lights came on. After backup pump had pressurized the No. 1 system, No. 1 primary servo caution light remained on until aircraft landed and was shut down. No. 1 hydraulic pump module, transfer module, three primary servos, and primary servo manifold were replaced.

A series - Stabilator failed during final approach to pinnacle at 6,600 feet msl, and warning light and audio came on. After resetting, stabilator again failed. IP aborted approach, slewed stabilator to zero, and returned to airfield. After landing, stabilator would not go below 20 degrees. Defective stabilator upper actuator was replaced.

Attack

AH-1 Class D

E series - During postflight inspection, dents were found in both tail rotor blades. Suspect pilot allowed tail rotor to hit tree during hover fire.

AH-1 Class E

F series - Aircraft was at near maximum gross weight when pilot, wearing AN/PVS-5 NVGs in near zero illumination conditions, attempted takeoff from gunnery pad. About 40 meters from pad, over dusty trail, aircraft encountered brownout. Pilot applied maximum torque to clear unlighted fence in front of pad, lost visual references in blowing dust, and aircraft drifted rearward and began settling. Aircraft was overtorqued when pilot applied collective to arrest descent.

AH-64 Class D

A series - During postflight inspection, damage to stabilator from tree strike was found. Damage occurred during approach into confined area.

Cargo

CH-47 Class E

D series - Aircraft was at 10-foot hover while crew performed hover checks. Thrust lever froze at hover-power position, and aircraft was landed by forcibly slipping thrust brake. Caused by internal failure of cockpit control driver actuator.

Observation

OH-58 Class A

A series - Aircraft was successfully recovered

Class A Accidents through 7 November

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	4	2	2
	November	2	1	1	3
	December	3		4	
2nd Qtr	January	2		4	
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	5	33	5

after simulated engine failure at 1,200 feet agl during maintenance test flight with two maintenance officers on board. When pilot attempted a power recovery from a second simulated engine failure, engine failed to respond. Aircraft was autorotated to dry river bed and landed on a slight slope. Main rotor blades struck ground twice, and aircraft came to rest on its side. There were no injuries. 9101

C series - Crew completed NOE NVG orientation flight and began unaided practice approaches to desert floor in vicinity of home base airfield. While on final approach, crew lost sight of the ground and crashed. Neither crewmember was injured. 9102

OH-58 Class C

C series - Aircraft caught fire during hot refueling operation. Student pilot was injured by burning fuel. IP shut down aircraft and extinguished fire on student. Student's injuries were limited to one lost workday.

D series - Aircraft was started with main rotor system shipping device on top of rotor head. When device was dislodged, rotor head and blades were damaged.

OH-58 Class E

A series - Aircraft was at 40-foot hover while pilot observed engagement area. When pilot moved aircraft to right, rotor hit top of tree.

C-12 Class C

C series - Weather forecast indicated possibility of thunderstorms along route of flight. After initially operating in the clear, crew noted cloud buildup, and onboard radar indicated presence of thunderstorm in the area. With assistance from ATC and use of airborne weather radar, crew was able to negotiate around storm area. Radar indicated aircraft was about 20 miles from thunderstorm when crew saw lightning flash to their left. It was not until their radios became intermittent that crew suspected possible lightning strike. After aircraft landed, inspection revealed damage to propeller blade where lightning entered. Molten metal from propeller had pitted left windscreen and scorched paint on fuselage. Passengers reported seeing a fireball exiting rear of left wing, and dime-sized exit hole was found in rear left wing tip.

C-12 Class E

H series - During takeoff climb through 3,000 feet, with maximum power applied, torque on No. 1 engine fluctuated from 70 to 100 percent, and fuel flow fluctuated from 300 to 500 pph. About 15 seconds later, torque stabilized at 104 percent and fuel flow at 500 pph. Power lever was reduced to idle, but torque and fuel flow remained the same. No. 1 engine was secured with condition lever, and prop was feathered. Caused by internal failure of fuel control.

OV-1 Class C

D series - Crew chief was running-up aircraft for ground check of torque problem. Only the two bottom latches had been secured on lower engine cowling. While crew chief was conducting maximum reverse thrust check on No. 2 engine, cowling was sucked forward and became unsecure, causing cowling to swing down and be pulled into propeller assembly. Propeller cut through cowling, throwing debris into fuselage, cockpit, and SLAR boom. Three blades of No. 2 propeller were destroyed, SLAR antenna was damaged, plexiglas was broken on both cockpit entrance hatches, and aircraft sustained sheet metal damage.

OV-1 Class E

D series - One hour into flight, aircraft entered into an uncommanded pitch-up and left roll accompanied by severe vibration. Autopilot was disengaged and aircraft returned to normal flight. Autopilot was reengaged and appeared to be functioning normally. A little less than an hour later, aircraft again pitched up, rolled left to an inverted position, and began spinning. Accompanying vibration was so severe that PIC had difficulty reading instruments and controlling aircraft. Aircraft spun around four to six times and lost 8,500 feet of altitude before PIC regained control at 4,500 feet. Thinking the autopilot was malfunctioning, PIC did not reengage it. About 15 minutes later, aircraft again experienced severe vibrations and binding of controls. Condition diminished after 1 to 2 minutes, and remainder of flight was uneventful. PIC noted aircraft required nose-down trim for landing. Postflight inspection revealed more than half of the left elevator trim tab was missing. Trim tab had failed at two inboard mounting points.

Maintenance

UH-1 Class E

H series - During hot refueling, PIC saw hydraulic fluid leaking from bottom of aircraft. Hydraulic pump for UH-1M had been installed on H model.

For more information on selected accident briefs, call AV 558-4198/3901, commercial 205-255-4198/3901.

U.S. ARMY SAFETY CENTER

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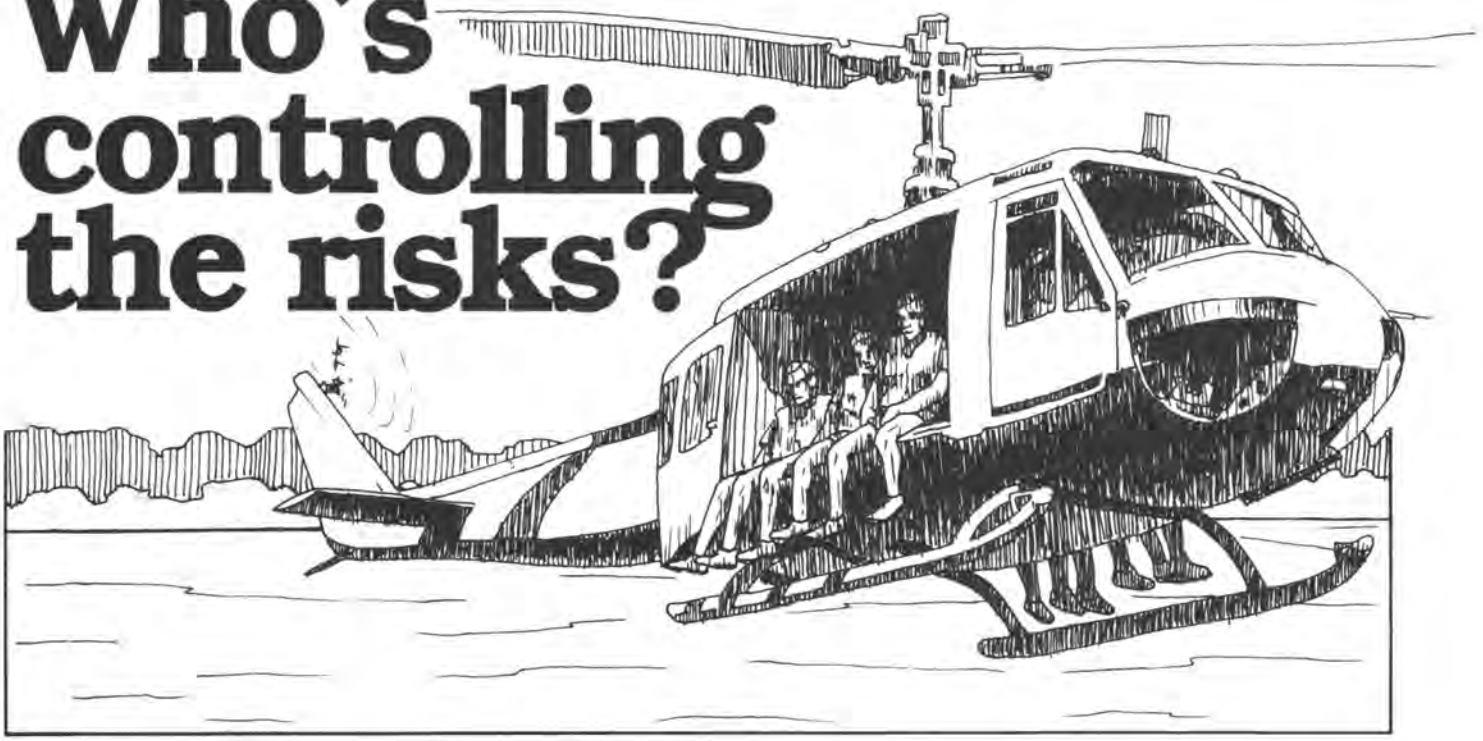
FLIGHTFAX

Volume 19 Number 4 REPORT OF ARMY AIRCRAFT ACCIDENTS 21 November 1990

Who's controlling the risks?



There is a certain amount of risk involved in flying the way Army aviators have to fly. That is true simply by virtue of the fact that day in and day out and night in and night out they strap into a cockpit and operate helicopters at altitudes where they are vulnerable to trees, wires, and other hazards. That involves risk. So do other types of flight operations, such as rappelling and helocasting.

There is a vast difference, however, in doing a risky job in the safest way possible and taking unnecessary chances. The fact is that people who forget that flying or jumping out of an aircraft is inherently risky are putting themselves and others at risk. These are the people who show up in accident reports because complacency and overconfidence led them to take unnecessary risks.

In an operation where risks are not controlled, something like the following can happen.

A special forces unit was training members of an aviation unit in helocast operations. Earlier, special forces and aviation personnel had met to discuss discrepancies in their SOPs. The aviation SOP allowed a maximum of 5 feet of altitude at 5 knots, while the special forces SOP allowed a maximum of 20 feet at 20 knots. The aviation commander decided to disregard the aviation SOP and make three drops—at 10 feet and 10 knots, 15 feet and 15 knots, and 20 feet and 20 knots.

Three UH-1 helicopters were supporting the helocast training. On board each helicopter were four pilots, two crew chiefs, the jumpers, and a castmaster.

The helocast jumpers were wearing shorts, T-shirts, sneakers, and a buoyancy compensator, which they had been told to partially inflate. The jumps at 10 feet and 10 knots were completed successfully.

Then with a different crew at the controls, one

of the helicopters picked up the first group that would jump at the established 15 feet and 15 knots. During approach to the drop zone, the aircraft descended from about 100 feet, rapidly losing altitude and airspeed. Unlike other pilots who started low and came to a slow hover before making the run, this pilot continued into the drop zone without flaring or coming to a hover.

The helicopter entered the drop zone at about 18 feet and 30 knots. As the jumpers exited the aircraft, the forward speed caused them to immediately be thrown onto their backs and heads as they hit the water. They skidded across the water, much like a water skier does after a fall.

One of the six jumpers suffered a broken neck and sank to the bottom of the lake because his buoyancy compensator was not inflated. Another jumper also suffered a broken neck but was rescued while floating unconscious face down in the water. Three other jumpers also received neck injuries. The sixth jumper was shaken up but required no medical assistance.

The five surviving jumpers had their buoyancy compensators partially inflated, allowing them to float to the surface. The fatally injured jumper did not; his body was recovered about 40 hours after the accident.

This operation was doomed from the beginning because the general attitude of the people involved was that helocast operations were not dangerous—they were a fun thing to do.

Although the aviation SOP and regulation stated that helocast operations would be conducted at 5 feet and 5 knots, the aviation company commander decided to follow special forces guidance, which might have been okay if all the guidance had been followed.

Special forces violated their SOP and regulations by not requiring, as a minimum, that the jumpers pass a combat water survival test. There was no formal training by the battalion and no pool training on water entries. All but one of the jumpers were jumping for the first time. The other jumper had not jumped in at least 4 years.

The buoyancy compensators were not checked to make sure they were at least one-half inflated, and the jumpers were not paired as buddy teams. No one knew exactly how many people were involved in the actual jumps.

No standard training is available for castmasters, and these castmasters were not formally trained in their duties. A standard training course for helocast, rappeling, and STABO operations should be established for castmasters.

The castmaster in the accident aircraft was performing those duties for the first time. He was seated on the jump seat facing forward and couldn't accurately judge speed or altitude. (The other castmasters were facing rearward or were on the skid so they could judge height and speed.) Two of the jumpers tried to tell the castmaster they were going too fast, but he either didn't hear them or disregarded what they were telling him.

The pilot, who was flying his aircraft at 30 knots instead of the instructed 15 knots, was inexperienced in helocast operations. It had been 5 or 6 years since he had participated in a similar operation.

The castmaster didn't check the buoyancy compensators to ensure they were at least one-half inflated. Had the fatally injured soldier's compensator been partially inflated, he might have survived.

The drop zone OIC had never before been in charge of helocast operations. He was giving no instructions to the aircrew other than telling them when the safety boats were in place. There was no communication between the pilot, castmaster, and drop zone OIC to ensure correct altitude and speed for the jumps.

The players in this particular operation were gambling—not managing risks—and tragedy was the result. ■

Class A Accidents through 21 November

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	4	2	2
	November	2	2	1	3
	December	3		4	
2nd Qtr	January	2		4	
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	6	33	5

It could have been catastrophic

A U-21A had just leveled off during a maintenance test flight when the copilot noticed white smoke and fluid around the right engine inboard exhaust stack. The smoke and fluid appeared to be increasing, and the crew secured the right engine and made a single-engine landing. When maintenance personnel removed the engine cowling and motored the engine, they could see fuel spewing from the nozzle covers on the engine combustor.

What caused this fuel leak that could have resulted in an inflight fire with possible loss of the aircraft and crew?

At some time, the engine combustor fuel nozzles had been removed so that the spray pattern could be checked. When the fuel manifold transfer tubes were replaced, the wrong size preformed packing was used. The packings used were too small, and this allowed fuel to leak out.

When the maintenance contractor ordered preformed packings using the national stock number (NSN) in the parts manual, the packing received was the wrong size because the NSN was wrong. The part number shown in the manual (MS9388-010) is correct.

The day before the test flight, the engine had been ground run with the cowlings removed, specifically to check for fuel leaks, but no leaks showed up. According to the engine manufacturer, when the wrong packing is used, leaks may not develop right away, but that doesn't mean the aircraft is safe.

A Category I quality deficiency report was submitted as a result of this incident, and safety-of-flight technical message U-21-91-01, 151500Z Nov 90, has been issued. The purpose of this message is to correct the NSN in the dash 23P manual and to require inspection of Beech Aerospace Services Inc. (BASI) usage records on all aircraft listed in the message to ensure the proper preformed packings are installed on fuel manifold transfer tubes.

Unknown to the crew, they were flying a potential Molotov cocktail. If the leaking fuel had ignited, the results could have been catastrophic. ■

Safety of flight messages

By the time you read this, a revision of AR 95-3, Aviation: General Provisions, Training, Standardization, and Resource Management, 27 Sep 90, should be in the field. A further revision to chapter 5, has been distributed in AVSCOM message 181900Z Sep 90, subject: Change to AR 95-3, Chapter 5, Safety-of-Flight (SOF) Messages.

Following is a summary of the changes to chapter 5:

- SOF message control numbers have been changed from calendar to fiscal year.
- Order of paragraphs in SOF messages has been changed.
- Types of SOF messages are now emergency, technical, and operational.
- Aviation safety action messages (ASAM) have been established to convey maintenance, technical, or general interest information where a low- to medium-risk safety condition has been determined IAW AR 385-16. ASAMs are of a lower priority than SOF messages and will be dispatched as priority rather than immediate.
- ASAMs may direct maintenance action that changes aircraft status and may also require compliance reporting.
- Types of ASAM messages are maintenance mandatory, informational, and operational.

The 27 Sep 90 revision of AR 95-3 does not include the changes in the AVSCOM message regarding chapter 5. Units should insert the referenced message as a change to the revised regulation.

Additional copies of the message may be obtained by contacting MAJ Victor P. Malmgren, Safety of Flight Division, Aviation Systems Command, AV 693-9089, commercial 314-263-9089. ■

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - Aircraft was on service flight. After landing because of maintenance problem, flight was continued over water. No further communication with aircrew was received. Pieces of wreckage were found by SAR boats. All three crewmembers were lost. 9103

UH-1 Class C

H series - During training flight, IP heard unusual sound and saw a 6- to 10-inch gap where right cargo door was off its lower track. He took controls and began a deceleration, but door separated from aircraft and hit main rotor blades. Aircraft was landed with no further damage.

UH-60 Class D

A series - During NOE flight, MILES equipment indicated an engagement. While attempting evasive action, pilot allowed main rotors to hit tree.

UH-60 Class E

A series - During climb-out, crew heard loud bang and aircraft yawed slightly. No. 2 engine had failed. After performing emergency shutdown, crew decided to return to airfield and make a roll-on landing.

Attack

AH-1 Class E

F series - PIC in front seat was flying aircraft NOE during troop battle drill. After passing between two trees, PIC began a right turn and allowed aircraft's main rotor blades to hit tree branches.

F series - During rotor coastdown, IP noticed dents in both main rotor blades about 16 inches from blade tips. Pilot probably allowed rotors to hit tree while attention was on maintaining tgt within limits. Leaves picked up during stationary hover had blocked FOD screen on engine inlet, causing erratic tgt.

AH-64 Class A

A series - During multi-ship battle drill using night vision systems, aircraft struck wires and crashed. Both crewmembers were killed. 9104

A series - Aircraft was at 50-foot hover and transitioning to forward flight when crew heard loud snap and caution light came on. Aircraft received extensive damage when it landed hard and rolled onto its side. One crewmember was injured. 9105

AH-64 Class D

A series - NVS mission was aborted after 15 minutes because of PNVS failure. After landing, crew discovered cowling on No. 1 engine was open.

A series - APU was running while IP performed walk-around inspection. While RSP in back seat was attempting to secure kneeboard to his right leg, checklist slipped and apparently struck stores jettison button on collective. All four wing stores were jettisoned.

Cargo

CH-47 Class C

D series - During return flight from mission, FE on lead aircraft noticed clamshell doors were missing from trail aircraft. Both aircraft landed, and minor damage was found to sheet metal on aft pylon and both engine tail cones. Search for doors continues.

CH-47 Class E

D series - No. 2 engine chip detector light came on during flight and would not reset. After landing, 1/4- by 1/8-inch piece of metal was found on engine chip detector. Caused by internal failure of engine.

D series - While hovering over taxiway, aircraft's rotorwash blew unsecured tunnel covers off parked aircraft.

D series - Aircraft was landed in rock-strewn field. When ramp was lowered to begin offloading, it would not go all the way down. Aircraft was repositioned. Hole in ramp was found next morning.

D series - Transmission chip detector light came on during approach. Small pin was found on aft transmission chip detector and metal flakes were found in main and auxiliary transmission filters. Transmission was drained, flushed, and serviced. After 1-hour ground run, large amount of flakes was found on auxiliary filter and oil sample contained metal. Transmission was replaced.

CH-54 Class C

A series - While landing in LZ, crew heard loud bang. Crew chief found hydraulic fluid and fuel leaking from upper area of aircraft. Inspection revealed rotor brake disk was missing. Rotor brake had disintegrated and separated from aircraft, damaging No. 1 engine, transmission, rotor blade, fuel and hydraulic lines, and sheet metal of airframe and pod.

Observation

OH-58 Class A

A series - Aircraft was in cruise flight at 150 feet agl over trees when engine failed. Pilot made a 70-degree right turn, autorotated, and landed aircraft in smallest trees. Aircraft came to rest upright. There were no injuries. 9106

OH-58 Class D

D - Inverter burned out during cruise flight. Message appeared on MFD, and IP detected burning odor. Aircraft was operating in extremely hot, sandy environment.

OH-58 Class E

A series - Rotor oversped during autorotational check on post phase test flight. Collective was increased, throttle was rolled back on, and test flight was terminated. Crew failed to notice overspeed condition in time to respond.

A series - IP initiated simulated engine failure at hover. Student reacted properly until aircraft lightly touched ground. Student then used excessive aft cyclic and bottomed collective too rapidly, resulting in spike knock.

Fixed wing

C-12 Class C

C series - During cruise

flight at FL 200, aircraft entered light freezing rain. All anti-ice and deice systems not in use were activated and aircraft climbed to FL 280. Aircraft radar indicated no weather in 100-mile range except for light precipitation. During climb, crew noticed static electricity buildup around inner-wing area in form of light sparking. As aircraft passed FL 245, crew saw bright flash of light to left front, just forward of left engine. During postflight inspection, no damage to engines, props, or wing surfaces was found. Later, detailed inspection revealed damage to one static wick and small exit hole on left elevator. Inspection on following day using 10-power lighted magnifying glass showed slight damage to two of three prop blades on left engine.

D series - When cargo was unloaded, crew chief found battery acid from lead acid battery had leaked into cargo compartment flooring. Supported unit had been told only dry batteries would be transported. Crew chief knew there was a vehicle battery in the cargo he loaded onto aircraft, but he had been told that the battery contained no acid. Cargo was not inspected for hazardous material before loading.

C-12 Class D

C series - Aircraft ECOD was struck by lightning.

U-21 Class C

A series - When gear was extended for landing, nose gear light indicated unsafe condition. Mirrors on nacelles confirmed nose gear was down but streamlining in the wind. After several attempts to recycle, crew tried to manually lower gear. Nose gear would not extend or retract. After one unsuccessful touch and go in attempt to lock gear into place, crew landed aircraft on main gear, shut down engines, feathered propellers, and allowed nose to settle. Aircraft landed on props and nose and slid to stop on runway.

U-21 Class E

A series - When gear handle was raised to retract landing gear after takeoff, gear light indicated unsafe condition. Nacelle mirror showed nose gear was 6 to 12 inches below gear door. After climbing, leveling aircraft at slow cruise, and performing emergency procedures, gear was lowered and indications were normal. Another attempt to retract gear failed, leaving gear in down position with handle, which was now in up position, showing unsafe indication. When gear handle was moved to down position, indications showed it was safe, down, and locked. Visual check confirmed nose gear was extended. After making low pass so ground personnel could visually check main gear, pilot made normal landing. Malfunction could not be duplicated, but, after worn squat switches were replaced, aircraft passed flight check.

A series - During climbout, Nos. 1 and 2 navigation radios and course indicators became unreliable. Coaxial cable at duplexer adjacent to VOR antenna was partially separated.

A series - During cruise flight at FL 100, Nos. 1 and 2 navigation radios and HSI directional needles became unreliable. Both needles on indicators began spinning, and aural identifiers on navigation receivers were lost. Maintenance found corrosion on both antenna leads.

H series - Nose-gear light did not come on when landing gear was lowered for landing. Attempt to change bulb was unsuccessful. Because of darkness, tower personnel could not tell crew whether nose gear appeared to be down. Aircraft made uneventful landing. Caused by failure of indicator bulb.

Maintenance

AH-1 Class E

E series - Engine oil temperature rose to about 102°C during runup. After shutdown, rag was found in oil cooler assembly.

AH-64 Class D

A series - During preflight, crew noticed odd silver coloration of lead lag link. Maintenance personnel discovered damage to lead lag link and found a 1/4-inch ratchet in housing. Caused by failure to maintain tool accountability and perform FOD checks.

CH-47 Class E

C series - When engine condition levers were advanced to flight position following engine start, rotor rpm accelerated past normal range. Beep switch was improperly installed. High side resulted when solder caused switch to short out.

OH-58 Class E

C series - As aircraft flew into FARP after reconnaissance mission, engine oil bypass light came on. Improper installation of O-ring packing allowed oil to leak out.

C-12 Class E

G series - When mechanic attempted to open cabin door, pressurization caused it to open with such force that it hit him in the head, knocking him to the ground. He was treated for concussion. Aircraft was undergoing acceptance inspection and test flight following repairs for a wing delamination. During maintenance, landing gear and part of pressurization system were removed. Vacuum line to pressurization safety valve was inadvertently disconnected, rendering the valve inoperative. The disconnected line was not discovered during the post-maintenance inspection, and, with the safety valve inoperative, the aircraft pressurized on the ground.

For more information on selected accident briefs, call AV 558-4198/3901, commercial 205-255-4198/3901.

Followups

Information on accidents previously reported

UH-60 Class A

Reported in 31 May 89 issue as 8922 - Aircraft was returning from a service mission. While approaching a civilian airfield in cruise flight at 125 KIAS, aircraft's No. 1 engine failed. IP increased airspeed, began a descent, and selected a landing area to the aircraft's front. Rotor rpm continued to decay until flight could not be maintained. Aircraft landed hard, rebounded into the air, and came to rest on its left side. When the engine failed, the IP failed to properly adjust cyclic and collective to maintain rotor rpm for single-engine

operations as specified in the operators manual. As a result, rotor rpm began to decay and continued decaying to a point that further flight was not possible.

AH-1 Class B

Reported in 12 Jul 89 issue as 8932 - Downgraded to Class C. While conducting a movement to contact along a series of ridges and valleys, crew detected a camouflaged installation and several vehicles in a large valley about 2 kilometers to their front. The aircraft was brought to an OGE hover and a simulated weapons engagement was initiated. As the aircraft entered a small, narrow valley, the gunner was looking through the target sighting unit and using the 20mm gun. The PIC failed to spot a single 55-foot tree located at the base of a ridgeline. The PIC moved the aircraft forward and slightly nose high to gain the proper attitude for simulated rocket firing. As he leveled the aircraft, it drifted about 10 feet to the rear, and its tail rotor struck the top of the tree. The PIC felt vibrations in the anti-torque pedals and the aircraft yawed right. He controlled the yaw by retarding throttle and placed the aircraft in a nose-up attitude in an attempt to land parallel with the steep, upsloping terrain. The aircraft landed hard, but remained upright.

AH-64 Class B

Reported in 31 May 89 issue as 8924 - Crew detected slight burning odor and terminated battle drill. Odor soon dissipated, but as crew executed a climbing turn to return to airfield, odor returned and smoke began entering cockpit. During approach for precautionary landing, both pilots felt heat, and the pilot told the copilot to get out of the aircraft as soon as it touched down. After landing, the pilot performed an emergency shutdown, switching battery off. While attempting to unhook his helmet and unstrap himself, the pilot was holding the cyclic between his legs. As the copilot exited the aircraft, he inadvertently kicked his cyclic, which had been in the stowed position, causing it to move forward. Design of the force trim system is such that all power is lost when the battery is switched off, thereby reducing flight control stability. The main rotor blades, which were still coasting down, flexed downward and contacted the PNVS.

OH-58 Class A

Reported in 31 May 89 issue as 8926 - While conducting aeroscout observer training, IP proceeded to a tactical site where emergency aircraft handling tasks would be practiced. IP landed aircraft and transferred the controls to the student aeroscout observer. The student was then told to pick the aircraft up to a hover. As the student attempted the maneuver, he initially applied aft cyclic and simultaneously began to increase collective. Student's application of aft cyclic became excessive, and the IP corrected by pushing cyclic forward. At the same time, the IP increased pressure on the collective with his left hand in an attempt to stop the student from increasing pitch. The student, unaware that the IP was applying pressure on the collective, continued to increase collective. Aircraft's left skid came off the ground, and the aircraft encountered dynamic rollover and rolled onto its right side. The main rotor blades struck the ground, and the aircraft was destroyed.

U.S. ARMY SAFETY CENTER

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We need your input

The Army Safety School is conducting an internal review of aviation safety training. Following is a partial list of items that will reviewed:

- Selection criteria for safety officers and NCOs.
- Career continuation training and professional development.
- Ability of aviation safety courses to satisfy actual needs of the field.
- Evaluation of future trends impacting on aviation safety officers and NCOs in the year 2000 and beyond.

If you would like to provide input, we would like to hear from you. Cutoff date for input from the field is 15 February 1991. Organizations and individuals may use any of the following methods to provide comments.

- Write to Assistant Commandant, U.S. Army Safety School, ATTN: MAJ Camp, Fort Rucker, AL 36362-5363.
- DATAFAX using 205-255-5318.
- Use ID CAMPG for E-mail if you are connected to the Army Safety Center ASMIS.
- Call AV 558-6410/3164 or commercial 205-255-6410/3164.

—POC: MAJ Glenn G. Camp, Army Safety School

FLIGHTFAX

Volume 19 Number 5 REPORT OF ARMY AIRCRAFT ACCIDENTS 5 December 1990

Aircrew coordination: Don't take it for granted

Most aircrew tasks have elements that require crew coordination; however, until recently, the importance of crew coordination had not been fully addressed in policy, procedures, training, or operations. The impact of this was revealed in a recent study of rotary wing accidents occurring during the past 6 years. The study determined that crew coordination failures were responsible for approximately 74 percent of all Class A through C rotary wing flight accidents. These failures doubled over the period studied, primarily because of the high coordination demands of night operations. Six types of crew coordination failures were identified:

1. Failure of the pilot on the controls to properly *direct assistance* from other crewmembers; for example, to direct the pilot not on the controls to provide information on airspeed, altitude, rate of closure, engine/flight instruments, or assist with aircraft clearance and control. The increased demands of night-aided tactical terrain missions require the pilot on the controls to use all available resources for assistance. Crew coordination and tactical coordination are competing demands, but crew coordination, especially to ensure obstacle clearance, must be top priority in operational situations where flight safety might be compromised.

2. Failure to *announce a decision or action* that will affect the ability of other crewmembers to properly perform their duties. Examples include discontinuing outside clearance to tune radios or read maps, initiating NOE turns, and making inputs or assuming flight controls unannounced. A crew cannot be an effective team if any member operates independently.

3. Failure to maintain *positive communication* (verbal and nonverbal). Positive communication implies that transmitted information is clear and unambiguous. Three key words define communication as being "positive": transmit, acknowledge, and confirm. For communications to be complete and effective, the transmitter must ensure that the receiver has heard and understood the message. This is accomplished by acknowledgment on the part of the receiver (for example, "Roger") and verification that the meaning of the transmission was understood (such as repeating the original transmission). Positive communication is further

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enhanced by using standard terminology with specific qualifiers. This ensures that the words used have the same meaning to all parties concerned. The following example of positive transfer of controls is a good illustration of what we mean by positive communication:

"I've got the controls" (transmit).

"You've got the controls" (acknowledge).

"I've got the controls" (confirm).

Communications critical to safe aircraft operation cannot be assumed simply because the message was transmitted.

4. Failure of the PIC to properly *assign crew responsibilities* prior to the mission during the crew briefing or during the mission for situations encountered. Responsibilities for aircraft clearance and assistance to the pilot on the controls must be clearly assigned and understood during the crew briefing. Desired assistance to the pilot on the controls should be specified in terms of what, who, when, and how. For aircraft clearance (what), who (which crewmember), when (priority), and how (technique) should be addressed.

Crew coordination: The interaction between crewmembers (communication) and the actions (sequence or timing) necessary for tasks to be performed efficiently, effectively, and safely.

5. Failure of the pilot not on the controls or other crewmembers to *offer assistance or information* that is needed or has been previously requested by the pilot on the controls. Crewmembers must anticipate when assigned assistance will be needed and not wait until the pilot on the controls requests it. Also, each crewmember must be alert and ready to assist in unanticipated situations requiring teamwork; for example, aircraft emergencies and environmental obscurations to vision.

6. Failure of the pilot on the controls to execute flight actions in *proper sequence* with actions of other crewmembers. Examples include initiating taxi turn before crew chief can clear the tail, releasing slingload before receiving crew chief's clearance, and taking off before completing before-takeoff checks. Actions that are executed out of sequence—too soon or too late in conjunction with the actions of other crewmembers—can disrupt the entire "flow" of a mission or even bring it to an abrupt end.

Following are the operational profiles in which these crew coordination failures most frequently occurred. Included are summaries of actual accidents that illustrate the operational profiles and crew coordination failures involved.

Profile 1

Failure of pilot on controls to properly direct assistance from pilot not on controls during night tactical missions.

An AH-64 was on a tactical terrain night systems currency evaluation mission, flying NOE, when the PNVS video imagery deteriorated. The IP (rear seat) decided to troubleshoot the PNVS without first **directing assistance** from the CP; i.e., telling him to take the controls. While both pilots had their attention inside the cockpit (CP was reading a map), the aircraft went into a gradual undetected descent and struck trees.

Profile 2

Failure of pilot not on controls to announce decisions during en route phase of day tactical terrain missions.

While on a day NOE tactical training mission, an AH-1F was descending to mask behind trees. The PIC (rear seat) diverted his attention from outside (where he was assisting in obstacle clearance) to inside the cockpit (to establish his location on a map). He failed to **announce this decision** to the CP (who was on the controls) so the CP would assume total responsibility for clearing the aircraft. As a result, the main rotor struck a tree on the right side of the aircraft.

Profile 3

Lack of positive communication by pilot not on controls during landing phase of day missions.

A UH-60A on a day tactical troop insertion mission was making an approach to a large open field bordered by trees. On short final, the IP told the pilot on the controls (right seat) that they were getting too close to the tree line on the left. However, he failed to confirm that the pilot understood the warning and took necessary corrective action (lack of **positive communication**). Instead, after warning the pilot, the IP started looking at his map. The aircraft hit the trees. When questioned, the pilot said he had not heard the IP's warning.

Profile 4

Failure of pilot not on controls to offer assistance to pilot on controls during day missions.

A UH-1 was on a day cross-country administra-

tive mission over snow-covered terrain. The CP was attempting to maintain a stationary 25-foot OGE hover while awaiting return of the lead aircraft (which had turned around because of adverse weather). The PIC was focusing his attention inside the aircraft and failed to **offer assistance** to the CP in maintaining attitude/altitude through use of outside references. The CP fixed his attention on the returning aircraft and failed to detect rearward drift and descent, resulting in impact with the ground.

Profile 5

Failure of PIC to properly assign responsibilities during crew briefing.

An OH-58A was on a day search and rescue mission. While both pilots had their attention on the ground search, the tail rotor hit a tree, and the aircraft crashed. The PIC failed to properly **assign responsibilities** during the crew briefing; i.e., one crewmember responsible for obstacle clearance while the other crewmember conducted ground search.

Profile 6

Failure of pilot on controls to properly coordinate (sequence) action with crew chief in clearing aircraft during hover / taxi phase of administrative / support missions.

A CH-47C, on a day support mission, landed at a small airfield (with no taxiway markings) for refueling. The PIC ground-taxied the aircraft near a hangar and, concerned that the aircraft was too close, decided to reposition. He received clearance to the right from the flight engineer but failed to wait for clearance from the crew chief (**improper sequence of actions**), who was lowering the ramp in order to clear aircraft's left rear. Consequently, when the aircraft turned right, the rear of the aircraft swung left, and the aft rotor struck the hangar.

Where do we go from here?

This study has generated actions to focus the Army aviation system on crew coordination requirements. Critical crew coordination actions are being included in each ATM task for all aircraft, and changes to training and evaluation will follow. At the same time, in order to prevent accidents, it is imperative that every Army aviator understand the importance of crew coordination. It is easy to become complacent and assume the other crewmember knows your intentions; however, failure to "crew coordinate" can lead to disastrous consequences. ■

—POC: LTC Jack Fuson or Ms. Charisse Lyle, Research and Analysis Division, AV 558-3842/5916, commercial 205-255-3842/5916

Planning key to safe deployment

Even under normal circumstances, deployment demands on aviation units are high as units rotate in and out of the National Training Center, support training at the Joint Readiness Training Center, and participate in emergency deployment readiness exercises. With the accelerated deployment of troops to support Operation Desert Shield, thorough prior planning becomes even more critical to reducing the risk of accidental injury or equipment damage.

The successful deployment of an aviation unit depends heavily on the aviation maintenance operation. Information in this article is intended to assist maintenance personnel in preparing for and supporting unit deployments by land, sea, or air.

In most cases, a unit deployment can be divided into four distinct phases: preparation, movement to the port of embarkation (POE), actions at the POE, and actions at the port of debarkation (POD).

Preparation for movement

During the preparation phase, the commander and maintenance personnel should take the following steps:

- Ensure vehicle load plans provide space for mission-essential equipment; use standardized load cards.
- Prepare checklist to ensure vehicles are properly prepared for shipment.
- Determine transportation requirements beyond the unit's organic capability.
- Determine requirements and sources for blocking, bracing, and tiedown material.
- Ensure qualified operators are assigned to vehicles.
- Have DA Form 2404, Equipment Inspection and Maintenance Worksheet, overprinted to guide in the disassembly and reassembly of aircraft that will be shipped on Air Force aircraft. This will standardize procedures and expedite the work.
- Prepare buildup kits for each aircraft to be shipped. Identify and have on hand those one-time-use parts and supplies required to place the aircraft into operational status after being shipped. Ship the kits with each aircraft.
- Secure padding and prepare a stowage plan for those components that will be removed from the aircraft to facilitate loading.
- Plan the sequencing of special tools, personnel, technical inspectors, and test pilots that must be available to reassemble aircraft after shipment.

This will minimize aircraft downtime and clear the ramp or port for follow-on equipment.

• Designate and train load teams. Assign each member specific duties and responsibilities.

Movement to POE

Movement to the POE will probably involve combination modes of travel. For example, aircraft are usually flown to the POE; vehicles may be driven in convoys or shipped by rail to the aerial or sea POE.

• Plan convoy operations. Brief drivers on safety. Cover convoy speeds, intervals, emergency procedures, telephone numbers, and security of equipment.

• Prepare strip maps to POE for all drivers. Station road guides at critical points along the route.

• Plan stops en route to check vehicles, refuel, secure loads, and change drivers.

• Follow convoys with a maintenance vehicle that has mechanics, tools, spare parts, and lubricants on board so that emergency repairs can be made en route.

• Send an aviation maintenance representative with the advance party to guide vehicles to the staging area at the POE.

Actions at POE

Actions at the POE should be coordinated in advance with the departure airfield control group or seaport transportation officer.

• Determine a staging area for vehicles and equipment.

• Arrange for an aircraft disassembly area.

• Distribute flyaway kits, component stowage plans, and overprinted DA Forms 2404 for each aircraft to be shipped by air.

• Use organic equipment or obtain support for lifting rotors, masts, and other heavy components.

• Prepare vehicles for shipment. Use low profile—windshields, bows/canvas, and antennas down and all removable items taken off to reduce height of the equipment; rotor blades off or folded, antennas and tail rotor blades removed, reducing height. Leave keys in ignition or secured to steering column. Gas tanks should be half full.

Actions at POD

Actions at the port of debarkation usually include the following:

• Send an advance party on the first sortie. Send a unit representative to coordinate with the receiving aerial or sea POD.

• Unload equipment and establish a staging area.

• Establish a maintenance operation to reassemble aircraft and to control equipment and personnel.

• Coordinate for runup and test flight area.

• Coordinate refueling of aircraft, vehicles, and equipment.

• Request assistance from the local transportation officer to arrange for the onward movement of personnel and equipment beyond the unit's organic capability.

• Prepare to clear the ramp or seaport and move to the employment area.

• Inspect aircraft shipped on sea vessels for salt water corrosion, and wash with fresh water as soon as possible.

References

The following references should be on hand in aviation units to aid in planning and executing safe deployment of people and equipment. Load planners should be totally familiar with these documents.

• AR 220-10: Preparation for Oversea Movement of Units.

• FM 55-9: Unit Air Movement Planning.

• FM 55-12: Movement of Units by Air Force Aircraft.

• FM 55-65: Preparation for Unit Movement Overseas by Surface Transportation.

• FORSCOM Reg 55-1: Unit Movement Planning.

• FORSCOM Reg 55-2: Unit Data Reporting and System Administration.

• TB 55-46-1: Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military Vehicles and Other Outsize/Overweight Equipment.

• TM 38-250: Packaging and Materials Handling: Preparation of Hazardous Materials for Military Air Shipment.

• TM 43-0105: Corrosion Control for Army Aircraft.

• TM 55-1520-400-14: Transportability Guidance: Marine Transport for U.S. Army Helicopters. ■

—MAJ Lenear Royer, Aviation Division, AV 558-4198/3901

Tree strikes and you're out

Eight aircraft were needed for the troop insertion mission, but the PZ was only large enough to accommodate four helicopters at a time. The first flight lifted off with its load of soldiers, clearing the way for the second flight to land. The crew chief of the trail aircraft got out and supervised the loading of six soldiers onto the UH-1. As the pilot in the right seat picked the aircraft up, the supported unit S3 approached from the left side and told the PIC that the wrong troops were on board. The PIC took the controls, landed, and the troops were offloaded.

When the right soldiers had been loaded, the pilot brought the aircraft to a hover for a power check. But then the unit S3 again approached the left side of the aircraft. Once again the PIC took the controls and landed the aircraft.

After finding out what the S3 wanted, the PIC turned the controls over once again to the pilot. By this time, the aircraft had moved 3 to 4 feet forward of its first touchdown point.

After clearing the aircraft to the left for takeoff, the PIC diverted his attention inside the aircraft and began calling out torque readings. The crew chief, who was seated behind the PIC on the aircraft's left side, also focused his attention on the aircraft's instruments.

As the helicopter became airborne, it moved forward and left, and the main rotor blades hit a group of trees in the flight path. Hearing the impact as the blades hit tree branches, the PIC took the controls. The impact of the retreating blade caused rotor rpm to bleed off, and the aircraft rolled left into the trees. The PIC banked the helicopter to the right and, hearing the rpm audio go off, the PIC reduced collective to regain rotor rpm. As rotor rpm increased, the PIC applied power to clear a tree to the aircraft's right front. When the aircraft had cleared the tree, the PIC set it down on a vehicle trail and performed an emergency shutdown. None of the nine people on board was hurt.

Although he knew the pilot was inexperienced and was distracted by the two aborted takeoff attempts, the PIC turned the controls over without expressing any concern over the aircraft's proximity to the trees or its takeoff direction. The pilot on the controls failed to ensure that the selected takeoff path was clear. If a heading of only 10 to 15 degrees to the right of the takeoff path selected had been used, the aircraft could have taken off with no problem.

Another mistake was made when the unit maintenance recovery team responded to the notification that an aircraft was down and needed to be recovered. After a brief inspection of the aircraft, the unit test pilot, who was acting as service platoon leader, incorrectly determined that the aircraft was safe to fly and flew the UH-1 to an airfield about 9 nautical miles away from the accident site. Subsequent inspection revealed a 3-inch-wide tear on the tip of one main rotor blade, extending toward the root of the blade for about 10 inches. The other blade also showed signs of multiple strikes on the tree branches.

The severity of damage to the main rotor blades required application of sudden stoppage criteria and changeout of the blades and drive train. Total cost of damage and repair exceeded $100,000. ■

Damage to main rotors and from sudden stoppage exceeded $100,000.

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - During overwater NVG training mission, aircraft descended, struck surface of lake, overturned, and sank in 15 feet of water. IP was killed and remaining five people on board were injured. 9107

UH-1 Class C

H series - Student pilot was on controls during normal approach to airfield. At about 10 feet agl, student allowed aircraft's nose to pitch up and down 12 to 15 degrees. During these unplanned movements, crew heard a loud thump. Suspecting possible mast bumping, IP took controls and landed. Both tail rotor blades and tail rotor hub were damaged beyond repair, and 90- and 42-degree gearboxes were replaced. Investigation continues.

UH-1 Class D

H series - Aircraft was at 3,000 feet, 90 KIAS, during standard instrument training flight. As student on controls was vectored for instrument approach, master caution and engine oil pressure lights came on. IP took controls, rpm warning light came on, and engine failed. Aircraft made downslope landing in terraced pasture with wires on two sides. Landing area conditions and high gross weight (auxiliary fuel tank was full) caused crosstubes to rotate in the saddles, resulting in damage to aircraft. IP had noted and verified with maintenance that engine oil sample had been taken previous day. High metal content caused oil lab to require additional samples be taken at end of each flying day for next 3 days. Anticipating that problems might be encountered, IP went over engine failure emergency procedures with students before flight.

UH-1 Class E

H series - During terrain flight at 25 feet AHO, crew failed to see tree in time to avoid hitting it. Right chin bubble was cracked.

H series - Damaged lower right engine cowling was found open after maintenance test flight. CP failed to close cowling and MTP failed to check it.

H series - During takeoff, 1,800-pound external slingload began slight oscillation, then released. Caused by faulty relay in cargo-hook release mechanism.

H series - When power was increased during descent for landing, aircraft experienced multiple continuous violent compressor stalls with rapid yaw inputs. Witness on ground saw pulsating 2- to 3-foot-long flame coming from engine tail pipe every 2 to 3 seconds. At 50 feet agl, yaw was so severe throttle was closed and aircraft was autorotated to touchdown. With engine at flight idle after landing, egt was noted at 800°C, and emergency shutdown was performed.

Attack

AH-1 Class E

F series - Aircraft was hovering in holding area. Winds were reported at 250 degrees and 15 knots, gusting to 20 knots. Aircraft began settling at a high rate, and pilot increased collective to stop descent. Noting indicated torque at 105 percent, PIC took controls, lowered collective, and made precautionary landing. Overtorque inspection revealed no damage. Pilot failed to anticipate winds in relation to hovering aircraft and applied more collective than needed to arrest descent.

F series - Mechanic, untrained in POL, was working as refueler. Retaining ring was broken when CCR nozzle was improperly inserted.

F series - During hot refueling, POL operator forced CCR nozzle into aircraft and applied up and down pressure in attempt to seat nozzle. All but two rivets on retaining ring were broken by use of improper technique.

AH-64 Class C

A series - During approach, stabilator audio alarm sounded and auto mode failed. During attempt to reset stabilator, wing stores were inadvertently jettisoned.

AH-64 Class E

A series - While hovering in battle position under NVS flight conditions, copilot/gunner noted aircraft slowly descending. He alerted pilot, who applied collective to arrest descent. Pilot's attention was focused on aircraft position and rate of descent, and it was not until the crew reviewed videotape that they noted torque had reached 120 percent for about 1 second. No damage from overtorque was found.

Cargo

CH-47 Class D

C series - While approaching aircraft parking at end of flight, PIC and crew chief heard a muffled thump. After touchdown, CE noticed right aft pylon work platform had opened, damaging No. 2 engine tail cone. Both platform latches were in closed and locked position. Both cables were snapped, and forward latch mounting was partially detached inwardly. Caused by misalignment of platform.

D series - During fast rope approach to LZ, aft rotor blades hit 60-foot tree.

CH-47 Class E

D series - Crew chief was performing flight control closet check during approach to air assault school LZ. Large

amount of hydraulic fluid was leaking from forward transmission area. Approach continued, slingload was placed on ground, and aircraft landed. Hydraulic pressure line to rescue/cargo winch passes through bulkhead secured by two fittings. Forward fitting had vibrated loose, causing loss of fluid.

D series - During unloading of cargo pallet using helicopter internal cargo handling system, pallet hung up on ramp extension. Attempts to two-wheel and four-wheel taxi aircraft away from load failed. Final attempt to four-wheel taxi away resulted in aircraft becoming airborne, breaking retaining teeth off ramp extensions. Forklift should have been used to offload in rough terrain.

D series - Slingloaded PRC 190VI had been placed on taxiway and crew chief told pilots it was clear to release load. Copilot depressed load release button, and both hooks opened. Crew chief reported load had released, but as aircraft was repositioned, crew felt shudder and crew chief shouted that aircraft had hit vehicle. Climb was begun to clear vehicle, and crew chief reported aft hook was still attached to vehicle and vehicle had been turned onto its back side. On second attempt, pilot was successful in releasing load, and aircraft landed. Damage to vehicle was limited to right windshield and wiper blade.

D series - No. 2 N2 control box failed and PIC was unable to adjust No. 2 engine to appropriate rpm for flight. Aircraft was shut down and N2 control box was replaced.

D series - During approach for landing at civilian airport, aircraft's rotorwash blew tin roof off small building located about 150 feet from runway.

D series - When FE leaned on lower portion of cabin door for support while clearing aircraft, door supports tore loose and opened, causing minor sheet metal damage. Lower portion of door was replaced. Six additional CH-47s showed stress cracks and damage in the same area.

Class A Accidents through 5 December

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	4	2	2
	November	2	3	1	4
	December	3	2	4	0
2nd Qtr	January	2		4	
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	9	33	6

Observation

OH-6 Class C

A series - When throttle was opened at 20 percent during second start attempt using GPU, TOT went to 1,040°C for more than 3 seconds. When hot start was noted, throttle was rolled off. Starter switch was kept engaged, but starter failed to motor engine.

OH-6 Class E

J series - Crew chief was having problems relacing telescopic sight unit (TSU) on aircraft during buildup after offloading. PIC didn't see CE, and, thinking the job was finished, PIC took off while CE was still securing TSU. CE was holding onto TSU, and it was pulled off and dropped when aircraft was brought to a hover.

Fixed wing

C-12 Class E

C series - During level cruise flight at 4,500 msl, 160 KIAS, pilot selected landing-gear down. Gear motor activated briefly, then stopped, but gear handle in-transit lights remained on. Landing gear selector was recycled, but unsafe gear indication remained, and crew performed manual gear extension. Tower personnel reported gear appeared to be down, and aircraft made uneventful landing. Suspect failure of landing gear extension/retraction motor and relay.

F series - Nose gear would not retract after takeoff. After visually verifying gear was down, crew made uneventful landing. Nose gear actuator locking pin failed to disengage. Actuator was replaced.

U-21 Class D

H series - During takeoff roll at full power, two deer appeared from right side of runway in front of aircraft. Aircraft went right in attempt to miss deer. Nose cleared, but left engine prop hit deer. Propeller, bottom cowling, main gear doors, and main gear were damaged, and engine was replaced.

U-21 Class E

A series - When PIC turned left and right fuel control heat switches during normal runup, sparks spewed from underneath left subpanel, burning

several small holes in floor covering. Brittle wires to switch were replaced.

A series - After landing at an unfamiliar airfield and turning right onto taxiway, pilot was looking for identifying marks for an upcoming turn onto another taxiway. As he made the next turn, without stopping forward movement, he allowed aircraft to drift off the taxiway centerline, and No. 2 propeller hit a taxiway light. PIC had his attention on searching an IFR supplement for a Unicom frequency and was not monitoring what the pilot was doing.

Maintenance

OH-58 Class C

A series - Aircraft was over mountainous terrain when crew noted engine oil temperature increasing. With no available safe landing area, crew decided to fly to nearest airport. Oil temperature was above 107°C for 8 to 10 minutes. Maximum oil temperature reached was 110° to 120°C. During postflight inspection, crew found paper towel had been shredded by oil cooler fan, blocking oil cooler and causing oil to overheat. Crew chiefs had used paper towels to clean tail rotor hanger bearings during a dash 18 inspection. Towel had been left under tail rotor drive shaft cover.

For more information on selected accident briefs, call AV 558-4196/3901, commercial 205-255-4196/3901.

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**C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center**

Warning—do not adjust fuel control assemblies on AH-1s

An unauthorized adjustment of the fuel control assembly on an AH-1 is believed to have caused the fuel control to malfunction and set the stage for the Class C accident that followed.

An IP and SP had been conducting aircraft transition training in an AH-1S for about an hour. When the SP attempted to perform a manual throttle operation in the emergency governor mode, he told the IP that even with the aircraft at full throttle he could not maintain N2 at 6400 to 6600.

The IP told him to abort the maneuver, and the SP landed and rolled the throttle down to the engine idle stop. The IP explained to the SP that he should have maintained N2 at 6400 to 6600 and coordinated rolling off the throttle so that the IP could place the governor switch into the auto position when N2 reached about 6000 rpm.

After pointing out to the SP that he had failed to follow the proper procedure, the IP told him to bring the engine back up to 6400 to 6600 rpm. As the SP increased throttle, the IP heard a popping sound and saw that tgt had risen and was holding at 1,050° to 1,100°C. The IP told the SP to perform an emergency shutdown. There was no postcrash fire and no further damage to the aircraft.

The overtemperature resulted from the SP's failure to follow the instructions in the aircrew training manual and guidance given by the IP.

An analysis of the fuel control assembly by Corpus Christi Army Depot revealed that the T1 bellows spring holder, P/N 80153, had been installed upside down. This is considered the primary cause for the fuel control malfunction. The turnbuckle lockwire was rubbing against the spring, P/N 85686. This interference could have caused the hydromechanical computer to malfunction and may have been a contributing factor in the fuel control malfunction.

The T1 bellows spring holder is an external part of the fuel control assembly, and it can be visually inspected in the field. However, units are prohibited from tampering with the fuel control assembly (including the spring holder). The fuel control assembly may be adjusted only at depot maintenance level, where configuration of the assembly can be validated through use of the test stand operational test.

There is reason to believe that the discrepancies found in the fuel control assembly on this AH-1 may have resulted from an unauthorized adjustment. While this is an isolated case, and this type of failure has not previously been reported, it is important that maintenance personnel understand that field maintenance activities are not authorized to make adjustments in these fuel control assemblies ■

—POC: Mr. Dong K. Nguyen, Aviation Systems Command Safety Office, AV 693-9089, commercial 314-263-9089

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2 January 1991 Vol 19 No 6 REPORT OF ARMY AIRCRAFT ACCIDENTS

A matter of trust

Every day in aviation units throughout the Army, pilots trust their lives to the people who maintain their aircraft. Living up to that kind of trust is a heavy responsibility, one that must always be in the minds of those of you who take care of these aircraft and make sure that they are safe to fly.

Experience has shown that most of you don't take this responsibility lightly. You are not satisfied to meet the minimum requirements. You insist on the closest thing you can achieve to perfection because you are professionals, and that's part of being a professional.

We in Army aviation have some of the best-trained pilots in the world, but if we can't give them an aircraft that is safe to fly, the mission

won't be accomplished. Worse, we may lose an aircraft and its crew. Completely aside from the human suffering this causes, it means that we have lost an important part of our essential assets—and I don't have to tell you what that does to our combat readiness.

No pilot should have to worry about whether the aircraft he is flying is going to break because someone on the ground did something wrong or failed to do something that should've been done. Having a problem in the air puts an awful burden on good pilots to make the best of a bad situation. Sometimes all the training, experience, and skill a pilot has just isn't enough because there is simply no suitable place to put the aircraft down safely.

There is no second-string on this team

Aviation is a team effort and everybody is a starter—there are no second-string players. That means the guy with the toolbox is every bit as important as the players in the cockpit. Units that recognize this are the ones with the good safety records.

In Army aviation, quality maintenance is not a job, it's an attitude and a duty. And in Army aviation, there can be no such thing as second best. Quality maintenance means giving your very best effort to the job all the time—people's lives depend on it. ■

—BG C.A. Hennies, Director of Army Safety and Commanding General, U.S. Army Safety Center

Good maintenance can make the difference

An Army pilot is no better than the aircraft he is flying, and the aircraft is no better than the person who services it.

There are only two real causes of maintenance-induced accidents: Someone either didn't do the job or didn't do the job correctly. With possibly a few exceptions, maintenance errors are preventable and inexcusable. There is no reason why they cannot be virtually eliminated. Good maintenance is trained personnel following correct procedures *all the time*. When authorized procedures are not followed, the stage is set for accidents.

It's easy to blame the pilots

It's easy to see why crew error gets a lot of attention because, statistically, human error by pilots is the largest single cause of aviation accidents. But even where a pilot makes a mistake that leads to an accident, we sometimes find maintenance was also a factor. For example, in the following case, an IP failed to follow the proper emergency procedures when he lost power on the No. 1 engine of a UH-60. As a result, rotor rpm immediately began to decay and continued downward to the point that further flight was impossible, and the aircraft crashed.

The IP had continued to operate the aircraft as the fuel decreased below a restriction imposed by a logbook entry. Specifically, the entry restricted flight when indicated fuel on the No. 1 system was below 400 pounds. As a result, he placed the aircraft in a condition where fuel starvation on No. 1 engine could happen.

When the low fuel pressure light came on during approach for landing, the IP failed to immediately place the engine fuel system selector switch to crossfeed as specified in the operator's manual. And, apprehensive that he might lose the remaining engine too, the IP failed to properly divide his attention between aircraft control and monitoring flight instruments that would have told him that he was losing rotor rpm.

This appears to be a clear-cut case of pilot error, but there's more to the story than that. True, the No. 1 engine failed be-

cause of fuel starvation, but the output line for the No. 1 engine submerged fuel boost pump was not connected. This allowed air to enter the fuel system when the free line was exposed to air in the fuel cell.

At an undetermined time, and for an undetermined reason, the line had been disconnected. When the fault was first documented, unit maintenance personnel did not take adequate steps to troubleshoot the problem and take corrective action.

Sometimes it's just plain carelessness

Too many times, the maintenance error that causes an accident is as simple as leaving something where it doesn't belong, and sooner or later it finds its way into an area where it does its mischief. The variety of these objects seems endless: bolts, washers, tools, shop towels, even soda cans have been found under drive shafts, jamming flight controls, blocking air ducts, and on and on. In the case of a UH-1 Class C, it was a DD Form 1577-2 condition tag that was discovered in the engine inlet area behind the 6 o'clock strut and against the variable inlet guide vanes. The aircraft had been equipped with an improved particle separator, and the tag must have been left inside the particle separator during previous maintenance.

This aircrew was luckier than some. They were hovering over an airfield, after returning from a training flight, when the aircraft's engine experienced a catastrophic compressor stall. The aircraft lost power, yawed, and settled. The pilot initiated engine failure procedures and landed without further damage to the aircraft.

Mechanic's Code

As a maintenance technician, I recognize my obligations—

To the United States Army, which trusts that I am technically qualified for the tasks expected of me.

To the aircrews and passengers, who trust their lives and safety to my mechanical skills.

To my organization, which expects me to be a professional mechanic as well as a professional soldier.

To my fellow mechanics, who as team members must depend upon me for a task completed.

To myself for the personal satisfaction of a professional job well done.

To discharge these responsibilities—

I will perform maintenance of the highest quality to assure the safety of every flight.

I will always be sure of my work or when in doubt consult my supervisor.

I will strive to improve my professional skill by attention to duty and self-education.

I will not allow personal desires or considerations to affect my performance of duty.

I will never attempt to perform duty when my mental or physical condition might lead to maintenance error.

I will keep my tools and equipment in first-class condition to ensure a job worthy of the professional mechanic that I am.

I pledge adherence to these principles to reflect credit to myself, my fellow workers, and my profession.

Just because it's on the aircraft doesn't mean it's right

The fact that something is installed on an aircraft doesn't always mean that it is the right part or that it is installed correctly. Following is an example of what can happen as a result.

While performing a maintenance test flight at about 10,000 feet agl, the crew of a UH-1 heard a report from the rear of the aircraft. There were no abnormal instrument indications and control responses were normal. The pilot performed emergency procedures, landed, and shut down the aircraft. After checking for damage, the crew chief informed the pilot that the oil cooler fan turbine had disintegrated, and there was extensive sheet metal damage to the fan compartment.

The oil cooler fan had failed due to an overspeed caused by installation of an improper reducer fitting that increased the fan-driven airflow beyond design limits. The oil cooler fan and shroud assembly were installed and inspected 134 hours previously, but the installation inspection was not performed in accordance with the technical manual, which clearly states the orifice diameter cannot be larger than .255-inch. The installed fitting orifice had a diameter of .680-inch.

What it takes to have good maintenance

- Awareness on the part of supervisors about the training, experience, and abilities of every person under their supervision.
- Qualified technical inspectors.
- Up-to-date technical manuals available in each unit in sufficient quantities to be in the hands of mechanics. It's true that after a mechanic works on

an aircraft for a while, he remembers torques and even assembly procedures, but manuals change. Mechanics *must* use the book every time.

■ Scheduling of flights to ensure preventive maintenance inspections are performed when due.

■ Submission of DA Form 2028 or DA Form 2028-2 when required. Errors may appear in publications from time to time or some important item may be omitted. The quicker errors are known, the quicker they will be corrected.

■ Constant command emphasis on all the above points.

We're all in this together

In the best aviation units, there is no attitude of "us and them" among people who fly aircraft and those who maintain them. There is instead an atmosphere of mutual respect that breeds confidence and trust between aviators and maintenance crews. In this kind of unit, when an aircraft leaves the ground the aircrew knows that it is mission capable, and the maintenance crew knows they have done their part to ensure the mission is accomplished. ■

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - During cruise flight at 2,000 feet over water, crew heard loud noise from engine area. Aircraft yawed left, and low rpm light and audio came on. Crew diagnosed problem as engine failure, and PIC executed power-off emergency ditching into water. Aircraft touched down level with zero forward speed, settled, and rolled left. The three crewmembers and four passengers got out of aircraft and into life raft. They were later rescued by Navy helicopter. Aircraft sank in about 12,000 feet of water. 9108

H series - Crew of chalk 2 in flight of four became spatially disoriented and crashed into trees. All three people on board were killed. 9109

UH-1 Class B

H series - While hovering over runway, aircraft experienced failure of 90-degree gearbox and landed hard. 9110

UH-1 Class C

H series - Aircraft was trail in flight of five. During termination of approach, aircraft began settling in downwash of preceding aircraft. Pilot ran out of left pedal and lowered nose to gain airspeed. As aircraft turned right, pilot saw wires in flightpath. During successful attempt to miss wires, aircraft was overtorqued.

H series - While on approach at about 10 feet agl, student allowed aircraft nose to pitch up and down 12 to 15 degrees. During these unplanned movements, crew heard loud thump. IP suspected possible mast bumping and immediately took controls and landed. Tail rotor blades were damaged. Investigation continues.

UH-1 Class D

H series - As IP hovered aircraft off autorotation lane, intending to cross another autorotation lane, tower advised him to hold for landing traffic. IP was hovering perpendicular to slope, and when he decelerated, tail skid assembly hit ground. Flexing action of tail boom caused tail rotor drive shaft to contact tail rotor drive shaft cover, severing drive shaft. Aircraft began right turn, and IP initiated hovering autorotation. Aircraft was landed with no further damage.

UH-60 Class C

A series - During maintenance test flight for blade tracking, aircraft was shut down at field site for adjustment of main rotor pitch change links. After further test flight for blade tracking, at speeds up to 157 KIAS, right APU compartment door was found missing. Main rotor blades were damaged. Cracked forward hinge on APU door failed during flight, allowing door to be lost.

A series - During postflight, crew noticed APU door had been lost. Main rotor and tail rotor blades, tail rotor gearbox fairing, and APU door hinges were damaged.

UH-60 Class D

A series - While aircraft was accelerating to maximum continuous power, crew felt jolt. There was no abnormal effect on controls, and engine performance was normal. Suspecting cowling had been lost, pilot decelerated and landed. Cowling was recovered. Examination showed latch probably failed.

A series - While performing NVG slingload operations at low light levels in dusty conditions, crew allowed aircraft to contact load. Aircraft right front tire was damaged.

A series - Aircraft had made numerous landings into unimproved areas. During postflight, hole was found in VHF antenna. Puncture was caused by landing on stump.

A series - During short final to LZ, passenger mistook cargo window jettison handle for cargo door handle. Window was inadvertently jettisoned and hit main rotor blades.

Attack

AH-1 Class B

E series - During takeoff for NVG mission, aircraft encountered brownout conditions, and crew lost sight of ground. Aircraft hit ground and rolled onto its right side. Neither crewmember was injured. 9111

AH-1 Class C

F series - During approach to unimproved field site, aircraft's rotorwash blew rear door off parked OH-58. Door hit parked aircraft's rotors and forward transmission cowling and scraped against right windshield.

AH-1 Class D

E series - Crew found damage to tail rotor blades during postflight. Suspect tail rotors struck something during NOE flight.

AH-1 Class E

F series - During landing, PIC called out wires at 12 o'clock. Pilot replied, "Roger, I have the wires." PIC looked inside cockpit while folding map. When he looked back outside, he saw a 15-foot pole in flight path. PIC came on controls to prevent aircraft from striking pole and wires and aircraft was overtorqued. Pilot failed to recognize hazard in flight path to planned landing site.

F series - During PMD, crew chief noticed several dents in leading edge of both main rotor blades. During NOE flight, crew apparently misjudged clearance and allowed main rotor blades to hit tree. Crew also failed to conduct a postflight inspection.

AH-64 Class E

A series - During live-fire gunnery training, crew allowed left side of aircraft to scrape against cedar tree.

Class A Accidents through 2 January

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	4	2	2
	November	2	3	1	4
	December	3	2	4	3
2nd Qtr	January	2	0	4	0
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	9	33	9

Ammo bay latch was broken and trailing edges of three tail rotor blades were bent.

Cargo

CH-47 Class E

D series - When M60 machinegun jammed during performance of aerial door gunnery training, it was removed from mount and placed on helicopter floor. As ammo bag was removed during attempt to clear jam, bolt slid forward, chambered, and round was discharged, causing minor sheet metal damage. Weapon was reportedly rodded, but safety was not engaged.

D series - During cruise flight, No. 2 engine oil temperature fluctuated from 80°C to 155°C. All other engine indications were normal. Caused by failure of engine oil pump. Engine was replaced.

D series - During level flight at 120 knots, 600 feet agl, loud howling noise began coming from forward transmission, and crew felt unusual vibrations. Transmission was replaced.

Observation

OH-58 Class C

A series - While landing from hover, aircraft drifted slightly right, and right skid touched ground. Collective was lowered, and left skid contacted ground. Crew heard knock from transmission area as aircraft touched down.

C series - Crew was practicing unaided night landings. Aircraft landed hard, breaking tail boom.

OH-58 Class E

A series - Crew was conducting refresher training. During contour flight, IP looked at grade slip to determine which maneuvers remained to be done. As he looked outside to reorient himself on map, he spotted wires in front of aircraft that pilot on controls had not seen. When IP called out "wires," pilot attempted evasive action, but aircraft hit wires, breaking windscreen. Aircraft was landed with no further damage. Wires were marked on wire hazards map in cockpit, and a recent hazards survey had been conducted on the approved NOE route being used. Time was late afternoon and wires were in shadow, making them difficult to see.

A series - IP initiated simulated engine failure at hover. Student's reactions were normal until aircraft lightly touched ground. Student then used excessive aft cyclic and bottomed collective much too rapidly, resulting in spike knock.

C series - While following AH-64 during departure from battle position, PIC lost sight of lead aircraft. During right turn to relocate AH-64, PIC allowed aircraft to slightly contact ground. Pilots failed to monitor radar altimeter and rate of descent.

Fixed wing

C-12 Class E

D series - While ground taxiing aircraft, pilot began a pedal turn to right, using proper procedures. As aircraft was coming out of turn with full right rudder applied, crew heard loud popping sound. IP took controls and checked rudder. Aircraft was taxied back to parking with differential power. Caused by failure of barrel assembly.

OV-1 Class E

D series - During IFR descent from 8,000 feet to 4,000 feet msl, encoding altimeter malfunctioned. After leveling off at 4,000 feet, pilot noticed city lights were not in same position on windscreen as in previous flights. Feeling aircraft was lower than indicated by altimeter, he asked ATC to verify encoder and cockpit indicator readings of 4,000 feet msl. ATC vectored aircraft for ILS approach, and when aircraft landed at field with elevation of 200 feet msl, altimeter was reading 1,500 feet msl. Apparently AIMS encoder and cockpit indicator both malfunctioned, placing aircraft 1,300 feet lower than indicated.

U-8 Class E

F series - On takeoff, right main landing gear did not indicate up. After recycling, gear indication was same. Aircraft made uneventful landing, and indicator switch was replaced.

U-21 Class E

A series - Crew was conducting training in traffic pattern. When gear-up position was selected after takeoff, gear remained down and locked. After selecting down position and asking tower if gear appeared to be down, crew made uneventful landing. Maintenance found loose wire where crimped wire connector attaches to gear selector assembly.

Maintenance

CH-54 Class D

B series - As aircraft was run up for maintenance test flight, washer that had been lost during maintenance was thrown into tail rotor and propelled back to tail pylon. One tail rotor blade, first-stage hydraulic return tube, and skin of pylon were damaged.

OH-58 Class E

A series - During post-phase maintenance test flight, pilot found pedal inputs had no effect, and he could no longer control aircraft trim. Pilot declared an emergency and made a successful run-on landing. Investigation revealed bolts and nuts securing pitch change levers and one of the levers had separated from aircraft, causing loss of tail rotor pitch control. Further investigation revealed that during phase maintenance, no status symbol was placed next to writeup for removal of these parts. Therefore, replacement work was never signed off. Test pilot stated that when test flight was begun previous day, he remembered seeing bolts, nuts, and cotter pins in place during preflight. He could not remember if the parts were in place when he preflighted aircraft on day of the incident. Suspect parts were replaced incorrectly during phase maintenance. Technical inspectors failed to read and inspect all line entries in phase book, and crew chief did not discover deficiency during daily and preflight maintenance.

C series - As aircraft flew into FARP after recon mission, engine oil bypass light came on. Probable cause was improper installation of O-ring packing, which allowed oil to be lost.

C series - As aircraft was picked up to hover, crew smelled something burning. PIC felt resistance in cyclic and asked pilot if he was on controls. When pilot replied that he was not, PIC performed emergency procedure for control malfunctions. A baggie containing metal plate and screws was found in controls under pilot's seat.

Safety messages

•Aviation safety action informational message concerning tail rotor swashplate de-ice brush block removal on AH-64 aircraft operating in adverse desert environments only (AH-64-91-ASAM-01, 051930Z Dec 90). Summary: Reports have been received describing symptoms of rough or noisy bearings in the tail rotor swashplate assembly. Further investigation has revealed that sand intrusion into the tail rotor de-ice slip ring at the brush block assembly caused the symptoms of roughness and/or noise that occurred during aircraft operations in an adverse desert environment. Purpose of this message is to provide authority to remove the tail rotor swashplate de-ice brush block from aircraft not requiring de-ice capability while operating only in adverse desert environments. This course of action is to be implemented at the discretion of the maintenance officer and is to be tailored to the flight environment of the aircraft. Contact: Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

•Aviation safety action maintenance mandatory message concerning recurring erosion inspection of main rotor blade tip caps on all AH-64 aircraft involved in Operation Desert Shield (AH-64-91-ASAM-02, 071800Z Dec 90). Summary: Due to harsh operating environment during Operation Desert Shield, main rotor blade tip caps are experiencing high erosion rates. Preventive maintenance can avoid serious supply problem and improve mission-capable rates. Protective coatings and/or paint coverage shall be applied as a sacrificial coating to reduce erosion damage. Although this message addresses tip caps, rotor blades should also be maintained with regard to erosion IAW TM 55-1520-238-23-5. Purpose of this message is to require a recurring erosion inspection of main rotor tip caps on all AH-64s involved in Operation Desert Shield after each mission day. Contact Brad Meyer, DSN 693-9089, commercial 314-263-9089.

For more information on selected accident briefs, call AV 558-4198/3901, commercial 205-255-4198/3901.

2062. Information is for accident prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition. Direct communication is authorized by AR 10-29.

C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center

A false sense of security

The crew of an OH-58D was on a night vision goggle aerial gunnery training mission over water. The purpose of the mission was to maintain gunnery proficiency with 2.75-inch rockets and the onboard .50-caliber machinegun.

Using a floating flare as the target, the PIC began target engagement from about 50 feet above the water, at an airspeed of 60 knots. He climbed to about 80 feet, then fired as the aircraft descended toward the target.

After several successful engagements, the PIC, who was flying from the right seat, rolled out of a turn after disengaging the target. This time, he misjudged his altitude above the water and allowed the aircraft to continue descending until it hit the water and sank.

The aircraft was being flown with the doors removed. Although the helicopter was under water, both crewmembers were able to get out through the right cockpit door opening. Using chemical signal lights and a survival radio, they signaled the crew of another OH-58D who also had been practicing target engagements.

The crew of the second aircraft had seen the splash as the first aircraft hit the water and had begun flying toward the area. They lowered a ladder and attempted to extract both crewmembers, who had attached themselves to the single ladder. As they were lifted from the water, the ladder began spinning, and the aircraft's engine overtemped. The crewmembers were lowered back into the water. A UH-60 arrived and moved into position. Using a hoist, the UH-60 crew extracted the downed crewmembers, one at a time, from the water.

Accident factors

The PIC had a total of 1,230 rotary wing hours, with 276 in the OH-58D. He had accumulated a total of 166 hours of NVG time, 63 of which were over water. In the past 90 days, he had flown 46 hours in the OH-58D, of which 24 hours were flown NVG over water. So he was no novice at overwater NVG flight.

Although illumination was only 9 percent, the weather that night was the best the crew had encountered since the operation began. Waves of 1 to 2 feet made it easier to judge altitude and airspeed than it would have been if the water had been completely calm and motionless. The PIC was confident that he could maintain an altitude of 50 feet above the water, and he felt that the low altitude warning system would alert him if the aircraft descended below the setting of 20 feet above the water.

This time, however, something went wrong. The last altitude indication the PIC remembered seeing before hitting the water was 58 feet. If the low altitude audio went off, the crew didn't hear it; and if there was a visual signal from the radar altimeter, they failed to see it. These warning systems may have failed to operate as designed, or, without realizing it, one of the crewmembers might have unintentionally deactivated them.

The PIC was lulled into a false sense of security by overconfidence in himself, his aircraft, and his copilot.

The rescue attempt

When the crew of the second OH-58D attempted to rescue the downed crew, they exceeded the maximum allowable turbine gas temperature, and the torque indication was in the transient range. These conditions occurred because the PIC of the rescue aircraft ascended with near-zero airspeed, requiring a large amount of power. When the aircraft approached about 200 feet above the water, the oscillation of the SAR ladder with the downed crew on it increased, causing the PIC great difficulty in maintaining the aircraft within the flight envelope. This also was due to the near-zero airspeed.

Because of the altitude above the water and the NVGs' limitations at that altitude, outside references and contrast were reduced, adding to the PIC's workload. He made the proper decision when he put the crewmembers back into the water and waited for arrival of a larger aircraft.

The fact that the downed aircrewmembers had undergone the Navy's underwater egress training no doubt played an important part in their successful underwater escape from the sinking helicopter. This training and the availability of other rescue aircraft certainly contributed to the crew's survival.

Army aircraft are operating more and more over lakes and rivers as well as from the decks of ships at sea, making it increasingly important that crewmembers are trained in techniques that will assist them to egress from sinking aircraft and survive in the water.

Corrective actions

All aviators should be made aware of the illusions involved in nighttime overwater operations and the dangers of becoming overconfident in their ability to maintain a safe altitude over water at night.

Use of floating flares as targets during NVG operations is unsafe because the light intensity of the flares reduces the effectiveness of the NVGs. This is caused by a condition called "washout," which reduces visual references. This makes it difficult for the crew to judge altitude, airspeed, and attitude of the aircraft. ■

Aviator receives Broken Wing Award

CW2 Roger K. Garner, C Company, 1/145th Aviation Regiment, 1st Aviation Brigade (Air Assault), Fort Rucker. While assigned to B Company, 53d Aviation Battalion, 25th Infantry Division (Light) in Hawaii, CW2 Garner's knowledge and skill in dealing with an inflight emergency prevented damage to his aircraft and possible injury to the crew. CW2 Garner has received the Broken Wing Award for his actions during this emergency.

CW2 Garner was PIC of a UH-1 flying in chalk three position of a five-aircraft formation en route to a PZ to participate in an air assault mission. After about 7 minutes of flight, CW2 Garner had begun a descent for final approach when he felt feedback in the cyclic and heard a whining noise. The noise seemed to be coming from the transmission, and CW2 Garner thought something within the transmission was malfunctioning. He began searching for a suitable place to land.

All system instrument indications were within normal limits. As CW2 Garner turned to the left, away from the formation, the crew of No. 4 aircraft reported fluid and smoke coming from underneath No. 3 aircraft. When he attempted to lower the collective and apply antitorque pedals, CW2 Garner found the collective would not move, and the pedals were frozen in the neutral position.

Realizing he had hydraulic failure, he initiated a right turn to return to the airfield. There was no suitable alternative landing area in the rocky, mountainous terrain. The right turn was necessary because of active firing points located to the aircraft's left.

When the turn was completed, and the aircraft was in level flight, CW2 Garner told his copilot to pull the hydraulic control circuit breaker. There was no change. He then told the copilot to push the circuit breaker back in. There still was no change. Placing the hydraulic control switch in the off position had no effect. Neither the master caution nor the hydraulic segment light had illuminated since the onset of the emergency.

CW2 Garner elected to have the copilot stand by to assist on the controls instead of actually getting on the controls with him. With so slim a margin for error, counteracting control movements could have caused aircraft control to be lost.

During the flight to the airfield, the collective could not be moved up or down more than ½ inch (20 to 23 pounds of torque). The antitorque pedals could not be moved, and the cyclic could be moved only about ½ inch in either direction.

Winds at the airfield were from 110 to 130 degrees at 20 knots, gusting to 25 knots. Temperature was 20°C, and pressure altitude was 5,900 feet. With no pedal control, CW2 Garner removed the slack from the throttle to maintain heading control. The aircraft was about 2 miles from touchdown, at 200 feet agl, with a 100- to 200-fpm rate of descent. Unable to increase power, CW2 Garner moved the cyclic aft to maintain altitude, but not so much as to lose sufficient airspeed for a hydraulics-off maneuver.

CW2 Garner alternated a fore and aft movement of the cyclic to maintain airspeed and altitude. Airspeed fluctuated between 20 and 40 knots. When the aircraft was over the approach end of the runway at about 10 to 15 feet, CW2 Garner reduced throttle to 6400 rpm to align the aircraft with the runway. Throttle was further reduced to 6300 rpm at the touchdown point, and, after a ground run of about 125 feet, the aircraft came to rest 8 to 10 feet right of the runway center line.

CW2 Garner's skill in reducing operating rpm to align the aircraft on the runway was particularly important because of the lava rock surrounding the runway. Had he allowed the aircraft to leave the runway, damage to the helicopter and possible injury to the crew is likely.

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Flightfax

16 January 1991 Vol 19 No 7 REPORT OF ARMY AIRCRAFT ACCIDENTS

Wires claim two Black Hawks

Aircraft No. 1

The unit IP had been in-country for about a year and he was very familiar with the area that would be flown during the NVG training mission. He knew about the wire hazards; he used that area a lot for both day and NVG flights.

When the UH-60 arrived in the area for that part of the night's training, the copilot, in the right front seat, was on the controls. The crew chief was in the left jump seat behind the IP. All three crewmembers were wearing AN/AVS-6 NVGs.

The aircraft was about 350 feet agl, at 80 knots, as it flew along a valley. Ahead, running perpendicular to their flight path and invisible in the darkness, was a double set of four-strand power lines. The wires were blackened from corrosion and pollution, and the support poles were located on the hills about 450 feet above and on each side of the aircraft. The wires drooped to within 300 to 350 feet of the valley floor.

The main rotors struck a dual set of transmission lines at about 300 feet, and the aircraft continued on for about 550 meters before hitting the ground left-side-low. The IP was killed. The injured copilot and crew chief tried to remove him from the wreckage, but they were driven back by a postcrash fire.

Illumination on the night of the accident was only 7 percent, but when the route was flown during 60 percent illumination conditions, the wires could not be seen either with the naked eye or with NVGs. The wire support poles could be seen only after the aircraft hovered to within 200 feet of them.

The IP had 2,745 flight hours, 2,572 in UH-60s. He had 637 hours in Black Hawks as an IP and 281 hours of NVG experience. He had flown 63 hours in the past 90 days, and he was using NVGs during 21 of those hours. The wires the aircraft hit were marked on the map he was using, but he was using the Doppler navigational system to identify checkpoints along his route,

and he was not following closely on the map. Unsure of his exact location, he did not anticipate the wires and warn the copilot. Probably because he knew the area so well, he was overconfident in his ability to navigate the route under NVGs and avoid wires without identifying them on the map.

2 Aircraft No. 2

When the flight operations center (FOC) received a call that an aircraft might be down, they attempted to contact aircraft No. 1, which was now 30 minutes overdue. After receiving no response, they requested assistance from aircraft No. 2, another UH-60, that was conducting NVG refresher training in the area.

After an unsuccessful search of the area assigned to them by the FOC, the crew of aircraft No. 2 terminated their flight. A short time later, the FOC received a report confirming that an aircraft had crashed. A medevac aircraft that was training in the area was asked to proceed to what was thought to be the location of the crashed UH-60 (aircraft No. 1). By this time, aircraft No. 2 had been refueled and its crew also agreed to join the search for the missing UH-60.

About 15 minutes later, the crews of both aircraft heard an emergency locator transmitter beacon over their radios and saw lights on the ground that appeared to be emergency vehicles. After discussing the situation with the crew of the medevac aircraft, the crew of aircraft No. 2 decided they should shoot an approach to determine if this was the location of the downed aircraft. Aircraft No. 2 was chosen because its crew had a 1:50,000 map on which the grid and wire hazards were marked (the other crew had a 1:250,000 map). In addition, the medevac crew was not familiar with the area and the wire hazards; the crew of aircraft No. 2 was. The medevac aircraft was in a training configuration and did not have a full complement of medical equipment on board.

The crew of aircraft No. 2 were aware of the wires in the area, but, in their urgency to provide assistance to the downed crew, they did not follow the procedures in the ATM for locating and visually identifying wires. They should have located the support poles and guy wires to determine a safe altitude and approach angle to clear all known obstacles before initiating approach to the landing zone.

Shortly after beginning the descent, aircraft No. 2 struck a 7/16-inch wire about 350 feet above the valley floor. The wire contacted the aircraft just below the windscreen, rode up the windscreen, and tore off the pylon access cover. As the aircraft yawed 60 to 90 degrees nose left, its momentum snapped the cable, and the cable whipped into one of the main rotor blades. The severed cable draped down over other power lines, and the intense flash of light as the wires shorted out caused the aircrew's NVGs to shut down.

Both generator lights came on, and the stabilator failure horn and low rpm audio sounded. The pilot applied right pedal to correct for the yaw and added to collective to see if he had aircraft control. Once he determined the aircraft was controllable, despite its moderate to severe vibrations, the pilot radioed the orbiting medevac aircraft that he had hit a wire and continued his approach while looking for a suitable place to land. There was no further damage to the aircraft as it landed astride an earthen berm.

It wasn't necessary

If communications had been better, the pilot of aircraft No. 2 probably wouldn't have attempted to land because it wasn't necessary. The two surviving crewmembers of aircraft No. 1 had already been evacuated by local ambulance.

About 2¼ hours had elapsed between the crash of aircraft No. 1 and the arrival of aircraft No. 2 at the crash site. The initial delay in confirming that an aircraft was down was followed by some confusion about procedures to follow and who to contact for search and rescue assistance. Not knowing the condition of possible survivors probably contributed to the feeling of urgency that led the pilot of aircraft No. 2 to attempt to land in an area where he knew wires to be a hazard.

Although it did not contribute to the accident, there is no record that the crew chief on aircraft No. 2 had undergone any NVG training before or during his assignment to the unit. The pilot, who was qualified and current in NVG flight, and the copilot, who was qualified and undergoing refresher NVG training, failed to spot the wires with NVGs (illumination conditions during the flight of aircraft No. 2 were zero), and it is not likely that the crew chief would have seen them either. However, the unit was in violation of the MACOM regulation requiring two qualified and current NVG pilots and one NVG qualified and current enlisted crewmember as the minimum crew for UH-60 NVG flights. ■

Wire strikes can be a shocking experience

The hazards from an aircraft striking a wire aren't always limited to the aircraft crew. When an aircraft crashes after hitting high-voltage electrical lines, the potential exists for injuries or fatalities among ground rescue personnel.

When an OH-58 hit a three-strand set of high-tension wires and crashed, six ground personnel received electrical shock injuries while attempting to extract the seriously injured crewmembers from the wreckage. Only luck prevented the rescuers from being killed by contact with the severed high-voltage wires that were entangled in the wreckage.

Should you become involved in a rescue attempt where electrical wires are present and in contact with the aircraft, be sure to take the following precautions.

■ In all cases, if time permits, have the power company turn off power before touching the aircraft.

■ If power cannot be turned off and time is critical, use a nonconductive probe of fiberglass or dry wood (broom handle, 2x4, or an old dry tree limb) to remove the wire.

■ It may be feasible to loop a length of dry rope around the wire and pull it away from the wreckage.

■ Ensure that everyone involved in the rescue attempt knows that high-voltage wires are present, and the location of these wires.

A key thing to remember when approaching any accident site is to ascertain whether all hazards to the rescuers have been identified. Remember, if you injure yourself and become incapacitated you will be of little help to the other accident victims. An accident is a shocking experience without grabbing a live wire. ■

POC: MAJ Billie McMahen, Aviation Division, AV 558-4198/3901, commercial 205-255-4198/3901

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - While aircraft was being ground run, high winds caused main rotor tiedown rope to come loose. Tiedown struck tail rotor blades, damaging blades. Damage was overlooked during preflight inspection and was found by mechanic during postflight inspection.

UH-60 Class C

A series - During cruise flight at 500 feet agl, 140 KIAS, crew heard loud bang. There were no noticeable vibrations, change in flight performance, or other unusual noises, and flight was continued for about 20 minutes. Upon landing, crew discovered No. 1 engine cowling had separated from aircraft. Part of the cowling was still attached to aircraft; lost portion has not been located. Determination has not been made whether human error or materiel failure was involved.

UH-60 Class D

A series - During refueling, PIC noticed rear windows missing from left cargo door. Door had been secured to full-back locked position during airmobile operations.

Attack

AH-1 Class C

F series - During engine start, pilots heard unusual sounds, and PIC completed emergency shutdown. Both pilots noticed main rotor tiedown was still on one main rotor blade. After inspecting aircraft and finding no damage, pilots removed tiedown and continued mission. No damage was found during postflight inspection. Crew chief found damage during PMD. Incident is under investigation.

AH-1 Class D

S series - While hovering in confined area wearing NVGs, student pilot allowed aircraft to get too close to tree. Main rotor blades were damaged when they contacted tree branch.

AH-64 Class A

A series - Aircraft landed following maintenance test flight, and APU was started. APU fire light came on, aircraft was shut down, and crewmembers attempted to extinguish fire. Damage was limited to APU area. 9112

AH-64 Class B

A series - During night flight using PNVS, aircraft hit high-tension wires. Pilot was injured when wires penetrated canopy. Wires became entangled in main rotor blades, damaging blades. Aircraft landed hard, damaging right side and right landing gear. 9113

AH-64 Class D

A series - Immediately after takeoff, pilot felt binding in tail rotor pedals and landed.

Access panel had shifted aft, contacting engine drive shaft, damaging coupling assembly and access panel. Unknown person had removed and reinstalled access panel incorrectly. Crew failed to notice improperly installed access panel during preflight.

Cargo

CH-47 Class D

D series - Aircraft made a precautionary landing in snow-covered area because internal fuel tanks were not transferring fuel. Upon landing, aircraft landing gear broke through ice, damaging gear housing.

CH-47 Class E

D series - Upon termination of approach at a 20-foot hover, rear cargo door fell off. Undamaged door was recovered. Emergency release assembly malfunctioned, allowing locking links to disengage. Emergency release handle was still saftied in locked position.

Observation

OH-58 Class D

C series - While approaching a ridgeline at 90 KIAS and 90 percent torque, pilot initiated cyclic climb and overtorqued aircraft at 100 percent for 1 second. Pilot's failure to plan climb far enough in advance resulted in need for excessive engine power to clear ridgeline.

OH-58 Class E

A series - Crew was performing confined area landings with forward airspeed to dry river bed. Aircraft touched down slightly past intended landing point, slid into soft sand, and pitched forward. Underside of forward fuselage contacted ground. As aircraft started to settle back level, IP took controls and applied forward cyclic and slight increase in collective to minimize pylon/aircraft oscillations.

A series - When throttle was rolled from 100 percent to idle during engine shutdown, throttle went past idle stop and TOT climbed to about 920°C. Starter generator was immediately engaged, and TOT began decreasing. Pilot failed to ensure that idle detent was not depressed as he rolled throttle off. Instead of using left hand on throttle and right hand to depress idle release button, pilot used left hand on throttle and left thumb to depress idle release stop. Without his realizing it, idle release button was depressed as throttle was rolled off. There are no standard procedures for this action, but most pilots use two hands to prevent inadvertently depressing idle stop release button.

Fixed wing

C-12 Class E

D series - IP initiated simulated engine failure on No. 2 engine by placing power lever in idle position. As power was reduced, IP noticed top portion of engine cowling on No. 2 engine was coming loose. Crew declared emergency and landed. After engine cowling was removed during previous maintenance, mechanic failed to verify camlock was properly engaged. During preflight, cowling latch appeared to be in secure position. When checked, cowling felt secure.

D series - Tire on nose wheel went flat during landing, and aircraft was taxied off runway.

D series - IP demonstrated in-flight engine failure with autofeather armed. During successful engine restart, propeller failed to come out of feather. Aircraft made single-engine landing. Caused by failure of autofeather dump solenoid in overspeed governor.

L series - After performing descent and level-off during single-engine operation, engine was restarted. Attempt to bring left propeller out of feather was unsuccessful, and aircraft was flown single engine to airfield. Caused by faulty solenoid on engine.

OV-1 Class E

D series - Deer crossed runway in front of aircraft during landing, striking nose wheel assembly and underside of aircraft.

D series - During takeoff climb at 500 feet agl, pilot entrance hatch opened, damaging entrance assembly.

For more information on selected accident briefs, call AV 558-4198/3901, commercial 205-255-4198/3901.

Class A Accidents through 16 January

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	4	2	2
	November	2	3	1	4
	December	3	2	4	3
2nd Qtr	January	2	2	4	0
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	11	33	9

use for punitive purposes or matters of liability, litigation, or competition. Direct communication is authorized by AR 10-29.

C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center

CY 90 Flightfax index

AH-1 pilot thought he had a tail rotor failure after tail rotor struck tree—11 Apr

AH-1 fuel control assemblies — 5 Dec

AH-64 crashes after unsecured door-locking device hits tail rotor—4 Jul

AH-64 hits wire after earlier errors indicate pilot's distraction—15 Aug

AH-64 engine anti-ice valve check—24 Oct

Aircraft get cold too (effects of cold weather on aircraft)—12 Sep

Aircrew coordination: Don't take it for granted (study identifies crew coordination failures and profiles in which these failures resulted in accidents)—5 Dec

ALSE note (correct underwear for flight suits)—31 Jan

Army joins honor roll (agencies achieving 70-percent safety belt use)—7 Nov

ASO correspondence course (where courses may be obtained)—14 Feb

Attention medevac personnel (accident review). Injury caused by civilian rescue team failing to proper secure patient in litter for hoist operation—18 Jul

Attention UH-60 pilots (pilots needed to participate in research at U.S. Army Aeromedical Research Laboratory)—14 and 28 Feb

Avoiding droop stop pounding in the Black Hawk—6 Jun

A well-earned thank you (to people in the field)—17 Jan

Broken Wing awards (recipients and synopses of emergencies for which awarded)—17 Jan, 14 Mar, 11 Apr

Built a better mousetrap lately? (Share your ideas on how to improve something or solve a problem with *Flightfax* readers)—20 Jun

C-12 hits parked aircraft while taxiing—29 Aug

CH-47 damaged during disaster relief operation (pallet used to slingload sandbags hits aircraft)—20 Jun

Centralized accident investigation...what it is, how it works—9 May

Close call (pilot allows UH-60 to descend into trees)—20 Jun

Controlling hazardous waste (way to prevent spilled hazardous materials from contaminating ground water through hangar drainage systems)—20 Jun

Cooling care (importance of cooling gas turbine engines before shutdown)—18 Jul

Correction to article in 23 May issue on crashworthiness of aircraft—29 Aug

Crashfax video available (announcement of latest Crashfax and NVG videos)—12 Sep

Crashworthy helicopters save lives and equipment (how design improvements save lives)—23 May

Crew error in night rotary wing accidents (results of study and operational situations in which night crew errors occurred)—24 Oct

CY 89 Flightfax index—28 Feb

Effects of ice on safe operations (icy conditions that lead to accidents)—26 Sep

Engine anti-ice valve check on UH-60 and AH-64 helicopters (importance of taking appropriate action when stuck valve is encountered)—24 Oct

Everybody knew, but where were the leaders? (accident review). Soldier was a well-known high-risk driver, but nobody stopped him before he had an accident and killed himself—7 Nov

Familiarity can breed overconfidence (importance of understanding aircraft's capabilities in mountain environment)—17 Jan

50 below and nowhere to go (building a safe survival shelter)—12 Sep

First quarter FY 90 accident losses (poster showing number and types of aircraft destroyed and number of fatalities)—17 Jan

5 Cs (poster for inadvertent IMC encounters)—10 Oct

Flying blind in a cloud of dust (accounts of accidents caused by brownout)—25 Apr

Flying in the snow (accounts of some who didn't do it right)—26 Sep

FOD conference scheduled (twice yearly conference scheduled in Sep)—18 Jul

Foreign object damage to fixed wing aircraft (most damage caused by objects picked up from ramps and taxiways and ingested by aircraft's engines)—15 Aug

Fourth quarter FY 90 accident losses (poster showing number and types of aircraft destroyed and number of fatalities)—24 Oct

Gear up for the battle (importance of using automobile restraints)—7 Nov

He thought it was a tail rotor failure (accident review). Following tree strike with tail rotor, pilot thought he had a tail rotor failure—11 Apr

He wasn't safe to fly (accident review). AH-64 hits wire after ear-

lier errors indicate pilot's distraction—15 Aug

Hotline available for questions on ATMs—31 Jan

How far is too far? (account of flight that could have been another IMC accident)—28 Mar

How important is maintenance to you? (includes account of how maintenance error caused loss of aircraft)—29 Aug

Icing...don't let it get you down (where icing occurs and how to avoid its hazards)—26 Sep

IMC claims another victim (accident review). OH-58 crew encounters IMC and crashes—1 Aug

IMC encounters can be deadly (number of Class A accidents from IMC Oct 84-Feb 90)—28 Mar

Investigating human error the "standard" way (large portion of human-error accidents tied to standards failure)—9 May

It all caught up with him (accident review). OH-58 pilot flies into IMC and crashes—10 Oct

It could have been catastrophic (U-21A in-flight fuel leak, caused by use of wrong size preformed packing, could have resulted in loss of aircraft)—21 Nov

It just makes you sick! (accident review). OV-1 pilot performs prohibited maneuver and crashes—14 Mar

It's not over until it's over (accident review). C-12 hits parked aircraft while taxiing—29 Aug

It's that time again (weather hazards to safe operations)—6 Jun

It's the little things...(maintenance key to safe aviation operations)—9 May

Mechanic's creed—29 Aug

NVD messages available on computer diskette (how to obtain)—31 Jan

NVD message computer diskette (list of messages available and update on how to obtain the diskette)—4 Jul

OH-6 and OH-58 gas turbine engines need to be cooled properly before shutdown—18 Jul

OH-58 blades mesh during shipboard landing—14 Feb

OH-58 encounters IMC and crashes—1 Aug

OH-58 pilot flies into IMC and crashes—20 Oct

OV-1 pilot performs prohibited maneuver and crashes—14 Mar

Old man winter can do you in (preparation key to safe cold weather operations)—12 Sep

Peak training season: Zeroing in on the problems (peak training months also peak accident months)—18 Jul

Planning key to safe deployment (prior planning critical to reducing risks)—5 Dec

Putting it all together (accident review). UH-60 pilot's actions cause aircraft to crash although it was capable of single-engine flight—1 Aug

QDRs do make a difference (accounts of how QDRs have been used to effect improvements)—23 May

Quality deficiency reports... making the system work for you (how QDRs can be used to improve equipment)—23 May

Recap of FY 90 AVSCOM SOF messages—28 Feb, 25 Apr

Reconstruction of a crash (reconstruction of unbelted driver crashing into tree at 55 mph)—7 Nov

Rotors can be deadly (need to be cautious around operating aircraft)—20 Jun

Safety of flight messages (revision of AR 95-3 changes SOF messages and establishes ASAM (aviation safety action messages)—21 Nov

Safety of flight messages

•AH-1 inspection for gap between spline plate and extension on main rotor mast—17 Jan

•Army-wide health risk assessment cardiovascular screening program and aviation-wide aeromedical cardiovascular screening program for aviation personnel—17 Jan

•OH-58A/C and H-6 one-time inspection of engine-mounted fuel line clamps—31 Jan

•CH-47D extension of combiner cooling fan drive shaft inspections and finite life increase of oil cooler fan—31 Jan

•CH-47D ungrounding requirements for 53 aircraft with history of fan failures "fan eaters"—14 Feb

•CH-47D recurring eddy current inspection of engine cross shafts—14 Feb

•UH-1H/V and EH-1H/X inspection of swashplate outer ring assembly—28 Mar

•AH-1P, AH-1E, and AH-1F inspection of aircraft power transformers—28 Mar

•CH-47C cargo hook/winch control load release button guard—11 Apr

•OV-1 inspection of elevator trim tabs and rudder trim tabs—11 Apr

•AH-1 and UH-1M main rotor pitch horn bolts—25 Apr

•CH-47D extension of vibration test on combining transmission cooling fans—25 Apr

•OH-58D update to fuel boost pump procedure change—25 Apr

•CH-47D inspection of aft transmission cooling fan assembly—9 May

•CH-47 inspection of forward transmission barrel nuts—6 Jun

•CH-47D inspection of forward transmission mounting nuts—6 Jun

•CH-47C/D inspection of pitch link retaining hardware—6 Jun

•UH-1H/V and EH-1H/X inspection and replacement of P/N AN320-6 nuts—4 Jul

•OH-58A and C inspection and replacement of P/N AN320-6 nuts—4 Jul

•U-8 and T-42 inspection/modification of fuel filler and fuel filler caps—4 Jul

•AH-1 inspection of swashplate and support assemblies.

•CH-54 inspection and replacement of P/N AN320-6 nuts—18 Jul

•UH-1 inspection of improved

particle separator—1 Aug

•AH-1 inspection and replacement of P/N AN320-6 nuts—1 Aug

•OH-58 and OH-6 discrepant splined adapters on engines—1 Aug

•U-8 and T-42 inspection/modification of fuel filler and fuel filler caps—1 Aug

•CH-47 inspection of fuel pump electrical ground on D model and revision to fuel system emergency procedures for all CH-47C/D aircraft—15 Aug

•OH-6 and OH-58A/C maintenance instructions for Casey heater system—26 Sep

•OH-6A inspection of main and tail rotor control tubes—26 Sep

•CH-47D inspection and modification of hydraulic line clamps—10 Oct

•CH-47D inspection and removal of forward transmissions containing suspect rotor shafts—10 Oct

•OH-58 and OH-6 inspection of aircraft equipped with Casey heater used with T63-A-700 engines—10 Oct

•OH-58A/C inspection and recall of tail rotor blades—10 Oct

•OV-1D/RV-1D inspection of elevator trim tab attachment hinge brackets

Second quarter FY 90 accident losses (poster showing number and types of aircraft destroyed and number of fatalities)—11 Apr

Severe weather update (lessons learned from fast-moving storms and high winds)—25 Apr

Slingload accidents (synopses, causes, training, load certification, and improvements)—31 Jan

Somebody has to take care of the little things (what happens when the maintenance system breaks down)—29 Aug

So you think you know the enemy (special issue on POV safety)—7 Nov

STACOMs for CY 90—31 Jan, 14 Feb, 28 Feb, 11 Apr, 6 Jun, 20 Jun, 4 Jul, 24 Oct

Swallowed up by the weather (accounts of flight into instrument meteorological conditions)—28 Mar

System safety, what does it mean to you? (historical perspective, how it affects the aviator, and what aviators can do to make it work for them)—23 May

Testing fire detectors (don't use blue- or clear-lensed flashlights to check fire detectors on UH-60, AH-64, and C-12 aircraft)—15 Aug

The big little things (accidents caused by objects picked up by rotorwash)—14 Mar

The pace never slowed (accident review). UH-1 pilot joins search for downed aircraft, encounters IMC, and crashes—10 Oct

There could have been another accident (UH-1 crew joins search for downed aircraft at night without NVG-equipped observers on board)—10 Oct

There was little margin for safety (accident review). Effect of wind on aircraft operating near maximum power available—17 Jan

There was more than one person at fault (accident review). Blades on OH-58s mesh during shipboard landing—14 Feb

Third quarter FY 90 accident losses (poster showing number and types of aircraft destroyed and number of fatalities)—15 Aug

Thunderstorm do's and don'ts—6 Jun

Tree strikes and you're out (accident review). After two aborted takeoff attempts, pilot allows main rotors to hit trees—5 Dec

U-21 in-flight fuel leak caused by use of wrong size preformed packing—21 Nov

UH-1 pilots run into trouble while operating in mountain environment—17 Jan

UH-1 in-flight emergency caused by chafed hydraulic line. Copilot may have turned off fuel switch during emergency—18 Jul

UH-1 civilian rescue team fails to properly secure patient for hoist operation—18 Jul

UH-1 maintenance error causes aircraft to be lost—29 Aug

UH-1 pilot joins search for downed aircraft, encounters IMC, and crashes—10 Oct

UH-1 crew joins search for downed aircraft at night without NVG-equipped observers on board—10 Oct

UH-1 helocasting fatality result of taking unnecessary risks—21 Nov

UH-1 main rotors hit trees after two aborted takeoff attempts—5 Dec

UH-60 effect of wind on aircraft operating near maximum power available—17 Jan

UH-60 oil cooler spline wear (warning on importance of using correct oil cooler and inspection procedures on H-60 aircraft)—14 Feb

UH-60 pilots needed for research at U.S. Army Aeromedical Research Laboratory—14 and 28 Feb

UH-60 droop stop pounding (how to avoid)—6 Jun

UH-60 pilot mistakes allow aircraft to descend into trees—20 Jun

UH-60 pilot's actions cause aircraft to crash although it was capable of single-engine flight—1 Aug

UH-60 anti-ice valve check—24 Oct

Unsecured door-locking device causes crash of AH-64 (accident review). Aircraft crashes after unsecured door-locking device hits tail rotor—4 Jul

Warning—do not adjust fuel control assemblies on AH-1—5 Dec

We need your input (Army Safety School requests field input during review of aviation safety training)—21 Nov

What can be done? (importance of training aviators to assess risks to avoid unforecast weather)—10 Oct

What you don't know can hurt somebody (warning about rotor

safety)—25 Apr

When things start going wrong...(accident review). In-flight emergency caused by chafed hydraulic line. Copilot may have turned off fuel switch during emergency—18 Jul

Who's controlling the risks? (accident review). Taking unnecessary risks results in helocasting fatality—21 Nov

Why do aircraft fly into one another? (failure to clear aircraft during turns)—28 Feb

Why do I do it? (account by Air Force maintenance technician of why he chooses to do the job he does)—29 Aug

Why do wire strikes continue to happen?—15 Aug

STACOM

Third copy of DA Form 759 series documents for IPs, SIPs, and IFEs

Table 2-1 of AR 95-3 specifies that the *third* copy of DA Form 759 series documents for instructor pilots, standardization instructor pilots, and instrument flight examiners be forwarded to Commander, USAAVNC, ATTN: ATZQ-ESO, within 60 days of closeout.

Effective immediately, the above requirement is rescinded. Distribution of the original and first and second copies of these documents should continue as prescribed in the regulation.

USAAVNC point of contact is Mr. William Rowe, ATZQ-ESO, AV 558-2501/4691, commercial 205-255-2501/4691.

Return of 1991 answer sheets for Army Aviation Annual Written Evaluation (AAAWE)

As a result of recommendations from the Annual Brigade Commanders' Conference, the Directorate of Evaluation and Standardization (DES) will eliminate the requirement that 1991 answer sheets for the AAAWE be returned to the Aviation Center.

Test control officers are still required to document completion of the annual written evaluation and to place the document in the Individual Aircrew Training Folder. DES recommends that these answer sheets be kept on file for 1 year.

USAAVNC point of contact is Ms. Marilyn Rarick, ATZQ-ESE-AW, AV 558-6571/2415, commercial 205-255-6571/2415.

CY 90 STACOM index

STACOM 138, 31 Jan
- UH-1 performance planning

STACOM 139, 14 Feb
- Authorized modifications of AN/PVS-5A NVG faceplates
- Counterweights for NVGs

STACOM 140, 28 Feb
- Aircrew training manual update
- Army Annual Aviation Written Evaluation (AAAWE)
- Medical Service Corps advisor to DES
- CY 89 STACOM index

STACOM 141, 11 Apr
- Documenting flying performance

STACOM 142, 6 Jun
- UH-60 emergency procedures

STACOM 143, 20 Jun
- EH-60 aircrew training program requirements

STACOM 144, 4 Jul
- NVG training program for nonrated crewmembers

STACOM 145, 24 Oct
- Documenting NVD qualification and flight time for nonrated crewmembers
- Submission of additional tasks (3000 series) to DES

STACOM 146 **16 Jan 91**

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208, AV 558-6309/3504. Information published here generally precedes the formal staffing and distribution of Department of the Army official policy. This information is provided to all commanders to enhance aviation operations and training support.

Chris Sieving

Immanuel C. Sieving III
Lieutenant Colonel, Aviation
Director, DES

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Fort Rucker, AL 36362-5163

Flightfax
30 January 1991 Vol 19 No 8 REPORT OF ARMY AIRCRAFT ACCIDENTS

Refueling accident injures student pilot

It was about an hour before midnight when an OH-58C landed at a hot refueling point. The IP stayed in the cockpit while the student pilot climbed out to stand fireguard. The refueler, whose duty day had begun about 21 hours before, inserted the closed circuit refueling (CCR) nozzle into the aircraft refueling port and fuel began pumping into the fuel cell.

The refueler didn't know that inside the CCR nozzle, the dog ring (PN DG270-20-6) had broken in several places, causing the stay-back rod to fall out of position and wedge between the sleeve subassembly and the pre-formed packing.

While it did not affect the normal function of the flow-control handle and valve, this malfunction would prevent the CCR nozzle from automatically closing if it were detached from the aircraft with the fuel flow handle in the flow position.

Student pilot suffered second-degree burns, and OH-58C received Class C damage during hot refueling accident.

As fuel was pumped into the aircraft, the tired refueler (he had not been on duty continuously but had had no substantial rest during this time period) failed to notice that his fingers were wrapped around the CCR's release cable. When he pulled aft to close the fuel flow handle, he also pulled aft on the CCR release cable, thus disconnecting the CCR nozzle from the fuel port. The stay-back rod prevented the automatic fuel shutoff feature from functioning, and fuel sprayed over the fireguard and ignited, seriously injuring him and damaging the aircraft. Instead of placing the fuel flow handle in the closed position before disconnecting the nozzle, the refueler had inadvertently disconnected the CCR nozzle from the fuel receptacle with the fuel flow handle still in the flow position.

How did it happen?

The cable release handle, which is used to release the nozzle from the aircraft fuel receiver, apparently had become unserviceable. The original handle

had been replaced with stiff copper wire. This "field expedient" loop or handle was slightly longer than the original insulated cable release handle. In addition, when pressure was removed from the stiff copper wire, it did not move down and away from the flow control handle as did the original flexible cable release handle.

The tired refueler, refueling an aircraft at night while wearing heavy leather gloves, probably wrapped his fingers around this "field expedient" release handle while the fuel flow handle was in the flow position. With his hand in this position, simply grasping the flow control handle would have inadvertently caused the nozzle to disconnect. The aft and down direction of travel of the flow control handle was basically the same as that required to release the CCR nozzle from the aircraft fuel receptacle. The refueler does not remember noticing any indications that the fuel cell was full, nor does he remember attempting to shut off the fuel flow. But the student pilot, who was standing next to the right cockpit door, near the refueling port, stated the refueler's motions appeared to substantiate that this is what happened.

When is a field expedient not expedient?

So the question is, "When is a field expedient not expedient?" The obvious answer is, of course, when it causes or contributes to unsafe operations that can (and often, do) result in an accident such as this and the near loss of an aircraft and major injuries to an aircraft crewmember. The cable release handle that was replaced by the stiff copper wire would have cost only a few dollars to replace. The accident that resulted from this field expedient, along with the resultant personnel injuries, cost more than $75,000 and hospitalized the student pilot for 22 days with an additional 14 days of convalescence time.

Although the student pilot received second-degree burns to his face, neck, upper arms and upper legs, his Nomex flight suit protected his body from direct contact with the flames and substantially reduced the severity of his injuries. The night vision goggles he was wearing also shielded his upper face.

Other lessons learned

There are several additional lessons to be learned from this accident:

- The place where the fireguard was standing—near the aircraft's right door and close to the fuel port—contributed to the severity of his injuries. This choice of location placed him at high risk in the event of a fuel spill, particularly one such as this where the nozzle disconnected and began spraying fuel. Another location would have been safer, and he could have performed the duties of fireguard just as effectively.
- During the refueling operation, the IP was filling out the aircraft logbook. By doing so, his attention was not focused on the refueling operation. The first indication he had of the emergency was when he heard the word "fire" over the ICS. He attempted to close the throttle, but the logbook was in his way. The logbook might also have interfered with the IP's first attempt to release his seatbelt. There is little doubt that the IP's focus on filling out the logbook cost him several seconds by delaying his recognition of the emergency and by interfering with his attempts to shut down and exit the aircraft. While it is common practice for pilots to fill out the logbook during refueling operations, the inherently hazardous nature of hot refueling demands the full attention of all involved. The logbook should be filled out after refueling has been completed.
- Written procedures in FM 1-104 and FM 10-68 do not require a fireguard during refueling operations and offer no recommendations as to where a fireguard should be positioned. This accident supports the contention that the refueler cannot be expected to function effectively as a fireguard in an emergency. If an accident occurs, at best he will be extremely busy, and quite possibly will be a victim himself.
- Refuelers and safety observers should be fully trained on how the CCR nozzle functions and in the use of fire extinguishers. The refueler in this accident had never been trained on the use of fire extinguishers. Although the safety observer had attended a fire-training class about 1½ years previously, he could not remember having attended. The IP was able to smother the fire on the student pilot, and the crash truck extinguished the aircraft fire.

Use of closed-circuit refueling greatly reduces the dangers of hot refueling, but we must never forget the inherent hazards of fuel handling and take every possible precaution to ensure the safety of everyone involved. ■

—POC: Mr. John Garner, Investigation Division, AV 558-3262/3820, commercial 205-255-3262/3820

Do you believe in caution lights?

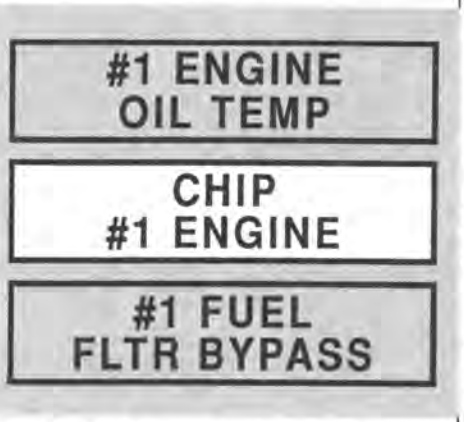
The UH-60 crew had completed the service mission with no problems. After landing for lunch and to refuel, they took off for the return flight to their home station. They would make one stop en route to drop off a passenger.

The first 10 minutes of flight were uneventful, then the No. 1 engine chip light began to flicker. There were no abnormal engine indications, and, after discussing the problem, the pilot and copilot decided the caution light was probably caused by a loose wire or salt-water corrosion. So they continued on.

When the aircraft landed to drop off the passenger, the chip light went out. But after departure on the last leg of the flight, the No. 1 engine chip light again began to flicker, then changed to steady.

Still, instead of following the emergency procedure for an engine chip light, the crew continued to fly. That would prove to be a bad decision. Only a minute later, the crew heard grinding and popping noises coming from the No. 1 engine. After another 3 seconds, with the aircraft at 400 feet and 100 knots, the engine failed.

The pilot told the crew they had an engine failure. Then he noted that main rotor rpm was dropping. In a vain attempt to regain rotor rpm, the pilot reduced collective and airspeed, but he was unable to maintain altitude with only the No. 2 engine producing power.



At 200 feet agl, the pilot began autorotation. At 100 feet, he started decelerating in preparation for landing in the trees. The aircraft was at 75 feet agl when the pilot spotted a small clearing. Applying collective pitch to clear a tree in his flight path, he maneuvered the aircraft toward the clearing. The helicopter fell vertically from 5 feet and hit the ground with minimal forward airspeed, coming to rest upright with the No. 2 engine running. Although there was substantial structural damage to the aircraft, no one on board was injured.

The reason the No. 1 engine failed was deterioration of the No. 4 bearing. This wasn't the first time the bearing had failed; 175 flight hours before this accident, the engine had been rebuilt for the same mechanical failure.

When they did their performance planning, the crew correctly calculated that they could sustain flight with only one engine. But when the No. 2 engine was analyzed after the accident, a power reduction of 11 percent was found. The reduction of power was caused by FOD and erosion. The crew had not detected the reduction of power while performing the HIT check.

The outcome of this in-flight emergency was determined by a lot of ifs:

- If the crew had believed the caution light, they would have executed the emergency procedure when the No. 1 engine chip light came on.
- If they had executed the emergency procedure, they would have discovered that they did not have sufficient power on the No. 2 engine to maintain straight and level flight.
- If they had detected the problem with the No. 2 engine before the No. 1 engine failed, they would have had time to make a power-on landing at an airfield about 3 miles away.
- If they had done all of these things, this crew could have prevented about $350,000 in additional damage to an aircraft. ■

When he wrote this article, MAJ Linear Royer was with the Safety Center's Aviation Division. He recently deployed to Saudi Arabia.

Correction

An article on aircrew coordination in the 5 December 1990 issue of *Flightfax* states that crew coordination failures were responsible for approximately 74 percent of all Class A through C rotary wing flight accidents. This is incorrect; the article should have said that 13 percent of all Class A through C rotary wing flight accidents were caused by crew coordination failures. The 74 percent figure was the percentage of accidents involving human error of any type, including crew coordination. ■

Kather named Army aviation trainer of the year

CW4 Michael S. Kather, a standardization officer with the Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker, has been named the 1990 Army Aviation Association of America Trainer of the Year.

The AAAA award, sponsored by CAE-Link Corporation, is presented each year to the military or civilian trainer who has made an outstanding individual contribution to Army aviation.

The award cited CW4 Kather's leadership of the Air-to-Air Stinger New Equipment Training Team, which supported fielding of air-to-air Stinger missiles to Army units worldwide. This effort encompassed establishment of a fielding schedule and actual fielding of the air-to-air Stinger missiles to major aviation units deploying to Southwest Asia. In addition to serving as team leader, CW4 Kather recommended changes to the missile guidance system which, when implemented, improved the accuracy of the missile. ■

IP receives Broken Wing Award

CW4 Earl R. Young, AASF No. 1, Hawaii Army National Guard, Honolulu, HI.

CW4 Young was IP of a U-21A on a routine night training flight. The aircraft, flying IFR in heavy clouds, was on approach to an airport about 30 nm away. As the U-21 descended from 9,000 feet in instrument meteorological conditions, the pilots felt a surge in the right engine with an accompanying loss of engine and propeller rpm. As the power lever was moved to the idle position, the right engine caught fire.

...while performing flight duty...displayed extraordinary skill, judgment, and technique during an in-flight emergency. In spite of extreme circumstances which might have led to catastrophic results, a successful landing was achieved through application of the highest degree of proficiency and discretion.

CW4 Young secured the right engine and told the pilot to turn off the right fuel shutoff valve, right fuel boost pump, and the fuel transfer and crossfeed switches. As the fire in the right engine continued to burn, white-hot flames could be seen coming from the exhaust stacks. The terrain below was hilly and dotted with volcanic cones. CW4 Young declared an emergency with Hilo approach control and was vectored to a more direct route to the airport, with continued descent to 2,000 feet.

At 20 miles out, CW4 Young took the controls. As the aircraft descended through 2,000 feet, the engine fire extinguished itself. At 10 nm, he reported the airport in sight and was cleared to land on any runway.

As the crew went through the before-landing checks, they discovered that the flaps were not operable (they later learned the flap motor had burned out). CW4 Young made a single-engine landing with zero-degree flap and no further damage to the aircraft. ■

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-60 Class A

A series - Aircraft encountered crosswind during landing and crashed. One person was killed and six others were injured. 9114

A series - External load comprising a basic shop test facility and avionics equipment was dropped from about 300 feet. 9115

UH-60 Class C

A series - During straight and level flight, crew heard and felt thump in airframe. Cyclic made uncommanded fore and aft movement of about 1/2 inch. Crewmember reported No. 1 engine cowling had been lost. Engine cowling was damaged beyond repair, and one main rotor and tail rotor blade were damaged.

Attack

AH-1 Class A

F series - While aircraft was taxiing to refueling point, skid caught on PSP (perforated steel planking) and aircraft flipped over. There were no injuries. 9116

AH-1 Class D

F series - Aircraft's main rotor blades hit a tree, causing minor damage to stainless steel abrasion plate and leading edge of blades. Neither pilot noted any indication of tree strike during flight nor did they find damage when tying down blades after landing. Damage was not noticed during postflight or daily inspection, although one dent was 6 1/2-inches long and 1/4-inch deep. Mechanic found and reported damage following day.

AH-1 Class E

F series - During climbout, crew noted airspeed indicator reading was zero. During hover checks, all indications were normal. Drain plug for pitot static system was found missing. While performing 50-hour inspection, one crew chief removed drain plug but failed to record what he had done. Another crew chief completed the work and, because there was no written entry, he did not check drain plug.

AH-64 Class A

A series - Pilot night vision sensor failed during night flight. Aircraft crashed while attempting to land, injuring both crewmembers. 9117

Cargo

CH-47 Class A

D series - During flight carrying internal and external loads, aircraft's No. 2 engine exploded. Crew made an emergency descent and landed hard. Aircraft and internal load were destroyed by postcrash fire. Two crewmembers sustained back injuries. 9118

CH-47 Class C

D series - Aircraft took off from PZ with external load consisting of an M101A2 and an A22 bag. About 3/4 mile from PZ, load was dropped about 250 feet into vacant area behind two buildings. IP had pressed his floor mike to communicate with tower, and crew felt a jarring in aircraft as crew chief reported load had released. About 3 seconds later, openhook light came on.

CH-47 Class D

C series - During external-load training, ground personnel noticed aircraft forward tunnel cover was open. Crew released practice load and landed. Suspect fasteners had not been secured.

Observation

OH-58 Class C

C series - Aircraft encountered brownout conditions during daytime flight and crashed.

OH-58 Class E

A series - During hovering flight, copilot dropped kneeboard. It struck right chin bubble, making a 4-inch hole in Plexiglas. Outside free air temperature was minus 10°C, and Plexiglas was brittle.

Fixed wing

C-12 Class D

H series - Aircraft was ascending through flight level 210 when left cockpit window broke. Rapid decompression pulled pilot's head into window opening, cutting his forehead and tearing headset off. Crew donned oxygen masks, and copilot took controls and descended below 10,000 feet until aircraft could be landed.

U-21 Class C

A series - With aircraft in cruise/climb mode, copilot noticed oil pressure gauge for No. 1 engine was fluctuating. When pressure dropped to 50 to 60 psi, PIC reduced N1 to 70 percent and landed. After landing, and before shutdown, oil pressure dropped to 20 psi. Engine temperature did not exceed 60°C. Postflight inspection revealed oil cap was not secured, and about 6 quarts of oil had been lost. Oil cap probably was not properly secured during preflight.

U-21 Class D

H series - During routine inspection, maintenance personnel noticed chipped paint on lower nose gear assembly where it is welded to strut assembly. Paint was removed, and crack in weld was found. Further inspection revealed damage to nose gear actuator and hanger bearings. Probable cause was side loading to gear assembly or allowing nose gear to touch down before main gear.

Maintenance

U-21 Class E

A series - During takeoff roll, aircraft

drifted left, requiring full right rudder to maintain on center line. After rotation, nose continued to turn left, and full right rudder would not correct condition until airspeed increased above 150 knots. Inspection revealed right rudder cable was broken. Cable had been incorrectly installed.

Safety messages

•Safety-of-flight technical message concerning one-time inspection of all servo cylinders for nonconforming hardware on all AH-64 aircraft (AH-64-91-01, 271930Z Jan 91). Purpose of this message is to require a one-time inspection of all AH-64 flight control servo assemblies. In the event a discrepant condition is found, a simple field fix is provided that minimizes maintenance effort and enables continued flight on an interim basis until a permanent fix can be installed. Contact: Dong Nguyen, DSN 693-9089, commercial 314-263-9089.

For more information on selected accident briefs, call AV 558-4198/3901, commercial 205-255-4198/3901.

Followups

Information on accidents previously reported

UH-1 Class A

Reported in 1 Nov 89 issue as 9002 - When student pilot attempted to take off from a 10-degree slope, he lacked sufficient cyclic input toward the upslope side of aircraft. As power was applied, aircraft began sliding downslope. Student pilot lost his composure and began making large, erratic flight control movements. Overcontrolled cyclic inputs and failure to coordinate other flight control movements necessary to achieve a stabilized hover caused aircraft's main rotor blade to hit the ground on the upslope side of aircraft.

AH-1 Class A

Reported in 28 Feb 90 issue as 9013 - Aircraft was one of two conducting a night security mission. After completing the mission, both aircraft flew to FARP to refuel. OH-58 landed, and AH-1 crew provided security by flying around FARP at about 30 feet above trees, at 40 knots. Crew was using AN/AVS-6 NVGs in zero ambient light conditions, and aircraft landing light and infrared light were off. Aircraft had almost completed one orbit, and pilot and copilot were looking out left side of aircraft at the OH-58 in the FARP. Neither pilot was scanning to the front or right. Aircraft hit a tree to front right, yawed, began vibrating severely, and settled to the ground, hitting several more trees. Both pilots were able to leave the aircraft unassisted.

AH-64 Class A

Reported in 1 Nov 89 issue as 9003 - Immediately after takeoff on a test flight, crew heard rumbling sound coming from behind aft pilot's station. Sound was closely followed by medium-frequency vibration throughout airframe. Pilot in rear seat, who was at the controls, aborted takeoff and landed on taxiway. Pilot moved both power levers to off position while opening canopy. Smoke could be seen coming from rear of aircraft. Crew exited and moved away from aircraft, making no attempt to extinguish the fire with onboard fire extinguishing system. Fire trucks extinguished fire, which had caused extensive damage to airframe and catwalk area. Rumbling noise was caused by failure of duplex bearing in forward end of power takeoff clutch. Suspect failure was caused by lack of lubrication.

CH-47 Class A

Reported in 31 Jan 90 issue as 9009 - Aircraft was on a day, low-level, VFR training mission, carrying a slingload. While ascending a draw to cross ridgeline, crew failed to detect deteriorating weather conditions. Aircraft entered low clouds, and crew lost sight of ground. SIP executed inadvertent IMC procedures by initiating a climb, but the aircraft was so close to the ridgeline that, by the time visual ground

Class A Accidents through 30 January

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	4	2	2
	November	2	4	1	6
	December	3	2	4	3
2nd Qtr	January	2	7	4	1
	February	3		11	
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	17	33	12

reference was regained, impact could not be avoided. Aircraft struck below crest of ridge, level with slope. After hitting ground, aircraft spun 180 degrees to the right, rolled, and slid about 120 feet downslope, coming to rest inverted. The most serious injury to the 19 people on board was a sprained ankle.

OH-6 Class A

Reported in 14 Feb 90 issue as 9012 - Aircrew was conducting search for equipment lost during recent paradrop mission. As aircraft flew at about 30 feet agl over grass-covered area near airfield, rotorwash caused parachute that had been concealed in 10- to 15-foot-tall grass to rise up behind aircraft and become entangled in aircraft's rotors. First indication crew had of trouble was when aircraft began violently shaking. Aircraft spun right about 180 degrees, all lift control was lost, and aircraft hit ground in a nose-low, right-roll attitude. Neither crewmember was seriously injured.

OH-58 Class A

Reported in 15 Nov 89 issue as 9004 - While attempting to laterally unmask from behind a 20-foot-high boulder, PIC misjudged aircraft's main rotor clearance with the boulder. Main rotor blades hit boulder and aircraft crashed, coming to rest inverted at base of boulder. While the relatively inexperienced PIC had his attention on monitoring instruments and directing a gunship onto a target, he allowed the aircraft to drift into the boulder.

OH-58 Class A

Reported in 13 Dec 89 issue as 9005 - While flying at between 600 and 800 feet agl, at about 115 knots, PIC performed an unauthorized aerobatic maneuver (right turn in excess of 90 degrees). As a result, aircraft rolled inverted and entered a steep dive. PIC was unable to regain control of aircraft before it crashed into trees. Aircraft was destroyed by impact forces and postcrash fire. The two injured crewmembers were pulled from the wreckage before the cockpit area was engulfed in flames.

OH-58 Class A

Reported in 17 Jan 90 issue as 9007 - Crew, using AN/AVS-6 NVGs, was on return flight from a training area. Pilot, who had been flying at about 350 feet agl, at 80 knots, descended to about 180 feet agl. Helicopter hit top wire of an electrical power line, and pilot lost control of aircraft. Pilot was killed, and aircraft was destroyed on ground impact. Although injured, the aerial observer survived. Crew failed to adequately divide their attention between outside visual cues and instruments.

CASA C-212 Class A

Reported in 31 Jan 90 issue as 9010 - Aircraft was on left downwind for landing at about 1,200 feet msl and 120 knots. Witnesses saw aircraft abruptly roll right about 60 degrees, pitch nose down about 80 degrees, and crash into the water. All five people on board were killed. The most likely scenario is that while attempting to descend to 500 feet msl, as directed by tower personnel, the PIC retarded both power levers and unintentionally placed the right power lever into the "Beta" range. Upon noticing his error, PIC immediately advanced both power levers forward. But, because the power levers were not symmetrical—left lever at idle, right lever in Beta—the left propeller immediately began producing thrust while the right propeller continued to produce drag. This asymmetrical-thrust condition caused the abrupt right roll and loss of control at an altitude where the aircraft could not be recovered before it hit the water.

U.S. ARMY SAFETY CENTER

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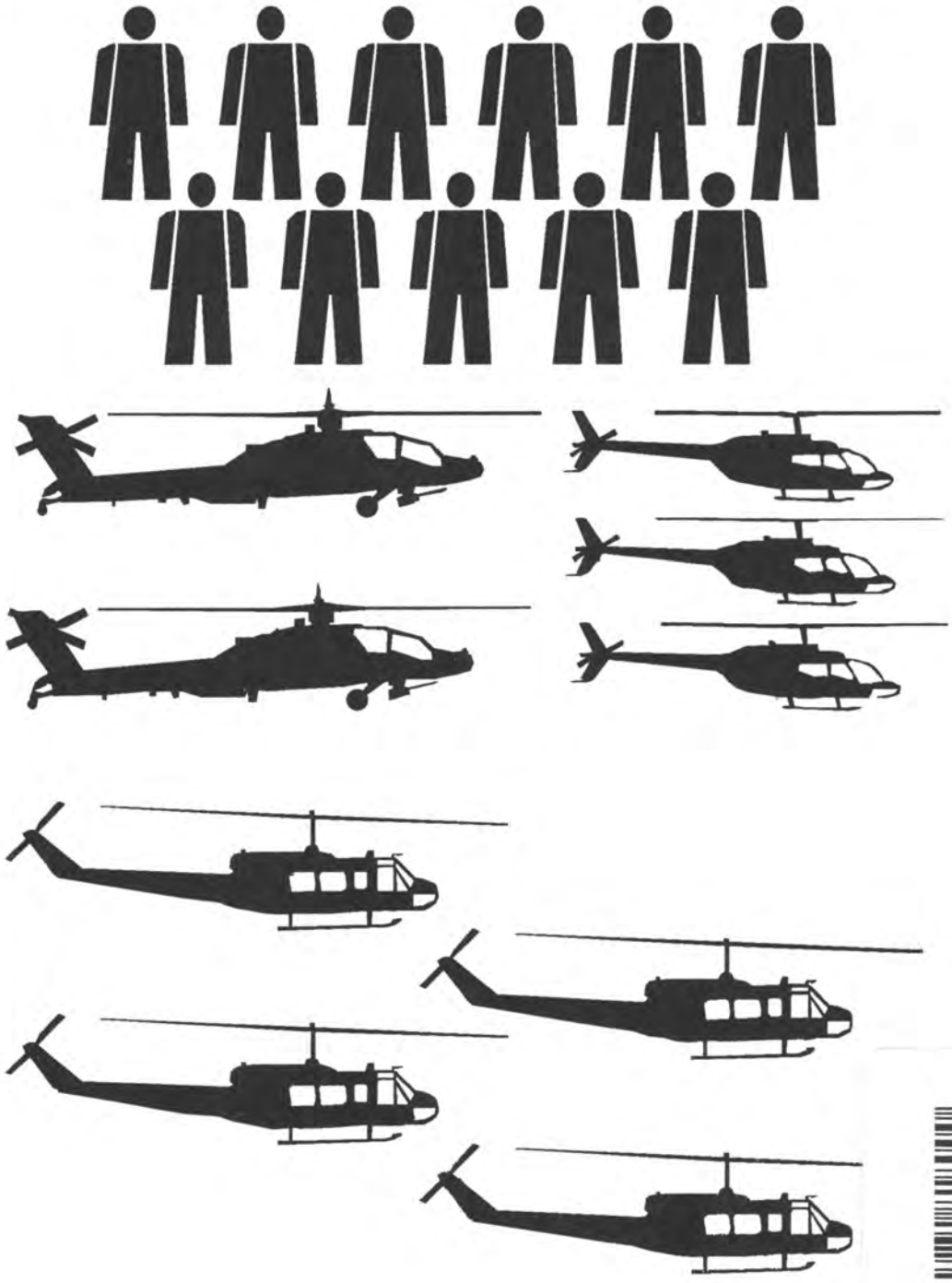
C. A. Hennies
Brigadier General, USA
Commanding General
U.S. Army Safety Center

Attention UH-60 pilots

The U.S. Army Aeromedical Research Laboratory at Fort Rucker needs male aviators between the ages of 18 and 40 to participate in research projects. Aviators must have 20/20 vision and possess a current flight physical. If acquiring up to 40 hours in a UH-60 simulator and an opportunity to participate in trials of new equipment interest you, contact the USAARL representative at AV 558-6862, commercial 205-255-6862. This is a new study and is open also to aviators who have previously participated in USAARL research. ■

—POC: LTC Thornton, USAARL, AV 558-6846, commercial 205-255-6846

First Quarter FY91
Accident Losses



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13 February 91 Vol 19 No 9 REPORT OF ARMY AIRCRAFT ACCIDENTS

Fatigue . . . an insidious enemy

Fatigue is an enemy always ready to attack the unwary, and it is much more likely to be a sneak attack than a frontal assault. The effects of fatigue are both insidious and cumulative, resulting from circumstances such as long work hours, sleep deprivation, emotional stress, poor nutrition, time zone changes, minor illnesses, and boredom. Environmental conditions—for example, aircraft vibration—also contribute to fatigue. Age, experience, and personality can affect how individuals react to factors that cause fatigue.

Army aviation attracts people with a strong drive to excel, trains them to do a job, and tells them that the job they do is absolutely essential to the mission. It is important, however, that hard-charging, "can-do" aviators also understand that they have human limitations. Exceeding these limitations can cause accidents.

In one unit, aviators were aware of the crew endurance policy and they were maintaining a daily log of individual flight/duty workloads as they were required to do. But when they exceeded their duty hours, they did not notify the chain of command because, in the words of one unit aviator, "The pressure to drive on and successfully accomplish the mission was felt by everyone. You could not step forward and state you had a problem with workload—the pressures were too great."

When the PIC of a UH-60 attempted to taxi around another Black Hawk at a refueling site, his fatigue caught up to him. Even though the copilot twice told him he was too close to the other aircraft, and the PIC responded with control inputs, he misjudged his clearance and the aircraft collided. In addition to the long duty days they had been working, this crew had failed to eat breakfast although MREs were available. Their last meal was a quick snack and coffee the night before.

Aviators are subject to the same personal problems as the rest of us. Job stress, family problems, illness, poor eating habits, too little rest, effects of alcohol and caffeine, smoking, and dehydration all contribute to fatigue and affect our ability

to function. That can be tough on anybody, but for an aviator it can be disastrous.

Much of the responsibility for his own well-being lies with the individual. We cannot force anyone to practice healthy personal habits, but we can increase awareness of how important it is to get enough rest, exercise regularly, eat nutritionally well-balanced meals, practice moderation in the use of alcohol and caffeine, abstain from smoking, and drink adequate amounts of water. We can also encourage people to seek help with family problems before they become so insurmountable that job performance and safety are affected.

Commanders/leaders

Know your people. People who are under emotional stress often suffer from fatigue. When someone in the unit is having personal problems—marital, financial, troubled children, illness of a family member—it should raise a signal that their performance may suffer. If the problem is known, help can be offered. If help is refused, it may be necessary to take them out of the cockpit for a while, but it is better to take action than to wish after an accident that something had been done.

Chaplains and flight surgeons can help commanders keep a finger on the emotional and psychological pulse of their units. Good commanders know, however, that nothing can replace their own personal interest in their people. When leaders show genuine concern, others will follow their example.

Crew endurance. AR 95-1 provides guidelines for establishing crew endurance policies. While some units have developed sound policies tailored to their individual needs, in other units they may amount to no more than simply meeting a requirement. A big step in reducing fatigue-related aviation accidents is to make everyone in the chain of command aware of the importance of this tool to conserve resources and prevent accidents. A commander who tells his people when they return from a training rotation that "nobody goes home until every aircraft is mission ready," could be setting the stage for an accident. Giving everybody a day off to rest or working in shifts so that some of the people are working while others sleep will not only increase productivity, it will prevent shortcuts being taken and things overlooked that can bring an aircraft out of the sky. People who are tired, mechanics as well as pilots, make more mistakes and catch fewer of them.

Support personnel

Refuelers are another group that may easily be overlooked when considering the effects of fatigue on performance. Often after working a full duty day, they have to tear down and move the refueling facility and be set up and ready to refuel aircraft by the next morning. The following incident shows what can happen when a tired refueler makes a mistake.

While hot refueling an OH-58 at night, a refueler removed the closed-circuit refueling (CCR) nozzle without first closing the flow control handle. The automatic shutoff malfunctioned, and the aircraft's engine exhaust ignited the spilled fuel. The pilot who was acting as fireguard suffered second-degree burns, and the aircraft was damaged.

Why did an experienced refueler remove the nozzle from an aircraft without first closing the flow control handle? His day had begun about 21 hours earlier. Although he had not been on duty continuously, he had had no substantial rest during this time, and he was tired. A "field expedient" release handle

made of stiff copper wire had been installed on the nozzle in place of the normal flexible cable release handle. The tired refueler, wearing heavy gloves, failed to notice that his fingers were wrapped around the CCR's release handle. When he pulled aft to close the fuel flow handle, he also pulled aft on the CCR release cable, thus disconnecting the CCR nozzle from the fuel port with the fuel flow handle still in the flow position.

Another important aspect good leaders will remember is that in the field the refueling unit often has already left to set up the next site when meals are served. One first sergeant took care of that problem. When he found drivers who were supposed to be taking food out to the refueling site had first sat down to eat themselves, he interrupted their meal until his refuelers had been fed. That kind of looking out for your people pays dividends—not only in safety but in morale.

Sleep

It's hard to say exactly how much sleep someone needs; the amount varies from one person to another. A study involving young, motivated college students who performed jobs requiring continuous work on tasks resembling those performed by flight personnel—visual memory, auditory vigilance, tracking, and numerical skills—found that fatigue effects began to appear after 6 hours of continuous performance. After 18 hours, there were serious decrements in performance and disturbing psychological symptoms such as visual illusions, hallucinations, and disorientation.

Just how important adequate sleep can be to aviators is demonstrated in the following accident.

The pilot of an OH-58 started to pick up the aircraft to a hover while directing his attention to a gunship about 300 feet to his right rear. He didn't notice that the cyclic control was in the aft right quadrant. The aircraft came off the ground left skid first, then began pivoting about the heel of the right skid. In this configuration, it exceeded a 15-degree angle of bank, entered dynamic rollover, and came to rest on its right side. Fortunately, neither crewmember was injured.

During the 7-day period preceding the accident, the pilot had exceeded the crew endurance policy in the unit SOP and AR 95-1, and what may have been more significant, rest periods in the preceding 48 hours never exceeded 4.6 hours in duration and were interrupted by periods of duty.

The day before the accident, the pilot had 6.5 hours of continuous flight. Most of the flight time was during the day, but it involved terrain and NOE flight and hot refueling. He had finished flying at 1430, but because he was battle captain, he was required to do extensive mission planning, which kept him busy until 2330. He got only 3.5 hours of sleep the night before the accident.

Another important concept that commanders and aviators need to be aware of is called "sleep deficit." When sleep is fragmented and scheduled for unusual hours—for example, during field training exercises—a crew's sleep deficit may accumulate to the point that mission risk increases. Once into a sleep-deficit situation, considerable time off is required to restore the body to its normal state. Studies have shown that following duty times of 12 to 20 hours, fatigue may exist for more than 1 to 2 days.

In extreme circumstances—for example, a unit engaged in life or death combat operations—it may be necessary for an already-fatigued aviator to use authorized stimulants to fly. Great care must be taken, however, that "fly or die" criteria are not applied to situations where an alternative is possible. The use of stimulants to help a sleep-deprived crew remain awake and continue to fly is extremely risky. While stimulants may enable an aviator to stay awake, they cannot prevent mental and physical errors caused by fatigue. In fact, stimulants may produce a feeling of performing well, while performance actually degrades. This false sense of security could result in aircrewmembers being subjected to unexpected and unrecognized high-risk situations.

Stress

Some kinds of aviation operations involve more stress and result in fatigue more quickly than others. For example, flying with night vision goggles is more stressful than daytime operations. Another high-stress type of flying is slingloading. Put the NVGs and the slingloads together, and the amount of stress rapidly increases.

A CH-47 crew had been attempting for more than half an hour to pick up an M198 howitzer. The crewmembers on the ground were having problems. First, the forward hookup man incorrectly hooked the clevis to the center hook. The flight crew released the hook and landed while the flight engineer (FE) briefed the hookup crew on the proper procedures. During a second attempt, the forward hook was successfully hooked, but while attempts were made to hook the aft hook, the pilot felt a bump (the slings had probably caught on the gun). Thinking the aircraft had contacted the gun, the pilot increased altitude, lifting the gun off the ground. The ground crew scattered, but the soldier who had been standing between the gun trails couldn't decide which way to run. By the time he was out of the way, the gun was completely off the ground and had begun to oscillate. Fearing the

gun might hit the aircraft, the FE jettisoned the load. The trails hit first, followed by the wheels, damaging the gun's carriage and wheel assembly.

The excessive amount of time required in the attempt to complete the hookup while maintaining a hover above the hookup crew and load, combined with wearing PVS-5 NVGs, resulted in fatigue of all crewmembers—ground and air. When the SIP thought the aircraft had contacted the load, he applied thrust and increased his altitude above acceptable limits, causing the partially hooked howitzer to be lifted off the ground. Excessive motivation and lack of written guidelines on when to abort caused the SIP to repeatedly attempt the hookup past the point of practicality and contributed to the fatigue of all concerned.

Effects

Fatigue can affect pilots in many ways. Attention span is reduced, important elements in a task series are overlooked, and instrument scanning patterns break down. Reaction time and the potential for errors increase. Fatigue may also affect decision-making ability and can make a pilot overconfident so that he attempts to do something that he cannot safely do. The following examples show how fatigue can affect a pilot's ability to fly safely.

Attention span. While flying at low level, the pilot of an OH-58 failed to recognize that he was in a slow descent. The aircraft struck a cable, damaging the main rotor blade, upper wire strike protection system, and windscreen. The pilot had exceeded the unit's crew endurance policy restricting him to 8 hours in the cockpit. Fatigued after 9½ hours of flying, he fixated on a set of lights to his front, and failed to notice that the aircraft was descending until it hit the cable.

Decision-making ability. Illumination was 100 percent and visibility unrestricted as a UH-1 approached a field site with a load of passengers. The aircraft was 30 feet agl when its main rotors hit a tree. During the previous 48 hours, the crewmembers had averaged 15-hour workdays and had been on duty for 15 hours before the accident happened. All duty was performed in a field environment, and the crewmembers had not received adequate continuous rest. Fatigue contributed to the pilot's failure to correctly analyze his approach angle and make a decision.

Overconfidence. An OV-1 maintenance test pilot had accumulated 46.5 duty hours during a 72-hour period, exceeding the unit crew rest policy by 9.5 hours. The night before a scheduled test flight, he had slept only 5 hours. While en route to the test area, he decided to perform an unauthorized aerobatic maneuver at 1,500 feet, an action he knew to be a violation of policy. He could not recover the aircraft at that low altitude, and he was killed when it crashed into the ground.

A word to the aircrew

Crew endurance guidelines were developed to assist aviation commanders in establishing a workable crew endurance policy for their units. And most commanders make a conscientious effort to do that. But you as an individual also have a responsibility for your own safety and the safety of your contemporaries. This is another case where you must be your "brother's keeper." Learn to recognize the signs of fatigue: irritability, headache, poor coordination, muscle and joint discomfort, continual yawning, and burning and scratchy eyes. When you realize that you or your fellow aviators are suffering these symptoms, speak up. It's better to be removed from a mission than to take a chance that it will be someone's last.■

Update on runway friction testing devices

An article in the 13 December 1989 issue of *Flightfax* described the damage to a U-21 when it slid off a snow- and ice-covered runway after landing. The article also provided the name of one company that makes a device designed to measure runway braking conditions. The device, called a Tapley meter, is used by the Air Force and is included in NATO STANAG 3634 and the ICAO Airport Service Manual.

We have received some calls from people who were unable to contact the company that manufacturers the Tapley meter at the address given in our article. The current address for Tapley Sales (Canada) is 100 Palmer Circle, RR #2, Bolton, Ontario L7E5R8. The telephone number is 416-880-0858. ■

—POC: MAJ David Regan, Aviation Division, AV 558-4198/3901, commercial 205-255-4198/3901.

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class D

H series - SAR mission was aborted because of poor illumination. During return to home base, pilot at controls lost visual reference with horizon. PIC took controls and initiated a left turn to maintain sight of ground and land. During landing, aircraft hit a sand dune, damaging landing gear.

Attack

AH-1 Class D

F series - During airtaxi to parking, pilot slowed aircraft and pulled power to terminate to hover. Aircraft experienced compressor stall. Pilot lowered collective to reduce power and, after stall stopped, reapplied collective to arrest sink rate. As power was reapplied, aircraft experienced another compressor stall and aircraft started to sink.

AH-1 Class E

F series - Aircraft was hovered out of FARP after refueling. During takeoff, aircraft settled slightly, and PIC increased torque to about 90 percent. Aircraft again settled, and as PIC increased collective, he noticed overtorque light and saw torque was 106 percent. Inspection revealed no damage from overtorque.

F series - Aircraft was one of two Cobras following an OH-58 during local area orientation. After about 1 hour of flight, crews decided to conduct an approach to a sand dune. As the No. 2 AH-1 was on final approach, the crew determined that the area was unsuitable for landing. Pilots elected to do a go-around with the aircraft below etl and 40 feet agl. Hearing two sharp reports and feeling the aircraft's nose yaw left, pilots elected to put aircraft on ground. The aircraft hovered forward about 25 feet and made an uneventful landing. Crew should have executed a go-around before losing etl. Suspect sand ingestion contributed to compressor stall.

F series - Aircraft was at 3-foot hover and beginning right turn into parking when crew heard two loud reports. Tgt was passing through 820°C as it decreased, and crew noticed slight yaw. Possible cause was sand and dust ingested into engine air intake.

AH-64 Class D

A series - Pilot felt uncommanded movement in antitorque pedals during instrument takeoff and landed. Postflight inspection revealed damage to L-200 panel and No. 1 engine input drive shaft coupling. Crew failed to detect improperly installed access panel during preflight. Unknown person had removed L-200 access panel and reinstalled it without making a proper entry in logbook.

Cargo

CH-47 Class C

D series - Aircraft was making NVG approach to field site with two M102 howitzers and an A22 bag suspended below. After A22 bag was set down, crew chief called for aircraft to move forward. As he repositioned himself in cargo hole to observe load, crew chief inadvertently pressed jettison button on pistol grip. Howitzers were damaged when they were released from about 15 feet agl.

D series - During return flight from forward area, FE in lead CH-47 noticed clam shell doors were missing from trail aircraft. Both aircraft landed, and minor sheet metal damage was found to aft pylon and both engine tail cones. Search for missing doors continues. Suspect failure of combining transmission cowling.

Observation

OH-6 Class E

A series - After taking off from confined area, aircraft was 30 feet agl and passing through 20 knots. Through lower chin bubble, crew sighted three small wires in flight path just as WSPS engaged and cut wires. Sun glare made wires hard to see.

Class A Accidents through 13 February

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	4	2	2
	November	2	4	1	6
	December	3	2	4	3
2nd Qtr	January	2	7	4	1
	February	3	2	11	1
	March	4		1	
3rd Qtr	April	1		0	
	May	1		0	
	June	3		0	
4th Qtr	July	2		8	
	August	3		2	
	September	3		0	
	Total	31	19	33	13

Fixed Wing

U-21 Class A

A series - Aircraft yawed and banked left, control was lost, and aircraft crashed about 500 yards south of runway. Both pilots received ankle injuries. 9119

Safety messages

•Safety-of-flight technical message concerning addendum to message AH-64-91-01 requiring one-time inspection of servo cylinders on all AH-64 aircraft for nonconforming hardware (AH-64-91-02, 302130Z Jan 91). Summary: As a result of further testing of servo cylinder attachment hardware, additional corrective procedures are required. Purpose of this message is to clarify and provide additional corrective procedures to previous message. Contact: Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

•Aviation safety action informational message concerning installation and use of cryptographic computer Kit-1C on all Army aircraft except EH-60A, EH-1H, and OH-58D (GEN-91-ASAM-02, 012230Z Feb 91). Summary: Kit-1C is the improvement form fit and functional direct replacement for Kit-1A. Purpose of this message is to provide authorization to install and use Kit-1C on all Army aircraft except EH-60A, EH-1H, and OH-58D. Contact: Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

•Aviation safety action maintenance information message concerning required TOW missile simulator functional check of all AH-1E/F aircraft that have had MWO 55-1520-236-50-19 applied (AH-1-91-ASAM-02, 041900Z Feb 91). Summary: An operational check of the weapons system of three aircraft at Fort Riley, KS, was conducted after the subject MWO was applied. The following problems were encountered: 1) No articulation of the right and left TOW missile launchers. 2) Quick cross-out of the TMI on the head-up-display. 3) No ready flag in TSU eyepiece. These same problems were encountered with three additional aircraft at Corpus Christi Army Depot. Purpose of this message is to require a functional check of the TOW missile simulator for aircraft that have had the MWO applied. Contact: Lyell Myers, DSN 693-9089, commercial 314-263-9089.

•Aviation safety action operational message concerning change of operational procedures of power-up/power-down for the TADS/PNVS systems with optical improvement installed on AH-64 aircraft S/N 89-0192 and subsequent (AH-64-91-ASAM-04), 012100Z Feb 91). Summary: TADS with the optical improvement installed (S/N 8001 and subsequent) have been identified as requiring a TADS/PNVS power-up/power-down procedure different from that in the dash 10 operator's manual and checklist manual. A retrofit fix has been developed and will be implemented beginning in August 91. Therefore, the dash 10 and checklist will not be changed through a publication change due to the expected turnaround time of the fix. Purpose of this message is to provide operational procedures of power-up/power-down for TADS/PNVS systems for specified aircraft. Contact: Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

•Aviation safety action operational message concerning revision of checklist for CH-47D aircraft involved in Operation Desert Storm (CH-47-91-ASAM-03, 312000Z Jan 91). Summary: Certain parts of the CH-47D pilot's checklist need to be revised in order to minimize ground running time while conducting preflight and postflight operations in the desert environment. Purpose of this message is to provide a revised checklist for CH-47D aircraft pilots involved in Operation Desert Storm. Contact: Brad Meyer, DSN 693-9089, commercial 314-263-9089.

•Aviation safety action informational message concerning revised inspection/replacement criteria to increase service life of main rotor pitch link bearing on all OH-58D aircraft (OH-58-91-ASAM-06, 281600Z Jan 91). Summary: The OH-58D main rotor pitch link bearing, P/N 406-310-405-101, NSN 3110-01-164-8251, is currently being prematurely rejected, causing a short supply. Purpose of this message is to inform OH-58D units of revised inspection/replacement criteria on the main rotor pitch link bearing. Contact: Terese McGrew, DSN 693-9089, commercial 314-263-9089.

•Aviation safety action maintenance mandatory message concerning one-time inspection of cabin door latching mechanism on T-42A aircraft (T-42A-91-ASAM-01, 041830Z Feb 91). Summary: There have been reports of accidents involving commercial Beech aircraft resulting from a cabin door opening in flight because the pilot did not assure the door was properly latched prior to takeoff. In each accident, the pilot failed to continue to fly the airplane and either lost control or allowed the aircraft to stall at low altitude. Because of the persistent frequency of these occurrences, Beech Aircraft Corporation published a mandatory service bulletin to require a one-time inspection of the door latching mechanism and affixing of a warning placard to the door. Purpose of this message is to ensure implementation of Beechcraft mandatory service bulletin No. 2190, Sep 90, subject: Doors—cabin door latching warning placard and cabin door adjustment instructions on Army-owned T-42A aircraft. Contact: Lyell Myers, DSN 693-9089, commercial 314-263-9089.

For more information on selected accident briefs, call AV 558-4198/3901, commercial 205-255-4198/3901.

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