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Report of Army Aircraft Mishaps

FLIGHTFAX

20 April 1988

Army aviation units are flying more in a high-risk night environment. The key to operating safely with night vision goggles is understanding the limitations inherent in the goggles and in the aircraft.

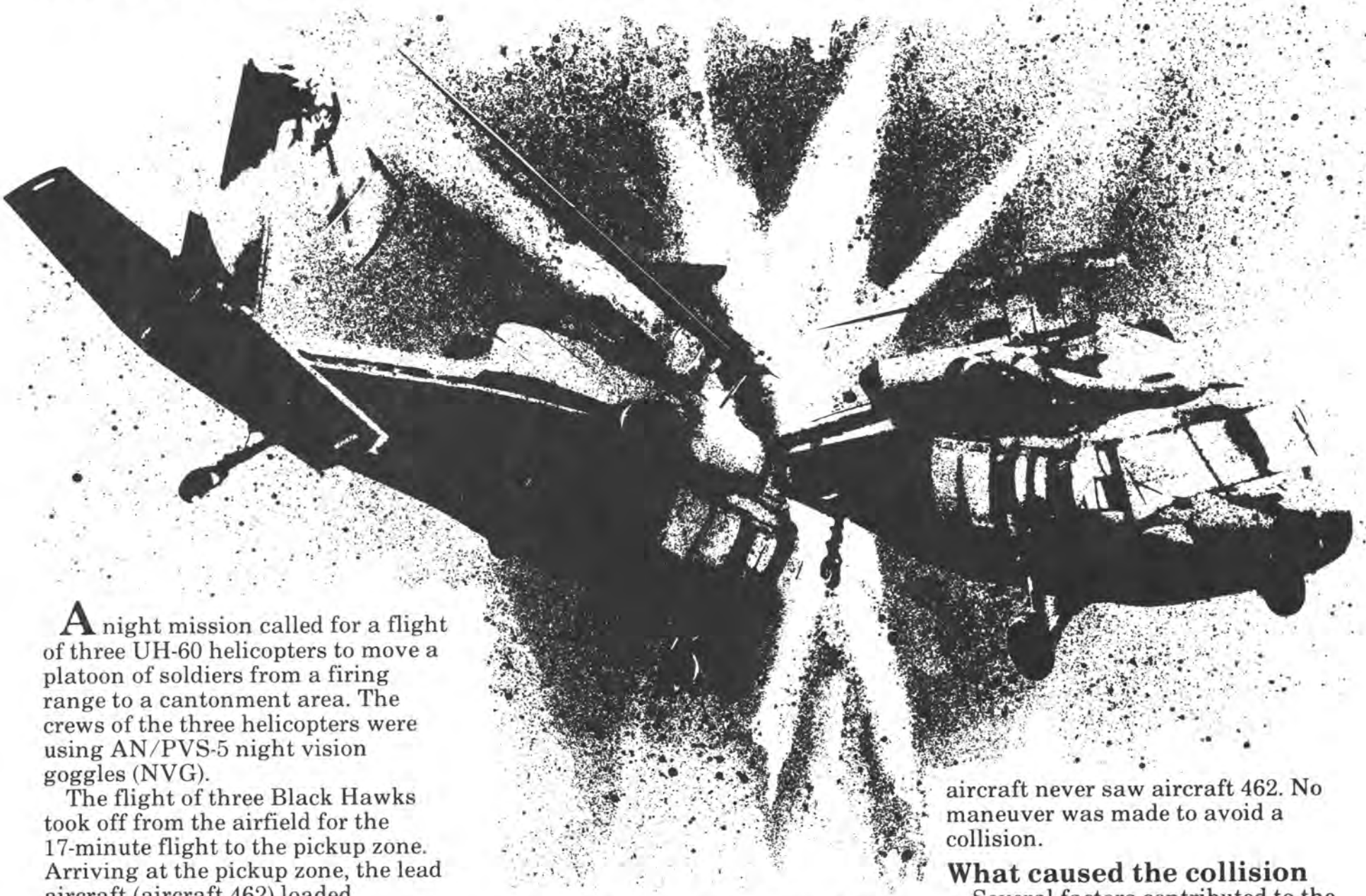
This special report covers

- Lessons learned from NVG-related accidents
- Formation lead change procedures
- Mission planning
- NVG battery packs
- Sample SOP for NVG training

Flying Goggles

a special report on night vision flying

Multiple factors cause Black Hawk midair



A night mission called for a flight of three UH-60 helicopters to move a platoon of soldiers from a firing range to a cantonment area. The crews of the three helicopters were using AN/PVS-5 night vision goggles (NVG).

The flight of three Black Hawks took off from the airfield for the 17-minute flight to the pickup zone. Arriving at the pickup zone, the lead aircraft (aircraft 462) loaded 10 soldiers and the other two aircraft loaded 11 soldiers each. Shortly after takeoff, the flight of three helicopters, with aircraft 462 in the lead, approached a mandatory checkpoint. The copilot, who was flying aircraft 462 from the left seat, began a climb from 100 feet agl to the required 200 feet agl to enter the corridor to the airfield. He was probably looking outside the aircraft to his left because he was using a road to the left of his flight route as a navigational aid. The IP in the right seat of aircraft 462 was looking inside the cockpit, tuning the radios to tower frequency.

At the same time, another UH-60 (aircraft 605) on an NVG qualification training mission arrived at the same mandatory checkpoint as the flight of three. The copilot of 605 was flying the aircraft from the right seat. He was probably looking outside the aircraft to his right as he began a right turn and increased his bank angle to about 25 degrees. The IP, in the left seat, was looking inside the cockpit, tuning the radios.

The flight path of the formation of three Black Hawks paralleled a small town. The town was about 4 kilometers off their left rear. From the viewpoint of aircraft 605, the lights of the flight of the three Black Hawks blended with the lights of the town.

Ten seconds after the copilot of aircraft 605 began his right turn, his aircraft flew into the lead aircraft in the formation, hitting aircraft 462 in the tail boom area. The aft portion of the tail boom separated, and the main rotor blades of the two aircraft meshed. Both aircraft crashed inverted. The 7 crewmembers and 10 passengers aboard the two aircraft were killed.

Aircraft 605 was equipped with a flight data recorder. Information from the flight data recorder indicated the copilot flying the aircraft never saw aircraft 462. No maneuver was made to avoid a collision.

What caused the collision

Several factors contributed to the failure of the crews of the two helicopters to see and avoid each other:

- **Field of view restriction in the UH-60 cockpit.** The accident investigation board plotted the flight paths of the two converging aircraft and calculated the relative angles at which the crews could have seen each other. Throughout the last 8 seconds of the flight before

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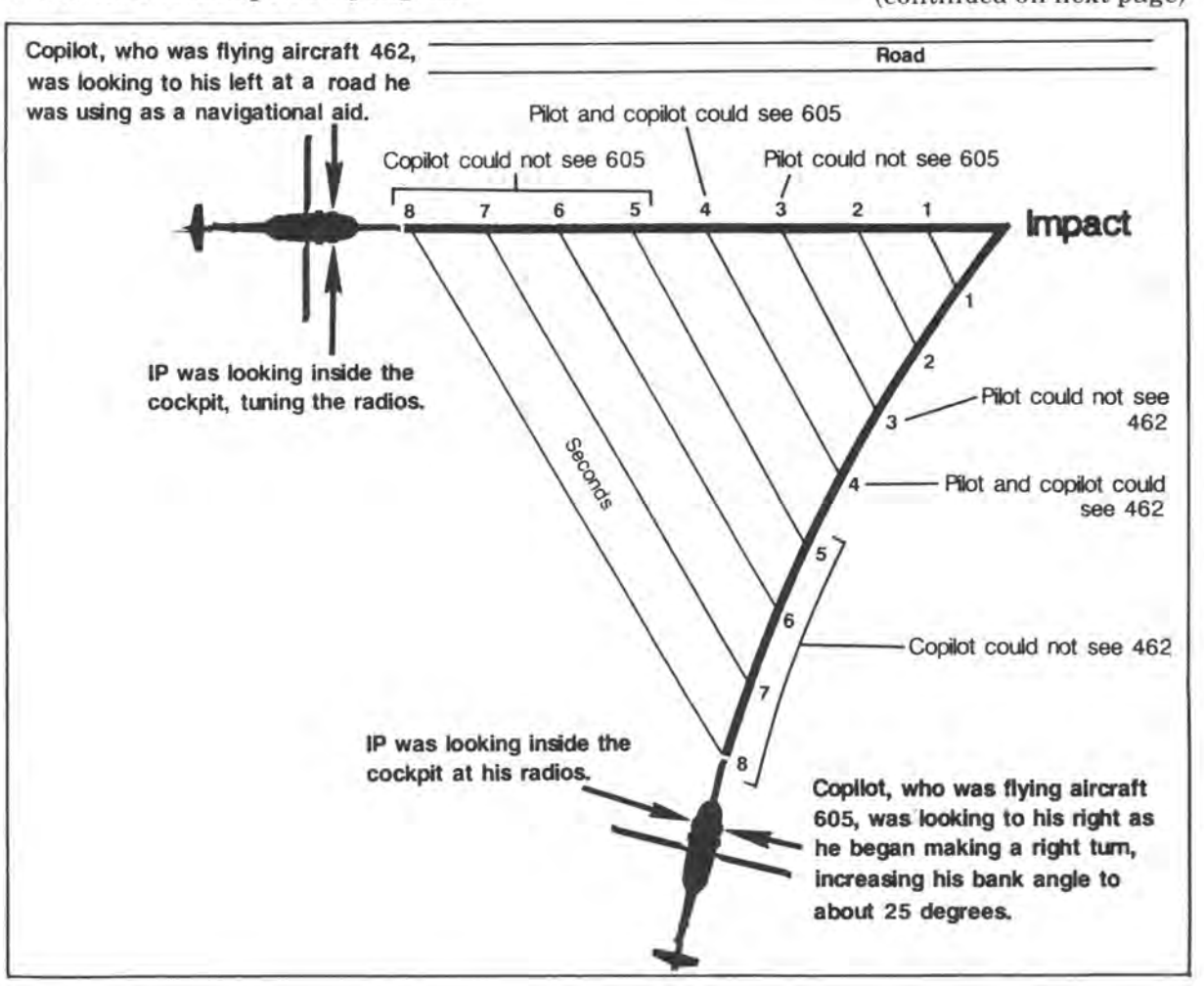


impact, each accident aircraft was blocked from the view of the other by windshield support structures. The field of view restriction of the UH-60 cockpit, coupled with the visual limitations of the PVS-5 goggles, greatly decreases the ability of aircrews to see each other.

• **Crew attention inside the cockpit.** The copilot of aircraft 462, who was flying from the left seat, had his attention outside the cockpit, looking to his left at a road he was using as a navigational aid. The IP of 462, sitting in the right seat and in the best position to see aircraft 605, was looking at the radios.

The copilot of aircraft 605, flying from the right seat, was looking to his right—away from aircraft 462—as he was making a right turn. The IP of 605, in the left seat and in the best position to see aircraft 462, was looking inside the cockpit at his radios.

• **Lights of the flight of three partially masked by lights of nearby town.** Members of the investigation team flew the routes of both accident aircraft at night using AN/PVS-5 goggles. They found that, from the position of aircraft 605, the lights of the three aircraft in the formation appeared to be ground lights of the town. This further hampered the ability of the crew of aircraft 605 to detect the formation flight of three.

• **No position reports required.** A common air-to-air frequency for all day, night, and NVG missions was provided, but there was no requirement to call on the frequency to make position reports at certain checkpoints. Pilots were required to only monitor the frequency. As a result, neither accident aircraft was alerted to the other.

This was listed as a command failure in not requiring aircraft to report on a common frequency at choke points.

Lessons learned

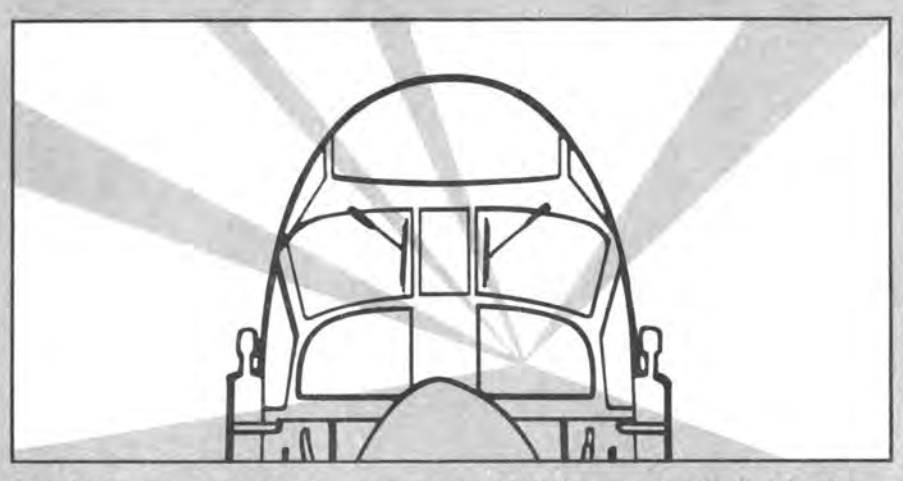
• **UH-60 cockpit restrictions** to visibility, coupled with visual limitations of the PVS-5 goggles, require aviators to compensate by using scanning techniques. It is absolutely critical that aviators use scanning techniques that require full movement of the head. Aviators should develop their own scanning pattern, whatever works best for them. One acceptable pattern is right to left. Another is lower left to upper right. The point is aviators should use a slow, regular scanning movement in a pattern that works well for them. Attention should not be fixed in any one direction for more than 2 or 3 seconds without moving the eyes.

• **Cockpit teamwork** is extremely critical during NVG operations. A close working relationship is necessary among all crewmembers to prevent confusion and improve proficiency. Each crewmember should tell the other what he is going to do and when he is going to make a change so there will be no surprises. If one crewmember says "I'm going to switch the radio," the other crewmember will know he is the only pilot looking outside and he must be extra watchful. Before each night mission, all crewmembers should know their in-flight duties and responsibilities. The flight should be briefed on the ground, with all possible situations considered, such as deteriorating weather, disorientation procedures, and navigation techniques and procedures. An additional crewmember is required during NVG multi-helicopter operations. This crewmember is positioned in his aircraft so he can see the aircraft on which his aircraft is flying formation and help the pilot maintain aircraft separation and obstacle clearance. Oftentimes the difference between avoiding an obstacle and hitting it are the NVG-trained and -equipped crewmembers in the rear of the aircraft providing clearance information to the pilots.

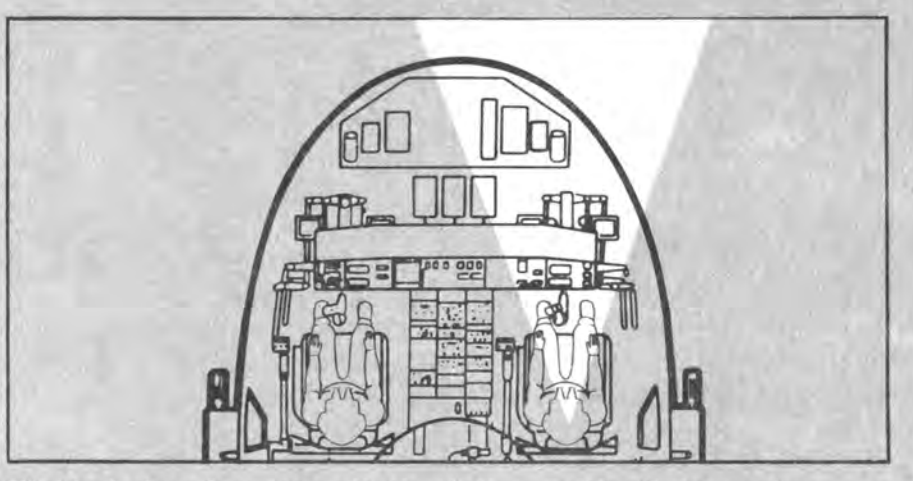
• If possible, outgoing and incoming NVG routes should not be established near towns.

• **Air control points** and flight following procedures requiring position reporting on a common frequency should be established. Had both aircraft reported on a common frequency as they approached the mandatory checkpoint, this accident may have been prevented. □

Field of view and visibility restrictions in UH-60 cockpit



Shaded areas show the areas blocked from pilot's field of view by UH-60 cockpit structures.



Field of view from the pilot's station, with pilot wearing NVGs and looking straight ahead.

Circles show limited field of view of both pilots wearing NVGs.

Circle shows restricted field of view of crew chief wearing NVGs, from left crew chief's seat.

Lessons learned from NVG accidents

An analysis of NVG accidents from FY 84 to the present shows that most of these accidents have been caused by spatial disorientation, flying too fast based on the visual cues and conditions present, wire strikes, or failure to see other aircraft.

Spatial disorientation

The 40-degree field of view of NVGs tends to promote disorientation through tunneled vision. However, with proper visual cues, orientation can be maintained. Viewing outside references through the tubes is the only method for accomplishing most rotary wing tasks.

Visual contrast is the most critical factor during NVG flight. Flights into, out of, or around areas of minimal contrast are hazardous. The contrast between an object and its background can aid in object identification. The degree of contrast, however, depends on the available ambient light and the color, texture, and background of the object being viewed. Proper visual scan techniques will aid, although in some situations they cannot prevent, spatial disorientation. Areas void of visual cues require a combination of internal and external viewing for orientation purposes. Highly skilled and properly trained crews with artificial lighting can still become confused without adequate visual cues to relate movement.

The ambient light level affects the degree of contrast that exists between objects. The higher the light level, the greater the contrast. As the ambient light increases, more light is reflected and shades become more recognizable. Objects with a poor reflective surface appear black during low light levels and dark gray during high light levels. Objects or terrain features with good reflective quality appear gray during low light levels and become progressively lighter as the ambient light increases.

Low ambient light conditions create a high signal/noise ratio or graininess in the goggles. The definition of objects viewed by the pilot loses sharpness or contrast. This results in inability to see some obstructions, depending on the backdrop of that object. NVG flights under overcast conditions away from populated areas have resulted in accidents due to this phenomenon.

Flight with NVGs over water should be avoided if shoreline references are not available and the aircraft is not equipped with advanced flight stabilization equipment and radar altimeters and is not capable of instrument flight.

There is very little color contrast between a landmass and a body of water during low light conditions. When viewed from the air, lakes or rivers appear dark gray in color. As the light level increases, water begins to change color, land-water contrast increases, and reflected moonlight is easily detected. When a surface wind exists, the ripples on the surface intensify the reflection off the water. This further aids in terrain identification.

Aircrew judgment in recognizing insufficient contrast and immediate execution of a takeoff or go-around is the best prevention for disorientation.

Do not conduct NVG training in areas of good contrast only and then try to operate in areas of low contrast.

Flying too fast

You can overfly your goggles just as you can overdrive your headlights in a car at night. The chances of overflying your goggles increase greatly when operating at high speeds or in weather. Slowing your airspeed can give you the time to recognize what you are seeing and take action.

Under the best conditions, which are rarely if ever present, aviators only have 20/50 vision with the PVS-5 goggles. This means that what you can clearly see from 50 feet with normal eyesight (20/20) cannot be seen with the goggles until you are 20 feet from it. This says you should slow your speed to give more reaction time.

Terrain becomes more clearly defined and contrast is greater when the aircraft is flown closer to the ground. Thus man-made and natural features are more easily recognized, and navigational capability is improved. The area that can be viewed at low altitudes, however, is smaller than at higher altitudes. At low altitudes, airspeed should be reduced to permit more accurate terrain interpretation.

Wire strikes

NVGs cannot "see" wires because of the frequencies involved. In the cases where aircraft have hit wires, crews were unsure or did not know the exact location of the wires. This underlines the importance of knowing all the wire hazards in NVG training areas.

Failure to see other aircraft

Train as a total crew. Crewmembers must be assigned specific duties before a night flight. Crew duties will be assigned by the pilot-in-command. The pilot-in-command must outline specific duties of the copilot, crew chief, and any other personnel assigned to the mission. Crew duties should also be outlined in the unit SOP. Oftentimes the difference between avoiding an obstacle and hitting it are the NVG-trained and -equipped crewmembers in the rear of the aircraft providing clearance information to the pilots.

Communicate as a crew. In most NVG-related accidents, the crew sensed or knew everything was not right just before the accident happened. The crew, or at least one member of the crew, was uncomfortable but, for some reason, did not let this be known or thought the other crewmembers had everything under control. If any member of the crew is uncomfortable he should make his feelings known, get out of the area, regroup, and try again if appropriate.

If crews are unsure how close obstacles are or how close other aircraft are, they should assume they are too close and take corrective action immediately.

NVG routes and operational procedures must be validated for adequacy. Checkpoints are often "choke" points. Ensure procedures clearly define where aircraft are to be and the required communication. Ensure everyone who uses the area knows the procedures and that non-NVG equipped aircraft stay out. Always plan and develop NVG areas and procedures based on the local conditions and environment. What worked at the last place will not necessarily work at the next place.

Other lessons learned

Unless an aircraft is correctly prepared for night flight, night vision will be degraded. Requirements for preparing an aircraft for night flight are contained in the appropriate operators manual, ATM, and unit SOP. Commanders can modify aircraft to meet the requirements for night flight as long as the modification does not degrade the capabilities of the night vision goggles.

During prestart checks, cockpit lights should be adjusted to the lowest intensity level that will allow the instruments to be read. Interior lighting or flashlights assist in illuminating the cockpit and the cabin.

As the ambient light level decreases from twilight to darkness, the intensity of the cockpit lights should be reduced to the lowest readable level. This will reduce the reflection of the lights off the windscreen.

For aircraft equipped with a BRIGHT-DIM switch, which controls the intensity of the caution panel warning lights, the DIM mode should be selected for night flight. A flashlight, with appropriate lens filter, or the map light can supplement the available light in the cockpit.

Circumstances leading to NVG accidents

In most NVG-related accidents, the following circumstances were present:

- Lack of contrast and visual cues.
- Lack of crew communication/coordination and "total crew" training.
- Flying too fast based on visual cues and conditions present.
- Lack of recent NVG flight experience.
- Inability to determine distance to obstructions.
- "Invisibility" of wires.
- Sensing that things are about to turn bad and failing to take corrective action. □

FLIGHTFAX

Standing Operating Procedures critical for night vision goggles training

Because of the many different and demanding requirements placed on aviators and units during night vision flight training, a thorough SOP must be developed. The SOP should cover all aspects of the training program. Guidance should be specific. Each pilot must become thoroughly familiar with the contents of the SOP. The information that follows is minimal and is provided for guidance only. Each unit SOP must be developed to meet the peculiar training needs of that unit.

Sample SOP for night vision goggles training

1. Flight Time Limits and Crew Endurance: It is the individual crewmember's responsibility to comply with crew rest requirements.

a. Flight limits and crew endurance will be IAW Annex B, para 16, [of this SOP] with the following exceptions for NVG qualification training.

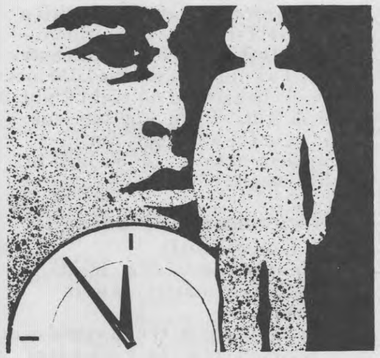
(1) Maximum student-to-IP ratio will be 2:1.

(2) Maximum of 4.0 hours can be flown with NVGs by an IP/SP in any 24-hour period. (The 24-hour period starts 0800 hours to 0800 hours the following day.)

(3) Except as authorized by the unit commander, the maximum flight duty in one 24-hour period will not exceed 6 hours for instructors and students.

b. It is the responsibility of all personnel engaged in night/NVG training to ensure that they arrive at the airfield rested and ready to train. It is also the crewmember's responsibility to inform the instructor of any physiological effects as a result of NVG training or operation.

c. Pilots undergoing training will be limited to 3 hours of NVG pilot time during each 24-hour period.



2. Aircraft Modification: Only NVG-modified aircraft will be used for training. A list of all assigned aircraft (by serial number) will be posted in flight operations showing which NVG mods have been applied and any peculiar unit requirements.

3. Aircraft Lighting Requirements: The following procedures will be used during NVG training and operations.

a. Navigation lights will be set to FLASH BRIGHT when rotor is untied and during runup. The navigation lights will be placed in STEADY BRIGHT before leaving the parking spot. Upon landing and during engine cool down, the navigation lights will be placed in BRIGHT FLASH. The navigation lights will not be turned off until the rotor blade is tied down.

b. The navigation lights may be placed in either the STEADY BRIGHT or STEADY DIM mode during NVG operations below 400 feet agl. STEADY BRIGHT mode MUST be used for all operations above 400 feet agl. When operations are conducted in the STEADY DIM mode, the aircraft must avoid all airport traffic areas (ATAs) and avoid by 3 miles all public airports that do not have an ATA, IAW TRADOC TWX #24, 1345Z Aug 87.

c. The anticollision light will be ON when the aircraft is en route to and from the tactical training areas, during operations above 200 feet agl, or when the density or air traffic requires it.

d. Lights-out NVG operations are permitted in the restricted area (R-2119) if conducted as follows: (AR 95-50)

(1) A dedicated safety observer is required to be aboard each participating aircraft. This observer will have at his disposal an operable set of NVGs or NVSs.

(2) At least two aircraft are required, one of which will be dedicated to observation and safety surveillance of the training aircraft and nonparticipating aircraft.

(a) The safety/observation aircraft will be properly lit at all times.

(b) The safety/observation aircraft will provide traffic notification to the training aircraft. When nonparticipating aircraft is relevant, the training aircraft's position lights will be turned on until the nonparticipating aircraft is no longer a factor.

(3) Lights-out training is confined to R-2119 at or below 200 feet above the surface.

(4) Commanders will provide NOTAM (Notice to Airmen) to all flight service stations in the local flying area at least 24 hours before lights-out training.

e. Internal dome lights will be turned on and the dome light circuit breaker pulled to prevent turning the lights on inadvertently.

f. Flashlights with the appropriate blue-green filters will be carried by all crewmembers. Supplemental lighting, i.e., finger lights, knee board lights, etc., is authorized if compatible with the NVGs being used.

4. Safety and Control (S&C) Aircraft Requirements.

a. An S&C aircraft is required during all NVG NOE qualification training flights.

b. S&C aircraft pilots will be briefed by IPs of planned training to include as a mimimum the following:

(1) Detailed route to be flown, including ACPs, LZs, PZs, start time, completion time, and radio reports.

(2) Phase line crossing reports.

c. The S&C aircraft will maintain two-way radio contact with all training aircraft.

d. The PC and IP of the S&C aircraft will be qualified and current in the aircraft.

e. Other duties of the S&C aircraft are as follows:

(1) Make periodic weather inquiries and notify training aircraft of pertinent weather developments.

(2) Advise training aircraft if other aircraft are sighted in or near the training area.

(3) Maintain a flight following log.

(4) Have available a hazards map and a crash rescue map or crash grid overlay.

f. During operations within the designated NVG training area, a position report will be made when passing each checkpoint on the NVG training map, i.e., "(aircraft call sign) passing checkpoint 5," but at no time will more than 15 minutes lapse between contacts.

5. Illumination Requirements: NVG terrain flight will not be conducted unless the following ambient light criteria is met.

a. The moon must be at least 23 percent and at least 30 degrees above the horizon when IR band pass filter is not required.

b. With an operational IR band pass filter equipped search/landing light, no ambient light restrictions apply.

c. IR band pass filter will be used during all NOE flights regardless of ambient illumination.

6. Flight Over Wires: To ensure NVG NOE aircraft do not approach wires at an unsafe altitude, a hazards map will be maintained indicating all crossings where wires are encountered. Each NVG NOE aircraft must avoid all wires by 100 meters horizontally and 50 feet vertically. Wires cannot be seen with NVGs.

7. Selection Criteria for NVG NOE Routes: Routes should be selected according to the following criteria:

a. All roads crossing or near routes will be assumed to have wires.

b. The starting and release point should be easily identifiable.

c. Avoid route segments requiring heading changes of more than 60 degrees.

d. Avoid routes directly into low-angle rising or setting moon. If no other choice is available, alter course to zig-zag along the route.

e. Select identifiable navigation aids along the route.

f. Avoid houses by 500 meters.

g. Avoid navaids and airports.

h. Avoid brightly lit areas and populated areas.

8. Instrument Meteorological Conditions: The instructor pilot/pilot-in-command (IP/PC) is responsible for ensuring inadvertent IMC is not encountered during NVG flight. However, if IMC is imminent, a landing should be made at the nearest safe landing area. If an aircraft enters into IMC inadvertently, proceed as follows:

a. Pilot at the controls will verbally announce that he is IMC, level the aircraft, transition to instruments by looking under the goggles, and begin a climb.

b. As the pilot at the controls transitions to instrument flight, the other pilot will remove his goggles, turn up the instrument lights, and take control of the aircraft, continuing the climb.

c. After relinquishing the controls, the first pilot will remove goggles and transition to instrument flight.

d. Conduct an IFR recovery to the airport. (See VHIRP, Annex Q)

9. Restrictions and Definitions:

a. Terrain flight - For purposes of NVG operations and training: NVG terrain flight is flight less than 200 feet above the highest obstacle on the flight path, including 1,000 meters forward and 500 meters both sides of the aircraft.

b. Altitude - Minimum altitudes for NVG terrain flight operations are:

(1) Low level flight - no lower than 100 feet above highest obstacle.

(2) Contour flight - no lower than 25 feet above highest obstacle.

(3) NOE flight - skids/wheels clear vegetation and obstacles in flight path.

c. Airspeed - NVG terrain flight airspeed limitations are:

(1) Low level flight - not to exceed 100 KIAS.

(2) Contour flight - not to exceed 70 KIAS.

(3) NOE flight - not to exceed 40 KIAS.

10. Flight Routes:

a. Ingress and egress routes will be as designated for the appropriate training area. (Designate in an appendix to SOP.)

b. Use of these routes is mandatory any time more than one aircraft is using the NVG training area. The briefing officer will brief the routes and directions to be used for entry and exit to ensure one-way ingress and one-way egress.

c. Routes flown to and from the NVG training area will be only in the directions and altitudes briefed.

11. Night Mission Briefing: Following are the minimum subjects that will be discussed during a night mission briefing:

a. Weather, including winds, and forecast for the entire period.

b. Visibility restrictions, such as smoke, haze, and fog.

c. Hazard map review and update of obstructions and wires.

d. Mission to be performed.

e. Airfield lighting and aircraft lighting.

f. Crew duties.

g. Communications and procedures.

h. POL requirements.

i. Parking and recovery plans.

j. Formations to be used if multiship operation.

k. Safety (to include downed aircraft procedures).

l. Aircraft assignments.

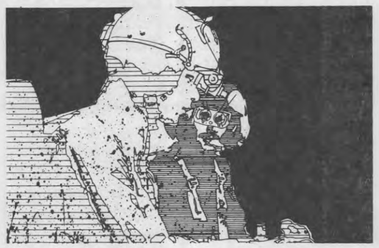
m. Pilot-in-command assignments.

n. Air mission commander assignment.

o. Aircraft down time.

p. Routes to be used to and from the training area.

q. PCs and briefers will indicate on their briefing sheet that equipment periodic checks, compatible goggles, and night vision compatible lighting are IAW MSG 281030Z Mar 87.



Sample night operations area/airfield SOP outline

1. General. The procedures contained in this SOP should be followed by all personnel during night training to ensure a safe environment and smooth traffic flow for training. All aviators entering traffic who have not been briefed on training site procedures will land and receive a briefing from the officer in charge or tower noncommissioned officer in charge as appropriate. All personnel will be familiar with this SOP, ATM and supplemental information, AR 95-1, and AR 95-50.

2. Training Requirements.

a. Location.

b. Field elevation.

c. Runway heading.

d. Frequencies.

e. Weather minimums.

(1) Ceiling and visibility.

(2) Wind.

f. Safety considerations.

(1) Familiarization with training site during daylight hours before night flight.

(2) Establishment of maximum density for aircraft in the training site.

3. Special Instructions.

a. Aircraft lighting.

b. Training airfield lighting.

c. Training area personnel safety standards.

d. Training area vehicle safety standards.

e. Traffic patterns.

(1) Entry and exit procedures.

(2) Call signs.

(3) Pilot procedures.

(4) Night vision device failure procedures.

f. Parking and refueling.

g. Aircraft mishap procedures. □

Formation lead change procedure

As a result of two accidents during attempts to change lead by using an "overtake" method, a standard lead change procedure was established. That procedure is:

At no time will a lead change be initiated, aided or unaided, by executing an acceleration to overtake the lead aircraft.

Only the lead aircraft will give the signal to initiate lead changes, which will be conducted as prescribed in the prebrief. Chalk 2 will acknowledge.

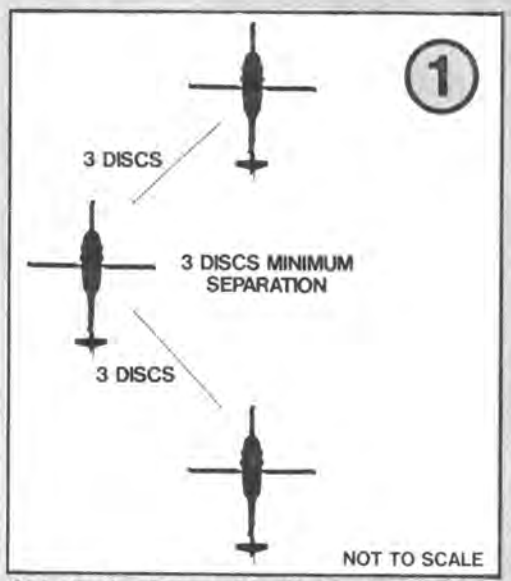
Lead will make a heading change of 30 to 90 degrees, depart the formation, and maneuver the aircraft a minimum of an additional five rotor disks (minimum of eight rotor disks separation) to the announced side (clear side).

When chalk 2 (new lead) determines and announces that the former lead is clear of the formation, the former lead will visually confirm each aircraft passing. The former lead aircraft must be careful not to drift too far away from the formation when executing the turn away from the formation. One technique is to have Chalk 2 advise the lead when he has attained the proper separation. At this time, the former lead should adjust the flight path to parallel the formation.

After the last aircraft in formation has passed, the former lead aircraft will assume rear/trail aircraft position with appropriate separation and aircraft lighting.

Formations suited for night multi-helicopter operations are echelon, straight trail, and staggered trail. Free-cruise is suited for aided night terrain flight.

Changing formations at night requires a high degree of proficiency. Changes from one formation to another should be kept to a minimum. Any changes to a formation should be specifically briefed and understood by all crewmembers involved. All en route formation changes should first be made to the trail formation and then to the desired formation. □



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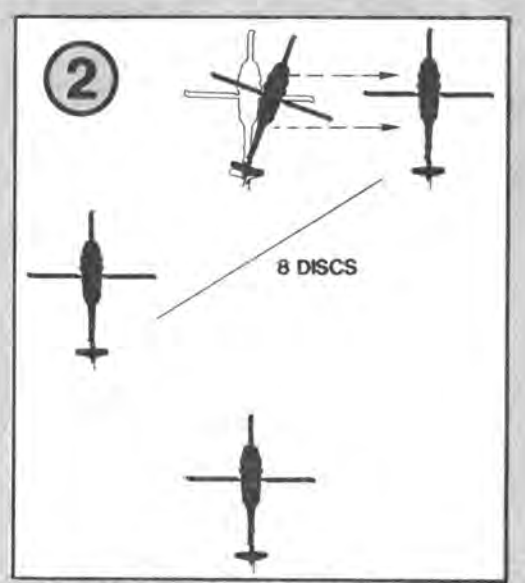

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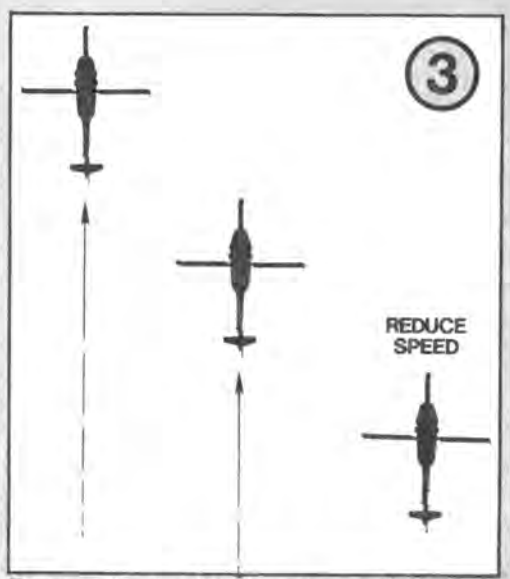
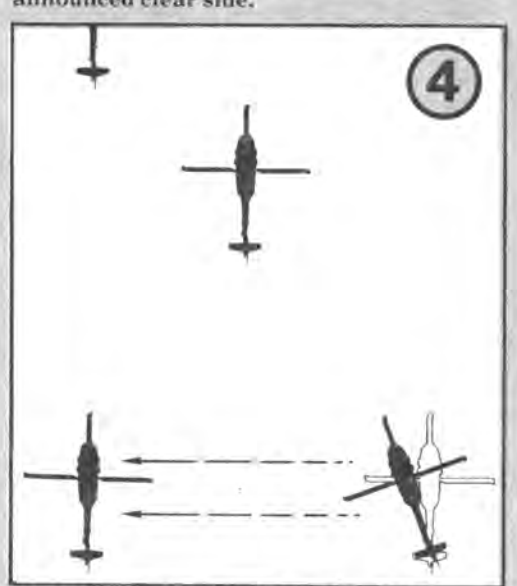


Former lead will visually confirm each aircraft passing.



After the last aircraft in formation has passed, former lead aircraft will assume rear/trail aircraft position.

Night mission planning and briefings

Night flying with night vision devices is a high-risk operation. But the risks can be managed and controlled by understanding the limitations of your equipment and by detailed mission planning that establishes acceptable operational parameters within the constraints of existing technology.

Operational parameters can be tailored by controlling the variables that affect the mission; for example, illumination levels, time standards, weather criteria, and so forth. The key is in clearly defining mission requirements and then establishing acceptable risk factors. This is done by identifying risks associated with mission operations and weighing them against the training benefit to be gained.

When operating at night with night vision devices, everyone from commander to crew chief must be aware of the higher risk implications. All controllable risk variables must be controlled, and by-the-book disciplined operations are mandatory.

It is extremely important that night missions be thoroughly planned and briefed. Each unit training mission, from planning to briefing, should be as realistic as possible.

Members of planning cells should be excused from other duties and responsibilities during the planning phase. Their full attention should be directed to the mission. The responsibilities of each member of the cell must be clearly specified so that time is used efficiently.

The aviator primarily responsible for navigation should be responsible for selection of the flight route and checkpoints.

All charts, drawings, and diagrams must be drawn to scale and constructed as accurately as possible. Several planning-cell members should doublecheck all times, distances, and headings. If an unresolved discrepancy in computations exists, an average should be taken.

Plans should be made for current mission profile requirements. Worst-case situations—such as adverse winds, abnormal fuel consumption, enemy compromise, and downed aircraft—should also be considered in these plans.

Emergency LZs, holding areas, downed crew rally points, and code names should be preselected and incorporated into contingency plans.

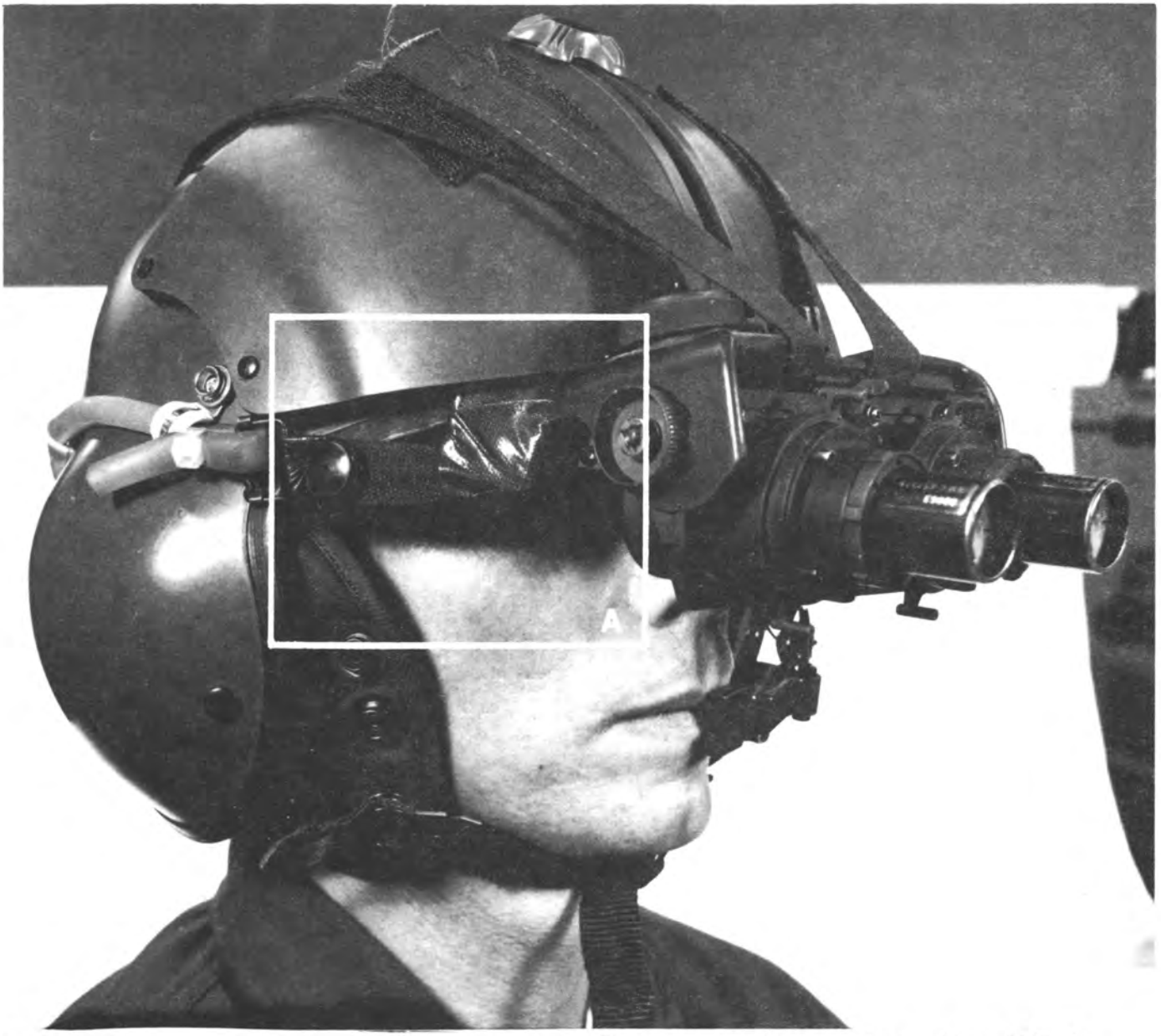
All crewmembers should be involved in mission planning. At the very least, they should be fully briefed.

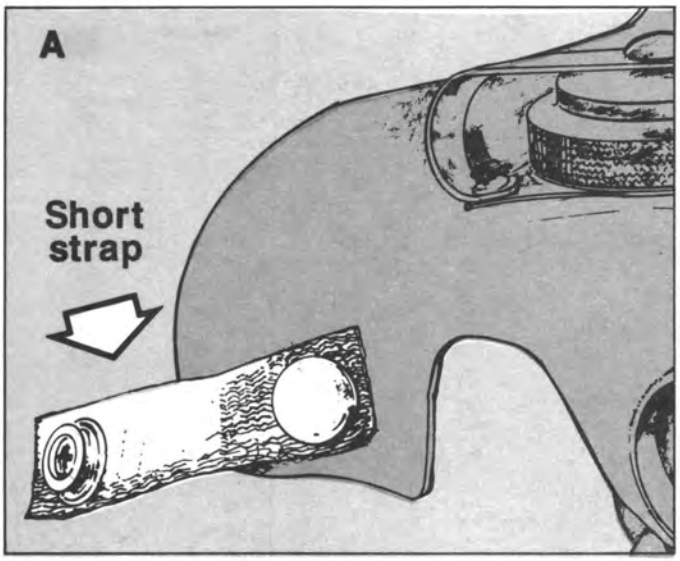
The formal briefing must be conducted far enough before the scheduled departure time to allow time to resolve any problems raised during the briefing. A final briefing should be scheduled just before departure time to update weather, confirm the time schedule, discuss any mission changes, and allow the commander time to reemphasize important aspects of the mission to the crew. All phases of the operation should be briefed in detail.

Final checks of personal equipment should be part of the briefing. The aviation life support equipment and supply officers should be present to correct any problems.

Pilots must study all times, distances, headings, estimated times of arrival, air control points, and terrain features for the mission.

Flight or team leaders must hold individual flight briefings after the formal briefing. Each aviator should be required to discuss the entire mission. □





Correct configuration of modified faceplate. Note the vertical straps pass between the binocular assembly and faceplate. Any other deviation to this modification is unauthorized. One of the most common unauthorized modifications is removal of the short strap (insert A). This strap reduces stress on the attachment point to prevent the faceplate from cracking. Removing the strap eliminates this advantage. The goggles may be attached to the helmet with either the rubber surgical tubing or the side straps supplied with the AN/PVS-5s.

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Flightfax
Report of Army Aircraft Mishaps

Seat belts save lives.

The high cost of overconfidence

The pilot had 3,296 rotary wing flight hours, 770 of which were in the UH-1. The copilot had 1,977 rotary wing flight hours, 1,638 of which were in the UH-1.

The mission to requalify crewmembers in the operation of the rescue hoist was routine with both pilot and copilot qualified for aircrew retraining, but neither had completed any hoist training in the preceding 7 months. They completed 12 uneventful hoist operations at varying altitudes between 50 and 160 feet over rolling terrain with a 212-pound dummy load.

The aircraft was at a 160-foot, out-of-ground-effect (OGE) hover when it experienced a 30-degree right yaw immediately followed by a return to original heading. The pilot initiated a descent and nosed the aircraft over to gain forward airspeed. The aircraft began a gradual right turn of approximately 120 degrees. The pilot discontinued the landing attempt and applied power, which aggravated the right yaw situation. The aircraft was estimated to be at a 40-foot altitude when power application was made, but it continued to settle into a depression while making a 270-degree turn. The main rotor blades struck a slope causing separation of the main rotor system and some of the main transmission. The aircraft then bounced and rolled down a 22-degree slope, coming to rest on its roof at the bottom of the depression.

Neither the pilot nor the copilot saw any warning lights or abnormal instrument readings throughout this phase. No crewmember actually thought a crash was imminent except for the copilot, who assumed a "crash position," even though this is not the recognized

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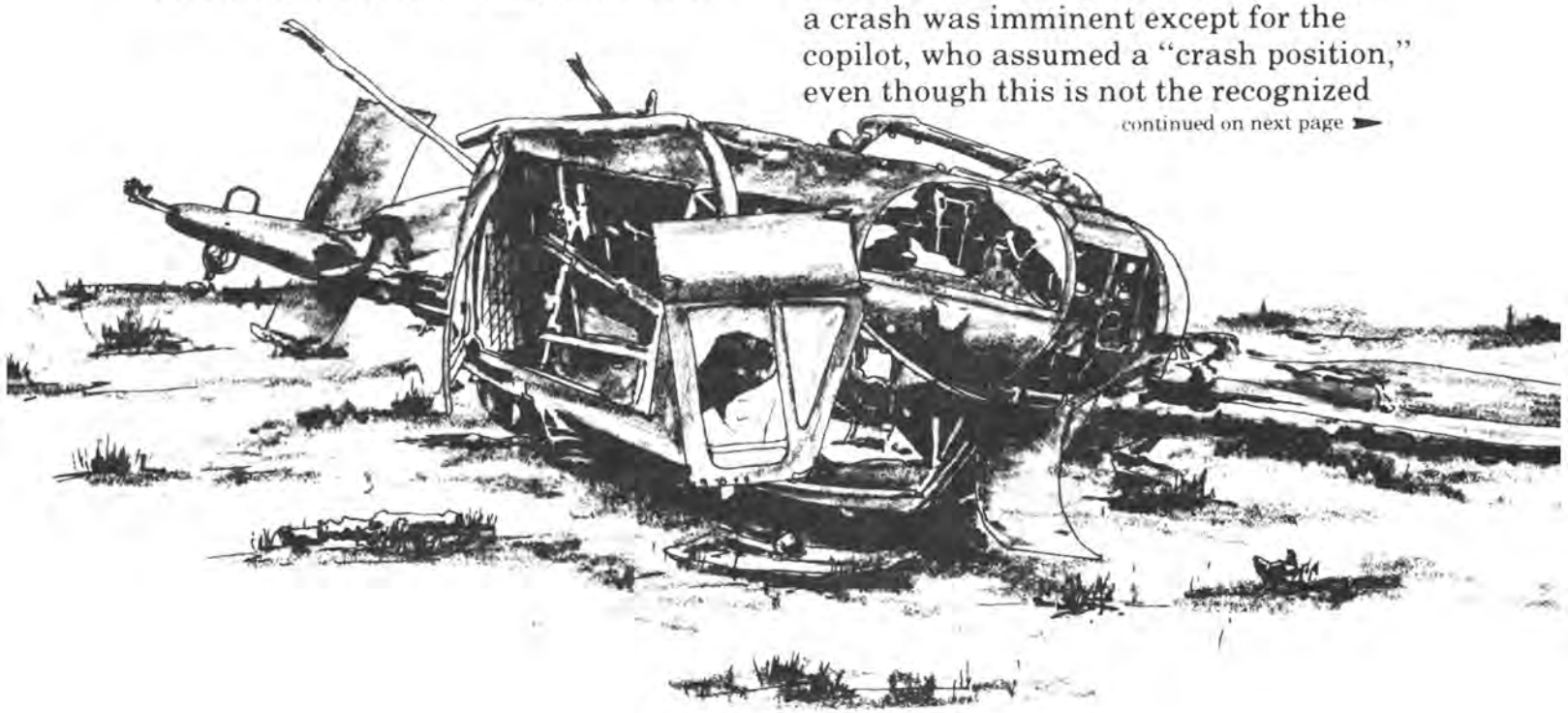

The high cost of overconfidence

position for those in the pilot/copilot seats. One crewmember occupied the one usable passenger seat, and another crewmember was seated on the floor using a safety belt attached to the transmission bulkhead. The crewmember operating the hoist was wearing a gunner's harness, which was attached to the cargo compartment floor. He was lying on the floor but moved to a seated position on the floor during the first sign of a problem.

Because the aircraft came to rest in the inverted position, all crewmembers initially suffered from disorientation. The PIC released his restraints and exited through the left pilot door. The copilot found himself in the crash position with both feet on the instrument panel. He removed both his helmet and survival vest before exiting through the broken window in the right pilot door. One crewmember, who was seated on the floor, had no problems getting out. Another, who was in the crew seat, found he could not release his safety belt because it had rotated, and the latch was against his stomach. Due to his inverted position, his full weight was against the belt, and he needed help to unlatch it. The hoist operator ended up standing outside the aircraft, restrained by his gunner's harness. He could not reach the latch attached to the cargo floor ring, and due to tension on the line and harness, he could not release the latches on the harness without assistance from others.

The cause of this accident was human error. While attempting to fly out of an unstable OGE hover, the PIC failed to properly respond to an uncommanded, right turn. That is, he failed to utilize all available cyclic and left pedal control to stop the right turn. Instead, he utilized an additional power reduction that decreased the rate of turn but increased the rate of descent. Still intending to fly out of the situation, the PIC increased power to arrest his rate of descent. When he did so, the aircraft developed a right yaw, and the nose tucked. The PIC then lowered the collective to the full-down position and leveled the aircraft just prior to ground impact. The PIC specifically remembered reaching the control stops of the cyclic but had no recollection of reaching the stops on the left pedal. With the power available, the right turn could have been stopped with adequate application of left pedal.

By bending over to assume what he thought was the proper crash position, the copilot put himself in needless danger by negating the protection afforded by the shoulder harness and inertia reel. By leaning forward, he extended his shoulder harness take-up strap so that when the inertia wheel locked, there was too much slack in the system to keep his upper body from flailing about. He further put himself at risk by removing his survival vest and helmet prior to exiting the wreckage. By doing this, he precluded his use of the primary life support equipment available to him.

Fortunately, installation of the hoist prevented the roof section of the cockpit and passenger/cargo compartment from collapsing and causing serious injury to the crewmembers in those areas.

These fliers were lucky; they were not injured. The aircraft was destroyed. ■

UH-60 Black Hawk EMI investigations

The following message, dated 131900Z Nov 87, has been received from the Black Hawk Project Manager's office at AVSCOM.

"Recent newspaper articles written and dispatched by Knight-Ridder newspapers have been critical of the UH-60 Black Hawk's electromagnetic interference (EMI) protection. The purpose of this message is to assure the Army aviation community that Army management, particularly the Black Hawk Project Manager's office and the Army Safety Center, have been and will continue to be on top of this issue as it pertains to flight safety, mission readiness/reliability, and combat effectiveness of the UH-60 Black Hawk.

"Contrary to the thesis of recent press articles by Knight-Ridder, there is no evidence from extensive EMI/EMC/EMV testing or worldwide UH-60 fleet experience which reflects flight safety critical effects from 'routine radio waves.' Allegations that the UH-60A can be 'knocked out of the sky by routine radio waves' are totally unsubstantiated. There is no evidence which suggests EMI as a cause factor in any UH-60A accident. As a matter of fact, extensive testing by the Naval Air Test Center (NATC) and the Army's Vulnerability Assessment Laboratory concludes that EMI poses no threat which compromises flight safety. The susceptibility to EMI is confined to very high levels of energy generated in a test environment where the radio frequency sources are within a few feet of the aircraft. The current level of EMI protection built into the aircraft's systems has been demonstrated to adequately protect the aircraft from unsafe conditions. This has been demonstrated repeatedly by continued testing as well as 9 years of fleet experience accumulating over 600,000 flight hours without an EMI-related accident. The bottom line simply stated is that—

- After extensive EMI/EMC/EMV testing by the Naval Air Test Center and the Army Vulnerability Assessment Laboratory, no evidence exists to indicate adverse flight safety effects caused by radio waves.
- As a result of formal accident investigations conducted by the Army Safety Center, no Black Hawk accident has ever been attributed to electromagnetic interference (EMI).
- Based on extensive operational experience, detailed testing, and official accident investigations, the facts about Black Hawk and EMI do not support the highly speculative allegations made in recent newspaper reports.

"As you are well aware, we utilize a program of centralized accident investigation by the Army Safety Center in order to ensure maximum objectivity, completeness, and accuracy of reports. It is worth repeating that their records show EMI has not been cited as a causative factor in any UH-60 Black Hawk accident report.

"While the Army states its position firmly, honestly, and categorically, there is always an awareness that changing threats, operational environments, and further tests, experience, and research may dictate future system improvements." ■

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps

H series - Pilot performed a normal approach to a hover. While the IP's attention was distracted outside the aircraft, the pilot abruptly lowered the collective. The high sink rate resulted in a hard landing.

H series - After completing a mission as cover aircraft during terrain flight training, crew elected to perform terrain flight consisting of both NOE and contour flight at airspeeds from 60 to 90 KIAS, at altitudes 5 to 50 feet above obstacles along a river. The PIC was at the controls as the aircraft turned southwest toward the setting sun. The sunlight was diffused by hazy conditions, and the crew failed to see a dead hardwood tree until the aircraft struck a limb protruding into their path. The aircraft's right chin bubble was broken, and the fuselage was scraped along the right and underside.

UH-1 Class E mishaps

H series - During final approach, pilot failed to anticipate rotorwash from other aircraft. Pilot applied torque to stop the descent, and the aircraft began an uncommanded right turn. When full left pedal was applied to stop the turn, torque climbed to 55 psi for 1 second. No damage resulted.

H series - Master caution and tail rotor gearbox chip detector lights came on during flight, and aircraft landed. Chip plug was cleaned, and after maintenance operation check, aircraft was released. About 20 minutes into next flight, master caution and tail rotor gearbox chip detector lights again came on. Ninety-degree gearbox will be replaced.

FY88 Class A Mishap Countdown

	FY87			FY88		
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	1 - 25 Nov	1	0
	December	4	6	December		
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3d Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	3	0

UH-60 Class E mishaps

A series - During takeoff at 80 KIAS, IP induced stabilator failure with cyclic slew switch. Auto control was not attempted. Cyclic slew switch was used to slew stabilator to zero-degree setting. Stabilator indicator continued up to 6 degrees above zero. IP made unsuccessful attempt to slew stabilator to zero degrees with manual slew switch, and aircraft landed. Suspect spring in cyclic slew switch made contact with microswitch.

A series - Aircrew was given incorrect grid coordinates for forward area refueling point (FARP). Failing to find the FARP and knowing they were into the 20-minute fuel remaining, the crew made a precautionary landing.

A series - Aircraft was 4,000 feet msl, 100 KIAS, at 49 percent NP when stabilator disengaged from auto mode and made no further movement. Connection to lateral accelerometer had shorted out.

Mishap briefs

A series - Crew felt aircraft yaw several times during NVG flight. NP and NR on both engines indicated 106 percent, and aircraft landed. All indications were normal when collective was reduced. Caused by failure of No. 1 engine control unit.

A series - While performing maximum power check during maintenance flight, No. 2 engine experienced severe compressor stall. Crew shut down engine and landed. Engine will be replaced.

Attack helicopters

AH-1 Class D mishap

F series - Aircraft was returning to assembly area after completing first of two battle drills. IP, who was flying from gunner station, misjudged speed and clearance and allowed aircraft to get too close to tree line. Both main rotor blades were damaged when they struck an overhanging tree branch. The other pilot failed to provide assistance during clearing procedure and did not warn IP of hazard.

AH-64 Class E mishap

A series - During runup, crew noticed message that pilot night vision sensor (PNVS) had failed. Fault detection/location system confirmed failure. Crew shut system down then powered up again, and it still indicated PNVS failure. Unit was removed from aircraft.

Cargo helicopters

CH-47 Class E mishaps

C series - During flight, crew heard sudden grinding noise from vicinity of No. 2 engine and felt aircraft vibrate. After 10-minute flight to nearest land, aircraft landed in a clearing. During approach, high-frequency vibration and grinding sound increased, accompanied by a loud, banging noise. Maintenance could not duplicate. Suspect cause was air in utility hydraulic system.

C series - No. 2 engine transmission hot caution light came on during flight. Engine was secured and aircraft made uneventful landing. Caused by chafed wire on No. 2 engine transmission.

Observation helicopters

OH-6 Class D mishap

A series - During runup for maintenance operation check, pilot heard a pop, saw a puff of smoke, and felt a brief shudder through the flight controls. Rock had been picked up and struck a main rotor blade.

OH-58 Class D mishap

C series - Aircraft was parked on a left slope. During runup, vibration caused copilot's knee board to slide off instrument panel. Chin bubble was damaged when struck by the board.

OH-58 Class E mishaps

A series - Master caution and fuel boost lights came on during flight. Caused by failure of fuel boost pump.

C series - During flight, unusual degree of sloppiness was felt between copilot and pilot cyclic. Aircraft landed, and maintenance recommended grounding. Maintenance replaced cyclic stick bearings.

Fixed wing

C-12 Class D mishap

C series - As aircraft rounded out for landing, flock of seagulls came up through flight path. One bird was struck, causing $2,000 damage to leading edge of right wing and deice boot.

U-8 Class E mishap

F series - Aircraft was downwind for landing. When landing gear handle was placed in down position, gear did not lower. Pilot did not hear landing gear motor running. Recycling of handle had no effect, and gear was lowered manually. Caused by failure of toggle switch.

Maintenance

AH-1 Class D mishaps

F series - During contour flight, crew heard a loud, high-pitched, grinding sound as collective was lowered for precautionary landing. Master caution and hydraulic lights came on, and tail rotor pedals became stiff. Aircraft landed with both pilots on controls to maintain yaw alignment. No. 1 hydraulic pump and failed line were replaced. Improper entry of status symbol for a "chafing (pressure) line" resulted in inadequate inspection and signing off of a difficult-to-find, chafed line, and the line subsequently failed.

P series - Aircraft was just out of phase inspection. Maintenance crew was assigned to run up the engine, check for leaks, and track the tail rotor blades. After a walk-around inspection of the aircraft, the mechanic untied the main rotor blades and pulled them around to the 90-degree position on the

continued on next page ►

Mishap briefs

right side, leaving the tiedown attached to the blade. The pilot entered the cockpit on the left side and strapped in. The mechanic gave the pilot a start signal. The pilot looked both left and right but, due to darkness, did not see the tiedown. The aircraft was started, and on the first rotation of the main rotor blades, the mechanic heard a slapping noise and signaled the pilot to shut down the aircraft. Investigation revealed one of the tail rotor blades was bent on the trailing edge and dented on the outboard side.

AH-1 Class E mishap

F series - During refueling, PIC noticed oil dripping from bottom of the aircraft. Internal transmission oil filter was leaking. Mechanic failed to ensure O-ring was not pinched during assembly, and O-ring split.

Safety messages

• Safety of flight technical message concerning electrical grounding of fuel flow transmitters on CH-47D helicopters (CH-47-87-13, 052030Z Nov 87). Summary: It was recently discovered that fuel flow transmitter cases were not properly grounded during manufacture. Should a fuel flow transmitter experience an internal electrical short to the unit case, the potential exists for electrical shock to personnel and/or electrical arcing. Arcing could produce localized heating or hot spots. These, in turn, could start a fuel fire. The manufacturer, General Electric, has corrected the problem in production with an internal ground jumper. Units corrected in production are identified with the suffix "A" after the serial number. A team from General Electric will perform a turnaround program in the field that will install the correct ground internally to the fuel flow transmitter. As an interim measure, field units will install a temporary external jumper to provide grounding protection. The purpose of this message is to: (1) Direct an inspection to identify any fuel flow transmitters that do not have an "A" suffix in the serial number. (2) Direct field installation of a temporary grounding jumper between the fuel flow transmitter and airframe. (3) Authorize permanent correction by a depot-level commercial team. Contact: Roger Heidenreich, AUTOVON 693-9089, commercial 314-263-9089.

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

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Report of Army Aircraft Mishaps

Seat belts save lives.

Five receive Broken Wing awards

The Broken Wing Award is given to aircraft crewmembers who demonstrate a high degree of professional skill while actually recovering an aircraft from an in-flight failure or malfunction necessitating an emergency landing. Requirements for the award are spelled out in AR 672-74.

• **CW2 Anthony Eupizi, Army Aviation Support Facility, Michigan Army National Guard, Grand Ledge, MI.** CW2 Anthony Eupizi was PIC of a UH-1H on a service mission. In addition to the three crewmembers, there were eight other people on board the aircraft. CW2 Eupizi was on the controls when, at 1,700 feet agl, the aircraft experienced a severe engine compressor stall immediately followed by a complete loss of engine power. CW2 Eupizi initiated emergency procedures and directed the copilot to place the governor in the emergency mode. While continuing an autorotative descent, the PIC cross-checked his instruments to confirm engine failure and selected an open field for landing. As the UH-1 descended toward the field, CW2 Eupizi could see that it was covered with mature stalks of corn, but he also realized that he didn't have enough altitude to make an alternate choice. He adjusted the aircraft heading to line up with the prevailing wind and estimated the height of the corn at about 6 feet. During deceleration, he held the aircraft's nose up to dissipate all forward speed and allow the helicopter to settle into the stalks of corn vertically. As the aircraft began to settle, CW2 Eupizi applied collective to cushion the landing while maintaining aircraft position and heading with cyclic and antitorque pedals. He landed the UH-1H

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Five receive Broken Wing awards

in the tall vegetation, limiting damage to a slight bend in the aft landing gear crosstube.

• **CW2 Jeffrey A. Handley, 11th Aviation Battalion (Combat), 12th Aviation Group, V Corps, APO New York 09457.** CW2 Handley was PIC of an OH-58A on a service mission with a crew of two and two passengers on board. During cruise flight at 400 to 500 feet agl, 80 KIAS, the crew heard a high-pitched, whining sound from the aircraft's engine. A check of the instruments revealed no abnormal readings. CW2 Handley considered making a precautionary landing but, about 10 seconds later, there was a loud bang and the engine failed. The N2 power turbine section of the engine had exploded. Fragments of the engine damaged the engine cowlings, deck, and rotor blades and, unknown to CW2 Handley at the time, the engine combustion section was resting on the tail rotor drive shaft. The tail rotor pitch change control tube was almost broken in two. CW2 Handley immediately placed the aircraft into autorotation, told his passengers what was happening, and made a mayday call. He adjusted airspeed to obtain maximum glide capability to clear a 20-foot berm of an access road directly ahead of the aircraft. The OH-58 landed in a 450- by 900-foot sugar beet field surrounded by wires, buildings, and highways. There were no injuries to the crew, passengers, or damage to the aircraft.

• **CW2 Mario Gabriel, Jr., 3d Squadron, 7th Cavalry, 8th Infantry Division (Mechanized), V Corps, APO New York 09028.** CW2 Gabriel was pilot of an OH-58C with three people on board. The aircraft was trail in a flight of four during a training flight. The OH-58 had climbed to cruise level and had just turned downwind in the traffic pattern when the engine-out audio came on, and the pilot noted an out-of-trim condition. CW2 Gabriel cross-referenced the dual tachometer and noted it was passing through 80 percent N2. He lowered collective and trimmed the aircraft. The engine-out, engine oil pressure, and generator caution lights came on as N1 passed through 40 percent. CW2 Gabriel turned the aircraft left 120 degrees to avoid wires in his path and to take the OH-58 away from the rest of the flight. As the turn was completed, the N1, N2, and engine oil pressure dropped to nearly zero. CW2 Gabriel turned the fuel boost and main fuel valve off and performed a deceleration to make a no-ground-run autorotation to a field. Because of the wheat covering the field, he was unable to determine the condition of the ground or the direction of the furrows. He also had a problem with depth perception created by the fact that he was unable to tell just how tall the wheat was. In addition, the wheat lessened the positive

cushioning action of ground effect because of its dissipation characteristics (much like elephant grass or water). CW2 Gabriel applied collective at about 10 feet above the wheat and, as the skids descended into the wheat, applied cushioning pitch. The aircraft landed with only 15 to 20 inches of ground run and stopped with a slight forward rocking motion due to the soft ground.

• **Mr. Ferrin D. Eason, Pan Am Support Services, Inc., U.S. Army Aviation Center, Fort Rucker.** Mr. Eason was IP of a TH-55A primary flight trainer. He was flying with a presolo student who had only 7 hours of flight time. The student completed a simulated engine failure, and the IP got on the controls to start a power recovery at 200 feet agl. As the aircraft climbed through 300 feet agl, it started vibrating and yawed to the right. Mr. Eason took control of the aircraft and, after ensuring the student had not caused the problem, entered autorotation. The yaw ceased, but during descent the noise and vibration continued with no tail rotor pedal response. Recognizing tail rotor failure, Mr. Eason leveled the aircraft and landed in a field. He allowed the aircraft to sink into the plowed surface to prevent it from yawing during landing. Postflight inspection revealed the left tail boom support rod bolt at the lower end had failed, allowing the tail boom to shift to the left. This caused the tail rotor drive shaft to be severed at the point where it enters the tail boom, some 20 inches aft of the output point. Mr. Eason's prompt action in initiating an autorotation stopped the aircraft's yaw, preventing the possible loss of the tail boom in flight.

• **WO1 Craig A. Martin, 4th Attack Helicopter Battalion, 4th Infantry Division (Mechanized), Fort Carson.** WO1 Martin was PIC of a UH-1 aircraft on a service mission. While on final approach to a helipad, WO1 Martin heard a loud bang from the engine and saw that his engine oil pressure had dropped to zero. N1 had also dropped, and the N2 and rotor rpm needles were split, confirming a total engine failure. There was no sound coming from the engine. WO1 Martin reduced collective pitch and executed an autorotative landing to desert terrain spotted with brush. Ditches and berms of sand and dirt ran at an angle to the direction of touchdown. One ditch was no more than 20 feet in front of the aircraft, and if WO1 Martin not been able to terminate the landing with minimal ground run, serious damage to the aircraft probably would have resulted. WO1 Martin was still in his first week of PIC duties. Although he had no experience with unannounced power-off landings in an aircraft with five people on board, he was able to correctly assess the engine failure, complete the emergency procedures, and land with minimal damage to the aircraft.■

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap

H series - Aircraft was on an instrument training flight. During final approach, IP reported an unusual vibration and took control of the aircraft. He stated his intention to land rather than executing a missed approach. Shortly thereafter, he reported hitting a tree. The aircraft entered the trees in a level attitude with the advancing blade of the main rotor striking approximately six trees.

UH-1 Class D mishaps

H series - Aircraft was on a search and recovery mission over hilly and rugged terrain near a mountain range. The aircraft was 75 feet agl, 50 KIAS, when the crew spotted the missile payload they were looking for. The copilot, who was flying from the right seat, slowed the aircraft to near zero airspeed and began a right turn, placing the aircraft in a strong right crosswind. The aircraft began a rapid spin to the right, turning 360 degrees in 3 seconds. When the copilot failed to initiate appropriate corrective action, the IP took the controls and landed on a small knoll. The left skid and sheet metal behind the left rear crosstube received some damage.

FY88 Class A Mishap Countdown

		FY87			FY88	
	Month	Class A Mishaps	Army Military Fatalities	Month	Class A Mishaps	Army Military Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	November	1	0
	December	4	6	1-2 Dec	0	0
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	3	0

The copilot did not recognize conditions that contribute to loss of tail rotor effectiveness and failed to initiate proper emergency procedure.

H series - During NOE flight, left synchronized elevator and tail rotor blade contacted tree limbs. Crew was unaware of mishap until postflight inspection. Maintenance replaced tail rotor blade.

H series - Pilot made a slightly fast approach to avoid blowing snow in landing zone. In the darkness and blowing snow, he misjudged distance to snow cover. Left rear skid struck the ground, and the aircraft pitched right and forward. Pilot applied cyclic and collective pitch, brought the aircraft to a stabilized 30-foot hover, and landed.

H series - Following is an update of a previously reported incident in 30 Sep 87 *Flightfax*. While hovering to parking after

maintenance test flight, PIC found he had almost full left pedal applied and noted a loud vibration in the airframe and pedals. Aircraft began an uncommanded right turn, and PIC applied full left pedal and reduced power, but the aircraft continued in a rapid right turn. PIC reduced throttle, and aircraft landed hard on the edge of a ditch. PIC applied collective and cyclic to keep aircraft from rolling over, and aircraft rose to a 10- to 15-foot hover, turning another 110 to 120 degrees right. Aircraft descended and PIC applied collective, but there was insufficient rpm remaining, and aircraft landed hard in a right bank. Investigation revealed unexpected 90-degree crosswind caused the hovering aircraft to make a sudden, uncommanded right turn, causing the pilot to think he had some type of tail rotor malfunction. The pilot overreacted, and when a reduction of power did not correct the right turn, he made an improper decision to autorotate to an unsuitable landing area. The landing gear, underside of the aircraft, and saddle mounts were damaged, and rocking motion made main drive shaft bolts contact disks.

UH-1 Class E mishaps

H series - During authorized contour flight, crew failed to see commo wire stretched between two sides of a valley. Crew heard a snapping sound and landed to investigate. Six feet of wire were found on vortex generator and left skid tube, but there was no damage. Ground unit had not followed division SOP while laying wire.

H series - During climb to 3,000 feet msl, crew felt high-frequency vibration in airframe and controls. During a later test flight, high-frequency vibration was felt in throttle and collective. Maintenance realigned engine and torqued engine nose plate.

H series - Aircraft was downwind during hydraulics-off maneuver. Crew felt unusual feedback in rear of aircraft. Hydraulics were turned on, and aircraft made uneventful landing. Maintenance replaced right lateral servo.

UH-60 Class E mishaps

A series - Aircraft was at 3,300 feet msl during sport parachute drop. Jumper's chute deployed inside the aircraft.

A series - Aircraft was 9.5 minutes from destination when low fuel light came on. Aircraft landed, and fuel was delivered by truck. Crew failed to ensure adequate fuel margin to complete mission.

A series - During flight, stabilator disengaged several times from automatic mode. Caused by air leak in pitot static system.

Attack helicopters

AH-1 Class D mishap

S series - Crew was operating aircraft in NOE environment in a tactical training area. During tactical operation, aircraft was maneuvered into a shallow dive and bank. During rollout and pullup from rising terrain, turret struck a dead tree sticking up above surrounding vegetation.

AH-1 Class E mishaps

F series - During low-level flight, crew heard and felt vibration and made a precautionary landing. After landing, pilot discovered alternator was on fire. Fire went out after emergency engine shutdown. Caused by failure of alternator shaft.

continued on next page ►

Mishap briefs

S series - During climbout, pilot increased power from 30 to 35 psi torque. Within 20 seconds, rpm began to bleed down, and aircraft yawed left. Pilot checked throttle and scanned instruments. N1 was decreasing past 89 percent, N2 was decreasing past 6000 rpm, and torque went to zero. Low rpm audio and light came on. Copilot took controls and completed an autorotation to a field just ahead of the aircraft. After recovery by maintenance, engine started and ran normally. In emergency governor, maximum rpm was 6700, and fuel sample passed lab tests. Fuel control and governor were removed and sent to depot for inspection.

AH-64 Class B mishap

A series - Crew was conducting AQC training. IP picked up second period student, refueled, and flew traffic pattern for 45 minutes. While waiting for next takeoff, rated student pilot reported a flickering master caution light. IP reduced power and asked student if he had a segment light. Student responded the accessory oil psi pump light was flickering. IP requested taxi to parking and asked student to start auxiliary power unit (APU). As APU was started, IP saw smoke coming from engine compartment and yelled to the student to get out of the aircraft. As the student got out of the cockpit, his foot hit the cyclic and knocked it forward out of the IP's hand. The main rotor blades contacted the pilot night vision sensor turret. The IP completed shutdown before leaving the aircraft. There was no fire. 8804

Cargo helicopters

CH-47 Class D mishaps

D series - Aircraft was hovering over gamma goat for tandem point hookup. After two attempts to hook load were unsuccessful due to dusty conditions, crew chief focused his attention on the forward hook and failed to detect the aircraft was descending. Aircraft settled onto antenna mount of gamma goat, puncturing lower rescue door and underside of aircraft.

D series - During external load pickup, lower cargo door came in contact with vehicle roll bar, damaging door lifting rod ends. Shepherd's hook was being used to pick up lifting clevis. Hookup ground crew failed to ground the cargo hook as specified in FM 55-450-1, and when hookup man was shocked by a static charge, he left his station and refused to continue the hookup. Flight engineer failed to go to "hot mike" while conducting shepherd's hook operations as required by unit crewmember standardization guide for external loads. As a result, he was unable to warn the pilot the aircraft was too close to the load.

CH-47 Class E mishaps

C series - During cruise flight, crew felt high-frequency vibration in pedals and airframe. Maintenance replaced No. 8 drive shaft.

C series - During confined area operations, No. 1 engine oil-low light came on intermittently. Aircraft landed, but crew was unable to detect oil leak. Oil level was brought up to normal range, and aircraft returned to airfield with no further incidents. During maintenance flight, oil consumption by No. 1 engine was excessive. Engine will be replaced.

Observation helicopters

OH-6 Class E mishap

A series - Main rotor blade striker plate was nicked when blade was severely flexed by rotorwash from CH-47. Aircraft had been parked in authorized parking pad for 2 ½ hours. PIC completed preflight and found no discrepancies. After aircraft was started and run up, another

aviator reported that the rotor blades had been flexed by a taxiing CH-47. Because the PIC had found no irregularities during preflight and runup, he decided to take off. During climbout, flight operations contacted aircraft and expressed concern about how much the blades had actually been flexed. PIC returned to airfield and made uneventful landing. During inspection, dent was found in striker plate, and several broken straps were found in strap pack.

OH-58 Class D mishap

A series - Aircraft appeared to be on ground or very near ground in a level attitude when PIC thought he heard a change in engine noise. A check of instruments revealed N2 and rotor needles were fluctuating. At the same time, the PIC saw the copilot apply a great deal of forward cyclic, and aircraft began vibrating excessively. PIC took controls and began to pull in collective and forward cyclic to move the aircraft forward and out of the area. The aircraft's nose had not yet risen, and PIC thought the tail rotor had struck something. The rpm audio came on, and aircraft's nose began to rise as the tail began to sink. Thinking the aircraft was going to roll backward down the hill, the PIC executed emergency shutdown and applied forward cyclic. Vibration increased and, as the rotors slowed so that they would produce no significant lift, the PIC centered the aircraft controls and completed shutdown.

OH-58 Class E mishaps

C series - During simulated engine failure and termination with power, aircraft developed higher than normal rate of closure. IP reacted late, and aircraft descended to 10 feet agl. Torque required to arrest rate of descent reached 102 percent for 1 second. Freewheeling unit was replaced.

C series - Aircraft was flying near lake at 70 feet agl, 60 KIAS. Crew saw flock of birds to left and turned right. Duck struck upper left side of windscreen.

Fixed wing

C-12 Class C mishap

C series - Aircraft had just taken off and was 500 feet agl, 120 KIAS, when crew heard and felt a heavy thud in airframe. Damage to right wing could be seen, and aircraft developed slight vibration. After landing, large dent was found in leading edge of right wing, and skin on leading edge was broken. Caused by bird strike. Crew had not seen any birds before impact.

C-12 Class E mishap

C series - Aircraft had been at cruise level with OAT minus 16° C. for about 15 minutes. Windshield anti-ice had been on about 20 minutes when crew heard a loud crack. Extensive windshield damage reduced pilot's visibility, and aircraft returned to home station.

OV-1 Class D mishap

D series - During demonstration of evasive maneuver, pilot's door blew open. Pilot had failed to ensure door latch pins were in locked position.

OV-1 Class E mishap

D series - Fuel pump light came on during takeoff roll. Caused by failure of submerged fuel pump.

U-21 Class E mishap

H series - During cruise flight, copilot saw fuel siphoning from right engine nacelle fuel cap. Fuel cap was not properly seated.

Maintenance

UH-60 Class E mishap

A series - When engine power control levers were advanced to fly position, severe vibration developed in aircraft nose compartment. Vibration had previously been written up, but maintenance had not been performed. Forward vibration absorber was not properly tuned, causing bracket holes to become elongated from excessive vibration.

AH-1 Class E mishap

F series - Pilot felt cyclic binding as he began bringing aircraft to hover. TCA wire bundle clamp was installed backward, causing binding in cyclic controls.

continued on next page ►

Mishap briefs

U-21 Class E mishap

H series - During propeller feather check during engine runup, propeller levers would not remain in feathered position. Aircraft had just received major inspection during which radios in avionics compartment were removed and reinstalled. Apparently, when radios were reinstalled, soundproofing began binding against propeller lever cables.

Safety messages

• Safety-of-flight operational message concerning high performance hoist on UH-1 series aircraft (UH-1-87-11, 110100 Nov 87.) Summary: MWO 55-1680-321-50-1, installation of improved quick disconnect adapter kit, replaces upper and lower quick disconnect attachment fittings with fittings having a larger outside diameter. These larger-diameter fittings may interfere with the tapered side of the fittings in the floor of the UH-1 aircraft. Interference can cause the adapter fittings to not fully lock. If the adapter fittings are not fully locked in place, the hoist could exit the aircraft. The purpose of this message is to remove hoists modified by the MWO from UH-1H/V aircraft until further notice. Corrective action and reinstallation will be authorized by separate follow-on message. UH-60 aircraft with modified hoists may operate without restriction. Contact: Robert Lawyer, AUTOVON 693-9089, commercial 314-263-9089.

• Maintenance information message concerning advance notice of one-time and recurring inspections of engine cowlings on UH-60 series aircraft (UH-60-87-XSOF-02, 301700Z Oct 87).

• Maintenance information message concerning intermixing of seatbelt components on UH-1H/M/V aircraft (MIM-UH-1-XSOF-87-08, 061830Z Nov 87).

• Maintenance information message concerning servo cylinder assembly on UH-1 aircraft (MIM-UH-1-XSOF-87-09, 062130Z Nov 87).

• Maintenance information message concerning manual changes for maintenance of cargo door retainers on all series (except C/M) UH-1/EH-1 aircraft and operation of cargo doors while in flight (MIM-UH-1-87-XSOF-10, 171800Z Nov 87).

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

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Report of Army Aircraft Mishaps

Seat belts save lives.

OH-58 crashes during weather recovery

The mission was to provide student night vision goggle (NVG) training in tactics. Weather for the training mission was 1,000 feet scattered, 2,000 feet broken, 4,000 feet overcast, with 7 miles visibility until 2200. At that time, the weather was forecast to be 600 feet broken, 2,000 feet overcast, and 3 miles visibility with rain and light fog. Based on the instrument flight conditions forecast for the control zone at 2200 hours, the mission was planned for the aircraft to recover no later than 2100 hours.

The accident OH-58A, with an IP and student on board, took off at 1930 to begin training. At 2016, the airfield control tower received notice that the control zone was instrument meteorological conditions (IMC) with weather 4,000 feet scattered, 25,000 feet broken, 2½ miles visibility with fog. The tower made an immediate blanket call on VHF radio to all aircraft notifying them that the control zone was IMC. The section leader, who was on the ground at the airfield, began recalling his aircraft.

The accident aircraft joined with another aircraft and began inbound flight. Arriving at an intersection, the flight received a 10- to 15-minute wait for clearance from the airfield control tower. They proceeded to a stagefield to hold,

After the IP reported he had the airfield in sight and would be landing, the aircraft entered IMC and crashed into trees.

OH-58 crashes

where they were joined by three more OH-58 helicopters. At 2058, they were cleared to enter the control zone as a flight of five aircraft. The accident aircraft was chalk 2 in the flight.

The aircraft proceeded inbound under NVGs at 300 to 400 feet agl. The flight was without incident until it reached the VHF omnidirectional range (VOR) about 2½ kilometers to the north of the airfield where the aircraft entered fog that extended from the ground to between 400 and 600 feet agl. From the VOR, the flight of five aircraft made a shallow left turn for final approach to the field, landing to the south. The accident aircraft announced to the flight that he had the airfield in sight and would be landing.

The lead aircraft lost sight of the field and stopped his descent. The accident aircraft continued to descend into the fog. The accident aircraft struck trees in a tail-low attitude with 12 degrees of left bank. The main rotor system, mast, transmission, and cabin roof began ripping free when the white retreating main rotor blade struck a 7-inch hardwood tree, severing 6 feet of the blade. Ground impact of the vertical fin forced the nose of the aircraft down, resulting in a level or slightly nose-low attitude at the major impact point. Both crewmembers were killed.

The accident aircraft was discovered to be missing at 2050 when the airfield control tower was unable to establish radio contact. Crash rescue located the downed aircraft at 2212, 2½ kilometers northwest of the airfield.

The IP had accumulated 4,395 rotary wing hours of which 1,199 hours were in the OH-58 helicopter. He had a total of 606 hours of NVG flying time. The student pilot had a total of 180 hours of flight time of which 54 hours were in the OH-58, and 3 hours were under NVG conditions. Neither aviator had any record of safety violations or accident involvement, and they were well thought of by their peers.

The cause of the accident was human error. The fog was not considered a cause factor even though it occurred earlier than it was forecast. The mission briefing had noted fog and light rain as safety considerations. When the control zone went IMC at 2016, fog was reported as the obstruction to visibility. IPs interviewed who had been operating out of the airfield were well aware of fog buildup in low-lying areas surrounding the airfield.

While in a descending left turn to final approach to the airfield, the IP of the accident OH-58 failed to follow the inadvertent IMC procedures as briefed by the flight leader. The IP continued his descent when the aircraft entered IMC rather than adjusting to climb power, initiating a left turn, and climbing to 2,100 feet msl. Separation between the lead aircraft and the accident aircraft in chalk 2 position was approximately four rotor disks. As the two aircraft made their descent to the airfield, they both encountered fog at about 600 feet msl and lost sight of the airfield. The lead aircraft stopped his descent and turned right to a heading of 210 degrees. The accident aircraft was seen by the number three aircraft in the flight continuing its descent at what

appeared to be a higher than normal rate of descent until it was obscured by fog.

When the lead aircraft stopped its descent, the mishap aircraft in chalk 2 position was still descending. The IP may have thought his aircraft was closing on the lead aircraft and initiated a rapid, controlled descent to avoid the possibility of a collision. IMC and the NVGs could have created the illusion that the accident aircraft was too close to the lead aircraft, diverting the IP's attention outside the aircraft rather than toward initiating the briefed IMC recovery procedures.

The possibility that the IP in the accident aircraft may have descended into IMC and failed to initially detect the conditions because of the use of NVGs was ruled out as a cause of the accident, because the IP had sufficient time to execute the briefed IMC breakup procedure.

Based on the altitude of the accident aircraft at the time the rapid descent was initiated (340 feet agl), the 1 kilometer traveled before ground impact, and the impact airspeed of 60 to 70 knots, the IP had a recovery reaction time of 20 to 30 seconds. The IP probably was unable to transition his attention from outside the aircraft to the aircraft instruments in sufficient time to stop his rate of descent.

Evidence indicates the aircraft was in a decelerative, tail-low attitude at the initial point of ground impact, at an airspeed of 60 to 70 knots, indicating the IP saw the trees and was attempting to decelerate the aircraft.

The following factors did not contribute to the accident; however, if left uncorrected, they could have an adverse effect on the safety of future aviation operations.

- During special visual flight rules (SVFR) recovery, the five OH-58s were in formation flight with all crews utilizing AN/PVS-5 NVGs. Recovering aircraft in formation, rather than individually, expedites recovery operations and is the approved battalion procedure; however, formal training on NVG formation flight techniques is not currently received during the OH-58 Methods of Instruction Course and is not an Aircrew Training Manual task for observation helicopters. In addition, NVG formation flight is not adequately addressed in either the training brigade, battalion, or company standing operating procedures.
- The airfield tower could not give recovering aircraft a flight visibility to the north of the airfield, in the area of a special visual flight rules recovery corridor, due to the absence of a visual reference point.
- The tower received no pilot reports (PIREPs) even though an aircraft that approached the field for landing from the same direction as, and about 5 minutes prior to, the accident aircraft had difficulty due to flight visibility from the VOR inbound to the airfield. ■

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class E mishaps

H series - Aircraft was using external, 250-gallon water bucket in support of state forestry fire-fighting operations. The aircraft had 450 pounds of fuel remaining at beginning of second lift. PIC calculated he had used 75 pounds of fuel on the previous lift and could complete another load and still have 400 pounds of fuel for flight to refueling point 35 miles away. At end of second lift, only 300 pounds of fuel remained. During flight to refueling point, fuel gauge indicated 20 pounds of fuel remaining, and the fuel pressure gauge began fluctuating. Aircraft landed with power 3 miles from refueling point.

H series - Aircraft was chalk 4 in flight of four. During short final, aircraft encountered rotorwash from other aircraft and began to settle. To prevent a hard landing, power was increased to maximum available. Due to turbulence and rotorwash, torque fluctuated to 55 psi for about 1 second.

H series - While aircraft was loading passengers in pickup zone, soldier ran into pitot tube.

H series - IP initiated simulated engine failure at altitude. Needles failed to split when collective was lowered. IP rolled throttle back to operating rpm and landed. Caused by malfunctioning of N2 tachometer gauge.

FY88 Class A Mishap Countdown

		FY87			FY88	
	Month	Class A Mishaps	Army Military Fatalities	Month	Class A Mishaps	Army Military Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	November	1	0
	December	4	6	1-9 Dec	0	0
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	3	0

M series - About 20 minutes into flight, ac voltage was noted at 109 volts. After switching to standby inverter, voltage still read 109 volts. N2 rpm fluctuated from 6600 to 6725 rpm. Although unrelated, aircraft cargo door came open in flight. Aircraft landed, and main inverter and dual tachometer were replaced.

UH-60 Class B mishap

A series - Aircraft was lead in flight of three conducting NVG training under low illumination conditions. At 110 feet agl, 80 KIAS, aircraft struck upper horizontal guy wire of 115-foot, high-tension wires. Aircraft cut wire but sustained damage to avionics compartment, pilot and copilot antitorque pedals, chin bubbles, and one main rotor blade. 8805

UH-60 Class C mishap

A series - During maintenance inspection following flight, damage was found to all four main rotor blades. Aircraft had been involved in 4-hour NVG mission with eight other aircraft. Landings had been made at three field sites covered with tall grass, scattered bushes, and blowing debris.

Mishap briefs

UH-60 Class D mishaps

A series - As aircraft climbed, right cargo door flew off. Door was cracked, and roller assembly was broken.

A series - Pilot saw bird approaching during flight at 800 feet agl, 140 KIAS. Aircraft turned left, but bird struck main rotor and stabilator.

UH-60 Class E mishaps

A series - During pinnacle landing at 7,500 feet msl, flying debris damaged main rotor blade. Aircrew did not see debris left by security guards at landing site.

A series - Pilot was at the controls during approach to confined area. During slight application of power to reduce rate of descent, engine-out audio went off accompanied by loss of power and decrease of turbine gas temperature. Using remaining engine, pilot began a slow climb to altitude and banked left for final approach. After completing emergency procedures, pilot placed power control lever and fuel selector in off position and made an uneventful roll-on landing. When engine start was attempted after parking, engine chip light came on. Failure could not be duplicated. Suspect power control lever was inadvertently moved past idle detent.

Attack helicopters

AH-1 Class E mishaps

F series - While performing control response check, pilot noticed cyclic pulling to right front quadrant. Copilot verified condition, and aircraft made uneventful landing. Cold temperature caused wires to gunner's cyclic to become stiff. Wire bundle clamp was repositioned to allow greater freedom of movement.

F series - During in-ground-effect hover, aircraft made uncommanded, right bank. A few seconds later, aircraft banked more severely to the right. Stability and control augmentation system (SCAS) was disengaged, and aircraft landed with no further problems. Caused by faulty roll channel SCAS card.

S series - Pilot was at controls during approach to confined area. During turn to base, aircraft was NOE over trees with 10- to 15-knot tailwind. Aircraft was about 10 feet over highest obstacle when struck by a wind gust. Pilot added left pedal to maintain heading and tail rotor clearance. PIC noticed overtorque light come on and saw torque was at 98 percent. Aircraft made uneventful landing at field site.

AH-64 Class E mishaps

A series - Aircraft was 170 feet agl during approach to out-of-ground-effect hover. Target acquisition and designation sight and pilot night vision sensor (TADS/PNVS) began oscillating. Noting 1,000 fpm downward movement, the IP took controls and applied torque to check descent. IP failed to properly divide attention while monitoring and adjusting PNVS and did not monitor vertical speed.

A series - During descent, crew heard loud, whining sound, and shaft-driven compressor (SDC) light came on. Caused by failure of shaft-driven compressor.

A series - Master caution, primary hydraulic, and primary hydraulic-low lights came on, and aircraft landed. Primary hydraulic line from pump to manifold had ruptured, causing loss of hydraulic fluid.

Cargo helicopters

CH-47 Class D mishap

D series - Aircraft was using locally manufactured cement block as slingload. During pickup, block was about 1 foot off the ground when three of the four sling attaching points failed. Released sling legs struck bottom of aircraft.

CH-47 Class E mishap

B series - During flight, master caution and No. 1 engine chip lights came on. No. 1 engine torquemeter needle went to zero. Caused by failure of No. 1 engine torquemeter drive roller assembly.

Observation helicopters

OH-58 Class E mishaps

A series - During night VMC cross-country flight, flight route turned away from an area with numerous lights on the ground toward an area with no visual ground references. Shortly afterward, aircraft entered IMC. Pilot experienced spatial disorientation, aggravated by reflections of anticollision lights. Pilot placed aircraft in a climb and broke out of the clouds at about 1,500 feet agl. He regained control, flew VMC to an area ►

Mishap briefs

with visible lights, and made an uneventful landing at a field site. When pilot encountered IMC, VHIRP procedures were not immediately followed, and aircraft control was lost due to spatial disorientation.

A series - During normal approach for landing, aircraft experienced sudden, very rough lateral vibration and landed with power. During postflight, main rotor blade tip cap was found missing.

Fixed wing

OV-1 Class E mishaps

D series - During test flight for No. 1 engine rigging, No. 1 engine exhaust gas temperature (egt) increased above normal. Pilot moved power lever to idle, but egt still increased. Pilot retarded power lever to ground-idle position, and egt increased to 800° C. Caused by broken cable between shaft-driven compressor (SDC) filter and SDC.

D series - During flight, oil could be seen leaking from No. 2 propeller control. Engine was shut down, propeller feathered, and aircraft made uneventful landing. Magnetic plug for the sump of propeller control had vibrated loose from plug housing assembly, and its internal spring-loaded safety valve failed to seat properly.

U-21 Class E mishap

A series - During climbout, left engine fuel pressure dropped to 14 psi. When power was reduced, fuel pressure returned to normal range. Caused by failure of submerged pump.

Maintenance

AH-1 Class E mishap

E series - Transmission oil hot light came on during flight, and aircraft landed in an open field. Upon landing, transmission oil pressure light came on, and pressure gauge indication dropped from normal range to 15 psi. Mechanic had failed to install transmission oil filter O-ring, causing loss of oil during flight.

OH-58 Class E mishap

C series - As pilot increased collective during takeoff from hover, he noticed engine and rotor rpm decreasing. Low rpm audio and light came on, and pilot made uneventful landing. Crew chief had installed copilot collective upside down.

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

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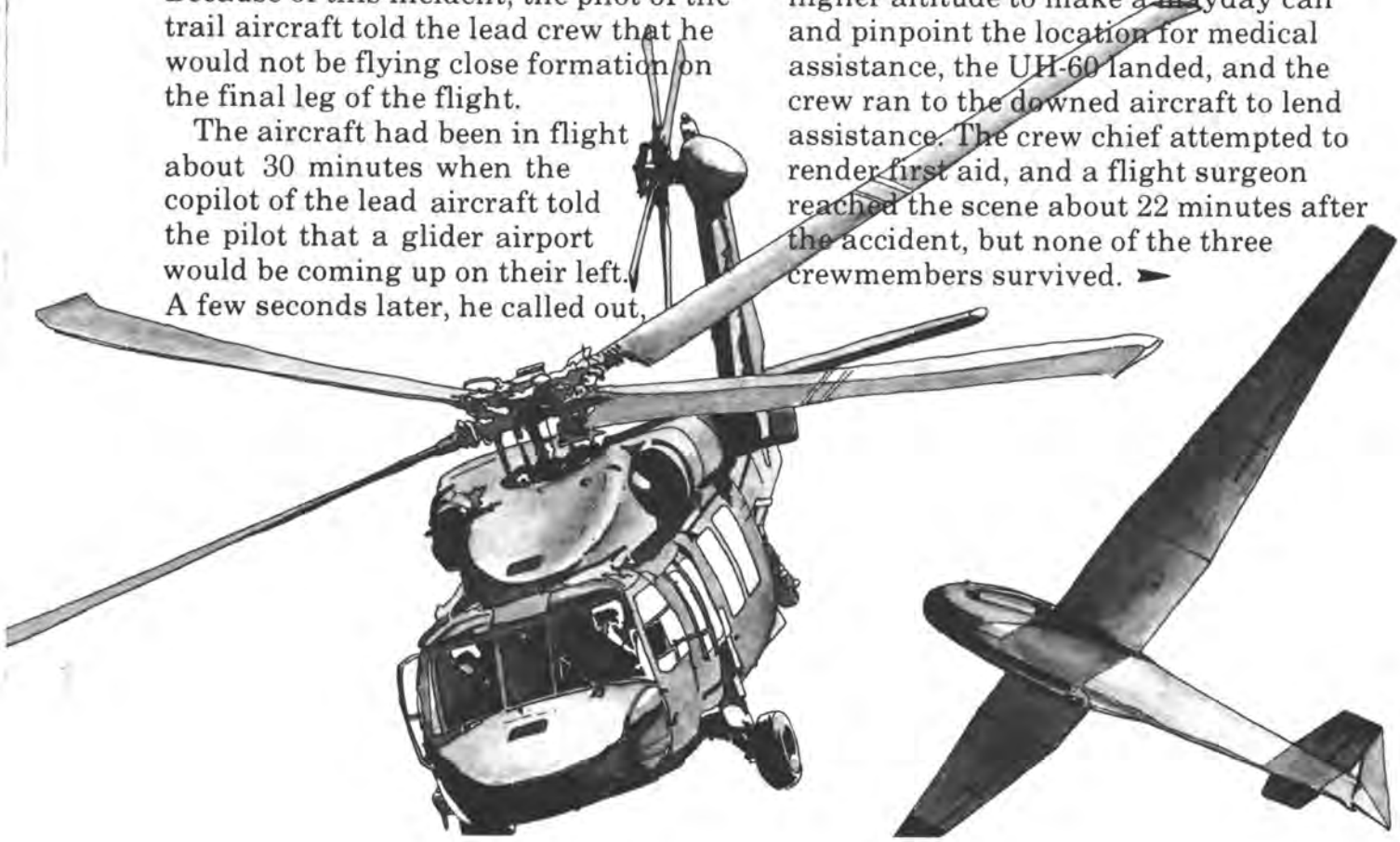
UH-60 crashes while attempting to avoid midair collision

The formation of two UH-60s took off at 1600 on the return leg of a cross-country navigational training flight. In spite of the fact that the copilot of the lead aircraft was a low-time aviator and had been having trouble navigating at high airspeed and low altitude, the aircraft were flying at 150 KIAS, less than 200 feet agl.

During the copilot's earlier problems with navigation, the lead aircraft had had to bank right and head south to avoid an air defense identification zone. Because of this incident, the pilot of the trail aircraft told the lead crew that he would not be flying close formation on the final leg of the flight.

The aircraft had been in flight about 30 minutes when the copilot of the lead aircraft told the pilot that a glider airport would be coming up on their left. A few seconds later, he called out, "Glider at 12 o'clock." The pilot did not see the glider at first, but then he spotted it flying toward the UH-60 from left to right. He initiated a quick right bank of about 45 degrees and descended to avoid a midair collision with the glider. He heard the trail aircraft make a radio call, but when he tried repeatedly to contact the trail aircraft, there was no response from the crew. The pilot of the lead aircraft did a 180-degree turn and found the wreckage of the second UH-60 in an open field. After climbing to a higher altitude to make a mayday call and pinpoint the location for medical assistance, the UH-60 landed, and the crew ran to the downed aircraft to lend assistance. The crew chief attempted to render first aid, and a flight surgeon reached the scene about 22 minutes after the accident, but none of the three crewmembers survived. ►



UH-60 crashes . . .

The copilot of the lead aircraft had allowed the formation to fly south of its course and enter a protection area and traffic pattern at an airport. When the lead aircraft made an unannounced abrupt right turn to avoid a glider in the airport traffic pattern, the second aircraft, which was flying close to the lead aircraft's right rear, also entered a steep right bank, approaching 90 degrees, to avoid colliding with the aircraft ahead. The trail aircraft could not recover from this maneuver and struck the ground at approximately 90 knots, in a 70-degree right bank, 50-degree nose up attitude. The right side of the aircraft was torn open on initial impact. The aircraft then spun on its nose, and the main cabin separated from the tail boom. The forward part of the aircraft turned upside down, while the tail boom remained upright. The crew compartment was totally destroyed.

Originally, the pilot of the trail aircraft was assigned as the air mission commander (AMC), but on the day of departure, there was a change, and the pilot of the lead aircraft was assigned as AMC. He was the more experienced of the two PICs; however, both pilots were considered competent and experienced enough to conduct navigation training of the copilots. The PIC of the lead aircraft had 1,233 rotary wing hours, with 893 hours in the UH-60. The PIC of the accident aircraft had 682 rotary wing hours, 509 of them in UH-60s.

During the first part of the flight, the crew of the accident aircraft were flying lead, but after a stop for lunch, the crew of the other aircraft took over the lead and navigation. The copilot of the lead aircraft had 365 rotary wing hours, 96 of them in UH-60s. The copilot of the accident aircraft had 241 rotary wing hours, with 71 hours in UH-60s.

The accident was the result of human error on the part of the AMC and the pilot of the accident aircraft.

- While returning to home station in an echelon right formation of two UH-60 helicopters, the AMC made an improper decision to fly at 150 knots and less than 200 feet agl, without ensuring that the trail aircraft was maintaining adequate clearance. As a result, the closure rate with an unseen glider was so great that an unannounced abrupt maneuver was required to avoid a midair collision with the glider. There was insufficient clearance for the trail aircraft to accomplish an avoidance turn within normal parameters. The AMC's improper decision resulted from overconfidence in his own and the other pilot's abilities and the urgency of returning to home station as quickly as possible.
- While attempting to avoid a midair collision at approximately 150 knots and 200 feet agl, the pilot of the trail UH-60 helicopter in the echelon right formation banked right to approximately 90 degrees and failed to maintain altitude. As a result, the aircraft impacted the ground and was destroyed, with all crewmembers sustaining fatal injuries. It is suspected that the failure to maintain altitude was a direct result of the pilot's lack of composure and his abrupt reaction in an attempt to avoid a midair collision. The pilot was so shocked by the near midair collision that he banked the aircraft beyond his ability to maintain control. ■

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishap

M series - Manned aircraft was being flown by ground drone controller. While on approach at 2,000 feet out, safety pilot saw telephone pole ahead and to right of approach path. At 800 feet out, pilot lost sight of pole due to angle of sun. Main rotor blades struck the pole. Safety pilot took control of aircraft and landed without further incident. Both main rotor blades were dented, and main spar was warped. Drive train was replaced due to sudden stoppage.

UH-1 Class D mishap

H series - During approach to field site, marker panel dislodged from ground and blew into main rotor system, damaging one main rotor blade. Supported unit personnel failed to properly anchor panel to the ground.

UH-1 Class E mishaps

H series - During runup, crew felt high-frequency vibration in the aircraft. Caused by delamination of one tail rotor blade.

M series - Aircraft was 500 feet agl, 85 KIAS, when engine chip detector light came on. N2 went to zero, and rotor rpm rose to 350 rpm. Aircraft was landed using manual throttle. Caused by failure of N2 gearbox.

UH-60 Class D mishaps

A series - Aircraft landed, dropped off passengers, and headed for next pickup zone. Route of flight was between trees "for tactical purposes" at 35 to 40 KIAS. Crew felt a slight bump in the airframe, which they initially thought was caused by aircraft going through effective translational lift. Aircraft continued to vibrate slightly, and aircraft landed. Two blade tips had been bent when they contacted a tree.

A series - About 3 minutes after departure, aircraft was climbing through 1,000 feet at 130 KIAS. Left cargo windows jettisoned. Suspect ALSE harness caught on jettison handle and moved it toward the rear. Aircraft vibration after takeoff caused handle to move full rearward and windows jettisoned.

A series - After brief shutdown, crew attempted to restart engines. No. 1 engine starter dropped out at approximately 16 rpm Ng. When start was attempted on No. 2 engine, starter dropped out at about 24 rpm Ng. Several more unsuccessful attempts were made to start engines. Maintenance is investigating cause.

A series - Aircraft was being ground taxied for repositioning on helipad. When aircraft taxied

FY88 Class A Mishap Countdown

		FY87			FY88	
	Month	Class A Mishaps	Army Military Fatalities	Month	Class A Mishaps	Army Military Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	November	1	0
	December	4	5	1-16 Dec	0	0
2nd Qtr	January	3	2	January		
	February	1	4	February		
	March	4	1	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	39	Total to Date	3	0

over bump in asphalt, right lower wire cutter guide blade contacted the ground. Blade broke off at mount bracket.

Attack helicopters

AH-1 Class D mishap

F series - During tactical hot refueling, refueler had difficulty removing closed circuit refueling (CCR) nozzle. Refueler tried to use a prying movement instead of pulling, and the up-and-down movement caused the retaining ring to partially separate from the CCR port.

AH-1 Class E mishap

F series - While performing hydraulic systems checks during runup, pilot noticed binding in cyclic and heard a whining sound coming from transmission area. Caused by failure of hydraulic pump.

Cargo helicopters

CH-47 Class E mishap

D series - Left main fuel tank indicated 600 pounds of fuel, and right main tank showed 1,800 pounds of fuel. Crossfeeds had already been opened because of a flickering right fuel pressure light. Aircraft landed, and inspection showed fuel was being pumped from right main tank. Aircraft took off, and after 5 minutes of flight, right fuel pressure light came on and No. 1 engine failed. Bracket support for fuel junction box was cracked, and vibration caused fuel pump to short out.

CH-54 Class E mishap

B series - During maintenance test flight, crew saw hydraulic pressure in utility system rapidly drop to zero. Master caution and first-stage tail rotor servo caution light and audio warning came on. Caused by internal failure of hydraulic pump.

Observation helicopters

OH-58 Class D mishap

C series - When aircraft hovered by parked OH-58, rotorwash blew pilot door off parked aircraft. Maintenance personnel had failed to secure door.

OH-58 Class E mishap

A series - Aircraft was being test flown for reinstallation of fuel control. During engine performance check, engine oil bypass light came on. Crew reduced power and began descent. During final approach, engine oil temperature rose to 120° C. for about 2 minutes. Engine oil pressure began fluctuating but remained within normal operating limits. Loose external oil sump fitting caused loss of engine oil.

Training helicopters

TH-55 Class D mishap

A series - Student pilot (SP) was executing a standard autorotation at a heliport. The SP told the IP that airspeed and rotor rpm were good, and the IP noted everything was well within the required parameters for a standard autorotation. Entry, descent, and deceleration were all normal and well within limits. SP applied initial collective pitch to cushion landing and applied forward cyclic to level the aircraft. He noted little or no cushioning effect as a result and informed the IP. The aircraft impacted hard in a level attitude. The IP and SP were unaware that the landing gear was damaged until the SP hovered the aircraft to a grassy area between the lanes. The SP was executing a 360-degree clearing turn when the IP of another aircraft informed the crew of the damage. The IP reported the previous hard landing and landed the aircraft in the grass with no further damage. Postflight inspection revealed damage to the right diagonal brace, forward right oleo strut, forward and aft crossbeams, landing light bracket, and strobe/anticollision light bracket. Although the standard autorotation was well within limits from entry to deceleration, suspect SP failed to place the collective in full-down position. When the SP started deceleration, rotor rpm began to dissipate, and when the SP applied initial pitch to cushion landing, there was insufficent rotor rpm to achieve the cushioning effect.

Fixed wing

C-12 Class E mishaps

C series - During VFR climb to en route flight level, pilot's airspeed indicator went to zero. Pilot's altimeter lagged behind copilot's altimeter by 6,000 feet, and vertical speed indicator stopped working. Aircraft made uneventful landing. Pilot's static system failed due to loose fitting on flexible static air line between airspeed indicator and pilot's altimeter.

C series - During takeoff roll, No. 2 engine could not develop takeoff power. No. 2 engine did

continued on next page ►

Mishap briefs

not exceed 65 N1 and 75° C. turbine gas temperature. Takeoff was aborted. Caused by hole in No. 2 engine high-pressure bleed valve diaphragm.

D series - During cruise flight, master panel light switch was turned on. About 30 seconds later, smoke was seen coming from the pedestal control panel near the power levers. Switch was turned off, smoke ceased, and aircraft landed. Edge light assembly had shorted out against mounting screw.

L series - After shutdown, smoke was seen coming from upper vent on No. 2 engine cowling. Inspection revealed air conditioner compressor clutch had seized. Friction from wear on drive belt caused smoldering and failure of belt.

SD-3-30 Class D mishap

During touchdown, right main landing gear brake was locked. Tire blew, and wheel was damaged. Caused by malfunction of brake control valve.

U-21 Class E mishaps

A series - About 2 miles from destination, No. 2 boost pump light came on. Four miles from destination, No. 1 boost pump light came on, followed immediately by failure of No. 2 engine. About 5 seconds later, No. 1 engine failed. Auto-ignition switches were turned on, engines continued to surge, and aircraft landed with partial power. Maintenance personnel drained 24 gallons of fuel from No. 1 inboard main tank and 26 gallons from No. 2 inboard main tank. Engines failed due to fuel starvation. Defective transfer pump test switch caused No. 1 transfer pump to fail to transfer fuel into left nacelle tank. Internal failure of No. 2 nacelle fuel probe caused No. 2 transfer pump to fail to transfer fuel into the right nacelle tank.

F series - Left bleed air failure warning came on during flight at 23,000 feet agl. Crew performed emergency procedure and asked for immediate descent to lower pressure altitude. When left bleed valve was closed, cockpit pressurization could not be maintained. Crew donned oxygen masks and continued descent. During descent, cabin altitude was equal to 15,000 feet. Caused by loose clamp on bleed air warning polyflow tubing.

Safety messages

• Safety-of-flight maintenance mandatory message concerning one-time inspection for and purge of certain fuel controls (UH-1-87-12, 232100Z Nov 87). Summary: In 1979, TSARCOM issued safety-of-flight operational messages UH-1-79-5 and AH-1-79-4, 131830Z Apr 79, for UH-1H/M, EH-1H, and AH-1G, TH-1G aircraft. This message restricted aircraft to visual flight above 500 feet agl. The fuel controls contained a P1 bellows made of bronze that was subject to a failure mode, which prevented the engine from developing full power. Subsequently, TSARCOM technical information messages UH-1-79-6 and AH-1-79-5, 270003Z 79 were issued for UH-1H/M, EH-1H, and AH-1G, TH-1G aircraft which permitted units to lift the restrictions by performing specified ground and flight checks. The messages directed that the flight checks be performed every 25 flying hours. An improved fuel control with a stainless steel bellows was fielded, and TSARCOM safety-of-flight operational messages UH-1-80-10 and AH-1-80-14, 042045Z Jun 80 outlined procedures for lifting NOE flight restriction ground and 25-hour flight checks for UH-1H/M, EH-1H, and AH-1G, TH-1G aircraft. These messages also directed that engines with the improved fuel control installed would be designated T53-L-13BA, P/N 1-000-060-10A, NSN 2840-01-093-7451, and that if an old fuel control was reinstalled on a T53-L-13BA engine, the engine designation would change back to T53-L-13B. Either designation change required annotation of all records, including the engine data plate. Today, all but a small percentage of aircraft have the improved fuel control. Supplies are now adequate to permit purging the older, less reliable fuel controls. The purpose of this message is to direct removal of the old fuel controls and to assure that recurring flight checks are performed until removal is accomplished.

• Safety-of-flight technical message concerning one-time inspection of H-60 and AH-64A aircraft for defective T700-GE-700/701 engine power turbine modules (UH-60-87-12 and AH-64-87-25, 030100Z Dec 87). Summary: As a result of a quality control audit, it has been discovered that some nonconforming, fourth stage

Mishap briefs

power turbine blades have been installed on 27 U.S Army T700-GE-700/701 engine power turbine modules. A fourth stage blade failure will result in an engine failure. The purpose of this message is to identify defective power turbine modules by serial number and remove them from service. Contact: Dick Mooy, AUTOVON 693-9089, commercial 314-263-9089.

• Safety-of-flight technical message concerning one-time and recurring inspection of flight control and utility hydraulic pump housing retaining screws on CH-47D aircraft (CH-47-87-14, 031830Z Dec 87). Summary: The No. 2 flight control hydraulic pump on a CH-47D was discovered to be leaking externally. Investigation revealed that three of the five screws attaching the valve plate to the pump housing were broken. Metallurgical examination showed the screws (P/N MS16998-44) failed as a result of hydrogen embrittlement. The same screws are also used to retain the main pump housing to the mounting flanges. These screws are found on hydraulic pumps in both flight control and utility hydraulics systems. Failure of these screws could cause loss of hydraulic fluid and subsequent loss of hydraulic pressure. The purpose of this message is to require a one-time visual inspection and torque check and recurring visual inspections of the screws retaining the valve plate to the pump housing and the pump housing to the mounting flange. The recurring inspection will be required until such time that a new screw is available to replace existing screws. The new screws will be provided for installation by the user as soon as they become available. Additional information will be provided by the logistical point of contact. Contact: Lyell Myers, AUTOVON 693-9089, commercial 314-263-9089.

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

U.S. ARMY SAFETY CENTER

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NVG feature, page 3

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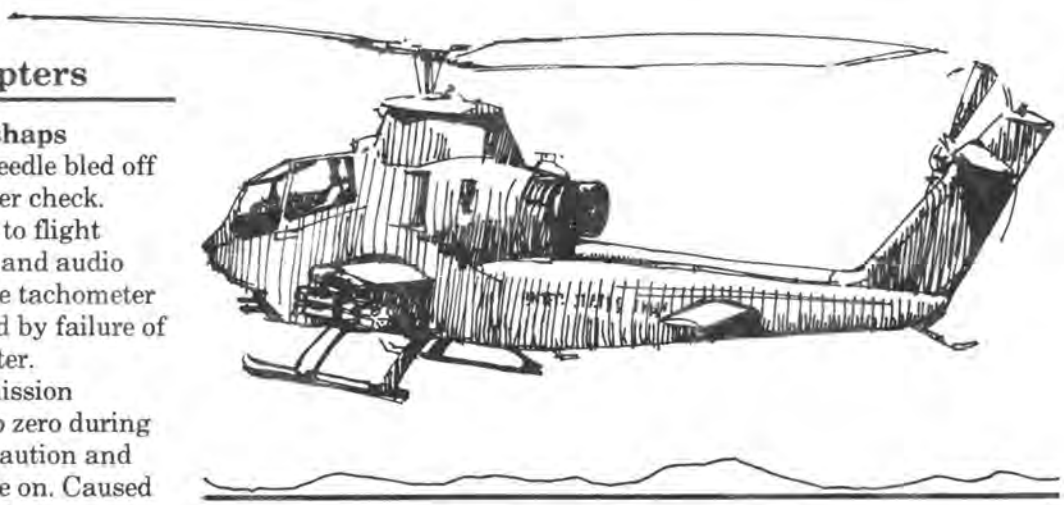
Report of Army Aircraft Mishaps

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps



Utility helicopters

UH-1 Class E mishaps

H series - Rotor needle bled off slightly during power check. Later, during climb to flight level, low rpm light and audio came on, and engine tachometer went to zero. Caused by failure of N2 engine tachometer.

H series - Transmission indicator dropped to zero during flight, and master caution and segment lights came on. Caused by failure of internal transmission oil filter gasket.

UH-60 Class E mishaps

A series - Aircraft was hovering 10 feet agl when the crew heard a loud whine from transmission area. After landing, pilot noted whine intensity was related to position of collective. Suspect cause was turbine wheel rubbing.

A series - Crew heard loud popping noise during takeoff, and aircraft yawed left. Caused by internal failure of engine compressor section.

A series - As multiship formation landed, rotorwash tore panel marker loose from its stakes. Aircraft trim tab was damaged when struck by the panel.

Attack helicopters

AH-1 Class E mishaps

F series - During touchdown, pilots smelled burning odor. About 5 seconds later, master caution and alternator/rectifier lights came on. Caused by alternator failure.

F series - During runup, emergency hydraulic light came on. Caused by failure of tail rotor quill seal.

F series - When aircraft was brought to hover, crew heard a loud pop from aircraft rear. Bleed band actuator was out of adjustment.

AH-64 Class C mishaps

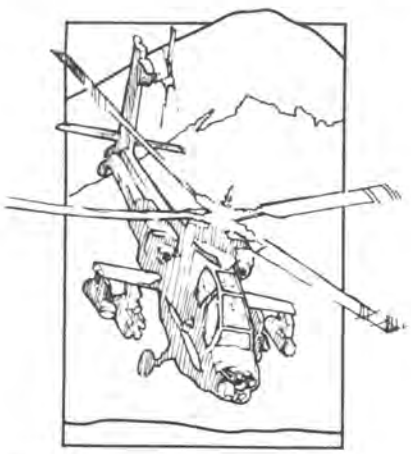
A series - Sometime during training evaluation and numerous operations from firing position, aircraft sustained tail rotor strike. Neither pilot felt nor heard any indication of strike during flight. Damage was found during postflight.

A series - During takeoff from field location, PIC saw an unidentified aircraft on collision course. PIC lowered collective, aircraft drifted 20 feet to the left, and main rotor blades struck a tree.

AH-64 Class E mishaps

A series - Aircraft was chalk 2 in flight of two at about 500 feet agl, 120 KIAS. Crew noticed unusual odor in cockpit, notified lead, and turned toward

Mishap briefs



landing area. Both cockpits began filling with smoke, and crew executed emergency procedure and landed. No caution or warning lights came on. During postflight, maintenance found oil on catwalk area and tailboom. Shaft on shaft-driven compressor had sheared, and blistered paint indicated overtemp had occurred.

A series - While hovering at 40 feet agl, with 66 percent torque, and 10-knot headwind, aircraft developed moderate to severe vertical vibration. Vibration intensity increased until power was reduced for landing. Maintenance could not duplicate.

A series - During flight, utility hydraulic gauge fluctuated from zero to 3,000 psi. No other failure indications were noted. Cause unknown.

A series - During cruise flight, utility accumulator hydraulic pump pressure fluctuated from 3,000 to 1,000 psi. Caused by faulty gauge.

A series - During ground taxi, IP noticed high-frequency vibration in antitorque pedals. Caused by failure of tail rotor coupling.

Cargo helicopters

CH-47 Class B mishap

D series - When pilot attempted to move condition levers from ground to flight position during runup, No. 1 engine responded normally; however, No. 2 engine did not. No increase in N1 or torque was noticed. Pilot heard loud grinding noise and immediately pulled both condition levers to stop. As pilot was completing shutdown, crew chief told him No. 2 engine shaft had failed. No. 2 engine received FOD damage. Combining transmission may also have been damaged. Suspect failure of No. 2 engine transmission clutch. 8809

CH-47 Class E mishaps

D series - While approaching LZ with 14,000-pound external

load, aircraft flew over flare parachute. Metal object attached to parachute flipped against underside of aircraft, causing crack in sheet metal.

D series - While conducting NOE flight during hazard recon, No. 1 engine oil low light came on. Caused by faulty switch on engine oil level sight gauge.

D series - During climbout on IFR flight, crew chief reported oil leaking from No. 1 engine. Caused by failure of preformed packing.

(continued on page 7)

FY88 Class A Mishap Countdown

		FY87			FY88	
	Month	Class A Mishaps	Army Military Fatalities	Month	Class A Mishaps	Army Military Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	November	1	0
	December	4	5	December	1	0
2nd Qtr	January	3	2	1-27 Jan	2	0
	February	1	4	February		
	March	4	1	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	39	Total to Date	6	0

Stacom

Standardization Communication

Night vision goggles

Numerous inquiries have been made to Directorate of Evaluation and Standardization (DES) and the Aviation Training Brigade (ATB), at the Army Aviation Center, regarding night vision goggle (NVG) operations and training. The following information should eliminate a major portion of the confusion that exists.

Changes to FC 1-219

Following is a consolidated list of changes to FC 1-219: Aircrew Training Manual (ATM), Night Vision Goggles (NVG), with the appropriate references indicating the sources of changes. Posting of these changes may be accomplished by using this STACOM as a reference.

References

1. STACOM 109, 13 Feb 85.
2. Message, HQDA, DAMO-TRF, 160131Z Mar 85, subject: Changes to FC 1-219.
3. Message, CDR USAAVNC, ATZQ-ES-SL, 121730Z Aug 85, subject: Utilizing Enlisted Aerial Observers During Night Vision Goggle Operations.
4. Message, HQDA, DAMO-TR, 182024Z Dec 85, subject: NVG Training and Operations.
5. Report on Status of 1986 Army Aviation Policy Committee Issues, 5 Mar 87.
6. Message, CDR USAAVNC, ATZQ-ATB-0, 081630Z Apr 87, subject: Change to FC 1-219: Aircrew Training Manual (ATM), Night Vision Goggles (NVG) and Multihelicopter NVG Operations.

Changes

Page 1-3, paragraph 1-2d(2), delete from the first sentence, "will be published annually by HQDA," and add, "will be published on 1 Oct of each year by HQDA." (Reference 2)

Page 1-6, paragraph 1-3e, change the entire paragraph to read, "No single pilot NVG flight will be conducted unless the pilot is assisted by an aeroscout observer occupying the copilot's station. The aeroscout observer must be trained in a DA-approved course and qualified in NVG operations." (Reference 3)

Page 1-6, paragraph 1-3f, change to read, "Aircraft crewmembers with access to a set of flight controls will both wear the same type NVG (i.e., both crewmembers will use AN/PVS-5 or AN/AVS-6 goggles). If required to wear NVGs, it is recommended that other crewmembers use the same type of goggles, when available, as the crew flying the aircraft." (Reference 6)

Page 2-1, paragraph 2-1b(1) (first bullet), delete, "must be completed within the preceding 45 calendar days." (Reference 2)

Page 2-2, paragraph 2-1b(1) (second bullet), delete, "must be completed within the preceding 45 calendar days." (Reference 2)

Page 2-2, paragraph 2-1b(1) (third bullet), delete, "must be completed within the preceding 45 calendar days." (Reference 2)

Page 2-2, paragraph 2-1b(1) (fourth bullet), delete, "must be completed within the preceding 45 calendar days." (Reference 2)

Page 2-2, paragraph 2-2, delete last sentence under qualification training which reads, "All flight training will be completed within the preceding 45 calendar days." (Reference 2)

Page 2-5 (top of page), paragraph 2-2d, delete the first two bullets and add, "• For initial qualification, 10 hours of hands-on flight training (evaluation may be included) must have been accomplished within the preceding 45 calendar days." (Reference 2)

Page 2-10, paragraph 2-4e, change to read, "Accomplish a minimum of 4.5 flight hours in the preceding 45 calendar days." (Reference 2)

Page 2-10, paragraph 2-5, under Mission Training Requirements, add, "(Mission training hour requirement may be reduced to 10 hours by the commander based on individual proficiency.)" (Reference 4)

Page 2-11, paragraph 2-5d, add, "Accomplish a minimum of 15 flight hours within the preceding 90 calendar days." (NOTE: 10 hours if reduced by the commander IAW paragraph 2-5.) (Reference 2)

Page 2-11, paragraph 2-5, delete, "/pilot." (Reference 2)

Page 2-11, paragraph 2-5e (1), delete, "/pilot." (Reference 2)

Page 2-12, paragraph 2-6a, change "annual" to "semiannual." (Reference 1)

Page 2-12, paragraph 2-6b, add, "Active component and Reserve component commanders are authorized to designate a 3-month period within an individual's training year in which the annual NVG flight evaluation will be conducted." (Reference 5)

Page 2-12, paragraph 2-6c, change to read, "Complete the annual tasks and iterations required by the TOE or TDA position IAW the Commander's Task List." (Reference 1)

Page 2-13, table 2-4, delete task, "Perform vertical helicopter instrument flight rules (IFR) 3." (Reference 1)

Page 2-14, table 2-4, under task, "Perform vertical helicopter instrument recovery procedures (VHIRP), add an X to Qual, Stdzn Eval, and Curr Eval columns." (Reference 1)

Page 2-19, paragraph 2-11 (second sentence), change to read, "The NVG SP is a highly qualified SP who should be selected on the basis of training, knowledge, experience, judgment, maturity, and proven SP ability." (Reference 5)

Chapter 3, wherever "IR bypass" appears, change to "IR bandpass."

Page 3-4, paragraph 3-2c(2), add, "Preferred bulb with IR bandpass filter is a 150w/28v/Par 46, NSN: 6240-00-690-1094 (commercial equivalent is Sylvania or GE bulb #4571)." (Reference 1)

Pages 4-27 and 4-28, figure 4-5, add to the Air Mission Planning Checklist a place for FARP information and a place for aircraft fuel loading data. (Reference 2)

Aircrew training manual information update

The current status of each aircrew training manual (ATM) is as follows:

TC 1-209: ATM, OH-58D. Manual has been printed and became available through normal publication channels in August 1987.

TC 1-210: Commanders Guide. October 1986, available through normal publication channels.

TC 1-211: ATM, UH-1. Coordinating draft was distributed to the field for review during August-September 1987. Final draft is being prepared for USAAVNC staffing and approval in January 1988.

TC 1-212: ATM, UH-60. Coordinating draft was distributed to the field for review during September-October 1987. Final draft is being prepared for USAAVNC staffing and approval in February 1988.

TC 1-213: ATM, AH-1. Revision began in August 1987. Coordinating draft will be sent to the field for review in June-July 1988.

TC 1-214: ATM, AH-64. Revision will begin in January 1988. Coordinating draft will be sent to the field for review in July-August 1988.

TC 1-215: ATM, OH-58. Revision will begin in February 1988. Coordinating draft will be prepared by July 1988. All information in FC 1-215-1 will be included in this manual.

FC 1-215-1: ATM Supplement, Aeroscout Observer. Published in March 1986. The information in this manual will be published in TC 1-215 when revised. The result will be a single-source document.

TC 1-216: ATM, Cargo Helicopter. Final draft completed in April 1987. The manual should be available through normal publication channels on 20 Jan 88.

TC 1-216-1: ATM Supplement, Flight Engineer. Coordinating draft is being staffed worldwide a second time following the addition of NVG training guidelines during November-December 1987.

TC 1-217: ATM, OV-1. Revision will begin in December 1988.

TC 1-218: ATM, Utility Airplane. Revision will begin in December 1988.

FC 1-219: ATM, Night Vision Goggles. Night/NVG information from this manual is being incorporated into each new and revised ATM. When all of the ATMs are revised, this manual will be deleted.

All new and revised manuals will be printed in standard 8½-inch by 11-inch size to facilitate distribution of changes.

DA Forms 2028 are requested for proposed changes or suggestions for improvement to all of the manuals. It is essential that units submit 2028s before or during the staffing of the coordinating drafts. By adhering to the deadlines for submission of 2028s, units can ensure that appropriate input will be incorporated into the final draft of the publication.

Consolidated list of NVG messages

Following is a current list of pertinent NVG messages valid for ALL users of NVGs.

NOTE: Messages listed in the changes to FC 1-219, above, will not be listed here.

Message Number	From	Subject/Title
251305Z Jun 84	HQDA	Night Vision Goggle (NVG) Training and Operations Message Number 2
182024Z Dec 85	HQDA	NVG Training and Operations
082320Z Jan 87	CSA	Aviation Night Vision Goggle (NVG) Training
021640Z Feb 87	VCSA	Night Vision Goggle (NVG) Flight Training (2-87)
051900Z Mar 87	USAAVNC	AN/PVS-5 Night Vision Goggle (NVG) Modification
280030Z Mar 87	AVSCOM	Safety-of-Flight: Night Vision Goggle (NVG) Operations (87-01)
062100Z Apr 87	AVSCOM	Airworthiness Release (AWR) for Use of GX-5 Flip-Up Night Vision Goggle System in Rotary Wing Aircraft
072100Z Apr 87	AVSCOM	Airworthiness Release (AWR) for Use of GX-5 Flip-Up Night Vision Goggle System in Rotary Wing Aircraft
251900Z Jun 87	CECOM	TM 11-5855-238-20: Organizational Maintenance Manual for Night Vision Goggles
291730Z Jun 87	AVSCOM	Safety-of-Flight: OH-58C Aircraft, Removal of Lamps Associated With Panel
291300Z Jul 87	AVSCOM	Safety-of-Flight: Inspection of Night Vision Goggle AN/AVS-6(V)1, and AN/AVS-6(V)2 (87-03)
211400Z Aug 87	AVSCOM	Night Vision Goggle (NVG)
241345Z Aug 87	TRADOC	Army Aviation Night Vision System (NVS) Operations Within the National Airspace System (NAS)
061200Z Oct 87	AVSCOM	Night Vision Goggle (NVG) Operations
131430Z Nov 87	AVSCOM	OH-58 NVG MWO Status

NOTE: MACOMs may have messages and guidance in addition to these messages that pertain only to that particular MACOM.

Questions and answers

Q. When must an aviator complete the Army Aviation Annual Written Examination (AAAWE)?

A. The AAAWE is an Annual Proficiency and Readiness Test (APART) requirement. Normally, aviators will take the AAAWE during their APART period (the 3-month period ending on the last day of their birth month). However, aviators are not required to take the AAAWE twice within their Aircrew Training Program (ATP) training year as defined by paragraphs 2-1a and 2-1b of TC 1-210. If aviators take the AAAWE to progress to Readiness Level (RL) 1 anytime within their ATP training year, they satisfy the AAAWE requirement for that training year.

The AAAWE is intended to be taken once during an aviator's ATP training year. Aviators may take the AAAWE either during RL 1 progression or during the APART, as appropriate.

Reserve component aviators will take the AAAWE during their commander-designated quarters, unless they have previously completed that year's AAAWE during the progression to RL 1.

Q. What are the NVG currency requirements?

A. a. Aviators occupying TDA/TOE-designated NVG positions, in order to be considered current, must complete the following:

(1) Every 45 days, make no less than one NVG or DVG

flight of 1-hour duration while occupying a crew station that allows access to the flight controls. (Compatible visual flight simulator, flown using NVG, may be substituted for DVG.)

(2) Every 90 days, make no less than one NVG flight at night of 1-hour duration while occupying a crew station that allows access to the flight controls.

(3) Meet continuation training requirements as outlined in paragraph 2-6, FC 1-219.

b. Aviators not occupying TDA/TOE-designated NVG positions, but performing NVG duties at the direction of the commander, must complete the following in order to be considered current:

(1) Every 45 days, make no less than one NVG or DVG flight of 1-hour duration while occupying a crew station that allows access to the flight controls. (Compatible visual flight simulator, flown using NVG, may be substituted for DVG.)

(2) Every 90 days, make no less than one NVG flight at night of 1-hour duration while occupying a crew station that allows access to the flight controls.

c. An aviator whose currency has lapsed must complete an NVG currency evaluation, conducted by an NVG IP or SIP, at night, at a minimum of 1-hour duration. This flight must be done occupying a crew station with access to the flight controls and all maneuvers listed under currency in table 2-4, FC 1-219, must be evaluated.

d. Currency must be maintained in designated aircraft by mission, type, design, and series. Therefore, an aviator who is NVG-qualified and current in a UH-1H and is NVG-qualified but not current in the UH-60, must complete a currency evaluation in the UH-60 as outlined in paragraph c. above, prior to performing duties in the UH-60.

NOTE: Aircraft are listed by mission, type, design, and series in AR 95-1, paragraph 3-8.

e. Aviators, as described in paragraphs a and b above, must successfully complete an annual NVG flight evaluation conducted by an NVG IP or SIP. This flight will be conducted at night with the examinee occupying a crew station with access to the flight controls. The minimum mandatory maneuvers will be IAW table 2-4, FC 1-219, listed under standardization evaluation.

Q. Are the 1.5 hours of static cockpit of SFTS required for NVG refresher training and do they count toward the 4.5 to 7.5 flight-hour requirement?

A. Yes, the 1.5 hours of static cockpit/SFTS training are required for refresher training. They do not count toward total flight time.

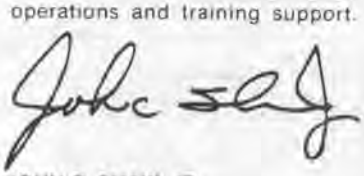
Day vision goggle operations

Flight with the AN/PVS-5 series night vision goggles and day vision filters is authorized as follows:

- DVG flight will be conducted using full faceplate (AN/PVS-5 series) goggles with day vision filters **only**. (NOTE: AN/PVS-5C NVGs are restricted from aviation use.)
- While conducting DVG flight, both aviators must be NVG-qualified. DVG flight will be conducted by one aviator at a time; the additional pilot acts as a safety pilot. Both pilots must be qualified and current in the aircraft being flown. (The safety pilot does not need to be NVG current.)
- During qualification training, mission training, and continuation training, DVG operations and time accrued may be utilized IAW FC 1-219 and current directives.
- At no time will night aided flight be conducted using full faceplate goggles.
- Modified faceplate goggles and the "GX-5" flip-up are not authorized for day use.

STACOM 126 27 January 1988

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5000, AUTOVON 558-3589 during duty hours, 558-6487 after duty hours. 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.



JOHN C. SHAW, JR.
Colonel, Aviation
Director, DES

Mishap briefs

Observation helicopters

OH-6 Class D mishap

A series - During film production, aircraft made a pass down a meadow then began a cyclic climb at 80 KIAS to clear trees at end of meadow. Crew failed to ensure adequate clearance, and underside of fuselage, skids, tail boom, and one main rotor blade struck top of tree.

OH-58 Class D mishaps

A series - Forward upper cowling had been placed on ground during runup. Wind and rotorwash blew cowling into tail rotor.

C series - During tactical training, aircraft crossed ridgeline into path of another aircraft. As pilot turned and decelerated aircraft torque exceeded maximum limit.

OH-58 Class E mishaps

A series - Engine chip light came on during flight. Excessive metal chips were found on chip plug, and engine was replaced.

A series - Crew completed three uneventful hovering autorotations. When throttle was reduced to engine idle during fourth attempt, engine failed. Autorotation was completed with no damage to the aircraft. Maintenance could not duplicate.

A series - During flight at 100 feet agl, N2 rapidly exceeded 104 percent, and rotor rpm went to 380 rpm for 20 seconds. Torque was 65 psi, and turbine outlet temperature reached 685° C. Crew increased collective to control overspeed and landed using manual throttle. Metal tube assembly around fitting was cracked.

Fixed wing

C-12 Class D mishap

C series - During takeoff roll at 95 knots, left brake grabbed and began pulling aircraft to the left. Contract personnel failed to bleed brake assembly, and brake stuck due to overheating. Left main gear outboard tire blew out.

C-12 Class E mishap

C series - During taxi for takeoff, left brake grabbed. Moisture in brake fluid had frozen.

OV-1 Class D mishap

D series - During cruise flight, eagle struck right wing, causing moderate damage to stabilizer.

T-42 Class A mishap

A series - Aircraft crashed and burned during maintenance test flight. Aircraft appeared to be in vertical descent before impact with the ground. 8810

Maintenance

AH-64 Class E mishap

A series - During maintenance operation check for replacement of master caution panel, sparks were seen in vicinity of No. 1 generator. Improperly routed generator wiring harness allowed wires to chafe against generator fan shroud.

Safety messages

• Safety-of-flight technical message concerning requirements for lifting restrictions on high performance hoists (HPH) on UH-1H/V aircraft (UH-1-87-13, 211800Z Dec 87). Summary: AVSCOM message UH-1-87-11, 110100Z Nov 87, prohibited operation of modified HPH in UH-1H/V aircraft. The message also described the interference problem that can occur between the new HPH quick disconnect adapters and the aircraft floor fittings. The interference problem originated with the larger quick disconnect adapters that were incorporated by MWO 55-1680-321-50-1. Prior to this MWO, there was a problem with unlocking only at the upper quick disconnect adapter. The MWO corrected this condition with a new, larger adapter fitting. The lower adapters were changed at the same time to have common parts for all three adapters. The larger fittings are not required at the two lower adapters for structural strength or mechanical security. Therefore, the design change that will correct the interference consists of reinstalling the original fittings for the two lower adapters. This change will be incorporated by a revision to the MWO. HPHs previously modified will have the original adapters reinstalled, and when other HPHs are modified, these adapters will remain. The purpose of this message is to provide conditions for restoring the modified HPH to serviceability in UH-1H/V

Mishap briefs

aircraft. Contact: Robert Lawyer, AUTOVON 693-9089, commercial 314-263-9089.

• Safety-of-flight maintenance mandatory message concerning one-time inspection of all UH-1 series aircraft for nonconforming parts (UH-1-88-01, 042000Z Jan 88). Summary: After AVSCOM message GEN-87-02, 291930Z Jun 87, concerning local purchase of time change aircraft components/parts was dispatched, some of the local purchase contracts may have been in progress. Some components entered the pipeline, either by local purchase or direct issue, which were later found to be nonconforming to design specifications. The components in question are steel tail rotor grips, collective lever assemblies, and the new improved servo cylinders. The steel grips and the collective levers did not conform to manufacturers' specifications, while some servos were not machined correctly and could cause mechanical interference. The purpose of this message is to identify the above three components by serial number and remove them from the supply system or the aircraft. This message will also update guidance for the new improved servo cylinders as indicated in AVSCOM message MIM-UH-1-XSOF-87-09, 062130Z Nov 87. The new improved servos may be installed in the lateral or fore and aft positions but shall not be installed in the collective position until the instructions are printed in the next revision of the appropriate TMs. Contact: Dick Mooy, AUTOVON 693-9089, commercial 314-263-9089.

• Aviation life support equipment (ALSE) advisory message concerning relocation of components for the SRU-21/P survival vest and standard individual survival kits (ALSE-88-01, 081630Z Jan 88). Contact: Boone Hopkins, AUTOVON 693-3215, commercial 314-263-3215.

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

SafeLine discontinued

The Safety Center toll-free SafeLine telephone service has been discontinued. If you have safety ideas, please call AUTOVON 558-3575, commercial 205-255-3575.

U.S. ARMY SAFETY CENTER

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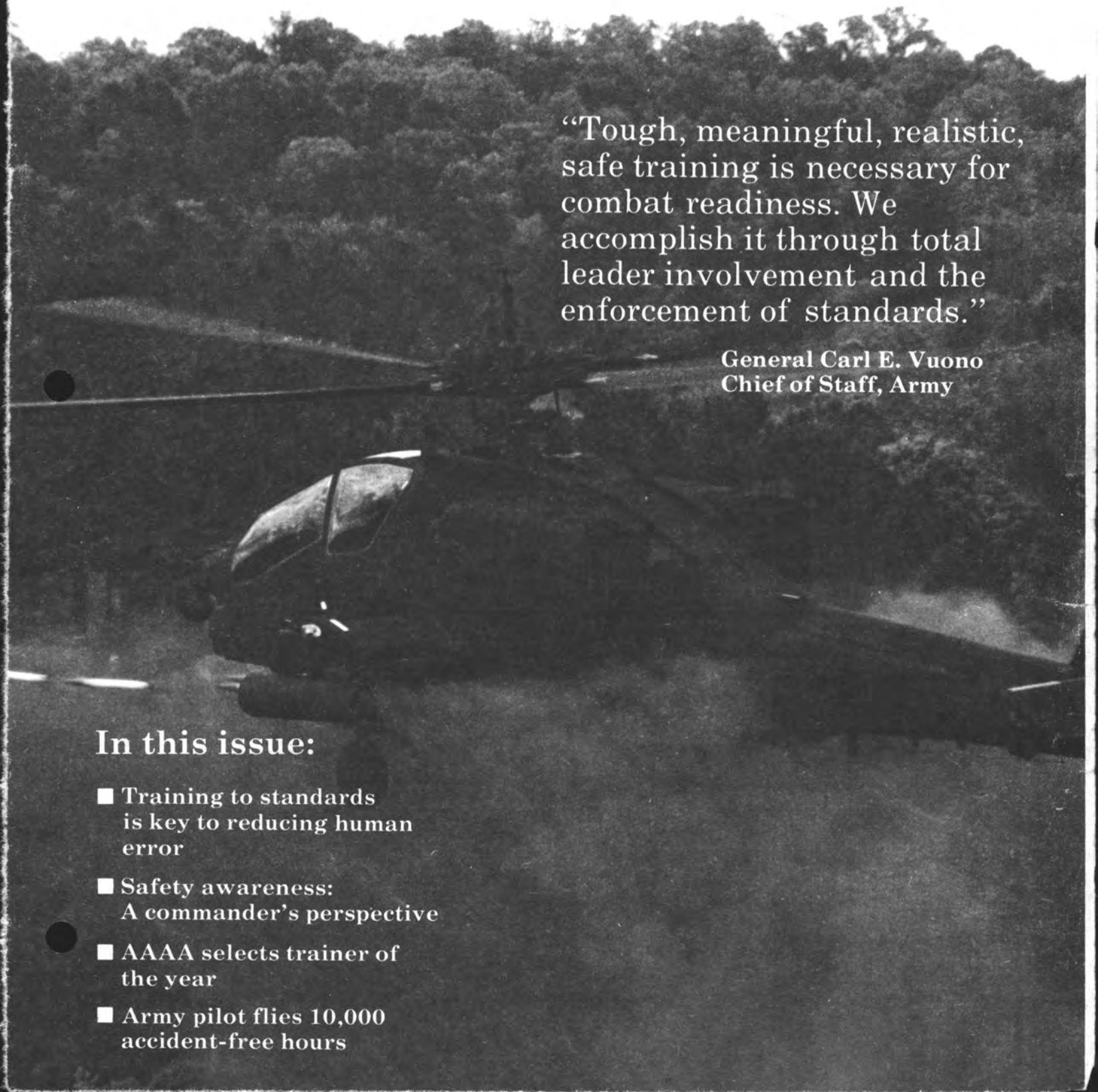
Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 16 10 February 1988



"Tough, meaningful, realistic, safe training is necessary for combat readiness. We accomplish it through total leader involvement and the enforcement of standards."

General Carl E. Vuono
Chief of Staff, Army

In this issue:

- Training to standards is key to reducing human error
- Safety awareness: A commander's perspective
- AAAA selects trainer of the year
- Army pilot flies 10,000 accident-free hours

Training to standards is key to reducing human error

Major Reasons for Human Error	
Standards are not clear or practical or do not exist	Command Failure
Standards exist but are not known or ways to achieve them are not known	Training Failure
Standards are known but are not enforced	Leader Failure
Standards are known but are not followed	Individual Failure

Quality training is the Army's top priority. That is why training has been selected as the Army theme for 1988. Good training produces tough, disciplined, and highly motivated soldiers, and it bonds units through shared experiences and mutual challenges.

Safe performance is a predictable result of performing to standard, and performing to standard is a result of training to standard. Training to standard leads directly to discipline—both collectively and individually, and disciplined soldiers and operations are inherently safe.

Human error is a definite cause in more than 80 percent of all Army accidents—air and ground. And the human-error problem is not unique to the Army. Human error is also the single largest cause of accidents for our sister services, our allies, and commercial aviation. Future reductions in Army accident losses will be directly related to reducing human errors with accident-causing potential.

Accident experience shows that human-error accidents are frequently clear indicators of training weaknesses—the same training weaknesses that would quickly deplete a unit's capability to fight in combat. The root cause of the problem is failure to train to standard or to the right standard. The solution lies in integrating safety into our training and operational processes.

In a large portion of human-error-related accidents, the error causing the accident can usually be tied in some way to a failure to train to standard or to enforce standards. And this is true Armywide, in air and ground operations. Too many people misunderstand the term "human error." For example, when an aircraft accident investigation team lists pilot error as a cause factor, it doesn't necessarily mean the pilot went out and did something to intentionally cause the crash. Pilot error means the aircraft crashed because the pilot made a performance error. He did something wrong or failed to do something correctly that caused the crash. The reason he made the performance error, however, could be lack of training, lack of established standards, or failure to follow standards.

The point is, when standards are not clear or practical or do not exist and the pilot makes an error, that error is the result of command failure—failure to establish standards. If standards exist but are not known or ways to achieve them are not known, and the pilot crashes an aircraft because he does not know the standards, we have a training failure. When standards exist and are known but leaders fail to enforce them, pilot error is the result of leader failure. When standards are known but not followed—when pilots fail to perform to established and enforced performance standards—then we have individual failure. While we realize most accidents are caused by a combination of failures, we are deliberately emphasizing only one teaching point in the following accidents.

Command failure

A UH-1 helicopter was operating at high gross weight in a mountainous area. When approach to a confined area was terminated at a 30-foot, out-of-ground-effect hover, the aircraft lost engine and main rotor rpm. During attempted recovery, the tail rotor struck a tree, causing complete loss of antitorque control. The aircraft crashed on upsloping terrain and tumbled about 100 feet down the slope, coming to rest on its side. *The unit did not have a standardized unit training program for mountain flying.*

Training failure

An aircraft was on a service mission with three passengers on board. While operating at low level over trees, a 180-degree turn to the right was made through a downwind condition. The aircraft spun around several times before entering an area of 75-foot trees. It was destroyed on impact with the ground. *The pilot had not received instruction on the operating characteristics of the OH-58 during NOE/contour flight as part of his recent unit-level transition training. He had not been trained in how to prevent loss of tail rotor effectiveness nor did he know the proper recovery procedures.*

Leader failure

A UH-1 was lead in a flight of four proceeding down a valley 100 to 150 feet agl at an airspeed of 90 to 100 knots. The helicopter hit wires and crashed. *The mission was being flown at an airspeed excessive for the terrain and altitude. No route/hazard recon had been made as required by the unit SOP. The unit commander was onboard one of the aircraft in the flight, yet took no corrective action. Standards were known but not enforced.*

Individual failure

An OH-58 pilot was approaching a landing area at 85 knots. When the helicopter was about 10 feet off the ground in a 20-degree bank left turn, and still traveling at 85 knots, the main rotor blade hit gently sloping ground to the left. The OH-58 hit the ground and came to rest on its side. The pilot made an unnecessary high-speed landing approach. *He knew the standard but failed to follow it—an individual failure.*

Aviation accidents are also caused by performance errors on the part of maintenance personnel. Establishment of standards and training maintenance personnel to standard are just as important to the Army's combat readiness as training aviators to standard. An aviation unit that fails to establish training standards for maintenance personnel and train to those standards will have the following types of accidents.

Command failure

A UH-1 was scheduled for a routine prephase test flight. The crew chief was occupying the copilot's seat when the pilot initiated an engine response check by rapidly increasing collective to allow the aircraft to climb vertically to about 50 feet. The aircraft was 30 to 40 feet agl when the pilot noticed a change in engine sound and saw N2 and rotor rpm were decreasing. He tried to regain rpm by lowering collective and attempted a hovering autorotation, but due to the decreasing rotor rpm, the aircraft descended rapidly, landed hard, and was damaged beyond repair.

A mechanic had incorrectly installed a fuel line to the external filter. The line had twisted over itself, and when maximum rpm was demanded by the pilot, the sudden increase in fuel flow collapsed the

line. The engine fuel control shut down, and the engine failed. A maintenance inspection had failed to reveal the incorrectly installed fuel line.

Deficiencies in historical records, signs of heavy-handed maintenance on other sensitive parts of the aircraft, and evidence of tool misuse found on various connections revealed a lack of maintenance standards in the unit.

Training failure

The pilot of a UH-60 was attempting a roll-on landing when the aircraft began to yaw to the left. The IP took the controls, corrected for the left yaw, brought the aircraft to a hover, and applied right pedal to align the aircraft with the lane. The aircraft immediately began to yaw to the right. The IP applied full left pedal, but the aircraft continued to spin to the right at an increased rate of acceleration. Unable to check the spin, the IP leveled the aircraft, reduced collective, and set the aircraft on the ground. On landing, the tail wheel broke and separated from the aircraft, causing damage to the fairings and left stabilator.

A check of maintenance records showed the oil cooler fan had been replaced several months before the mishap, during which period the aircraft had accumulated 183 hours of flight. Investigation revealed that the oil cooler fan exit flange failed in flight, disconnecting the tail rotor drive shaft and resulting in loss of directional control. Further investigation determined the oil cooler fan exit flange failed because of excessive shaft runout—the result of misalignment.

Maintenance personnel did not check shaft runout following the oil cooler fan installation as required because *the portion of the training manual covering the task being performed was deficient in format and lacking in detail. Also, a required special tool was omitted from the tool list.* Collectively, these deficiencies made it appear that the task was completed upon installation of the oil cooler.

Following this mishap, runout checks were performed on seven other UH-60 aircraft on which oil cooler fans had been replaced. The shafts on five were found to be out of alignment.

Leader failure

The right aft auxiliary tank of a CH-47 was leaking. To isolate the auxiliary tank from the fuel system so that maintenance could be performed, the platoon sergeant told the crew chief to cap the line between the auxiliary and main fuel tanks. *Instead, the crew chief capped the main fuel line to the No. 2 engine.* When the crossfeed switch was placed in the closed position, no fuel would go to the No. 2 engine.

The platoon sergeant failed to take into account the experience level of the crew chief and the complexity of the aircraft's fuel system. *He also failed to supervise the crew chief's work.* The technical inspector had limited recent experience in the operation of the CH-47C fuel system. He didn't recognize that what had been done would prevent fuel from flowing through the main fuel line, and he released the aircraft.

Individual failure

The crew of a UH-60 was practicing slingload operations when several warning lights came on. The lights went out when the circuit breaker was recycled, and the aircraft was brought to a stabilized

hover about 5 feet above the slingload. Suddenly, without any warning, the aircraft began spinning to the right. Realizing he had a loss of tail rotor control, the PIC cut off fuel to the No. 1 engine. Before fuel to the No. 2 engine could be cut, the aircraft hit the ground.

A tail rotor gearbox seizure resulted in loss of antitorque control. The seizure was caused by excessive heat produced by insufficient lubrication. A mechanic had drained the gearbox to replace an input seal and then did not record his work. Therefore, the gearbox wasn't refilled with oil.

Procedures in the training manual require that the tail rotor gearbox must be serviced when an input seal is replaced. *The mechanic was aware of these procedures, but he failed to follow them.* The technical inspector should have caught the deficiency, but he didn't.

The standards that guide our training must reflect the requirements of the battlefield. Leaders are responsible for the establishment of unit standards and ensuring that desired objectives are met.

Effective training is the key not only to sustaining a combat-ready Army but also to reducing human-error accidents. Training to standard produces skilled, disciplined soldiers. And skilled, disciplined soldiers are professional soldiers who accept responsibility for the safety of themselves, the safety of others, and the protection of Army equipment. □

FLIGHTFAX

Safety awareness: A commander's perspective

In response to the article "A terrific brigade," in the 18 Nov 87 Flightfax, COL Matthew M. McGuire, military staff assistant, Weapon Systems Assessment, Office of the Under Secretary of Defense, submitted the following personal experience.

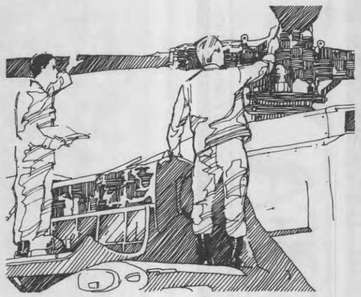
The most embarrassing safety experience of my life came after I had asked the brigade safety officer to inspect my work areas and flight line. I honestly believed my unit was operating at a high state of operational efficiency and safety awareness. I was quickly disillusioned when the safety officer asked me to accompany him on a walk-through of the areas he had inspected.

I could not believe the safety violations he pointed out in the same areas I had visited before without finding anything wrong. The thing was, as a leader and organizer, I had trained myself to look for *results*. My eyes were trained to spot inefficiency and waste efforts and activities. Even when I talked to soldiers, I asked about problems with getting the job done—not about the work environment.

That walk-through was a real eye-opener. I realized my "results only field of view" was like walking through the area wearing blinders, and that is what leads to safety deficiencies and unacceptable losses.

I devised a simple test that proved invaluable. During frequent visits to the work areas and flight line, I trained myself to look specifically at *how* the soldiers were doing their tasks. I also found that command emphasis and the stated understanding of subordinate leaders about the importance of safety wasn't enough. This "simple" test needs to be done at all levels of leadership—all the time!

Soon after I began looking at how things were being done, not just at what was being accomplished, I was shocked to see how soldiers were working in the aircraft maintenance area. It was hard to believe my eyes when I saw one soldier, working on a tail rotor from a maintenance stand, who had placed the grease gun on the platform right behind his foot. I also noted the task he was performing required verification by a technical inspector (TI), but there was no TI in the area. In fact, there wasn't even a manual to be seen.



This kind of incident wasn't representative of the unit or its personnel, but it wasn't the only one I noticed after becoming more aware of what I should be looking for.

I believe safety awareness problems are out there every day, even in the most professional organizations. These problems can only be reduced by establishment of proper environmental indicators and continuous leadership involvement at every level. □

Having trouble getting Flightfax?

If you are having problems receiving Flightfax, or if your address has changed, the correct number to call for assistance is AUTOVON 558-2062/3014, commercial 205-255-2062/3014. □

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A

H series - Aircrew transitioned from cruise flight to 50-foot stationary hover to avoid flying into a snowstorm. Aircraft descended vertically and struck the ground. Pilot then increased collective and aircraft ascended to about a 25-foot hover and made a 360-degree turn to the right, followed by another 180-degree turn to the left. After momentarily stabilizing, the aircraft entered a 30-degree nose-down attitude. The aircraft descended, struck the ground, and rolled onto its left side. The three crewmembers were injured. 8811

UH-1 Class D

H series - Aircraft encountered tail wind during final approach and made two rotational turns to the right before PIC regained control. During landing, PIC failed to see a wire fence to the rear of the aircraft. Antenna and antenna mount were broken off by contact with the wire. During postflight, damage to crosstubes and skids was also found.

H series - Aircraft was in a 10-degree left bank when crew heard a loud bang from right rear, and aircraft veered slightly left. Instrument indications were normal and aircraft was flown about 2 miles to a field site. Crew heard three more bangs during flight but made an uneventful landing. After shutdown, telephone wire was found trailing from skids. One end of wire was wrapped around wire strike protection system.

UH-60 Class D

A series - Aircraft was hovering down a small valley with known wire hazards. CP was at the controls with PIC navigating. When the PIC saw wires, he took the controls and attempted to stop the aircraft. Two strands of power lines struck under aircraft nose compartment, slid down, caught on the pilot's step, and broke. Wires were marked on the pilot's hazards map.

A series - During landing in brownout conditions, left main gear rolled into a hole. Aircraft's nose struck a mound of sand.

A series - Aircraft was chalk 2 in flight of three conducting NVG support mission. While landing in snow and mud, aircraft struck a stump that ground unit personnel had failed to detect during recon of landing area.

Attack helicopters

AH-64 Class C

A series - Crew was performing mission with pilot night vision sensor under day VFR conditions and back seat blacked out. After performing remote training maneuvers: masking/unmasking and NOE takeoffs, decelerations and approaches, aircraft was flown to stagefield for normal stagefield work. During walk-around inspection after student change, IP discovered damage to tail rotor blades and stabilator from apparent tree strike. Neither crewmember was aware a strike had occurred.

Cargo helicopters

CH-47 Class D

C series - Tower personnel notified crew aircraft had open tunnel cover. Aircraft landed. While FE was securing tunnel cover, he noted another tunnel cover was missing. Tunnel covers had not been properly secured or checked during preflight.

CH-47 Class E

C series - Transmission chip detector light flickered several times during approach, but aircraft made uneventful landing. Caused by failure of forward transmission.

Observation helicopters

OH-58 Class E

A series - Pilot attempted takeoff after refueling at FARRP. Right skid stuck in sand, and aircraft could not lift off because of insufficient lateral cyclic input. Aircraft rolled about 8 degrees before pilot reduced collective pitch and allowed aircraft to settle roughly. Pilot's MOPP gear interfered with his lateral cyclic input.

Fixed wing

C-7 Class E

A series - Upon rotation during takeoff, crew noticed change in engine sound and felt engine surge. All instruments were normal, but FE reported fuel leaking from lower inboard side of No. 2 engine cowling. PIC turned downwind and decided not to shut down engine because aircraft had encountered low-level wind shear and gusty right crosswinds during landing only 15 minutes earlier. Because of effects of such winds on the C-7's large tail area, PIC determined engine would be needed to make a successful landing. He also considered location of fuel leak in relation to the exhaust area before reaching a decision not to shut down engine. Aircraft made uneventful landing, and engine was secured before landing roll was completed. Leak was caused by fracture in nipple on fuel pump inlet.

Maintenance

UH-1 Class D

V series - Aircraft was preflighted, then flight was delayed for 3 days. Cowlings were closed during second preflight. After completing 4-hour NVG flight, crew chief discovered a screwdriver had been left under the drive shaft cowling. Result was FOD to tailboom, tail rotor drive shaft, clamps, and hanger bearing assembly.

AH-1 Class D

S series - During third adjustment for blade tracking, wrench was left on top of main rotor hub. When aircraft was run up to ground idle, wrench was thrown off, striking one main rotor blade. Wrench was not found during FOD inspection and tool count was not conducted. □

FY88 Class A Mishap Countdown

		FY87			FY88	
	Month	Class A Mishaps	Army Military Fatalities	Month	Class A Mishaps	Army Military Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	November	1	0
	December	4	5	December	1	0
2nd Qtr	January	3	2	January	2	0
	February	1	4	1-10 Feb	0	0
	March	4	1	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	39	Total to Date	6	0

Well done

AAAA selects trainer of the year

Major Jim Thurman, Apache Training Brigade, Fort Hood, TX, has won the 1987 Army Aviation Association of America Trainer of the Year award. The award is given annually to the trainer who has made an "outstanding individual contribution to Army aviation during the year."

A year ago, Thurman was given responsibility for orchestrating the unit training program for every Apache battalion in the Army. When he joined the newly formed Apache Training Brigade as S3, his mission was to develop, coordinate, and implement a detailed and comprehensive unit training plan for 34 advanced attack helicopter battalions receiving the AH-64. So far, five battalions have gone through the program.

Thurman gives much of the credit for winning the trainer of the year award to other people in the brigade and his family.

—Fort Hood *Sentinel*

Army pilot flies 10,000 accident-free hours

On 5 November 1987, Secretary of the Army John O. Marsh, Jr. presented CW4 Robert J. Kirksey with the Army Commendation Medal for completing 10,000 hours of flight without an accident.

CW4 Kirksey, who flies out of Davison Army Airfield, Fort Belvoir, VA, has spent the equivalent of 3½ years in the air. The 48-year-old Army pilot flies fixed wing aircraft and has been flying since 1966—10 years after he joined the Army—and he isn't ready to turn in his wings yet. His next goal is to fly Army jet aircraft.

—Military District of Washington *Pentagram*

Flightfax to be biweekly

Beginning with this issue, *Flightfax* will be published on alternate weeks in a new format. With this new format, we can give you the same amount of information we have been giving you weekly. This format also lends itself to the incorporation of posters into future issues. □

U.S. ARMY SAFETY CENTER

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Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 17 24 February 1988

The high cost of leader failure

When leaders fail to enforce established training standards, the natural result is accidents—and accidents cost. They cost lives, they cost time, and they cost equipment. We can't afford to let this drain on assets and its effect on our warfighting capability continue.

A leader who understands and accepts his responsibility will not only make sure that his people know what the standards are, he will care enough to ensure the standards are enforced. Leaders could have prevented the following accidents if they had enforced standards.

• A UH-1 was scheduled to take supplies to a river site and pick up troops. Before takeoff, the pilot was told by his platoon leader to recon the river downstream where training in rappelling would take place the next day. Three crewmembers and three passengers, including the acting troop commander and acting squadron commander, were on board the aircraft. The supplies were delivered and offloaded,

and three more soldiers came on board. The pilot took off downstream. A post regulation and the unit SOP prohibited flights at altitudes less than 300 feet above the ground outside the military reservation. However, the pilot decided he could not do a good recon from 300 feet above the river. He went down to 75 feet and began flying down the river at about 80 knots. A few minutes later, the helicopter hit powerlines and crashed. ***The acting troop commander, a current and qualified aviator, was sitting behind the copilot. At no time during the 10-minute flight at low altitude did he tell the crew they were in violation of regulations and require***

In this issue:

STACOM

UH-1/AH-1 ground-handling wheels

UH-1 crashes during medevac mission

The high cost of leader failure

them to operate the aircraft at a higher altitude. Three people were killed in this accident, six suffered major injuries, and the aircraft was destroyed.

• As a flight of four AH-1s started through a mountain pass, a low cloud cover caused visibility to decrease substantially. The flight leader thought they should turn back, ***but the platoon leader, who was in one of the other aircraft, urged him to go a little farther.*** The flight leader continued on, became disoriented, and the aircraft hit the side of a hill, injuring both occupants. Although unplanned entry into instrument meteorological conditions can occur at any altitude, attempting to maintain visual flight once conditions of low visibility were encountered was a clear violation of standards.

When there is someone in a unit who repeatedly takes unnecessary risks and fails to follow standards—somebody knows about it. It may not be the unit commander, it might be the operations officer, the safety officer, or it may be other aviators, but somebody knows. Several people knew about the pilot in the following accident, but nobody did anything.,

• The pilot made an unauthorized, low-level pass over a bay to give his passengers a look at a yacht anchored below. The aircraft struck a wire about 100 feet above the surface of the water.

This pilot had a reputation for flying at low altitude whether or not it was required by the mission. ***Other aviators knew about it, and they didn't want to fly with him. The unit standardization IP knew that he had been reported for flying at low level following maintenance test flights, and he told the unit commander.*** Nothing was done until the pilot was accused of another offense, and then he was verbally counseled by the unit commander. By not requiring disciplined performance, the commander was setting new standards—the lowest standards—the standards that lead to accidents.

During a previous assignment, this same aviator had been grounded for a month and restricted to copilot duties for an additional 3 months for unauthorized low-level flight.

Who was responsible for the fact that this aviator continued to fly this way until he had an accident? It wasn't just one person. Everybody who knew about what he was doing and failed to enforce the standard was responsible for this accident.

The leader who knows that standards are not being followed must do something about it. If he fails in this responsibility, he fails as a leader. □

FY 88 Class A Mishaps through 24 Feb

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	2	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	0	4	0
	March	4		1	
3rd Qtr	April	2		1	
	May	5		3	
	June	5		13	
4th Qtr	July	2		5	
	August	5		1	
	September	3		0	
	Total	38	6	39	0

Stacom

Standardization Communication

Implementing safety programs in J Series TOE units

Recently, Directorate of Evaluation and Standardization (DES) and the Army Safety Center have agreed that AR 385-95: Army Aviation Accident Prevention, as currently written, presents some degree of difficulty when implementing a formal safety program at company/troop level in J Series tables of organization and equipment (TOEs). AR 385-95 is now being updated and should be fielded in 1989. In that revision, written procedures for consolidation of the administrative safety workload will be delineated for units under J Series TOEs. New aviation safety officers (ASOs) are being advised in the ASO course that the current AR 385-95 and Eleventh Edition Guide to Aviation Resources Management and Aircraft Mishap Prevention were developed for H Series TOEs and that their commander may need to make adjustments, pending publication of the updated AR. In the interim, safety evaluations given in conjunction with DES flight standardization evaluations will take this factor into consideration when evaluating J Series TOE units.

Questions and answers

Q. How does AR 95-1: Army Aviation: General Provisions and Flight Regulations, paragraph 3-20.1 (Flight Crews), change our pilot in command (PC) program?

A. Simply stated, this paragraph expands the PC program to include all flight crewmembers who are authorized to fly (manipulate the controls) from a flight crew station. By definition, a flight crew station is: "A station in an aircraft at which flight controls may be used to control aircraft in flight; e.g., pilot or copilot station(s) specified in operators' manuals." Because of the number of discrepancies found during DA evaluations, a more comprehensive explanation follows:

a. Paragraph a states that "Unit commanders must establish, in writing, formal flight crew qualification and selection programs." It does not state only a PC program in writing; it states a formal flight crew qualification and selection program. This means, by the above definition, PC, PI, UT, IP, IE, SP, MP, ME, and XP, when flying from a set of flight controls.

b. "Programs will contain qualification and selection criteria and evaluation methods." This means that for each duty (PC, PI, etc.) the aviator will perform, there must be a qualification, selection, and evaluation program, in writing, on how the aviator obtained that status (how the aviator got to where he/she is). The main objective of this paragraph is to have the commander directly involved in the aircrew training program. The commander may tailor this program to meet the unit's requirements.

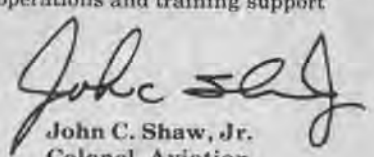
c. Flight crewmembers will be—

(1) Designated in writing, specifying the duties and flight crew stations that they are authorized to fly. This is the second requirement that the commander must accomplish in writing. The commander must specify which duties (PI, PC, IE, etc.) and flight crew stations (left, right, front, back) the aviator is authorized to perform and occupy. Before the commander can authorize an aviator to perform specific duties or occupy a flight crew station, the commander must evaluate the aviator in performance of these functions. This evaluation must be accomplished initially before the aviator is designated to occupy a flight crew station and perform those duties and during subsequent Annual Proficiency and Readiness Tests (APART) in accordance with paragraph 3-20.1b(4).

(2) An evaluation conducted in a more demanding duty position will suffice for one conducted in a less demanding position. This designation is the means commanders use to convey their intent to mission briefers. With this document in hand, mission briefers can accomplish their requirements in accordance with paragraph 3-20.1b(2). This designation by commanders can be in any format selected as long as it is in writing and is signed by the commander. There is no requirement in AR 95-1 that PCs be on separate orders, because the designation just described meets this requirement.

STACOM 127 24 February 1988

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208. AUTOVON 558-3589 during duty hours, 558-6487 after duty hours. 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



John C. Shaw, Jr.
Colonel, Aviation
Director, DES

UH-1/AH-1 ground-handling wheels

• A soldier was installing the ground-handling wheel assembly on an AH-1S aircraft. The wheel assembly he was using was equipped with a spring-loaded front locking pin. The front and rear locking pins appeared to be engaged, but after he had jacked the aircraft up about 2 inches off the ground, the front retaining pin released. The soldier, who was kneeling to the right rear of the assembly, was struck in the face.

• A civilian mechanic was told to help move a UH-1H out of the hangar after it had been painted. He installed the ground-handling wheel assembly on the aircraft skids and began pumping the hydraulic pump handle. He still had his hand on the pump handle when the ground-handling wheel assembly disengaged. His hand was cut when the wheel assembly broke loose and hit the helicopter's gun mount.

• A crew chief attached the ground-handling wheel assembly to the skids of a UH-1H helicopter. He had jacked up the wheel assembly with a manual hydraulic pump when the assembly suddenly came loose and struck him on the left elbow.

These kinds of accidents involving ground-handling wheels on Hueys and Cobras can be prevented with a little effort. The following safety modification can be made by drilling the release pin and adding a lock pin to the ground-handling wheel assembly. (Reference TSARCOM maintenance notice message AH-1-81-05, 261400Z Feb 81.)

• Remove the release pin by removing the lube fitting and the connecting pin, using a small screwdriver.

• Measure, mark, and drill a .093-.098 hole in the release pin, P/N 204-050-163-1, as shown in the illustration, using a 3/32-inch bit.

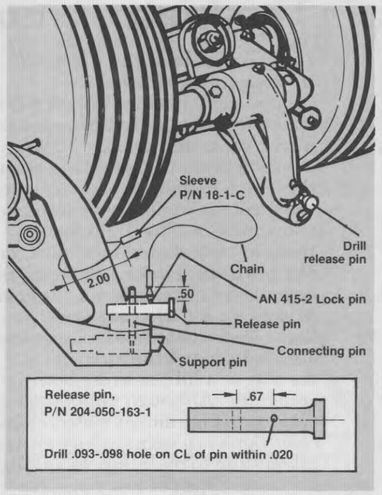
• Clean and deburr the release pin and lubricate with grease.

• Reinstall the release pin, connecting pin, and lube fitting.

Now, when the wheels are mounted, the lock pin should fit into the release pin—meaning the support pin is fully extended into the skid eyebolts. That will ensure the wheels can't fly off and hurt somebody.

This may sound like old news; however, there are wheel assemblies out there that have not been modified. □

—Adapted from PS Magazine



Modifying the AH-1/UH-1 ground-handling wheel assembly by adding a lock pin can prevent accidents caused by the wheels flying off. You can make sure the lock pin, NSN 5315-00-194-2455, is always there when you need it by chaining the pin to one end of a 12-inch length of chain, NSN 4010-00-262-1551, by using lock wire. Loop the other end of the chain around the cradle and secure it with wire rope swaging sleeve, NSN 4030-01-021-6339, or equivalent.

FLIGHTFAX

ACCIDENT REVIEW

UH-1 crashes during medevac mission

Army medevac teams are trained to respond—fast. The difference between life and death may be measured in seconds. Because of this, a team may respond to a call for help without adequately considering the risks involved. The result can be another tragedy.

One such medevac crew had been on standby since 0700. At 2050, a call came from the emergency room of an Army hospital. There had been an automobile accident about 8 miles from the airfield. One person was pinned in the wreckage and another had been thrown from the vehicle and was unconscious.

Six minutes after the call came in, the crew received a special visual flight rules clearance, and the UH-1 took off. The weather was 200 feet scattered, measured 500 feet, and overcast. Visibility was 3 miles with light rain and fog. At 2058, the aircrew advised the tower that they would report clear of the control zone in 2 minutes. One minute later, standby range control personnel saw the aircraft flying over their range headquarters. The aircraft was at a very low altitude, just above the treetops, and the searchlight was on. It appeared to be traveling at cruise airspeed.

No further transmissions were received from the aircraft. Approximately 2 minutes after takeoff, 4 nautical miles northwest of the Army airfield, the aircraft struck an 80-foot tree, 59 feet above the ground. It traveled another 345 feet as it descended through a heavily wooded area, striking several more trees before reaching the ground. The three aircrewmembers and a senior flight medic were killed.

The darkness, rain and fog, low altitude, and airspeed of 90 to 110 knots severely limited the pilot's ability to see and avoid obstacles. The aircraft's altimeters had not been set prior to takeoff and they indicated the aircraft was 220 feet higher than its actual altitude. The radar altimeters were on and should have provided accurate altitude information.

However, the ability of the radar altimeter to track absolute altitude above obstacles on the ground is affected by tree density and airspeed. For example, at high airspeeds over sparse-density trees, such as tall pine trees, the altimeter is likely to read a distance to one-half tree height. At slower airspeeds, the altimeter is likely to read the distance to the ground unless directly over a tree. During operations over thick foliage, the altimeter will read the distance to treetops (see "The radar altimeter...its uses and limitations," STACOM 124, in the 19 August 1987 issue of *Flightfax*). If the crew misinterpreted the readings from the standard altimeters they could have had a false sense of security about their altitude.

Several risks were taken by this medevac crew: low altitude, high airspeed, and weather conditions that made it difficult to see obstacles. Ironically, the accident to which they were responding could be reached by a hard-surfaced road and an ambulance could get there just as fast as the helicopter could. Risk assessment works in determining whether training and tactical missions should be flown—it will work for these types of missions too. □

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-60 Class A

A series - When aircraft completed approach to hover, brownout conditions rapidly developed, and crew lost visual references. Aircraft drifted to the right, right wheel struck the ground, and aircraft rolled over. 8812

UH-60 Class D

A series - During an automatic flight control system boost-off maneuver, aircraft touched down unevenly and bounced. Rated student pilot pulled collective to return to hover, with left cyclic applied. Aircraft left the ground in a left roll, causing side loading on tail landing gear. Side loading increased when tail wheel hung in a gap in the pavement, resulting in partial failure of the yoke, which was already weakened by a fatigue crack. IP took the controls and, unaware of weakened state of tail landing gear, landed the aircraft. As brakes were applied, yoke collapsed.

Attack helicopters

AH-64 Class E

A series - During low-level flight, No. 2 engine fuel psi light came on. Before boost pump could be latched on, light went out; then same light again came on, followed by engine-out audio. Rated student pilot was instructed not to latch the boost pump on or attempt to restart No. 2 engine because both of these actions would position the No. 1 crossfeed to the aft tank and could possibly cause flameout of No. 1 engine. After uneventful roll-on landing, forward and aft tanks showed approximately 750 pounds of fuel remaining. Caused by failure of fuel boost pump.

A series - Aft right catwalk door separated from aircraft during flight. When hinge pins vibrated loose, catwalk door latches loosened, and door came off.

Cargo helicopters

CH-47 Class C

D series - Aircraft was transporting external load consisting of HMMWV. During evasive maneuver for a simulated SA-7 launch, copilot attempted to launch flares and inadvertently released the load while aircraft was 150 feet agl, at 80 KIAS.

CH-47 Class D

D series - After preflight, crew failed to secure all dzus fasteners on tunnel cover. Cover was blown off by rotorwash from a taxiing aircraft.

D series - When engine condition levers were advanced from ground position during runup, no torque was indicated on No. 2 engine. Caused by sprag clutch failure.

CH-47 Class E

D series - While aircraft hovered to hook up external load, partial brownout was encountered. Aircraft drifted slightly forward of load. During repositioning, aircraft contacted top of load.

Observation helicopters

OH-58 Class D

C series - During autorotational landing, pilot, who was undergoing transition in aircraft, failed to keep aircraft level. Nose turned left at touchdown. Spike knock resulted when skids touched down unevenly.

OH-58 Class E

C series - Aircraft was lead in flight of five. During approach, rotorwash from chalk 2 caused lead to suddenly yaw right. CP applied excessive left pedal to stop yaw and overtorqued engine.

C series - PIC noticed CP was allowing aircraft to get too low during NOE flight. Before corrective action could be taken, main rotor blade struck top of small tree.

Fixed wing

OV-1 Class D

D series - During line-up check, sparks and smoke began coming from under dash. Suspect pilot inadvertently stepped on wiring bundle to oxygen regulator, causing ground wire to overheat.

U-21 Class E

F series - After refueling of main tanks, fuel began pouring onto ramp from left wing heated fuel vent. One-way check valve in auxiliary fuel tank was stuck in open position.

Maintenance

UH-1 Class E mishap

H series - During straight and level flight, 100 feet agl, 60 KIAS, IP noticed cyclic pulling left and aft. With both pilots on controls, aircraft made uneventful landing. Suspect malfunction of irreversible valve. Maintenance also found blade grip reservoir was empty of oil. Suspect trapped air made reservoir appear to be full.

UH-60 Class E

A series - Crew smelled fumes in cockpit during flight at 4,000 feet agl. After landing, large inspection access panel seal for left fuel cell was found in bottom of cell. Improper installation caused seal to seat improperly.

AH-1 Class E

P series - Aircraft slowly turned left during descent from hover. Aircraft continued to turn left as it touched down and collective was lowered to full-down position. Right pedal could not be applied from either crew position. Disengagement of stability control augmentation system yaw channel had no effect. Aircraft was about 30 degrees off original heading when it stopped turning left. During replacement of cannon plug, old plug was left on floor of aircraft. Cannon plug became jammed in control linkage.

OH-58 Class D

C series - As throttle was rolled back to 100 rpm during simulated engine failure, engine quit. Aircraft landed without power. Caused by incorrect rigging of throttle linkage.

OH-58 Class E

C series - Aircraft lost hydraulic power prior to takeoff. Overtorque of jam nut on pressure line to left hydraulic servo activator caused hydraulic leak.

D series - Aircraft was en route to NOE area when pilot noticed warning that transmission oil pressure was low. Strip gauge indicated zero pressure, and pilot immediately landed. Caused by improperly seated lower transmission sump chip detector.

Safety messages

• Safety-of-flight technical message concerning one-time inspection and removal of governor with possible missing cotter pin on UH-1/EH-1H and AH-1 series aircraft (UH-1-88-02 and AH-1-88-03, 232030Z Feb 88). Contact: Dick Mooy, AUTOVON 693-9089, commercial 314-263-9089.

• Safety-of-flight technical message concerning inspection of UH-60 aircraft for certain serial-numbered tail rotor blade assemblies (UH-60A-88-01, 151800Z Feb 88). Contact: Roger Heidenreich, AUTOVON 693-9089, commercial 314-263-9089.

• Safety-of-flight technical message concerning one-time inspection and selective replacement of wingbolt hardware on U-21, RU-21, A-90, and VC-6 aircraft, all models, (U-21-88-02, 231930Z Feb 88). Contact: Robert Lawyer, AUTOVON 693-9089, commercial 314-263-9089.

• Safety-of-flight technical message concerning one-time inspection of flight control cable tensions on C-12, RC-12, U-21, and RU-21 aircraft (C-12-88-01, 022000Z Feb 88). Contact: Robert Lawyer, AUTOVON 693-9089, commercial 314-263-9089.

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

Followup information on accidents previously reported

UH-1 Class A

Reported in 18 Mar 87 issue as 8723 - The aircraft with three crewmembers and two passengers on board was in the landing phase of a night service mission. About 4 miles out, the crewmembers were able to see the tactical landing area, a lighted "Y." The copilot in the left seat made an approach downwind from the southeast. The PIC decided the approach was too steep and took over the controls. He executed a missed approach, circled, and overflew the landing area, heading back to the south. He then made a final left turn to the northwest and initiated another approach from the southeast. The PIC misjudged clearance between his aircraft and the terrain along the approach path, and the aircraft impacted the ground at 40 KIAS, 400 meters short of the intended landing area. After impact, the aircraft skidded, bounced, and rolled 360 degrees left before coming to rest in an upright position with the engine running. The two pilots were uninjured. The passengers and crew chief were evacuated to a hospital.

UH-60 Class C

Reported in 25 Mar 87 issue as 8725 - Downgraded from Class B. Aircraft was chalk 4 in a staggered left formation of six UH-60A helicopters on an NVG airmobile training mission. The mishap aircraft cleared a ridgeline and began descending to maintain position in formation. While adjusting himself in his seat, the PIC of chalk 4 hit the battery pack attached to the back of his flight helmet against the back of his seat, causing his NVGs to go off. He alerted the copilot, who was navigating. As the copilot looked up from his map, he saw treetops over the instrument panel. When the PIC's NVGs failed, he had increased collective and applied aft cyclic to initiate a climb. When the copilot saw the treetops, he also increased collective and applied forward cyclic in an attempt to level the aircraft and initiate a climb, but the aircraft struck the trees. Damage to the main rotor blades, tail rotor, and stabilator caused severe vibration of the aircraft, requiring both pilots to stay on the flight controls. The low rotor audio warning activated, and the PIC, whose NVGs had slipped down over his face, turned on the landing light and turned right to descend down a ravine and regain rotor rpm. The crew identified a field at the end of the ravine and landed. There were no injuries.

OH-6 Class A

Reported in 18 Mar 87 issue as 8724 - Two OH-6 aircraft were conducting NVG, low-level, multiship training at 300 feet agl, 80 KIAS. The trail aircraft was in an echelon left position at the beginning of a planned lead change. The lead aircraft decelerated to 70 knots, and the pilot of the lead aircraft signaled the trail aircraft to execute the lead change. A few seconds later, the crew of the lead OH-6 heard a loud explosion, and flames and sparks entered the cockpit. The main rotor blade of the trail aircraft had struck the rear of the lead aircraft. The trail aircraft crashed out of control, fatally injuring both crewmembers. The lead crew successfully autorotated to the ground; however, the helicopter had lost a skid during the midair collision, and it rolled over after landing. The aircraft sustained major damage, but neither pilot was seriously injured. The IP of the second aircraft probably had his attention focused on configuring his aircraft to assume the lead and failed to maintain proper separation between the aircraft during the lead change maneuver.

OH-58 Class A

Reported in 28 Jan 87 issue as 8718 - The unit to which the aircraft belonged was in the second day of a 2-week field training exercise. The aircraft had returned to its home station for correction of a communications problem and was en route back to the field training site. Arriving at the site from the west, the pilot flew a descending right turn and rolled out on final approach about 500 meters from the unlighted landing zone. He began his final approach at about 100 feet agl. During approach over the open, snow-covered field, the aircraft, which was flying at 30 knots, impacted a rise in the terrain, bounced, and rolled onto its right side. The two crewmembers were uninjured; the aircraft was destroyed. □

U.S. ARMY SAFETY CENTER

Report of Army aircraft mishaps published by the U.S. Army Safety Center, Fort Rucker, AL 36362-5363

Commander, Army Safety Center

The case for performing to standard

Command failure. UH-1 pilot was operating at high gross weight in a mountainous area when engine and main rotor rpm were lost. The unit did not have a standardized unit training program for mountain flying.

Training failure. Two UH-1 pilots were flying an unauthorized maneuver when their helicopters collided in midair. Both pilots were unaware the maneuver was prohibited by regulations and standing operating procedures.

Leader failure. OH-58 pilot, who was authorized but not qualified to fly the mission, flew his helicopter into a mountain.

Individual failure. AH-1 pilot, in a hurry to get home, attempted flight in deteriorating weather and flew into wires.

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Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 18 1 May 1988

Six aviators receive Broken Wing awards

Not only can we learn from successful aviation units, we can learn from successful aviators. When aviators are trained to standard, when they know standards and how to achieve them, and they have the self-discipline to follow standards, such aviators, even when faced with an emergency situation, are much more likely to be able to prevent or lessen the effects of an accident.

In the following accounts, six aviators were faced with an in-flight failure or malfunction of the aircraft that required an emergency landing. In recognition of the high degree of personal skill demonstrated while recovering the aircraft from an in-flight emergency, these aviators have been presented the Army's Broken Wing Award. Requirements for the award are spelled out in AR 672-74.

• **CW2 Thomas E. Ahl, 220th Assault Helicopter Company, Task Force Phoenix, 4th Brigade, APO NY 09250.** CW2 Ahl was pilot in command of the lead UH-60 in a flight of two engaged in transporting troops. In addition to the three crewmembers, there were ten soldiers on the lead aircraft. The Black Hawks had been in the air for about an hour when CW2 Ahl told the copilot, who was on the controls, to climb to 3,000 feet agl. The aircraft had reached 2,000 feet when it began a continuous right yaw that the copilot could not correct with left pedal input. CW2 Ahl took the controls and attempted to level the aircraft but, even with full left pedal applied, the aircraft continued to yaw right. He reduced collective, lowered the aircraft's nose to gain airspeed, and placed the tail rotor servo switch in the backup position. The crew of the trail aircraft saw the lead aircraft's tail rotor slow, stop, and begin slowly windmilling. CW2 Ahl managed to gain airspeed and recover some control of the aircraft by the time it reached 1,500 feet. He tried to roll out of the right turn, but when he attempted to level the aircraft, the right turn tightened and he knew loss of control was imminent. He continued in the right turn toward a

In this issue:

OH-58 hits slope during landing attempt

Spectacle lens study under way

USASC flight-surgeon named aerospace medicine specialist of year

Six aviators receive Broken Wing awards

small field he had spotted when the emergency began. He told the copilot to pull one engine power control lever off line, and CW2 Ahl began maneuvering the aircraft to avoid a village, high-tension power lines, and a hillside. During short final, CW2 Ahl realized the flight path would take the UH-60 into a line of 20-foot trees and a creek just short of the landing site. He decelerated and increased power to avoid these hazards, knowing his action would increase the aircraft's spin. When the aircraft was over the field, the copilot pulled the second power control lever off line to reduce the spin, and the aircraft landed with no forward airspeed in the only level area. The aircraft spun another 12 degrees after touching down, but it remained upright. Although there was some damage to the aircraft, there were no injuries to the crew or passengers.

• **CW3 Lanny D. Brooks, D Company, 1st Battalion, 223d Aviation Regiment, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker.** CW3 Brooks was undergoing instrument examiner training in a UH-1H. During an instrument flight rules climb from 5,000 to 7,000 feet, the Huey's engine failed. After confirming engine failure, the student examiner in the right seat, who was operating the flight controls, lowered collective pitch while maintaining the aircraft in trim. As soon as the aircraft was established in an autorotative descent, he transferred the controls to CW3 Brooks, who was occupying the left seat. The aircraft broke out of instrument meteorological conditions at about 500 feet agl, and the crew began looking for a place to land. In order to reach the only suitable area, CW3 Brooks had to turn the aircraft 160 degrees to the left while in autorotative descent. He successfully negotiated the turn, and the aircraft touched down, undamaged, in the selected landing area.

• **CW2 Steven P. Owens and CW2 James C. Reardon, 3d Battalion, 3d Aviation, 3d Infantry Division, APO New York 09182.** CW2 Owens was pilot in command, and CW2 Reardon was pilot of an AH-1F that was in trail position of a flight of three aircraft on a tactical training mission. Their aircraft was at 1,000 feet agl when the crew heard a loud bang, saw debris fly past the right side of the cockpit, and felt something hit the aircraft. One of the tail rotor blades had separated from the yoke assembly. Pieces of the blade struck the trailing edge and top of the right wing and the main fuselage. The other tail rotor blade, 90-degree gearbox, and cowling then separated from the aircraft. When CW2 Owens lowered collective, the right yaw increased. CW2 Reardon told him to maintain airspeed and the aircraft returned to the original yaw configuration. The crew began looking for a suitable landing area and issued a mayday call. There was little remaining lateral control of the aircraft, and both pilots got on the controls in an unsuccessful attempt to turn the aircraft left toward a suitable landing area. By combining their efforts, they were able to maneuver the aircraft toward a less-suitable area to their right, a plowed field surrounded by 50- to 75-foot trees. As the Cobra approached the field the crew initiated a slight deceleration with aft cyclic, but the aircraft began to settle and was in imminent danger of going down in the trees. As the pilots maneuvered to avoid the trees, the aircraft started to rotate to the right about its mast. When the aircraft's rotation approached 90 degrees, the crew closed the throttle to stop the rotation. The aircraft was now headed toward a 35-degree slope, and the crew struggled to get the helicopter to flatter ground using the remaining rotor inertia. The AH-1 touched down hard on a 10- to 15-degree slope, and the forward movement caused the aircraft to roll onto its left side. The aircraft was destroyed, but neither crewmember was seriously injured.

• **Mr. Ralph T. Schmidt, Pan Am Support Services, Inc., U.S. Army Aviation Center, Fort Rucker.** A student instructor was on the controls of a U-21 during IP qualification training. When he attempted to retract the landing gear after takeoff, the right main gear remained down, and the gear handle light and audio warning came on. Attempts to recycle the landing gear were unsuccessful. The crew decided to return to the airfield, where tower personnel reported the right main landing gear appeared to be down. Further attempts at recycling were unsuccessful, and the crew of another aircraft verified the gear had failed to retract. Mr. Schmidt attempted to lock the gear in place by making a touch-and-go landing, lightly tapping the right brake upon touchdown. The attempt failed. After remaining in the air for about 2 ½ hours to use up fuel, Mr. Schmidt decided to attempt a landing on a foamed runway. He manually extended the landing gear and began a normal full-flap approach. The U-21 touched down at about the 1,000-foot marker and rolled straight down the runway with Mr. Schmidt making maximum use of the controls to keep the right wing level. As airspeed dissipated, and the controls became less effective, the right gear collapsed. Mr. Schmidt used reverse thrust to keep the aircraft on the runway until he could bring it to a complete stop. There was minimal damage to the aircraft.

• **CW2 Scott T. Cochran, C Company, 1st Battalion, 212th Aviation Regiment, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker.** CW2 Cochran was conducting low-level terrain flight training in a UH-1H. The aircraft was about 50 feet agl when the student pilot, who was on the controls, noticed feedback in the cyclic. When it happened again, CW2 Cochran got on the controls with the student. The cyclic continued to surge, and CW2 Cochran took the controls and began looking for a suitable place to land. As he started a shallow left turn in preparation for a precautionary landing, the aircraft experienced a cyclic hardover. The Huey's nose pitched up, and the aircraft rolled right. CW2 Cochran told the student pilot to get on the controls with him. It took both pilots to keep the cyclic in the center flight position. Once the aircraft was in a near-level attitude, CW2 Cochran held the cyclic with his knees while the student pilot switched the hydraulic controls off, but there was no change in the hardover situation or easing of pressure. As the aircraft continued to pitch nose up and roll right, CW2 Cochran told the student to again assist with the cyclic while he reduced collective to try to keep the aircraft at 500 feet mean sea level. With the hydraulics off and continued stiffness in the cyclic, collective, and pedals both pilots were beginning to experience muscle cramps in their arms, shoulders, and backs. There was still no suitable place to land and the crew continued to fly for about 30 minutes to reach a tactical field. CW2 Cochran made numerous applications of collective during final approach to keep the aircraft from gaining altitude because of the forces still being exerted to the right rear quadrant of the cyclic. The forces applied to the cyclic by the rotor system caused the aircraft to touch down right-skid-low and slightly nose high. When the collective was placed in the full-down position, the aircraft began oscillating, but when collective pitch was sufficiently reduced, the oscillation stopped. The UH-1 came to a complete stop with no damage to the aircraft or injury to the four people on board. □

FY 88 Class A Mishaps through 4 May

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	0	3	0
	June	5		13	
4th Qtr	July	2		5	
	August	5		1	
	September	3		0	
	Total	38	14	39	29

FLIGHTFAX

ACCIDENT REVIEW

OH-58 hits slope during landing attempt

The unit was training hard to make up for a period of bad weather that had forced cancellation of flight training activities. On the second day of a scheduled 2-week field training exercise, one of the aircraft, an OH-58, developed communication problems. The pilot was told to return the aircraft to the unit's home station, about 20 miles away, for maintenance. He was also told to return to the field training site before dark if he could. The aircraft, with the pilot and a crew chief on board, landed at the home station at 1550.

By the time the radios were fixed and the pilot was ready to take off on the return flight it was 1740, 34 minutes past official sundown. It was still light, however, and weather didn't appear to be a problem, although the aircraft did fly through a snow shower during its return to the training area. It was 1755 when the pilot began an approach over a large, open, snow-covered field to the unlighted landing zone. The OH-58 was flying at about 30 KIAS when it struck a small rise in the terrain. The occupants were uninjured, but the aircraft was destroyed.

The pilot thought he still had about 30 feet of altitude when the aircraft suddenly struck the rising terrain. The absence of any visual cues made the field of snow over which the approach was made look level. The shallow angle of approach (less than 10 degrees) added to the pilot's

problems because his intended landing area near a far treeline was not seen in the right perspective. The knoll on which the aircraft impacted looked like it was at the base of the treeline. Instead it was about 40 feet higher than it appeared to be and about 150 meters short of the intended landing point. The knoll wasn't discernible because of the vast field of snow and the low ambient light conditions that made it blend in with the surrounding area.

Although the light was still good when the aircraft took off, by the time it reached the training area, it was dusk. During the approach, the pilot could see the woodline. He could even see wires stretched between poles south of the training area. Once he got over the field, however, there were no shadows or ground references to be seen, only the vast expanse of white.

The pilot in this aircraft had 1,357 rotary wing hours; 1,123 of them in OH-58s. He was familiar with the area and had made as many as 30 approaches into the area where the accident happened, but this time he made some mistakes—

- Although it was light when he took off on the return flight, he took a chance that the light would last until he arrived at the training area. While he had been told to get back before dark, if possible, there was nothing urgent about his return.
- Unit standing operating procedures required a lighted tactical landing area, and pilots had been briefed on field lighting requirements. This pilot had not informed anyone of his intention to return that evening, however, and no flights were expected. Although a tactical "Y" was available, it was not lighted, and this deprived the pilot of a much-needed visual cue.
- He thought he could see well enough to land, but the diminishing light and lack of visual cues in the snow-covered field made him fail to perceive rising ground that lay between the aircraft and his intended landing point.

A steeper approach would probably have given the pilot a better perspective of his intended landing area, and he might have realized the knoll was there in time to prevent the accident. □

Spectacle lens study underway

During CY 88, the Army will be studying use of polycarbonate lenses for eyeglasses. Aviators—active duty status, National Guard, and Army Reserve—will participate in a test to evaluate use of the new material. The study will be conducted by the Optical Fabrication Laboratory, Fitzsimmons Army Medical Center.

Aviators who fly regularly and wear glasses are requested to report to their optometry clinic sometime during June or July 1988 to order glasses with polycarbonate lenses. Aviators who have a current prescription can have glasses ordered without a doctor's appointment. If a new prescription is necessary, an appointment should be made for a complete optometric examination. In order to minimize bottlenecks, aviation safety officers are asked to encourage aviators in their units to order the glasses as soon as possible.

Each participating aviator will receive a letter of instruction with one pair of glasses (clear lenses only). These glasses are in addition to the standard authorized number of glasses issued to aviators. After 6 months of wear, participants will be asked to complete a questionnaire and return it with the glasses to the Optical Fabrication Laboratory.

The only special instructions for use of test glasses are that they be worn whenever night vision goggles are used, and they should be cleaned by washing rather than being wiped clean while dry. Other than that, the test glasses should be worn and cared for just as any other clear-lensed glasses would be. If, at any time, the test glasses become unserviceable, they should be returned to the optometry clinic for replacement. All glasses, regardless of their condition, must be returned to the Optical Fabrication Laboratory at the end of the 6-month test period.

Points of contact at the Optical Fabrication Laboratory, Fitzsimmons Army Medical Center, are MSG Thibodeau and Mr. Johnson, AUTOVON 943-8158/8725, commercial 303-361-8158/8725. □

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A

H series - Twenty-minute fuel caution light came on while crew was attempting to reach refueling point. Fuel gauge showed about 250 pounds of fuel remaining, and flight continued for about 15 minutes. Before suitable landing area could be found, engine quit. Aircraft autorotated to a field, hit hard, and rolled onto its left side. 8813

UH-1 Class D

H series - During postflight, evidence of tree strike was found on tail boom and tail rotor.

UH-1 Class D

H series - Aircraft picked up 1,800-pound concrete culvert and ascended to 1,257 feet agl. With full left pedal applied, aircraft began slow, uncommanded lateral drift and banked right. PIC jettisoned load, which disintegrated on impact. Gusty and variable winds induced loss of tail rotor effectiveness.

UH-1 Class E

H series - When aircraft encountered downdraft during final approach, copilot pulled too much collective pitch, causing engine to overtorque.

UH-60 Class A

A series - Flight of three aircraft with crews under NVGs was inbound to drop off passengers.

Another aircraft approached on a perpendicular path to the formation and struck the lead aircraft. All personnel on both aircraft were killed. 8814

Attack helicopters

AH-1 Class B

F series - IP made an approach to snow-covered field and thought he was landing on level ground. When he realized the aircraft was rotating left around its left skid, the IP applied right cyclic. Thinking he had overcorrected, the IP attempted to take off. During takeoff, aircraft crashed into trees. 8815

AH-1 Class C

S series - During postflight inspection, PIC found damage to tail rotor vertical fin and tail stinger. Crew had noticed flying debris during terrain flight operations but did not know when damage occurred.

AH-1 Class C

F series - Aircraft was at 100 KIAS, 100 feet agl. IP reduced throttle and announced simulated engine failure. The pilot applied aft cyclic and lowered collective. Autorotation progressed normally until the pilot decelerated aircraft. The pilot failed to make collective input to maintain rotor rpm, and IP was late with corrective action.

AH-1 Class D

F series - While concentrating on firing during gunnery training, crew was unaware aircraft was drifting rearward. When aircraft descended rapidly to remask, tail rotor struck a large bush.

AH-1 Class D

F series - Aircraft was trail in flight of two. After about 14 minutes of contour flight, both aircraft began a right turn toward objective. At beginning of turn, trail aircraft was about 20 feet above the highest object over rolling terrain. During turn, aircraft descended slightly and struck trees on crest of hill.

Cargo helicopters

CH-47 Class A

D series - While aircraft was in cruise flight, a pop was heard, followed by a loud bang. Witnesses reported hearing a grinding noise, and another witness reported a fire in the rear of the aircraft. Smoke filled the cabin and cockpit and an emergency descent was initiated. The aircraft was totally destroyed by impact forces and inflight/postcrash fire. Ten people were killed. Investigation is ongoing. 8816

CH-47 Class B

C series - Type IV connector link failed during slingload operation. M101A1 howitzer was dropped and destroyed. 8817

Observation helicopters

OH-58 Class A

A series - Crew was conducting aeroscout observer training when aircraft crashed in wooded area. Pilot was killed and observer was seriously injured. 8818

OH-58 Class D

A series - Aircraft was on final when pilot's attention was diverted, and aircraft struck a tree. Chin bubble was broken.

OH-58 Class E

A series - PIC failed to take into account turbulence created by takeoff of two preceding aircraft. During attempted takeoff, aircraft assumed a nose-down condition and pivoted about the toes of the skids. Application of aft cyclic did not stop pivot, and lower wire cutter dug into the ground. After dragging for about 5 feet, the aircraft broke free, climbed to 10 feet, and made an uneventful landing.

Fixed wing

OV-1 Class B

D series - During hard landing, right main gear unlocked and partially collapsed. 8819

U-21 Class C

A series - Aircraft touched down on runway covered with packed snow and ice. There was a quartering left crosswind of 6 to 10 knots, and during landing roll, aircraft started to drift and slide to the right. Efforts to maintain control with crosswind control inputs were ineffective. As aircraft slid off the runway, pilot applied full reverse, but aircraft slid through a low mound of snow and continued another 150 feet before stopping.

Maintenance

AH-1 Class E

F series - During cruise flight, master caution and transmission oil hot lights came on. Before crew could land, temperature reached 115° C. Quick disconnect oil line to cooler was not properly seated, and oil flow was restricted.

UH-1 Class E

H series - Aircraft was being run up for compass swing following engine flush. As throttle was rolled through 5000 rpm, crew heard three loud, sharp reports and aircraft rocked. Fuel lines to variable inlet guide vane (VIGV) actuator were reversed, causing VIGVs to remain closed during runup and resulting in compressor stall.

OH-58 Class E

A series - During maintenance test flight at 700 feet agl, 80 KIAS, pilot noticed cyclic was stiff in right quadrant. He was unable to move cyclic in the aft and right-of-center positions. Pilot made uneventful running landing. Rigging bolt had been left in place after cyclic was rigged. The bolt jammed the cyclic control, preventing aft and right movement.

Safety messages

- Maintenance information message concerning local purchase practices affecting all U.S. Army-owned and -operated aircraft (GEN-MIM-88-01, 302200Z Mar 88).
- Maintenance information message concerning H-60 series operators manuals and checklists (UH-60-MIM-88-03, 302300Z Mar 88).

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

Followup information on accidents previously reported

UH-1 Class A

Reported in 20 May 87 issue as 8734 - Aircraft was on final approach for landing to a mountaintop pinnacle at 12,300 feet msl. As the aircraft approached the edge of the pinnacle, at 5 to 10 KIAS, it began an uncommanded spin to the right. The pilot applied right cyclic, neutralized the tail rotor pedals, and reduced collective in an attempt to fly out of the spin. The unit trainer took the controls, applied left pedal, and reduced collective, but the aircraft assumed a nose-low attitude and continued to spin. The aircraft's main rotor blades, followed by the fuselage, struck the side of the mountain about 100 feet below the crest of the pinnacle. The mast separated below the main rotor hub, and the hub and blades were torn away from the aircraft. The aircraft rolled 1,000 feet down the slope and came to rest on its left side, almost inverted. The four crewmembers were injured, and the aircraft was consumed by a postcrash fire.

UH-1 Class A

Reported in 10 Jun 87 issue as 8739 - During takeoff, as the aircraft approached effective translational lift, at about 30 feet agl, the low rpm audio and warning light came on. Engine rpm was seen decreasing through 6200. The PIC took the controls from the copilot and maneuvered the aircraft downslope for more than one-half mile. During this time, he checked to see that the throttle was fully open and increased the linear actuator. Finally, after taking the slack out of the throttle, he placed the governor in the emergency mode. Engine rpm decreased from 5800, and the aircraft struck rocks, rupturing the fuel cells. The aircraft rolled onto its left side. The fuel ignited, and fire flashed through the passenger compartment. Two passengers died as a result of the accident. Two other passengers and the crew chief were critically injured.

AH-1 Class A

Reported in 6 May 87 issue as 8731 - The aircraft had been engaged in aerial gunnery training. After departure from the forward area rearm/refuel point, the aircraft began losing altitude, but the descent stopped when the PIC applied 101-percent torque. The PIC conducted an out-of-ground-effect hover check and determined he had aircraft control. Later, when the PIC slowed the AH-1 to remain in position behind the lead aircraft, he again began losing altitude. As the aircraft approached a treeline, the PIC applied power to climb over the trees and again experienced a loss of altitude. The main rotor struck a 55-foot pine tree and the aircraft fell about 35 feet through trees to a dirt road. The two crewmembers were injured.

CH-47 Class A

Reported in 20 May 87 issue as 8736 - Aircraft was in cruise flight during a ferry mission when No. 2 generator light came on. As the PIC was attempting to reset the generator, the crew chief reported the aircraft was on fire. There was an immediate explosion, and smoke and flames were blown from the rear of the aircraft through the cabin and into the cockpit. The aircraft was over a heavily wooded area and had to be flown 2 miles to a clearing before an emergency landing could be made. The aircraft came to rest upright but was destroyed by fire. The aircraft fire resulted when a component of the hydraulic system failed. The failure atomized hydraulic fluid in the vicinity of the accessory gearbox. The source of ignition was probably the No. 2 generator. A passenger was killed when he fell from the aircraft while it was still at 400 feet agl. The three crewmembers were injured by the onboard fire.

OH-58 Class A

Reported in 4 Mar 87 issue as 8722 - Aircraft was on an NVG tactical training mission. While flying at 400 feet agl, at about 60 KIAS, the aircraft experienced a power loss that activated the low rotor rpm light and audio. The pilot immediately entered an autorotational descent. During the power-off autorotative descent to an open field, the pilot decelerated at too high an altitude, resulting in a high rate of vertical descent. He allowed the aircraft to descend too near the ground before initiating pitch pull, and it was not sufficient to arrest the rate of descent. The aircraft impacted the ground and bounced back into the air in a right roll and nose-low attitude. The main rotor struck the ground, tearing the transmission loose from the fuselage. The fuselage came to rest on its left side. The two crewmembers received minor injuries.

OH-58 Class B

Reported in 8 Jul 87 issue as 8744 - While conducting a tactical command and control mission under contour flight conditions, the copilot entered into a right turn at 50 to 60 KIAS, 50 feet agl. While recovering from the turn, the aircraft engine failed to adequately respond to collective input, and the aircraft continued to descend until it hit the ground. The main rotor struck a sand dune on the left side of the aircraft, severing the mast below the main rotor hub. □

U.S. ARMY SAFETY CENTER

Report of Army aircraft mishaps published by the U.S. Army Safety Center, Fort Rucker, AL 36362-5363. AUTOVON 558-2062. Information is for accident prevention purposes

USASC flight surgeon named aerospace medicine specialist of year

MAJ (Dr.) Jerry W. Hope, flight surgeon for the Army Safety Center, has been selected as the U.S. Army Aerospace Medicine Specialist for 1988 by the Society of U.S. Army Flight Surgeons.

Dr. Hope supports both USASC accident investigation teams and flight surgeons throughout the Army by lending his technical medical expertise to determining the circumstances and causes of accidents. He also devotes a great deal of his time and effort to accident prevention.

MAJ (Dr.) Jerry W. Hope, flight surgeon for the Army Safety Center, examines a patient.

Photo by SP4 Frank T. Sullivan, Fort Rucker *Army Flier*

In addition to assisting flight surgeons in the field by furnishing visual aids and information on the medical aspects of safety for safety standdowns, meetings, and so forth, Dr. Hope lectures to National Guard and Reserve units on weekends. He devotes as many as 60 hours a month to teaching in the various safety courses conducted by the Army Safety Center and in the Army Flight Surgeon Course at Fort Rucker. He is also a regular contributor to a professional newsletter for Army flight surgeons.

Not all of Dr. Hope's 21-year military career has been served in the medical field. After enlisting in the Army and completing the Officer Candidate Course, he received his commission in the Engineer Branch. He served in Vietnam before completing flight school and returning to Vietnam for a second tour of duty during which he received the Distinguished Flying Cross. He received his medical degree in 1982, earned a master's degree in public health, and completed his residency at Brooks Air Force Base in Texas.

Soldier, doctor, aviator, Dr. Hope's contributions to the Army, to medicine, to aviation, and to safety have been recognized by those who know him best—his professional peers. □

Distribution of Flightfax

Beginning with this issue, Flightfax will be distributed only to Department of Defense units and organizations, other Federal agencies, and safety organizations of Allied nations. □

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FORT RUCKER, AL 36362-5000

Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 19 1 June 1988

Months ahead call for increased safety effort

FY 88 Class A accident update

The first 7 months

Seven months into this year, we had recorded 14 Class A aircraft accidents while flying about 965,000 hours—just over half the year's total flying hour program. This was 4 accidents below the same period last year and 6 below the same 7 months in FY 86, the best aviation safety year ever recorded. We ended the month of April with a Class A rate of 1.45.

The month of May

We had 7 Class A accidents during the month of May. Our investigations revealed no common thread running through these accidents. They involved virtually all types of rotary wing aircraft and a variety of unrelated causes.

- The crew of a UH-1, flying low level, crossed a ridge and began a descent to maintain low-level flight. Winds were strong and gusty, and when the pilot tried to level off, he did not have sufficient power to stop the descent. The aircraft crashed.
- During an NOE training flight at 100 feet agl, the pilot of an AH-1 made a steep bank into the sun and lost outside visual reference in the glare. The aircraft crashed into trees.

In this issue:

Summer training and NVG flying

EMI effects on Black Hawk

Beware of blowing dust during summer operations

The importance of performance planning

FY 88 Class A accident update

• Another AH-1 crashed during a high-speed dive. No materiel problems have been discovered. It appears the pilot was late in pulling out of the dive.

• An OH-58 crew was on a night vision goggles training mission. The pilots, trying to locate targets for another aircraft, were unaware their aircraft was descending. The aircraft hit the ground and rolled over.

• A UH-1 was hoisting a rubber raft during a mission over water. The raft swung and arched toward the main rotor blades. As the pilot was making evasive maneuvers, the tail rotor hit the water. The UH-1 sank in 75 feet of water.

• The rockets of an AH-1 were fired while the aircraft was at a high hover. The AH-1 spun right, and tail rotor effectiveness was lost. When the tail rotor abruptly regained effectiveness, the drive shaft failed and the aircraft crashed.

• The cause of an in-flight breakup of an OH-6 is still being investigated. Evidence indicates the engine was not running at impact.

At the end of May, we had recorded 21 accidents for the first 8 months of this year, compared to 23 for the same period last year.

While the number of Class A accidents so far this year—particularly during the month of May—is a matter of serious concern, it is important to keep this year's record in perspective. The sharp increase in the number of Class A accidents in the month of May, while cause for concern, is not an indication of an overall upward trend, nor do the causes of these accidents indicate an Armywide operational or aircraft system problem.

What we have had is a series of accidents that happened to cluster in one month.

The months ahead

With 4 months of peak flying exposure ahead, the current Class A accident record calls for action, not alarm, at this point in time. Over the next 4 months, we will fly almost 40 percent of the total year's flying hours. The increased demands placed on aircrews and aircraft during these summer training months must be met with a corresponding increase in smart, disciplined operations.

A major effort is required in the weeks and months ahead by commanders and pilots.

Commanders must be directly involved in day-to-day unit operations. **Enforcement** of regulations, SOPs, and other directives is mandatory to ensure safe performance. **Unit training** programs must fully qualify every pilot in the type mission he will be flying and the environment in which he will operate. Careful attention to **crew selection** is essential.

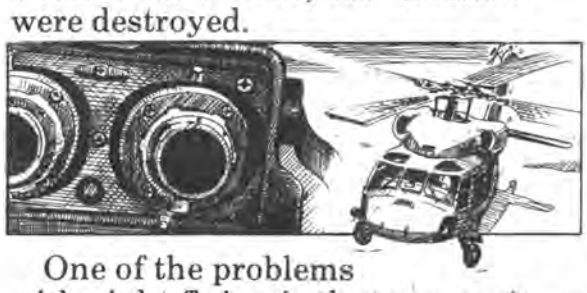
Pilots are the basic element in aircraft accident prevention. Their role in this regard is clear. Pilots must build and maintain **proficiency** in the aircraft they are assigned; maintain sound physical and mental **fitness**; and maintain strict air **discipline** with respect to SOPs, regulations, rules, and professional ethics.

Total dedication to these basic principles will do more than any other known remedy to prevent aircraft accidents. □

Summer training and NVG flying

Weather

As dangerous as an encounter with severe weather or inadvertent IMC is during normal flight, it is much worse at night when crewmembers are flying with night vision goggles. Between June and the end of September last year, two Army aircraft encountered IMC and crashed before the crews could regain visual reference or transition to instruments. Six people on one aircraft were killed; both aircraft were destroyed.



One of the problems with night flying is that you can't see weather at night, and aircrews can be in it before they know it's there. However, aviators **can** do some things to minimize their chances of an inadvertent encounter with severe or adverse weather.

• Obtain a weather forecast, including winds, for the entire period of flight. Be sure the forecast includes any restrictions to visibility, such as haze or fog. Check for last-minute changes in the weather immediately before takeoff.

• Safety and control (S&C) aircraft assigned to the area in which training aircraft will be operating should make periodic weather inquiries and notify training aircraft of weather developments. If there is no S&C aircraft, aircrews should closely monitor radio weather advisories.

Fatigue

AR 95-1 provides guidelines for unit crew endurance policies, and unit SOPs should provide specific restrictions on the number of hours crews are allowed to fly with night vision goggles. However, individual aviators are responsible for ensuring that they are in peak condition for flying NVG missions.

Fatigue is made worse by high temperatures, even in aviators who are used to them. Aviators who leave a mild climate and arrive at the National Training Center where highs of 105° are not uncommon will have to become acclimatized before they can function at highest levels of performance. Probably worse is leaving a temperate climate for one where both the temperature and humidity are high.

Crew coordination

Nowhere is crew coordination more important than in NVG flight. And yet, 3 of the 4 NVG accidents that occurred last summer involved crew coordination and communication:

• A CH-47 flew into the water because the crew failed to communicate. While the aircraft was descending, no one called off altitudes to the IP, who was flying the aircraft, and he failed to recognize that the aircraft was descending below the level-off altitude of 50 feet.

• The crew of a UH-1 initiated inadvertent IMC emergency procedures by maintaining control of the aircraft and turning away from a thunderstorm while regaining visual meteorological conditions. But apparently, while their attention was directed toward regaining visual reference, the crew failed to monitor the altimeter, and the aircraft flew into a hill.

• The pilot of an AH-64 initiated a climb after encountering inadvertent IMC during an NVD flight. But while he was transitioning to instruments, the aircraft struck the ground.

There are several reasons these crews were not communicating. The CH-47 crew hadn't been trained by the unit in crew communication/coordination, and the copilot didn't perform one of his duties when he failed to warn the IP. The crewmembers of the UH-1 both had their attention on regaining visual reference, and no one was monitoring the altimeter. Vertical helicopter instrument recovery procedures do not specify what the AH-64 copilot/gunner's duties are, and both crewmembers had their attention diverted away from controlling the aircraft.

If two things had been done, these accidents might never have happened:

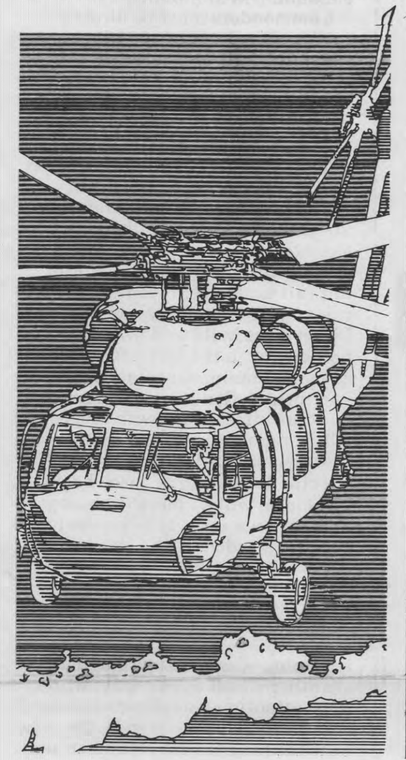
• The unit SOP on NVG missions should have specified what each crewmember was supposed to do in the event of an inadvertent encounter with IMC, and crewmembers should have been trained to perform these duties.

• The PICs should have thoroughly briefed all crewmembers and ensured that they understood what their duties were in any eventuality during the flight. □

FLIGHTFAX

EMI effects on Black Hawk

Following the recent report of unusual blinking lights by a Black Hawk pilot flying near a large array of high-intensity antennas in Germany, field tests were conducted in late April and early May. These tests deliberately exposed a UH-60 helicopter to extraordinarily high levels of electromagnetic interference (EMI); the results of which confirmed much of our earlier EMI testing.



The field tests were conducted while flying very close to a massive antenna farm with extremely high-strength EMI emissions. In addition to illuminating caution/advisory lights in the cockpit, EMI caused uncommanded yaw pedal control movements and a stiffness in pedal control, causing difficulty in moving the pedals. During the tests, the aircraft turned to the right on its own for about 5 seconds while flying near the antenna farm.

Massive EMI exposure, such as that experienced in the tests, is found in close proximity to high-intensity antenna ground locations and near large Navy ships. The tests confirmed that published antenna avoidance flight criteria for Europe provide ample separation distances from the antenna locations to ensure safe operations.

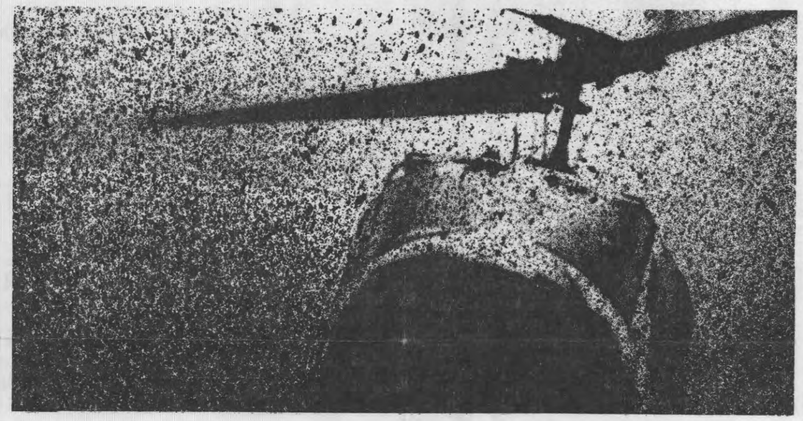
Work is under way with Navy and private industry EMI experts, as well as with Sikorsky Aircraft, to apply state-of-the-art technology to the design and test of protective shielding for the Black Hawk. However, until the fleet of aircraft can be modified, avoid flight in or around the vicinity of high-intensity radio transmission areas. For specific criteria refer to messages CDR AVSCOM (AMSAV-E), 210500Z May 88 and CDR AVSCOM (AMSAV-E), 272000Z May 88. □

Beware of blowing dust during summer operations

A sudden encounter with a blinding cloud of dust is bad at any time, but add nighttime conditions, and the situation gets worse fast.

A UH-1 was on a medevac mission at night. The copilot, who was on the controls, selected an unimproved dusty road as a landing site. While the aircraft was on short final, it became engulfed in a dust cloud caused by its rotors, and the crew lost sight of the ground. The aircraft hit several trees before coming to rest on its left side.

In another case, the crew of a UH-1 on an NVG training mission had landed to drop off a package at a desert outpost and was preparing to resume training. The IP decided to move the helicopter from the prepared helipad to facilitate an easterly takeoff. While hovering about 10 feet agl, 200 feet northwest of the helipad, the aircraft became engulfed in blowing dust caused by its own rotors. The IP lost all visual reference, and the aircraft began an uncommanded drift to the rear. The left rear skid hit the ground, and the aircraft rolled onto its left side



Slingload operations in dusty conditions can be tricky. A CH-47 was slingloading a 2 ½-ton truck when it encountered blowing dust in the landing zone, and the crew lost visual reference. The pilot jettisoned the load and flew to another area to land.

Even when landing areas have been watered down, they are rapidly dried out by the winds created by a helicopter's rotors. A CH-47 landed on a dry lake bed that had been watered down. It picked up a conex container and began an ascent. Before the aircraft reached effective translational lift, it became engulfed in a dust cloud, and the pilot lost all ground reference. Rotor rpm began to decay, and the pilot released the load.

There will be times, particularly during field training, when it is impossible to avoid dusty conditions. Landing zones that have a high volume of traffic or are located near roads heavily traveled by wheeled or tracked vehicles can quickly become hazardous to flight operations. Such areas should be avoided whenever possible. If they must be used, the following procedures also should be used.

Taxiing and takeoff

When it is necessary to taxi in sand and dust, get the aircraft airborne as quickly as possible. This is to minimize sand and dust intake by the engines and to avoid the danger of losing visual references in a cloud of dust. Taxiing over the same area repeatedly should be avoided.

A running takeoff is preferred for airplanes and wheel-equipped helicopters, while a maximum-performance takeoff is preferred for skid-equipped helicopters. If rotor blades and/or propellers stir up sand and dust, take off as rapidly as possible to avoid loss of visual reference and to prevent damage to the engine and flight control system.

Landing

The best procedure to minimize blowing sand and dust is a running landing. If the terrain does not permit a running landing, an approach to touchdown should be made. A landing should not be made to a hover.

When operation in sand cannot be avoided and a running landing is not possible, landing should be made using an approach angle that is greater than the angle used for normal approaches. The approach angle should be compatible with available power. If a running landing can be made, the touchdown roll should be kept to a minimum to prevent the possibility of overloading the landing gear. □

FY88 Class A Mishap Through 1 June

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	0	13	0
4th Qtr	July	2		5	
	August	5		1	
	September	3		0	
	Total	38	21	39	33

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D

M series - During firing of M-21 weapons subsystems, shell casings and/or links struck vertical fin or struck tail rotor blade and were deflected into vertical fin causing puncture.

UH-1 Class E

H series - Dent in leading edge of tail rotor blade was found during postflight inspection. Mount for NVG light under rear position light was cracked and lens cover was broken off. Damage was probably caused by blowing debris while aircraft was operating in confined area.

H series - After engine was started and throttle increased to 6600 rpm, pilot noticed hydraulic switch was in off position. He moved switch to on position, but the pilot, who was on the controls, did not relax pressure on the antitorque pedals. This caused the aircraft to rotate 90 degrees to the left. Full right pedal was applied and rotation stopped. Crew failed to follow procedures and omitted item on checklist.

UH-60 Class A

A series - Aircraft with crew under NVGs was hovering down runway. Another UH-60, whose crew was also under NVGs, hovered out of parking, and both aircraft made contact with each other over the runway. A small postcrash fire was extinguished by ground support personnel. 8820

UH-60 Class D

A series - IP misjudged width of taxi lane when he set aircraft down across the taxiway. Tailwheel was protruding over edge of taxiway, and aircraft settled onto tailboom.

A series - Aircraft struck unmarked pole during slope landing. Hole in stabilator was found during postflight inspection.

A series - Main rotor tip cap was damaged by tree strike. Tree blended into background terrain, and it was not seen by crew in time to avoid contact.

Attack helicopters

AH-1 Class E

F series - During approach to landing, crew heard two loud bangs from engine, and turbine gas temperature rose to 850° C. Aircraft made uneventful landing. Operating in dusty conditions caused buildup on compressor blades.

F series - Master caution and engine oil bypass lights came on during cruise flight. Caused by cracked valve in engine oil cooler compartment.

AH-64 Class D

A series - During departure from battle position, one aircraft in flight of three struck electrical wire on low hilltop. Support pole broke, IP applied collective to clear wires, and made uneventful landing. Crew was operating under pilot night vision sensor (PNVS) and did not detect rising terrain. Pilot in front seat was working with navigation equipment, and pilot in rear seat had his attention on linking up with the flight. Aircrew had not received complete wire hazard information and did not know the wire they struck was there.

AH-64 Class E

A series - During taxi for takeoff, pilot saw smoke and smelled burning odor. IP completed emergency shutdown, and crew got out of aircraft. Cause was failure of shaft-driven compressor. As pilot left aircraft, he heard droop stop pounding of the rotor system and saw the blades were close to the PNVS turret and front canopy. He got back in the aircraft, turned on the battery, and recentered the cyclic. When dc power was shut off during emergency shutdown, power to force trim system was also shut off. Rotor blades began flapping, and droop stop pounding resulted.

A series - When airspeed was reduced from 160 KIAS to 140 KIAS during flight, crew felt a sharp lateral chop through airframe and controls. Airspeed was reduced to 100 KIAS, and aircraft made uneventful landing. Droop stop liner had come free from main rotor head and had fallen down onto main mast.

Cargo helicopters

CH-47 Class C

D series - Aircraft was on short final with external load, a tandem-rigged, rough-terrain forklift, when it began an uncontrolled rate of descent of 300 to 400 fpm. Pilot applied maximum dual-engine torque in an unsuccessful attempt to arrest rate of descent. Forklift impacted on slight rise in ground in a level attitude. Pilot released load, and aircraft began immediate climb. The forklift had struck the ground with enough force to cause it to bounce and roll over, causing significant damage.

CH-47 Class D

D series - Aircraft was conducting slingload operations. While at 100 feet agl, crew heard a noise. All instruments were in normal operating range, and there were no unusual vibrations. The crew returned to the airfield where No. 3 tunnel cover was found missing. High-frequency antenna mount was broken. Tunnel cover was recovered.

CH-47 Class E

D series - IP initiated simulated engine failure using emergency trim. N1 speed decreased to 35 percent, and power turbine inlet temperature rose to 920° C in 8 seconds. Engine was shut down, and aircraft made uneventful landing.

Observation helicopters

OH-58 Class E

A series - During NOE tactical mission, copilot spotted enemy and made an abrupt evasion maneuver. As the PIC looked up from his map, he saw torque descend through 120 percent. PIC took the controls and landed.

C series - Aircraft experienced total electrical failure during NVG flight.

Fixed wing

U-8 Class E

F series - During lowering of landing gear, left main gear was slow to indicate lowered and locked. Right main gear showed in-transit, and light remained on. Recycling had no effect. Tower reported all gear appeared down. Gear were retracted, crew performed manual extension, and indicators showed all gears down and locked. When flaps were extended, pilot noticed something was wrong. Right outboard flap was not fully retracted. PIC retracted flaps and made no-flaps landing. Caused by failure of flap actuator cable.

U-21 Class D

A series - Damage to two propeller blades was found during postflight. Suspect rock was picked up from runway when aircraft landed and props were reversed.

Maintenance

UH-1 Class D

H series - During postflight, pilot noticed 42-degree gearbox cover was bent. A tool had been left under the cowling, causing damage to gearbox and clamps.

UH-1 Class E

During preflight the day after a 25-hour inspection, crew found 90-degree gearbox filler cap had been removed and two screws were missing from synchronized elevator access plate. Remaining screws were loose.

OH-58 Class E

C series - While performing autorotational rpm check, power recovery was attempted at 100 feet agl. The throttle could not be increased or decreased. The pilot declared an emergency and made an autorotational descent and landing. Incident was caused by improperly positioned engine gearbox vent hose. When the throttle was retarded to idle to perform autorotational rpm check, bolt head at top of throttle push-pull tube at fuel control caught on the vent line, and the throttle could not be moved either way.

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

Distribution of Flightfax

Beginning with the 4 May 1988 issue, *Flightfax* will be distributed only to Department of Defense units and organizations, other Federal agencies, and safety organizations of Allied nations. □

U.S. ARMY SAFETY CENTER

Report of Army aircraft mishaps published by the U.S. Army Safety Center, Fort Rucker, AL 36362-5363. AUTOVON 558-2062. Information is

The importance of performance planning

During the next few months of increased training tempo and higher summer temperatures, it is particularly important not only that aviators religiously and accurately complete performance planning data but that they fully understand what the data is telling them.

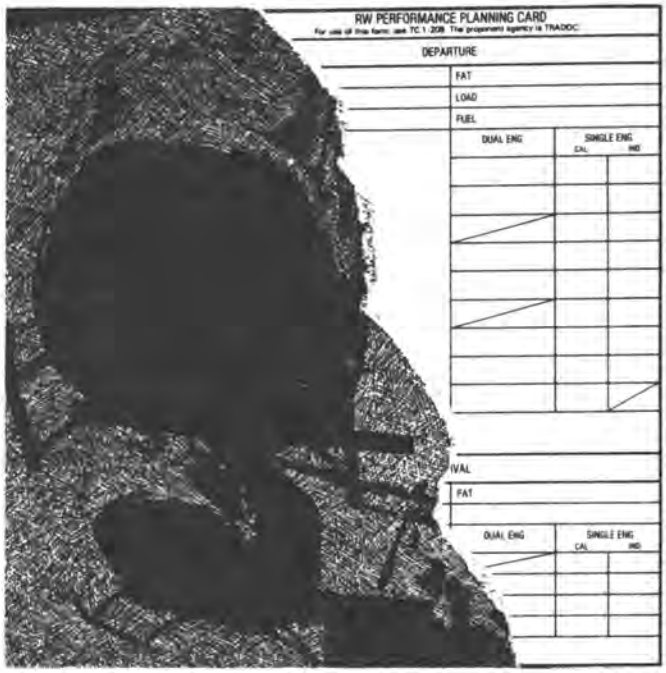
Even when performance planning has been conducted, unless the crew fully understands what the data is telling them, they can easily get into a situation where they are demanding more from the aircraft than it is capable of performing.

A UH-1 at a gross weight of 8,300 pounds was carrying three crewmembers and five soldiers when the copilot attempted to take off from a hover in mountainous terrain. The aircraft was about 30 feet agl and just about to enter effective translational lift when the engine and rotor rpm began decreasing. The pilot took the controls and flew downslope for about one-half mile in an attempt to regain rpm. But rpm continued to drop, and the aircraft crashed.

Aviators cannot take for granted the capability of the aircraft to perform, even when flying missions that have been routinely accomplished by themselves or by another aircrew.

Another UH-1 with a crew of 4 and 1,200 pounds of fuel on board made an uneventful flight into an LZ. Nine soldiers equipped with rucksacks came on board, and the PIC attempted to take off. The aircraft rose about 2 feet, and engine and rotor rpm began to decay. Large rocks near the tail rotor prevented the pilot from landing, and he applied left forward cyclic and flew off the pinnacle. Engine and rotor rpm continued to decay. After five of the soldiers' rucksacks and water jugs were thrown out, engine and rotor rpm were recovered, and the aircraft was flown to a landing site in the valley.

This pilot was trained and experienced in mountain flying and pinnacle



operations. He was also trained to use hover OGE power requirements for pinnacle and ridgeline operations. For this flight, however, he figured in-ground-effect hover power because other pilots had flown the same mission the day before with no problems.

Accident reports often contain references to failure to conduct performance planning or inaccurate performance planning even though they did not directly contribute to these accidents. For example: "He did not compute a new performance planning card because temperature, pressure altitude, and weight were similar to the previous day's conditions," or "He used an 'on-file' weight and balance form that did not accurately duplicate the weight and balance of the aircraft at the time of the accident."

Where performance planning is concerned, "close enough" isn't good enough. It must be done carefully and accurately, and it must take into consideration any changes that might be encountered from initial takeoff to final landing. □

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Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 20 15 June 1988

Safety officer receives McClellan Award

CW2 Gary D. Braman, S Troop, 4th Squadron, 11th Armored Cavalry Regiment, has been awarded the James H. McClellan Aviation Safety Award for his work as troop aviation safety officer. The McClellan award is presented annually by the Army Aviation Association of America (AAAA) to a person who has made an outstanding individual contribution to Army aviation safety in the previous year. The award was presented in April 1988 at the AAAA national convention in St. Louis, MO.

We asked CW2 Braman to share some of his experiences from the perspective of an aviation safety officer. This issue of Flightfax is the result of that request. □

"These pilots do it by the book."

Pilots assigned to the 4th Squadron, 11th Armored Cavalry Regiment, fly about 17,000 hours in an average year, and S Troop has racked up more than 7,000 hours without a single Class A, B, or C aviation accident. The troops on the ground have set their own impressive record by driving 25,000 miles since September 1985 without an Army motor vehicle accident. These kinds of records don't happen by chance; they come from hard, dedicated effort on the part of a lot of people. We had an opportunity to talk to one of those people, CW2 Gary D. Braman, aviation safety officer (ASO) of S Troop. We wanted to know the reasons for the troop's outstanding safety record.

S Troop is a tactical unit operating on the border between East and West Germany. Pilots of the 21 UH-1 and EH-1 aircraft assigned to the troop are primarily engaged in border surveillance, but in the event enemy troops crossed the border, this unit would become part of the forces that would have to stop them. Because of its importance to the defense of Western Europe, this area is frequently visited by U.S. and Allied government officials as well as high-ranking military leaders. This kind of visibility, combined with the types of missions flown, large number of flying hours, and some of the worst weather in the world, creates a stressful and potentially dangerous flying environment. In spite of all this, last year S Troop pilots flew around 3,600 hours with only one Class D mishap.

Braman attributes this to the professionalism of the aircrews and ground support personnel who make up this tactical unit. "These pilots do it by the book." If something starts to go wrong and the dash 10 says put it on the ground, then we put it on the ground. That means there are a lot of times we have to go out and recover aircraft, but these pilots are too smart and too experienced to wait until things start to snowball before they do something.

"Occasionally, a pilot may make a bad decision, such as the one who detected vibration in the main rotor system while flying on the border. He flew about 10 miles back to the airfield instead of landing immediately. I heard about it, but I waited to see if he would come to me, and he did. I asked him if he had learned anything and he said, 'Yeah, and I'll tell you something, I'll never do it again.' Enough said. But if this guy's name had come up again and it looked like things were happening over and over, I would've talked to the IPs to see if we had a problem. You try to get things straight yourself first, and then if you still have a problem, it's time to get the chain of command involved. But that doesn't often happen."

Braman cites several reasons aviators in S Troop are safe pilots.

Training

As difficult and stressful as the flying is in this unit, aviators get a lot of quality training. They do a lot of things besides hauling people and equipment. They perform slingload missions, rappelling, paradrops, and fly a lot of night missions, both with and without night vision goggles. This is a 7-day-a-week, 365-day-a-year outfit, too, where field training is just a normal way of life. For example, this summer the unit will participate in 5 weeks of gunnery training followed by a 3-week REFORGER, with no break in between.

Following standards

The reason these pilots can fly so many hours under such conditions and still set safety records is that they are self-disciplined, and they follow the standards. Braman says, "Flying by the book is instilled into the PICs, who then instill it into their copilots, and it spreads from there. As new aviators come in, the old copilots, who are now the PICs, teach the new guys so the process continues. Following standards is just the way we do business in this unit."

Self-discipline

Not only do S Troop aviators follow the standards, they make sure everybody else does too. Braman says that occasionally someone in the unit will come to him because they saw somebody doing something that wasn't by the book, something that could cause somebody to get hurt. The scenario goes like this, "Hey, Mr. Safety Officer, there's a guy doing this out there; how about taking care of it?"

Braman says he doesn't buy that. "In this unit, everybody is a safety officer." He asks if they made an on-the-spot correction and if they didn't, why not?

"Sure, it takes some backbone to speak up to somebody like a PIC, especially if the PIC outranks you, but you have to make a habit of speaking up when something looks wrong or just doesn't feel right. If you're wrong, you may feel stupid, but you'll be alive. The cockpit is no place to be timid."

Crew integration

Because of S Troop's stressful environment, careful attention is given to crew integration. A weak pilot or a pilot with problems that aren't severe enough to ground him is paired with a strong PIC. New aviators in the unit, some of them right out of flight school, are teamed up with more experienced pilots until they develop the kind of sixth sense about their flying that comes only with experience.

Braman keeps a close check on mission sheets to be sure that in their zeal for flying, these pilots don't go beyond their limits, especially in regard to crew endurance. "These guys like to fly, and they would fly 12 hours a day if you let them," he says. "Flying is dangerous, flying can kill you, and if you don't do it right and you don't do it by the book, if you exceed your limitations and an emergency comes up when your reactions are a little slow, it's going to eat your lunch for you. But that's a learning process; it comes with experience. That gets us right back to following the standards; if the older pilots fly that way, more than likely the new guy is going to fly that way."

Communication

Safety meetings in S Troop are not fault-finding sessions; they are used to share information and experiences that will make safer aviators. For example, an aviator may know all the steps in the emergency procedures found in the dash 10, but when it comes to an encounter with an actual emergency, that isn't enough.

FLIGHTFAX

"These pilots do it by the book."

No matter how well an aviator knows the steps in the book, he's going to have to know more if he's going to survive and keep the aircraft in one piece. That's where the discussions that take place during the safety meetings can make a difference.

Accounts of accidents from *Flightfax* and other safety publications are used to get things started—this is what happened, this is what the pilot did; what would you have done? If somebody says something that isn't right, the IPs and the safety officer are there to get things back on track. But nobody's throwing rocks; it's just a learning process. This kind of learning goes far beyond what the book says. It's as near the real thing as anybody can get without actually experiencing the emergency in the cockpit. And it's aviators talking to each other—not some instructor or safety guy.

Good PIC program

Another thing that makes S Troop pilots safer pilots is a good PIC program. A PIC has to be recommended by a platoon leader and a platoon IP and then go through a series of day contact rides, a day VFR checkride, nighttime flight, and instruments. Then he is tested on the missions. In addition, the safety officer talks with other PICs who have flown with him to learn what kind of judgment he displays. Note is also taken of the standards he sets in military appearance, personal conduct, and how he does his job. The program is designed to ensure that only the best pilots are selected as PICs.

Command support

Braman recognizes that he couldn't have done much without the backing of his chain of command. "I've been lucky as a safety officer. There has never been a time that I did not have solid support from the commander. That doesn't mean he's going to do your job for you. But you have to have his support because if you want to do anything that is the least bit innovative or different, you can't do it without the commander. I was given pretty much free rein to run

the program and the leeway to do things to get people thinking and talking about safety.

"Incidentally, in J series TOE units, and that's what S Troop is, you sometimes have commanders—captains or first lieutenants—who are coming into their first aviation assignment after flight school. It's the responsibility of the senior warrants—the safety officers and the IPs—to show these commanders how safety needs to be integrated into everything the unit does.

Safety councils

Braman is assigned to S Troop as the aviation safety officer, but his work goes far beyond the duties normally associated with that job. He is also involved in the safety programs for ground support people and even in family safety. One of the methods he uses to keep the different parts of the safety program moving smoothly is through use of safety councils.

Under the J series TOE, safety meetings and safety councils (officer and enlisted) formerly required at troop unit level have been elevated to squadron level. While Braman works in close concert with the squadron safety officer, he felt there was a need for safety meetings and safety councils at the unit level. He began a combined safety council that, out of a 60-person unit, involves 15 to 20 people, enlisted and officer.

The council meets once each quarter, just before the quarterly squadron safety council. After a topic is discussed and recommendations have been made, an action officer or NCO is assigned to follow through. Braman believes that this kind of accountability is the reason S Troop's safety council is effective.

Awards and recognition

Braman is a firm believer in the value of awards, and he has established a unique program for recognizing quality performance by all members of S Troop. "If a guy gets 500 or 1,000 hours of accident-free flying, or an IP puts in 1,500 hours without an accident, we make a big thing out of it. The squadron commander presents the awards or certificates, and we take pictures, and it's a big deal. People in other units see what we're doing and start putting pressure on their safety officers, 'How come we're not getting recognition like those guys over there?' so it spreads. And it isn't all hype either. When a guy flies 1,200 hours in his 3-year tour in a place like this without breaking an airplane, he's really done something worth recognizing. We do the same kind of thing for our ground people too.

"Another thing, you don't necessarily have to give a plaque or certificate. If a guy has done a good job and you call him up in front of his peers and tell them about it, it means a lot.

"I guess if I tried to sum up what I think we've done in S Troop—and I do mean **we** because I haven't done anything by myself—that might be useful to somebody else, it would be 'do it by the book and use good common sense and sound judgment, and you'll do fine.'" □

FY88 Class A Mishaps through 15 June

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	2	13	4
4th Qtr	July	2		5	
	August	5		1	
	September	3		0	
	Total	38	23	39	37

Who was that guy in the red cape?

When Safety Man, clad in blue tights and red cape and sporting a pilot's skull cap topped with a spinning propeller, swoops into a safety meeting or shows up at a troop formation, the first reaction may be, "What in the h— is that?" But you don't forget him or the safety awards he presents to aviators for racking up hundreds of hours of flight time in some of the worst flying conditions found anywhere in the world—and doing it without an accident. Or the recipient may be a soldier who regularly has to tear down a forward area refueling point, pack up, drive a heavy truck loaded with equipment to the next POL site, and be back in business by the time the first helicopter arrives for refueling the next day.

Safety Man, who bears an uncanny resemblance to the S Troop safety officer, may be a little humorous, but there's nothing funny about the safety efforts represented by the awards he hands out. The people in S Troop operate right on the border between East and West Germany, and they're deadly serious about what they do and how they do it. The fact that they do it well is attested to by their outstanding safety record—in the air and on the ground. □

MISHAP BRIEFS Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C

H series - During straight and level flight at 500 feet agl, torque was set at 37 pounds. After about 5 minutes, collective began slowly creeping upward, and torque reached 75 pounds before crew reacted. Torque exceeded 50 pounds for about 5 seconds. Crew was talking on radio to flight service station.

UH-1 Class E

H series - Crew chief left pilot's door open. Rotorwash from a hovering aircraft blew door shut, and plexiglass in vertical slider was broken.

A series - During deceleration for landing, tail wheel and stabilator struck the ground. Trailing edge of stabilator was damaged.

Attack helicopters

AH-1 Class C

F series - Aircraft was chalk 2 in flight of two AH-1s. While engaged in tactical scenario, aircraft struck a tree.

AH-1 Class D

E series - During flight, gunner was using telescopic sight unit while engaging enemy. Pilot had attention focused on left side of aircraft and allowed right side of aircraft to contact a tree.

AH-1 Class D

F series - While maneuvering to avoid MILES engagement, pilot misjudged clearance, and aircraft main rotor blade struck a tree.

Cargo helicopters

CH-47 Class D

D series - Aircraft was transporting a 10,000-gallon collapsible fabric tank on a tandem sling. During flight at 80 KIAS, hard points on the tank broke, and tank fell. Neither aircrew nor riggers were aware of 35 knots airspeed restriction when load is rigged in this manner.

C series - Aircraft was hovering about 4 feet above water during drone recovery. Drone's tail contacted bottom of aircraft causing a 6-inch gash in sheet metal.

Observation helicopters

OH-6 Class E

A series - During approach, SIP gave pilot forced landing 100 feet above minimum descent altitude. Engine failed. Aircraft was autorotated to runway.

A series - After enroute refueling, flight of 3 OH-6s took off without updated weather briefing. When weather deteriorated, flight tried to continue under estimated 200- to 300-foot ceilings but had to land in open field. After several minutes on the ground, AMC directed that another attempt would be made, and flight again took off. Ceiling continued to lower, forcing flight down to NOE altitude. No. 2 aircraft lost sight of lead and turned left to land in an open area. No. 3 aircraft lost sight of No. 2 and landed in the same area. Lead aircraft continued flight for about 2 miles before it, too, was forced to land.

OH-58 Class C

A series - During contour flight at 60 KIAS, 60 feet agl, aircraft struck a .5-inch-diameter wire at a near-perpendicular angle. The wire was suspended between two poles about 200 meters apart.

A series - While performing masking and unmasking during NOE training, aircraft was masked behind two large 50- to 60-foot trees. While crew was discussing maneuver and looking at map, IP allowed aircraft to drift between the trees. Blade caps on both main rotor blades were sheared off when they contacted trees.

OH-58 Class E

C series - Crew was conducting transition training. Aircraft landed and then was picked back up so that fuel port could be turned toward ramp for refueling. Another OH-58 was hovering about 100 feet to the right, and an AH-1 was hovering about 200 feet upwind. As the pilot of the first OH-58 turned the aircraft tail into the wind, the aircraft assumed a nose-low attitude. IP took controls as aircraft began settling and applied power to stop descent. Torque went to 103 percent for less than 1 second.

C series - During shutdown, with collective in full-down position and throttle at idle, N2 would not decrease below 100 percent. Crew chief manually adjusted throttle linkage at the fuel control, and engine rpm decreased normally. About 3 seconds later, rpm and turbine outlet temperature (TOT) rose rapidly, and TOT exceeded 1,000° C. before throttle could be fully closed. Air lines were partically clogged.

Fixed wing

C-12 Class E

C series - Aircraft was landing at a civilian airport. Winds were from 290 to 300 degrees, at 15 to 25 knots. Just as the main gear touched down, a change in wind direction caused the aircraft's nose to yaw abruptly to the right. As pilot applied left rudder, he apparently touched the toe brake. Tire on left main gear blew out.

OV-1 Class D

D series - During training flight, IP made single-engine landing. Upon touchdown, he initiated single-engine reverse thrust. While correcting for yaw, IP used excessive braking, causing left tire to blow out.

D series - Left external fuel tank fell off aircraft during takeoff roll at 50 KIAS. Cause has not been determined.

U-21 Class C

A series - Aircraft was taxiing on sod runway. Ramp gate was closed, and crew decided to use an old asphalt taxiway to turn aircraft around and drop passengers off. Pilot failed to properly align aircraft on taxiway, right main landing gear sank in mud, and propeller struck the ground.

U-21 Class E

D series - During climb through 8,500 feet msl, crew noticed pilot and copilot airspeed indicator and altimeter did not agree. Pilot's airspeed indicated 130 KIAS, and altimeter read 8,500 msl; copilot's airspeed indicated 160 KIAS, and altimeter read 9,600 msl. Caused by kink in flexible hose between pilot's vertical speed indicator and altimeter.

Maintenance

UH-1 Class D

H series - During PMD inspection, crew chief discovered a wrench on the tailboom under the forward drive shaft section. Aircraft had been flown after wrench was left there, and a tail rotor drive shaft clamp and tailboom showed damage. Mechanic failed to account for tools, and the tool was not found during preflight inspection.

UH-60 Class C

A series - During troubleshooting of rigging problem in main rotor system, the input rods from primary servos to the mixer unit were disconnected in accordance with task 16, step 6, TM 55-1520-237-8. A sharp bang was heard. The sound was caused by the swashplate uniball riding up over the guide and to one side, cracking the uniball. The uniball, inserts, swashplate guide, and swashplate assembly were damaged and had to be replaced. Disconnecting primary servo rods with hydraulic pressure applied allows the servo to travel to its internal stop. This exceeds travel resulting from normal flight control inputs.

AH-1 Class D

S series - Crew chief left rubber mallet and screwdriver under drive shaft cover. Cover was not opened during preflight. As pilot was walking blade around to tie it down, he heard scraping noise from under drive shaft cover. Drive shaft was damaged.

AH-1 Class E

F series - While conducting emergency governor operations with N1 at 60 percent, crew heard loud reports from rear of aircraft. Turbine gas temperature exceeded 1,000° C. Maintenance personnel failed to follow procedures during engine flush, and work was not properly recorded.

F series - While aircraft was being repositioned, collective stuck. PIC requested crew chief's assistance. When crew chief pushed down on collective, it broke free. PIC increased collective, reduced throttle, and entered autorotation. Bolt on droop cam was overtorqued, causing linkage to bind. Washer stackup on other bolt was also incorrect.

F series - During shutdown after ground runup, following extensive maintenance, transmission fluid could be seen running out of drain port. Quick disconnect on oil cooler return line to the bypass valve was not completely connected. This caused overpressurization of the transmission oil cooler assembly. Contractor maintenance personnel had disconnected line during maintenance, and the quick disconnect was overlooked when aircraft was reassembled.

F series - During takeoff for limited maintenance test flight, pilot noticed rising engine oil temperature. During shutdown, oil temperature went to 95° C. for 1 minute. Crew chief had left oil-soaked shop towel in oil cooler compartment, and it was ingested during flight.

OH-58 Class E

A series - Aircraft was on a general maintenance test flight. During stabilized hover over parking pad, crew detected an odor of melting plastic and immediately landed. Ducting in electrical compartment shelf had melted. Solvent had dripped through engine deck onto elbow assembly of heater duct, causing component to dissolve and emit gaseous fumes. During engine flush, mechanic had allowed excessive amounts of solvent to spill onto the engine deck.

Safety messages

- Maintenance information message concerning UH-60 main transmission overtemp prevention tips (UH-60-MIM-88-05, 041700Z May 88).
- Aviation life support equipment message concerning extension of potency expiration date on certain medical material (ALSE-88-03, 221250Z Apr 88). Contact: Boone Hopkins, AUTOVON 693-3573, commercial 314-263-3573.

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

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Tips for ASOs from an ASO

From his experiences in building an aviation safety program in a tactical unit, CW2 Gary D. Braman offers the following tips to other aviation safety officers (ASOs).

• **Believe in what you're doing.** You can't consider being a safety officer as just another job—something you put on an OER. You have to believe in what you're doing, and you have to care about people.

• **Establish your credibility and set the example.** Safety officer is your job, but you're a pilot too. You have to pass your checkride just the same as everybody else, and you have to know just as much as they do—or more. But there's more to it than that; you have to set the example. You have to fly by the book and perform to standard. You also have to set the example in your military appearance and by your personal and professional conduct. That doesn't mean you don't make mistakes. In fact, part of your credibility depends on your willingness to stand up in a safety meeting and tell people when you've done something wrong and how you learned from it. In other words, you can't ask anybody to do anything that you aren't willing to do yourself.

• **Your place isn't behind a desk.** You need exposure, and if you're stuck behind a desk it will cut into your exposure time in the hangars, on the ramp, and flying with the crews. I don't mean that the safety officer should be in the back seat checking out how the crews fly; that's an IP's job. You can get the feel for how guys are flying when you are flying with them as a member of the crew. You also need to talk to the crew chiefs, and I don't mean that you do all the talking. The crew chief should do the talking—you do the listening. You can find out a lot about what is going on from the crew chiefs; they know how the pilots fly, and they know the ones they don't want to fly with. Listen to them.

• **Be innovative.** One thing you can't do is get yourself a good safety program going and then sit back and relax. It just doesn't work that way. You have to continually be thinking of a new way, a different way, to get people thinking about safety, about doing things by the book, and using common sense. You can never let up.

• **Don't fall into the negative trap.** If the only thing you do is go around telling people what they're doing wrong, you'll be seen as negative, and safety will be perceived as something that gets in the way of getting the job done instead of something that gets the job done safely. The safety officer shouldn't develop a watchdog image. That's why you have to work so hard at the positive aspects of your job: following standards, risk management, and so on. On the other hand, you aren't in a popularity contest. When there is something that needs to be corrected, you have to do it, and you do it right then. I don't hesitate for a minute to shut down work on an aircraft if I see something is being done wrong. One of the things I always look for is whether the manuals are out and if all the changes are posted. There are constant changes, and something as small as overtorquing or undertorquing a bolt or a missing cotter key can cause a catastrophic accident. □

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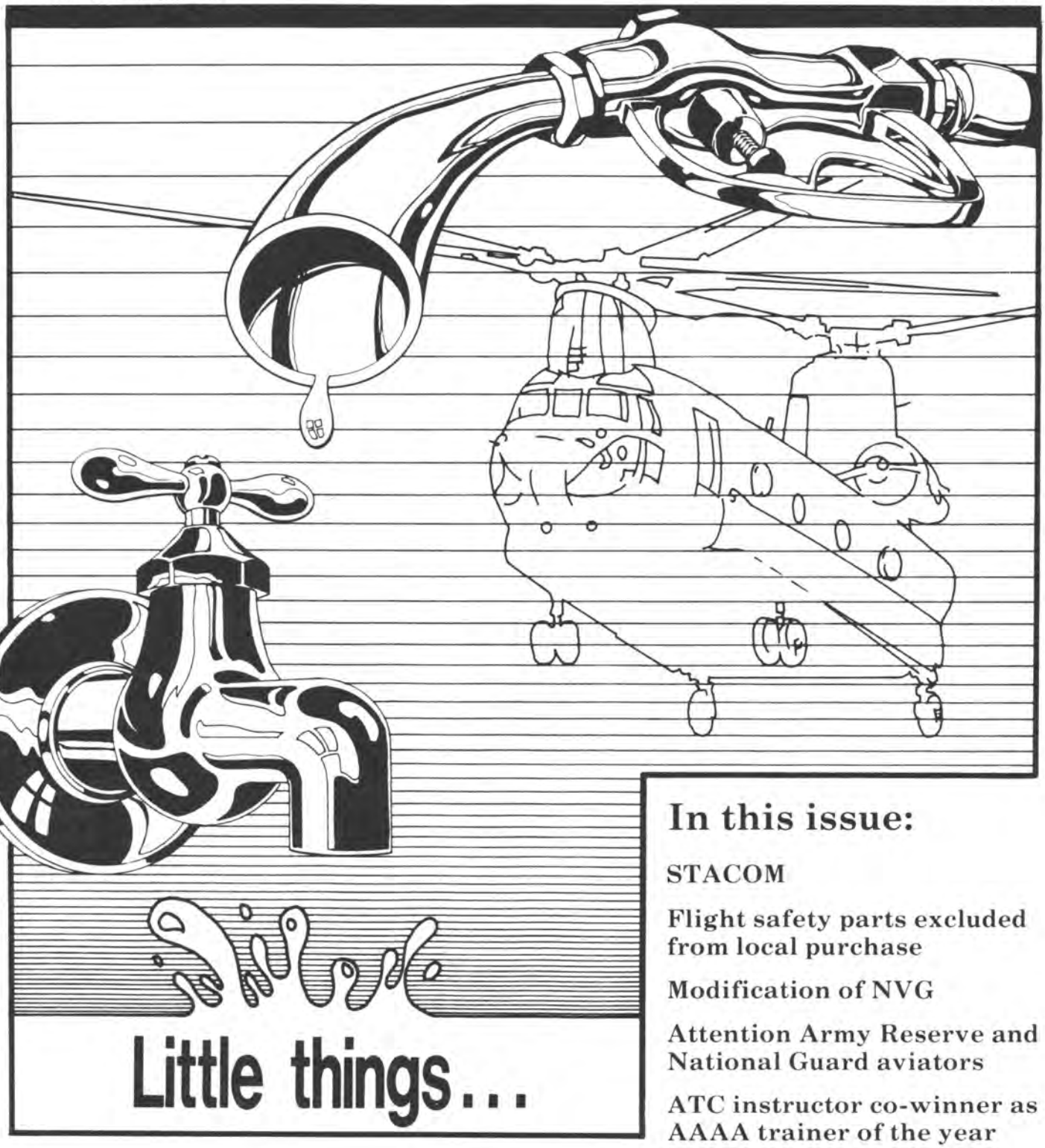
Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 21 29 June 1988



In this issue:

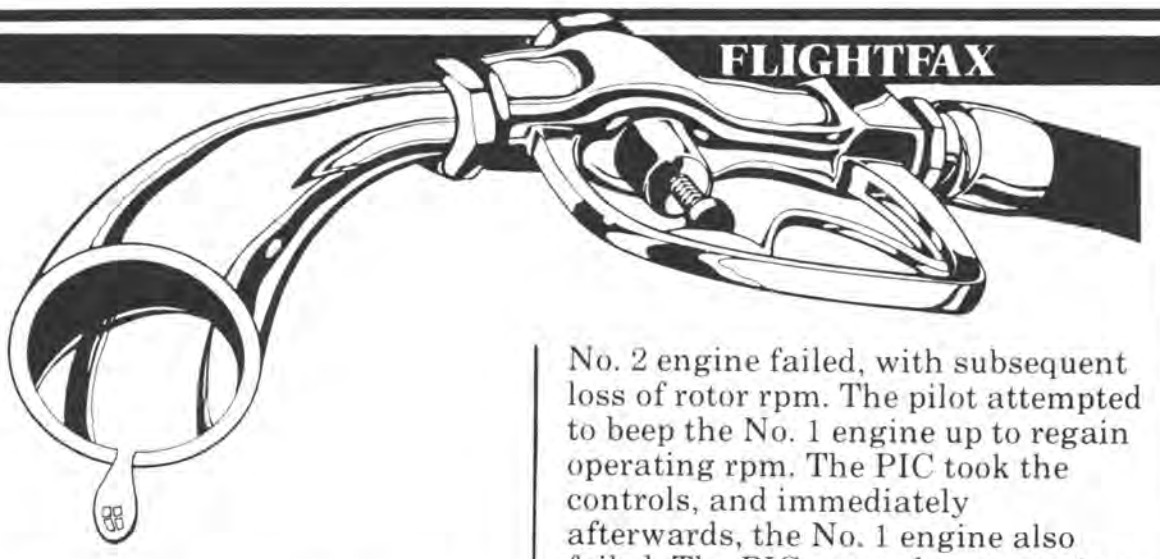
STACOM

Flight safety parts excluded from local purchase

Modification of NVG

Attention Army Reserve and National Guard aviators

ATC instructor co-winner as AAAA trainer of the year



. . . do make a difference

Not all Army aircraft accident causes can be traced to some dramatic human or materiel failure. In fact, a lot of them happen because units fail to establish procedures for the little things—the simple, routine tasks they do every day.

What follows is the story of how a few little things caused the destruction of a CH-47 and serious injury to two of its crew.

Monday

Ferry fuel tank No. 3 was loaded as cargo into the CH-47C, which already had two 600-gallon internal ferry fuel tanks installed. Tank No. 3 was empty and was loaded on the aircraft backward with no hoses connected.

On the flight back to home station later that day, a fuel leak developed. After checking the two installed tanks and finding no leak, the crew chief suspected the leak was coming from tank No. 3. To check, he poured 5 gallons of water into the unconnected tank to see if it leaked. It didn't, so he continued his search. He later found the leak—one of the quick releases was open. He closed it, solving the problem.

However, tank No. 3 now contained 5 gallons of water.

Thursday

A different crew prepared the CH-47C for a FARE (forward area refueling equipment) mission to provide fuel to other battalion aircraft redeploying to home station. Maintenance on the aircraft took all day. That night, the crew installed tank No. 3, which had remained on the aircraft since Monday, and fueled both the main and the ferry tanks for Friday's mission.

Tank No. 3 still contained 5 gallons of water.

Friday

The aircraft departed home station and arrived at destination about 2 hours later. There they refueled four UH-60 Black Hawks, which required all of the fuel in the first and second ferry tanks and about 80 gallons from tank No. 3.

Following the refueling operation, the crew broke down the FARE system and prepared the aircraft for the return flight to home station. Immediately following engine runup, the crew began transferring fuel from tank No. 3 to the main fuel tanks.

Eight minutes after takeoff, the No. 2 engine failed, with subsequent loss of rotor rpm. The pilot attempted to beep the No. 1 engine up to regain operating rpm. The PIC took the controls, and immediately afterwards, the No. 1 engine also failed. The PIC entered autorotation, selected a forced landing area, and turned toward it.

As the aircraft approached the landing area, the PIC used thrust to clear a line of 50-foot trees. As he decelerated, the aft rotor struck the trees. The aircraft landed vertical (90 degrees nose up) with the aft rotor system striking the ground first, separating the aft pylon and both engines. The nose continued pitching up and over, and the aircraft came to rest inverted on its top right side.

The aircraft immediately burst into flames from severed electrical wiring and fuel lines. The PIC, copilot, and all three enlisted crewmembers escaped the burning aircraft; two of the enlisted crewmembers were seriously burned, and the aircraft was destroyed.

The little things

- **There were no written procedures requiring Monday's crew chief to record his actions, so no one else knew there was water in the No. 3 ferry fuel tank.** The procedures the crew chief used to detect the source of a fuel leak were valid and reasonable under the circumstances. He believed the tank would be removed from the aircraft. He was not the regular crew chief on this aircraft, and he wasn't there when it was being prepared for Friday's flight.
- **The water in tank No. 3 went undetected because there was no requirement for keeping a record when tanks were purged.** When the crew chiefs connected the ferry fuel system in the CH-47 on Thursday night, they failed to purge the 5 gallons of water in tank No. 3 because they assumed the tank had already been purged. In addition, darkness made it difficult to differentiate water from fuel in the tank. When the water was pumped into the engines during flight, the engines flamed out, and the aircraft crashed.
- **There were no procedures requiring personnel involved in refueling operations to have additional uniforms issued and available during operations.** The two enlisted crewmembers sustained burns during the postcrash fire because the uniforms they were wearing had been saturated with fuel during refueling operations.

Something as simple as requiring written records could have prevented this accident. And something as simple as requiring refueling crews to have a change of clothes could have prevented the serious burns suffered by these crewmembers.

The little things do make a difference. □

FY88 Class A Mishap Through 29 June

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	4	13	4
4th Qtr	July	2		5	
	August	5		1	
	September	3		0	
	Total	38	25	39	37

Attention Army Reserve and National Guard aviators

The U.S. Army Safety Center (USASC) is presently processing training requests for the resident portion (Phase II) of the Aviation Safety Officer Correspondence Course (ASOCC).

As advertised in the Army Correspondence Course Program (ACCP) catalog, the ASOCC is a two-phase program. Phase I (correspondence subcourses) is administered by ACCP and Phase II (resident training) is administered by USASC.

Only aviators who have successfully completed all Phase I requirements are eligible for Phase II training. Aviators who will complete Phase I requirements prior to 1 October may request Phase II training during the next fiscal year by—

- Mailing a copy of the certification of Phase I completion to Commander, USASC, ATTN: CSSC-PD (Fran Souders), Fort Rucker, AL 36362-5363, and
- Submitting their request for training with a second copy of the certificate of training through normal training channels.

Questions concerning ASOCC Phase II eligibility and requirements should be addressed to Fran Souders, AUTOVON 558-4479/6410, commercial 205-255-4479/6410. □

FLIGHTFAX

STACOM

Flight data recorders

The following information is extracted from HQDA (DAMO-FDV) Memorandum for Director, Human Resources Development, ODSCPER, subject: Formal Implementation of Flight Data Recorder (FDR) Policies, dated 6 July 1987:

Selected aircraft are currently being equipped with tape-type FDRs. This initial installation will assist in mishap prevention and provide focus and direction to Safety Team investigation of Army aircraft mishaps and, therefore, the tape-type FDRs should be operational for all flights of aircraft that have been modified for tape-type FDRs. Every effort will be made to assure tape-type FDR-equipped aircraft fly with an operational tape-type FDR. However, due to limited available logistical support, a nonoperational tape-type FDR will not result in mission cancellation.

Additionally, DALO-AV will implement a change to AR 700-138, chapter 4, which will require tape-type FDR-equipped aircraft with inoperative tape-type FDRs to be reported as partially mission capable (PMC). This policy will assure that proper logistical attention is given to aircraft that have a nonoperational tape-type FDR.

This policy supports the importance of having operational tape-type FDRs while recognizing initial support may hinder operational availability. It will be revisited when the solid state FDRs are installed in the UH-60 and AH-64.

The above information will be in the next revision of AR 95-1.

Medical Service Corps advisor

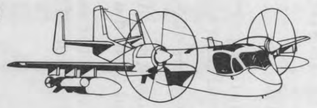
CPT Ron Wilson is the Medical Service Corps advisor to the Director, DES. CPT Wilson provides staff assistance and serves as action officer for all aeromedical evaluation issues addressed to DES. You may contact him at AUTOVON 558-3589/2770, commercial 205-255-3589/2770, or by writing to: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES (CPT Wilson), Fort Rucker, AL 36362-5208.

STACOM 128 29 June 1988

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208. AUTOVON 558-3589 during duty hours, 558-6487 after duty hours. 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

Michael H. Abbott
Colonel, Aviation
Director, DES

Flight safety parts excluded from local purchase



"We can't afford to wait for an aircraft to crash and kill a lot of people to find out a part did not achieve its calculated service life." These words by then Army Vice Chief of Staff, General Maxwell R. Thurman, initiated the Army's Flight Safety Parts (FSP) Program. This program, which is administered by the U.S. Army Aviation Systems Command (AVSCOM), is the aviation portion of the Army's Critical Safety Item Program for all Army equipment. It is a cooperative Army-industry effort to provide **life cycle management** of aircraft parts whose integrity is essential to flight safety. The key to the program is monitoring and controlling FSPs—from initial manufacturing throughout the part's life cycle to retirement.

An FSP is defined as any part, assembly, or installation whose failure, malfunction, or absence could cause loss or serious damage to the aircraft and/or serious injury or death to the occupants or ground support personnel. Specific selection criteria are used to determine each FSP, including identification of critical characteristics that must be controlled. A critical characteristic is any feature throughout the life cycle of a flight safety part which, if nonconforming, missing, or degraded, could cause failure or malfunction of the flight safety parts. Critical characteristics include dimension, tolerance, finish, material or assembly, manufacturing and inspection processes.

Although the flight safety parts for Army aircraft have been defined, the appropriate manuals are still being updated. To specifically identify individual parts, lists of FSPs have been furnished to the field by Quality Test Division, Directorate of Product Assurance, AVSCOM. Most helicopter applications have similar design features; therefore, the FSPs can be divided into the following general categories:

- All items listed in the aircraft overhaul and retirement schedule
- Most rotating control parts, including control tubes
- All gearboxes, transmissions, and drive shafts
- All rotor blades (main and tail rotors)
- All engines and fuel controls

Because many of the controls necessary to verify adherence to critical characteristics are required during the manufacturing cycle, and some of these cannot be verified once the part has been completed (for example, proper heat treatment or shot peening operations that give the part its required strength), parts must be procured through a rigorous quality control procedure. AVSCOM has established these procedures, which include 100-percent verification of each critical characteristic. Thus, to ensure an FSP has met all requirements, it must be obtained through the AVSCOM supply system.

When it was determined that some FSPs were being locally purchased, AVSCOM issued safety-of-flight message 87-02, July 1987, restricting introduction of FSPs from local-purchase sources and directing that any parts so procured be removed from the system. When additional evidence showed continued introduction of local-purchase parts, another safety-of-flight message UH-1-88-01, January 1988, and maintenance information message GEN-MIM-88-01, March 1988, were issued. In this case, other parts were being offered as substitutes for previous procurements—but there still was nothing to validate the parts and prove that they would meet FSP requirements.

The purpose of this article is to emphasize to all Army personnel involved in aviation that, in order to maintain the required integrity of the FSP program, **all** FSPs must be procured through the AVSCOM supply system. Commercial sources for the same or similar part are not required to meet the Army standards. That means they could provide a part that does not meet the critical characteristic standards. In addition, AVSCOM has determined that some parts offered as new parts were actually refurbished used parts. There have also been some parts found that have the right part number and AVSCOM control numbers, but the parts were never part of an AVSCOM procurement. Certification by a commercial supplier that a part is acceptable is not a valid means of substantiating critical characteristics. Specific inspection and quality control records for each operation are necessary before an FSP can be certified.

The FSP program was initiated after materiel problems were revealed during investigation of Army aviation accidents. To preclude future accidents caused by similar problems, it is absolutely essential that we maintain the integrity this program has provided. To do this, and to continue our efforts to improve the outstanding safety record achieved in Army aviation, we must ensure that aircraft parts that have not met all FSP requirements are not introduced into the system. □

—Point of contact: James Ray, Deputy Director of Engineering, AVSCOM, AUTOVON 693-1100, commercial 314-263-1100

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A

H series - The crew, flying low level, crossed a ridge and began a descent to maintain low-level flight. Winds were strong and gusty. When the pilot tried to level off, he did not have sufficient power to stop the descent. The aircraft crashed. 8821

V series - Aircraft was hoisting a rubber raft during a mission over water. The raft swung and arched toward the main rotor blades. As the pilot was making evasive maneuvers, the tail rotor hit the water. The UH-1 sank in 75 feet of water. 8822

UH-1 Class D

H series - Aircraft hovered too close to power line. Main rotor blades cut two of the lines.

H series - During loading operations for a troop lift, soldier's rifle struck and broke window on jump door.

UH-1 Class E

During flight, crew noticed moderate vibration and landed. Caused by cracked antiflap assembly.

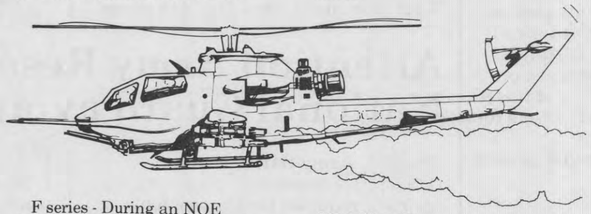
UH-60 Class B

A series - While performing a fast-rope demonstration, aircraft was placed in deceleration. Aircraft lost rpm, hit the ground, and rolled into a tree. 8823

Attack helicopters

AH-1 Class A

F series - Rockets were fired while aircraft was at a high hover. The aircraft spun right, and tail rotor effectiveness was lost. When the tail rotor abruptly regained effectiveness, the drive shaft failed and the aircraft crashed. 8824



F series - During an NOE training flight at 100 feet agl, the pilot made a steep bank into the sun and lost outside visual reference in the glare. The aircraft crashed into trees. 8825

F series - Aircraft crashed during high-speed dive. No materiel problems have been discovered. It appears the pilot was late in pulling out of the dive. Both crewmembers died in the crash. 8826

AH-1 Class C

F series - Aircraft was chalk 2 in flight of two en route to assembly area. Lead aircraft reported signs of targets on road and that he was being engaged with MILES. While chalk 2 crew had their attention on locating possible targets, aircraft struck a tree.

S series - IP retarded throttle and announced a forced landing. SP lowered collective abruptly and applied cyclic. Before IP could recover aircraft, rotor had exceeded limits.

AH-1 Class D

F series - IP initiated a simulated engine failure from a hover altitude by retarding throttle and announcing "hovering auto." Pilot immediately rolled throttle to engine idle stop and pulled collective pitch without allowing the aircraft to begin to settle. When IP tried to arrest the sink rate, there was insufficient rotor rpm and aircraft landed hard.

F series - Aircraft was at a hover during NOE tactical training flight. Pilot allowed the aircraft to drift rearward, and tail rotor struck a tree.

F series - Electrical compartment access panel was lost during flight. Panel was not secured before takeoff.

F series - When before-landing check was performed for NVG approach, light did not come on showing 20mm gun was stowed. Pilots thought light was unreliable and continued approach. During touchdown, crew felt a jolt. Aircraft rocked aft and struck on the heels of its skids. The gun was not properly stowed.

AH-64 Class E

A series - During cruise flight at 700 feet agl, crew felt increasing vibration followed by a loud bang. Caused by debonding of main rotor blade.

Cargo helicopters

CH-47 Class B

D series - Aircraft was in out-of-ground-effect hover with external load while waiting for flight to form up. All three cargo hooks opened, and M102 was dropped. 8827

CH-47 Class D

D series - Driver of M1008 vehicle failed to follow directions of ground guides during tactical loadup. Vehicle damaged fiberglass fairing in the vicinity of the upper center ramp seal.

CH-47 Class E

C series - About 5 minutes after leveling off at 5,000 feet msl, aircraft began vibrating, and oil began hitting windshield. Caused by failure of bearing assembly on pitch horn.

D series - During hover, No. 2 engine N2 governor had a high-side failure. Caused by failure of N2 actuator assembly.

Observation helicopters

OH-6 Class A

H series - Aircraft was 200 feet above water at 80 to 90 KIAS when the engine failed. PIC autorotated, and aircraft sank in 20 feet of water. Cause of engine failure has not been established. 8828

C series - Aircraft broke up during routine VFR training flight. Low rotor rpm caused main rotor blades to chop off tail rotor. Evidence indicates engine was not running at time of ground impact. The two occupants were killed. 8829

OH-58 Class A

A series - Aircraft entered inadvertent IMC and crashed into a wooded mountainside, killing the pilot and passenger. 8830

C series - Aircraft was on an NVG training mission. The pilots, trying to locate targets for another aircraft, were unaware their aircraft was descending. Aircraft hit the ground and rolled over. 8831

OH-58 Class D

A series - During demonstration of standard autorotation to sod, aircraft touched down heels first and rocked forward. As aircraft rocked back, spike knock resulted.

A series - Crew was conducting night autorotation training. SP applied initial pitch at 20 to 25 feet and bled off too much rotor rpm for cushion. IP took controls and leveled aircraft, but hard landing caused one main rotor blade to flex down and strike tail rotor drive shaft cover.

OH-58 Class E

A series - Aircraft was hovering over sloping terrain, facing into the sun. Aircraft settled, and tail rotor struck a small tree.

Fixed wing

OV-1 Class D

D series - When pilot applied aerodynamic braking during simulated no-hydraulics landing, tail-mounted fuel vent contacted the ground and was torn off. Placement of the vent makes it vulnerable during a tail-low landing.

OV-1 Class E

D series - After pilot had placed both engine power control levers in reverse during normal touchdown, No. 1 engine came out of reverse at about 50 percent torque. Aircraft swerved to the right, and pilot had to use brakes to control heading. Left tire blew out due to excessive heat buildup. Caused by faulty prop control relay.

Maintenance

CH-54 Class E

B series - During climbout after picking up a 2,000-pound load, CE reported profuse hydraulic leak apparently originating from the hoist well. Crew placed the load on the ground and landed. Caused by improperly tightened hydraulic line.

OH-58 Class E

A series - During autorotation at 700 feet agl after completion of main rotor rpm checks, aircraft developed vibration, and crew heard grinding noise from engine/transmission area. Aircraft had been out of service for maintenance for several months. During this time, undocumented maintenance had been performed, and a nut and washer were not installed at the No. 1 tail rotor segment, forward coupling assembly, attached to the free-wheeling unit. The missing nut was not detected by mechanics who worked on the aircraft or during subsequent inspections.

Safety messages

- Safety-of-flight technical message concerning one-time inspection of pivoting and swiveling servo cylinders on CH-47 aircraft (CH-47-88-11, 092200Z Jun 88). Contact: Leo Smith, AUTOVON 693-9089, commercial 314-263-9089.
- Safety-of-flight technical message concerning one-time and recurring inspection and installation of aluminum elevator fittings on T-42A aircraft (T-42-88-01, 092000Z Jun 88). Contact: Roger Heidenreich, AUTOVON 693-9089, commercial 314-263-9089.

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

U.S. ARMY SAFETY CENTER

Report of Army aircraft mishaps 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.

Well done

ATC instructor co-winner as AAAA trainer of the year

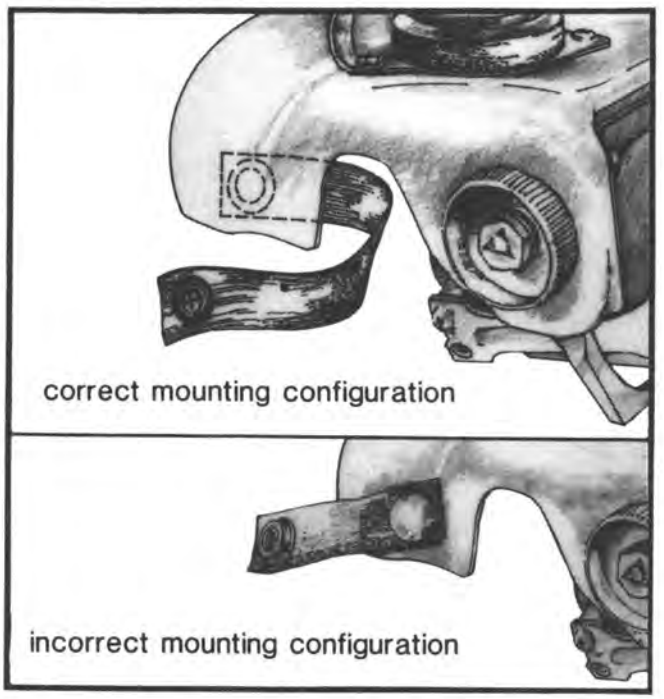
Staff Sergeant Bobby W. Eades, an instructor in the Academic Branch, Air Operations Division, Department of Enlisted Training, U.S. Army Aviation Center, was selected as the 1987 co-winner of the Army Aviation Association of America Trainer of the Year Award.

SSG Eades was recognized for his superior performance while training students in control tower operator and general academic subjects. He was also cited for his ability to tailor his instructional techniques to the needs of the student air traffic controllers.

Some 28 nominees from Army units worldwide competed for the AAAA's CY 87 Trainer of the Year Award. This was the first year the award was won by two outstanding Army trainers (see 10 February 1988 issue of *Flightfax*). □

Modification of NVG

The Army Safety Center has received a question from the field regarding an article in the special issue of *Flightfax* on night vision flying. The article emphasized that removal of the short strap assembly from night vision goggles (NVG) is unauthorized. The illustration accompanying this article was designed to highlight the short strap, not the mounting configuration. The correct mounting configuration would show the short strap connecting inside the NVG's frame, then wrapping around the front of the cutaway side.



A detailed description of NVG modification instructions can be found in the USAAVNC booklet, AN/PVS-5, 5A Night Vision Goggle (NVG) Aviator Modifications, dated 10 June 1983. A copy of this booklet can be obtained by writing to: Commander, Aviation Training Brigade, ATZQ-ATB-O, Fort Rucker, AL 36362-5000 or by calling Bob Portman, AUTOVON 558-4630/4632, commercial 205-255-4630/4632. □

Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 22 13 July 1988

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FORT RUCKER, AL 36362-5000

Seven steps for wire strike prevention

Helicopters and wires are incompatible, but they sometimes occupy the same space. The problem is that while helicopters are flying more and more frequently at low level and at night, the numbers and height of wires are also increasing. Add to this the increasing number of multiple high-tension power lines, which pose the greatest threat of all to helicopters, and a growing effort in many parts of the world to make support poles and towers blend into the surrounding environment for aesthetic reasons, and it is easy to see that wire strikes pose a very real threat to Army aircraft.

Some time ago, the Army Safety Center published a seven-point program to assist in preventing wire strikes. These points are still valid and they should continue to be stressed.

In this issue:

- **Safety tips for NVG lithium battery users**
- **Fort Rucker unit sets new safety record**

Seven steps for wire strike prevention

1. Standing operating procedures (SOPs) and directives. Directives and SOPs for terrain flight should reflect all the safest procedures possible for the types of missions being flown. Detailed responsibilities for the pilot at the controls, the pilot not at the controls, and other crewmembers should be specified. The procedures should be reinforced regularly at aviation safety meetings.

The crew of a UH-60 engaged in NVG training responded to a request for assistance by locating a downed CH-47 and leading a medevac aircraft and another CH-47 into the area. Later, when the second CH-47 could not be contacted by control tower personnel, the UH-60 crew was asked to return to the crash site and try to contact the CH-47 crew by radio. When this attempt also proved unsuccessful, the UH-60 pilot decided to land at the crash site. The aircraft struck a wire and crashed. There were no established procedures in the unit for pilots to receive command approval and a mission rebrief in the event of a mission change. In the absence of established procedures, it was left up to the pilot to decide whether to fly into an area he knew to be hazardous.

2. Supervision. Commanders and supervisors must ensure that pilots adhere to established procedures. All missions should be planned, and all aircrews should know the plan. Immediate and positive action should be taken regarding any violation of flight discipline.

The IP of a UH-1 had been given a mission to transport members of the battalion staff from home base to another location and return. There was a 3-hour delay of the return flight because en route weather was forecast below VFR minimums. When the weather improved enough to allow VFR flight through a mountain pass, the aircraft took off. The aviation maintenance officer was on the controls. During the flight, visibility decreased because of darkness and light rain, and an increasingly low ceiling forced the aircraft to descend. The IP decided they should turn around and he had just taken the controls when the helicopter struck the top cable of a powerline. The unit commander, who was on board the aircraft, allowed the flight to continue even though the weather had continued to deterioriate.

3. Hazard maps. Wires and other obstacles that pose a threat to terrain flight should be accurately depicted on hazard maps. In areas such as Europe where the prominence of wires would unduly clutter the map, major wire hazards and wires that are located in unlikely areas should be plotted and aircrews made aware of other unplotted wire locations such as along roads, railroads, etc. When it is possible for all wires to be plotted without compromising the usefulness of the map, then they should be. Crews should be thoroughly briefed on wire strike hazards before every terrain flight mission. This is particularly important for night vision goggles (NVG) training missions. NVGs cannot "see" wires because of the frequencies involved.

An OH-58 crew was engaged in nap-of-the-earth flight during a tactical exercise. The aircraft was flying down the middle of a valley when the copilot saw a wire directly in front of the helicopter. He put the helicopter into a climb and was able to avoid the wire he had spotted, but the aircraft struck three higher wires. The wires weren't marked on the map the PIC was using to navigate.

4. Wire marking. Whenever possible, all wires around potential takeoff and landing sites on and off military reservations should be marked. Certainly, all wires around frequently used sites should be marked. While pilots should know when to expect wires, markers make them easier to see.

Four UH-1s were providing airlift support during a tactical exercise. A fuel tanker was supposed to meet the flight at the fourth stopover point, but when the aircraft arrived at the field site, the fuel tanker wasn't there. One of the UH-1s had an auxiliary fuel cell, and the pilot decided to fly down a road to try to find the tanker and lead it to the other aircraft. The crew kept their altitude at 200 to 300 feet because of other aircraft operating in the area above them. The aircraft was returning to the field site and was on final approach when it hit one of five strands of wire stretched across its flight path. The poles to which the wires were attached had been set in trees about 200 feet above a river. Two small panels used to mark the wires were located in the center and on the left side. There was no marker on the right side where the helicopter struck the wire. The wires and panels blended into the surrounding terrain making them difficult for the crew to see.

5. Minimize contour flight. Most wire strikes occur during terrain flight in the contour mode or on takeoff or landing. Unless required by the mission, contour flight should be avoided. Crews also should be extremely careful when landing in or taking off from an unfamiliar area. And, they cannot be complacent when going into or out of places they know. Wire hazards can be constructed in a matter of minutes.

The OH-58 crew was on a search and recovery mission for a hawk missile. While hovering with a forward speed of about 5 knots, 20 to 30 feet above ground level (agl), the aircraft's left skid struck a cable. The aircraft rotated 180 degrees and the cable came loose from the skid. The helicopter escaped with only minor damage. The pilot knew there was a line for an old cable car in the area, but he thought it was only 5 to 10 feet agl at its highest point. The pilot and observer were both engrossed in looking down while searching for the missile, and they did not notice the cable until the aircraft had hit it.

6. Maximum crew coordination. The more crewmembers actively engaged in spotting wire hazards on any given flight, the less the risk of wire strikes. When flying in a wire environment, maximum coordination among all crewmembers is needed to search for wires. During terrain flight, the pilot's full attention should be on flying. Navigation, setting radio frequencies and monitoring instruments should be a copilot function. If the pilot must direct his attention away from flying, he should land or climb to a higher altitude.

A flight of four helicopters, three OH-58s and one AH-1, had been engaged in night training. The pilot of one of the OH-58s was wearing NVGs when he took off in lead position for the return to the airfield. When the platoon leader, who was in one of the other aircraft, failed to respond to a radio call from unit operations asking the status of the flight, the copilot of the lead aircraft answered. Then, he continued to act as a relay between operations and the platoon leader instead of navigating and monitoring instruments for his aircraft. The pilot knew there were hazards in the area and he was concerned. While he was waiting for a chance to break into the radio conversation to tell the copilot to stop talking on the radio and pay attention to navigating and clearing the aircraft, the pilot decided to adjust the left vision tube of his NVGs in order to look inside the cockpit and check his heading and airspeed. As he ►

Seven steps for wire strike prevention

was adjusting the focus, he caught sight of powerlines and a pole out his left door. He thought the aircraft would clear the lines, and he made no attempt to miss them. Instead, the OH-58 hit the wires and crashed.

7. Go slow when you go low. The slower the airspeed, the more time a pilot will have to identify and react to an unforeseen obstacle in his flight path. Assuming good visibility, if two aircraft are approaching wires and one is at 80 knots while the other is at 40 knots, the pilot of the faster aircraft will need to spot the wires at a distance of more than 1,650 feet to react and avoid them. The pilot of the slower aircraft will have ample time to react if he sees them at 600 feet.

After participating in a static display at a college, the crew of an AH-1 stayed on for some of the homecoming festivities. It was raining when they refueled at a nearby airfield for the return flight, but they didn't get a current weather briefing or file a flight plan. In the meantime, the weather at the airfield went below VFR minimums, requiring a special VFR clearance. The crew received clearance and took off, following an interstate highway and flying below 600 feet agl to avoid cloud cover. The terrain over which the aircraft was flying was gradually rising and the weather continued to deteriorate. About half an hour after takeoff, the aircraft was down to around 100 feet agl as the crew tried to maintain visual contact with the highway. The aircraft was flying at an estimated 100 to 120 knots when it struck the top two strands of powerlines crossing the highway and crashed. Safety aspects of the mission were included when the pilot was briefed.

Reports of wire strikes reveal many instances where the helicopter's wire protection system was able to cut the wire and prevent a major accident. But these systems cannot provide 100 percent coverage of an aircraft's frontal area, especially when there are multiple wires. That is one reason why it is vitally important that hazard maps be correctly marked and all crewmembers actively participate in searching for wires, particularly during takeoff, landing, and contour flight.

Probably the most important thing to remember when operating an aircraft where wire hazards may exist is that speed can make the difference in whether an aircrew can avoid a wire or become another wire strike statistic. □

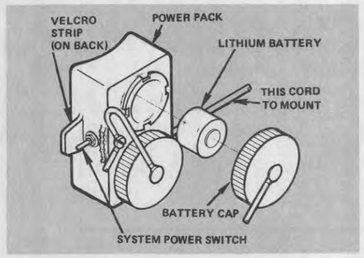
Safety tips for NVG lithium battery users

Lithium-sulfur dioxide (LiS02) batteries are lightweight, powerful batteries that operate in temperatures down to -20 degrees F. The use of LiS02 batteries in aircraft is expected to greatly increase during the upcoming years due to the increased use of NVGs. The main lithium battery used for night vision is the BA-5567, which is used in the AN/PVS-5A, B, and C series NVGs and the AN/AVS-6 aviator's night vision imaging system (ANVIS).

Here are some practical Do's and Don'ts for people who handle, transport, or use these lithium batteries.

DO

- Inspect batteries for damage or defects before using.
- Report any battery venting to your local safety office within 24 hours and to the Communications-Electronics Command Safety Office (AV 995-3112/4427).
- Store batteries in cool, well-ventilated areas, separate from flammable liquids, oxidizers, or other hazardous materials.



- Prohibit smoking and restrict the use of open flames around battery storage areas.

DON'T

- Carry unwrapped batteries in pockets along with other metal objects, such as pens, loose change, paper clips, etc. This could cause a short circuit in the battery, which could lead to overheating or a venting of the battery.
- Use batteries that show signs of damage or defects.
- Use equipment if the battery compartment becomes hot. Allow the gear to cool to the touch (at least 60 minutes) before changing the battery.
- Charge the battery.
- Use batteries in parallel circuits unless the equipment is provided with diode protection.
- Test battery for capacity.
- Use a battery that is not authorized for the equipment in which it is to operate.
- Use a Halon fire extinguisher on a lithium metal fire, because it produces toxic products.
- Leave batteries in equipment when not being used.
- Dispose of batteries in local garbage. Special handling and disposition, using DD Form 1348-1, are required through the Defense Reutilization and Marketing Office. This office can be located through your installation environmental coordinator or your local safety office.

When battery lots are received in the maintenance shop, one battery from each lot should be tested for its function in the NVGs. Do not test for capacity in a normal tester, because this can short the battery and cause it to vent. The test should be performed in NVGs with the lens caps in place, while checking for proper operation through pin holes in the lens caps every 2 hours.

The BA-5567 (LiS02) is designed to provide at least 14 hours operation in NVGs. The battery must pass 8 hours use (not necessarily continuous). If the battery fails in less than 8 hours, it is recommended that the entire lot be rejected or used for other equipment with noncritical applications. If the battery passes the 8-hour test, the battery should be monitored every 2 hours (again, not necessarily continous) until the battery fails. Record this time. This test is not designed to check BA-1567 mercury batteries, because these batteries are not designed with the same capacity as a lithium battery.

To ensure you have a fresh battery for every mission, record the time on the battery before and after every mission if the battery is going to be used more than once. After using the battery on a mission, do not mix the battery with others that have not been used, as there is no way to distinguish between a fresh and a used battery.

Lithium-sulfur dioxide batteries are useful, high-energy, portable power sources and are safe when properly handled and not abused. Additional information for all LiS02 batteries is available from the CECOM Safety Office. "What You Should Know About LiS02 Batteries for Army Applications" and "Battery Disposition/Disposal Handbook" may be obtained by writing or calling Commander, U.S. Army Communications-Electronics Command, ATTN: AMSEL-SF, Fort Monmouth, NJ 07703-5000, AV 995-3112/4427. □

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A

H series - Aircraft was chalk 4 in a formation of 7 aircraft. The aircraft climbed above a tower supporting power lines. When it began descending on the other side of the tower, tail of the aircraft hit the top of the tower and the aircraft crashed. All three crewmembers were killed. 8832

UH-1 Class D

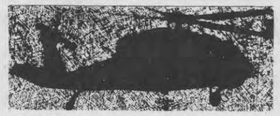
H series - During attempted water drop on a fire in a national park, gate on water bucket failed to operate properly. When cargo hook arm switch was moved to off position, cargo hook released water bucket without control input from aircrew.

M series - During NVG flight at about 800 feet agl, 80 KIAS, right cargo door separated from aircraft.

UH-60 Class E

A series - Cracked main rotor bearing was found during postflight inspection.

A series - While performing hoist training over water, 240-pound dummy load was positioned on litter pan. Hoist hook was connected with 3 to 4 feet of cable extending from hoist. Cable-up switch was engaged to maneuver load and boom outside aircraft, but with no tension on the hoist, the cable would not reel up. When the dummy load was pushed out of the aircraft to put weight on the hoist, the cable snapped, and load fell into water. Suspect slack in cable had caused it to jump off track and when load was put on the cable, it snapped.



A series - Crew smelled fuel after takeoff on NVG training flight. Drain under fuselage for No. 2 engine was source of leak.

Attack helicopters

AH-1 Class E

F series - Cockpit filled with fumes during runup. Packing seal on alternator input shaft had deteriorated and adhered to shaft. Fumes were sucked into environmental control unit intake and blown into cockpit.

AH-64 Class D

A series - Aircraft was 150 feet agl, at 60 to 70 KIAS, when the crew heard a loud bang from the left side. Transmission access panel door had been left unsecured during preflight.

AH-64 Class E

A series - No. 1 engine was at 100 percent NP during runup when pilot's No. 1 engine oil psi light came on and oil pressure dropped to zero. IP performed emergency shutdown of engine.

Cargo helicopters

CH-47 Class D

D series - Crew was unsuccessful in attempt to miss a large buzzard in its flight path.

CH-47 Class E

D series - During NVG terrain flight, pilot noticed bright yellow glow coming from center console. Electromagnetic relay had failed, causing electrical arcing. Fire went out after aircraft landed.

D series - Copilot felt binding in thrust during takeoff. Cockpit control driver actuator was not working properly.

CH-54 Class D

A series - A 105mm towed howitzer was hooked up as external single-point load. When load was picked up, the howitzer turned upside down inside slings. Load was improperly rigged.

Observation helicopters

OH-58 Class A

A series - Aircraft was destroyed when it crashed into water. One crewmember died as a result. 8833

OH-58 Class E

D series - Crew was conducting team tactics training with another OH-58 aircrew when all hydraulic control was lost on aircraft. Pilot initiated climb to gain airspeed and climb above trees. Aircraft was uncontrollable below 30 KIAS but stabilized at 70 to 75 knots. The pilot had to use both hands on the cyclic to bank the aircraft, and it took the combined efforts of the observer and pilot to lower or raise the collective. After flying 10 miles to an airfield, the aircraft made a shallow approach and touched down at 35 to 40 knots. The aircraft slid two-thirds of the length of the 1,000-foot runway before the crew was able to completely lower the collective. Investigation into cause continues.

A series - During short final, crew heard a squealing noise from the engine. Caused by rubbing of engine compressor liner and excessive corrosion of last stage of compressor.

Fixed wing

C-7 Class E

A series - Aircraft was at 4,200 feet msl and climbing when engine began running rough and backfiring violently. After successful single-engine landing, excessive metal was found in engine.

C-12 Class E

C series - During flight, pilot noticed oil siphoning from No. 1 engine. Dip stick cap was not properly secured.

U-21 Class E

A series - Just before touchdown during landing, large bird flew across runway and struck outboard leading edge of aircraft's left wing.

Maintenance

UH-1 Class D

H series - During maintenance ground run, one of two screws holding center underside tailboom inspection panel vibrated loose and panel struck tail rotor. Panel had been temporarily secured.

CH-47 Class D

D series - Rotorwash from landing CH-47 caused damage to unsecured tunnel covers on nearby parked aircraft.

CH-47 Class E

D series - When brakes were applied after landing, hydraulic fluid began leaking from parking brake manifold housing. Head had sheared off one of the two bolts connecting the parking brake valve solenoid. Hole for safety wire was drilled too close to bolt shank. Sheared bolt head caused valve solenoid to break when brakes were applied.

OH-58 Class E

A series - During climbing flight, N2 decreased to 99 percent. PIC reduced collective and N2 returned to 103 percent. Aircraft was now in a needles-joined autorotation. Collective was slowly increased and N2 decreased to 99 percent. PIC alternately increased and decreased collective to maintain flight until aircraft could land on road. Nut that attaches the PG2 airline to fuel control fitting had backed off, causing loss of pneumatic air signal to fuel control.

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

Followup information on accidents previously reported

UH-1 Class A

Reported in 8 Jul 87 issue as 8742 - While conducting an orientation ride to acquaint ground personnel with helicopter operations, the flight crew performed a cyclic climb terminating with a rapid 180-degree heading change. During their attempt to recover the aircraft from this abrupt course reversal, the crew allowed the tail rotor blades to contact a tree. The 90-degree tail rotor gearbox separated from the aircraft, and the aircraft spun around several times. The sudden shift in center of gravity caused the main rotor blades to contact the fuselage, severing both synchronized elevators, the vertical fin, and most of the tail boom. The rotor system then separated from the mast and the aircraft's fuselage struck the ground inverted. All 10 personnel on board died in the crash. The aircraft was consumed by a postcrash fire.

AH-1 Class A

Reported in 5 Aug 87 issue as 8748 - While in terrain flight during a tactical training mission, the PIC failed to anticipate the extra power required to maintain his altitude as he entered a steep angle of bank. Because of the PIC's inadequate knowledge of the section on level turns in FM 1-203, which warns of the dangers of excessive bank angles at low altitudes, he allowed the rate of descent to increase until he was unable to recover the aircraft. As a result, the aircraft struck the ground and was destroyed. The aircraft began to lose altitude shortly after it entered the turn, but the initial rate of descent went undetected because the PIC's attention was diverted to scanning the desert floor for a decontamination site and the copilot was looking for a nearby airfield. By the time the crew perceived their high rate of descent, the PIC was unable to recover the aircraft.

AH-1 Class B

Reported in 22 Jul 87 issue as 8745 - The copilot landed the aircraft in a marshy area while the PIC removed his day vision goggles. As the PIC took the controls and brought the aircraft to a hover, he noticed the transmission oil pressure was near the lower limit of the normal range of operation. As he leaned toward the gauge to verify the pressure reading, the PIC inadvertently applied right cyclic. After noting that the transmission oil pressure was within limits, the PIC looked back outside and saw the aircraft had begun drifting to the right and descending. The right skid struck the surface, creating a pivot point for a right roll. The PIC applied left lateral cyclic, but the aircraft continued to roll until its main rotor struck the ground. The helicopter came to rest on its right side, partially submerged in water.

OH-58 Class A

Reported in 25 Mar 87 issue as 8726 - Aircraft was in an out-of-ground-effect hover at 200 feet agl with a left crosswind. When the aircraft evidenced the beginning stages of loss of tail rotor effectiveness, the copilot, who was on the controls, made a right downwind turn. The aircraft entered a rapid, uncommanded right spin and crashed.

OH-58 Class A

Reported in 8 Jul 87 issue as 8743 - Aircraft was at a stationary hover over sloping terrain during NOE scout training mission. While attempting a target handoff, the pilot focused his attention on radio communications and movement of the target aircraft, and failed to monitor his position in relation to the ground. He was unaware that the aircraft was drifting to the right until the right skid contacted a small stump, causing the aircraft to roll to the right. The pilot was afraid the aircraft would roll over onto its right side, and he overcorrected with excessive left cyclic and decreased collective. As a result, the aircraft rolled to the left. The main rotor struck the ground, causing major damage to the aircraft. □

U.S. ARMY SAFETY CENTER

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Marvin E. Mitchiner, Jr.
Colonel (P), Aviation
Commander, Army Safety Center

Well done

LTC Jim A. Orahood, commander, 1-212th Avn Bn (right), congratulates members of the flight crew who set the 200,000-hour accident-free flight record.

Photo by Jim Kelly

Fort Rucker unit sets new safety record

In June, 1st Battalion, 212th Aviation Regiment, Aviation Training Brigade, located at the Army Aviation Center, broke its own outstanding safety record. In 6 months, flight crews assigned to 1st Battalion upped their record of accident-free flight hours from 160,000 to 200,000. "This unit is creating all of the new Army aviation officers," said LTC Jim Orahood, who commands the battalion. "What could be a better role model for them than for this unit to have achieved this record." Orahood gives equal credit to maintenance personnel who keep the battalion's aircraft in top mechanical condition.

"Our philosophy simply put is—don't take any unnecessary risks. More than 300 instructors and hundreds of students have flown here. As they depart from the unit they carry this philosophy with them. No one wants to have an accident, but the best way to prevent one is not to take a chance," Orahood concluded. □

—Fort Rucker Army Flier

FY 88 Class A Mishaps through 13 July

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	4	13	4
4th Qtr	July	2	1	5	0
	August	5		1	
	September	3		0	
	Total	38	26	39	37

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Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 23 27 July 1988

FOD can spell disaster

• While a UH-1 was at an out-of-ground-effect hover during an NOE training mission, its engine failed. The IP began autorotation, and the aircraft came down on a steep, brush-covered slope. It sustained major damage as it slid down the slope, but there were no serious injuries to the crew. The engine failed because, when the fuel control was installed on this aircraft, mechanics used a lubricant on the fuel control drive shaft. That was the correct procedure for an older model fuel control, but the new fuel control was designed to receive drive spline lubrication from the engine oil system. The lubricant used on the fuel control drive shaft clogged the four oil passages of the accessory gearbox drive gear. This meant no lubrication was going to the splines and without engine oil lubrication they failed. When the fuel control stopped working, fuel to the engine was cut off, and the engine failed.

• An AH-1 was flying NOE about 20 feet above trees when the aircraft's engine ingested a spacer sleeve. The compressor section was completely destroyed and the engine failed. The pilot initiated autorotation over terrain densely covered by trees and brought the aircraft down vertically through the trees. The aircraft was destroyed, but it came to rest upright and the crew escaped serious injury. No one could determine where the spacer sleeve had come from, but it probably had been lodged in the engine area for some time before the aircraft's vibration caused it to dislodge.

• An OH-58 was in cruise flight 50 to 60 feet above trees when the engine failed. The pilot began autorotation and tried to reach a fire break, which was the only clear landing area available. Realizing he couldn't make it, the pilot ►

FOD can spell disaster

zeroed airspeed, applied collective pitch, and the aircraft descended vertically through 60-foot trees. The aircraft came to rest upright and sustained major damage, but there was only one minor injury to the occupants. The engine failure resulted when a pneumatic line failed. Permatex sealing compound had apparently dropped on the metal line during installation. As the sealing compound decomposed, it formed acid which caused the corrosion and led to failure of the line.

These three Class A accidents were caused by foreign object damage (FOD). Fortunately, most of the 322 Army aviation mishaps reported as FOD related in the past 4½ years were Class C, D, or E. The fact that more of these accidents were not catastrophic doesn't mean that FOD is not a hazard to safe Army aviation operations. Some of these minor mishaps could easily have been catastrophic.

Most FOD accidents are preventable at the user level. It is true that occasionally a materiel failure results in an engine ingesting parts of the aircraft, but far more often someone, somewhere, simply did something or failed to do something and FOD is the result. Not only are these the most common FOD accidents, they are the ones we can do something about. □

FOD is everybody's business

A foreign object is something that doesn't belong where it is. And when that foreign object is in an aircraft, it's only a matter of time until it causes some kind of damage. Foreign object damage to Army aircraft results from a variety of causes: objects are sucked into engines or rotors, tools are left in engines or flight controls, and objects strike or are struck by various parts of the aircraft.

The most common factor in FOD mishaps, as is true in all other types of accidents, is the human element. Failure to properly account for tools and secure objects, haste, and inattention are only some of the human errors found repeatedly in descriptions of FOD-related mishaps.

The kinds of foreign objects that cause damage to Army aircraft vary, as do the types of aircraft damage. No part of the aircraft is immune, but let's take a look at some of the more frequent types of FOD.

Loose hardware causes many FOD mishaps each year. A journalist once described a helicopter as a machine made up of thousands of individual pieces, all of which are simultaneously trying to tear themselves apart. He was certainly right about the thousands of pieces, and it only takes one small fastener, screw, or bolt in the wrong place to begin the sequence that can tear an aircraft apart.

• A CH-47 had to have an engine change during its return to home station. During the changeout, a dzus fastener from the engine cowling FOD screen fell into the drive shaft tunnel. No one knew the screw was there until the aircraft stopped for fuel and the crew chief found scoring on the drive shaft. The drive shaft had to be replaced. Luckily the crew chief found the fastener, averting a possible disaster.

• While hovering to takeoff, an AH-1 experienced four compressor stalls. A screw head found in the compressor section had damaged six compressor blades.

Policing of runways and airfields is essential to the prevention of FOD. Thorough FOD walks and routine removal of loose objects will greatly reduce damage caused by pieces of plastic, rocks, and other items inadvertently left on airfields.

• While a U-21 was taxiing, the crew heard a loud noise near the No. 2 engine. Pieces of the concrete ramp had broken at the joints and were picked up by the propeller blades.

• A UH-60 made an instrument approach and roll-on landing. When the aircraft touched down, the right tire blew out. A set of car keys that had been lost on the runway had punctured the tire.

Unsecured items in aircraft cause several mishaps each year. Compliance with published procedures, would prevent mishaps of this type.

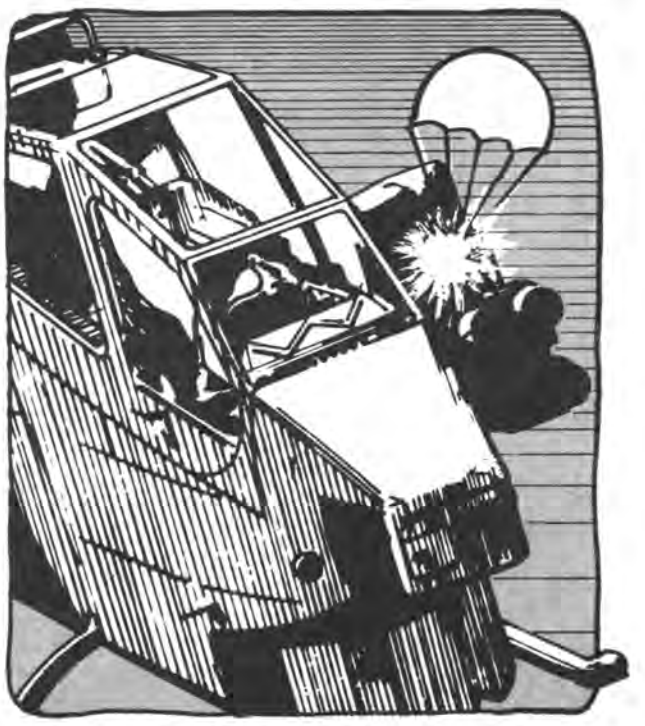
• An AH-1 was engaged in a night aerial gunnery exercise. During takeoff after rearming, the pilot noticed his airspeed indicator wasn't working. A steel combat helmet stored behind the pilot's seat had broken the plastic pitot line.

• During flight, the crew of an OH-6 heard a loud, explosive bang. After landing, a dent in the tail rotor blade was discovered. The pilot had failed to secure a seat cushion, and it blew out and hit the tail rotor.

Water, trash particles, and objects in fuel and fuel systems can cause mishaps.

• A UH-1 was being test flown. While the aircraft hovered, engine oil pressure began fluctuating and engine oil temperature rose rapidly. During teardown analysis, a screw and two washers were found in the line from the oil pump to the oil thermal valve assembly. The restriction in the oil line caused back pressure that resulted in failure of a gasket inside the oil pump. This caused the fluctuation in oil pressure and increase in oil temperature. Maintenance personnel had failed to cap the line during disassembly.

• During runup, an OH-58's engine oil pressure and torque went to zero. An oil sample bottle cap was found in the engine oil reservoir.



Panel markers, commo wire, parachute flares, and other debris are hazardous to aircraft operating in tactical training sites.

• An AH-1 was participating in an exercise over an artillery impact area. While the aircraft was en route to a firing position, a parachute from a 155mm flare was picked up through the rotor system. The parachute and spent flare damaged the main rotor blade erosion boots and one tail rotor blade.

• A UH-60 was damaged when panel markers tore loose from the ground and struck its main rotors during landing at a field site.

It is never safe to throw any kind of object in the vicinity of an operating aircraft.

• A UH-1 had landed in an unimproved area. The IP noticed a piece of metal tubing lying next to the aircraft. When he picked it up and tossed it away from the aircraft, it flew up into the rotor system and damaged the leading edge of a main rotor blade.

• A passenger on a UH-1 dropped a canteen as he got out of the aircraft. The crew chief picked up the canteen and threw it away from the aircraft, but the canteen was drawn up into the rotor system where it damaged one of the rotor blades.

Tools, shop towels, and other items associated with toolboxes cause several high-cost mishaps each year. Toolbox inventory is one of the best weapons maintenance personnel have in the war on FOD. The following cases emphasize that not just maintenance personnel but crew chiefs and pilots must always be on the alert for foreign objects. ►

FOD is everybody's business

• A UH-1 was hovering while the crew conducted an engine response check. The aircraft experienced a compressor stall, lost power, and successfully autorotated. The engine, both gearboxes, output quill, and tail rotor hub were damaged because a crew chief left a rag in the bellmouth housing area and it was drawn into the engine.

• While an AH-1 was hovering to park, the tail rotor pedals would not move forward of the neutral position. A flashlight was found in the aft cell compartment beneath the tail rotor stability control augmentation system servo actuator.

When people neglect to secure cowlings or rotor blade tiedowns, FOD is a natural result. In other cases, people working around aircraft sometimes fail to secure their equipment or forget that an operating helicopter can pluck towels out of pockets or hats off heads. And, unless FOD cans are securely covered, the trash they contain may cause FOD to aircraft.

• During takeoff, the main rotor tiedown on an OH-58 was blown through the tail rotor system. The soldier acting as fireguard placed the tiedown over the aircraft's tail cone and forgot it was there.

• While the crew of a UH-60 was conducting engine runup before a mission, the aircraft's rotorwash blew an unsecured hand cart into the tailboom of another aircraft. A crew chief had used the cart to move his toolbox to the aircraft parking area, and he failed to secure the cart after removing the box.

• While a MOC was being performed on a CH-47, a shop towel was drawn from a mechanic's pocket into the inlet of the No. 2 engine. Before the aircraft could be shut down, extensive damage had been caused.

• During runup, the pilot of a UH-60 noticed FOD flying out of an FOD can. During a HIT check, an unusual whistling noise was heard from the rotor system. After shutdown, a shop towel was found wrapped around the deice harness on the main rotor blade. The FOD can was overfilled and the spring securing the top was broken.

Not only is FOD expensive in terms of damaged aircraft, it can cause injuries to people.

• A soldier in the host-country's army was struck and killed by a piece of wood that had been picked up and blown through the air by a helicopter's rotors.

• During a MOC, a screw was drawn into the tail rotor and thrown toward the front of the aircraft. It struck a soldier who was standing near the aircraft's engine. He lost two days of work because of injuries to his face.

FOD is everybody's business. If FOD prevention is going to work, everybody in the unit must be on the lookout and take responsibility for removing hazards that could cause FOD. □

FY88 Class A Mishaps
through 27 July

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	4	13	4
4th Qtr	July	2	1	5	0
	August	5		1	
	September	3		0	
	Total	38	26	39	37

FLIGHTFAX

Aerospace FOD conference to be held

How big a problem is foreign object damage (FOD) to aircraft? It's big enough that the U.S. Air Force's Aeronautical Systems Division Safety Office at Wright-Patterson AFB, Ohio, is hosting an aerospace FOD conference 14-16 September in Fairborn, Ohio. These conferences are held twice a year, in the spring and fall, and this is the eighth such conference to be hosted by various aerospace organizations. In addition to military representatives, attendees include other government agencies such as NASA, commercial airlines, contractors, and other aviation industries.

One of the objectives is to provide a communication link so the aerospace industry will continue to profit from the FOD-related experiences of people attending the conference. The meetings are also aimed at sharing successful techniques to reduce foreign object debris and damage. Demonstrations of equipment, such as a mechanical FOD sweeping device, have also been included in previous conference agendas.

Anyone interested in attending the September conference should contact either Danny Tipton, ASD/SEG, Wright-Patterson AFB, OH, 45433-6503 (AUTOVON 785-4212) or Gayle McCormick, Textron Aerostructures, Department 421, P.O. Box 210, Nashville, TN 37202 (commercial 615-361-2008). □

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Marvin E. Mitchiner, Jr.
Colonel (P), Aviation
Commander, Army Safety Center

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A

H series - During mountain operations at low altitude and low airspeed, aircraft began losing rpm. The aircraft crashed on a steep slope. The copilot and one passenger were injured. 8834

UH-1 Class D

H series - During preflight, crew chief and pilot checked drive shaft and closed the tail rotor drive shaft cover. Cover was damaged when it came open during flight.

H series - Pilot terminated approach to an OGE hover. While lowering slingload consisting of 20 5-gallon water cans, PIC unintentionally pressed the cargo hook release button. The load fell about 10 feet to the ground.

H series - Crew had completed an NOE training flight and landed so that a chemical dispenser could be loaded on aircraft. Throttle was reduced to 5500 rpm. The PIC got out of the aircraft to supervise loading and securing the dispenser, and the pilot remained at the controls. The PIC got back in the aircraft and began increasing throttle to operating rpm. Both pilots had their attention outside the aircraft and the PIC did not notice when throttle reached the normal stop position at 6600 rpm. When he looked at the tachometer, rpm was at 7100.

UH-1 Class E

H series - The PIC got out of the aircraft, leaving the pilot to complete shutdown. The engine was off, but the blades were still turning when, without either pilot's knowledge, the crew chief climbed on top of the aircraft and began wiping oil from the swashplate area. The rag he was using caught in the turning swashplate and his hand was cut when it was dragged across a projection on the aircraft.

H series - As aircraft was returning to parking after completing its mission, the IP felt unusual vibration in flight controls. Both pillow blocks were empty.

UH-60 Class A

A series - Pilot picked aircraft up to a hover and nose turned right 180 degrees. The aircraft drifted left and its tail rotor struck a parked aircraft on the ground. The aircraft turned another 180 degrees and landed on its left side. There was one minor injury. 8835

UH-60 Class D

A series - During short final, PIC decided a vehicle was too close to the landing site. He slid the aircraft to the right and landed in tall grass. During postflight, a hole was found in the underside of the aircraft.

A series - Aircraft was flying down a river to a refueling point when it struck an unmarked wire about 20 feet agl. Poles were not visible on either side of river.

D series - While air taxiing for flight lineup, crew felt a bump and buffeting in the controls. Crew hovered several minutes, but noted nothing unusual and continued with the flight. Later, they noticed a noise, but the aircraft seemed normal. After landing, they found the antiflap had broken off and struck one of the main rotor blades.

Attack helicopters

AH-1 Class E

E series - Aircraft was at a 3-foot hover when the crew felt uncommanded right cyclic input and aircraft began a roll to the right. PIC increased collective and moved into forward flight. Roll cannon plug on stability control augmentation system had backed off. Crew failed to turn off affected SCAS channel as outlined in dash 10 emergency procedures.

S series - When power was reduced to 35 psi during flight, the crew heard a rumbling sound from the engine, the airframe vibrated, and the aircraft yawed slightly left. Two or three muffled reports were heard from the engine and N2 decreased momentarily. Caused by failure of engine fuel control.

AH-64 Class E

A series - Aircraft was on final approach at 50 feet agl. Collective stuck and could not be increased to arrest rate of descent. IP took controls, neutralized cyclic, and made a hard landing.

A series - Tail rotor pedals developed high-frequency vibration when aircraft was started. As NP increased, so did vibration. High-frequency vibration occurred with either engine or APU on line. Caused by failure of drive flange.

A series - Prior to takeoff, IP noticed collective lever had crept up slightly. As he pressed down on collective, he inadvertently touched the wing store jettison button and all four wing stores were jettisoned.

Observation helicopters

OH-58 Class D

A series - The PIC was serving as battle captain while supporting elements of armored cavalry. The aircraft was in a 50-foot OGE hover observing ground elements. The pilot allowed the aircraft to drift into a tree.

OH-58 Class E

C series - Copilot induced an excessive roll rate when he attempted to pick aircraft up to a hover while under NVGs. As the aircraft slid right and began to roll, the copilot applied left cyclic and reduced collective. A resulting hard landing induced spike knock.

C series - Aircraft was returning to airfield after a maintenance test flight. During cruise flight at 1,000 feet agl, 90 KIAS, N2 rpm dropped to 80 percent and engine-out light and low rpm audio came on. The pilot lowered collective, the needles split, and he entered autorotation. Attempts to increase rpm with increase/decrease switch resulted in only 85 percent rpm. Aircraft made an uneventful landing. Caused by failure of accumulator.

Maintenance

UH-1 Class E

H series - Tail rotor gearbox chip detector light came on and aircraft landed. Wire to 42-degree gearbox chip detector light was pinched under edge of gearbox cover. When wire was freed, light went out.

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

Followup information on accidents previously reported

UH-1 Class A

Reported in 5 Aug 87 issue as 8747 - During a night vision goggles (NVG) flight, the aircrew inadvertently entered instrument meteorological conditions (IMC). The crew initiated the proper emergency procedures by turning to an appropriate heading away from the thunderstorm and indications are that they were able to exit the thunderstorm and regain visual meteorological conditions (VMC). The aircraft was in a level attitude, flying at cruise airspeed, when it struck the side of a hill 38 feet below the ridgeline. The PIC and copilot probably were so intent on maintaining VFR and looking for ground references that they failed to monitor their altimeter and maintain the altitude required to provide terrain clearance. Only one of the seven occupants survived the accident.

UH-1 Class A

Reported in 10 Jun 87 issue as 8738 - Aircraft was on a tactical training mission. The aircraft landed, and a field artillery forward observation party exited the still-operating aircraft. One of the party then left the assembly area and returned to the helicopter. He probably did not hear a shouted warning from another soldier because of the noise from the aircraft's engine and rotor. As he attempted to go around the rear of the helicopter, he was struck and killed by the aircraft's tail rotor. Members of the party had been instructed by the section chief not to approach a parked or hovering helicopter from the rear. They had also been told to wait at the assembly area until the helicopter had departed before returning to the landing point to recover additional equipment.

UH-1 Class C

Reported in 22 Apr 87 issue as 8727 - Downgraded from Class B. During approach into an improved confined area, copilot chose one of four built-up concrete helipads and planned a termination to the ground to avoid possibility of blowing dust. When the aircraft touched down, only the front portion of the skids was resting on the pad. The aft part of the skids projected over a 19-inch dropoff from the concrete to the ground. When the copilot lowered collective, the aircraft rocked aft and the aft portion of the skids struck the ground. The copilot applied full forward cyclic, increased collective, and the aircraft left the ground and assumed an extremely nose-low attitude. Both the copilot and pilot applied aft cyclic and lowered the collective, and the aircraft struck the pad slightly nose low. The skids collapsed and the aircraft came to rest upright on its fuselage.

UH-1 Class C

Reported in 20 May 87 issue as 8735 - Downgraded from Class B. The aircraft made an uneventful pinnacle landing to drop off passengers. The engine was shut down, but strong winds deflected off the steep side of the mountain below the helicopter caused the main rotor to continue to turn. While the crew waited for the winds to abate and allow coastdown of the rotor, a strong upward wind gust caused the main rotor to flex down and sever the aircraft's tail rotor drive shaft in the vicinity of the 42-degree gearbox. The pilot had followed prescribed procedures by applying cyclic input into the wind, but rotor rpm had decreased to the point that the control inputs were ineffective. Strong updrafts caused the main rotor to continue to rotate for another 3 hours before it could be secured.

UH-60 Class B

Reported in 25 Feb 87 issue as 8720 - Pilot misjudged clearance from obstacles in landing area, and main rotor blades struck an obstruction during touchdown. Pilot executed a go-around and flew aircraft to a safe landing zone. Three main rotor blades were damaged beyond repair.

AH-1 Class A

Reported in 29 Apr 87 issue as 8729 - During an NOE training flight at about 20 feet above trees, at 20 KIAS, the aircraft lost power. The IP got on the controls with the student and both pilots increased collective pitch in an attempt to achieve a minimum rate of descent. The aircraft descended 80 feet, vertically through the trees, coming to rest in an upright position. The helicopter was destroyed, but the two crewmembers escaped with minor injuries. The aircraft's engine had ingested a spacer sleeve, which caused complete destruction of the compressor section and subsequent engine failure. Prior to failure of the engine, the two hexagon cap screws that retain the oil seal retainer in place in the reduction gear assembly, and the bearing support liner, fractured due to fatigue. Fretting corrosion on the first few threads under the head of the screws and deformation of the threads in this area suggests the screws may not have held the liner securely. Resulting cyclic stress in the parts likely caused them to fail. When the cap screws and liner failed, the reduction gears probably shifted and became misaligned. This probably would have resulted in vibration which could have dislodged the spacer sleeve that had previously been lodged somewhere in the engine. When the spacer sleeve was ingested, the compressor blades and vanes were damaged, and the engine failed. Origin of the spacer sleeve found in the engine could not be determined.

AH-1 Class B

Reported in 17 Jun 87 issue as 8740 - Aircraft was hovering 10 feet above 50-foot trees while preparing to engage simulated targets. The PIC in the back seat was on the controls. The crew heard three loud bangs, felt vibrations, and the aircraft yawed first left then right. The pilot reduced collective and applied cyclic trying to reach an area of smaller trees. The aircraft settled into the trees with decreasing rpm and came to rest in an upright position. A second stage compressor blade had broken in the blade root area, causing extensive damage to the first and second stage compressor section and the variable inlet guide vanes. As a result, the engine experienced compressor stall followed by complete engine failure. The compressor blade failed as a result of fatigue. The blade showed evidence of pitting caused by ingestion of sand while operating in a desert environment.

AH-64 Class A

Reported in 28 Jul 87 issue as 8746 - The aircraft was in an out-of-ground-effect hover at an altitude of 50 feet when the crew noticed a peculiar odor and the environmental control unit began fluctuating. Then the master caution and shaft-driven compressor lights illuminated. Within seconds, fire lights for both engines came on. The IP, who was in the front seat, immediately began a descent, landed, and pulled both power levers off. He activated both fire handles, and the student and IP got out of the aircraft and ran to a safe area. Fire trucks arrived within minutes but were unable to extinguish the fire before the aircraft was completely destroyed. Failure of a bearing and oil slinger led to subsequent failure of the shaft-driven compressor. The ensuing friction ignited transmission oil and caused the in-flight fire that destroyed the aircraft. Evidence indicates the aircraft was on fire before the warning light for the shaft-driven compressor came on. The speed at which the bearing turns, during normal operation has resulted in an extremely high rate of failure of the shaft-driven compressor in the AH-64.

U-8 Class C

Reported in 17 Dec 86 issue as 8712 - Downgraded from Class B. Landing gear failed to retract during climbout. Crew was unable to manually extend gear due to binding in the system. Floorboards above landing gear motor and clutch were removed, but efforts to free system were unsuccessful. Aircraft landed with gear indicating "in-transit." Both engines were shut down and propellers feathered during short final. □

Attention ASOs

Keeping an aviation unit FOD free takes effort, but it can be done. Chapter 4 of AR 385-95 outlines the requirements for an FOD prevention program. The regulation also includes a guide for developing a standing operating procedure (SOP) for FOD prevention, and it provides an FOD control checklist. In addition, the following tips can help you keep your unit FOD free.

• Ensure personnel working on and around aircraft understand the hazards to aircraft of such things as cigarette lighters, car keys, coins, credit cards, and other items normally carried in pockets. These items turn up in engines, fuel tanks, and other parts of the aircraft where they can do serious damage.

• Mark stanchions and other items used on ramps with reflective tape. This will help aircrews operating in the dark see and avoid them.

• Caution personnel working in runup areas that ladders should be folded and laid flat on the surface any time they are not in actual use. Other movable objects such as chocks and carts must be secured.

• Remind people who do not normally work around aircraft to remove caps and hats before entering an area where aircraft are operating.

• Check to ensure FOD cans are not overfilled and lids are of the "stay shut" design.

• Use tool layout sheets to assist mechanics and maintenance personnel in keeping track of tools being used on a job.

• Set up an FOD display to graphically document actual cases of FOD within the unit.

• Ensure all aviation personnel are aware of the importance of plugging or capping aircraft openings, ports, lines, hoses, and ducts to prevent introduction of foreign objects.

• Stress the importance of securing cowlings, covers, and tiedowns before operating aircraft.

• Develop a presentation for safety meetings to illustrate damage caused by failure to secure objects in aircraft (helmet bags, clipboards, or toolboxes).

• Check mechanical sweeping operations to ensure they are effective and are conducted regularly. When mechanical aids are not available, conduct thorough FOD walks to remove foreign objects from runways, taxiways, hover lanes, and parking areas.

• Ensure personnel in supported units understand the hazard to aircraft from panel markers, broken tree branches, and other debris in tactical environments, particularly during hover, landing, and takeoff phases of flight.

• Use the awards program to promote FOD awareness. Supplement formal awards with additional recognition of individuals whose efforts contribute to FOD prevention. For example, one unit in Europe held a contest to select an FOD-sticker design (see illustration). The winner received an expense-paid trip for himself and his wife. When an unexpected check of a mechanic's toolbox shows all tools are accounted for, one of these stickers is applied to the toolbox. They are also used to draw attention to outstanding work areas. □

Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 24

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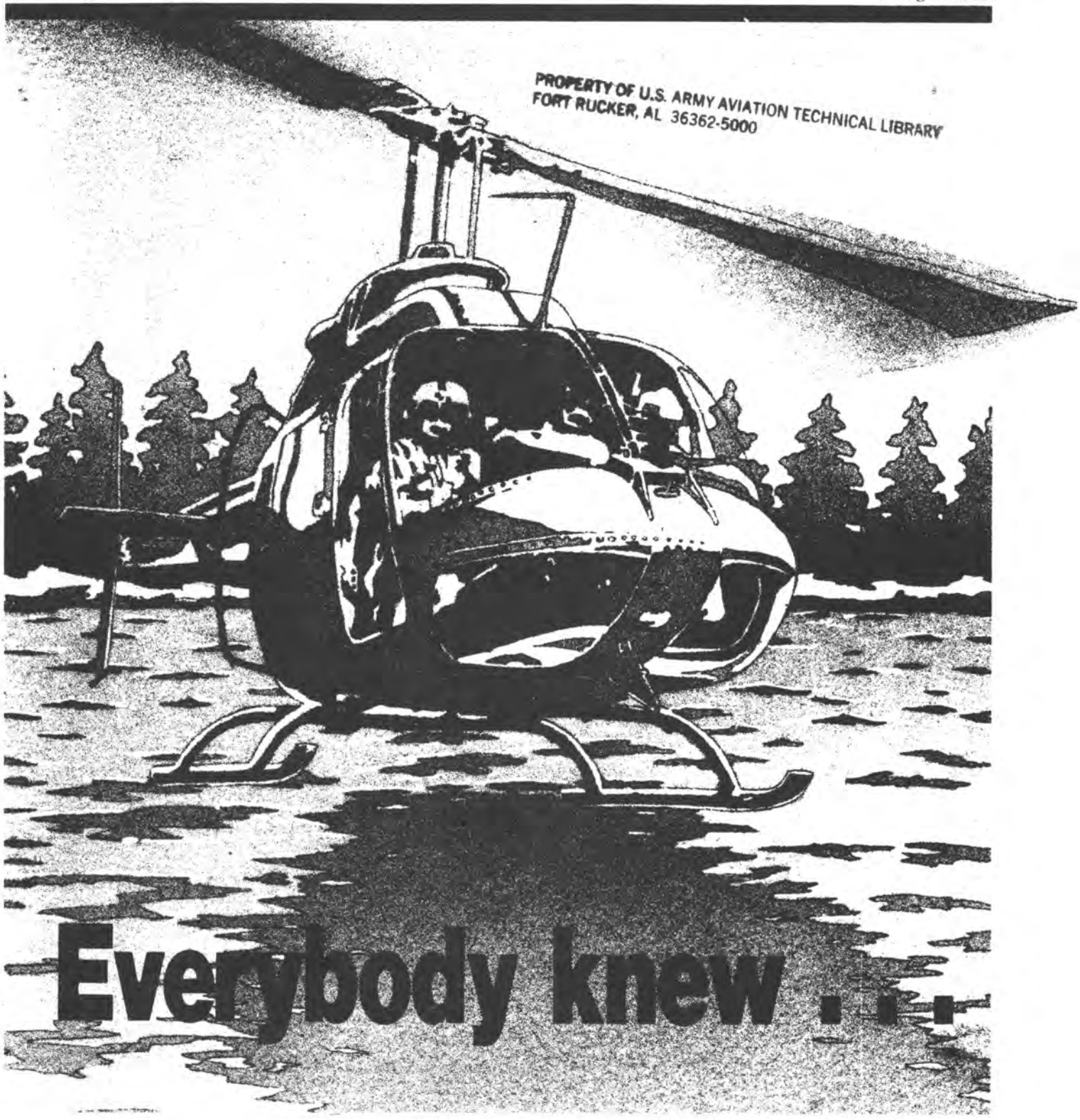

Everybody knew something like this might happen

How many times after an accident have you heard people say, "I knew something like this was going to happen?" Maybe you've said it yourself; most of us have. When there is somebody in a unit who takes risks, usually somebody knows about it. Sometimes a lot of people know about it. That was true in the following case. Everybody in the unit knew about how this PIC flew, but nobody stopped him. Eventually, he took one chance too many and died in an accident.

The accident didn't just happen on the day he crashed an OH-58 into a large lake. It really began long before then. It had its roots in the kind of flying he had been doing for the past year and possibly even longer than that. In the past 12 months, he had had four operational hazard reports (OHR) filed against him in addition to at least two verbal reports about his flying.

The other aviators knew

Several aviators had reported the PIC for his "cowboy" style of flying. They called him a "hot dog," and some of them refused to fly with him again. OHRs mentioned seeing him accelerate down a runway at 60 to 70 knots during takeoff from an airfield that was below VFR minimums. Two pilots reported him for placing the helicopter in an extremely nose-low attitude during takeoff. Another aviator, who was the pilot of the lead aircraft in a flight of five OH-58s, had to execute a go-around to avoid this PIC's aircraft when it taxied onto the runway in front of him. The PIC of the taxiing aircraft then brought his aircraft to a hover as the third aircraft in the flight of OH-58s terminated approach, endangering the landing aircraft.

The crew chiefs knew

Some of the enlisted men in the unit enjoyed the "thrill" of flying with this PIC. They liked his aggressive style of flying; they found other aviators boring by comparison.

The standardization officer, safety officer, and the platoon leader knew

Not only were they aware of the OHRs and other reports about the PIC's flying, they had heard rumors circulating in the unit about other incidents. They also knew he had had to have a period of extra training before being appointed a PIC. They had discussed the problem among themselves, and after the second verbal OHR (the last of a total of six) they approached the acting unit commander and requested that the PIC be grounded.

It wasn't done.

The unit commander knew

Although he knew about the OHRs, written and verbal, and rumors about the PIC's flying habits, the commander apparently looked at each report as a separate incident and never considered them as an indication of a pattern. When his staff recommended that the PIC be grounded, the commander decided that verbal counseling was the better route to take, although he had grounded aviators in the past for one reason or another. The unit commander had flown with the PIC in question in the past, and each time it was a "by-the-book" flight.

The accident

The mission was to provide cross-country training for the copilot, who was acting as unit commander. The aircraft took off around 0900, and the flight proceeded normally. After two stops for fuel and to eat lunch, the crew removed the doors from the OH-58 and again took off. The PIC was at the controls from the left seat. As the aircraft neared a large lake, the PIC brought the helicopter down to within 5 feet of the water and began flying along the long axis of the lake at 90 to 100 knots. After about 3 minutes, the OH-58 hit the water with explosive force and immediately sank.

History of flight

The copilot had been at the controls during the early stages of the mission, handling not only the flying, but navigation and the radios. When he began falling behind the aircraft, the PIC took over the controls and the radio, leaving the copilot to handle navigation.

When the aircraft took off after lunch, the PIC was still at the controls and the copilot was navigating. The PIC initially descended to about 30 feet above ground level, although that was below the 400-foot restriction for the OH-58A. The PIC continued to allow the aircraft to descend as it approached the border of the lake. He told the copilot to navigate a direct route back to the airfield and to handle the radio calls. While the copilot was looking at his map, the aircraft hit the water.

The copilot managed to surface and grab hold of a piece of floating debris. Two boats reached the crash site, and the crew of one pulled the copilot from the water while the other began searching for the PIC. Several days later, Navy divers recovered the PIC's body from the bottom of the lake. He was still strapped in his seat.

Why?

Why did this PIC continue to fly the way he did even after he had been reported and counseled? Why did his friends delay in reporting his unsafe behavior? Why didn't the crew chiefs realize that a "thrill" could cost them their lives? Why didn't the unit commander see that the reports on this aviator weren't isolated incidents but signs pointing almost inevitably to an accident?

Why didn't somebody stop this aviator before he killed himself?

This accident graphically illustrates what can happen when there is a lack of "tough caring." Tough caring is people caring enough about their own professional performance and the performance of other members of their unit to police themselves and their fellow soldiers. Tough caring is also leaders caring enough to fix accountability, tighten supervision, set standards for performance and parameters for operations, and require that all operations be conducted within those parameters.

The PIC in this accident was described as a risk taker. But he has also been described as intelligent, bright, and an aviator who loved to fly. While his fellow aviators recognized his technical proficiency in the cockpit, everybody knew he was headed for trouble. Tough caring might have saved his life. □

FY88 Class A Mishaps
through 10 August

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	4	13	4
4th Qtr	July	2	1	5	0
	August	5	1	1	0
	September	3		0	
	Total	38	27	39	37

Six aviators receive Broken Wing award

The Broken Wing award is given to aircraft crewmembers who demonstrate a high degree of professional skill while actually recovering an aircraft from an in-flight failure or malfunction necessitating an emergency landing. Requirements for the award are spelled out in AR 672-74.

• **W01 Gary L. Carrola, 320th GSAC, 210th Combat Aviation Battalion, Fort Kobbe.** WO1 Carrola was flying an OH-58A on a service mission to reconnoiter a bridge site. He dropped off a passenger and headed for a refueling point to take on fuel. Arriving at the single-point refueling site, he saw a CH-47 was on the pad. He began flying in right circles at about 500 feet agl, 60 to 65 KIAS, while waiting for the other aircraft to clear the refueling point. After a few minutes, he attempted to level the aircraft with left cyclic, but the cyclic wouldn't move and the aircraft failed to respond. When he used force, the cyclic moved and the OH-58 rolled level, but then it continued to roll into a left bank. WO1 Carrola was able to maintain partial control of the aircraft with the antitorque pedals, collective pitch control, and the limited cyclic control, but he knew he had to land as soon as possible, and he was over a town surrounded by hills. The only suitable landing area he could see was a soccer field. WO1 Carrola declared an emergency and began maneuvering the aircraft toward the field. He circled, placed the aircraft out of trim, and forced the helicopter level as he began an approach. Then he saw a game had started on the field. He selected an open spot and continued the approach but, as the aircraft slowed, the lack of cyclic movement made the aircraft very difficult to control. As the OH-58 touched down, its tail skid struck the ground and the aircraft rocked forward. WO1 Carrola used collective to cushion the touchdown, and the aircraft came to a stop, undamaged. The emergency was caused when an unsecured cannon plug vibrated from beneath the center console and wedged itself between the cyclic control tube and the aircraft structure.

• **CW4 Terry Bennett, C Troop, 1-9th Cavalry Brigade (Air Attack), Fort Lewis.** CW4 Bennett, a standardization pilot, was conducting a checkride for an instructor pilot in the AH-1F. The aircraft was at 1,600 feet agl when CW4 Bennett instructed the IP to perform a simulated forced landing. Rotor rpm was allowed to increase to 101 percent to see how the IP would react. During descent, at about 800 feet agl, both pilots felt a jolt in the aircraft which they thought was due to turbulence. When rpm continued to increase, the IP was told to control rpm. He increased collective, but there was no effect on the high rpm. CW4 Bennett took the controls and noted that the collective was at least halfway up. When N2 reached 108 percent and rotor rpm rose to 110 percent, CW4 Bennett identified the problem as a high-side governor failure. He reduced throttle in an attempt to gain control of the rpm while continuing to increase collective, but there was no effect on the rate of descent, and he began a deceleration in an attempt to slow the rate of descent. At about 20 feet agl, he applied initial pitch but there was no apparent effect on the aircraft's rate of descent. The tail stinger and rear portion of the skids contacted the ground, and the aircraft bounced back into the air before again contacting the ground and coming to rest upright. There was moderate damage to the aircraft. The crew extinguished a fire near the scissors and sleeve bearing assembly which had failed and caused the engine overspeed.

• **CPT Albert E. Ryan III and CW4 Robert E. McClellan, Jr., 1st Battalion, 223d Aviation Regiment, Aviation Training Brigade, Fort Rucker.** There were three crewmembers and a technical inspector on board the CH-47C during a ferry flight over a heavily wooded area. As the master caution and No. 2 generator lights flashed on, the crew chief shouted to the pilots that the back of the aircraft was on fire. Within seconds, there was a loud explosion and the cockpit filled with black smoke and flames. The crew initiated emergency procedures, but they were unable to control the fire. The first flash of fire, which lasted about 30 seconds, shorted out all electrical systems, including the crew intercom, radios, and the stability augmentation system. The instrument panel and both pilots' helmet visors melted, and the windshields and flight instruments were obscured by the heavy smoke and soot. Unable to see or communicate with each other, the crew acted instinctively to maintain control of the aircraft while trying to vent the smoke and fumes. After about 5 minutes of flying virtually blind, the crew was able to clear the smoke and sight the ground through the side windows. CW4 McClellan, the PIC, gestured to CPT Ryan that he had control of the aircraft. CPT Ryan relinquished the controls and began searching for a possible landing site. Spotting an open area, he signaled to the pilot, and the pilot indicated that he understood. After landing, the crew had to kick the doors out in order to get out of the aircraft. They found the flight engineer, who had been hanging outside the aircraft by her harness since the initial blast of fire. She was suffering from burns and shock. The remaining person on the aircraft was killed when he fell from the helicopter while it was still about 400 feet agl. The emergency was caused when a hydraulic component failed and fluid began spraying out in the vicinity of the accessory gearbox. The atomized fluid was ignited, probably by the No. 2 generator. The aircraft was completely destroyed.

• **CPT Stephen M. Maks and CW2 Anthony Schultz, 159th Medical Company (Provisional), APO New York 09175.** The aircraft was returning from a week of providing medevac standby coverage during field training. There were four crewmembers and three passengers on board the UH-60 during the night IFR flight. CW2 Shultz was on the controls. The aircraft had been flying for about an hour, and the crew had just received a weather update, when the main rotor began an increasingly severe vibration. Realizing that continued safe flight was not possible, and that control of the aircraft was in imminent jeopardy, the crew declared an emergency and began a descent. The descent and deceleration from 130 knots did not lessen the vibration, and the aircraft continued to descend through a thick layer of clouds. It broke out at 1,000 feet agl in a small valley surrounded by rugged mountains. CPT Maks, the PIC, was familiar with the area and he elected to turn the aircraft to the left, away from a known populated area. CW2 Shultz aligned the helicopter with the only immediately available safe landing area which appeared to be a sloping plowed field. As the aircraft slowed to approach speed, the rotor vibrations and aircraft oscillations became increasingly violent. When power was applied to slow descent during approach, the rotor vibrations increased and feedback in the cyclic made it almost impossible to control. Realizing it was not practical to attempt to hover the aircraft, CW2 Shultz continued the approach to the ground. The helicopter landed in the field, which had a 10-degree right slope, with no further damage to the aircraft. Postflight inspection revealed an inflight catastrophic loss of the outboard portion of one of the main rotor blades. □

FLIGHTFAX

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D

H series - Aircraft began vibrating during flight. After test flight confirmed medium vibration, inspection of airframe revealed damaged tailboom and fuselage. Tailboom attaching mounts on fuselage would not line up correctly. Suspect tailboom was misaligned during installation, causing stress of airframe.

H series - Shortly after takeoff, PIC inadvertently pressed the cargo release button while attempting to make a radio call. Load was released from 150 feet agl.

UH-1 Class E

H series - During 25-hour inspection, mechanic removed 90-degree gearbox filler cap to take an oil sample. He failed to properly secure the cap when he replaced it, and the cap came off during flight. Aircraft was flown with oil at low level.

UH-60 Class D

A series - Small tear in lower side of tailboom was found during postflight inspection. Pilot hovered too low over slingload of gunnery targets.

A series - Hole in underside of aircraft was found during preflight. Hole appears to have been caused by landing on rock.

A series - During flight, large bird struck right side of aircraft and went through rotor system. Damage to main rotor trim tab assembly was found during postflight.

A series - During takeoff, IP told the pilot to slow the aircraft. When cyclic was placed in aft position, crew felt vibration and banging in the controls. Caused by failure of antiflap bushing.

A series - During takeoff, crew felt vertical vibration. Caused by failure of antiflap stop assembly.

Attack helicopters

AH-1 Class E

F series - Copilot began shallow right turn during NVG mission. Glare from aircraft lights prevented crew from seeing aircraft was closing on trees. Pilot took the controls and applied cyclic and collective to avoid trees, and aircraft overtorqued for 1 second.

F series - Engine chip detector light came on during takeoff and aircraft landed. After chip detector was cleaned and MOC was performed, aircraft was released for flight to home base. While at 1,000 feet agl, 100 KIAS, engine chip light came on, accompanied by reduction in engine noise. Pilot entered autorotation and landed with partial power. Engine failed as aircraft touched down.

S series - When collective pitch was applied, N1 and N2 rpm decreased. There was no response when collective was lowered and rpm increase/decrease switch was used to increase rotor rpm to 6600. When collective was again applied, the same thing happened. During long final, rpm couldn't be sufficiently increased with increase/decrease switch. When power was applied on short final to slow descent and airspeed, there was a corresponding drop in rpm. At 100 feet agl, 30 to 40 KIAS, PIC turned governor switch to emergency position, and made an uneventful landing. PIC did not have throttle full open.

Cargo helicopters

CH-47 Class D

D series - Crew attempted four-wheel taxi with ramp extension out. When aft wheels were inadvertently lifted from the ground, aft portion of aircraft slid sideways, causing ramp extension to be torn from ramp.

D series - While hovering along ridgeline of mountain, at 12,000 feet, ramp struck a rock outcrop. Enlisted crewmember clearing rear of aircraft failed to realize aircraft was too close to rocks.

D series - Aircraft picked up an M198 howitzer during NVG mission. Engine torques split as aircraft was brought to 40-foot hover. Copilot's attempt to match torques failed, and emergency power light began flickering. During descent, torque continued to split and power turbine inlet temperature (PTIT) reached 890° C. Load was placed on ground and slings released. Faulty PTIT gauge on No. 1 engine caused PTIT fluctuations and flickering of emergency power light. Cause of torque split is still under investigation.

CH-54 Class E

A series - When load (a C-47 aircraft) was picked up, the C-47's tail was lower than it should have been. Load was set down and sling on tail section was shortened. After satisfactory takeoff, aft hard point, to which sling was attached, tore loose from airframe and caused the load to swing forward. Flight engineer released load and aircraft landed. Aft hard point beam failed because of excessive corrosion.

Observation helicopters

OH-58 Class E

A series - During OGE hover, aircraft shuddered and yawed left and right. Torque fluctuated and N2 dropped to 99 percent. IP thought he was experiencing loss of tail rotor effectiveness or possible engine underspeed, and he turned into the wind. All gauge indications and directional controls returned to normal. As IP began moving aircraft to landing site, engine failed. IP successfully autorotated between stumps and trees and made an uneventful landing. Caused by failure of fuel pump assembly.

A series - IP was demonstrating simulated engine failure from 800 feet agl. Initiating a steady state autorotation, he focused his attention on the landing area. When the IP heard his rotor rpm begin a rapid increase, he applied collective. The pilot noticed the aircraft was close to overspeed and told the IP. The IP initiated a power recovery and returned to home base. IP's inattention to N2 guage allowed rpm to exceed operating limits.

A series - Pilot had aircraft in stabilized hover at 2 feet agl. IP noticed torque gauge was unusually stable at 52 psi and torque did not correlate with collective movement. When collective was lowered all the way during landing, torque decreased at an extremely slow rate. Caused by failure of fuel control assembly.

C series - During hover taxi for takeoff, copilot noted rpm droop and heard low rotor audio. PIC increased throttle to full-on position and rpm recovered. Rpm again drooped as aircraft continued to taxi, and aircraft landed. N1 control was out of rigging.

Fixed wing

OV-1 Class D

D series - During simulated single-engine landing, pilot applied excessive braking pressure, causing left main tire to blow out.

U-21 Class D

A series - During paradrop mission, soldier hit left inboard flap assembly as he jumped.

C-12 Class E

F series - During cruise flight at 12,000 feet msl, 200 KIAS, master warning and left bleed-air-failure lights came on. After landing, pin hole was found in polyflow tubing between right engine and fuselage. Inspection revealed leak was actually on right side of bleed-air system. Switches for bleed-air warning were apparently wired backward at factory.

OV-1 Class E

D series - During simulated single-engine landing, pilot noticed aircraft vibrating during rollout. Flat spot on tire indicated pilot may have inadvertently tapped the toe brake, causing tire to skid.

D series - During cruise flight, pilot saw sparks coming from No. 1 engine cowling. Caused by failure of generator drive shaft.

Maintenance

UH-60 Class E

A series - No. 2 engine would not start during runup. After three unsuccessful attempts, maintenance found ignition wiring harness was improperly installed.

AH-1 Class D

F series - After 2½ hours of uneventful flight, mechanic found a screwdriver under No. 4 tail rotor drive shaft. Drive shaft and hanger bearing clamp were damaged.

CH-47 Class E

D series - Improper installation of rear-mounted fire extinguisher allowed it to chafe hydraulic line. When line broke, hydraulic fluid sprayed into cargo compartment.

T-42 Class E

A series - When aircraft entered traffic pattern, fuel could be seen streaming from aft portion of No. 1 engine nacelle. Fuel return line had come loose at fitting, and fuel was ejected when power was reduced. Aircraft's wings had recently been removed for repair. Suspect fuel return line fitting was only hand tightened, and vibration of aircraft caused it to come loose.

Safety messages

• Safety-of-flight technical message concerning expanded coverage of one-time inspection of pivoting and swiveling servo cylinders on CH-47D aircraft (CH-47-88-14, 212200 Jul 88). Contact: Leo Smith, AUTOVON 693-9089, commercial 314-263-9089.

• Safety-of-flight maintenance mandatory message concerning one-time inspection of recently overhauled deice generators on OV-1/RV-1 aircraft (OV-1-88-02, 192130Z Jul 88). Contact: CPT Greg Adams, AUTOVON 693-9089, commercial 314-263-9089.

• Safety-of-flight maintenance mandatory message concerning life extension of the MK-J5D ejection seat rocket motor, NSN 1377-00-244-1578, DODIC M447 lot number UPC82J001-003 only, on OV-1/RV-1 aircraft (OV-1-88-03, 202100Z Jul 88). Contact: Lyell Myers, AUTOVON 693-9089, commercial 314-263-9089.

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

U.S. ARMY SAFETY CENTER

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Marvin E. Mitchiner, Jr.
Colonel (P), Aviation
Commander, Army Safety Center

STACOM

Recording "imminent danger" flight time

Army aviators are flying combat-like missions in imminent danger zones. Presently, they are not allowed to report "combat time" on DA Form 2404-12. This restriction is based on AR 95-1: Army Aviation: General Provisions and Flight Regulations, paragraph 1-19, "Definition of combat—...against the enemy within a designated zone." Accordingly, these missions are now being recorded as service or training. To accurately depict the type mission flown and identify crewmembers who have performed under combat-like conditions, a new mission category will be established to reflect flight in areas where the risk of hostile fire is significant. The new mission category will be "D" for imminent danger. It will be officially designated through the same methods that designate "imminent danger" special pay in DOD Pay Manual, chapter 10, section 11007.

The following changes are retroactive to 25 August 1987.

- FM 1-300, page 7-1, paragraph 7-6b, under mission symbols, "X—Experimental Test Flight," add "D—Imminent Danger."
- AR 95-1, page 4, paragraph 1-19b, under mission symbols, add "(3) D—Imminent Danger." Adjust (4) through (7) appropriately.

Low-pressure, high-altitude qualification training

TC 1-210: The Commander's Guide, paragraph 3-14b(2) requires **all** aviators who have undergone low-pressure, high-altitude qualification training to undergo refresher training every 3 years. Aviators who have attended the Initial Entry Rotary Wing course have completed this qualification training.

The U.S. Army Aeromedical Research Laboratory (USAARL) indicates that qualification training and, thus, refresher training only apply to crewmembers who perform missions in pressurized aircraft and/or above 10,000 feet pressure altitude in unpressurized aircraft.

Individual waivers to this requirement may be made at no lower than installation-commander level. Unit waivers may be made at no lower than MACOM-commander level (AR 95-1, paragraph 3-10).

A change to TC 1-210, paragraph 3-14b(2), has been submitted to the Aviation Training Brigade, U.S. Army Aviation Center, to reflect the USAARL guidance.

Logging time flown by DACs in Army aircraft

Q. Is time flown in Army aircraft by Department of the Army civilians (DAC) recorded on DA Forms 759 and 759-1 as military or civilian time?

A. Time flown in military aircraft (leased or owned) by Army and DAC aviators will be recorded on DA Forms 759 and 759-1 as **military** flight time. Flight time from authenticated civilian log books **may** be recorded in section B, DA Form 759, but there are no provisions for time flown in civil aircraft to be recorded on DA Form 759-1.

STACOM 129 10 August 1988

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Michael H. Abbott
Colonel, Aviation
Director, DES

Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 25 24 August 1988

UH-60 update

The UH-60 Black Hawk has been in the Army aviation inventory now for more than a decade. Capable of transporting a squad of combat-equipped troops, the UH-60 is a vital part of the Army's air assault capability, and from its inception, this aircraft has had built-in growth potential.

Much of the Black Hawk's success has been its adaptability for new roles and missions, including serving as a firing platform for Hellfire missiles and Volcano mines. Additional operational capabilities can be obtained by mounting the External Stores Support System (ESSS) on the aircraft.

Not only was the UH-60 designed with significant safety features such as increased crash survivability through a combination of improved landing gear design and crashworthy seats, it can safely operate with only one of its three hydraulic systems or one of the three generators functioning.

Making the UH-60 a safer aircraft is an ongoing process. Improvements include wire strike protection and night vision goggle (NVG) compatible lighting as well as retrofit for main rotor and tail rotor deice kits and fuel boost pump. A corrosion prevention program includes improved sealing, riveting, and painting techniques as well as replacing over 150 components on the aircraft with more corrosion resistant components. An inlet particle ➤

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UH-60 update

separator to reduce sand erosion on the auxiliary power unit is another part of the continuing effort to make the Black Hawk safer.

More recent advances include installation of magnetic-tape flight data recorders in UH-60s. If a UH-60 is involved in an accident, information provided by these recorders can give additional focus and direction for conducting investigations and determining accident causes. The second phase of this program provides for development of a solid-state flight data recorder capable of recording even more information about the aircraft and its history of flight.

Work is also under way to apply state-of-the-art technology to the design and test of protective shielding of the UH-60 from effects of extremely high levels of electromagnetic interference (EMI).

Of the 38 Class A Army aviation accidents occurring in FY 87, 7 involved UH-60s.

• While performing a standard level performance test flight for adaption of the Vulcan Weapons System to the UH-60 aircraft, contractor test pilots experienced loss of tail rotor thrust. The aircraft was autorotated into 35-foot trees, coming to rest upright.

• During a two-aircraft formation training flight, the lead UH-60 flew off course and entered a protected zone and traffic pattern at a civilian airport. When the lead aircraft made an unannounced abrupt right turn to avoid a glider, the second UH-60, which was following closely behind the first aircraft, entered a steep right bank and crashed.

• During rappelling operations at 80 feet agl, a tiedown assembly for the rappelling rope came loose from its mounting and a rappeller was killed when he fell to the ground. The rope had not been attached to the secondary anchor point.

• While attempting a lead change during the return flight from an NVG training mission, the overtaking aircraft drifted left and collided with the lead aircraft.

• When the master caution and No. 2 primary servo lights came on during an NVG training flight, both pilots focused their attention inside the cockpit. The aircraft began descending, and the pilot was unable to regain visual references because of the snow-covered terrain and the aircraft's low altitude. As he attempted to transition to instruments, the aircraft hit the ground.

• While in cruise flight on an NVG tactical mission, a UH-60 crew unexpectedly encountered a set of power transmission lines in their flightpath. They attempted to fly beneath the lowest strand of wires, but the main rotors struck the wire. The aircraft hit the ground in a nose-high attitude.

• The remaining UH-60 crashed when the crew became disoriented while operating over calm water with NVGs.

During the first three quarters of FY 88, there were four UH-60 Class A accidents.

• During approach to a field site, with the aid of AN/AVS-6 NVGs and with the aircraft's searchlight on, the PIC of the lead aircraft in a flight of four terminated his approach to a hover. The crew lost visual references in blowing sand and dust caused by the UH-60's rotors and the aircraft drifted. The tail gear and right main gear hit the slightly elevated terrain, inducing a dynamic rollover condition. The aircraft rolled right and came to rest inverted.

• The crews of three UH-60 helicopters were using AN/PVS-5 NVGs while transporting a platoon of soldiers from a firing range to a cantonment area. As the lead aircraft approached a mandatory checkpoint, another UH-60, which was on an NVG qualification training mission, arrived at the same checkpoint. The aircraft collided in mid-air. Indications are that neither pilot saw the other aircraft before collision.

• The crew of a UH-60 were wearing NVGs as they hovered the aircraft down a runway. Another UH-60, whose crewmembers were also wearing NVGs, hovered out of parking. The aircraft collided over the runway.

• When a UH-60 was picked up to a hover, the aircraft's nose turned right 180 degrees. The aircraft drifted left, and its tail rotor struck a parked aircraft. After turning another 180 degrees, the aircraft hit the ground and came to rest on its left side.

The only common factors in these accidents appear to be those related to NVG limitations and problems associated with aviation night operations. There are several ongoing actions to address these problems, including—

• Continued fielding of the ANVIS-6 NVG to forward deployed aviation units. By third quarter FY 91, all Army aviation units at corps level and below will have the ANVIS-6 goggles.

• Incorporation of crewmember-teamwork training into formal courses of instruction.

• Establishment of central proponency for NVG doctrine and training with the Aviation Training Brigade, U.S. Army Aviation Center.

• Development of standardized procedures for multi-ship NVG operations, including NVG formation lead-change procedures, crew requirements, and specific aircraft tasks and maneuvers to include night and NVG considerations.

• Development by the U.S. Army Air Traffic Control Activity at Fort Rucker of a plan for improved airspace management in high-density locations. The plan will include standardized procedures to address flight following, corridors, and altitudes.

• Development by the U.S. Army Aviation Systems Command of a Night Vision Materiel Master Plan that will incorporate all facets of the aviation night vision program. The master plan will encompass command responsibilities, NVG, avionics and aircraft lighting, crew protection, and research, development, and acquisition planning for the night vision program.

• Development by the Aviation Center of a night-vision-device exportable training package for nonrated crewmembers, to be incorporated into unit training programs. The package covers qualification, mission, and continuation training for all nonrated crewmembers: crew chief, flight engineer, and medical technicians.

• Production of two videotapes on aviation night operations. The first of the two tapes, produced jointly by the Army Aviation Center and the Army Safety Center, is targeted at operational pilots and focuses on NVG capabilities and limitations. The second tape is targeted at aviation unit commanders and focuses on development of an SOP for night operations for a typical UH-60 unit.

These actions addressing the major factors contributing to night flying accidents will have a positive impact on accidents involving the UH-60 as well as other aircraft.

There is nothing in the mishap history of the UH-60 to suggest that it is anything less than the best utility helicopter in the world. However, the UH-60 is no more immune than other aircraft systems to the largest cause of accidents...the human factor. This is the area where the greatest gains can be made in reducing all classes of Army aircraft accidents. □

FY88 Class A Mishaps
through 24 August

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	4	13	4
4th Qtr	July	2	1	5	0
	August	5	2	1	0
	September	3		0	
	Total	38	28	39	37

FLIGHTFAX

STACOM

UH-60 performance planning

The recently distributed change to the UH-60 operator's manual has fundamentally changed the performance planning information in chapter 7. As a result, Task 1004: Prepare Performance Planning Card (PPC) in FC 1-212 has been revised. The following updated task replaces the current Task 1004 in FC 1-212. The UH-60 performance planning card included with this task must be reproduced locally. This updated task and card format are authorized for use upon receipt of this STACOM.

TASK: Prepare UH-60 performance planning card.

CONDITIONS: Given a completed DD Form 365-4; TM 55-1520-237-10; environmental conditions at takeoff, en route, and landing; a blank UH-60 performance planning card; and aircraft and engine torque factors.

STANDARDS: Correctly complete performance planning data according to procedures given in TM 55-1520-237-10 and the description below.

DESCRIPTION:

1. The aviator will determine and have available aircraft performance data necessary to complete the mission. The UH-60 performance planning card is used as an aid to organize this information or to handle emergency procedures that may arise during the mission. The PC will ensure that aircraft limitations and capabilities are not exceeded. The performance planning card shown in figure 6-1 must be used during ATP evaluations. The front of the form is used to organize departure and cruise information, and the reverse is used for fuel management and arrival planning.

2. The most accurate performance data can be obtained by using existing conditions. If mission or time constraints preclude using these conditions, use the highest PA and temperature forecast during the mission to establish maximum torque available and go/no-go torque. Predicted hover torque should be determined using conditions forecast for the time of departure. Instructions for completing the items indicated by circled numbers in figure 6-1 are given in TM 55-1520-237-10 and, when necessary, are supplemented by the instructions below.

NOTE: Drag factors should be considered whenever they affect mission accomplishment.

a. **Departure.**

(1) **Items 1 and 2—PA.**

(a) **Departure PA.** Record the PA forecast for the time of departure.

(b) **Highest PA.** Record the highest PA forecast during the mission profile.

(2) **Items 3 and 4—FAT.**

(a) **Departure FAT.** Record the FAT forecast for the time of departure.

(b) **Highest FAT.** Record the highest FAT forecast during the mission profile.

(3) **Item 5—Takeoff GWT.** Record takeoff gross weight.

(4) **Item 6—Load.** Record as required.

(5) **Item 7—Fuel.** Record takeoff fuel weight.

(6) **Item 8—ATF.** Record aircraft torque factor.

(7) **Item 9—ETF.** Record individual engine torque factors.

(8) **Item 10—TR.** Using the torque factor chart, record the torque ratios for dual-engine operation and for each individual engine.

(9) **Item 11—Max Torque Avail (Dual Eng).** Using the maximum torque available chart and the dual-engine torque ratio obtained in (8) above, record the maximum torque available for dual-engine operation.

(10) **Item 12—Max Torque Avail (Single Eng).** Using the maximum torque available chart and the individual engine torque ratios obtained in (8) above, record the maximum torque available for each individual engine.

(11) **Items 13 and 14—Max Allowable GWT (OGE/IGE) (Dual Eng).** Using the hover chart, enter at pressure altitude, move horizontally to FAT, and then move vertically through the gross weight section. Note the location of the vertical line. Next, enter the indicated torque/engine ~ % section at the maximum torque available obtained in (9) above. Move vertically to the applicable wheel height line, and then move horizontally to intercept the vertical line previously obtained. The intersection of the two lines indicates the maximum gross weight to hover for the selected wheel height.

(12) **Items 15 and 16—Go/No-Go Torque (OGE/IGE) (Dual Eng).** Using the hover chart, determine go/no-go torque values. Enter the hover chart at pressure altitude, move horizontally to FAT, and then move vertically to the maximum allowable gross weight OGE or IGE noted in (11) above. From this point, move horizontally to the appropriate wheel height line (normally 10 feet), and then move vertically to read go/no-go torque OGE or IGE. (For external loads, select the hover height that will place the load at approximately 10 feet AGL.)

NOTE: The example in TM 55-1520-237-10 does not show how to determine go/no-go torque.

(13) **Item 17—Predicted Hover Torque (Dual Eng).** Using the hover chart, record the torque required to hover at 10 feet for anticipated takeoff conditions. For external load operations, record the predicted torque required to hover at a height that will place the load at approximately 10 feet AGL.

(14) **Item 18—Predicted Hover Torque (Single Eng).** Record the torque required to hover at 10 feet for anticipated takeoff conditions. Arrive at this figure by doubling the value obtained in (13) above. If power is not available for single-engine hover, enter NA.

(15) **Item 19—Remarks.** Use as required to note data useful for the particular mission; for example, to record minimum fuel required to complete the mission.

b. **Cruise data.**

(1) **Item 20—PA.** Record planned cruise PA.

(2) **Item 21—FAT.** Record forecast FAT at cruise altitude.

(3) **Item 22—Vne.** Using the airspeed operating limits chart, record the maximum indicated airspeed for anticipated environmental conditions.

(4) **Item 23—Vh.** Using the applicable cruise chart, enter at the actual gross weight line. Move along the line until intersecting a point representing the ATF value listed in a(6) above. Move horizontally right or left and read Vh (IAS).

(5) **Items 24 and 25—Cruise Speed (IAS and TAS) (Dual Eng).** Using the applicable cruise chart, record the indicated and true airspeeds based on gross weight and cruise data.

(6) **Items 26 and 27—Cruise Speed (IAS and TAS) (Single Eng).** Using the applicable cruise chart, record the indicated and true airspeeds based on gross weight and cruise data.

(7) **Item 28—Cruise Torque (Dual Eng).** Using the applicable cruise chart, record the torque required to attain the airspeeds listed in (5) above.

(8) **Item 29—Cruise Torque (Single Eng).** Using the applicable cruise chart, record the torque required to attain the airspeeds listed in (6) above. If power is not available for single-engine flight, enter NA and omit (10) below.

(9) **Item 30—Cruise Fuel Flow (Dual Eng).** Using the applicable cruise chart or the single/dual engine fuel flow chart, record the predicted fuel flow. (Use the torque listed in (7) above.)

(10) **Item 31—Cruise Fuel Flow (Single Eng).** Using the applicable cruise chart or the single/dual engine fuel flow chart, record the predicted fuel flow. (Use the torque listed in (8) above.)

(11) **Item 32—Cont Torque Avail (Dual Eng).** Using the applicable cruise chart, record continuous torque available for dual-engine operation.

(12) **Item 33—Cont Torque Avail (Single Eng).** Using the applicable cruise chart, record continuous torque available for single-engine operation.

(13) **Item 34—Max R/C or Endurance IAS (Dual Eng).** Using the applicable cruise chart, record the maximum rate of climb or maximum endurance indicated airspeed.

(14) **Item 35—Max Range IAS (Dual Eng).** Using the applicable cruise chart, record the maximum range indicated airspeed.

(15) **Items 36 and 37—Single-Eng Capability IAS (Min/Max).** Using the applicable cruise chart, refer to the torque available ~ 30 minutes lines (ATF=0.9 or ATF=1.0) and determine the maximum torque available for cruise conditions. ►

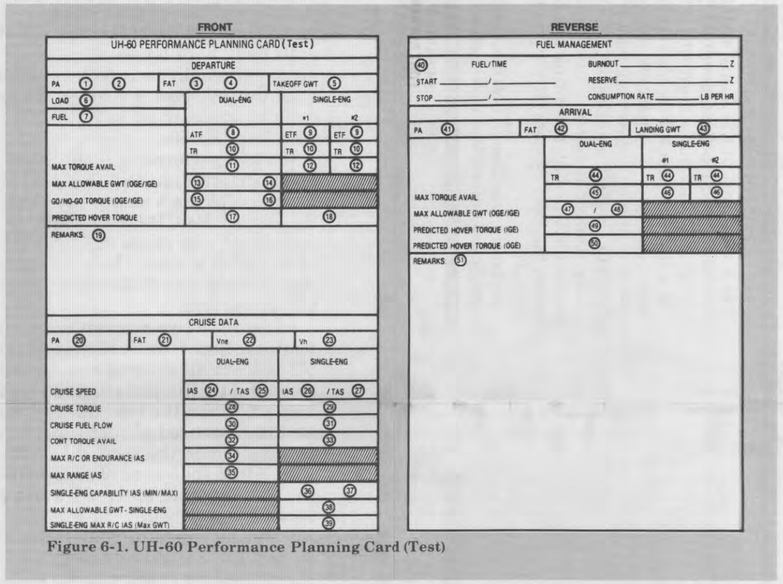

Figure 6-1. UH-60 Performance Planning Card (Test)

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D

H series - Rotorwash from another aircraft blew unsecured left crew door open, breaking top hinge and damaging bottom hinge.

UH-1 Class E

H series - During NVG formation training flight, crew of lead aircraft heard a loud thump. The aircraft began to shudder violently, and its nose pitched up 15 to 20 degrees. Transmission case lift link attaching point had broken off.

H series - Left cargo door separated from aircraft during cruise flight at 2,000 feet msl.

UH-60 Class D

A series - Aircraft with 10 passengers on board was chalk 4 in flight of 5 aircraft departing PZ. While pilot, who was flying from the left seat, was positioning aircraft to the right to assume staggered right formation as briefed, aircraft drifted and main rotor blades struck a tree.

A series - Aircraft dropped off passengers and departed heliport. When aircraft reached cruise flight, crew heard a noise and two cargo windows blew out. Suspect one of the passengers accidentally pulled emergency release and did not notify the crew of the error.

A series - Tail rotor drive shaft cover came open during flight. Crew chief failed to properly secure cover.

Attack helicopters

AH-1 Class C

S series - Aircraft fired a 2.75-inch illumination rocket from a nose-high hover. During recovery, aircraft drifted to the rear and contacted the ground. Left skid was torn from aircraft.

AH-1 Class E

E series - During takeoff, aircraft flew through extremely thick dust cloud caused by rotorwash. Turbine gas temperature rose rapidly and could not be maintained within safe limits for continued flight.

F series - Aircraft was lead in flight of two during deployment to gunnery range. The copilot was on the controls and aircraft was at 5,000 feet agl when it reached the reporting point for a scheduled fuel stop. The copilot thought he had transferred the controls to the pilot in the rear seat because the aircraft began turning in the intended direction. But there was confusion about who had control of the aircraft, and it assumed a 65-degree dive angle at about 160 KIAS. Both pilots came on the controls, and the aircraft was recovered at about 1,000 feet agl. Crew failed to

properly verify transfer of flight controls, resulting in uncontrolled dive of aircraft.

Cargo helicopters

CH-47 Class D

D series - Aircraft was on short final during pinnacle approach at 30 to 40 feet agl when rotor started to bleed off and aircraft began descending. Slingloaded dozer was damaged when load was released from 10 feet agl.

D series - During flight, smoke began entering aircraft from area of combining transmission. Visibility was less than 5 feet inside the cargo area. During emergency descent, transmission chip detector light came on. Approach was continued to the ground, and the aircraft contacted a stump that was hidden by vegetation. The combining gearbox cooler fan shaft had spun out of the bearing and drive quill.

D series - While performing multiple slingloads in support of air assault and enlisted crewmember training, PIC decided to perform a hover with the automatic flight control system off. After hooking the load, a HMMWV, the aircraft became unstable. The PIC released the clevis which then struck the windshield of the HMMWV.

Observation helicopters

OH-58 Class C

A series - While flying at contour and NOE altitudes, aircraft approached a tree-covered, finger-like projection extending from a ridgeline. As the aircraft approached on a perpendicular angle, at 90 KIAS, the pilot misjudged clearance from the trees. Both rotor blades were damaged and lower left window panel was broken when aircraft contacted trees.

A series - During approach to a confined area, pilot heard a rattling sound and saw a dead tree leaning toward the aircraft. He applied power to make a go-around and the noise stopped. Damage to main rotor blades from tree strike was found during postflight inspection.

OH-58 Class D

C series - During NOE flight between trees, pilot misjudged clearance and main rotor blades struck a tree.

C series - During attempted low-level, low-airspeed autorotation, rotor rpm started to build. IP applied small amount of collective to correct this condition, and the rated student pilot (RSP) initiated a deceleration that allowed the tail stinger to contact the ground. The IP took the controls as the RSP pulled up on the collective to stop descent. The aircraft became airborne again, and the IP used the remaining collective to cushion landing, but the aircraft landed hard. The tail boom and drive train were damaged.

Fixed wing

C-7 Class C

A series - During climbout, flight mechanic noticed oil coming from nose portion of No. 1 engine. After uneventful landing, oil could be seen leaking from No. 3 blade grip. Caused by prop failure.

C-7 Class E

A series - When student applied nose-down trim during flight, elevator trim cable broke. During postflight inspection, bird nest was found on top of cable inside horizontal stabilizer. Moisture retained by nest material caused cable to rust.

C-12 Class E

D series - Battery switch would not turn off electrical system during shutdown. Caused by failure of dc power relay.

D series - After normal takeoff, airspeed abruptly dropped to 80 knots. Kink in pitot static line to copilot's altimeter restricted air flow.

OV-1 Class D

D series - Aircraft was at 14,000 feet agl when the technical observer noticed the No. 2 engine forward inside cowling latch was loose. Pilot began a descent and aircraft was at 10,000 feet when the cowling sheared off.

D series - After taxiing to parking, pilot was zeroing aileron trim wheel when the right index finger of his flight glove caught between the trim wheel and housing assembly. As he attempted to free the glove, his finger engaged the manual stores jettison handle and external fuel tanks were released.

U-21 Class E

A series - During instrument approach, pilot heard a thump from right side of aircraft. Caused by bird strike.

H series - Left main gear failed to go down, and tower personnel confirmed gear did not appear to be down. Gear was pumped down and aircraft made uneventful landing.

Safety messages

• Safety-of-flight technical message concerning revision to one-time and recurring inspections of tracks and components on U-8F and BE-65 series aircraft (FW 88-03, 092200Z Aug 88). Contact: Roger Heidenreich, AUTOVON 693-9089, commercial 314-263-9089.

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

U.S. ARMY SAFETY CENTER

Report of Army aircraft mishaps published by the U.S. Army Safety Center, Fort Rucker, AL 36362-5363. AUTOVON 558-2062. Information is

UH-60 performance planning

Interpolate if the ATF value falls between the two lines. Enter the chart at 50 percent of the maximum torque available, and move vertically to the first intersection with the actual gross weight line. Record minimum airspeed for single-engine operation. If the maximum torque available is not displayed on the chart, enter the chart at 55 percent (50 percent of transmission torque limit). If the lines do not intersect, record either hover OGE or NA, depending on whether the gross weight line is to the left or right of the vertical line. Continue up to the second intersection with the actual gross weight line to obtain the maximum airspeed for single-engine operation. Record either the IAS value where the vertical line intersects the gross weight line or NA if the lines do not intersect.

(16) **Item 38—Max Allowable GWT (Single Eng).** Determine maximum torque available for cruise as in (15) above. Then enter the chart at 50 percent of the computed maximum torque available and move vertically to intersect the MAX END AND R/C line. Record maximum allowable GWT for single-engine cruise.

(17) **Item 39—Single-Eng Max Rate of Climb IAS (Max GWT).** Using the procedure in (16) above, record the best single-engine rate-of-climb speed at maximum gross weight (optimum).

NOTE: Use the lowest ETF to compute single-engine cruise data.

c. **Fuel Management (Item 40).** Use this space to record the in-flight fuel consumption check, to include fuel burnout and appropriate reserve. (Task 1023 discusses fuel management procedures.)

d. **Arrival.**

(1) **Item 41—PA.** Record the forecast PA at destination at ETA.

(2) **Item 42—FAT.** Record the forecast FAT at destination at ETA.

(3) **Item 43—Landing GWT.** Record the estimated landing gross weight.

(4) **Item 44—TR.** Using arrival environmental conditions, compute the torque ratios as described in a(8) above.

(5) **Item 45—Max Torque Avail (Dual Eng).** Using arrival environmental conditions, compute the maximum torque available as described in a(9) above.

(6) **Item 46—Max Torque Avail (Single Eng).** Using arrival environmental conditions, compute the maximum torque available as described in a(10) above.

(7) **Items 47 and 48—Max Allowable GWT (OGE/IGE) (Dual Eng).** Using arrival environmental conditions, compute maximum allowable gross weight OGE and IGE as described in a(11) above.

(8) **Item 49—Predicted Hover Torque (IGE) (Dual Eng).** Using arrival environmental conditions, compute predicted hover torque as described in a(13) above.

(9) **Item 50—Predicted Hover Torque (OGE) (Dual Eng).** Using arrival environmental conditions and the hover chart, compute predicted hover torque as described in (8) above.

(10) **Item 51—Remarks.** Use this block as required.

NOTE: The same PPC will suffice for consecutive takeoffs and landings when aircraft gross weight or environmental conditions have not increased significantly; that is, 1,000 pounds gross weight, 5° C, or 1,000 feet PA.

REFERENCES:
AR 95-1
FM 1-203
TM 55-1520-237-10

STACOM 130 24 August 1988

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Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 26 7 September 1988

Avoiding the settling with power phenomenon

Helicopters are particularly complicated aircraft. To the untrained eye, these heavier-than-air hovercraft might appear to have all the aerodynamic characteristics of a brick. But those of us who have flown these machines know better. Yet, even the most seasoned helicopter veteran does well to pause every now and then and examine the aerodynamic forces at work, particularly when the mission requires operations into unprepared takeoff and landing areas.

One aerodynamic characteristic stands out as particularly confusing and potentially deadly—vortex ring state, more commonly known as settling with power. A thorough understanding of this phenomenon will help avoid its possibly disastrous results.

(continued on next page)

Settling with power

Before we discuss the causes and solutions of this helicopter-unique problem, we must first establish common ground regarding proper terminology for the subject. Many publications use the terms "settling with power" and "power settling" interchangeably. Though both conditions may have the same result—broken bodies and bent sheet metal—the causes are significantly different. So to avoid further confusion, we'll refer to "settling with power" by its more correct technical term, "vortex ring state."

Figure 1. Variation of induced velocity along the blade span during hovering flight.

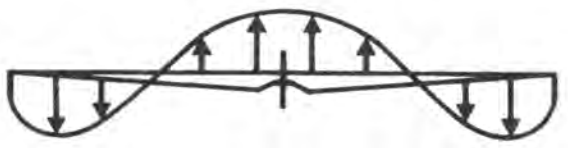


Figure 2. Variation of induced velocity along the blade span during vortex ring state.

Figure 3. Vortex ring state.

What is vortex ring state?

A helicopter in powered flight produces a downflow of air through the rotor system. This downflow is the "thrust" that keeps the aircraft flying (figure 1). As a helicopter begins to descend, an upflow of air through the rotor system begins. In forward flight (above about 35 knots), the effect of rotor tip vortices is negligible. However, as the helicopter descends and slows below 35 KIAS, the angle of the upflow increases. As descent rate increases, so does air upflow through the rotor system. When the upflow of air caused by the descent rate exceeds the downflow created by the rotor system thrust, vortices begin to form at the rotor hub and blade tips (figure 2). These vortices reduce the effectiveness of the rotor system by creating a disturbed column of air for the rotor blades to fly through. The net result of this action is a loss of lift.

Increasing collective pitch to compensate for this loss of lift only aggravates the situation by creating even larger vortices. If the condition persists, the rate of descent will increase and the aircraft will probably hit the ground with "G" forces in excess of those planned for. The potential for encountering vortex ring state increases with high gross weights, high density altitudes, and high rates of descent combined with slow forward airspeeds (figure 3).

What to do?

Obviously, the **best** method of eliminating the effects of vortex ring state is to avoid it entirely. A few simple steps will assist you in evading this potentially lethal aerodynamic condition.

• **Plan your approach.** During the site evaluation (or chart study, in the case of tactical approaches), take time to select a final approach course that permits you to fly, as much as possible, a normal approach glidepath (apparent 30 degree angle). A normal approach allows you to keep airspeed up during early stages of the approach and permits visual contact with the LZ through most, if not all, of the landing sequence.

Steep approaches, on the other hand, require slower airspeeds throughout the approach and leave the helicopter more vulnerable to the effects of downdrafts. Also, in most helicopters a steep approach is synonymous with losing visual contact with the LZ on short final. If you must fly a steeper than normal approach, make it as shallow as possible and take care to closely monitor rates of descent. Do not attempt to salvage a poorly flown approach. It's better to go around and make another attempt.

Make sure you avoid tailwind conditions, particularly during the lower portions of the approach where wind direction and velocity may change dramatically. If you maintain a headwind component throughout the approach, you diminish the possibility of premature loss of effective translational lift (etl). An early, unplanned loss of etl will result in a loss of altitude, an instinctive increase in collective pitch, and a decrease in airspeed. These conditions favor the formation of vortex ring state.

• **Control the rate of descent.** By definition, vortex ring state exists when upflow exceeds downflow. Reducing the rate of descent will reduce upflow of air through the rotor system. It follows that reducing the rate of descent will necessarily inhibit the formation of rotor blade vortices. In some helicopters, a rate of descent as low as 300 feet per minute (fpm) at airspeeds below etl may create the upflow necessary to induce vortex ring state. Under no circumstances should you allow the rate of descent to exceed 800 fpm at airspeeds below etl and outside of ground effect. Consult your aircraft's flight manual for additional rate of descent restrictions.

• **Airspeed.** Reduce airspeed gradually during the approach. Remember, forward airspeed reduces the angle of upflow and permits rotor blades to fly through undisturbed air. Avoid decelerating below etl airspeed until the aircraft is in ground effect, with rate of descent no more than 300 fpm, and in a position where a safe landing is assured. This becomes difficult when you must fly a steep approach. In this case, riding the "burble" of translational lift down the glidepath may be a good technique.

• **Power (collective pitch).** Ensure that power required to hover does not exceed power available based on LZ terrain restrictions. Make sure you take into account the **additional** power necessary to arrest the inertia of the descending helicopter. During the initial portions of the approach, keep collective setting changes to a minimum. The same control/performance techniques used during instrument flight can help here. As you continue the approach, carefully increase collective to slow your rate of descent. Excessively high collective settings produce significant downflow.

• **Gross weight.** Reducing gross weight reduces collective power demand which subsequently reduces downflow. Some aircraft have fuel/tip-tank jettison capability that allows the aircrew to adjust gross weight in flight if necessary. Other ways of adjusting gross weight include minimizing crew and equipment complements. Thorough preflight planning can also ensure excess fuel isn't on board.

• **Crew coordination.** Effective crew coordination is essential to recognize symptoms of vortex ring state. Pilots in command (PIC) who use their crews wisely will make their own jobs a lot easier. Let the copilot monitor the gauges while the pilot focuses attention on outside references. The copilot should keep the crew informed regarding rates of descent, power settings, and airspeeds. It's also critical that he inform the pilot of any deviations from the planned course of action. This sounds painfully obvious, but all too often minor deviations from prebriefed descent angles turn into major problems at the bottom of the approach. There's no harm done by informing the pilot that the approach angle looks a little steep.

Crewmembers in the back also play a major part in the crew coordination process. Don't let inexperience inhibit your input. From your vantage point in back, you very possibly have the **best** perception of wind direction and speed on-site, not to mention excellent visibility of objects on the approach route. Keep intercom comments brief and pertinent, but if you detect a deviation, let the PIC know! One of the most disturbing comments the pilot can hear after a close

(continued on back page)

FLIGHTFAX

ACCIDENT REVIEW

AH-1 victim of settling with power

While conducting range firing, the crew of an AH-1 rearmed and expended their ammunition three times before stopping to refuel. After refueling, the aircraft took off carrying 1,400 pounds of fuel, 14 10-pound rockets, and 500 rounds of 20mm ammunition. The aircraft's gross weight was 9,900 pounds.

As the Cobra crossed a berm during departure from the rearm point, it began losing altitude. But the descent stopped when the PIC applied 101 percent torque. After performing a 50-foot out-of-ground-effect hover check, the PIC decided that he had sufficient power and departed for the firing range.

It was dusk and there was light rain and a 10- to 20-knot tailwind as the AH-1, which was following an OH-58, approached a line of 50-foot trees. Just before the AH-1 reached the trees, it began a second uncommanded descent. The descent again stopped when the PIC applied 115 percent torque.

As the two aircraft continued flying over the trees, the lead aircraft slowed. When the PIC of the AH-1 also slowed his aircraft, it began descending for the third time. The PIC again increased torque. But this time, even with 125 percent torque applied, the aircraft continued losing altitude.

It was beginning to get dark, but the copilot could see the tank trail they had been following. He told the PIC to turn left to make an emergency landing on the tank trail. However, the PIC didn't see the tank trail, and he turned to the right, trying to reach a range access road.

The aircraft began descending into trees bordering the road, and the PIC and copilot added collective to cushion the landing. The main rotor blades hit a large pine tree, and the helicopter fell vertically about 35 feet, in a 10-degree nose-low attitude, before coming to rest upright.

During the flight to the range and the first three trips back to the range after rearming, the AH-1's gross weight was reduced by consumption of fuel, and the PIC encountered no control problems. After refueling and rearming, however, the aircraft's gross weight was the heaviest it had been since the mission began. The PIC knew the aircraft had one of the strongest engines in the fleet, and he was overconfident in the aircraft's capability to produce the power needed to overcome the conditions encountered after taking on a full load of fuel and ammunition.

The aircraft was operating in conditions where settling with power was a distinct threat:

- High gross weight.
- Low forward airspeed.
- Vertical or near vertical descent of at least 300 feet per minute.
- 20 to 100 percent engine power applied, and insufficient power remaining to retard sink rate.
- A 10- to 20-knot tailwind.

Each time the aircraft began an uncommanded descent, the PIC reacted with the normal tendency to apply collective and power. While he was successful in arresting the descent the first two times, he was not able to stop the descent when it happened the third time. Actions outlined in TM 55-1520-236-10 to correct settling with power—lower the aircraft's nose and accelerate into forward flight or reduce collective to the minimum—were not viable options for this PIC because of the aircraft's low altitude.

A better understanding of the conditions that lend themselves to settling with power might have enabled the PIC to avoid placing his aircraft in a situation from which it was incapable of recovering. □

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A

H series - Aircraft was chalk 3 in a flight of four on a night VFR NVG mission when it encountered a cloud of dust caused by one of the preceding aircraft along the route of flight. Light from the IR searchlight reflected off the cloud of dust, and the pilot tried to maintain terrain clearance by looking out the left side of the aircraft. The aircraft crashed into a ravine and caught fire. 8836

UH-1 Class C

H series - During climb from 900 to 1,500 feet msl, crew heard a loud bang and the aircraft yawed slightly to the left. IP took the controls and prepared to land on a golf course. As he turned the aircraft left, engine noise stopped and N2 began dropping rapidly. The aircraft was now at 800 feet msl. The IP saw there were too many people on the golf course for a safe landing, and he autorotated to a large field. The aircraft's engine turbine blades and nozzles had disintegrated, causing engine to fail.

V series - During cruise flight, engine oil temperature began rising. Crew initiated approach and while aircraft was still about 1 mile from the landing site, engine oil temperature increased to 100° C. Oil psi was 70 pounds. After landing, oil temperature exceeded 150° and psi dropped to 40 pounds. Caused by failure of thermostat flow control.

UH-60 Class A

A series - While ground taxiing to refueling point at a civilian airfield, pilot allowed aircraft's main rotor to strike a sign. Aircraft rolled onto its side. 8837

UH-60 Class C

A series - While aircraft was being ground run awaiting passengers, crew chief found a metal pipe on ground next to aircraft. When he attempted to throw it clear of the landing area, the pipe caught on his mike cord and was deflected into the main rotor system.

UH-60 Class D

A series - Damage to left trailing edge of stabilator was found during postflight inspection. While conducting airmobile operations in unimproved area, aircraft had landed on a left-side slope covered with tall grass.

A series - During simulated FLOT insertion mission under NVGs, with zero illumination, passenger jettisoned left cargo door windows. Loss of windows was not discovered until aircraft returned to PZ. Search for windows next day was unsuccessful.

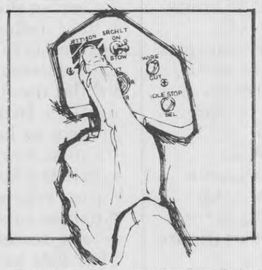
UH-60 Class E

A series - During flight at 500 feet agl, 120 KIAS, crew felt violent vertical vibration in the aircraft. Vibration stopped when airspeed was reduced to 100 knots, but recurred during shutdown. Caused by excessive play in swashplate assembly.

Attack helicopters

AH-1 Class D

F series - Aircraft was lead in a flight of four. The copilot was on the controls from the rear seat. During shallow approach to a river bed, he heard the PIC say "wires," and brought the aircraft to a stop under the wires. The crew thought the aircraft was clear of the wires, but during landing, the main rotor struck one of the wires and both main rotor leading edge guards were damaged. A reconnaissance of the area had been made earlier, but the wires and poles were not detected. Brightness of the sun, size and height of the wires, and hidden location of the poles made detection difficult.



E series - While conducting TOW fire, pilot heard a call over the radio to cease fire. Intending to push the "wire cut" button before remasking, he inadvertently pressed the wing store jettison button instead. Left TOW launcher rack jettisoned.

AH-64 Class C

A series - During straight and level flight at 2,500 feet msl, 90 KIAS, pilot reached down for collective polarity switch and hit the wing stores jettison switch. Both rocket launchers and right Hellfire launcher assembly were jettisoned.

AH-64 Class D

A series - During postflight, crew found UHF antenna broken. Suspect antenna was broken when aircraft landed over tree stump or some other object.

A series - Crew discovered damage to drive shaft cover and scoring on drive shaft during postflight inspection. Caused by failure to properly secure cover.

AH-64 Class E

A series - While taxiing for takeoff, aircraft started to roll over to the right. Full right pedal and 2 to 3 inches of left cyclic were required to keep the aircraft somewhat level. When tail wheel was unlocked to start into parking, aircraft began uncommanded yaws. Caused by failure of digital automatic stabilization equipment.

Cargo helicopters

CH-47 Class B

D series - Aircraft was damaged during hard landing. 8838

D series - Aircraft carrying slingload was about 2 kilometers from landing zone. Crew chief inadvertently pressed cargo release button instead of intercom button, and load was released from about 300 feet agl. 8839

CH-54 Class E

A series - Aircraft completed approach with slingload and hovered about 10 feet above drop point. Flight engineer reported fluid on back windshield and master caution and transmission oil pressure lights came on. Crew placed load on ground and landed. Caused by failure of fitting to upper oil jet on right side of transmission.

Observation helicopters

OH-6 Class C

B series - IP placed aircraft in 20- to 30-degree left bank turn with 30 to 35 pounds torque indicated. Aircraft began descending and IP tried to level the aircraft and increase collective. Before full recovery could be made, main rotor blades struck trees. Aircraft made an uneventful landing.

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

Followup information on accidents previously reported

UH-60 Class A

Reported in 21 Oct 87 issue as 8757 - Aircraft was in cruise flight during an NVG tactical training mission when the crew unexpectedly encountered a set of power transmission lines in their flightpath. The crew attempted to fly under the lowest strand of wires, but the main rotors struck the wires. The main rotor severed four wires, and the aircraft continued to descend, hitting the ground in a nose-high attitude. The empennage separated from the aircraft, and the aircraft rebounded into the air, spun around several times, and came to rest 300 feet from the point of initial impact and burned. All six people on board were injured. The PIC had failed to update his maps with wire hazards in the area of operation, and he was not on guard or looking for wires when the accident happened.

AH-1 Class B

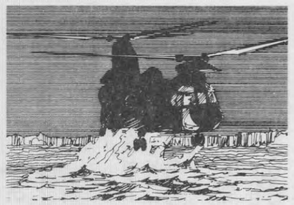
Reported in 25 Feb 87 issue as 8721 - Downgraded from Class A. Aircraft was on takeoff about 50 feet above runway, at 40 KIAS, when the engine failed. The PIC initiated an autorotation and immediate deceleration. The aircraft touched down in a tail-low attitude and slid forward 216 feet. During the slide, the main rotor blade contacted and severed the tail boom aft of the synchronized elevator. The aircraft rotated 70 degrees to the left and came to rest upright on the runway with no further damage. Neither crewmember was injured. Engine failure resulted from defective spot welding of the liner of the first stage gas producer nozzle. When the liner broke loose, internal air flow in the engine was disrupted. Extensive mechanical and burn damage occurred throughout the rotors and nozzle.

AH-64 Class A

Reported in 16 Sep 87 issue as 8753 - While the aircraft was at a 200-foot hover over a gunnery range, the duplex bearing of the tail rotor swashplate overheated and failed. This caused the tail rotor slider bearings to seize on the static mast. The seizure fixed the tail rotor thrust into a right fixed-pitch condition, which caused a loss of effective antitorque control, and the aircraft entered an uncontrollable right turn about the mast. This bearing, and other bearings examined, contained insufficient amounts of lubrication, and the bearing cages were below the specified hardness and form requirements of Aerospace Materials Specifications 4616 because they were a cast material. In addition, these bearings may not be properly designed to handle the thermal and mechanical stress loads imposed during normal operations.

CH-47 Class A

Reported in 17 Jun 87 issue as 8741 - During NVG flight over water, with near zero ambient light, the IP began a gradual descent from 300 feet, intending to level off at 50 feet above the water. He failed to level off, and the aircraft was moving at about 70 knots, in a 200-fpm descent, when it hit the water. The bottom of the aircraft and the landing gears were damaged, but the IP was able to fly it to a shallow-water area. After landing, the IP taxied the aircraft onto a beach to await recovery. No one on the aircraft was injured. The crew lacked training in communication/coordination and no one assisted the IP by calling out altitudes or alerting him to the fact that the aircraft was approaching level-off altitude. The IP thought he would see the water when he reached 50 feet. He was not fully aware of the limitations of NVGs and the pink light filter when flying over areas of low contrast such as water. The aircraft had two operational radar altimeters, but neither the IP nor the copilot had thought to set the altitude warning which could have alerted the IP when the aircraft approached level-off altitude.



OH-58 Class A

Reported in 26 Aug 87 issue as 8751 - Aircraft was 10 to 15 feet agl, flying at 85 knots. The pilot executed a cyclic climb followed by an abrupt, descending left turn with excessive left bank and a nose-low attitude. During this maneuver, described as a return to target maneuver, the aircraft hit a heavy expanded mobility tactical truck (HEMTT) and crashed into the ground. The passenger was seriously injured.

OH-58 Class A

Reported in 16 Sep 87 issue as 8754 - The aircraft was on a routine recon training mission. While 15 to 20 feet above trees, at near zero airspeed, the IP, who was on the controls, heard a high-pitched shrill noise from the engine. He turned the aircraft toward an open field, but the aircraft was still about 25 feet agl when the crew heard an explosion and the engine failed. The IP entered autorotation and the OH-58 came to rest upright on a 10-degree slope. The cluster helical torque gear in the engine had failed because of fatigue as a result of excessive sideloading/deflection of the torquemeter gear. This gear has a history of similar failures. As a result of the helical gear failure, the power train oversped to the extent that the third stage power turbine rotor disintegrated. This caused the engine to be torn into two pieces, rupturing fuel and oil lines, and causing a fire that subsequently destroyed the aircraft after a successful emergency landing.

OV-1 Class A

Reported in 27 May 87 issue as 8737 - The aircraft was on a recon training mission 800 feet above water, at 170 KIAS. The crew of another aircraft saw fire in the OV-1's No. 2 engine, and then they saw the aircraft pitch up and roll right, inverted, before it dove into the water. Both crewmembers were killed. The pilot was inexperienced in over-water flight. He may have been distracted by a compressor stall on the No. 2 engine and allowed the aircraft to enter an unusual attitude. This could have caused him to become disoriented, and he failed to recover the aircraft before it hit the water. □

U.S. ARMY SAFETY CENTER

Report of Army aircraft mishaps 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.

call with vortex ring state comes from the crewmember in the back who **thought** the pilot was aware of a slight tailwind condition.

• **Maintain your go-around option.** This is not unique to vortex ring state conditions; it applies when flying any approach. Once you lose this option, you're committed to land—one way or the other.

Okay, so I screwed up and found myself in vortex ring state—what now?

In the immortal words of a wise old aviator, "If you don't do something quick, you're gonna die!" In order to avoid this, we recommend:

• **Enter autorotation.** Entering autorotation automatically eliminates the downflow necessary to sustain vortex ring state. Unfortunately, this option presupposes sufficient altitude and airspeed to recover. Given the low altitudes and airspeeds normally associated with this phenomenon, autorotation may not be possible.

• **Increase forward airspeed.** Increasing forward airspeed permits the helicopter to fly out of the disturbed column of air in which it is settling. Though to a lesser degree than autorotation, this also requires sufficient altitude to compensate for the altitude loss encountered when you lower the nose to gain airspeed.

• **Reduce collective pitch.** Like autorotation, reducing collective pitch reduces downflow through the rotor system. If altitude and airspeed preclude autorotation, this may be the best option. Minor reductions in collective pitch may **reduce** vortices but probably won't **eliminate** them.

Keep in mind that all of the above options require an altitude/airspeed tradeoff.

What else need be said?

Vortex ring state (settling with power) is a deadly aerodynamic condition that all helicopter crewmembers must be aware of. Early recognition of vortex ring state and corrective actions are essential for survival. □

—CPT Michael J. Iltis, USAF. Adapted from *The MAC Flyer*.

NVD auxiliary lights

The Directorate of Combat Developments, U.S. Army Aviation Center, is soliciting information pertaining to night vision device (NVD) auxiliary lights that are currently being used by Army aircrews to assist in night-aided operations.

Request anyone having knowledge about who is producing these devices (finger or lip lights) provide name, address, and telephone number of the individual or company to Commander, USAAVNC, ATTN: ATZQ-CDM-A, Fort Rucker, AL 36362-5000, AUTOVON 558-3973/5902/4872. □

FY88 Class A Mishaps
through 7 September

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	4	13	4
4th Qtr	July	2	1	5	0
	August	5	2	1	0
	September	3	2	0	0
	Total	38	30	39	37

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7 October 1987

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Report of Army Aircraft Mishaps

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class B mishap

H series - MTP was conducting postphase maintenance test flight. While performing rigging check during rearward flight, aircraft experienced severe compressor stalls. Aircraft landed hard while in a right spin, causing major damage to landing gear assembly. Aircraft remained upright, and personnel made normal exit. 8656

UH-1 Class D mishap

H series - Aircraft was on final approach to a hospital helipad. Rotorwash blew improperly secured camper shell off parked civilian pickup truck. Shell caused minor damage to the hood of an automobile, and rear window in camper shell was broken.

UH-1 Class E mishaps

H series - Aircraft was climbing through 2,100 feet msl when crew felt and heard lateral vibration. Aircraft landed on a dirt road. After one-time flight to home station, aircraft was put into phase maintenance.

H series - During runup at full throttle, engine experienced total failure due to disintegration of combustion chamber component. Suspect No. 3 bearing in engine froze.

H series - On short final, unit trainer felt uncommanded feedback in cyclic, followed by servo activation noises. During shutdown, additional feedback and noises were heard, followed by grinding sound from main transmission area. After coastdown, rotor could not be turned by hand in either direction. Main generator failed internally, and shaft seized after main rotor stopped turning.

H series - Slingload of wire was inadvertently released and dropped in a field.

H series - Small dent was found in tail rotor. Suspect aircraft picked up a rock during hover.

H series - Master caution light came on intermittently during flight. Oil analysis showed abnormal concentration of metal in engine oil, and engine was replaced.

UH-60 Class D mishaps

A series - During postflight inspection, minor damage was found to trailing edge of two main

(continued on next page)

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Mishap briefs

rotor tip caps. Rotor struck small tree in landing zone.

A series - Cargo door was shut and locked, but when it vibrated during takeoff, passenger thought door was coming open and tried to secure it. Instead, he activated the window release, and window was jettisoned. Passenger had been briefed, but he still failed to tell the crew when he thought the door was coming open.

A series - During climbout, stabilator horn sounded, and master caution and stabilator lights came on. After auto reset, stabilator again failed. Crew gained manual control and landed. Stabilator amplifier was reset by maintenance.

A series - Aircraft developed moderate vertical vibration after takeoff. Antiflap cam became unseated, causing the antiflap stop to stick.

A series - Plastic bag was improperly used as cover for pitot tube, and rain water got into pitot system.

A series - During engine runup, pilot inadvertently shut off auxiliary power unit (APU). After about 4 minutes, pilot attempted to start APU again, and CE reported unusual flame near APU exhaust. Excessive fuel resulting from premature shutdown caused stack fire during second start attempt.

UH-60 Class E mishaps

A series - Pilot heard tapping noise after putting aircraft down in landing zone, and CE told him to pick aircraft up. Main rotor had struck small tree on pilot's side, damaging three main rotor blade tip caps.

A series - During two successive terrain flight approaches, collective exerted resistance on last 3 inches of downward travel. Maintenance could not duplicate.

Attack helicopters

AH-1 Class E mishaps

F series - During postflight inspection, signs of contact with vegetation were found on aircraft rotor blades. No damage resulted.

F series - During inspection of wiring leading from alternator to alternator control unit, wire bundles were found with several wires burned in half. No caution lights or signs of fire were noted by the aircrew or maintenance personnel while aircraft was running.

F series - Aircraft was 100 feet agl, 60 KIAS, when master caution and alternator/rectifier lights came on. Maintenance removed alternator, capped the quill, and released aircraft.

F series - CCR malfunctioned during hot refueling, and 1,850 pounds of fuel were placed on board aircraft. First indication of malfunction was when fuel began spilling from overflow line on bottom of aircraft.

F series - During hovering flight, pilot noticed erratic turbine gas temperature indications. P-3 airline was leaking, causing bleed band to open and shut at improper times.

S series - Crew finished emergency governor operations and placed governor switch in automatic position. Throttle was open to 6600 rpm. Aircraft was picked up to hover, and a stability control augmentation system (SCAS) hardover occurred. SCAS was disengaged, and aircraft was flown to parking.

FY 87 Class A Mishap Countdown

		FY 87			FY 88	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	3	4	Oct 1–7	0	0
	November	1	0	November		
	December	4	6	December		
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	0	0

Cargo helicopters

CH-47 Class D mishaps

C series - During cruise flight at 500 feet agl, 130 KIAS, aircraft struck a bird, breaking left eyebrow windshield.

C series - During preflight, crew found two 2- by 3-inch holes in bottom of aircraft. Previous day, aircraft had been working sling-loads and landing in unimproved area.

CH-47 Class E mishaps

C series - During flight, No. 1 engine chip light came on. Engine was shut down. Suspect internal engine failure.

C series - During health indicator test, No. 1 engine would not accelerate to flight when engine condition lever was advanced from ground to flight position. N1 increased, and power turbine inlet temperature (PTIT) rose. Shutdown procedure for suspected sprag clutch failure was followed. During coastdown, with PTIT at 200° C., crew heard a loud clunk and felt airframe shudder. Engine and engine transmission were replaced.

C series - After takeoff, crew felt two sharp lateral shudders in aircraft and landed. Excessive forward cyclic was required to land the aircraft, and response in lateral cyclic was sluggish. Cause has not been determined.

D series - During flight, No. 1 engine torque accelerated to 90 percent, and rotor increased to 104 percent. Pilot identified problem as a high side and executed proper emergency procedure. Caused by failure of No. 1 N2 control box.

D series - During cruise flight, debris screen latch indicator for forward transmission tripped. CE was unable to reset indicator, and immediate landing was made. Metal flakes were found on debris screen. Forward transmission showed excessive internal wear.

D series - During cruise flight witn an external load, No. 2 hydraulic light came on. FE verified that system pressure indicated zero on his panel, and pilot set load down and landed. Caused by failure of No. 2 flight boost pump.

Observation helicopters

OH-6 Class E mishap

A series - Aircraft was on night VFR flight. During short final at 200 feet, 40 KIAS, engine flamed out due to fuel exhaustion. Autorotation terminated 115 feet short of runway with no damage or injury. Refueler and aircrew stated fuel tank was visually checked as full prior to flight, and PIC stated fuel gauge also indicated full. Low-fuel light did not come on prior to flameout but did flicker once on downwind. Cause is under investigation.

OH-58 Class D mishap

A series - During termination with power after simulated engine failure, pilot overtorqued aircraft to 105 percent for 1 second.

OH-58 Class E mishaps

A series - During straight and level flight, engine oil temperature suddenly rose above 150° C. and stuck. Maintenance replaced gauge.

A series - Aircraft was downwind when 20-minute fuel light came on, and fuel gauge indicated approximately 70 pounds of fuel in aircraft. Aircraft was flown to helipad and, while aircraft hovered, engine quit due to fuel starvation. Fuel gauge showed 50 to 60 pounds of fuel remained.

C series - During flight, dc generator light came on, and meter read zero. After performing emergency procedure for generator failure, generator was reset, and light went out. Light came on again as flight continued and would not reset. During shutdown, igniters and starter failed to disengage.

C series - During flight at 500 feet agl, 100 KIAS, fuel boost light came on. Caused by failure of fuel boost pump.

C series - Main rotor tachometer generator began leaking during flight. Aircraft landed, and maintenance replaced mounting pad gasket.

Fixed wing

OV-1 Class E mishaps

D series - While conducting evasive maneuver training, pilot entered a split "S" to be followed by an orthogonal break. As the aircraft was passing through vertical in the split "S" with 270 KIAS, the IP noticed an over-G condition. The pilot reduced power and reduced pitch. The G-meter indicated approximately 5 Gs were pulled.

(continued on page 5)

Stacom

Standardization Communication

Requirements for mission briefing officers

Reference paragraph 3-21a(7), AR 95-1: Army Aviation: General Provisions and Flight Regulations. The following policy regarding appointment of briefing officers is effective immediately and will remain in effect until the next revision of AR 95-1.

> Commanders (05 and above) may designate in writing other briefing officers when a chain of command (i.e., company commander, platoon leader, and operations officer) by organizational design does not exist or when designated briefing officers cannot brief because of official duties or absences. Briefing officers will be selected based on experience and level of responsibility in the unit. Designations will be limited to the minimum number needed to meet operational requirements.

U.S. Army Aviation Center point of contact is Mr. Wall, AUTOVON 558-4770/4603, commercial 205-255-4770/4603.

STACOM questions and answers

Q. What is the visibility requirement for Army helicopters flying VFR outside controlled airspace?

A. a. Table 4-1, AR 95-1, indicates that Army helicopters may be flown VFR in daylight conditions outside controlled airspace when visibility is at least one-half mile.

b. Paragraph 4-1a, AR 95-1, tells us that "specific paragraphs in FAR Part 91, subparts A and B, *that do not exempt military aircraft or flight crewmembers* apply to flights in the National Airspace System (NAS)."

c. FAR Part 91.105 requires 1 statute mile visibility, as a minimum, for VFR flights outside controlled airspace above 1,200 feet above the surface.

d. Since the Army is not exempted from the provisions of this paragraph, the minimum visibility for VFR flights in helicopters above 1,200 feet agl in the NAS is 1 mile. At 1,200 feet agl and below, outside controlled airspace in the NAS, Table 4-1 is applicable.

Update of DES personnel and telephone numbers

STACOM 123 in the 22 Jul 87 issue of *Flightfax* included a list of names and telephone numbers for key DES personnel. The following changes should be made to this list:

The AUTOVON number for Chief, Flight Standardization Branch, National Guard (Western Army Training Site) is 863-2541.

CW4 Bob Cooper has retired. His replacement as DES safety officer is CW4 Dave Thill.■

STACOM 125 7 October 1987

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5000. AUTOVON 558-3589 during duty hours, 558-6487 after duty hours. 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.

JOHN C. SHAW, JR.
Colonel, Aviation
Director, DES

Mishap briefs

Crew returned to base and made uneventful landing. The counting accelerometer indicated G-loads in excess of 5.5. Pilot inadequately divided attention between G-meter and outside visual references, allowing over-G condition to develop. IP also inadequately divided attention between G-meter and outside visual references, allowing over-G condition to develop before taking corrective action.

D series - When props were brought out of feather during taxi, No. 2 engine short stack blew out of engine. Aircraft was shut down. Coupler clamp cracked and separated, allowing tail pipe to separate from aircraft.

D series - As aircraft was being rotated for takeoff, pilot and observer saw a bird flying toward No. 2 engine. Crew heard a thud, and pilot shut down aircraft. Maintenance found feathers in engine inlet. After engine was flushed, aircraft was released.

D series - During takeoff roll, No. 2 engine torque indicator spiked to 110 pounds. Caused by short in primary windings of torque head.

D series - During takeoff, pilot could not retract right main gear. Caused by overservicing of strut.

D series - During climbout, pitot static instruments were erratic but stabilized as aircraft leveled off. During descent, instruments were again erratic. Postflight inspection revealed static port was obstructed by insect larvae.

D series - During flight, power loss was noted in No. 2 engine, followed by loud reports. Bleed band and variable inlet guide vane were out of adjustment.

U-21 Class D mishap

C series - During landing, pilot applied brakes too soon, causing left main tire to blow out. Pilot applied brakes before aircraft's weight could be absorbed by struts.

U-21 Class E mishaps

H series - During flight, right engine primary pitch light came on, but there were no other indications. Light went out when secondary idle stop test switch was recycled. Several minutes later, right engine prop rpm slowly decreased to 1650 rpm. Prop governor idle stop circuit breaker was pulled out, and prop rpm returned to 1900. Caused by failure of sensing switch.

H series - Aircraft was 18,000 feet agl, 130 KIAS, when pilot saw fuel siphoning from both nacelle fuel caps. Fuel filler cap flange was bent on one fuel cap, and the other was not seated properly.

Maintenance

UH-1 Class E mishap

H series - During cruise flight, master caution and hydraulic segment lights came on. Both lights went out when master caution was reset, but about 10 seconds later, both lights came on again. After cycle was repeated several times, segment lights remained on. Hydraulic pump had become increasingly noisy, and antitorque pedals became extremely stiff. Hydraulic failure emergency procedure was performed, and uneventful running landing was made. Caused by loose hydraulic line.

UH-60 Class E mishap

A series - While performing flight control check during runup, pilot noticed binding in forward 2 inches of travel. Binding was evident from full left to right and full forward to aft. Maintenance found collective torque shaft bottom hardware was

incorrectly installed. Binding was caused by bolt shanks on controls rubbing together.

Safety messages

• Safety-of-flight maintenance mandatory message concerning reduced inspection interval of combiner transmission fan and drive shaft on CH-47D helicopters (CH-47-87-11, 241500Z Sep 87). Summary: Safety-of-flight technical message CH-47-85-18, 072330Z Nov 85, reported CH-47D combiner transmission cooler fan failures that were caused by lack of

Mishap briefs

lubrication and imposed a requirement for inspecting and lubricating fan bearings when the transmission reached 200 hours of operation and every 100 hours thereafter. The present 200-hour initial and 100-hour recurring inspection and lubrication have not prevented additional cooling fan failures. A design change has been approved to improve the bearing installation and lubrication of the cooler fan shafts; however, improved components will not be available in the near future. The purpose of this message is to increase the frequency of inspection and lubrication from 200-hour initial and 100-hour recurring intervals to 100-hour initial and 30-hour recurring intervals. Contact: Roger Heidenreich, AUTOVON 693-9089, commercial 314-263-9089.

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

Don't drink and drive...call somebody

The 15th Combat Engineer Battalion at Fort Lewis, WA, is making it easy for soldiers who have had too much to drink to get a ride home.

The battalion, like other Army units, has had some people involved in driving while intoxicated. The lucky ones got tickets, two others were hospitalized, and two soldiers died.

Now when one of the 15th Engineer Battalion soldiers drinks, he knows he can get a **safe** ride home; the battalion has issued each soldier a card to carry in his pocket to ensure that he can. One side of the card has a list of telephone numbers he can call for a ride. The other side has a quarter laminated to it to pay for the call. All the soldier has to do is make the call.

The soldier has been assured that calling for a ride when he has had too much to drink won't result in punishment. Instead, he is taking responsibility for his own safety and the safety of others by not driving a car or riding with someone else who has been drinking. ■

U.S. ARMY SAFETY CENTER

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Report of Army Aircraft Mishaps

Followups

Additional information on mishap briefs previously published

Utility helicopters

UH-1 Class A mishap in 17 Dec 86 issue (8710) □ The aircraft was on a MILES/AGES (Multiple Integrated Laser Engagement System Air-Ground Engagement Simulation) support mission. After passing a tank at NOE altitude, the pilot executed a climbing left turn to pass close abeam the tank on the opposite side. In the turn, he induced an extreme nose-low attitude and struck a sand dune while attempting to pull the aircraft out of the dive. The aircraft rotated right and struck several other sand dunes, coming to rest 250 feet from the initial point of impact. There was major damage to the aircraft. The crew chief and the pilot received major injuries, and the copilot had minor injuries.

UH-60 Class A mishap in 15 Oct 86 issue (8701) □ While performing a standard level performance test flight for adaption of the Vulcan Weapons System to the UH-60A aircraft, contractor test pilots experienced loss of tail rotor thrust. During deceleration from approximately 150 knots to 130 knots, at 500 feet agl, the aircraft began a right yaw. The pilot could not correct the right yaw by applying full-left antitorque pedal or by varying airspeed. At 120 feet agl, both engines were placed in flight idle, and the aircraft was autorotated into 35-foot trees. The aircraft landed hard with no forward motion, coming to rest in an upright position in marshy terrain. Both pilots were injured.

UH-60 Class A mishap in 15 Oct 86 issue (8702) □ The UH-60 was on a two-aircraft formation, cross-country navigational training flight that was being conducted at less than 200 feet agl, at 150 KIAS. The copilot of the lead aircraft allowed the formation to fly south of its course and enter a protection zone and traffic pattern at a civilian airport. The lead aircraft made an unannounced abrupt right turn to avoid a glider in the airport traffic pattern. The second aircraft, which was flying close to the right rear of the lead aircraft, entered a steep right bank, approaching 90 degrees, to prevent collision with the lead aircraft. The second aircraft could not recover from this maneuver and crashed into the ground. All three crewmembers were killed.

UH-60 Class A mishap in 22 Oct 86 issue (8703) □ While conducting rappelling operations at an 80-foot, out-of-ground-effect hover, a rappeller fell to the ground with the

(continued on back page) ►

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Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class E mishaps

H series - Master caution and transmission oil pressure lights came on during flight, and transmission oil pressure gauge read zero psi. Quick disconnect between transmission oil filter and jets was not properly seated, and it disconnected.

H series - Engine chip detector light came on during flight. Crew landed, and plug was cleaned. Crew had difficulty starting engine because exhaust gas temperature almost exceeded limits. Previous hot start or overtemp had not been reported.

H series - During power changes in cruise flight, N2 fluctuated plus or minus 200 rpm. Overspeed governor was replaced.

H series - During go-around from pinnacle approach, pilots heard one loud report. Aircraft yawed slightly, and exhaust gas temperature rose slightly. Suspect compressor stall.

H series - Main generator failed during flight and would not reset. After 15 minutes, generator came back on line. Maintenance adjusted voltage regulator.

H series - Aircraft was on downwind when crew heard a thump and landed. Dent in front battery compartment door was caused by bird strike.

H series - During hot refueling, CCR was unserviceable, and open port refueling was required. POL handler mistakenly released latches on hose CCR to install open port nozzle. System was pressurized, and about 40 gallons of fuel were spilled.

V series - Aircraft was 50 feet agl, 40 KIAS, during takeoff from field site. N2 dropped to 6150 rpm, and warning light and audio came on. Pilot lowered collective, made a right turn, and regained normal rpm. During before-landing checks, engine oil temperature indicated 107° C. Aircraft was hovered off the pad and shut down.

UH-60 Class D mishaps

A series - Aircraft was sling-loading four empty fuel blivets at 500 feet agl. Pilot felt small change in pitch and thought it was a gust of wind. After landing, damage was found to bulkheads and VOR antenna.

A series - Aircraft hit bird during cruise flight, damaging two main rotor tip caps.

UH-60 Class E mishaps

A series - While initiating simulated single-engine failure,

FY 87 Class A Mishap Countdown

		FY 87			FY 88	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	3	4	1-14 Oct	0	0
	November	1	0	November		
	December	4	6	December		
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	0	0

No. 1 power control lever (PCL) was pulled to rear. Engine-out audio and light came on, and tgt and NG decreased. PCL was at 10 percent torque when the engine failed. Failure could not be duplicated.

A series - During shutdown, droop stops would not operate. Maintenance lubricated droop stops.

A series - During flight at 6,500 feet msl, 120 KIAS, reservoir light came on. Pilot assist servos were shut off, and boost servo-off and stability augmentation system-off lights came on. Caused by leak in pilot assist area.

A series - No. 2 reservoir-low and master caution lights came on during flight, followed by No. 2 hydraulic pump caution light. Caused by broken quick disconnect fitting on No. 2 hydraulic pump.

A series - During flight, left module chip light came on. Excessive metal content was found in input module and main module. Caused by internal failure of left transmission module and internal damage to main module transmission.

A series - Aircraft landed in cloud of dust at unimproved field site. Forward movement during touchdown carried aircraft into a small ditch that was masked by the terrain. Wire cutter apparently struck opposite bank of ditch, causing forward rivets to shear.

A series - During APU start and runup, fuel was seen dripping from APU drain. APU was shut down, and APU compartment was checked and found dry. APU was run again for 10 minutes, and the leak continued. APU drain valve in APU compartment had been installed backwards during manufacture.

Attack helicopters

AH-1 Class D mishap

F series - During tactical training flight, the crew noticed a large, threatening thunderstorm approaching. The crew first tried to evade the storm by flying away from it, but the storm rapidly closed on them, and they decided to land in a field to wait it out. During short final, winds became very strong, and it began to rain. The aircraft made an apparently uneventful landing but was buffeted by heavy winds and rain. The airspeed indicator showed winds in excess of 25 knots while the aircraft was at flat pitch and 100 percent rpm, and the pilot experienced feedback in the flight controls because of the winds. After about 15 minutes the storm passed, and the crew elected to fly back to home station. The aircraft landed, hot refueled, and hovered to the parking area with no further problems. During postflight, crew discovered that both blade boots had several holes and tears along the first 3 feet of the leading edge. Severity of the rain, coupled with rotor speed at 100 percent rpm, led to tearing of the rubber blade boots.

AH-1 Class E mishaps

F series - Aircraft was on maintenance test flight. At the end of engine-topping check, power was reduced to stop climb. Engine experienced six compressor stalls in rapid succession, and aircraft landed. Cause has not been determined.

F series - Rpm light came on during flight, and N1 and N2 gauges indicated engine tachometer had failed.

F series - Master caution and alternator lights came on during NOE flight. Alternator failed and would not reset. During approach to landing, cockpit filled with smoke and fumes. After shutdown, excessive carbon was found around the alternator in transmission area.

F series - During terrain flight, aft fuel boost pump light came on. Pilot pulled circuit breaker and continued flight below 6,000 feet pressure altitude. Boost pump had failed.

P series - During descent from turbine analysis check, transmission hot light came on at about 10,000 feet. Oil temperature held steady at 100° C. during descent, and transmission oil pressure remained at 55 psi. Crew made power-on approach, and aircraft made uneventful landing. Transmission oil bypass valve was replaced.

AH-64 Class E mishaps

A series - During hover power check, tgt exceeded limits to 820° C. Maintenance corrected problem by replacing deice box.

A series - Vibration gearbox light came on during hover. Caused by failure of accelerometer.

Cargo helicopters

CH-47 Class D mishap

D series - While on short final to a tactical landing zone with an external load, pilot misjudged approach speed and power required to stop approach at hover. Pilot feared power was not sufficient to halt his sink rate and

attempted to stop it with 102 percent torque (dual engine) with a go-no-go of 90 percent. When that failed, he intentionally released the load, an M561 gamma goat, at about 10 feet agl. The M561 was damaged.

CH-47 Class E mishaps

C series - During hovering flight, aircraft was positioned near ground personnel who were taking down a general purpose tent. Tent was picked up by aircraft downwash, throwing one soldier against a nearby tree. The soldier was slightly injured.

C series - During slingload operation, several aircraft were hovering close to the load. While trying to hook up load, mishap aircraft encountered turbulence and descended rapidly. Before crew could correct descent, aircraft struck jeep antenna mount.

C series - During flight, FE noticed hydraulic leak and corresponding decrease in utility hydraulic pressure. Aircraft landed with zero utility hydraulic pressure. Caused by failure of utility hydraulic pump.

D series - During formation takeoff, No. 1 engine torque split (low side) with corresponding low rotor rpm. Normal and emergency beep failed to produce reaction in No. 1 engine. Minimal inflight power was used to recover aircraft to home station. Caused by failure of actuator assembly.

D series - After engine start, engine condition levers were advanced to flight position. No. 2 engine N1 dropped to 64 percent, and No. 1 engine accelerated and stabilized at 100 percent rotor rpm. Normal engine beep was ineffective, and engine beep on No. 1 engine was controlled with emergency beep. Caused by failure of electromechanical actuator.

D series - During climbout with 10 passengers on board and an external load of an M198, pilots noticed longitudinal cyclic trim system (LCT) was programmed appropriately for the airspeed being flown. Upon approach, the aft LCT failed to retract and a go-around was initiated. Efforts to manually operate the LCT were unsuccessful. Caused by failure of engine trim dual element potentiometer.

Observation helicopters

OH-6 Class C mishap

H series - During deceleration of autorotation by IP, tail rotor blades struck the ground. Tail rotor blade assembly and tail rotor drive shaft were damaged.

OH-6 Class E mishaps

A series - During takeoff to hover, N2 increased to 106 percent. Aircraft was landed, and linear actuator was readjusted to 101 percent. During second takeoff to hover, N2 increased to 108 percent, decreased to 102 percent, and again surged to 108 percent. Surging continued, and aircraft was shut down.

A series - Aircraft was lead in flight of two returning from tactical training. At about 1,800 feet agl, 104 KIAS, transmission oil pressure light flickered intermittently. Master caution and low fuel light also flickered during short final to open field. Caused by failure of oil pressure sending unit.

OH-58 Class E mishaps

A series - During climbout, fuel boost light came on. Caused by failure of submerged boost pump.

A series - Aircraft was 3 to 5 feet above trees, at 25 KIAS, during approach to FARP. Rotor rpm audio and light came on, and rotor N2 was noted at about 93 percent. Pilot used available forward airspeed and power to clear the trees and established power-on approach. During initial application of collective, rotor and N2 bled off to 80 to 85 percent. At initial pitch, large application of collective was required to clear hedge in aircraft's path. Pilot leveled aircraft and cushioned landing. Rotor and N2 recovered to about 92 percent before shutdown.

A series - During hot refueling, aircraft fuel gauge jumped from 185 to 650 pounds in 5 seconds. Refueling was terminated, and engine flamed out. Caused by water-contaminated fuel.

A series - After landing at tactical operations center, PIC found hydraulic fluid on side of aircraft. Further examination showed one-fourth of hydraulic fluid had leaked out. Caused by loose hydraulic fitting.

A series - Master caution and fuel boost lights came on during hover, and fuel pump circuit breaker popped. Caused by failure of fuel pump.

C series - During flight, N1 gauge suddenly became erratic, changing from 75 percent to about 125 percent. Caused by separation in N1 tachometer generator assembly.

C series - Aircraft engine oil pressure was less than required for flight, and oil line was replaced.

(continued on next page)

Mishap briefs

Next day during takeoff, engine oil pressure registered 100 percent. N2 was 120 psi, slightly less than usual pressure but within normal limits. During termination of approach after 20 minutes of flight, engine oil pressure was 75 to 80 psi. N1 was 82 percent, and oil temperature was 65° to 70° C. During postflight, no obvious signs of damage could be found, and aircraft was cleared for one-time flight. Engine oil pressure fluctuated between 90 and 100 percent during flight. Other instruments and oil levels were normal. Oil pressure gauge and transmitter were replaced.

C series - N2 went to 106 percent when collective was reduced during approach into LZ. Increasing collective caused rotor to droop. Pilot flew to nearby airfield where he was able to descend by reducing throttle and placing aircraft out of trim. Once over touchdown point, pilot performed hovering autorotation and landed with no damage to the aircraft. Overspeed control air line to engine governor had broken.

Fixed wing

C-12 Class E mishaps

C series - During approach, flaps seemed to take excessive time to position. After landing, flaps were checked and again were slow to position. At 20 percent, flap circuit breaker popped and flaps stopped. Circuit breaker was reset, and flaps were retracted. During takeoff with flaps in retracted position, crew heard a snapping noise when gears were retracted, and unsafe indication appeared in cockpit. Flyby determined gear was fully retracted, and gear doors were closed. Flight continued, and gear extended normally for landing. Flap motor gearbox had failed, followed by failure of landing gearbox.

C series - Aircraft was on climb-out through 14,000 feet msl. Crew heard a surge in engine power, and No. 2 engine torque began fluctuating before dropping to 10 percent. Aircraft yawed right. N1, turbine gas temperature, and fuel flow indications remained constant and within normal limits for engine idle. Crew disengaged autopilot and returned to airfield with No. 2 engine developing only idle power. Aircraft made uneventful landing. Bearing support for fuel control drive shaft disintegrated, and fuel control malfunctioned.

OV-1 Class E mishap

D series - Pilot was taxiing to parking when he smelled burning odor and saw smoke in the cockpit. Voltage regulator overheated.

U-21 Class E mishap

A series - During steep turn, clear fluid was seen coming from cowl seam aft of exhaust. Crew suspected fuel leak, shut down the engine, and landed. Water had collected in nacelle and drained out when aircraft made steep turn.

Maintenance

UH-1 Class E mishaps

H series - Abnormal vertical vibration developed during cruise flight, and crew landed. Maintenance retorqued collective servo mount bolts.

H series - After performing a hover check, crew attempted maximum performance takeoff. As aircraft climbed through approximately 20 feet at 36 psi torque, aircraft experienced rapid series of compressor stalls. Compressor stalls stopped when collective was lowered, and aircraft landed. Suspect improper rigging of variable inlet guide vane.

H series - During takeoff, after finishing hover work, crew noted neither airspeed indicator was registering speed. Pitot static tube had been replaced because of an inoperative pitot heater, and pitot static system check was not performed in accordance with the TM. Unit's test set was missing the head adapter, and electrician improvised by connecting the test set directly to the manifold system and blocking the pitot tube and static air openings with tape. This allowed the total system to be pressurized: first, from the manifold to the instruments, and second, from the manifold back to the pitot tube. However, this test "procedure" failed to detect an air leak in the ram air portion of the pitot static tube. The replacement pitot static tube had been taken from bench stock. It was in the proper box and was identified by nomenclature and FSN; however, inspection after the incident revealed the pitot static tube showed signs of prior use.

CH-47 Class E mishap

D series - Upon acceleration of Nos. 1 and 2 engine condition levers from ground to flight position, crew heard noises coming from No. 1 engine. A clutch problem was suspected, and the aircraft was shut down. Inspection revealed the problem was improper bleed band adjustment.

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

Followups

rappel rope and tiedown assembly. The rappel was being conducted utilizing an improper tiedown assembly. The assembly came loose from its mounting when the self-locking nut lost torque and allowed the retaining bolt to fall off. The rappelling rope had not been attached to the secondary anchor point, and when the primary anchor point failed, the rappeller fell to the ground and was killed.

UH-60 Class A mishap in 14 Jan 87 issue (8713) □ Two UH-60 helicopters were on the return flight from a night vision goggle (NVG), low-level training mission. While attempting to exchange the lead by having one aircraft pass the other on the right side, the main rotor blades meshed, and the aircraft crashed. Both aircraft were destroyed, and the three-man crew of the overtaking UH-60 were killed.

Attack helicopters

AH-1 Class A mishap in 10 Dec 86 issue (8707) □ During dearming operations at a forward area rearm fuel point, the PIC got out of the aircraft to confirm the weapons systems were clear and to inspect the tailboom for damage after firing the 2.75-inch rockets. He inspected the tailboom, vertical fin, and tailrotor area on the right side of the aircraft, then looked at the underside of the tailboom before walking around the rear of the aircraft to the rocket pod on the left side. He began his return trip along the left side of the tailboom, touching it in several places. In the vicinity of the vertical fin, he glanced at the fin and upper tail rotor area, without stopping. He made another step or two and was only inches past the tail stinger when he turned left into the path of the tailrotor. He was struck and killed by the tailrotor.

Observation helicopters

OH-58 Class A mishap in 10 Dec 86 issue (8708) □ During a weather recall, the accident aircraft joined with four other OH-58s. It was in chalk 2 position in the flight. The recovering aircraft proceeded under NVGs at 300 to 400 feet agl, inbound to the airfield. The flight encountered ground fog about 2½ kilometers northwest of the field. The accident aircraft was turning to final approach when it was seen in a rapid descent into the fog. The aircraft struck the ground in a tail-low attitude, with 12 degrees of left bank, and was destroyed. Both pilots were killed. ■

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Report of Army Aircraft Mishaps

Unnecessary risk

The UH-1 was on a service mission in support of an armored cavalry regiment undergoing new equipment training in the M1 tank. The aircraft, which was equipped with MILES/AGES (Multiple Integrated Laser Engagement System/Air-Ground Engagement Simulation), was to act as a target for the tank crew. This would be the fourth time the continuing support mission had been flown in a 5-month period.

The platoon leader, who had flown the mission once before with another pilot, received the mission briefing from the troop commander on a Friday. The mission would be flown on the following Sunday. On the day of the flight, the PIC prepared the flight plan, completed the performance planning card, and was briefed by the platoon leader. The UH-1 crew completed their preflight and took off, arriving at the tactical operations center (TOC) on schedule.

After a briefing by the tank unit, the UH-1 crew was told there would be a delay in conducting the exercise. They left the TOC and proceeded to a holding area where they practiced desert approaches while waiting for the exercise to begin.

The platoon leader was on the controls when the UH-1 made its first run on the tank. The tank missed the target and the UH-1 flew behind the tank, circled, and flew back to its original position to wait for the next run. While they were waiting, the PIC flew a return-to-target maneuver. The crew chief told the PIC "If you're going to be doing that, you can let me out right here, because I don't like it." In spite of the crew chief's objection, however, the platoon leader also tried the maneuver.

During the second run at the tank, the PIC was flying the aircraft from the left seat. After passing the tank at an altitude of 40 to 50 feet

(continued on back page)

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Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap

H series - While hovering to parking after maintenance test flight, crew noted vibration in airframe and pedals as aircraft began uncommanded right turn. PIC applied full left pedal and reduced power, but the aircraft continued to turn to the right. PIC reduced throttle and aircraft landed hard on the edge of a ditch. As collective and cyclic were applied to keep aircraft from rolling over, the aircraft rose to a 10- to 15-foot hover, turning another 110 to 120 degrees to the right. PIC applied collective as the aircraft again descended, but there was insufficient rotor rpm remaining, and the aircraft landed hard in a right bank. The landing gear, belly, and saddle mounts were damaged. Investigation continues.

UH-1 Class E mishaps

H series - After hookup, aircraft hovered to ensure load in cargo net was stable and secure. Receiving positive signal from hookup man, aircraft took off and was about 250 feet agl, 30 KIAS, when crew chief reported load had been lost. Cargo net was recovered and inspection of hook revealed no malfunctions.

H series - Master caution and right fuel boost lights came on during flight. Caused by faulty fuel flow switch.

H series - During flight, fuel pressure gauge indication dropped to zero. Caused by faulty fuel pressure gauge circuit breaker.

H series - Aircraft experienced compressor stall during termination of normal approach.

H series - As aircraft entered autorotation over runway, SIP smelled fuel, initiated a power recovery, and landed. Crew chief found fuel leaking from left rear sump. He turned the petcock and reported the leak had stopped. During troubleshooting, petcock stuck in open position and allowed 1 to 2 gallons of fuel to drain out.

H series - During hover, pilot felt cyclic stick bouncing in an aft right to left forward direction, and pilots could hear a low humming noise from right rear of aircraft. Caused by failure of irreversible valve.

H series - During takeoff, N2 increased to 6900 rpm. After landing, N2 was beeped down to 6000 and could not be beeped back up to 6600. Suspect internal failure of linear actuator.

H series - Aircraft yawed twice during approach. Power was reduced and running landing was made. Inlet guide vanes were stuck in closed position. Caused by broken control rod from actuator to guide vanes.

UH-60 Class C mishap

A series - During approach to a confined area, pilot felt abnormal feedback in cyclic and heard swooshing sound. Crew suspected blade strike and aborted landing. After landing in larger clearing about 400 meters away, four torn and punctured tip caps were found on main rotor blades.

UH-60 Class D mishaps

A series - During slingload training, pilot allowed aircraft to descend onto slingloaded jeep. Jeep antenna mount punched small hole in aircraft's lower tail boom. Inappropriate load was being used for training, and IP failed to take timely corrective action.

A series - During engine runup, crew felt antiflap pounding, and pilot told copilot to neutralize controls. Pilot then neutralized controls himself and took off. Crew felt vibration and returned to field site where three damaged antiflap supports were found

UH-60 Class A mishap

A series - Aircraft struck four strands of 1-inch-diameter high-tension power lines, then struck the ground. Vertical fin separated from aircraft, and main fuselage struck the ground 75 meters away. Main fuselage burst into flames as six occupants escaped the cabin area. 8757

UH-60 Class E mishaps

A series - During hover, aircraft experienced uncommanded full left pedal input, resulting in an uncommanded spin to the left. PIC applied full right pedal, with no response from the aircraft. PIC retarded power control levers to idle position and made a hovering autorotational landing. Caused by failure of automatic flight control system computer.

A series - Excessive vibration developed during takeoff. Caused by broken antiflap stop.

A series - During attempt to place conex container on the ground during partial brownout conditions, copilot jettisoned load. Failure to use standardized terms during communication resulted in confusion among crewmembers.

A series - During flight at 8,000 feet agl, 135 KIAS, stabilator audio sounded, followed by master caution and stabilator lights. Stabilator amplifier bias was out of adjustment.

A series - Boost off, stability augmentation system, and No. 2 reservoir-low lights came on during flight. Caused by failure of pitch trim actuator.

A series - No. 1 reservoir-low light came on during flight. During final, No. 1 tail rotor light came on, followed by back-up pump and No. 2 tail rotor lights. Caused by failure of No. 1 tail rotor hydraulic line.

A series - Aircraft experienced uncommanded right yaw input, changing heading 15 to 30 degrees. Caused by failure of yaw boost servo.

A series - APU failed with both engines at idle, and aircraft lost all ac power. In attempt to regain power, pilot advanced No. 2 engine power control lever (PCL) from idle position. While pilot was advancing PCL, he received radio report that the aircraft had a stack fire on No. 2 engine. He retarded PCL in an attempt to extinguish fire and shut aircraft down, extinguishing fire. Engine was replaced.

FY 87 Class A Mishap Countdown

	Month	FY 87 Class A Mishaps	FY 87 Army Fatalities	Month	FY 88 Class A Mishaps	FY 88 Army Fatalities
1st Qtr	October	3	4	1-21 Oct	1	0
	November	1	0	November		
	December	4	6	December		
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	1	0

Attack helicopters

AH-1 Class E mishaps

F series - Master caution and engine oil bypass lights came on during cruise flight, and crew initiated precautionary landing. At about 50 feet agl, engine oil temperature rose to 110° C. Upon landing and shutdown, temperature increased to 120° C. Just before throttle was cut, engine oil pressure began fluctuating. Caused by broken engine oil bypass line.

F series - During gunnery training with aircraft in OGE hover, aircraft began descending into trees. IP tried to check descent, and when collective was applied, overtorque light came on. Torque reached 102 percent.

F series - When aircraft was shut down for crew debriefing, indications were found that main rotor had struck tree branches. Crew had misjudged clearance during NOE operations.

F series - Aircraft was chalk 3 in flight of four. About 5 minutes after takeoff, pilot was performing a level-off check and noted transmission pressure dropping into the yellow zone. After uneventful landing, transmission pressure read zero. Caused by transducer failure.

F series - During cruise flight, crew noticed engine oil temperature was 93° C. During approach, engine oil temperature exceeded 93° C. for about 1 minute. Aircraft was released after maintenance cleaned oil cooling fan.

P series - Aircraft was in tactical firing position at an OGE hover when crew heard a single loud report from the engine. Pilot saw turbine gas temperature surge to approximately 940° C. before returning to 850° C. Pilot immediately found a level place and landed aircraft. Inspection of first stage compressor showed major erosion of blades.

AH-64 Class A mishap

A series - Aircraft encountered inadvertent instrument meteoro-

logical conditions. Pilot was in process of transitioning to instruments when the aircraft impacted the ground. 8758

AH-64 Class E mishaps

A series - Aircraft was chalk 2 in flight of 2, at approximately 500 feet agl, 120 KIAS. Crew detected unusual odor in cockpit, notified lead aircraft, and made a 180-degree turn to landing area. Both cockpits began filling with smoke, and chalk 2 was informed by lead that his aircraft was smoking badly and to land immediately. The crew executed emergency procedure for smoke and fume elimination and made an uneventful landing. No audio warning or lights came on. During postflight inspection, oil was found on the catwalk area and tailboom. The shaft on the shaft-driven compressor (SDC) had sheared and blistered paint indicated an overtemp condition had occurred. SDC has been sent to manufacturer for teardown analysis.

A series - After a normal start, No. 1 engine failed as power levers were being brought forward. Problem could not be duplicated.

Cargo helicopters

CH-47 Class E mishaps

C series - During normal start, APU ran for approximately 2 minutes then No. 2 generator-off light came on. Switch was recycled, but light would not go out. CE informed pilot that auxiliary gearbox (AGB) and generator were making a loud noise, and CE was told to move away from the area. AGB shaft had failed. Maintenance replaced aft transmission.

C series - No. 2 engine chip light came on during shutdown. Large metal chip was found on No. 2 engine transmission chip detector.

Observation helicopters

OH-6 Class B mishap

A series - During takeoff at 60 to 80 feet agl, crew felt aircraft shudder. Then shudder became severe, and aircraft began an uncommanded right turn. Pilot attempted autorotation (reduced throttle to flight-idle position and began reduction of collective) while trying to maintain level attitude in a right turn. Collective was increased before ground contact, and aircraft spun on runway before coming to rest. Crew got out of aircraft unassisted. Aircraft damage is estimated at $100,000. 8801

OH-6 Class D mishap

E series - During weapons integration test, a 40mm test firing was conducted in ground effect with weapon at a 10-degree depression. Five rounds were fired approximately 30 meters in front of aircraft. One round exploded, causing shrapnel damage to one main rotor blade and slightly injuring the flight test engineer. Data point for this test was in ground effect, 5 feet agl, with weapon depressed 10 degrees from water line. Pilot had fired minigun earlier and had to pull the aircraft nose up because of short rounds. The pilot elected to fire a short burst to decide whether to reposition to higher ground or continue. Rounds hit short and one exploded, causing shrapnel damage to aircraft and injury to crewmember.

OH-58 Class E mishaps

A series - Pilots heard five or six loud sharp reports from engine area during flight. Reports stopped when collective was lowered, and emergency procedure was completed. Engine instruments indicated normal readings. Aircraft landed in open field. Maintenance was unable to duplicate but suspect compressor stall.

A series - During start procedures, transmission oil pressure light failed to come on. During press-to-test mode, light came on but would not remain on. Caused by failure of pressure switch.

C series - When aircraft was started, turbine outlet temperature (TOT) went to 990° C. Pilot closed throttle, placed fuel handle and fuel boost in off position, and TOT dropped below 200° C. Caused by failure of thermal coupling on engine.

C series - Aircraft was sitting at check point on a hill when fuel boost light came on. Caused by faulty boost pump.

Fixed wing

C-12 Class E mishap

D series - As gear retracted during takeoff, sound of chain ratchetting came from nose area. Rudder pedals vibrated in resonance with sound. Chain tension was adjusted.

OV-1 Class E mishaps

D series - Upon leveling off, pilot performed cruise check and observed right drop tank was down to 500 pounds. Left drop tank still indicated full. Pilot positioned drop tank transfer switch to left drop tank and waited for 5 to 10 minutes. There was no indication of fuel transfer, and after considering possible asymmetrical loading problems upon return, pilot elected to abort mission and return to home base. Before reaching base, pilot saw left drop tank was down to 750 pounds. After uneventful landing, left drop tank showed 500 pounds. Although pilot followed procedures outlined in

Mishap briefs

chapter 2-22 of the operators manual, it is suspected that he did not allow sufficient time for the left drop tank to give an indication of transferring before aborting the mission.

D series - During runup checks, crew noticed No. 2 engine torque was decreasing. During autofeather check, No. 2 prop would feather when autofeather test button was pushed even though torque was above 19 percent. Torque then stabilized at 10 percent and would decrease when No. 2 power lever was advanced. Torque dropped to zero during taxi to ramp. Engine wiring harness and cannon plug were corroded.

D series - During descent for landing, pilot noticed master caution light was on, without an accompanying segment light. Fuel gauge totalizer was fluctuating, and pointer was spinning. Indications returned to normal after landing. Maintenance checked fuel gauge and all connections but could not duplicate the condition.

U-21 Class C mishap

A series - Crew was conducting IP qualification training. During gear retraction after takeoff, gear warning horn sounded, and landing gear handle lights did not extinguish. The crew continued a climb to 3,500 feet msl and recycled the gear down. The right main down light did not come on after the down cycle and the gear handle lights did not extinguish. Tower personnel reported the right main gear appeared to be down. Crew departed traffic and tried recycling the gear four more times without success. At this time, crew suspected that the right main gear was not retracting. Another flyby of the tower, and in-flight visual inspection by another aircraft, confirmed their suspicions. One more attempt to lock right main gear into position was attempted by touching down at the airfield on the right main gear and tapping the right brake, but without success. The last gear extension was made manually, and the gear remained in that position until touchdown. The aircraft remained in the air while the runway was prepared, then performed a normal multiengine full-flap approach to the runway. The aircraft touched down at about the 1,000-foot marker, between the center line and left edge of the runway. The aircraft rolled straight ahead before the right gear collapsed. The crew left the aircraft without assistance. Investigation revealed the torque tube connecting bolt had fallen out, resulting in a disconnect between the landing gear and the actuator motor. It was also discovered that the self-locking nut had lost its self-locking characteristics.

U-21 Class E mishap

A series - Aircraft was climbing through 9,000 feet msl when the left bleed air failure warning light came on. All cockpit indications remained stable, and no further actions were required to reduce malfunction. Aircraft made a normal landing. Air leak in polyflow tubing activated the warning system.

UV-18 Class E mishap

A series - Copilot noted abnormally high fuel flow rate in No. 2 engine during cruise flight and suspected contamination of fuel from previous refueling point. Crew elected to make a precautionary landing. When No. 2 main (external) fuel filter was removed, maintenance personnel found water in filter bowl and dirt around filter element. Refueling point was notified, but fuel sample tests were satisfactory. Suspect either erroneous fuel sampling procedures or that crewmembers are not draining filter sump during preflight, resulting in accumulation of water and dirt.

Maintenance

UH-1 Class E mishap

H series - Aircraft was in cruise flight at 3,000 feet agl when crew noticed increasing odor of smoke and saw smoke coming from pilot side of overhead electrical circuit breaker panel. When power wires from rheostat to NVG section lights on instrument panel were installed, they were left excessively long. The wires had become pinched between the instrument panel and the nut securing the side portion onto the instrument panel. This short caused excessive current to flow through the sectional light rheostat, causing it to overheat and smoke.

CH-47 Class E mishaps

C series - During flight, pilots noticed drop in oil pressure for No. 1 engine. FE checked engine and saw a stream of oil coming from engine cowling. Oil pressure continued to drop and aircraft landed. Improper O-ring had been installed on fitting.

C series - During cruise flight at 5,500 feet msl, combining transmission oil pressure dropped below 20 psi. Improper installation of pressure indicator caused erroneous pressure indication.

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

Unnecessary risk

and 50 KIAS, the pilot initiated a cyclic climb to dissipate airspeed and then made a left-pedal turn in order to pass close to the tank on the opposite side.

During the turn, the PIC induced an extreme nose-low attitude and struck a sand dune while attempting to pull the aircraft out of the dive. The aircraft rotated right and struck several other sand dunes, coming to rest 250 feet from the point of first impact. There was major damage to the aircraft and the crew chief and pilot sustained major injuries. The copilot received minor injuries.

This accident resulted from a lack of discipline on the part of the PIC. He was flying a target mission wherein the UH-1 was to use cover and concealment to present a small engagement picture to the M1 tank crew. Gun runs and other erratic flight patterns were not anticipated by the tank unit. The aircraft was expected to make an advance to the tank and, if the tank engaged and hit the aircraft, then the aircraft was to return to the holding area. If there was no engagement, the aircraft would continue to proceed inbound. Once past the tank, the PIC had the option of a "back shot." This was the option that had been translated into the maneuver described by the crew as "a return to target."

The PIC had successfully completed similar maneuvers on other occasions, and he decided to add this "extra" to the present mission. He wanted a slow, skidding level turn at 100 feet agl; but what he got was a maneuver more closely related to a hammerhead stall. When the PIC added left pedal and placed the aircraft in a left bank, the aircraft's nose dropped. He then pulled available collective, but that only accelerated the aircraft into the ground. Just before impact, he was able to get the nose up and lower his rate of descent, but his high speed caused the aircraft to skip from sand dune to sand dune for over 220 feet.

The PIC, who had a total of 621 rotary wing hours, 571 hours in UH-1Hs, was overconfident in his ability to perform the return to target maneuver because he had successfully performed this maneuver before. However, the maneuver is not found in the Aircrew Training Manual, and it is not one taught by the unit instructor pilots. The platoon leader, who was flying as copilot of the mishap aircraft, had 281 rotary wing hours, 231 of them in UH-1Hs. He was aware that various versions of the return-to-target maneuver had been flown by other pilots, and he saw nothing wrong with what the PIC was attempting.

The PIC attempted an unnecessary high-risk maneuver with the aircraft too close to the ground. While attempting to recover the aircraft, his inadequate experience led him to make improper control inputs, and the aircraft crashed. ■

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Report of Army Aircraft Mishaps

Seat belts save lives.

Wrong emergency procedure

Two OH-58 and two AH-1 helicopters were scheduled for a tactical training mission in support of a troop extraction by five UH-60 helicopters. The IP of the accident AH-1F conducted an extensive briefing on the training tasks the AH-1s would be performing. One of the maneuvers was to be a racetrack pattern simulating a firing run. Particular emphasis was placed on the timing coordination so that one AH-1 was turning on final approach to cover the other AH-1 as it made its turn to downwind.

When the briefed takeoff time arrived, the AH-1s were still undergoing final maintenance inspections and a decision was made to launch the OH-58s as scheduled and to have the AH-1s join the operation later. Performance planning cards were completed, flight plans filed, and the preflight and final maintenance checks were completed. Despite the delayed takeoff time, there did not appear to be any undue sense of urgency connected with the flight.

The two AH-1s joined the other aircraft on the third lift of the mission. The two aircraft assumed a right and left echelon position at the trail of the formation and escorted the flight to the landing zone (LZ). Arriving at the LZ, and finding it declared "cold," the IP of the accident aircraft directed that the attack element practice the prebriefed racetrack pattern for training purposes.

The two OH-58s positioned themselves southwest and southeast of the LZ, in concealed overwatch positions. The two AH-1s established a racetrack pattern. The accident aircraft assumed a left orbit and completed two circuits. It

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Wrong emergency procedure

was on the third orbit when the OH-58 pilots observed the aircraft cut short the pattern in a nose-low, left bank estimated at 45 degrees. The aircraft rolled out of the turn and assumed a nose-high attitude. The aircraft struck several small trees with the main rotor and tail rotor, then rebounded into the air to approximately 100 feet agl, in an extremely nose-high attitude. The aircraft started descending in a right accelerating spin and impacted the ground in a nose-low, right-side-low attitude, coming to rest on its right side, 331 feet from the initial tree strike.

The two OH-58s landed at the crash site and one pilot from each aircraft went to the wreckage of the AH-1 to render assistance. The IP had been killed in the crash. The other pilot was evacuated to the hospital where he later died.

The IP, who was known in his unit as very safety-minded, had no record of flight safety violations, flight evaluation board action, or any accident involvement. He had 984 rotary wing hours, 808 of them in the AH-1S. The pilot also was highly thought of in the unit, but he was relatively inexperienced as a pilot. He had a total of 363 rotary wing hours, 131 in the AH-1S.

The accident was caused by performance errors on the part of the pilot and the IP. While flying a racetrack pattern, the pilot increased his downwind airspeed so that it exceeded 100 knots and, with the aircraft at 90 feet agl, attempted to make a 180-degree turn with a bank angle exceeding 45 degrees. This condition exceeded power available to maintain level flight, and the aircraft began to descend.

When the pilot failed to maintain level flight by coordinating pitch, power, and bank, the aircraft developed a rate of descent from which recovery could not be made before impact with the trees. The pilot's failure to maintain level flight was probably the result of inadequate division of attention. The pilot probably had his attention concentrated on the other aircraft in the racetrack pattern and the necessity of properly performing the planned tactics.

When the pilot allowed the aircraft to descend, and the 100-knot airspeed and 45-degree bank exceeded aircraft limitations, the IP was late in taking corrective action. The IP also probably had his attention fixed on the other aircraft with which they were operating in tandem. As a result, the IP was not aware that their airspeed had increased and the bank angle had exceeded aircraft limitations, until there was insufficient altitude to recover the aircraft before it crashed. The IP's overconfidence in the pilot's ability to fly the mission probably led him to concentrate his attention on the other aircraft, and he failed to give proper attention to monitoring the altitude and attitude of the aircraft he was in.

When the aircraft's rate of descent became excessive and impact with the ground was imminent, the IP probably took the controls and attempted to recover the aircraft. The pilot then placed the governor switch in the emergency governor position. It cannot be established if the pilot took this action on his own or was told to do it by the IP. Regardless of which aviator initiated the action, it was the wrong thing to do.

With the aircraft's governor switch in the emergency mode, a maximum of 78 percent of rated power was available, and aircraft engine rpm was no longer automatically governed but had to be controlled through use of the twist grip throttle. This incorrect procedure worsened the already existing in-flight emergency.

When the aircraft struck the trees, the tail rotor drive shaft failed and antitorque control was lost. The aircraft climbed to 100 feet agl, and then began to spin rapidly to the right. At this time, the IP should have closed the throttle and autorotated; but the IP failed to follow the emergency procedures in the operators manual. As a result, the aircraft's spin to the right increased, and he was unable to maintain it in a level attitude. The aircraft struck the ground in a nose-low, right-side-low attitude.

The IP failed to follow the emergency procedures because he was overcome by the rapid onset of this emergency following impact of the aircraft with the trees and the noise and vibration caused by separation of the tail rotor drive shaft. ■

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class E mishaps

H series - During a terrain flight training mission, crew noted feedback in cyclic. IP assisted SP with controls as feedback continued. As crew turned aircraft to the left to initiate approach to an open field, cyclic violently jumped to right rear quadrant. Aircraft pitched 30 degrees nose-up and rolled right 40 degrees. By team effort, the crew managed to level the aircraft and proceeded to an Army airfield 18 miles away. Crew was following proper emergency procedures, however, severe feedback in cyclic continued, and aircraft control became increasingly more difficult to maintain. Working together, IP and SP maintained attitude control with cyclic. IP provided collective inputs during approach to the airfield, and another SP, who was in the jump seat, made necessary radio frequency changes. Aircraft touched down in a right-side-low and nose-high attitude. Aircraft had started to oscillate, but the crew managed to land without incident or damage. Maintenance replaced right lateral servo.

H series - During flight, pilot felt aircraft yaw left about 45 degrees. PIC noticed exhaust gas temperature rise to 580° C, and N2 dropped to 6100 rpm. N1 was at 95 percent. Crew heard one loud report from engine, and pilot reduced power. PIC checked to ensure bleed air and deice were off, and crew made uneventful landing. Variable inlet guide vanes were out of rig.

H series - During flight, crew felt feedback in controls and stiffness in upward motion of collective. During postflight inspection, fluid was seen leaking from hydraulic line to filter. Hydraulic fluid reservoir was about 10-percent full.

H series - Aircraft lifted off with water bucket containing 600 pounds of water. Water bucket was destroyed when it disengaged from cargo hook during flight and fell to the ground. No malfunction in the system was found.

H series - Aircraft was on base leg when rpm light came on. Caused by failure of rotor tachometer.

H series - When collective was lowered to full-down position upon touchdown, crew heard loud reports from engine compartment. Caused by compressor stall.

FY 87 Class A Mishap Countdown

	Month	FY 87 Class A Mishaps	FY 87 Army Fatalities	Month	FY 88 Class A Mishaps	FY 88 Army Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	November		
	December	4	6	December		
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	2	0

H series - Just after takeoff from confined area, engine surged. Engine continued to surge and N2 fluctuated between 6400 and 6700 rpm. IP told pilot to be prepared to place governor switch in emergency position, however, crew was able to return to confined area and make uneventful landing. Caused by failure of tachometer generator.

H series - Bird flew into rotor system during takeoff.

H series - Ten minutes after takeoff, pilot noticed engine oil temperature was 145° C. Thermostat flow control in engine oil cooler had failed, causing engine oil to bypass oil cooler.

H series - During initial hover check, crew felt binding in pedals. Maintenance replaced tail rotor hub assembly.

H series - After touchdown, transmission oil pressure dropped to zero psi, and CE noticed smoke near engine area. Caused by failure of transmission internal oil filter seal.

UH-60 Class D mishap

A series - Aircraft struck top of pine tree during low-level flight. Right fairing was cracked and right position light was broken.

UH-60 Class E mishaps

A series - During roll-on landing, copilot spotted rock on the ground. Crew felt a thump, and aircraft was stopped. Crew chief could find no damage, but preflight following day revealed lower wire strike protection system wire guide had struck a rock and sheared both rivets. Guide was recovered.

A series - Pitch bias actuator failed during flight and would not reset.

A series - Right accessory module chip light came on during flight. Maintenance replaced accessory module.

A series - Stabilator failed three times. After third incident, pilot took manual control and slewed stabilator to zero. Maintenance adjusted stabilator amplifier.

A series - During flight at 700 feet msl, 140 KIAS, No. 2 reservoir-low light and all pilot assist lights came on. Collective rose 3 inches and pedals displaced 1 to 2 inches. Caused by failure of hydraulic pump.

Attack helicopters

AH-1 Class D mishaps

S series - During power recovery from simulated forced landing, RSP advanced throttle rapidly, causing him to think rotor was going to overspeed. He increased collective to load the rotor and overtorqued the aircraft. IP, in front seat, didn't anticipate student pilot's actions and was unable to prevent overtorque.

S series - Refueler completed closed-port hot refueling and attempted to disconnect fuel nozzle. Outer ring of CCR port was pulled from the aircraft.

AH-1 Class E mishaps

F series - Aircraft was on short final when it experienced suspected compressor stall. Turbine gas temperature rose to 850° C., torque was 70 to 75 percent, and N2 was normal. Maintenance was unable to duplicate.

S series - Aft fuel boost pump light came on during flight. Caused by failure of fuel boost pump.

Cargo helicopters

CH-47 Class E mishap

C series - When Nos. 1 and 2 engine condition levers (ECL) were moved to flight position during engine runup, both engines accelerated normally, but No. 2 ECL light stayed on. ECLs were returned to ground position, but No. 2 engine failed to decelerate. No. 1 engine was shut down with its ECL. No. 2 engine was shut down by shutting off its fuel valve. No. 2 power turbine inlet temperature (PTIT) climbed to 260° C. PTIT dropped to 200° C. when No. 2 engine was motored, then rapidly rose to 1,200° C. No. 2 start switch was in motor only. N1 increased to 30 percent. Maintenance replaced No. 2 engine.

Mishap briefs

CH-54 Class E mishap

A series - During flight, No. 2 rectifier light came on. Automatic flight control system and forward and aft boost pumps were lost. Cause is unknown.

Observation helicopters

OH-58 Class C mishap

D series - Aircraft was flown for more than an hour after previously having been ground handled into a hangar. A 3-inch tear was found on left side of tailboom, 22 inches forward of the tail rotor gearbox. Investigation is in progress.

OH-58 Class D mishap

A series -After shutdown, copilot opened left passenger door and was removing helmet from back of aircraft. Rotorwash from flight of UH-60s blew left passenger door off its hinges. The door struck the OH-58's left front fuselage, causing a 6-inch tear.

Fixed wing

C-12 Class D mishap

C series - Aircraft had been cruising at flight level 200 for about 20 minutes. OAT was minus 16° C. Crew heard loud crack and pilot's external windshield cracked. Extensive damage to windshield reduced pilot's visibility and aircraft returned to home station.

C-12 Class E mishap

D series - During cruise flight, pilot saw oil on right engine cowling. Torque pressure line fitting on No. 2 engine was loose.

Maintenance

UH-1 Class E mishap

M series - During level flight at 1,500 feet agl, fire warning light

Unit training deficiencies cause Army aviation accidents

• The pilot of a UH-1 was conducting a search and rescue training mission in mountainous terrain. During an OGE pinnacle approach at an altitude of 11,800 feet, the aircraft crashed into the trees when rotor rpm was lost, and the anti-torque system became ineffective. The power required exceeded power available. There were one fatality and several injuries. The aircraft was destroyed.

• While making a left turn at 50 feet agl, the pilot of an OH-58 heard the low rpm audio warning and felt the aircraft lose power. He continued the turn and attempted to land on level ground to his left front. The aircraft impacted on its left side and slid nose first on its left side for 72 feet down a slope. The pilot sustained minor injuries, and the passenger was killed. The pilot misinterpreted a temporary low rotor rpm audio and a sudden downward movement of the aircraft as an engine failure and over-reacted to the emergency.

What do these examples have in common? Both were caused by units assigning aviators to perform missions for which they were not properly trained. Since 1981, inadequate unit training has caused 58 accidents at a cost of $30.5 million.

The key elements in reducing unit training accidents are unit commanders and their staffs. Where can these professionals get information to help them better understand this problem and better direct their accident prevention programs? What are the most common failure areas in their training programs?

One source for this information is Technical Report 87-5: Unit Training Deficiencies Causing Army Aviation Accidents, prepared by Research and Analysis Division of the Army Safety Center. From the information in this report—

• "lessons can be learned."

• countermeasures can be developed to improve unit training programs.

• training safety and realism can be increased.

• operational mission readiness will be enhanced.

A copy of this report has been sent to aviation units. Additional copies may be obtained by writing Commander, U.S. Army Safety Center, ATTN: CSSC-M, Fort Rucker, AL 36362-5363. ■

Mishap briefs

flickered on and off. Aircraft landed in large open field. Fire detection strip was positioned too close to engine diffuser section, causing sensor to illuminate.

OH-58 Class E mishap

A series - During cruise flight, pilots heard hissing sounds from engine area. Turbine outlet temperature (TOT) went to 800°C. Pilot reduced power for approach and TOT returned to normal limits. When collective was increased on termination, TOT again went to 400° C. Bleed air line from diffuser scroll to heater was improperly installed, allowing fitting on line to blow off. Mechanic had bottomed out fitting on line and only two threads were screwed into diffuser. When power was applied, these two threads gave way and blew out, causing a severe bleed air leak.

Safety messages

• Safety-of-flight technical message concerning one-time inspection of input flange assembly on UH-60A/EH-60A aircraft (UH-60-87-10, 131430Z Oct 87). Summary: The U.S. Navy has reported that an input flange assembly manufactured by W and G Machine Company (ESCM 33682) was found defective. A manufacturing defect of the nut plate installed on the input flange assembly resulted in a cracking failure of three nut plates. Subsequent investigation revealed six additional nut plates with the same defect. Input flange assemblies with serial numbers ranging from WG0001 through WG0107 are suspect. These suspect W and G input flange assemblies were delivered as spare assemblies under contract number DAAJ09-85-C-A384 to Army depots during the period March through May 1987. Purpose of this message is to direct a one-time inspection to identify and remove from service the suspect W and G input flange assemblies. Contact: Robert Lawyer, AUTOVON 693-9089, commercial 314-263-9089.

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

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Report of Army Aircraft Mishaps

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UH-60 midair collision

Aircraft No. 1, a UH-60, was on a night vision goggle (NVG) proficiency and qualification training mission. The IP and crew chief would fly the entire mission, while the two pilots would alternate. One would fly the first period, then they would change places, and the other pilot would fly the second period. The IP briefed the crew about the intended training for that night and on actions to be taken in the event of an in-flight emergency. He and the IP of the second UH-60 also discussed the planned multiship training the two aircraft would conduct later that evening.

Aircraft No. 1 took off at 1630 to conduct day and night training for the pilot who would fly the first period. The aircraft returned to the parking ramp about 1920, and the first period pilot got off the aircraft. The second period pilot came on board, and the UH-60 took off again for closed traffic. The aircraft

made one circuit around the traffic pattern with a slingload, dropped the load off, and departed the airfield for the local training area. The IP was in the right seat; the pilot was in the left seat. The crew chief was sitting directly behind the IP. Both pilots were wearing AN/PVS-5 NVGs.

Aircraft No. 2, another UH-60, was scheduled to conduct night vision goggle (NVG) proficiency evaluations for two aviators newly assigned to the unit. The aircraft took off at 1823 and remained in closed traffic while performing NVG training until about 1920. The aircraft landed, and the first period pilot left the aircraft. The aircraft took off again with the IP occupying the right seat and the second period pilot in the left seat. It remained in closed traffic until 2012 when it also departed for the training area to the south.

Shortly after Aircraft No. 2 departed the airfield, the two Black Hawks joined up over a predesignated point and flew a local nap-of-the-earth (NOE) training route. Aircraft No. 1 was in the lead, with the IP on the controls and the pilot navigating. Aircraft No. 2 was in a staggered-right position with the pilot flying.

The flight proceeded uneventfully until just after completing the planned NOE route. At that point, the lead aircraft was proceeding north and climbing to 500 feet msl (280 feet agl) en route back to the airfield. The IP of the lead aircraft requested that Aircraft No. 2 assume the lead to give the pilot of Aircraft No. 1 some training in formation flying.

The crew of Aircraft No. 2 acknowledged and indicated they would be passing Aircraft No. 1 on the right side. The lead aircraft maintained a constant heading of 360 degrees, 70 KIAS, and 500 feet msl. Aircraft No. 2 initially slid to the right and accelerated to approximately 100 KIAS in order to pass Aircraft No. 1 and assume the lead. As the second aircraft was attempting to pass the lead aircraft, the crew chief on Aircraft No. 1 realized Aircraft No. 2 was drifting into them and shouted a warning over the intercom.

The IP, who was flying from the right seat, looked out the right side of the aircraft and saw the left cargo door on Aircraft No. 2 sliding towards him. As he lowered collective and turned hard left, the two aircraft collided.

Following the collision, the IP of Aircraft No. 1 determined that he could control his helicopter and decided to continue with an autorotation. Because of loss of vision due to light reflection from a shattered windscreen, he removed his NVGs to complete the landing. When he noted the radar altimeter at 100 feet, he decelerated and, as he saw the ground coming up, applied maximum collective pitch. The aircraft impacted on upsloping terrain in a three-point attitude, rebounded into the air, spun to the right, and came to rest facing back down the flightpath.

Aircraft No. 2 began to break up in the air following the collision and fell out of control to the ground. The main fuselage

Although the lead UH-60 (shown above) was damaged in the midair collision, the IP retained enough control to autorotate. The other UH-60 began breaking up in the air and fell out of control to the ground.

section struck the ground in a right roll (past the 90-degree point), in a nose-low attitude, approximately 105 feet short of Aircraft No. 1 along the flightpath. A postcrash fire erupted and eventually consumed a majority of the wreckage.

Aircraft No. 1 had come to rest in an upright position. The aircraft landing gear attenuated a great deal of the crash forces. Although injured, all three crewmembers got out of the aircraft under their own power and made their way down the slope to the wreckage of the second aircraft. They found the IP still in the aircraft; the pilot had been thrown out. Both aviators were dead. They were unable to find the crew chief until help arrived, and his body was found near the wreckage. He also had been killed.

The IP of Aircraft No. 1 tried to use a survival radio to summon help, but he was unsuccessful. PRC-90 radios have a limited range due to a line-of-sight requirement, and transmissions can be blocked by terrain features. The airfield tower and airborne aircraft in the vicinity of the airfield were unable to pick up the signals from the radio.

In addition, the emergency locator transmitter (ELT) installed on Aircraft No. 1 had activated on impact. Because the ELT operates on UHF 243.0 MHz, it can interfere with voice communication on the PRC-90 radio on that same frequency. When the crew attempted to use the radio, all they could hear were beacon noises from the ELT.

When the crew of Aircraft No. 1 attempted to use the flares from their aircraft, only two of them worked. A civilian from the local area, who arrived on the scene, agreed to drive the

surviving crew chief to the nearest military installation where he reported the accident. By this time, the crash/rescue plan had already been initiated because neither aircraft had called in after making an initial report to the tower that they were inbound for landing. About an hour had elapsed before trained medical assistance reached the accident site.

The surviving aircrew tried to use the fire extinguishers from Aircraft No. 1 on the wreckage of Aircraft No. 2. The first extinguisher did not work at all. The second one sounded as if it was working, but fire retardant did not come out. A local volunteer fire department arrived on the scene after about half an hour and extinguished the fire.

The IP who was flying Aircraft No. 1 at the time of the accident had 2,242 hours of rotary wing time, 2,026 of them in UH-60s. He had a total of 200 NVG hours. The pilot of Aircraft No. 1 had 476 rotary wing hours, 300 of them in the UH-60. He had 13 hours of NVG time.

The IP of Aircraft No. 2 had accumulated 5,269 rotary wing flight hours, of which 670 hours were in the UH-60. He was IP-rated in the UH-1 and the UH-60 and had a total of 927 IP hours, 154 of them in the UH-60. He had 66 hours in NVGs. The pilot, who was flying Aircraft No. 2, had 238 rotary wing hours, with 71 hours in the UH-60. He had 17 hours of NVG time.

None of the aviators involved in this accident had a record of past safety violations, flight evaluation board actions, or any history of prior involvement in an accident.

The accident was caused by human error on the part of the crew of Aircraft No. 2. The crew failed to recognize that their aircraft was drifting into the lead aircraft during the passing maneuver. The pilot and IP failed to recognize their aircraft was drifting to the left because of:

- Equipment limitations associated with the AN/PVS-5 NVGs, coupled with the obstructions to vision and noncompatible NVG lighting in the UH-60.
- Inadequate written procedures for NVG multiship operations addressing lead changes, minimum crew requirements, separation distances, appropriate NVG formations, and which crewmembers should be goggled up.

The following factors also may have contributed to the pilot's and instructor pilot's inability to detect the drift:

- The low NVG experience level of the crew, which may have resulted in their being less alert than they should have been.
- The relaxed mood of the crew as they were heading home with the airfield in sight.
- The IP's burden of personal problems that may have occupied his thoughts.
- The IP's overconfidence in the pilot's flying abilities, which may have caused him not to monitor the pilot as closely as he should have. ■

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class E mishaps

H series - Chip detector light came on during flight. Aircraft made uneventful landing, and light went out during shutdown. Special oil sample results did not meet standards, and 90-degree gearbox was replaced.

H series - During level flight at 4,000 feet msl, engine oil pressure dropped from 90 to 60 psi and fluctuated between 50 and 60 psi. After landing and shutdown, oil began leaking from lower line quick disconnect at engine oil reservoir. Caused by failure of oil quick disconnect.

H series - During level flight, rpm light came on, and N2 needle fluctuated from zero to 7000 rpm. Caused by generator tachometer failure.

H series - During power recovery while performing a simulated engine malfunction, main rotor and N2 rpm bled off and failed to recover when full throttle was applied. Crew performed emergency governor operation and landed. Caused by governor failure.

H series - IP was on the controls as aircraft hovered away from refueling pad. Pilot noticed small oil spot on pad, and aircraft was hovered to parking. Oil was leaking from transmission drain tube. Caused by internal failure of drain petcock.

FY 87 Class A Mishap Countdown

	Month	FY 87 Class A Mishaps	FY 87 Army Fatalities	Month	FY 88 Class A Mishaps	FY 88 Army Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	1-4 Nov	0	0
	December	4	6	December		
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	2	0

H series - During hover, crew felt high-frequency vibration in airframe. Caused by broken spring on main drive shaft.

UH-60 Class E mishaps

A series - During cruise flight, stabilator audio and light came on. Emergency procedure was performed, but stabilator failed again within 5 minutes. Problem could not be duplicated.

A series - During flight, pilots noticed vibrations normally associated with antiflap pounding. Antiflap had stuck, causing mount to crack.

A series - Aircraft developed severe vibrations during level off. Vibration stopped when collective was increased. Two dampeners on main rotor required servicing.

A series - Fire light came on during short final. Caused by failure of No. 1 engine upper fire wall sensor.

Mishap briefs

Attack helicopters

AH-1 Class D mishap

F series - Aircraft was in contour flight to join up with other attack elements in battle position. Copilot called out "Wires," and pilot applied rearward cyclic. Aircraft struck top wire of four power lines.

F series - During cruise flight at 1,000 feet agl, 100 KIAS, aircraft yawed left 20 degrees. Engine N2 and rotor rpm dropped to 96.5 percent for about 2 seconds before returning to 100 percent. Aircraft made uneventful landing. Suspect cause was wind gust.

Assembly mount for 20mm MILES cannon transmitter was cracked and dented when it struck and severed the ½-inch wire.

AH-1 Class E mishaps

E series - During night training, IP initiated a simulated engine failure. N2 and rotor tachometer failed to split, and rpm dropped below 90 percent. Aircraft made uneventful landing.

F series - Aircraft was flying NOE between two trees when it struck an unmarked wire with the upper AN/ALQ-136 antenna.

F series - During NOE flight, master caution and transmission oil bypass lights came on. Maintenance replaced transmission oil bypass switch.

F series - As pilot applied collective during hover check, power rose to about 42 percent, and N2 bled off to 93 percent. Caused by failure of fuel control.

F series - Pilot noticed high-frequency vibration in pedals during approach. Oil cooler bearing failed.

P series - During NOE flight, master caution and dc generator lights came on. Emergency procedures were performed, but generator was not restored. During final approach, pilot was able to reset generator. Generator failed again after landing. Caused by failure of generator field control relay.

AH-64 Class E mishaps

A series - During night battle drill, pilot felt high-frequency vibration in pedals and smelled burning oil. During landing in open field, shaft-driven compressor (SDC) light came on. Caused by internal failure of SDC.

A series - About 5 seconds after landing, aircraft abruptly rolled 8 degrees on the right. IP took controls, and aircraft started to rock back and forth. Yaw channel digital automatic stabilization equipment was disengaged, but aircraft continued to rock with uncommanded control input. Problem could not be duplicated.

A series - During flight, crew heard loud, popping sound accompanied by lateral vibration. One main rotor blade tip had debonded.

A series - During NOE hover hydraulic pressure fluctuated from zero to 4,000 psi, and primary hydraulic pressure light came on. Digital automatic stabilization equipment came off line, and crew heard loud whine from pump with associated servo movement. Caused by failure of primary hydraulic pump.

A series - During ground taxi on mission termination, crew smelled fumes in cockpit,

followed by auxiliary power unit (APU) fire light. Caused by APU failure.

A series - During climbout after performing OGE simulated engine failure, No. 2 power lever was moved to fly position, and No. 2 engine went to 110 percent. NG was 102 percent, and turbine gas temperature went to 805° C. for 3 to 5 seconds. Maintenance operation check was performed, and aircraft was put into lockout several times. Problem could not be duplicated during test flight.

A series - During second flight of the day, IP took controls and noticed that with flat pitch, full right pedal was required to maintain aircraft in a level position. IP turned the aircraft 180 degrees, but it still took full right pedal to level the aircraft. Maintenance found three tail rotor blades were binding and replaced blades.

Cargo helicopters

CH-47 Class E mishaps

C series - Shortly after takeoff, crew chief noticed excessive oil leaking from spacer ring plug and input seal in aft transmission. Spacer ring plugs had not been properly torqued during rebuilding.

C series - During cruise flight, No. 1 engine oil temperature fluctuated from 90° to 150° C. Caused by failure of oil temperature indicator.

Observation helicopters

OH-58 Class D mishaps

A series - During takeoff, aerial observer allowed lower wire strike protection system to contact the ground. IP failed to take appropriate corrective action, and breakaway tip on wire strike protection system was sheared off.

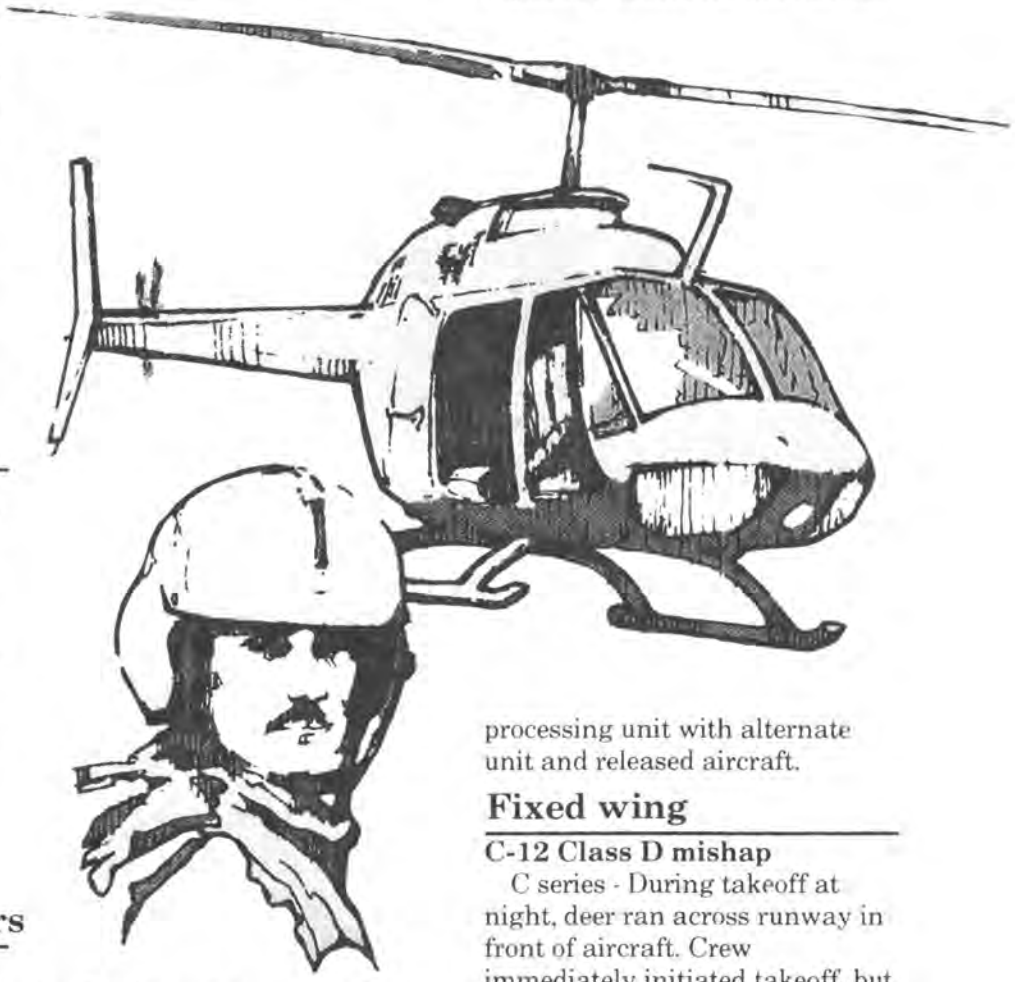
A series - During hovering turn into wind for takeoff, pilot felt something strike main rotor. Two dents were found 10 inches from blade tip.

A series - Following several approaches into unimproved confined areas, puncture was found in fuselage forward of aft cross tube.

0H-58 Class E mishaps

A series - Aircraft was downwind when engine chip light came on. Maintenance found excessive amount of metal on upper chip plug and replaced engine.

A series - While aircraft was in 30-degree, right bank, audio came on, accompanied by low transmission oil pressure light. Multiparameter display indicated zero psi transmission oil pressure and oil temperature of 60° C. Maintenance personnel replaced primary master control processing unit with alternate unit and released aircraft.



Fixed wing

C-12 Class D mishap

C series - During takeoff at night, deer ran across runway in front of aircraft. Crew immediately initiated takeoff, but as aircraft rotated, it struck the deer. After landing, damage was found to skin of right inboard flap.

Mishap briefs

U-21 Class E mishaps

H series - During climbout, aircraft struck four birds. Pilot could see no damage to wings and cowling and chose to continue mission. During postflight inspection, crew discovered damage to No. 2 engine outboard exhaust cowling.

H series - Right nacelle fuel tank was not being filled by transfer pumps. After repeated attempts to recycle switch and start pump, crew aborted mission and returned to airfield. After maintenance reset left transfer circuit breaker, pump worked. Malfunction could not be duplicated.

H series - Right generator light came on about 2 hours into flight and would not reset. All unnecessary electrical equipment was turned off. During approach, left main gear showed unsafe condition. After recycling, gear indicated safe condition, and uneventful landing was completed. Left main landing gear microswitch was out of adjustment. Right generator-out light was caused by failure of annunciator circuit board.

UV-18 Class E mishap

A series - Upon initiation of takeoff rotation during routine maintenance test flight, pilot noted momentary binding of control yoke at about mid-travel. Yoke moved aft with ease, but with yoke full aft, it became apparent that the aircraft was not rotating or responding to aft elevator input. Pilot tried to initiate forward yoke movement, but control yoke was stuck in full aft position. Aircraft was airborne at about 20 feet agl. Takeoff power was reduced and landing accomplished with partial power and nose-up trim. Aircraft was stopped with full reverse and braking on gravel runway overrun. Taxi back was uneventful. Inspection revealed the elevator control tube was sheared and jammed against the fuselage, thereby freezing the control yoke in full aft position. Suspect control gust locks were not installed on a consistent basis when winds were prevalent and aircraft was unattended.

Maintenance

AH-64 Class E mishap

A series - During final approach, pilot noted intermittent master caution light followed by vibration gearbox light. Caused by low fluid level in gearbox. Intermediate gearbox was not properly serviced.

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

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Report of Army Aircraft Mishaps

Seat belts save lives.

UH-1 accident waiting to happen

The UH-lH, with a crew of four and two passengers, was on a training/support mission for familiarization of medevac pilots. The mission also included making stops at various airfields and landing sites to inspect refueling facilities. After several stops, the aircraft was on the final leg of its mission before returning to home base.

The aircraft was over a mountainous area at 4,000 feet msl at 100 knots on a westerly heading, when the crew and passengers noticed a burning odor. A few seconds later the pilots felt the aircraft make an uncommanded yaw. The passengers in the rear described hearing and feeling a distinct snap above and centered behind them, followed by an immediate yaw and slight pitchup of the aircraft.

Without discussing the situation with the copilot, the PIC assumed the controls, told the crew he was making an immediate landing, and asked for a mayday call. He immediately initiated a full-power, descending right turn to an intended landing area. The copilot got off mayday calls on UHF and VHF radios while the crew chief and left passenger broadcast mayday calls on FM.

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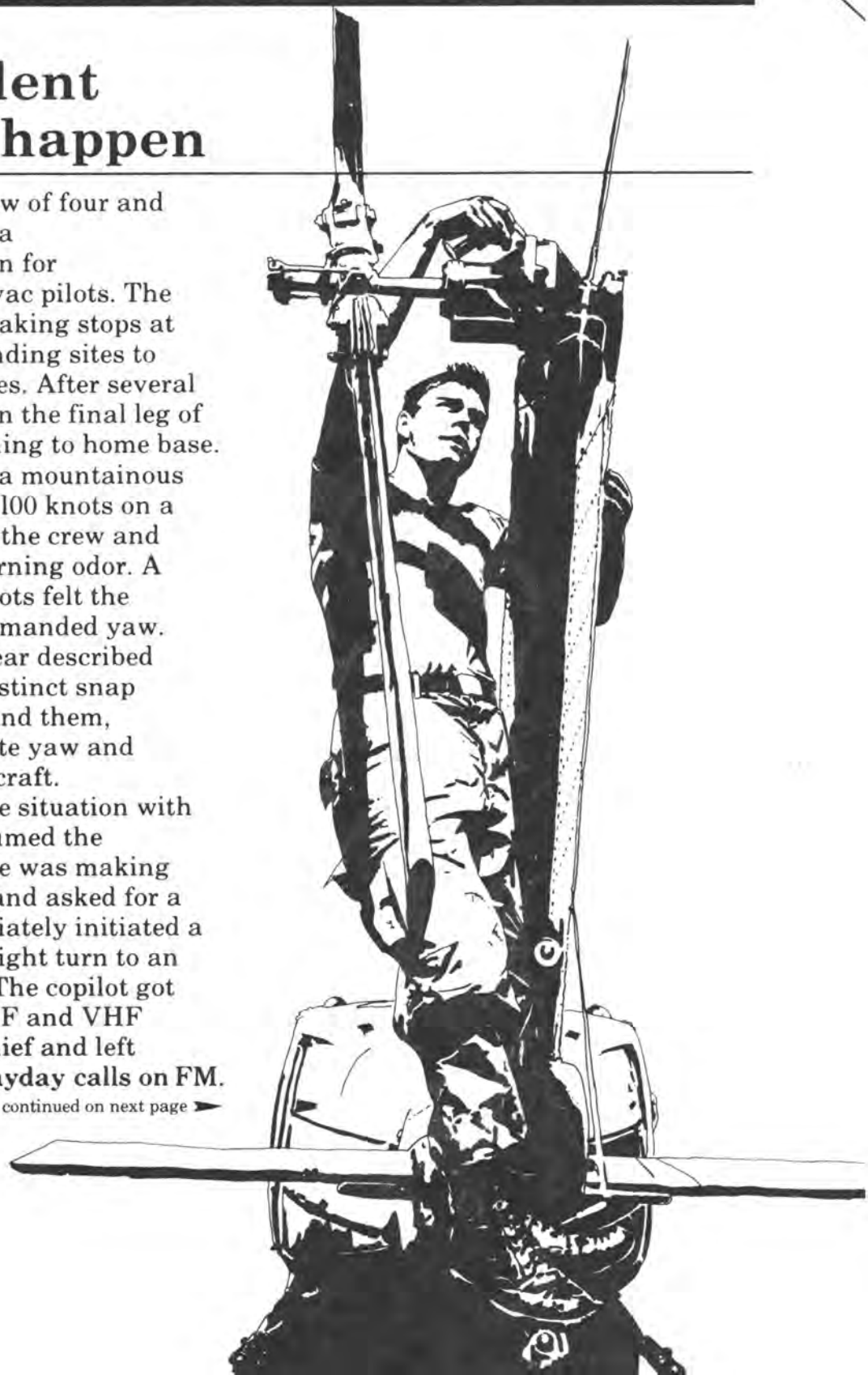

UH-1 accident waiting to happen

Descent to the intended landing area was at normal power-on approach until the aircraft was approximately 200 feet agl. Then the PIC started a gradual deceleration and applied power to slow the approach speed. When the aircraft made an uncontrolled right turn, the PIC attempted to correct by applying left pedal, but there was no response. The aircraft entered a descending right spin of approximately two and one-half turns when the PIC applied right cyclic in an effort to fly out of the spin. At about 40 feet agl, the spin rate accelerated, and the aircraft made two more full turns. The PIC applied collective in an attempt to slow the descent, but there was no time for the collective pull to be completed. The aircraft hit the ground in a near-level attitude in a right spin and rolled over on its left side before coming to rest.

All occupants were conscious and able to escape the aircraft except the passenger on the left rear side of the cargo compartment, who was trapped and unconscious. The PIC and copilot removed the debris and freed him, and all of them moved to a safe location.

The cause of this accident was a combination of human error on the part of maintenance personnel and the flight crew.

After preliminary facts of the accident indicated a spin was involved in the accident, close examination of the tail rotor drive and component parts followed. Although there was no apparent damage to the tail rotor or scoring on the drive shaft along the tailboom, all evidence suggested the tail rotor was not turning at the time of impact. The shaft going through the heat shield tunnel under the engine was severed. There were also extensive rub marks on both the shaft and shield. The heat shield was also deformed on the inside at the area of the break, suggesting the tail rotor drive shaft had hooked the shield. The bearings at each end of the failed drive shaft section showed no evidence of any impending failure. The tail rotor drive shaft failed in flight after extensive rubbing on the heat shield. The drive shaft and heat shield made contact because the heat shield had been distorted on the outside. This distortion buckled the inner surface and allowed the drive shaft to contact the shield. The wear and tear on the shaft had been occurring over an extended time period until it finally made enough contact to snag the insulation and pull the shield firmly onto the tail rotor drive shaft, severing it.

During work on the engine, either installation or removal, it is likely that an unknown mechanic or crew chief either stepped on or used the shield as a lever in repositioning the engine, thus deforming the heat shield and causing it to begin rubbing on the drive shaft.

The first indication that something was wrong was when the aircraft experienced an uncommanded yaw. There was no discussion of the yaw between the PIC and copilot. The PIC immediately took the controls, instructed the copilot and crew to transmit mayday calls, and began a descent with power without stopping to analyze what caused the uncommanded yaw. Proper procedures indicate that the most important consideration for the pilot is aircraft control. Some

emergencies dictate immediate reaction by the crew; this one did not. Had the PIC considered what situations would affect the yaw control of the aircraft and checked the flight controls, he would have noted a lack of pedal response and probably would have selected the proper emergency procedure. The proper decision would have been to autorotate and land immediately or go to a more suitable area and complete an autorotative approach.

His decision to land immediately with power was improper since it placed him in a situation, farther down the approach path, of not being able to maintain aircraft control.

The PIC further masked the loss of tail rotor thrust by reducing the buildup of rotor rpm in the approach with the rpm increase/decrease switch. The proper procedure is to adjust rpm with collective. Had he done so, it is likely another uncommanded yaw would have alerted him to loss of tail rotor thrust.

Consequently, as the PIC initiated a deceleration to slow the aircraft for landing, it began an uncommanded right turn that progressed into a right spin about the vertical axis. As the turn progressed into a spin, the PIC recognized the loss of tail rotor thrust, but again he failed to initiate the proper emergency procedure. Instead, the PIC made a right turn into the spin in an attempt to fly out of it while making no attempt to arrest the descent. As the spin continued, he found himself too close to the ground to effectively slow the rate of descent before making impact.

The PIC, who had 711 military flight hours, 539 of which were in the UH-1, made the improper decision to land as soon as possible because of a lack of training and confidence in his ability to analyze and handle the situation. He did not know what was wrong, but his reaction was to land immediately regardless of what emergency was involved. The PIC had been flying during a period that high-risk maneuvers were not being practiced on a regular basis. Such maneuvers had been limited to a verbal examination and evaluation in a flight simulator. The existing evaluation guide in FC 1-211: Aircrew Training Manual does not ensure loss of tail rotor thrust procedure or any other emergency procedure is regularly evaluated. The PIC was unprepared for the events that occurred and attempted to regain airspeed in a manner inconsistent with the emergency procedures. Had the PIC initiated an autorotation at the onset of the spin, he would not have been guaranteed a successful termination, but he would have increased the possibility of success.

In addition, while not affecting the outcome, the K-flex engine to transmission drive shaft was found to be assembled incorrectly because of unauthorized unit maintenance. There were two washers missing on the flex bars and the bolts were excessively loose. The responsible crew chief, mechanic, or unit could not be determined from the existing records. The condition had existed over a long time period. The faulty shaft was not observed because of inadequate maintenance inspections being conducted by the unit crew chiefs and flight crews. ■

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap

H series - During landing at a tactical LZ with zero ground speed, PIC noticed aircraft was unsteady. PIC increased collective and repositioned aircraft to center of pad. Bent skids were discovered.

UH-1 Class E mishaps

H series - During descent from 5,000 feet to 2,000 feet agl, copilot noticed antitorque pedals were stiff and jerky. PIC took controls and, as descent was continued to airport, right pedal locked with about 2 to 3 inches of pedal remaining. PIC made shallow approach and landed using throttle, collective, and airspeed for heading control. Tail rotor control hydraulic servo was binding. Maintenance replaced hydraulic servo cylinder.

H series - Aircraft was on the ground at engine idle when CE saw oil flowing from 42-degree gearbox input quill. While changing input seal, maintenance personnel noticed metal in gearbox oil. Gearbox was replaced.

H series - After takeoff, pilot felt stiffness in right forward and left rear quadrants of controls. Caused by failure of hydraulic servo cylinder.

H series - During decelerating descent, aircraft developed a loud, whining noise. Caused by dirty hydraulic shuttle valve.

FY88 Class A Mishap Countdown

		FY87			FY88	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	1-11 Nov	0	0
	December	4	6	December		
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	2	0

UH-60 Class D mishaps

A series - During takeoff from confined area, PIC misjudged clearance with tree on right side of flightpath. Crew chief's attention was on ensuring troops, who had just loaded onto aircraft, had secured their equipment. He looked outside and saw the main rotor strike a branch of the tree, but it was too late to warn the pilots. Tip cap on blade was damaged.

A series - Aircraft slingloaded an M105 howitzer 20 feet feet into the air at a stable hover. About 20 seconds later, the hook opened and the howitzer fell to the ground. Hook had been preflighted and passed test. Suspect oil and grit buildup on hook-open microswitch allowed hook-closed light to come on without the hook being locked and safe.

UH-60 Class E mishaps

A series - During flight, crew heard a loud report that sounded like metal flapping on metal. After landing, CE found left main strut panel and step cover were missing. Suspect in-flight failure of fairing hinge.

A series - During preflight, tail rotor paddle trailing edge was found to be separated. Hub pad was protruding from separation.

A series - During climbout through 3,000 feet agl, crew noticed increased lateral vibration. Vibration did not subside when aircraft leveled off at 6,000 feet agl. Retaining ring had separated from main rotor dampener assembly piston.

A series - Stabilators on two aircraft failed, were reset, and failed again.

A series - Pitch bias actuator (PBA) light came on during takeoff. Caused by failure of PBA.

A series - Aircraft took off for second leg of flight. At a 10-foot hover, vertical vibration developed. Antiflap stops were displaced, and one was cracked.

Attack helicopters

AH-1 Class A mishap

F series - Aircraft was trail in flight of three during a battle drill and recon mission. While in straight and level flight at 80 to 100 KIAS, 1,000 feet agl, crew heard a loud bang and saw parts from the aircraft fly by the right side of the cockpit. Tail rotor and 90-degree gearbox had separated from the aircraft, and pieces of the tail rotor struck the right wing and rocket pod. Crew flew to an open area and began autorotation. Aircraft landed hard, rolled left, and turned over onto its top. Pilot got out by breaking side window. Gunner was dazed and required assistance from pilot and crew of another AH-1. 8802

AH-1 Class E mishaps

F series - Copilot applied excessive torque to exit battle position. Pilot was looking through TOW sight unit and heard the increase but was unable to react in time to prevent overtorque to 101 percent.

F series - During flight, pilot noticed transmission oil pressure fluctuating between 50 and 0 psi. Caused by internal failure of transmission oil pressure transducer.

F series - Aircraft was operating at full rpm on rearm pad when transmission oil bypass and transmission oil pressure lights came on. Caused by failure of preformed packing on tail rotor output quill.

P series - During unmasking maneuver, copilot applied excessive collective and overtorqued aircraft to 102 percent.

S series - No. 2 hydraulic light came on during flight. Caused by failure of pressure switch.

S series - Tower contacted pilot and told him his aircraft had dropped a panel on the runway. During preflight, crew failed to ensure turret fairing retaining screw was installed, and 40mm grenade launcher panel fell off. Panel was retrieved.

AH-64 Class E mishaps

A series - Three aircraft experienced gearbox vibration detector lights.

A series - During slope operations in an unimproved area, FOD was blown up into main rotor blades.

A series - Second period student pilot noted no turbine gas temperature (tgt) indications. IP's gauges showed 506 and 508 degrees. Tgt did not increase when engines were motored. Caused by failure of signal data converter.

A series - During single-engine, out-of-ground-effect recovery, primary hydraulic psi and primary hydraulic low lights came on. Caused by failure of primary hydraulic line.

Cargo helicopters

CH-47 Class C mishap

C series - Aircraft was on approach to landing zone at 60 KIAS. Cargo switch was in armed position. Crew chief inadvertently released the load from 300 feet agl.

CH-47 Class D mishap

D series - After offloading an M102, crew chief was attempting to rewind cable. While the winch was rewinding, cable caught on the aft section of the internal cargo handling system. The crew chief failed to notice the cable was caught and continued with rewinding. When the cable snapped loose, it hit the crew chief on the leg.

CH-47 Class E mishaps

C series - During flight, CE noted oil leaking from aft transmission. Caused by O-ring failure.

C series - No. 1 engine rpm N2 increased rapidly during in-ground-effect hover. PIC suspected engine beep trim failure (high side) or N2 governor failure. PIC controlled rpm by moving No. 1 engine condition

Mishap briefs

lever from flight to ground position and made uneventful landing.

Observation helicopters

OH-6 Class E mishap

A series - Aircraft was being test flown for engine surge and to double check the valve accumulator replacement. A thorough MOC and hover check were completed with no indication of malfunction. Then, during normal approach, N2 increased to 108 percent for 45 seconds. Pilot attempted manual throttle operation with no effect. He then placed the throttle in engine idle position, but N2 still would not decrease below 108 percent. Pilot tried to load the rotor system to decrease N2, still with no effect. N1 remained at 80 percent, turbine outlet temperature was about 520° C., and rotor rpm increased to 510 rpm. No other indications were noted. Mishap is under investigation.

OH-58 Class E mishaps

A series - During cruise flight at 400 to 500 feet agl, PIC experienced restricted movement of cyclic control. PIC executed immediate landing, using pedals and collective to control aircraft with very minimum cyclic control. During power-on landing, aircraft hit tail skid first, then came to a rest level on its skids 3 to 5 feet from point of initial skid impact. Loose cannon plug for APR-39 had lodged against the cyclic control, limiting travel of the control.

D series - Start fuel was not delivered to engine for several seconds during modulated start. When start fuel was delivered, throttle had reached engine idle, and start was immediately aborted and throttle closed. Crew chief saw flames coming from engine exhaust. Engine monitor showed turbine gas temperature was 934° C. for 1 second. No damage resulted from hot start.

Fixed wing

C-12 Class E mishap

C series - About 40 minutes into flight, copilot noticed small stream of oil, which rapidly increased to a substantial leak, coming from weep hole on right forward portion of No. 1 engine nacelle. Caused by leaking prop shaft seal.

OV-1 Class E mishap

D series - During takeoff, airspeed indicator stopped at 110 KIAS then slowly increased to 140 knots. Indicated ground speed was 50 to 70 knots faster than indicated airspeed. Insect larvae had blocked pitot static port on right side.

U-21 Class E mishap

A series - During climbout check, fuel was seen siphoning from right wing tank filler cap. Cap was checked by two pilots before takeoff and appeared to be properly seated.

Maintenance

UH-1 Class E mishap

H series - During cruise flight, exhaust gas temperature fluctuated from 220° to 400° C. Caused by loose connection on previously replaced resistor.

AH-1 Class E mishap

F series - During NOE flight, master caution and engine oil bypass lights came on. PIC landed in first available area and, during shutdown, noticed stream of oil coming from engine. Suspect garlock seal was improperly installed.

OH-58 Class E mishap

A series - During climbout, turbine outlet temperature rose to 820° C. Power was reduced and aircraft landed. Bleed air fitting backed out of scroll. Suspect fitting was improperly installed.

Safety messages

• Safety-of-flight technical message concerning one-time inspection of cargo door upper and lower roller support assembly on H-60 series aircraft (UH-60A-87-1, 292300Z Oct 87). Summary: It has been reported that a UH-60A cargo door departed the aircraft in flight. The door was recovered, and investigation revealed that the upper roller support assembly failed due to incorrect aluminum alloy used in manufacture. All spare upper and lower roller support assemblies manufactured by AGH Industries are suspect. The supply system is being purged of suspect roller support assemblies. Serviceable replacement assemblies will not be received for an extended period of time.

The purpose of this message is to direct a one-time inspection to immediately identify suspect roller support assemblies, then remove them from service when replacement assemblies are available. Aircraft with suspect fittings or aircraft with cargo doors removed are authorized to operate under conditions prescribed by this message until serviceable replacement support assemblies are received. Contact Robert Lawyer, AUTOVON 693-9089, commercial 314-263-9089.

• Safety-of-flight maintenance mandatory message concerning inspection of aft and combining transmission fan bearings on CH-47D helicopters (CH-47-87-12, 022130Z Nov 87). Summary: During an inspection of a CH-47D combining transmission fan assembly, it was discovered that incorrect bearings are being issued under NSN 3110-01-014-7508. The incorrect bearing has seals on both sides of the bearing, thereby preventing proper lubrication of the bearing. The correct bearing has a seal only on one side of the bearing. The purpose of this message is to require a one-time disassembly and inspection of the aft and combining fan if a replacement bearing or fan assembly has been installed in the past 6 months. Contact: Leo Smith, AUTOVON 693-9089, commercial 314-263-9089.

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

Recap of AVSCOM messages

Following is a list of AIG 8881 addressed messages transmitted by AVSCOM (AMSAV-XSOF) from 1 July through 30 September 1987.

UH-1-87-08 Safety-of-flight maintenance mandatory message concerning one-time inspection of all UH-1H/V and EH-1H/X aircraft for cracked tail boom attachment fittings.

UH-1-87-09 Safety-of-flight maintenance mandatory message concerning revision to one-time and recurring inspections of all UH-1/EH-1 series aircraft for proper grounding of fire warning detector installation.

UH-1-87-10 Safety-of-flight maintenance mandatory message concerning one-time special inspection of tail rotor hub retaining nut on UH-1/EH-1 series aircraft.

UH-60-87-09 Safety-of-flight technical message concerning cyclic stabilator slew switch on UH-60A/EH-60A series aircraft.

AH-1-87-03 Safety-of-flight maintenance mandatory message concerning restriction due to interference of pilot map light assembly bracket on AH-1 series helicopters.

AH-1-87-04 Safety-of-flight maintenance mandatory message concerning revision to restriction due to interference of pilot map light assembly bracket on AH-1 series helicopters.

AH-1-87-05 Safety-of-flight maintenance mandatory message concerning manifold junctions of specific serial numbers on AH-1E/F/P and TAH-1P aircraft.

AH-1-87-06 Safety-of-flight operational message concerning lifting restrictions for the firing of the TOW GM system on all Cobras, AH-1E/F/P/S series aircraft.

AH-1-87-07 Safety-of-flight operational message concerning armament prelanding procedure for the M197 gun system on AH-1E and AH-1F helicopters.

AH-1-87-08 Safety-of-flight maintenance mandatory message concerning removal of night vision landing light bracket on AH-1 series aircraft.

AH-1-87-09 Safety-of-flight technical message concerning one-time inspection of Kaman 747 rotor blades on AH-1 aircraft for proper installation of slip fit bushings.

AH-64-87-15 Safety-of-flight technical message concerning revision to engine wiring harness inspection, PAS rigging test, and collective rate POT test on AH-64A aircraft.

AH-64-87-16 Safety-of-flight technical message concerning one-time inspection of aft equipment bay area of AH-64A aircraft.

AH-64-87-17 Safety-of-flight technical message concerning revision to one-time inspection of aft equipment bay area of AH-64A aircraft.

AH-64-87-18 Safety-of-flight operational message concerning operation of engine chop collar on AH-64A aircraft.

AH-64-87-19 Safety-of-flight emergency message concerning emergency grounding of AH-64A aircraft for mechanical failure as a result of crashed AH-64A.

continued on next page ►

Recap of AVSCOM messages

AH-64-87-20 Safety-of-flight technical message concerning ungrounding of AH-64A aircraft.

AH-64-87-21 Safety-of-flight maintenance mandatory message concerning battery heater disconnection and additional battery preventive maintenance on AH-64A aircraft.

AH-64-87-22 Safety-of-flight maintenance mandatory message concerning revision to inspection of aft engine mount pins on AH-64A aircraft.

CH-47-87-06 Safety-of-flight technical message concerning replacement of engine cross shaft bolts on CH-47D aircraft.

CH-47-87-07 Safety-of-flight technical message concerning revision to replacement to engine cross shaft bolts on CH-47D aircraft.

CH-47-87-08 Safety-of-flight technical message concerning immediate grounding of selected CH-47D series helicopters to replace three-way hydraulic valves.

CH-47-87-09 Safety-of-flight technical message concerning recurring inspection of forward and aft transmission on CH-47A/B/C helicopters.

CH-47-87-10 Safety-of-flight technical message concerning one-time inspection of shaft coupling washers on CH-47B/C/D aircraft.

CH-47-87-11 Safety-of-flight maintenance mandatory message concerning reduced inspection interval of combiner transmission fan and drive shaft on CH-47D helicopters.

OH-6-87-04 Safety-of-flight operational message concerning flight and ground operational restrictions on OH-58A series aircraft with T63-A-700/T63-A-5A engines.

OH-6-87-05 Safety-of-flight operational message concerning revision to flight and ground operational restrictions due to torquemeter gear failures on OH-6A and OH-58A series aircraft.

OH-58-87-07 Safety-of-flight maintenance mandatory message concerning one-time inspection of the engine exhaust stack coupling clamp on OH-58 aircraft.

OH-58-87-08 Safety-of-flight operational message concerning flight and ground operational restrictions on OH-6A and OH-58A series aircraft with T63-A-700/T63-A-5A engines.

OH-58-87-09 Safety-of-flight operational message concerning revision to flight and ground operational restrictions due to torquemeter gear failures in OH-6A and OH-58A series aircraft.

SOF-GEN-87-03 Safety-of-flight technical message concerning inspection of night vision goggle AN/AVS-6(V)1, NSN 5855-01-138-4749 and AN/AVS-6(V)2, NSN 5855-01-138-4748.

Addressees requiring copies of messages should contact their higher headquarters. ■

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U.S. ARMY SAFETY CENTER

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A. E. Hervey, Jr.
Colonel, Aviation
Commander, Army Safety Center

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Seat belts save lives.

Flightfax

Report of Army Aircraft Mishaps

FY 87 one of best years in aviation safety

We have just recorded one of the safest years in Army aviation history. The momentum of 86—when we had the best Class A rate ever—carried over to FY 87. In FY 87 we had the lowest number of Class A-C aviation accidents in 10 years and the third best Class A rate in history—2.22 per 100,000 flying hours.

Credit for this goes to all of you in Army aviation who have enthusiastically accepted the challenge of training for peak readiness and, at the same time, protecting and safeguarding our aviation resources. Each of you can be proud of the contribution you made to this record.

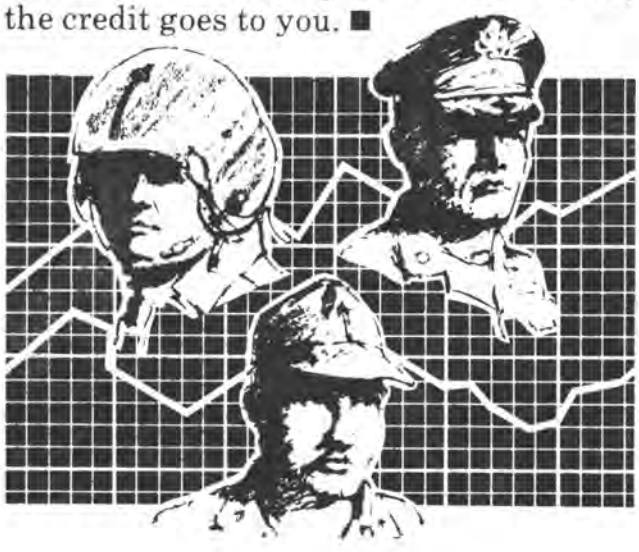
To really understand the significance of the progress we have made in aviation safety over the past 5 years, we need to remember where we were in FY 82. That year, the Class A rate was 3.23. Had this rate continued over the past 5 years, we would have had an additional 58 Class A aircraft accidents at a cost of more than $100 million, not to mention the increased loss of life and decreased combat capability.

This record takes on even greater significance when you consider that it was achieved during a period of increasing aviation mission demands. Every year mission demands and exposure have increased and tough requirements have been placed on top of already tough requirements.

In FY 82, about 43 percent of our total flying hours were in the high-risk environment; that is, terrain flight at night with night vision goggles, slingloads, and hoist missions. In FY 87, about 90 percent of the total flying hours of our combat-ready divisions were in the high-risk environment, with some units reporting as high as 65 percent of their total flying hours at night with night vision goggles at NOE levels.

We are now operating our helicopters at treetop level, in marginal weather, under radio silence, and in multi-aircraft formations. And we are flying more at night with night vision goggles, where a single performance error greatly increases the probability of a major accident.

We are making progress, and the credit for that belongs to aviation units: to the commanders, the safety officers, the operations officers, and most of all to the pilots in the cockpits and the mechanics on the flight lines. For FY 87, the credit goes to you. ■



A terrific brigade

There once was a brigade that could do its job. This brigade performed in such an outstanding manner, not just every day but during multiple rotations to the National Training Center and FTXs and CPXs too numerous to mention, that everybody wanted to know why. It was obvious from this brigade's performance under some really trying circumstances that something about it was different. But what?

When people looked closer at this brigade and how it was run, they inevitably came to the guy at the top—the commander. There was something different about him. "At the right place at the right time" describes this commander best. No one knew where he would turn up next. He seemed to be everywhere—because he was. The soldiers in the shops knew him because he would stop and talk to them. When the brigade was in the field, he was there—fighting the dust, slogging through the mud, enduring the heat or cold. He might even turn up in the middle of the night where his soldiers were on patrol.

This commander paid attention to everything that affected his soldiers. When he ate breakfast with them, he waited in line just like everybody else—so he didn't have to ask how long his soldiers had to wait to be served. He might turn up at sick call for the same reason. No detail about his soldiers' daily lives was too small to escape this commander's interest.

He was tough, and corrections were made when needed, but no subordinate commander had to fear the humiliation of a public tongue-lashing. His counseling was one-on-one, and it took place privately, footlocker style. Deviations from standards were immediately corrected, but in a mature, professional manner. The command climate throughout this brigade was as extraordinarily good as its capacity to respond instantly to contingency missions—whether they were in Honduras or anywhere else in the world.

In this brigade, the state of training was high, as was the state of discipline. The state of morale was high, as was the state of readiness. The state of family involvement was high, as was the cohesion of the brigade. The level of

continued on back page

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap

H series - Aircraft was 1,000 feet msl (990 feet agl), 100 KIAS, during final leg of VFR service mission. Pilot initiated a climb of approximately 600 fpm by increasing power to 35 psi torque and reducing airspeed to 90 KIAS. At about 1,200 feet msl, crew heard a single loud bang from aft portion of the aircraft. The pilot immediately lowered collective and began a descent. During cross-check of engine and transmission instruments, the crew determined the engine was functioning normally and completed an uneventful power-on approach. Suspect compressor stall, caused by malfunction of fuel control. The 42-degree and 90-degree gearboxes, tail rotor drive shaft couplings, and tail rotor hub were damaged.

UH-1 Class E mishaps

H series - During cruise flight, master caution and hydraulic pressure lights came on, followed by complete loss of hydraulic boost to flight controls. Caused by failure of hydraulic line.

H series - Right fuel boost pump light came on during flight. Caused by failure of submerged pump.

V series - During landing from a hover, copilot, who was in the left seat, commented that antitorque pedals felt a little different from usual. Pilot took controls and stabilized at a 3-foot hover. After right-pedal turn was made to place aircraft into the wind, binding in pedals could be felt. After power-on landing, tail rotor pedals were adjusted.

FY88 Class A Mishap Countdown

	Month	FY87 Class A Mishaps	FY87 Army Fatalities	Month	FY88 Class A Mishaps	FY88 Army Fatalities
1st Qtr	October	3	4	October	2	0
	November	1	0	1-18 Nov	0	0
	December	4	6	December		
2nd Qtr	January	3	3	January		
	February	1	4	February		
	March	4	2	March		
3rd Qtr	April	2	1	April		
	May	5	3	May		
	June	5	13	June		
4th Qtr	July	2	5	July		
	August	5	1	August		
	September	3	0	September		
	Total for Year	38	42	Total to Date	2	0

UH-60 Class D mishaps

A series - PIC parked aircraft in undesignated parking area adjacent to three OH-58s. During start and subsequent hover, rotorwash from UH-60 blew off left rear door of an OH-58.

A series - Aircraft was returning three nearly empty 600-gallon blivets to POL facility. The aircraft was about 100 feet agl when the load began to swing. The pilots were slowing the aircraft to gain control of the load when the load released, and the blivets dropped. The load had been properly rigged, and a 10,000-pound clevis with the current modification was being used. The load dropped without the release switch being activated. Cause is unknown.

A series - Pilot was being ground guided during approach to hilltop with a fuel blivet as an external load. Pilot lost visual reference to the ground due to blowing dust and decided to release load at 1-foot altitude. The copilot released the load as instructed by the pilot. When the

load hit the ground, the blivet began rolling down the side of the landing zone and split open, spilling about 500 gallons of fuel.

UH-60 Class E mishap

A series - Aircraft was in the traffic pattern when crew smelled strong odor of fuel. Pressure overspeed unit was replaced.

Attack helicopters

AH-1 Class E mishaps

F series - Aircraft was 200 feet agl, 40 KIAS, during night takeoff from sod area. Aircraft began developing severe high-frequency vibration throughout the airframe, and crew could hear a moderate humming noise. Takeoff was aborted, and just prior to touchdown, crew detected odor of electrical fire. No fire was found; however, the alternator was hot and smelled of electrical burning.

S series - During maintenance test flight, aircraft had total electrical failure. Stability control augmentation system came off line, and voltage regulator and amperemeter showed zero readings. Attempt at emergency procedure for generator failure was unsuccessful. Aircraft made uneventful running landing. Caused by failure of voltage regulator.

AH-64 Class C mishap

A series - Aircrew was participating in night gunnery qualification. The aircraft was returned to rearm pad because of weapon malfunction. During approach, vibration gearbox caution light came on. Two tail rotor blades had been damaged beyond repair, and another blade sustained minor damage. There was also sheetmetal damage to the stabilator and chaff dispenser, and the ADF sensing antenna was torn off. Investigation continues.

AH-64 Class D mishap

A series - While hovering over firing point, crew attempted to fire 30mm gun. After one burst, weapon would not fire again. Aircraft returned to rearm pad, and armament personnel reported that the gun barrel had been blown off, and the gun had jammed. Barrel was recovered. Suspect barrel was not properly seated during installation.

AH-64 Class E mishaps

A series - During out-of-ground-effect hover, pilot in rear seat heard a thump from transmission area, and main transmission chip light came on. Aircraft made uneventful landing.

A series - Environmental control unit failed during runup, and crew heard a loud, whining noise. Caused by failure of shaft-driven compressor.

A series - During flight at 700 feet agl, 100 KIAS, rated student pilot told IP forced trim did not seem to be releasing. IP took controls and found forced trim was releasing; however, something was resisting any movement forward of the center position. While taxiing into parking, any forward movement of the cyclic against the pressure resulted in a pounding in the rotor system, similar to droop stop pounding. During shutdown, the pounding was encountered whenever cyclic was forward of dead center. Shear rivet in pilot's cyclic control quadrant had sheared, resulting in resistance to movement forward of center and causing feedback in the rotor system.

Cargo helicopters

CH-47 Class C mishap

D series - While in cruise flight at 2,000 feet agl, 130 KIAS, pilots felt aircraft shudder and heard a bumping sound. Crew of another aircraft in the flight notified pilots their clam shell doors had blown open. The left door separated from the aircraft and blew up through the aft rotor system. Underside of one main rotor blade was damaged, and top of Nos. 1 and 2 engine inlet screens were pushed in. During short final, the right clam shell door fell off but was recovered by another aircraft. Investigation continues.

CH-47 Class D mishap

C series - During final approach to landing zone with externally loaded M102 howitzer, aircraft was engulfed in dust. Crew lost visual references, and aircraft began a drift to the right, dragging the M102. Crew chief told pilots the aircraft was drifting and released the load in an attempt to prevent the howitzer from turning onto its side. At the same time, the pilots increased power to lift load off the ground. The howitzer was 4 to 6 feet agl when the cargo hook opened. One wheel rim on the M102 was bent when the load dropped. Copilot was wearing MOPP-4 equipment, and aviator gas mask degraded his ability to see.

CH-47 Class E mishaps

C series - During flight, FE noticed hydraulic leak in flight control closet. Leak was isolated

Mishap briefs

to yaw stability augmentation system (SAS). SAS extensible link was replaced.

C series - No. 2 engine failed to start during normal engine start. Power turbine inlet temperature reached 760° C., and N1 stopped at 40 percent. After several more attempts to start engine, crew chief reported fluid coming from auxiliary power unit, and pilot noticed APU generator was not working. Pilot shut down APU and No. 1 engine. After shutdown, 90 percent speed switch was found melted, and shaft was broken.

D series - During approach, engine chip caution light came on. Engine was replaced.

D series - During runup, No. 1 engine would not respond to normal engine trim inputs. Caused by internal failure of N2 actuator.

Observation helicopters

OH-58 Class E mishap

A series - Aircraft was 1,000 feet agl at 90 KIAS when crew noticed fuel level at 200 pounds and decided to return to airfield. About 10 minutes later, the 20-minute fuel light came on, and fuel level indicated 100 pounds. Three to four minutes later, the fuel level was down to 50 pounds, and the crew made an uneventful landing. Approximately 35 gallons of fuel were found trapped between the fuel cell and liner. Caused by loose patch inside fuel cell.

Fixed wing

C-12 Class E mishaps

C series - During shutdown, fuel was seen leaking from bottom of No. 1 nacelle tank. Three fuel cell retaining snaps had come loose, and one snap punctured the fuel cell.

C series - During takeoff, crew noticed No. 2 engine exhaust gas temperature was higher than normal. At liftoff, only 90 percent torque was available on No. 2 engine. Caused by internal malfunction of high-pressure bleed valve.

OV-1 Class C mishap

D series - When gear handle was placed in up position during takeoff, the wing stores tank jettisoned. Maintenance found pilot wing stores jettison button was stuck in closed position, and control stick cannon plug would short out when moved.

OV-1 Class D mishaps

D series - During flight, attaching rod between gear strut and long door broke. Rear door struck fuselage. Door and fuselage were damaged.

D series - Aircraft struck a bird at 1,500 feet agl, 150 KIAS, while performing single-engine emergency procedures at night. Right side of nose compartment was dented.

OV-1 Class E mishap

D series - During maintenance ground run with both engines running, No. 1 engine torque indicator went to 120 percent, then dropped to zero. Simultaneously No. 1 engine chip light came on, and engine was shut down. All other engine indications remained normal. During postflight inspection of engine and prop for freedom of internal movement, engine hose case was binding. Suspect internal oil system was improperly installed at rebuild facility.

U-21 Class D mishap

C series - Crew smelled burning rubber after landing and rollout. Left main landing gear outboard tire had blown out. Suspect pilot applied brakes too soon during landing.

U-21 Class E mishap

A series - After completing HIT check, fault warning and left generator lights came on, and smoke came out of left exhaust stack. When aircraft was washed, water seeped into P-Y line and caused fuel control unit to shut down. During coastdown, water passed through the P-Y line and fuel control unit, and engine and fuel control began operating normally. High humidity and cold morning temperature prevented engine area from completely drying.

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

U.S. ARMY SAFETY CENTER

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A. E. Hervey, Jr.
Colonel, Aviation
Commander, Army Safety Center

A terrific brigade

maintenance was high, as was the level of concern for the soldiers. This just might have been the best brigade in the Army. It was a brigade that did everything well, with a commander who cared about what the brigade could do and the people who did it.

In this brigade, the accident rate involving primary mission equipment was zero for more than 2 years. Safety permeated the unit, and it was taken one day at a time. Concern for tomorrow's performance was always still a day away, but when that day came for this brigade, it was ready to meet the challenge.

Isn't it interesting that safety can be a better indicator of readiness than any other standard that can be used? That is not to say that safety is most important; the mission is most important. It does say, however, that safety appears to be the most important measure of a unit's ability to accomplish that mission. This is no idle statement. It is backed up by units as they rotate through the NTC, by first-hand observation of operations officers in tough environments everywhere, by statistics maintained at the Army Safety Center, and by good common soldier horse sense. Once upon a time it all came together in one brigade. And it can happen again and again. It has happened, and it will happen because we have commanders who have genuine concern for their mission and their soldiers—and for the safety of those soldiers.

That's one reason why, overall, 1987 was the safest year in the history of the Army.

—COL A. E. Hervey, Jr., Commander, U.S. Army Safety Center

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Report of Army Aircraft Mishaps

FLIGHTFAX

Volume 16 □ Number 27 21 September 1988

Aircrew coordination and communication

Crew coordination doesn't begin when an aircrew straps into their seats and starts the engines. Effective aircrew coordination begins with the mission briefing. That's when everybody should learn what the mission is all about: what has to be done, when it has to be done, and why it has to be done. That is also when all crewmembers need to learn what is expected of them during each phase of flight and in the event of an emergency.

To be effective, an aircrew—no matter whether it comprises a crew of four or only two—must function as a team, and the cockpit is no place to decide what the game plan is going to be. All of that needs to be worked out ahead of time, and the larger the crew, the more complex good crew coordination becomes.

Greatly increasing attention is being given to the need for training aircrews, military as well as commercial, in coordination and communication skills. The primary reason is that since FY 83 74 percent of all Army aviation accidents have been definitely human error related.

STACOM

Flight crew qualification and selection program

Numerous inquiries have been made to the Directorate of Evaluation and Standardization (DES) regarding the requirement in AR 95-1: Army Aviation: General Provisions and Flight Regulations for a formal flight crew qualification and selection program. This has also been a recurring problem identified during Armywide evaluation/assistance visits by DES personnel.

Aviation units may use the following generic flight crew qualification and selection program as a guideline. It should be tailored to fit the specific mission and needs of individual units.

1. **Purpose.** To establish the commander's flight crew qualification and selection program in accordance with AR 95-1, paragraph 4-5.

2. **Scope.** This Standing Operating Procedure (SOP) applies to all flight crewmembers assigned or attached for flying purposes.

3. **Responsibilities.**

a. Commander. Establishes, in writing, a formal flight crew qualification and selection program. The program will contain qualification and selection criteria as specified by the commander. Provides the aviation unit chain-of-command a current list of assigned flight crewmembers and the flight crew stations from which they are authorized to fly. Assists in selection of flight crews for missions/flights

d. Instructor pilot (IP). Trains and evaluates aviators and other personnel in accordance with the Aircrew Training Manual (ATM) and the flight crew qualification and selection program.

e. Flight crewmembers. Comply with unit Aircrew Training Program (ATP) and flight crew qualification and selection program.

4. **Qualification requirements.**

a. Pilot in command (PC) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-6.

(2) Meet all the prerequisites outlined in the commander's PC program. (Program may be included here.)

(3) Meet the prerequisites of the commander's night vision goggle (NVG) PC program if appropriate.

(4) Be designated in writing by the commander, to include authorized crew stations. (Be specific as to task or hour requirements prior to being designated in each station.)

b. Pilot (PI) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-8.

(2) Have completed appropriate Readiness Level (RL) progression as outlined in the commander's ATP prior to flying with a unit PC

c. Copilot (CP) will—

(1) Meet the requirements of AR 95-1, paragraph 4-9.

(2) Be designated as an Army aviator.

(3) Be assigned/attached for flying duties.

d. Unit trainer (UT) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-10.

(2) Complete appropriate training outlined in TC 1-210 and the ATM.

(3) Complete a flight evaluation in accordance with the appropriate ATM.

(4) Meet local requirements designated by the unit commander. (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements. Example: Additional training on special tasks that are pertinent to this position and specific according to seat designation.)

(5) Be designated in writing by the commander, to include authorized crew stations.

e. Instructor pilot (IP) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-11.

(2) Complete appropriate local training and requirements designated by the commander. (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements. Example: Additional MOI training in areas relating to peculiar unit

flight crew positions within the unit.

b. Safety officer. Monitors the flight crew qualification and selection program to ensure compliance with commander's written guidance. Assists in selection of flight crews for missions/flights.

c. Standardization instructor pilot (SP). Provides technical supervision of the unit flight crew qualification and selection program

(3) Have completed appropriate additional unit training. (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements. Example: Left- or front-seat training for new aviators.)

(4) Be designated in writing by the commander, to include authorized crew stations. (Again, list specific training requirements for each seat.)

missions/tasks.) Qualification criteria should list hours required or tasks to show proficiency as an instructor and evaluation in each crew station.

(3) Be designated in writing by the commander, to include authorized crew stations.

f. Instrument flight examiner (IE) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-12.

MISHAP BRIEFS

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D

H series - While aircraft was on climbout after dropping off a passenger, crew heard a loud report. Jump door window had broken. Suspect that passenger grabbed jump door handle while exiting aircraft. The unsecured jump door later opened as the aircraft rolled out of a turn and then was slammed shut by the slipstream.

H series - During cruise flight, aircraft developed rapidly increasing vertical vibration. Caused by skin delamination and separation on main rotor blade.

UH-60 Class D

A series - Tail rotor drive shaft cover and clamps were hard to close during preflight. Cover was found open during postflight. Damaged cover was replaced.

A series - During flight after refueling, refuel compartment door opened and was ripped in half. Aircrew failed to check security of door after refueling.

Attack helicopters

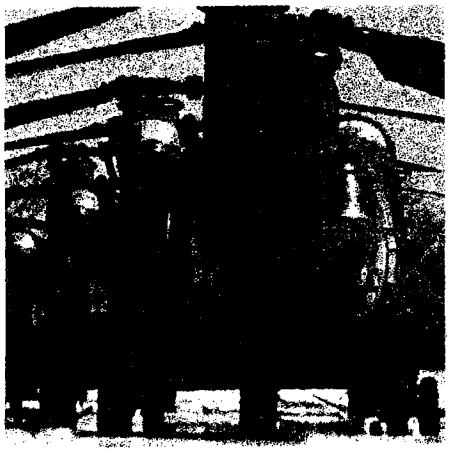
AH-64 Class E

A series - During final approach, smoke began entering cockpit from behind pilot's seat. Just before touchdown, there was a hard shutdown of the aircraft's electrical system. By the time aircraft landed, both cockpits were filled with smoke. Firefighters disconnected the battery, which disabled the force trim system. The IP, who was in the front seat, had to remain in the aircraft to ensure the cyclic was centered so the main rotor blades would not droop and cause damage to the pilot night vision sensor unit. Smoke was caused by an internal electrical fire in No. 1 generator.

Cargo helicopters

CH-47 Class D

D series - Aircraft was in cruise flight at 60 KIAS with two 10,000-gallon collapsible tanks loaded on the forward hook. One of the six mounting points failed, causing the load to swing out of flight engineer's field of view. When the load swung back into view, one container was missing. Neither crew nor ground support personnel realized this load is recommended only for UH-1 aircraft. Maximum recommended airspeed for such a load is 35 knots.



D series - Inexperienced hookup man placed clevis securing an A-22 bag to an M102 on the center hook with the main M102 clevis. This greatly shortened the rear slings. As the load became light, the M102 pivoted and struck the underside of the aircraft.

D series - Aircrew felt helicopter shake while pickup truck was being loaded on board. When questioned, loading crew reported the truck went in okay. Flight was delayed, and when PIC saw that equipment boxes on back of truck were up against soundproofing of aircraft's roof, he told the crew to let air out of the truck's tires to lower the load. Before unloading, he again asked if air had been let out of the truck's tires and was told that it had been. After an apparently uneventful unloading, bent formers on inside of aircraft's roof were found.

Observation helicopters

OH-58 Class E

C series - Fuel boost caution light came on during final approach. Caused by failure of fuel boost pump.

Fixed wing

C-12 Class E

C series - After landing and shutting down engine, PIC saw

(2) Meet local requirements designated by the commander. (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements. Example: Orientation to the local en route structure.)

(3) Be designated in writing by the commander, to include authorized crew stations.

g. Standardization instructor pilot (SP) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-13.

(2) Meet local requirements designated by the commander. (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements. Example: Administration of the commander's ATP.)

(3) Complete an SP evaluation in accordance with the appropriate ATM.

(4) Be designated in writing by the commander, to include authorized crew stations.

h. Maintenance test pilot (MP) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-14.

(2) Meet local requirements designated by the commander. (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements. Example: Local test flight (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements. Example: Commander's MP/ME ATP requirements.)

(3) Complete an ME evaluation conducted by a designated ME.

(4) Be designated in writing by the commander, to include authorized crew stations.

j. Experimental test pilot (XP) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-16.

(2) Meet local requirements designated by the commander. (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements.)

(3) Be designated in writing by the commander, to include authorized crew stations.

k. Aerial observer (AO) (enlisted aerial observer/field artillery observer) will—

(1) Be a graduate of the U.S. Army Aviation Center Aeroscout Observer Course Number 600-ASI-ZI.

(2) Be trained in accordance with the appropriate ATM.

(3) Meet local requirements designated by the commander. (Commanders should evaluate each flight crew position and designate additional training as required to meet unit mission requirements.)

(4) Be designated in writing by duties they are authorized to perform. (Enclosure 1)

b. Selection criteria should address individual crewmember proficiency, mission complexity, crew capability, special flight crew qualifications, and any other appropriate factors designated by the commander.

c. Crew selections will be designated on the mission briefing, specifying the duties and flight crew stations for each crewmember.

6. **Evaluation requirements.**

a. Aviators will be evaluated during RL progression. Thereafter, they will be evaluated annually during Annual Proficiency and Readiness Test (APART) in their primary aircraft and during the training year in alternate and additional aircraft. They will be evaluated in each flight crew station from which they are authorized to fly in accordance with the appropriate ATM and Commander's Task List. Aviators need not perform all tasks from each crew station to meet this requirement provided all required ATP tasks are evaluated at some time during the process. SOPs should designate the procedure devised by the commander to accomplish this requirement.

b. Crewmembers will be evaluated in accordance with the appropriate ATM. □

(3) Complete an MT evaluation conducted by a designated ME.

(4) Be designated in writing by the commander, to include authorized crew stations.

i. Maintenance test flight evaluator (ME) will—

(1) Meet the requirements of AR 95-1, paragraphs 2-1 and 4-15.

(2) Meet local requirements designated by the commander.

authorized crew station.

5. **Selection criteria.**

a. Crew selections will be made by the aviation unit chain-of-command with assistance provided by the unit safety officer and SP. When making crew selections, the chain-of-command will have available to them a list of assigned flight crews, the crew stations from which they are authorized to fly, and

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Michael H. Abbott
Colonel, Aviation
Director, DES

fuel dripping from aircraft's right wing near a draincock and from the outboard gear door. Fuel cell had chafed against an installation snap, causing cell to rupture.

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

Followup information on accidents previously reported

UH-60 Class B

Reported in 2 Sep 87 issue as 8752 - Aircraft was chalk three in a flight of three UH-60s. The aircraft were slingloading M102 105mm howitzers with A-22 bags attached. After climbout at 400 feet, the pilot initiated a slow left turn. During the turn, the aircrew heard a loud "pop" and the howitzer fell to the ground, muzzle down, and broke apart. The slingload clevis was still attached to the cargo hook. Riggers from the supported artillery unit had used a sling extension leg with a working load capacity of 2,500 pounds for the 3,660-pound load. The load was rigged using a single leg of a 10,000-pound sling set instead of the 25,000-pound sling set directed by the battery commander and specified in the unit SOP.

UH-60 Class C

Reported in 26 Aug 87 issue as 8749 - Downgraded from Class B. Aircraft was operating on the ground during rappel mission. While the belayman was walking the rappel rope back to the aircraft, the rope became entangled in his equipment. The rappel master attempted to throw the rope away from the rotor system, but the rope was drawn up into the rotors, damaging the aircraft. The belayman was thrown against the aircraft, but the pilot had seen the rope enter the rotor system and he cut the engines. Quick action by the pilot prevented further injury to the belayman and more serious damage to the aircraft.

AH-64 Class A

Reported in 21 Oct 87 issue as 8758 - Aircraft was on an NVG tactical mission. During cruise flight at low level, the crew encountered instrument meteorological conditions (IMC). The pilot initiated a climb and was in the process of transitioning to flight instruments when the aircraft descended and hit the ground. When he encountered IMC, the pilot moved his hand from the collective and reached down and to the left to turn up the instrument panel lights. During this critical time when the pilot's attention was on locating the instrument light rheostat and on removing the helmet display unit from in front of his eye, power decreased to 35 percent torque and the cyclic was displaced right and forward. The aircraft began a rate of descent exceeding 1,000 fpm. The aircraft hit the ground at about 85 KIAS, in a nose-low attitude, slid a short distance, and rebounded into the air. The pilot activated the chop collar and the aircraft descended vertically, striking the ground and rotating 180 degrees after impact. The two crewmembers sustained minor injuries.

OH-58 Class C

Reported in 16 Sep 87 issue as 8755 - Downgraded from Class B. When the pilot applied collective during a takeoff to hover, the aircraft appeared to drift slightly to the right and began a rolling motion to the right. The pilot maintained heading and immediately lowered collective and applied left cyclic. The main rotor blades struck the ground on the right and separated from the aircraft. The aircraft came to rest upright, and neither crewmember was injured. The pilot failed to follow procedures when he did not establish a vertical ascent. He also allowed a nonrated observer to "follow through" on the controls. Twice before, he had successfully completed the same maneuver with the observer following through. During the third attempt, he was explaining his actions to the observer and failed to pay enough attention to establishing a vertical ascent. ☐

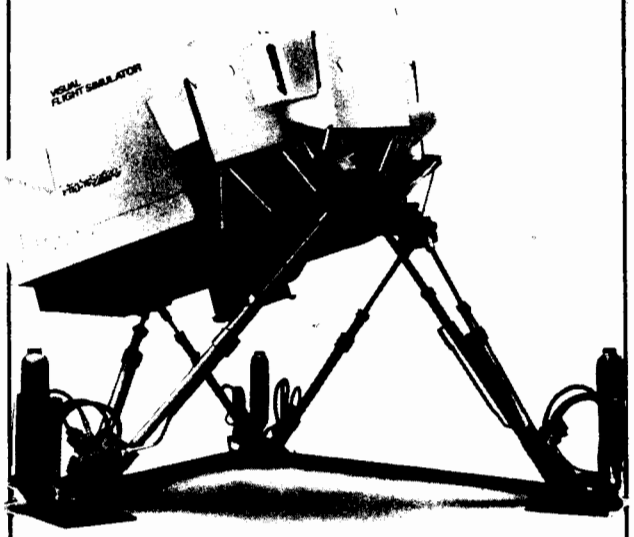
Since the human side of the accident equation is the single greatest problem area, it is the one in which the greatest advances need to be made in reducing accidents. One major way of dealing with human performance or human error problems is to improve the way aircrews work together and communicate with each other. All too often, one member of the crew knew or sensed something was wrong before an accident happened; yet, many times, nothing was said or done to warn the pilot. Even more puzzling are those cases in which aircrew warnings were ignored or their questions unanswered by the pilot. In still other cases, crewmembers had not been properly briefed or were not being used in the most effective way to provide assistance to the pilot in control of the aircraft.

There are some human characteristics that affect the way in which the Army approaches crew coordination training.

Psychologists generally agree that personality characteristics are pretty well determined by the time a person reaches adulthood. These characteristics influence attention, perception, memory, thinking, judgment, decision-making attitudes, and values.

Attitudes, on the other hand, are characterized by the ways individuals think, feel, or often behave toward an event, person, or groups of persons—and attitudes are more capable of change. It is toward

Training in these subject areas depends to a large extent upon active participation in realistic exercises based on real-life events. Students participate as crewmembers in actual situations that have happened, or could happen, in real aviation units. In the future, use of simulators during this training will allow crews to replay these scenarios to see their actions and interactions as a crew. In this way, they can both see where they went wrong and what they should have done, as well as how they function as a team.



Accident reports identify many instances where there was a breakdown in coordination and communication before an accident. For example:

Who's flying the aircraft?

Clear communication is never more important than when control of the

Everybody is a member of the team

If all crewmembers are kept informed, they will be more capable of functioning as a team. When the pilot of an OH-58 failed to communicate with his copilot, he deprived himself of some much-needed assistance during a critical phase of flight.

- The pilot attempted to take off into the wind over a high obstacle, an antenna support pole. He failed to maintain a constant angle of climb, and the aircraft's main rotor blade hit the pole about 36 feet above the ground. Nylon ropes supporting the pole became entangled in the aircraft's flight controls, and it crashed. The pilot had been flying single-pilot missions out of this same desert field site. Because of this, he neglected to tell the copilot what he planned to do. If the copilot had been briefed, and had been helping with obstacle clearance, the pilot's workload would have been reduced, and collision with the obstacle might have been avoided.

Information sharing

For communication to be effective, it must flow between all crewmembers, not just downward from the PIC.

- The crew of a CH-54 was attempting to pick up a wrecked armored personnel carrier (APC) weighing 16,000 pounds. As the load was hooked up, the rigging cable became entangled with a protruding part on the APC. When the helicopter tried to lift the load, the APC shifted

to safe and effective flight that most training in cockpit management and crew coordination is being directed.

Providing training for Army aircrews in cockpit management and crew coordination skills includes—

- Effective communications
- Problem solving
- Decision making
- Managing the workload
- Exercising sound judgment
- Breaking the poor judgment chain
- Procedural compliance
- Recognizing and handling stress
- Managing cockpit distractions
- Dealing with crew incapacitation
- Situational awareness
- Identification of available cockpit resources

pilot to the other.

- An AH-1 was en route to a gunnery range. The aircraft was at 5,000 feet agl when it reached the reporting point for a scheduled fuel stop at an airfield. The copilot, who was on the controls in the front seat, thought he had transferred the controls to the pilot in the rear seat because the aircraft began turning in the intended direction. It wasn't until the helicopter assumed a dive angle of 65 degrees that both pilots realized no one was flying the aircraft. The aircraft had reached an airspeed of 160 knots and descended to 1,000 feet agl before it was recovered.

Don't assume everybody knows what to do

It is never safe to assume that crewmembers know what is expected of them and both can and will do it without being told. In the following accident, an aircraft was flown into the water because no one was calling out altitudes to the pilot.

- During a night vision goggle mission over water, the IP of a CH-47 began a gradual descent from 300 feet, intending to level off at 50 feet. The copilot watched as the altimeter registered 78 feet, but he was so confident in the IP's abilities that he didn't say anything. The rest of the crew had not been briefed as to what their responsibilities in this situation were. As a result, no one called out altitudes as the aircraft descended. The IP thought he would be able to see the water when he reached 50 feet, but he couldn't. The helicopter hit the water at 70 knots.

and rotated. The cable slipped and the load dropped about 2 feet. The cable frayed against the cargo hook and snapped. Relieved of its load, the hook rebounded and struck the aircraft's rotors. The flight engineer was in a position where he could see the load. If he had warned the pilot at the first sign of trouble, this accident probably could have been prevented.

(continued on back page)

FY88 Class A Mishaps
through 21 September

	Month	Class A Mishaps		Army Military Fatalities	
		FY87	FY88	FY87	FY88
1st Qtr	October	3	3	4	0
	November	1	1	0	0
	December	4	1	5	0
2nd Qtr	January	3	2	2	0
	February	1	1	4	10
	March	4	3	1	18
3rd Qtr	April	2	3	1	1
	May	5	7	3	4
	June	5	4	13	4
4th Qtr	July	2	1	5	0
	August	5	2	1	0
	September	3	4	0	1
	Total	38	32	39	38

Aircrew coordination and communication

It takes two to communicate

The fact that a message is "sent" doesn't mean that it was "received." For example, in the following incident, a clear statement such as "You have control of the aircraft," followed by a specific "I have the controls," could have prevented a misunderstanding about who was flying the aircraft.

• During cruise flight at 200 feet agl, the pilot of an AH-1 told the copilot (who was flying from the front seat) to change a radio frequency. The copilot told the pilot to take the controls. The copilot didn't hear a verbal response from the pilot, but he assumed the pilot had the controls, and the copilot released them. What really happened was that both pilots began changing radio frequencies. No one was on the controls! The aircraft went into a shallow dive, and the pilot and copilot couldn't react in time to prevent the aircraft from striking trees.

Proper use of all crewmembers

Unless information given to crewmembers is correct and complete, they will not be able to effectively assist the pilots.

• The IP of a CH-47 put the aircraft into a hover while he selected a landing site below a ridgeline. He realized the slope was too steep for all four wheels to be placed on the ground, but he calculated that the site was large enough for the aft wheels and still provide clearance for the aft rotors. However, the IP failed to tell the other crewmembers that the principal hazard to the aircraft was the upsloping terrain to the rear of the helicopter, not obstructions underneath it. As a result, while the IP was attempting the landing, the crew chief in the rear of the aircraft was concentrating on clearing the aft wheels, not the aft rotor blades. The slope was actually steeper than the IP realized, and the helicopter's aft rotor blades struck the slope. The aircraft rolled down the slope and was destroyed.

Everybody has a job to do

If one member of the crew fails to correctly or adequately perform, a sequence of events may be set into motion that can result in disaster.

• An OH-58 was lead in a flight of four aircraft on an NVG training mission. The unit trainer was at the controls, and the copilot was navigating. The copilot's attention was fixed on relaying radio traffic between unit operations and his platoon leader, who was in another aircraft, and he wasn't providing the pilot with necessary navigational information and instrument readings. Because of this, the pilot focused his attention inside the aircraft. The helicopter struck a wire and crashed, killing the copilot.

Flying an aircraft involves an extremely demanding set of tasks performed at high skill levels, and it is becoming more complex and demanding every day as the technology of Army aircraft continues to increase. Army aircraft are also flying more nap-of-the-earth and contour, often with night vision devices or visual displays. It is more and more critical that aircrews fly as well-coordinated members of a team. Better coordination and more effective communication are absolutely essential if Army aircrewmembers are to complete their demanding missions safely and effectively. □

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