Accident Prevention is a Combat Multiplier

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 10 □ 30 Nov 1983

More than you ever wanted to know about your pressure altimeter

A pressure (aneroid) altimeter indicates height by measuring pressure through an analog mechanism solving the hydrostatic equation ($P = \varrho gz$) for altitude (z). (See figure 1.) All aviators know the importance of operating with a current altimeter setting, and the rule of thumb "from high to low, look out below" probably still rings in their ears from their last instrument training. A change of only a tenth of an inch in the barometric pressure can put you 100 feet closer to that obstacle than you thought and with possible diurnal and spatial (a tank's range for even the short-legged birds) variations on the order of .5 inches it is an eye-opener which keeps all pilots cranking in that latest Kollsman setting. So with the latest and nearest setting dialed in, you are proverbially "fat, dumb and happy, believing what you see is what you got." But is it?

That analog mechanism we mentioned earlier is programed for a standard lapse rate (decrease of temperature with increase of altitude) of 1.98 degrees centigrade per thousand feet. The meteorological term "standard" is very similar to the naval term "standard," that being a basis from which the real world deviates. Hence, if there is a true standard lapse rate physically present, blink and it will be back to a more "abnormal" lapse rate. Those of you with some background in the physical sciences may interject: "But a nonstandard lapse rate will be reflected in the barometric pressure for that location since the atmospheric pressure is just the weight of the overlying column of air. Therefore, a lesser lapse rate will yield warmer, less dense air and a lower Kollsman setting which cranks in a safety factor for we dauntless aviators and our obstacle clearance."

This point of view has a couple of problems. First, atmospheric pressure is not truly the weight of the overlying column of air. This would be true were there no air motion. That is, if the atmosphere had reached a complete state of stability or static rest. Unfortunately, crosswind landings and turbulence of the thunderbumpers are proof-positive that this is never the real world case. Thermal highs (high atmospheric pressure) are actually warm areas (lesser lapse rates) in which the pressure (P) is equal to the density (ϱ) times the absolute temperature (T) times the gas constant (R) (Gas law: $P = \varrho RT$). As T goes up, P goes down and there is expansion or vertical motion from the resultant pressure gradient force. This all takes time, and until the motion stops, we have high pressure associated with a lesser lapse rate.

A second problem with the idea that nonstandard lapse rates are corrected for by the Kollsman setting is that even

More than you ever wanted to know

in the presence of no vertical motion a greater lapse rate may be overlain by a lesser lapse rate, thus yielding an air column with the "normal" amount or mass of air, but having a distribution which upsets the programing of the analog mechanism in our altimeter. That is, we may have a normal 29.92 inches at the surface, but we can have some severe altitude errors from our preprogramed standard lapse rate analog mechanism. This meteorological phenomena of nonstandard lapse rates is especially evident in the presence of strong inversions or very stable atmospheres.

For dry air: $P = \varrho RT$ and $P = \varrho gz$

$\varrho RT = \varrho gz = z = (R/g)\,T$

From figure 1, lapse rate deviations may be shown to introduce major errors in indicated altitude. Figure 1 has an actual lapse rate deviation from the standard lapse rate which has been exaggerated for clarity, but from the figure it should be apparent that any deviation will introduce error, and the larger the deviation, the larger the error.

To further complicate the issue, we have been discussing dry air. What happens when moisture or humidity is introduced? Moisture or higher humidity actually decreases the density of the air (higher DA with higher humidity). Thus with all else equal, if you go from a wet airmass to a dry airmass and maintain a constant indicated altitude, you will actually be descending. The highest saturation levels of water moisture are only about three percent partial pressure of the total atmospheric pressure, hence lapse rate deviations are more likely to introduce altitude errors since their effects are greater.

As a pilot, you have no knob to adjust the altimeter for a nonstandard lapse rate, or for an especially dry or humid day, so what can you do about all the information just presented? Well, the refrain we started out with "from high to low, look out below" can be remembered now as "from high to low, warm to cold, wet to dry, look out below" and keep that Kollsman current!

—from Approach

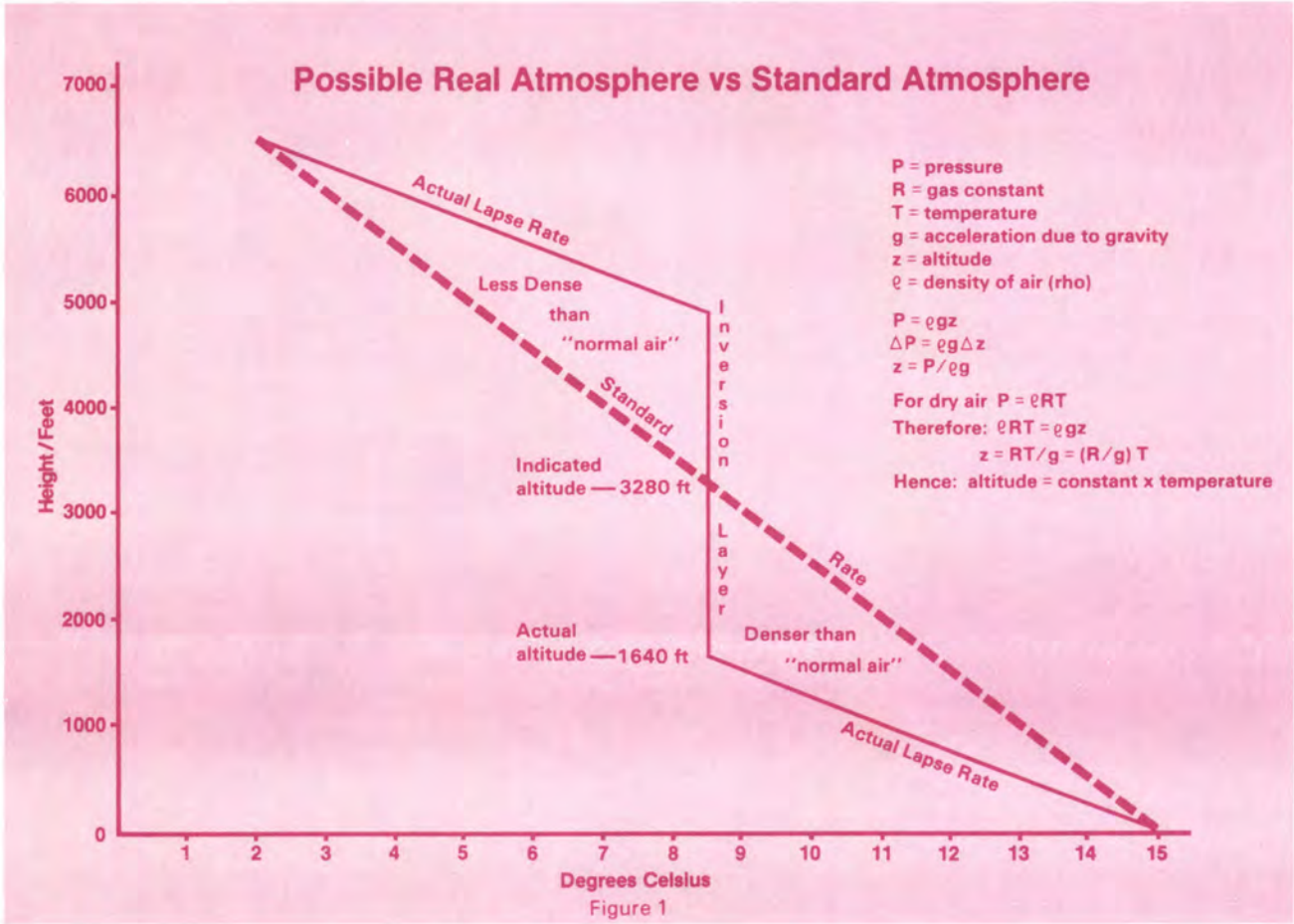


Figure 1

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (H series) Aircraft, on maintenance test flight after replacement of main rotor system swashplate and engine fuel control, crashed in wooded area. Preliminary investigation indicates in-flight breakup. Main rotor system and tail boom separated from aircraft before high-speed inpact of main fuselage into trees. Two fatalities. 8413

UH-1 Class D mishap □ (H series) Aircraft landed on large rock at night. Right skid was damaged.

UH-1 Class E mishaps □ (H series) Crew smelled bleed air odor during flight. Caused by failure of heater overtemperature switch. □ (H series) Crew felt severe vertical vibration and slight left forward lateral cyclic pressures. Caused by failure of rod end bearing. □ (H series) Master caution light and all caution panel segment lights came on. Screw in back of master caution light backed out, causing short in cannon plug.

UH-1 aviation-related mishaps □ Mechanic was told to move UH-1 to another location within the hangar. Serviceable landing gear (skids) had been removed and replaced with unserviceable pair of skids while undergoing maintenance. Crew chief did not install securing bolts into skid assembly. UH-1 was raised onto the handling wheels. As helicopter was being moved, cross tubes rotated forward, allowing helicopter to settle rearward and come to rest on handling wheels and aft section of fuselage. Cross tubes, lower fuselage, and left bulkhead were damaged. □ Mechanic drove tug too close to aircraft and sideswiped it. □ Fuel truck was backed into rear of helicopter, causing damage to tail boom, elevator, and VOR antenna.

UH-60 Class D mishap □ Pilot moved power control lever from idle position to fly position while gust lock was engaged. This caused gust lock to break and rotor to become engaged.

UH-60 Class E mishap □ Pilot's ICS circuit breaker popped during flight. When attempt was made to reset, No. 2 generator and stabilator caution lights came on and stabilator horn sounded. Auto reset was ineffective. Aircraft was landed at airstrip with stabilator under manual control. Main wire bundle covering had deteriorated, resulting in short circuit.

Attack helicopters

AH-1 Class D mishap □ (S series) Aircraft hit powerline while flying into the sun at a speed of 15 to 20 knots and altitude of 75 feet agl. Pilot noticed the wires about 20 feet in front of the aircraft and began a deceleration. Wires hit upper canopy and slid back against forward pylon fairing, where they snapped. Wires were not marked on pilot's wire hazard map.

AH-1 aviation-related mishap □ Aircraft was being ground handled from hangar to ramp. Ground handling personnel misjudged speed and clearance from parked AH-1. Tail rotor blade of aircraft being moved hit main rotor blade of parked aircraft.

Cargo helicopters

CH-47 Class D mishap □ (D series) Ramp was lowered onto tree stumps concealed by tall grass. Ramp and ramp extension were damaged.

CH-47 Class E mishaps □ (B series) As forward gear was brought off the ground, cyclic started moving laterally without corresponding aircraft motion. Caused by failure of servo cylinder. □ (C series) Transmission oil pressure fluctuated and caution light came on. Caused by malfunction of pressure gauge. □ (C series) Right pedal input caused severe vibrations with No. 2 SAS on and No. 1 SAS off. Caused by loose circuit board in No. 2 SAS yaw channel.

FY 84 Class A Mishap Countdown

	FY 83			FY 84		
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**8**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December		
2nd Qtr	January	1	0	January		
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**11**	**13**

Observation helicopters

OH-58 Class E mishaps □ (A series) While aircraft was in OGE hover with no airspeed and tail into the wind, buffeting was felt in fuselage. Aircraft was turned into the wind and landed. Buffeting could have been caused by tail being into the wind. □ (C series) As aircraft crossed ridgeline, wind gust caused aircraft to yaw violently to left. Torque increased to 103 percent for 2 seconds. Pilot was not prepared for wind effects on aircraft.

OH-58 aviation-related mishaps □ As tractor was being backed up to aircraft, engine surged, causing tractor to hit and break chin bubble of aircraft. □ Mechanic was removing a transponder test kit from aircraft. When spring-loaded screw failed to activate, mechanic went to get a tool to remove the kit. While unattended, test kit fell on chin bubble and cracked it.

Maintenance

UH-1 Class E mishaps □ (H series) Master caution and hydraulic pressure lights came on. Control stiffness was felt. Caused by hole in pressure line. Line had chafed against push-pull tube. □ (M series) Master caution and hydraulic lights came on. No. 1 hydraulic system was low on fluid. □ (H series) Transmission oil pressure gauge fluctuated and caution lights came on. Caused by loss of transmission fluid. Before the flight, crew chief was told to drain some transmission fluid. Crew chief tried to drain the fluid by opening drain valve, but valve was clogged. Crew chief went to get some tools, leaving drain valve in open position. Another crew chief arrived at the aircraft and drained transmission fluid from chip detector plug opening. When the first crew chief returned to the aircraft, he assumed the second crew chief had cleared the line to drain the fluid, so he replaced the panel without checking to insure that drive valve had been closed. During the flight, whatever was clogging the drain line came loose and transmission fluid was lost.

OH-58 Class E mishap □ (A series) Crew smelled fuel fumes during flight. Fuel shutoff valve was seeping fuel because of cut O-ring.

Messages received

• Maintenance information message concerning installation and handling caution for UH-60 pressure cartridge assembly (squib cargo hook assembly) (MIM-UH-60A-MEA-83-16, 161720Z Nov 83).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202. ■

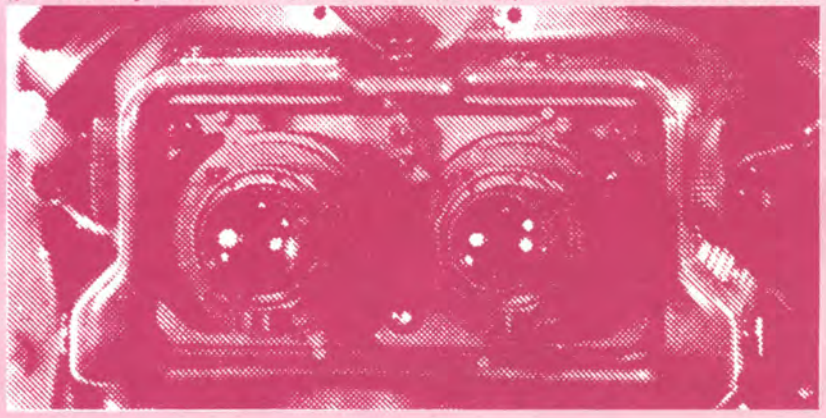
Snow is heavy. An early season storm recently dumped more than a foot of snow on Fort Huachuca. The snow on the tail of this OV-1 caused the nose to lift off the ground. The same thing also happened to another Mohawk. No damage was done, but this is a good reminder of the hazards of winter. Get a copy of FM 1-202. It contains some excellent information on cold weather operations.

NVG alert

We have recently learned of a problem with certain AN/PVS-5 night vision goggles. These goggles with image intensifier tubes are used primarily by ground personnel, but they are also approved for night flying activities. When the UHF radios in aircraft are keyed for transmission between 200 and 400 MHz, the level of light intensity increases above normal resolution in one or both tubes. When the mike switch is released, the light intensity dims to below normal resolution and may shut down for several seconds and then resume normal operations.

The goggles are manufactured by VARO Corporation, under contract number DAAB07-81-C-1066. The manufacturer is aware of this problem and is working on a solution. Should any of these night vision goggles encounter UHF interference, we recommend their use be discontinued pending corrective action.

Point of contact at CECOM is Dave Werner, AUTOVON 992-1381/1382. ■



Aviation mishap prevention forum

Answers to last week's questions

1. The safety goals of the U.S. Army are achieved through what safety program objectives?

- Prevention of injury and occupational illness.
- Damage control.
- Accident prevention.
- Compliance with statutory and regulatory requirements.
- Occupational health. **AR 385-10, page 1-1, par. 1-5**

2. Flying hours, safety surveys, safety council meetings, and safety training records will be maintained in accordance with what Army regulation? AR 340-18-6. **AR 385-95, with Change 1, page 2-3, par. 2-10**

3. What is the purpose of AR 385-95? AR 385-95 establishes the Army aviation accident prevention function as an integral part of the Army Safety Program (AR 385-10). It also prescribes policies, procedures, and guidelines for implementing the function as part of the overall Army Safety Program. Army aviation accident prevention includes the following functional areas: command and staff; safety training; operations; hazards evaluation; aviator standardization and proficiency; safety of flight; maintenance and materiel; system safety; life sciences; investigation and analysis; research, development; test and evaluation; awards; and foreign object damage prevention. **AR 385-95, with Change 1, page 1-1, par. 1-1**

4. Fire is the greatest single danger to personnel in refueling operations. What other hazards will personnel face during refueling? Dangers from aircraft and fuels. **FM 10-68, with Change 3, page 5-1, par. 5-1 and 5-2**

5. If an open-port nozzle is received with a device to hold it open automatically, what must be done? The device must be removed. **FM 10-68, with Change 3, page 6-8, par. 6-2**

Questions for aviation personnel

1. What is the purpose of AR 385-63? **Reference: AR 385-63, Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat**

2. Is a maintenance test flight required when an engine has been replaced or removed and reinstalled? **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures**

3. What is acute fatigue? **Reference: FM 1-301, Aeromedical Training for Flight Personnel**

4. What is chronic fatigue? **Reference: FM1-301, Aeromedical Training for Flight Personnel**

5. The spread between maximum positive deviation and maximum negative deviation after compensation of a compass shall not exceed how many degrees? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual** ■

FY 83 fixed wing mishap summary

Type aircraft	Total mishaps	Total cost	Injuries	Fatalities
Convair 580	1	0	0	0
B-E8	1	0	0	0
B200	1	0	0	0
C-7	137	1,697	1	0
C-12	95	218,851	0	0
OV-1	103	4,602,924	4	2
RV-1	36	12,189	0	0
T-28	3	885	0	0
T-41	1	0	0	0
T-42	55	127,706	1	0
U-3	11	1,120	0	0
U-8	39	40,031	1	0
U-21/RU-21	176	175,249	1	0
UV-18	1	0	0	0
Total	660	5,180,652	8	2

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 96 □ 30 Nov 1983

Survival gear—how is yours?

Crew confidence in survival equipment is an important aspect that is often overlooked. Do all of your aircrews know how to use the equipment they have? In an actual emergency, crew attitude can mean the difference between survival and nonsurvival. An individual who lacks confidence in his equipment often fails to learn how to use it and, therefore, is poorly prepared for a survival situation.

Because of the wide ranges of geographic, atmospheric, and temperatures that are encountered daily by Army flight crews, a compromise between equipment required for flight and that required for survival is a difficult one. Even more difficult is insuring that survival equipment for military missions outside of your normal operating area is available and that crews are trained in its use.

Will your next mission begin in a warm, lush green area and end in a snow-covered mountain with temperatures well below zero? Safety officers and ALSE officers should insure that needed equipment is available and that aircrews are properly trained in its use.

AR 95-1 (Change 1), paragraph 2-20, states: "The commander will ensure that personnel are equipped with aviation life support equipment (ALSE). This equipment will be appropriate for the mission, type of area overflown, and climatic condition along the proposed route of flight. Use will be in accordance with the Aviation Life Support Equipment Program." ■

Night goggle qualified?

Table 7-3, section II, paragraph 3, FM 1-300, requires that aviator's qualifications be posted in "Remarks" section of DA Form 759 (Individual Flight Record and Flight Certificate—Army).

Starting 29 July 1983, with Initial Entry Rotary Wing (IERW) Classes 83-5/6, all IERW students now graduate night vision goggle qualified. Due to an oversight, this qualification was not posted to the remarks section of DA Form 759 of some recent UH-1 graduates. Aviators, check your DA Form 759 and insure your NVG qualification has been entered. ■

New training extension course

The night hawk/night vision goggles exportable training package has become obsolete because of a new training extension course (TEC).

Unit TEC libraries desiring the new N/NVG training extension course should request "Night Flight Training—BOI 166" from: Commander, U.S. Army Transportation Center, ATTN: ATIC-ETP-T, Ft. Eustis, VA 23604. ■

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-7174 during duty hours; 558-6487 after duty hours.

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The awards program: when mishaps count and when they don't

There is some confusion in the field regarding the qualifications for unit aviation safety awards. Some unit commanders have questioned the kinds of mishaps which precluded their units from getting an award for mishap-free performance. Let's see if we can clear up the confusion.

The Awards of Merit, Honor, and Excellence are applicable to all Active Army, National Guard, and Army Reserve units or organizations having aviation personnel or aircraft assigned by tables of organization and equipment or tables of distribution and allowances that are engaged in Army flying operations. Activities that have completed 12 consecutive months of flying without a mishap are eligible for the Award of Merit. Activities with 24 consecutive months of flying without a mishap can receive the Award of Honor. The Award of Excellence is presented to activities which have completed 36 consecutive months of flying without a mishap. For the purpose of these awards, "mishap" pertains to Class A, B, and C.

All nominations for awards are submitted in standard military correspondence through command channels to the Army Safety Center. Safety records of the unit are then validated by mishap information in the data bank at the Center. This is where some of the confusion comes in. A unit that has been charged with a mishap could still qualify for an award depending on the circumstances. Determination must be made as to whether the mishap was caused by personnel of the unit owning the aircraft, personnel of another unit operating or maintaining the aircraft, or by an "act of God." For example, if an aircraft is struck by lightning and the pilot gets it down without further damage, the lightning may have done enough damage to warrant a Class C classification. For **rate** purposes, a Class C mishap is charged to the unit. But for **safety award** purposes, the mishap does not disqualify the unit for an award. However, if the pilot is responsible for causing further damage to the aircraft subsequent to the lightning strike, this disqualifies the unit for an award.

In one case, an AH-1 broke up in flight because of materiel failure of the main rotor pitch change link. The pilot had no control over the aircraft, so the mishap did not disqualify the unit for an award. If the pilot could have reasonably been expected to get the aircraft down without further damage, but he used the wrong procedures and damaged the aircraft, the unit would not qualify for an award. And, if a materiel failure is **induced** by the unit owning the aircraft, as in the case of a UH-60 which crashed because of bearing failure caused by incorrect blade folding procedures, the unit does not qualify for an award.

If you consider your unit is due an Award of Merit, Honor, or Excellence, send us your request. We will then query our mishap information bank. If a mishap shows up for the time period of the award, we will check it out to determine if the mishap circumstances will allow your unit to qualify for a specific award. If the mishap was caused by an "act of God," a manufacturing defect, or a maintenance error by another unit, and the pilot did everything right in trying to get the aircraft down, the unit will not be penalized for award purposes.

When your request for an award has been processed and you get a letter from us saying that your unit is not eligible for an award because of a certain mishap, if you consider your unit should not be penalized for the mishap, send the request back. Explain why you think the request should be reconsidered. **The commander of the Safety Center will personally review the case and make the final determination.**

When you send us a request for an award, be sure to include your correct unit identification code. We cannot process your award without it. Also be sure you include the correct period of time. Some units do not keep permanent records of the awards they have received and are therefore not sure if they are eligible. We receive requests for awards from Army units throughout the world, and it takes a good deal of time to process each one. If all the information in the request is correct, the unit receives the award much quicker. It is very important that you include a point of contact and AUTOVON, FTS, or commercial telephone number on the request. Many times we need to call the requestor to clarify something.

AR 672-74, dated 15 May 1982, prescribes policies, procedures, and qualification standards for the Army Accident Prevention Awards Program. It covers general safety awards, aviation mishap prevention unit awards, and the Broken Wing Award for aircrews.

If you have any questions concerning these awards, call the Directorate for Plans, Operations and Programs, AUTOVON 558-2947/6510, commercial 205-255-2947/6510. ■

Postaccident biochemical test results

A DA message dated 181800Z Nov 83, subject: "Clarification on the use of postaccident biochemical test results," is reprinted here for your information.

"Reference A. Paragraph 1-9a, AR 385-40, 1 Sep 80.

"Reference B. Paragraph 3-16, Interim Change I02 to AR 600-85, 11 Feb 83.

"1. This message clarifies the use of biochemical test results from accident participants and highlights existing procedures which allow commanders to ascertain fitness for duty while also obtaining evidence of drug or alcohol use by accident participants. This guidance applies to both aviation and ground accidents.

"2. After an accident, the commander may direct a fitness for duty examination of an accident participant if the commander has a reasonable suspicion that the soldier used controlled substances or alcohol. This may include a complete physical examination or may be limited to biochemical testing of urine, blood, and breath. Such testing is authorized by regulation (reference B) and is a matter of command prerogative. Commanders need to know a soldier's medical fitness for duty after an accident and may also need a medical evaluation to discover nonapparent injuries which bear on future duty performance. If the commander directs a fitness for duty examination, a complete physical examination to include biochemical testing of blood and urine is recommended.

"3. A commander's order for a soldier to submit to a fitness for duty examination is a lawful order the violation of which may become grounds for disciplinary and/or administrative action. Positive biochemical test results for controlled substances, nonprescribed medications or alcohol following commander-directed fitness for duty examinations may not be used for UCMJ

purposes or for characterization of discharge (see table 6-1, AR 600-85). However, test results may be used for reclassification, removal of security clearance, bar to reenlistment, removal from duty position, line of duty investigation, report of survey, letter of reprimand, efficiency ratings, flight evaluation boards, and on the issue of separation in separation proceedings.

"4. Reference A prohibits the use of safety reports or their attachments as a basis for adverse personnel actions. This prohibition applies to those documents initiated or prepared by accident investigation officials. Because fitness for duty testing or medical examination of accident participants was not directed or initiated by safety officials/investigators, the results are common source information available for use by all who have an official need. If the commander does not direct blood and urine testing of an accident participant, the accident/safety investigating officials may direct testing when necessary. As with commander-directed fitness for duty tests, the results of safety or accident investigation board biochemical testing may not be used as evidence in judicial or nonjudicial proceedings per reference A.

"5. Flight surgeons, physicians, safety officials and their staffs are requested not to take samples for biochemical testing from accident participants, except for medical treatment purposes, without first ascertaining from the unit commander (or his superior commander) his desire to direct a fitness for duty examination.

"6. Blood/urine will be forwarded by medical officers to the Armed Forces Institute of Pathology for testing for drugs, carbon monoxide, poisons and alcohol. Reports from the Armed Forces Institute of Pathology of blood/urine testing from accident participants will be furnished to the submitting medical treatment facility and to the U.S. Army Safety Center, ATTN: PESC-TI.

"7. Commanders and safety officials responsible for reporting Army aircraft and ground accidents or mishaps are reminded of the existing requirements to report the results of biochemical testing for alcohol, illegal drugs, or self-medication on accident reports.

"8. This clarification will be included in the next change to AR 385-40. The U.S. Army Safety Center POC is Major Ivey, AUTOVON 558-3819." ■

Defective oxygen masks

The Navy recently found a potential safety hazard with the MBU-12/P oxygen mask. A mask was found with a 2- to 3-inch crack on the hard shell of the facepiece at the strap attaching point. Lost stress durability was apparent at the strap points.

You might want to check any MBU-12/P oxygen masks you may have for this discrepancy. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap □ (H series) Aircraft hit wires during night training flight. IP took control. Collective pitch could not be lowered below 34 pounds of torque. Left cockpit door was jammed against collective pitch control. Run-on landing was made. Aircraft hit wires because IP did not take into account the lead and lag of the altimeter. When aircraft turned from downwind leg of traffic pattern to base leg and began to descend, altimeter began to lag. As descent was continued onto final approach leg to 500 feet msl, IP estimated aircraft would clear the wires by 50 feet. When IP read the altimeter at 600 feet, aircraft was actually between 500 and 600 feet. Without taking into consideration the lag or the altimeter error, IP told student pilot to descend to 500 feet. This put aircraft on a collision course with the wires.

UH-1 Class E mishaps □ (H series) Humming noise was heard, followed by complete hydraulic failure. Caused by defective hydraulic pump. □ (H series) Master caution and transmission oil pressure lights came on. Caused by ruptured gasket on tail rotor internal transmission oil filter. □ (H series) As aircraft was hover taxiing from pad, crew landed to do a HIT check. Another pilot ran to aircraft to tell crew that transmission cowling was open. □ (H series) When aircraft landed, crew chief saw puddle of hydraulic fluid on the ground. Caused by cracked tee fitting on pressure side of left cyclic servo. □ (H series) Fire warning light came on. Caused by open resistor in fire detection system. □ (H series) Master caution and right fuel boost pump lights came on. Caused by failure of submerged pump.

Attack helicopters

AH-1 Class D mishap □ (S series) As aircraft was landing at rearm pad, lid from 20mm ammo box sitting on the ground flew up and hit tail rotor blades.

AH-1 Class E mishaps □ (S series) Loud grinding noise was heard from hydraulic pump area, and master caution and No. 2 hydraulic lights came on. Caused by failure of seal on armament solenoid valve. □ (S series) Aft fuel boost pump light came on. Caused by failure of submerged fuel pump. □ (S series) Engine oil pressure dropped to 65 psi during landing. Caused by failure of transducer. □ (S series) Thermocouple connector unseated during flight, causing pilot's and copilot's tgt gauges to register zero.

Cargo helicopters

CH-47 Class D mishap □ (C series) As aircraft was flying about 350 feet agl, two ducks approached aircraft. Pilot saw ducks just before impact and attempted cyclic climb and left turn. Ducks hit and damaged pilot's chin bubble.

CH-47 Class E mishaps □ (B series) When No. 2 engine was brought back on line during single-engine training flight, engine transmission would not engage. Caused by defective engine. □ (C series) Flight engineer saw oil coming from around seal in forward transmission. Caused by failure of O-ring seal in output quill on transmission. □ (C series) As aircraft was taking off with an external load, flight engineer told pilot that ramp cargo door was missing. Caused by failure of jettisonable release mechanism.

Observation helicopters

OH-58 Class A mishap □ (C series) Pilot, trying to avoid heavy rainshowers,

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	8	10
	November	2	2	November	3	3
	December	0	0	1-7 Dec	0	0
2nd Qtr	January	1	0	January		
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	11	13

flew aircraft into the ocean. Crew and passenger were rescued. 8414

OH-58 Class C mishap □ (C series) Aircraft hit tree during NOE flight. Main rotor and tail rotor blades, left stabilizer, tail boom, and fuselage were damaged.

OH-58 Class E mishap □ (A series) Aircraft was on short final. As power was pulled in to slow descent, pilot saw TOT climbing to 880. Caused by broken bleed air line fitting.

Fixed wing

C-7 Class E mishap □ After touchdown, when nose wheel steering was applied for crosswind landing, steering system became inoperative. Differential power and braking were used to complete landing roll. Worn steering gear assembly caused chain cable assembly to disengage.

OV-1 Class C mishap □ (D series) Both engines were brought to 85 percent N_1 during ground run. No. 2 engine power lever was retarded to ground idle and then into reverse. As No. 2 N_1 increased, nose of aircraft yawed right and nose wheel lifted off the ground 2 to 3 inches. No. 2 power lever was immediately moved to ground idle, and nose wheel hit the ground while moving right. Aircraft came to rest nose low as nose gear failed. Suspect fatigue failure of landing gear nose strut.

OV-1 Class E mishap □ (D series) Right main landing gear outboard door would not close during gear retraction. Caused by failure of sequence valve.

T-42 Class C mishap □ Aircraft touched down on wet runway. Pilot applied brakes and aircraft started hydroplaning. Pilot felt there was insufficient braking action to stop and not enough runway remaining to take off. Pilot ran off side of runway because there were obstructions at end of runway. Nose gear hit runway light. Nose gear sheared off, nose dropped, and propellers hit the ground.

C-12 Class E mishap □ (C series) Flaps would not retract during climbout. Caused by stuck flap activator microswitch.

U-8 Class E mishap □ (F series) Smoke and fire were seen coming from right engine as aircraft was landing. Engine backfire ignited asbestos lining in augmentor tube.

U-21 Class E mishaps □ (A series) Fuel siphoned from left nacelle area. Caused by breakdown of sealant on cover assembly. □ (RU-21H) Fuel was seen siphoning from right wing tank. Caused by failure to seat fuel cap correctly.

Maintenance

OH-58 Class D mishap □ (A series) As aircraft was shutting down in gusting winds, left passenger door came open and blew off. Pilot said door was secured before takeoff. Door latch was adjusted incorrectly.

OH-58 Class E mishaps □ (A series) Pilot felt unusual vibrations in tail rotor pedals during climb. Caused by imbalanced tail rotor. □ (A series) When heater was turned on, smoke came from heater ducts and defog vents. Suspect maintenance personnel allowed rivet to short electrical circuit card during installation of new windshield.

Messages received

• Safety-of-flight maintenance mandatory message concerning inspection of UH-60 accessory module oil return screen for contamination (UH-60A-83-11, 221600Z Nov 83). Summary: At least four accessory modules have been rejected and removed from Black Hawk aircraft because of overheating. Symptoms preceding removal included high lubricating oil temperature, fluctuating main oil pump pressure, and accessory module chip indication. Examination of the accessory and input modules revealed localized heat evidenced by a color change of the modules from aluminized gray to brown. Removal of the oil return screen between accessory and input modules revealed an accumulation of Nomex/fiberglass originating from conductor sleeving in the main generator. An in-line change has been implemented. An inspection will be done to identify fibrous material found in the lower oil screen from the left and right accessory modules. Contact: William Readhead, AUTOVON 693-3300, commercial 314-263-3300.

• Safety-of-flight maintenance mandatory message concerning inspection of CH-47D integrated lower control actuators (CH-47-83-09, 232200Z Nov 83). Summary: During inspection of the four lower stick boost actuators on a commercial Boeing Vertol model 234 aircraft, it was found that the jam indicator test button could not be depressed sufficiently to indicate a jammed valve. A subsequent teardown inspection of these four actuators revealed that the secondary sleeve and jam indicator shutoff valves were being held in a fixed position due to contamination and corrosion. The control valves in the YCH-47D and CH-47D are similar to and made of the same material as the control valves in the 234 model aircraft. Contact: James Winkeler, AUTOVON 693-1418, commercial 314-263-1418.

• Message dated 231330Z Nov 83 concerning termination of touchdown emergency procedures in rotary wing aircraft. Message supersedes the following messages: HQDA, 011630Z Apr 83, subject: Helicopter Touchdown Emergency Procedure Training; and HQDA, 061945Z Apr 83, subject: Changes to Helicopter Touchdown Emergency Procedure Training.

For more information on selected mishap briefs, call AUTOVON 558-4202/4198.

Aviation mishap prevention forum

USATSARCOM Materiel Readiness Information Bulletin

If you are not receiving the USATSARCOM Materiel Readiness Information Bulletin, find out why. Each copy of the bulletin contains a form for address changes and quantity desired. Make sure your unit receives this important bulletin.

Don't use for aviation!

O-ring splicing kit, NSN 5330-00-882-7073.

O-ring assortment, NSN 5330-00-966-8657, PS Magazine, Issue No. 363, page 64, Feb 83.

Reports to TSARCOM indicate there may be unauthorized usage of O-rings on aviation equipment. Preformed packing assortment kits, O-ring, P/N RUS380, OK311, and ACOK311, NSN 5330-00-966-8657, are commercial nitrile base material and are to be used only for automotive vehicle parts. Air Force Materiel Lab at Wright-Patterson AFB performed tests on subject O-rings and concluded that O-rings are not compatible for aircraft, aircraft engines, or aerospace ground support equipment.

Aircraft maintenance and Repair Parts Special Tools List manuals call out specific types of O-rings for peculiar requirements, such as temperature range, chemical makeup, and resistance to fuels, oils, lubricants, and hydraulic fluids. Use of unauthorized O-rings may compromise the integrity and safety of equipment and personnel.

Be advised that LOCTITE O-ring splicing kit, NSN 5330-00-882-7073, and O-ring assortment kit, NSN 5330-00-966-8657, are not authorized for use on Army aircraft or aviation equipment and use of the O-ring is **prohibited.**

—from USATSARCOM Materiel Readiness Information Bulletin

This nickel flakes off

Neither the 25-cubic-inch accumulator, NSN 1650-00-880-4138, Boeing Vertol (BV) P/N 114H133-4 and vendor P/N 8421-031, nor the 200-cubic-inch accumulator, NSN 1650-00-880-4139, BV P/N 114HS133-5, and vendor P/N 8425-031, should be installed on CH-47 helicopters. The nickel plating on these accumulators can flake off inside the cylinder. All spares support data on these items will be deleted from figure 161 in the CH-47A, B, and C Repair Parts Special Tools List (RPSTL).

The new 25-cubic-inch accumulator is NSN 1650-00-880-4138, BV P/N 114HS133-8, vendor P/N 1356-643887M1 and 08-8421-020.

The new 200-cubic-inch accumulator is NSN 1650-01-039-3485, BV P/N 114HS133-9, vendor P/N 1356-643888M1.

Repair parts breakdown for accumulators, P/N 1356-643887M1 and P/N 1356-643888M1, are in figure 161A in the current RPSTL.

The repair parts breakdown for accumulator, P/N 08-8421-020, will be in the next revision/change to the RPSTL.

—from USATSARCOM Materiel Readiness Information Bulletin

Answers to last week's questions

1. What is the purpose of AR 385-63? AR 385-63 prescribes general safety precautions necessary to minimize the possibility of accidents in the firing and other uses of ammunition and explosives by troops in training, target practice, and, as much as possible, combat and range operations, including range clearance. **AR 385-63, page 1-1, par. 1-1**

2. Is a maintenance test flight required when an engine has been replaced or removed and reinstalled? No. **TM 55-1500-328-25, page 3-2, par. c**

3. What is acute fatigue? Acute fatigue is the loss of coordination and unawareness of errors and is the first type of fatigue to develop. This is the tiredness which is felt at night after being awake for 12 to 15 hours every day. With adequate rest or sleep, the pilot or aircrewmember overcomes this fatigue and is ready to start all over again. Acute fatigue is characterized by the need for larger stimulus; errors in timing; loss of accuracy and control smoothness; unawareness of error accumulation; ease of distraction; neglect of secondary tasks; and inattention. **FM 1-301, page 3-18, par. a(1)**

Aviation mishap prevention forum

4. What is chronic fatigue? Chronic fatigue is a serious fatigue which occurs over a longer period of time. Besides the physical tiredness, a mental tiredness also develops. Early recognition of this fatigue and appropriate treatment and/or prevention by the unit flight surgeon and commander is critical. Chronic fatigue is characterized by slowed reaction time, poor judgment, irritability, loss of appetite, weight loss, insomnia, and depression. **FM 1-301, page 3-18, par. a(2)**

5. The spread between maximum positive deviation and maximum negative deviation after compensation of a compass shall not exceed how many degrees? 5 degrees. **TM 55-1500-204-25/1, page 3-136A, par. 9**

Questions for aviation personnel

1. An aircraft undergoes a phase at 900 hours. The first 25-hour **scheduled special** inspection is due at 925 hours and the second is due at 950 hours. Management decides to pull the first inspection early at 920 hours. The second inspection would be due at ____hours. **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures.**

2. The maintenance officer will insure that the scope and frequency of daily inspections are increased to offset the effects of local environmental conditions, mission requirements, flight crew experience, maintenance personnel capabilities, and/or periods of inactivity. True or false? **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures**

3. Aircraft will not be flown into known or forecast severe icing conditions. If a flight is to be made into known or forecast moderate icing conditions, the aircraft must be equipped with adequate deicing or anti-icing equipment. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. An aviation mishap is seldom caused by a single factor. Although a human error or a materiel failure may appear to be a proximate cause in a mishap, it usually becomes a cause factor because of other deficiencies. What areas require constant command attention to prevent aviation mishaps? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

5. Aviation safety publication libraries should be maintained by all aviation units. If separate facilities are not available or desirable, libraries should be established where they will be convenient to all aviation personnel, both flight and ground crews. What publications should libraries contain? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention** ■

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Cargo helicopter FY 83 review

Before we get too far into this fiscal year, let's take a few minutes to review last year's cargo helicopter record. Hopefully, a look at some of our past mistakes will prevent their recurrence.

In FY 83, the Army had 328 Class A, B, C, D, and E cargo helicopter mishaps. These mishaps resulted in 11 fatalities, 9 injuries, and a total dollar loss of $11,401,058 (table 1).

After reading the numbers, I hope you are wondering what caused the mishaps—materiel failure, pilot error, etc.

At the Safety Center we categorize mishap causes under three major areas: personnel, environmental, and materiel /maintenance. Table 2 shows a breakdown of the FY 83 cargo mishaps by cause factor.

As you can see from the table, about 80 percent of the Class A through E mishaps were caused by materiel and/or maintenance failures. It is important to note that mishaps with these types of causes are normally Class E wherein a component fails through normal use and there is no other damage to the aircraft. These are the mishaps that usually don't hurt people. This is not to infer that they are not important. Accurate and timely reporting of Class E mishaps and their analysis are vitally important in identifying trends and correcting materiel and maintenance problems—hopefully before the problems become the causes of Class A, B, or C mishaps.

A disturbing conclusion which can be drawn from this data is that in about 68 percent of the Class A, B, and C mishaps—the ones that cost us a lot in terms of lives and dollars—**we** are at fault—flightcrews, ground crews, and supervisors. Even worse is the fact that

when compared to FY 82 cargo mishap data, there has been about an 18 percent increase in personnel-caused A, B, and C mishaps. In addition, maintenance-caused A, B, and C mishaps have increased 11 percent over those in FY 82.

I am sure that many of you are as skeptical as I once was that you and I—pilots, crewmembers, and supervisors—are causing such a large percentage of our Class A, B, and C mishaps. Some of you are saying "the crew always gets blamed" or "if they (investigators) can't figure out anything else, they will say the crew used poor ➤

TABLE 1.—FY 83 CH-47/CH-54 Helicopter Mishaps

	CH-47			CH-54		
Class	Number	Fat/Inj	Cost	Number	Fat/Inj	Cost
A	2	11/0	$10,630,956	0	0	0
B	3	0/5	406,197	1	0	$126,888
C	26	0/4	178,991	2	0	54,150
D	1	0/0	0	0	0	0
E	274	0/0	3,876	19	0	
Total	306	11/9	$11,220,020	22	0	$181,038

Cargo helicopter FY 83 review

judgment and didn't follow procedures." Well, I used to think and say the same things, but after being at the Safety Center for a couple of years, I have changed my mind. After reading every cargo helicopter PRAM and each mishap report for the past 2 years, it has become clear to me that you and I are causing most of our A, B, and C mishaps.

I know that no one in the cargo helicopter community is pleased with any of the numbers in this article. We can argue that for every mishap there are hundreds or perhaps thousands of safe mishap-free operations and flights. I for one also believe that cargo helicopter pilots, crewmembers, maintenance personnel, etc., are, with very few exceptions, prudent, professional, and proficient individuals.

So where does this leave us? We know what caused the mishaps and now we need to look at why. I'm sure there is room for disagreement, but I offer the following reasons for the mishaps, based on my perspective.

- Being in too big a hurry—rushing.
- Attempting a mission or task that you are not prepared to perform.
- Initiating an action before "thinking it through."
- Trying to do too much based on personal or equipment capabilities.

Now, what do we do about it? This is the tough question to answer. Remember, no one plans on having a mishap but we all are susceptible to being involved in one. The next time you give or are given a mission or a task to perform, be it a 15,000-pound external load, replacement of a "widget," or an inspection, consider the following:

- Don't assign a task to an individual unless you are confident that the individual is capable of adequately performing that task.
- If you are given a task to do and you honestly feel that you are not able to do it—say so! Ask for help. We are all proud but don't let your pride overrule your good sense.
- Slow down and think things through. Before you impart on one course of action, think about alternatives—maybe there is a better way!
- Most of all, if you are in the midst of performing some task—landing to a small PZ, installing flight control linkage, assigning missions—and you hear a "little voice" saying "that PZ is probably not big enough," "I'm not 100 percent sure the bolt goes this way," "is he really ready and qualified to do this mission?"—STOP! If you continue, history tells us that you are setting yourself or others up to become part of those statistics we all hope we never become. Remember, in most cases, if you are really uncomfortable about doing something, something is wrong!

I'm sure some of you will disagree with what I have written. Who knows, I may be naive. But one thing is for sure—cargo helicopters, and especially the people who work with them and fly them, are important and vital to the Army's mission. Let me know what you think.

—Major Ron Isbel
Army Safety Center
AUTOVON 558-4198/4202

TABLE 2.—FY 83 Cargo Mishap Cause Factors

	Class							All	
	A	B	C	D	E	A+B+C	%	Mishaps	%
Personnel									
Flightcrew	1	3	10		16	14	45.1	30	9.8
Ground crew			6		8	6	19.3	14	4.5
Supervisory		1				1	3.2	1	.3
Environmental									
Facilities									
Command		1	1			2	6.4	2	.6
Training									
Other			2		2	2	6.4	4	1.3
Materiel									
Failure/malfunction	1	1	4		176	6	19.3	182	59.4
Maintenance		2	4	1	57	6	19.3	64	20.9
Design									

Note: Percentages do not necessarily total 100 because there may be more than one cause factor per mishap and/or sufficient data was not available to assign cause factors.

Aviation mishap prevention forum

Component Removal and Repair/Overhaul Record

Accurate completion of the DA Form 2410 is necessary to maintain a current and accurate history file of retirement life parts. TSARCOM Directorate of Maintenance is currently conducting a review of all DA Form 2410 records. Special efforts will be made to insure that all the required information is being reported. To improve the accuracy of the history file, it is requested that all units submitting DA Form 2410 conduct a thorough review of this form with special attention to such data elements as failure codes, inspection and action codes, serial numbers, and component hours. Insure that proper disposition is made on the form (i.e., copy 1 is **not** sent with the part to be repaired). Reconstruction of parts history is costly. The lack of information can be even more costly. Take the time to complete the DA Form 2410 correctly.

It's worth the effort.

—from USATSARCOM Materiel Readiness Information Bulletin

Safety-of-flight compliance reporting

Compliance reporting of safety-of-flight messages by field units has become a problem in the last few months. Compliance reports are not being received by the Command (AVSCOM) suspense date.

If you cannot comply with a message before the suspense date, acknowledge the message and provide an estimated date of completion by return routine message.

The importance of timely and accurate compliance reporting in response to these messages cannot be overemphasized, for safety-of-flight messages cannot be closed until compliance reporting is 100 percent.

—from USATSARCOM Materiel Readiness Information Bulletin

Answers to last week's questions

1. An aircraft undergoes a phase at 900 hours. The first 25-hour **scheduled special** inspection is due at 925 hours and the second is due at 950 hours. Management decides to pull the first inspection early at 920 hours. The second inspection would be due at ___ hours. 950 hours. **TM 55-1500-328-25, page 2-9, par. b**

2. The maintenance officer will insure that the scope and frequency of daily inspections are increased to offset the effects of local environmental conditions, mission requirements, flightcrew experience, maintenance personnel capabilities, and/or periods of inactivity. True or false? True. **TM 55-1500-328-25, page 2-4, par. 2-2**

3. Aircraft will not be flown into known or forecast severe icing conditions. If a flight is to be made into known or forecast moderate icing conditions, the aircraft must be equipped with adequate deicing or anti-icing equipment. True or false? True. **AR 95-1, with Change 1, page 4-1, par. 4-2**

4. An aviation mishap is seldom caused by a single factor. Although a human error or a materiel failure may appear to be a proximate cause in a mishap, it usually became a cause factor because of other deficiencies. What areas require constant command attention to prevent aviation mishaps? Human factors; training, education, and promotion; design, adequacy, and supply of equipment; procedures for normal and emergency conditions; supervision; maintenance; facilities and services; environment. **AR 385-95, with Change 1, page 2-1, par. 2-2**

5. Aviation safety publication libraries should be maintained by all aviation units. If separate facilities are not available or desirable, libraries should be established where they will be convenient to all aviation personnel, both flight and ground crews. What publications should libraries contain? **Flightfax, U.S. Army Aviation Digest**, available aviation safety publications from the other services, weather manuals, **PS Magazine**, flight regulations (AR 95 series), applicable operator manuals, and others, as necessary. **AR 385-95, with Change 1, pages 2-4 and 2-5, par. 2-17**

Questions for aviation personnel

1. Can self-locking bolts and nuts be reused on Army aircraft? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

2. Self-locking bolts are used on aircraft to provide tight assemblies which will resist severe vibration conditions. True or false? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

3. At takeoff, aircraft must have enough fuel to reach the destination and alternate airport (if required) and have a planned fuel reserve of how many minutes? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. Maintenance test flights are required when safe operation and/or proper functioning cannot be determined by means of maintenance operational checks (MOC) or shop tests. True or false? **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures**

5. May the commander grant an extension on time change or finite life/retirement life components? **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures**

FY 83 fixed wing mishap cause factors

Type aircraft	Mishap cause factors*
C-7A Flying hours - 4,016 Landings - 7,982 1 Class C mishap 135 Class E mishaps 1 ground mishap	Flightcrew (7) Facilities (1) Materiel failure/ malfunction (91) Maintenance (33) Weather (2)
C-12A Flying hours - 34,509 Landings - 29,707 2 Class C mishaps 50 Class E mishaps	Flightcrew (8) Environmental - other (1) Materiel failure/ malfunction (28) Maintenance (6) Weather (2)
C-12C Flying hours - 15,145 Landings - 13,223 2 Class C mishaps 33 Class E mishaps	Flightcrew (1) Environmental - other (1) Materiel failure/ malfunction (23) Maintenance (3) Weather (2)
C-12D Flying hours - 12,074 Landings - 11,069 1 Class B mishap 1 Class C mishap 6 Class E mishaps	Flightcrew (1) Ground crew (1) Environmental facilities (1) Materiel failure/ malfunction (5) Maintenance (2)
OV-1B Flying hours - 1,623 Landings - 1,882 1 Class C mishap 2 Class E mishaps	Flightcrew (2) Materiel failure/ malfunction (1)
OV-1C Flying hours - 2,695 Landings - 2,751 4 Class E mishaps	Materiel failure/ malfunction (2)
OV-1D Flying hours - 15,915 Landings - 16,300 2 Class A mishaps 8 Class C mishaps 1 Class D mishap 85 Class E mishaps	Flightcrew (8) Ground crew (3) Personnel - other (1) Environmental - command (1) Environmental - other (2) Materiel failure/ malfunction (58) Maintenance (14) Materiel design (1) Weather (1)
RV-1D Flying hours - 2,432 Landings - 2,415 2 Class C mishaps 34 Class E mishaps	Flightcrew (2) Materiel failure/ malfunction (19) Maintenance (19) Weather (1)
T-42A Flying hours - 19,144 Landings - 30,798 1 Class A mishap 3 Class C mishaps 51 Class E mishaps	Flightcrew (8) Ground crew (1) Supervisory (1) Materiel failure/ malfunction (34) Maintenance (8) Weather (2)
U-3A Flying hours - 3,994 Landings - 5,852 7 Class E mishaps	Flightcrew (1) Materiel failure/ malfunction (5)
U-3B Flying hours - 2,159 Landings - 2,750 2 Class C mishaps 2 Class E mishaps	Flightcrew (1) Materiel failure/ malfunction (1) Maintenance (1)
U-8F Flying hours - 10,888 Landings - 12,378 2 Class C mishaps 37 Class E mishaps	Flightcrew (2) Environmental - other (1) Materiel failure/ malfunction (22) Maintenance (5)
RU-21A/U-21A Flying hours - 35,781 Landings - 41,373 1 Class B mishap 6 Class C mishaps 102 Class E mishaps 1 ground mishap	Flightcrew (15) Ground crew (3) Personnel - other (1) Environmental facilities (2) Environmental - other (4) Materiel failure/ malfunction (63) Maintenance (2) Weather (2)
U-21D Flying hours - 2,640 Landings - 2,693 1 Class C mishap 6 Class E mishaps	Flightcrew (2) Ground crew (1) Materiel failure/ malfunction (3) Maintenance (3)
U-21F Flying hours - 2,246 Landings - 2,032 5 Class E mishaps	Flightcrew (1) Materiel failure/ malfunction (4)
U-21G Flying hours - 2,836 Landings - 2,868 1 Class C mishap 3 Class E mishaps	Environmental - other (1) Materiel failure/ malfunction (1) Maintenance (1)
RU-21H/U-21H Flying hours - 10,404 Landings - 7,595 1 Class D mishap 49 Class E mishaps	Flightcrew (3) Materiel failure/ malfunction (25) Maintenance (7) Weather (2)

*The number of mishap cause factors and the number of mishaps for each aircraft do not necessarily correspond because there may be more than one cause factor per mishap or the using units did not report enough data to assign a cause factor.

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (V series) Main rotor blade hit tree during takeoff from confined area. □ (H series) IP and pilot were on training flight. IP turned off what he thought was the hydraulic switch, but it was actually the fuel switch. Aircraft yawed to left and engine surged and then quit. IP autorotated to dirt road and landed hard. Forward and aft cross tubes were damaged.

UH-1 Class E mishaps □ (H series) Loud grinding noise was heard during hover. Caused by defective hydraulic pump. □ (H series) Transmission oil pressure fluctuated during flight. Caused by defective pressure relief valve. □ (H series) Engine was started with main rotor blade tied. Checklist was used. When copilot called "blade untied" he did not verify that it was and pilot did not verify. □ (H series) Fire warning light came on. Caused by failure of fire alarm control. □ (H series) Rotor tachometer failed during flight. Caused by sheared tachometer generator shaft. □ (H series) Master caution and segment lights came on. Caused by failure of fuel pressure switch.

Attack helicopters

AH-1 Class E mishaps □ (S series) Engine oil pressure dropped below normal. Caused by failure of engine oil transducer. □ (S series) Engine oil temperature rose to 120° C. Extensive water was found on engine disconnect cannon plug on lower right engine firewall. Mildew buildup on mating surface of cannon plug caused engine oil to bypass cooler.

Cargo helicopters

CH-47 Class E mishaps □ (C series) No. 1 engine came off line and stabilized at 70% N_1. Aircraft was landed. Engine failed during cooldown. □ (A series) Loud noise was heard during runup and fire warning lights flickered. Caused by failure of sprag clutch.

Observation helicopters

OH-58 Class E mishaps □ (A series) High frequency vibration was felt through airframe during takeoff. Caused by loose transponder. □ (A series) Aircraft touched down tail low during low-level autorotation, resulting in possible spike knock and pylon whirl. IP did not take corrective action to prevent pilot from landing tail low.

Fixed wing

C-7 Class E mishap □ Left main landing gear down and locked green light remained on after landing gear was up. Caused by defective downlock microswitch.

OV-1 Class E mishap □ (D series) Speed brakes were extended without results during landing. Flaps, gear, and wipers were used to positively identify hydraulic failure. Emergency landing was made. Caused by cracked flare fitting on hydraulic line.

Maintenance

UH-1 Class E mishaps □ (H series) Loud noises were heard from engine and aircraft shuddered. Variable inlet guide vanes and bleed air band actuator were out of adjustment. □ (H series) Rpm warning light came on. Wire was chafing against metal surface, causing short circuit.

CH-54 Class E mishap □ (A series) Chip detector light came on during flight. Metal particles had fallen into tail

(continued on back page)

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**8**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	1-14 Dec	**0**	**0**
2nd Qtr	January	1	0	January		
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**11**	**13**

Mishap briefs

rotor gearbox when gearbox input seal was replaced.

C-7 Class E mishap □ Copilot's brakes were inoperative during taxi. Caused by incorrect installation of brake control actuating rod assembly.

U-21 Class E mishaps □ (A series) Gear-in-transit light stayed on when pilot lowered landing gear. Crew cranked gear down by hand and landed. Pivot bolt in right main gear was too tight. □ (A series) When gear handle was placed in up position after takeoff, red lights in handle came on and gear motor was heard running the gear up. Red lights in handle remained on. Gear was extended and aircraft landed. Safety switch was out of adjustment.

Messages received

• Safety-of-flight maintenance mandatory message concerning UH-60 cargo hook relief from limitations imposed by prior safety-of-flight messages (UH-60A-83-15, 281730Z Nov 83). Summary: Uncommanded load releases of the UH-60 cargo hooks prompted certain limitations. Engineering analysis has developed two modifications to eliminate the problems. Contact: Lyell Myers, AUTOVON 693-3300, commercial 314-263-3300.

• Maintenance information message concerning minimum clearance when adjusting the rpm stop screw on the T63-A-5A/700 turbine engine governors (MIM-T63-83-MEA-05, 181500Z Nov 83).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM change

Change 30, dated 14 Nov 83, to TM 55-1520-228-23-1 for OH-58A and C helicopters, has been released.

Last FLIGHTFAX this year

This is the last issue of FLIGHTFAX you will receive this year. The next issue will be dated 11 January 1984 and will include briefs for the period 2-29 December 1983. The personnel of the Army Safety Center wish you a Merry Christmas and a Safe and Happy New Year.

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Icing. . . major winter hazard

Aircraft icing is one of the major weather hazards to aviation. While icing may occur at anytime of the year, winter is the most dangerous time for lower level operations. The formation on either fixed or rotary wing aircraft can disrupt the smooth flow of air over the airfoils, and, therefore, decreases lift and increases weight, drag, and stalling speed. In addition, the accumulation of ice on exterior movable surfaces affects the control of the aircraft. Icing on rotors and propellers can result in disastrous vibration, while ice formation in the air intake of an engine can rob it of air to support combustion, or ice may be ingested into the engine, causing foreign object damage.

Aircraft icing can be classified into two types: structural and induction. Structural icing affects the exterior of the aircraft while induction icing occurs in the powerplant itself. Two conditions must be met for structural icing to occur. First, the free air temperature and the aircraft surface temperature must be at or below freezing. Second, supercooled visible water droplets must be present or a high humidity must exist.

Wind tunnel experiments reveal that when saturated (moist) air flows over a stationary object, ice may form on the object at an air temperature as high as 4° C. The temperature of the object is cooled by evaporation and pressure changes in the moving air currents. Conversely, the object is heated by friction and by the impact of water droplets. When an aircraft travels at less than 400 knots true airspeed, the cooling and heating tend to balance. Therefore, structural ice may form when the free air temperature is at 0° C. or colder. Ice is seldom encountered at temperatures below -40° C.

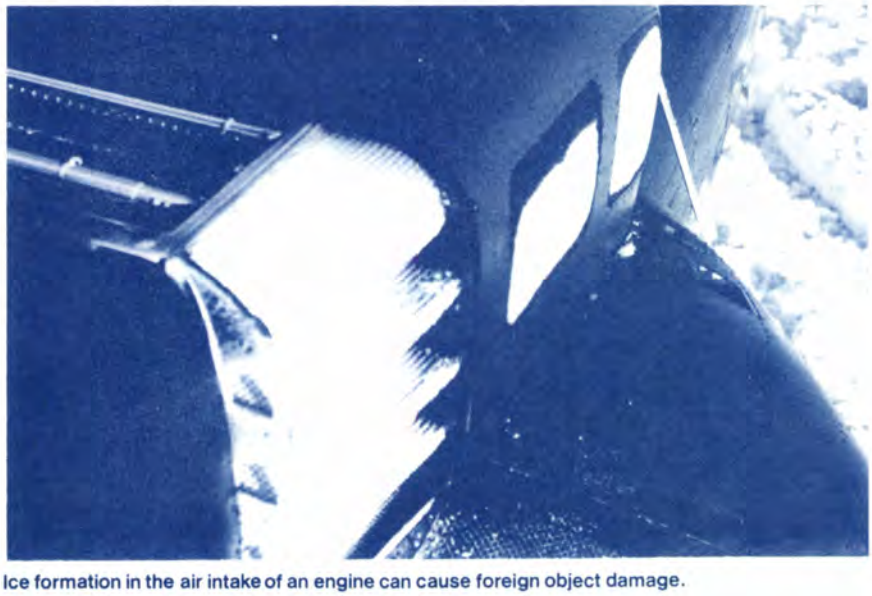
Clouds are the most common forms of visible moisture. Water droplets in the free air, unlike bulk water, do not freeze at 0° C. Instead, their freezing temperature varies from -10° C. to -40° C. The smaller the droplets, the lower the freezing point. As a general rule, serious icing is rare in clouds with temperatures below -20° C. since these clouds are almost completely composed of ice crystals. Freezing precipitation may be encountered in the clear air below a cloud deck and is the most dangerous of all icing conditions. It can build hazardous amounts of ice rapidly and is extremely difficult to remove.

Ice is seldom encountered at temperatures below -40° C.

There are three types of structural icing: clear, rime, and frost. Also, mixtures of clear and rime are common. The type of icing that will form depends primarily upon the water droplet size and temperature.

Clear icing is a glossy ice identical to the glaze which forms on trees and other objects as freezing rain strikes the earth. Clear icing is the most serious of the various forms of ice because it adheres so firmly to the aircraft. Conditions most favorable for clear air formation are high water content, large droplet size, and temperature slightly below freezing. Normally this occurs between 0° C. and -10° C. It is most frequently found in cumuliform clouds and freezing precipitation.

Rime icing is a milky, opaque, and granular deposit of ice with a rough ►



Ice formation in the air intake of an engine can cause foreign object damage.

Icing

Icing on rotors and propellers can result in vibration.

surface. It is formed by the instantaneous freezing of small, supercooled water droplets as they strike the airframe. Rime ice is most frequently encountered in stratiform clouds when the temperature is between 0° C. and -20° C. It is comparatively easy to remove by conventional methods, even though it distorts the airfoil more than clear ice.

Frost normally forms on the exterior surfaces of parked aircraft but may also form on aircraft in flight when a cold aircraft descends from a zone of subzero temperature to a warmer, moist layer below. The air is chilled suddenly to below freezing temperatures by contact with the cold aircraft, and sublimation (formation of ice crystals directly from water vapor) occurs. Frost can cover the windshield or canopy and completely restrict outside vision.

Frost is a most deceptive form of icing. It affects the lift drag ratio of an aircraft and is a definite hazard during takeoff. All frost should be removed from the aircraft prior to takeoff.

Weather conducive to icing formation is varied. Normally (85 percent) all icing conditions reported occur in the vicinity of frontal zones. This icing may be in the relatively warm air above the frontal surface or in the cold air beneath. For significant icing to occur above the frontal surface, the warm air must be lifted and cooled to saturation at temperatures below freezing, making it contain supercooled water. If the air is unstable (cumuliform clouds), icing may be sporadic; if it is stable (stratiform clouds), icing may be more continuous. Icing below the frontal zone outside of clouds occurs most often in freezing rain or drizzle. Precipitation forms above the frontal zone, falls into the subfreezing zone below the front, and freezes on impact with the aircraft.

Icing is more probable and more severe in mountainous regions than over other terrain. Mountain ranges cause upward air motions on their windward side, and these vertical currents support large water droplets that would fall as rain over level terrain. The movement of a frontal system across a mountain range combines the normal frontal lift with the upslope effect of the mountains to create extremely hazardous icing zones. The most severe icing occurs above the crests and to the windward side of the ridges. This zone usually extends to about 5,000 feet above the tops of the mountains but can extend much higher when cumuliform clouds have developed.

The effects of icing to fixed and rotary wing aircraft are numerous. The following are just a few you may encounter:

- Propellers: reduce airspeed and cause vibration.
- Radio antenna: loss of communication.
- Windshield: can reduce visibility to zero zero.
- Engines: loss of power.
- Rotor systems: Ice formation on the helicopter main rotor system may produce critical vibration and loss of efficiency or control, and it can deteriorate significantly the available revolutions-per-minute to a level where safe landing cannot be assured.

Aircrews must be prepared to avoid or minimize the icing hazard. The following procedures will help reduce the effects of icing on an aircraft:

- Remove all snow and ice from the aircraft before takeoff.
- Use all necessary anti-ice/deice equipment.
- Avoid flying in clouds when the outside air temperature is between 0° C. and -20° C.
- If ice is encountered, climb or descend to an altitude where the temperature is warmer than 0° C. or colder than -20° C.

In summary, icing presents one of the greatest dangers to aviation. However, careful planning and proper preventive measures can substantially reduce this risk. This includes a thorough and up-to-date weather briefing. So take the time to get all the facts and let's make this a safe winter. ■

—thanks to 1LT William D. Hall, USAF Staff Weather Officer, Det 9, 5WS, Fort Rucker

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (H series) Aircraft hit wires during NOE flight, damaging windshield. □ (H series) Tail rotor blades hit tree limbs during hover.

UH-1 Class E mishaps □ (M series) Transmission oil pressure light came on and oil pressure dropped to zero. Caused by leak in transmission oil cooler. □ (V series) Low rpm audio and light activated. Caused by failure of engine fuel control. □ (H series) High frequency vibrations were felt in tail rotor control pedals. Caused by failure of hydraulic servo cylinder. □ (H series) Master caution and hydraulic lights came on, followed by control stiffness. Caused by failure of tail rotor servo return line preformed packing. □ (H series) Aircraft jerked and yawed. Mast boot had separated and hit tail rotor blade. □ (H series) Low transmission oil pressure was caused by failure of transmission input quill. □ (H series) Engine fire light came on during landing. Caused by worn mount spring on fire warning system. □ (H series) Pilot smelled electrical burning odor. Caused by failure of main inverter.

UH-60 Class B mishap □ Crew undershot landing zone at night and allowed aircraft to hit the top of a tree. Pilot continued approach and landed. Right fuselage and tail wheel were damaged. 8415

UH-60 Class C mishap □ Failure of No. 2 engine high speed shaft caused internal damage to engine oil sumps, high speed shaft cover, and right input module.

UH-60 Class D mishaps □ Pilot decelerated excessively to avoid overshooting intended touchdown point. Stabilator hit the ground before tail wheel. □ Main rotor blades hit tree during approach to LZ, damaging tip caps. □ Crew smelled burning odor and saw smoke. Windshield wiper motor had been left in low position, causing motor to burn out.

UH-60 Class E mishaps □ Aircraft pitched nose up and then nose low. SAS, boost, and No. 2 reservoir low lights came on. Caused by failure of pitch assembly. □ Stabilator auto mode failed during landing. Caused by failure of electronic control amplifier. □ No. 1 engine chip detector light came on, followed by compressor stall. Caused by failure of No. 4 bearing. □ Burning smell and fumes entered cabin. Caused by stress fracture in No. 1 engine exhaust ejector.

Attack helicopters

AH-1 Class C mishap □ (S series) Copilot in front seat entered left turn. As aircraft began to descend, copilot applied aft cyclic and increased collective. Copilot's attention was focused outside aircraft and he did not monitor the torque when he applied power, causing overtorque.

AH-1 Class D mishaps □ (S series) Tail rotor blades hit bush during landing, damaging blades. □ (S series) As AH-1 hovered near parked OH-58, rotorwash caught unsecured door of OH-58 and slammed it forward, breaking the hinges.

AH-1 Class E mishaps □ (S series) Crew noticed lack of airspeed indications on both airspeed indicators. Pilot had stored flight gear close to pitot static line behind seat, breaking line. □ (S series) Master caution and No. 2 hydraulic lights came on. Caused by failure of pressure switch. □ (S series) Master caution and No. 1 hydraulic lights came on. Pilot felt feedback in cyclic and collective controls. Caused by ruptured hydraulic pressure line.

Cargo helicopters

CH-47 Class D mishaps □ (D series) As howitzer was being loaded, gun crew allowed rear of gun to get too low and hit aircraft ramp. □ (D series) Left forward emergency exit panel separated from aircraft during flight.

CH-47 Class E mishaps □ (C series) No. 1 engine fire light came on. Caused by failure of bearing scavenge line adapter. □ (B series) Minimum beep resistor failed, causing low-side beep failure on No. 1 engine. □ (C series) No. 1 engine would not produce more than 380 pounds of torque and 79 percent N_1 when aircraft was brought to hover. Caused by malfunction of flow divider. □ (A series) No. 2 engine oil low light came on. Caused by failure of microswitch. □ (C series) No. 1 engine chip detector light came on. Caused by shorted wire.

CH-54 Class E mishaps □ (A series) Loud noise was heard during NOE flight. No. 2 engine had ingested a tumbleweed. □ (A series) Failure of stick trim control valve caused complete loss of stick trim during landing.

Observation helicopters

OH-6 Class E mishap □ Loud humming noise was heard and high frequency vibration was felt. Snow which had melted during daylight hours froze in rotor blade after dark. As ice broke loose inside blade, out-of-balance condition resulted.

OH-58 Class E mishaps □ (A series) Eleven-foot section of communication wire blew into rotor blades and wrapped around mast during hover to parking area at field site. □ (A series) Loud bang was heard, TOT rose, and aircraft yawed left. Caused by stripped threads in scroll where deice fitting attaches. □ (A series) Severe vibration was felt in pedals and airframe after takeoff. Aircraft had been parked outside in rain and freezing temperatures. Suspect ice formed in pylon stop. □ (C series) High frequency vibration was felt in tail rotor

pedals during takeoff. Water was found in blades. □ (C series) Rpm warning light came on. Pilot had failed to monitor instruments and applied collective pitch too rapidly. □ (C series) Transmission oil pressure rose to 90 psi. Pin in transmitter cannon plug was bent and was not seating into connection socket. □ (A series) Crew chief did not secure seatbelt strap after exiting crew area. During takeoff, pilot heard loud noise. Aircraft was landed and belt secured.

Fixed wing

C-7 Class E mishaps □ Manifold pressure for No. 2 engine was at zero during taxi. Fuel pressure sending unit had shorted internally. □ Main gear-in-transit light remained on after takeoff. Caused by defective nose landing gear drag strut assembly. □ Nose wheel steering was inoperative during landing rollout. Caused by failure of nose wheel steering shutoff valve.

C-12 Class E mishaps □ (A series) Right fuel cap came off during takeoff. Cap was defective. □ (C series) Fuel flow and torque fluctuated. Generator light came on and loadmeter read zero. Caused by bearing failure in generator.

U-21 Class E mishaps □ (B series) Fuel was seeping from fuel cap during flight. Caused by failure of O-ring on cap. □ (D series) No. 2 engine torque and fuel flow decreased during flight. Caused by failure of fuel control unit.

T-42 Class E mishaps □ Right engine manifold pressure indicated standard sea level and left engine indicated normal operation. Inspection revealed bolt attaching throttle linkage to throttle lever had fallen out. □ Fluid was seen streaming from under rear part of right cowling. Inlet oil line to overspeed governor had broken at governor.

OV-1 Class C mishaps □ (B series) Left main gear did not retract after takeoff. When aircraft was landed, upper fairing door separated from landing gear. Caused by failure of lift check valve. □ (D series) No. 2 engine chip detector light came on and crew heard loud noise. Technical observer saw oil running out of cowl. Single-engine landing was made. Postflight inspection revealed No. 2 engine almost seized. Suspect reduction gear failure.

OV-1 Class E mishaps □ (D series) Landing gear would not retract after takeoff. Landing gear dump valve was unseated. □ (D series) No. 1 engine developed 67 percent torque during takeoff. As power was reduced, loud bang was heard and aircraft yawed. Inspection revealed engine compressor blades were bent and torn.

Maintenance

UH-1 Class D mishaps □ (H series) During daily inspection, crew chief discovered that collective lever bearing plates were installed under the lip on the outside, allowing collective levers to push in bearings and scar the mast. Backwards installation was not noticed by technical inspector. □ (H series) Maintenance test pilot heard loud bang during runup. Castellated nut on internal wrenching bolt holding coupling set on short shaft and main transmission input quill assembly failed. Nut, bolt, and coupling set separated from short shaft assembly, causing damage to transmission input quill assembly, short shaft and flex coupling, collective pitch control connecting link, transmission fifth mount assembly, and hydraulic fluid line. Cotter pin may not have been installed when nut was replaced during phase inspection.

UH-1 Class E mishaps □ (H series) Master caution and transmission oil pressure lights came on. Oil pressure dropped to zero. Suspect petcock was left open after transmission oil was drained to proper level. This was not noticed because fluid was cold and partially clogged. □ (H series) Cyclic binding occurred during flight. Bearings in cyclic were not properly lubricated. □ (H series) Pilot smelled electrical smoke. Loose wire to windshield wiper motor resistor caused arcing. □ (H series) Low fuel light came on with 425 pounds indicated. Light was out of adjustment.

AH-1 Class E mishaps □ (S series) Pilot felt binding in cyclic during hover. SCAS control motion transducer was installed upside down, causing control interference. □ (S series) IP heard high-pitched noise and felt high-frequency vibration during hover for takeoff. Tail rotor was out of track. □ (S series) Yaw SCAS motored several times during takeoff. SCAS channels were out of adjustment. □ (S series) Master caution and main inverter lights came on. Wire bundle to inverter relay was not properly secured, causing it to chafe through and short out.

CH-47 Class D mishap □ (C series) Crew chief found No. 6 drive shaft had lost balance weights and drive shaft was scored. The remains of a Bic-type lighter were found in drive shaft area.

CH-47 Class E mishaps □ (D series) No. 1 hydraulic light and No. 1 AFCS light came on during landing. Hydraulic fitting had been retightened the day before and had been incorrectly seated, causing jam nut to vibrate loose and fitting to leak. □ (C series) Pilots were unable to adjust engine speed with normal engine trim beep switches. Minimum beep resistor was out of adjustment. □ (C series) Loud noise was heard from No. 2 engine during hover. Engine lost power and flames were seen coming from tail cone. Inspection revealed screwdriver inside inlet screens, causing foreign object damage.

OH-58 Class E mishap □ (C series) N_1 would not go above 30 percent ►

Mishap briefs

during runup. Caused by incorrectly adjusted fuel control.

OV-1 Class E mishap □ (D series) As power levers were advanced during takeoff, No. 2 propeller rpm rose to 1760. Caused by low propeller control fluid and out-of-adjustment takeoff rpm.

Messages received

• Safety-of-flight maintenance mandatory message concerning one-time inspection of CH-54A main rotor head trunnion assembly (CH-54-83-03, 101115Z Dec 83). Summary: The shaft on a main rotor blade damper assembly failed at 35 hours since overhaul. Shaft failure was caused by binding of the trunnion assembly connecting the damper assembly to the horizontal hinge pin fork. The trunnion assembly was oversize by .055 inches. Aircraft should be inspected for adequate clearance between the trunnion assembly and horizontal hinge pin fork to prevent damper shaft failures. Contact: Robert High, AUTOVON 693-1639, commercial 314-263-1639.

• Safety-of-flight maintenance mandatory message concerning daily inspection of OH-6 tail rotor blades (OH-6A-83-01, 271715Z Dec 83). Summary: An OH-6 was recently forced to land because of a high frequency vibration, followed by a loud bang. The leading edge abrasion strip was missing from one of the tail rotor blades and three of four tail rotor gearbox mounting bolts failed at the tail boom. Contact: Larry Wieschhaus, AUTOVON 693-1687, commercial 314-263-1687.

• Safety-of-flight maintenance mandatory message concerning one-time inspection of H-6 series main rotor swashplate bearing assembly for missing bearing cages (OH-6A-83-02, 271800Z Dec 83). Summary: A main rotor swashplate bearing assembly was found without the ball bearing cages installed. These bearing assemblies are used on the Hughes model 500/369 (commercial), OH-6A (military), and H-6 series helicopters. This message specifies requirements for a one-time inspection for swashplate bearing assemblies with missing bearing cages. Contact: Larry Wieschhaus, AUTOVON 693-1687, commercial 314-263-1687.

• Safety-of-flight technical message concerning one-time inspection of certain OH-58C (round glass) helicopters (OH-58-83-05, 271815Z Dec 83). Summary: During the OH-58C (round glass) modification program, shotpeening of the blade bolt hole prior to installation of repair bushings was omitted on certain grips. Certain serial numbered main rotor hub assemblies on OH-58C helicopters will be inspected and the assemblies removed on or before 100 hours of operation. Contact: Tom Bell, AUTOVON 693-3300, commercial 314-263-3300.

• Maintenance information message concerning OH-58A/C loose nuts in the collective controls installation (MIM-OH-58-83-MEM-07, 271845Z Dec 83).

• Maintenance information message concerning OH-58A/C engine to transmission drive shaft (MIM-OH-58-83-MEM-08, 271915Z Dec 83).

• Maintenance information message concerning aircraft pitot static system and instruments functional check (MIM-GEN-MEA-82-02, 121900Z Dec 83). MIM-GEN-MEA-82-02 is current and will remain in effect until the special inspections section and Chapter 8 for the AH-1, UH-1, OH-6, and OH-58 series dash 23 maintenance manuals are updated.

• Safety-of-use advisory message concerning AN/PVS-5A night vision goggles (CECOM message, 061845Z Dec 83).

For more information on selected mishap briefs, call AUTOVON 558-4202/4198.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**8**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	1-11 Jan	**1**	**0**
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**12**	**13**

Aviation mishap prevention forum

TAMMS update

The Army Maintenance Management System (TAMMS) just split at the crossroads. A change 1 to the current TM 38-750 (May 81) is on the way to drop everything in that pub **except** the forms and records on aircraft. The current TM 38-750 will then become TM 38-750-A TAMMS - aviation **only**. Non-aircraft forms and records are now in DA Pam 738-750. This pam, along with AR 750-1, is included in the new Maintenance Management Update (Dec 83).

Answers to last week's questions

1. Can self-locking bolts and nut be reused on Army aircraft? Yes, if not used in flight essential applications, such as flight and engine controls and single-bolted structural joints which serve as a primary load path. **TM 55-1500-204-25/1, page 2-4, par. 2-5b**

2. Self-locking bolts are used on aircraft to provide tight assemblies which will resist severe vibration conditions. True or false? True. **TM 55-1500-204-25/1, page 2-4, par. 2-25b**

3. At takeoff, aircraft must have enough fuel to reach the destination and alternate airport (if required) and have a planned fuel reserve of how many minutes? VFR - 20 minutes at normal cruise; IFR - 30 minutes at normal cruise. **AR 95-1, with Change 1, page 4-1, par. 4-2**

4. Maintenance test flights are required when safe operation and/or proper functioning cannot be determined by means of maintenance operational checks (MOC) or shop tests. True or false? True. **TM 55-1500-328-25, page 3-1, par. 3-2**

5. May the commander grant an extension on time change or finite life/retirement life components? Yes, but only under actual emergency situations of combat or disaster, such as fire, flood, hurricane, etc., which necessitates flight to evacuate aircraft or personnel. **TM 55-1500-328-25, page 4-4, par. 4-3d**

Questions for aviation personnel

1. What is foreign object damage (FOD)? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

2. FOD prevention will be assigned as an additional duty for one of the unit NCOs. If practical, the FOD NCO should be working in unit aircraft maintenance operations. True or false? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

3. Icing is most common when the temperature is between 32° F./0° C. and -4° F./-20° C. and visible moisture such as clouds, drizzle, rain, or wet snow is present. True or false? **Reference: FM 1-202, Environmental Flight**

4. What U.S. Army approved clothing and equipment will be worn by all crewmembers when performing crew duties? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

5. Specific and mandatory requirements for accomplishment of aircraft test flights and maintenance operational checks are found in what manual? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

Correction

The forum in the 7 December 1983 issue contained a wrong answer. The answer to question 2, concerning a maintenance test flight for engine replacement, should have been "yes." ■

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Know them before you need them

If you fly long enough, you will most likely be faced one day with an in-flight emergency. The key to safely handling any emergency is knowing and understanding the emergency procedures for the aircraft you fly. But it is just as important that you be able to recognize the emergency, analyze the situation, and apply correct procedures.

When pilots find themselves in panic situations, they must be able to react with something that has been firmly implanted in their minds. Actions to take must have been memorized before the emergency so the subconscious can take over when panic sets in. When things go wrong, the tendency is to grab for something without really thinking about it. If there's something to grab for, it usually makes for a much better ending to the situation.

Some pilots are not able to diagnose emergencies and follow correct emergency procedures. Other pilots may be able to correctly assess the emergency but not know exactly what corrective actions are called for in the operator's manual.

The crew of an AH-1 was on a maintenance test flight. About 700 feet agl, the pilot felt the aircraft lurch, followed by an uncommanded roll (SCAS hardover) and yaw. The pilot thought the actions of the aircraft were too extreme to be caused by a SCAS malfunction. Therefore, he did not release the SCAS nor make sufficient cyclic control inputs to compensate for the displaced neutral position of the cyclic control stick. The aircraft continued in the right roll until the main rotor blades hit the ground. The pilot did not have a full understanding of possible SCAS malfunctions or appropriate emergency procedures for such malfunctions.

Another AH-1 was on a tactical low-level formation flight. A complete power loss occurred while the aircraft was flying about 100 feet above the ground and 100 knots. Instead of immediately autorotating, the pilot delayed entering autorotation while he placed the governor auto/emer switch in the emergency position in an attempt to regain engine rpm. This caused a significant loss of rotor rpm, altitude, and airspeed. The AH-1 sustained substantial damage during touchdown.

The right main landing gear of a U-21 did not retract after takeoff. Repeated attempts by the crew failed to correct the problem. The aircraft was landed with the landing gear unlocked. On rollout, the right gear collapsed, and the aircraft was damaged. The IP did not follow the emergency procedures in the operator's manual. He did not use the backup manual gear lowering system or apply light braking force to the gear after touchdown, which could have locked the gear.

The crew of a UH-1 misinterpreted an N_2 tachometer generator failure as complete engine failure and ditched their aircraft in a bay while the engine was still running. They did not cross-check their engine instruments to confirm the suspected failure. The pilot of another UH-1, when faced with a potential in-flight emergency, panicked and overshot the intended landing area. The aircraft crashed into trees.

Another UH-1 pilot had earlier failed a written examination on emergency procedures and was given no additional training. When his engine cowling came off in flight and hit the tail rotor, causing loss of tail rotor thrust, the pilot did not take the time to identify the problem. Thinking only of engine failure, he immediately entered autorotation and rolled off the throttle. He initiated a deceleration at 125 to 150 feet agl to obtain a zero ground-run autorotation instead of 75 feet agl in accordance with the operator's manual. He could not check the high rate of descent, and the aircraft landed hard, with substantial damage.

While an OH-58 pilot was hovering 5 to 10 feet above trees, he cross-controlled the aircraft, causing it to drift and yaw. The pilot misinterpreted the drift and yaw as loss of tail rotor effectiveness and did not use the correct recovery procedures. He aggravated the condition by reducing left pedal and maintaining his power setting. The aircraft spun to the right, and the pilot autorotated into the trees.

A CH-47 crew misinterpreted a No. 1 engine transmission failure and fire as being a No. 2 engine fire, and the copilot shut down the unaffected engine. When the pilot learned there was a fire, he initiated an emergency descent instead of making a power-on approach and landing without delay as called for in the operator's manual. The cyclic speed trims, being operated in the manual mode, were not retracted during the autorotation. This contributed to overshooting the selected touchdown point, an excessive landing roll, and damage to the aircraft.

If you are one of those pilots who isn't sure what you would do in an emergency situation, study your emergency procedures now. Indecisiveness you can do without. A thorough knowledge of your aircraft and its systems is the only way you are going to throw the odds in your favor when you are faced with an in-flight emergency. ■

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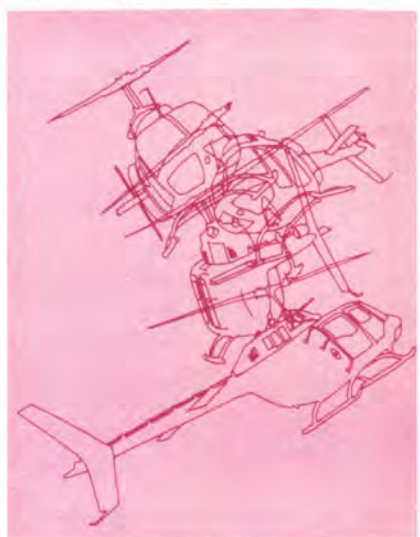
Aviators court-martialed (as a result of collateral investigations) - 7 Sep
Awards program: when mishaps count and when they don't (Awards of Merit, Honor, and Excellence) - 7 Dec
Biochemical test results (clarification on the use of test results) - 7 Dec
Biological rhythms (effect on performance) - 7 Sep

Blowing dust (accident review) - 18 May
Broken Wing Award, eleven receive (recipients for January through March 83) - 4 May
Broken Wing Award, nineteen receive (recipients for April through June 83) - 3 Aug
Broken Wing Award, twelve receive (recipients for October through December 82) - 9 Feb
Butane lighter unreliable (in survival vests) - 30 Mar
Cargo helicopter FY 83 review (mishaps and cause factors) - 14 Dec
Change in Class C reporting - 13 Jul
CH-47 cabin windows lost in flight (wrong seals and fillers) - 20 Apr
CH-47s have wheels, don't they? (engage swivel locks) - 9 Mar
CH-47 window NSN - 1 Jun
CH-54B main rotor head diaphragm seals defective - 2 Mar
Collateral confusion? (explains collateral investigations) - 10 Aug
Component Removal and Repair/Overhaul Record (DA Form 2410) - 14 Dec
Cracked SPH-4 helmet shells (do not repair) - 30 Mar
Cutting losses in the months ahead (first half FY 83 mishap review) - 25 May
CY 82 **Flightfax** index - 12 Jan
Defective oxygen masks (cracked) - 7 Dec
Division of attention (accident review) - 26 Jan
Don't bend engine tubing (can cause chafing and cracking) - 27 Apr
Don't use for aviation (O-ring splicing kit) - 7 Dec
Do your habit patterns work for or against you? (guard against complacency) - 27 Apr
Dusty area precautions (procedures for operating in dusty areas) - 6 Apr
ELTs for Army aircraft (approved for selected aircraft) - 12 Oct
Expedite EIR exhibits - 16 Nov
Failure to plan (accident review) - 31 Aug
Fatigue, aircrew (causes and effects) - 16 Feb
Followups (of mishaps previously reported) - 9 Feb, 16 Mar, 18 May, 27 Jul, 28 Sep, 19 Oct
Fourth quarter Class A mishap review - 26 Oct
From the field (letter and OHR) - 25 May
FY 83 fixed wing mishap cause factors - 14 Dec
Good, better, best (emergency procedure technique) - 31 Aug
High lightning potential weather briefings (now available) - 23 Feb
Hot cold weather survival kit (matches ignited) - 19 Oct

IMC at night (accident review) - 9 Nov
Inaccurate PPC (accident review) - 20 Apr
Info available on hazardous materials (from HMTC) - 21 Sep
Ingredients for success (factors found in a survey of three organizations) - 15 Jun
It's yours, IP (mission planning) - 7 Sep
Keeping the record straight (importance of good recordkeeping) - 24 Aug
Lack of planning (accident review) - 17 Aug
Landing gear briefs - 6 Apr
Lessons learned from a T-42 mishap - 2 Nov
Lightning strike mishaps - 5 Oct
Low-flying helicopter reported to Congressman (helicopter buzzing beach club) - 9 Nov
Medevac mission (accident review) - 29 Jun
Microlights (see and avoid) - 23 Feb
Mishap classification criteria changed (effective 1 Oct) - 19 Oct
Misjudged runway distance (accident review) - 21 Sep
More power to you (engines and hot weather) - 11 May
More than you ever wanted to know about your pressure altimeter - 30 Nov
Mortar fire observation mission (accident review) - 27 Jul
Mountain flying (accident review) - 23 Mar
Mountain training mission (accident review) - 2 Mar
No aircraft is immune (foreign object damage) - 14 Sep
Notice to safety officers (include component serial numbers on PRAMs) - 10 Aug
NVG alert (goggles may shut down) - 29 Jun, 30 Nov
Obesity - 16 Nov
OH-58 engine power droop (accident review) - 16 Mar
OH-58 loss of tail rotor effectiveness (update on problem) - 19 Oct
OH-58 tail rotor spin (accident review) - 23 Feb
OH-58 tail rotor spin accidents (causes and cures) - 4 May



OH-58 tail rotor spin phenomena (Operation Alert) - 23 Feb
Operation Alert (hazards around Randolph AFB) - 26 Oct
Operation Alert (OH-58 tail rotor spin phenomena) - 23 Feb
Perilous time (fatigue can cause accidents) - 8 Jun
Postaccident biochemical test results (clarification on the use of test results) - 7 Dec
Prepare for summer exercises (safety films) - 18 May
Problem with refueling receiver latch tools (plastic comes off) - 6 Apr
Pyrotechnics, status of - 13 Apr
Quality control (responsibility of everyone in aviation) - 21 Sep
Radioactive materials in engines (magnesium-thorium alloy components) - 18 May
Real aviators don't read dash 10s (humorous article from **Approach**) - 13 Apr
Recap of TSARCOM messages (from 1 January through 31 March 1983) - 11 May
Recap of TSARCOM messages (from 1 October through 31 December 1982) - 26 Jan
Reporting loss of tail rotor effectiveness (send data to USASC) - 8 Jun
Responsibility of supervisors (principles to follow) - 15 Jun
Review time (submit EIRs) - 7 Sep
Safety-of-flight compliance reporting (reports not received on time)-14 Dec
Safety-of-flight messages
- AH-1 and UH-1 finite life schedule - 6 Jul, 20 Jul
- AH-1 force gradient - 3 Aug
- AH-1 main rotor blade - 1 Jun
- AH-1 transmission pylon bolts - 5 Oct
- Changes to urgent change No. 35 of TM 55-1520-210-23-1 - 2 Mar
- CH-54 intermediate gearbox support fitting assembly - 27 Apr
- CH-54 tail rotor gearbox support fitting assembly - 18 May
- CH-47 combining transmission support fitting - 8 Jun
- CH-47 fiberglass rotor blade sealant - 10 Aug, 24 Aug
- CH-47 fleet update status - 12 Jan, 2 Mar, 20 Apr
- CH-47 integrated lower control actuators - 7 Dec
- CH-47 rotor head assemblies - 9 Nov
- CH-47 upper flight controls - 8 Jun
- OH-58 flapper assemblies - 14 Sep
- OH-58 main rotor blades - 16 Mar
- OV-1 wing attachment bolts - 1 Jun
- UH-1 and AH-1 rotor blades - 25 May
- UH-1 main rotor blades - 16 Mar, 30 Mar
- UH-60 accessory module oil return screen - 7 Dec
- UH-60 cargo hook operations - 16 Nov, 14 Dec
- UH-60 cargo door upper tracks - 12 Jan
- UH-60 collective bias tube assembly - 2 Nov
- UH-60 directional control lever assembly - 6 Apr
- UH-60 engine output shaft - 2 Mar
- UH-60 external load hookup - 25 May
- UH-60 forward sliding cover assembly - 16 Nov

- UH-60 inlet duct assembly and alignment pin bracket - 27 Apr
- UH-60 tail rotor servo assembly - 23 Nov

See and avoid (midair collisions) - 26 Jan
Share your successes . . . your problems, too (contribute to **Flightfax**) - 6 Apr
Shipping container explodes, killing one (fuel system of engine in container was not purged) - 20 Apr
Skill/difficulty balance (reduce the hazard probability) - 27 Jul
Snow scene (whiteout mishaps) - 28 Sep
Somebody goofed! (power wrench adapter) - 30 Mar
Spatial disorientation (explains two-mode visual system) - 12 Oct
Sprag clutch failure (how it can happen) - 2 Nov
STACOM - 19 Jan, 2 Mar, 23 Mar, 20 Apr, 1 Jun, 6 Jul, 3 Aug, 31 Aug, 21 Sep, 30 Nov
Status of pyrotechnics - 13 Apr
+Stress, fatigue, and the squadron commander (symptoms of stress and fatigue and how to deal with them) - 13 Jul
Summer fallout (objects falling from aircraft) - 8 Jun
Supervisory error: failure to take corrective action (FY 82 accident synopsis) - 12 Jan
Suspected contaminated water (canned water) - 6 Apr
Take time for a little cooling care (cool gas turbine engines) - 10 Aug
Testimony by accident board members (restricted from testifying) - 19 Oct
The aviation cowboy (results of personal opinion survey) - 1 Jun
The awards program: when mishaps count and when they don't (Awards of Merit, Honor, and Excellence) - 7 Dec
The buck stops here ("here" means you) - 22 Jun
The hazard eliminator (Operational Hazard Report) - 6 Jul
The instructor pilot (responsibility of IPs) - 24 Aug
The most valuable tool (hands) - 23 Mar
The role of vision in spatial disorientation (explains two-mode visual system) - 12 Oct
The secret is selectivity (follow established procedures) - 2 Feb
The snow scene (whiteout mishaps) - 28 Sep
The woods are full of them (tree strikes) - 20 Jul
+Third quarter Class A mishap review - 17 Aug
This nickel flakes off (CH-47 accumulator) - 7 Dec
Tree strikes - 20 Jul
UH-1 wire strike (accident review) - 2 Feb
Unauthorized use of FM transmitters (not approved for use in aircraft) - 2 Nov
Use the right shaft (CH-47 engine transmission) - 4 May
Violation of procedures (accident review) - 3 Aug
War stories (article on instructor pilots) - 19 Jan
Watching and directing (supervisory errors) - 9 Mar
Were the passengers briefed? (importance of briefings) - 30 Mar
What you see is not always what you get (physiology of visual accommodation) - 22 Jun
What you should know about Nomex (facts about the Nomex uniform) - 16 Nov
When the thermometer drops (cold weather factors) - 5 Oct
When you're hot you're hot (effects of heat on crewmembers) - 25 May
Who has the answers? (availability of information after an accident) - 31 Aug
Wind observation (Air Weather Service study) - 16 Nov
Wire strike (accident review) - 9 Feb
Wire strike (accident review) - 8 Jun
Would you take a chance? (don't move aircraft after a mishap) - 2 Mar ■

Helmets authorized for passengers

An OH-58 recently crashed on the side of a ravine, slid about 70 feet downhill, and came to rest on its left side. The passenger, who was sitting in the copilot's seat, was pinned under the wreckage. Wearing only a communication headset, he received a fatal blow to his head. The pilot received only minor injuries even though his helmet hit the fuel shutoff handle hard enough to bend it.

As of September 1982, CTA 50-900 (page 02-040, line item K34252) authorizes the issue of a flight helmet for passengers in observation helicopters. Nonaviation personnel participating in missions should be provided with protective headgear. If the passenger is required to communicate with the pilot or others aboard the aircraft, he should be issued the SPH-4 helmet. The helmet can be fitted by one of the crewmembers well enough so that it will not be lost during a crash.

If the passenger in this OH-58 accident had been wearing a helmet, he would have survived.

Point of contact at the Safety Center is Mr. Laurel Sand, AUTOVON 558-4198/4202. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class E mishaps ☐ (H series) Master caution and tail rotor chip detector lights came on. Ninety-degree gearbox required replacement. ☐ (H series) Cyclic control became stiff during flight. Caused by accumulation of ice on right servo cylinder and bellcrank. ☐ (H series) Pilot was told that fuel was spraying from his aircraft. Caused by failure of auxiliary fuel system.

UH-60 Class D mishap ☐ Main rotor blades hit small tree during landing in confined area. Blade tips were damaged.

UH-60 Class E mishap ☐ Stabilator auto mode failed during landing. Caused by malfunction of electronic control amplifier.

Attack helicopters

AH-1 Class D mishap ☐ (S series) During night gunnery mission, cartridge hit and damaged tail rotor blade.

AH-1 Class E mishaps ☐ (S series) When pilot increased collective during turn, three loud noises were heard. Torque fluctuated and tgt rose. Engine compressor stalled. First and second stages of compressor blades were slightly eroded, and bleedband actuator was defective. ☐ (S series) Engine oil pressure rose during flight. Caused by failure of oil pressure transducer.

Observation helicopters

OH-58 Class D mishap ☐ (C series) Aircraft drifted to left during hover. Main rotor blades hit top of tree.

OH-58 Class E mishaps ☐ (A series) Transmission oil hot light came on. Caused by failure of switch. ☐ (A series) Throttle was rolled on at 11 percent N_1 during runup. Because of low battery voltage, tot started to climb. Pilot tried to roll off throttle and inadvertently rolled throttle the wrong direction, causing tot to rise to 940 degrees for 3 seconds before throttle could be rolled off.

Fixed wing

OV-1 Class E mishap ☐ (D series) Thumping sensation was felt from right side of aircraft during landing rollout. Right tire was flat. Suspect pilot applied excessive brakes.

U-8 Class E mishap ☐ (F series) Pilot could not get safe nose wheel indication before landing. Caused by failure of microswitch.

U-21 Class E mishap ☐ (RU-21H) Aircraft was configured for stall characteristics check with gear and flaps down. After completion of stall maneuver, gear handle was placed in up position. Gear safe indicators went out and in-transit lights in gear handle illuminated. After 2 seconds, landing gear power CB on copilot's panel popped. Gear retraction stopped and in-transit lights remained on. Landing gear was extended manually. Caused by failure of gear retract electromechanical actuator.

Messages received

- Maintenance information message concerning AH-1/UH-1 mismatch of certain pressure indicators and transmitters (MIM-UH-1-83-MEM-04, MIM-AH-1-83-MEM-06, 131915Z Dec 83).
- Maintenance information message concerning engine torque available values for UH-1H, UH-1M, EH-1H, EH-1X, and AH-1G/TH-1G aircraft (MIM-T53-84-MEM-01, 051115Z Jan 84).
- Maintenance information message concerning field maintenance support of the new heavy-duty AH-1S ground handling wheel (MIM-AH-1-HEM-84-01, 051640Z Jan 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**8**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	1-18 Jan	**3**	**0**
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**14**	**13**

Aviation mishap prevention forum

Answers to last week's questions

1. What is foreign object damage (FOD)? FOD is damage to or malfunction of an aircraft caused by an object that is alien to an area or system or is ingested by or lodged in a mechanism of an aircraft. FOD may cause materiel damage or it may cause a system or equipment to be unusable, unsafe, or less efficient, as in the case of fuel contamination. Some examples of FOD are ingestion of loose hardware or grass by an engine, flight controls jammed by hardware or tools, and tires cut or propellers and tail rotors damaged by debris on the ramp or taxiway. **AR 385-95, with Change 1, page 4-1, par. 4-1**

2. FOD prevention will be assigned as an additional duty for one of the unit NCOs. If practical, the FOD NCO should be working in unit aircraft maintenance operations. True or false? True. **AR 385-95, with Change 1, page 4-2, par. 4-6**

3. Icing is most common when the temperature is between 32° F./0° C. and -4° F./20° C. and visible moisture such as clouds, drizzle, rain, or wet snow is present. True or false? True. **FM 1-202, page 1-3, par. 1-3d**

4. What U.S. Army approved clothing and equipment will be worn by all crewmembers when performing crew duties? Leather boots, flight helmet, flight suit, flight gloves, cotton, wool, or Nomex underwear, and identification tags. Major Army commanders, numbered Army commanders, CNGB, and CG, USAAVNC, may waive the requirements for the first five items for crewmembers assigned to flights which require other uniforms. The flight helmet requirement does not apply to C-12 or T-42 airplanes. **AR 95-1, with Change 1, pages 2-6 and 2-7, par. 2-17**

5. Specific and mandatory requirements for accomplishment of aircraft test flights and maintenance operational checks are found in what manual? TM 55-1500-328-25. **TM 55-1500-204-25/1, page 1-24, par. 1-74**

Questions for aviation personnel

1. What general standard safety measures will be included in the planning for firing exercises? **Reference: AR 385-63, Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat**

2. When storing aircraft inner tubes, a small amount of air should be left in the tube to keep surfaces from sticking. True or false? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

3. What is the most common method of safety or lock wiring? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

4. Must the magnetic compass be installed and operating for day, night, and IMC aircraft flights? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations** ■

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 15 □ 25 Jan 1984

Review of first quarter mishaps shows upward trend continuing

The Army recorded 40 Class A aircraft mishaps in FY 83. Fourteen of these were caused by aviators knowingly violating regulations, procedures, or directives. Through the first 3 months of FY 84, Army aviation units recorded 11 Class A mishaps and 13 fatalities. Ten of the 11 mishaps involved human error. Following are selected synopses of the human error mishaps.

• A UH-1 was participating in an airmobile insertion to a mountain training area. The copilot made the approach, terminating at a 25-foot hover. The copilot then began a right pedal turn to align the helicopter with the desired landing axis. The turn could not be stopped and the helicopter drifted toward a building. Application of power allowed the helicopter to clear the building, but engine and main rotor rpm deteriorated. The pilot took the controls and tried to fly out of the situation. The tail rotor hit a tree, and the aircraft crashed and tumbled down a slope.

Cause: Improper decision of copilot to terminate the approach at an out-of-ground-effect hover while at a high gross weight and altitude of 4,300 feet msl. Pilot did not anticipate the development of an emergency because of an inadequate unit mountain flying training program.

Result: Five injuries and a destroyed aircraft at a cost of $933,754.

• Three UH-60s were involved in a low-level night vision goggles training flight. As the flight proceeded up a narrow valley, at an airspeed of about 40 knots and an altitude of 100 feet above the treetops, the No. 2 aircraft's main rotor system hit a tree and rising terrain to the right of the aircraft. The aircraft then hit other trees and crashed.

Cause: Supervisor (flight leader) selected an inappropriately low altitude in a deep narrow valley for the training mission, and pilot failed to maintain appropriate terrain clearance during low-level NVG flight.

Result: Four fatalities and a destroyed aircraft at a cost of $3,865,720.

• A U-8 was on a training flight. The aircraft was flying about 1,900 to 2,100 feet above the ground when airspeed was reduced, the landing gear and flaps were lowered, and the crew began doing 180-degree turns. Witnesses saw the aircraft snaproll to the left and enter a steep, descending spiral. The U-8 crashed through a grove of trees and burst into flames.

Cause: With gear and flaps extended, pilot allowed aircraft to stall at an altitude too low for recovery.

Result: Three fatalities and a destroyed aircraft at a cost of $1,134,593.

OH-58 lost tail rotor effectiveness while hovering 60 to 75 feet above the ground.

Review of first quarter mishaps

• An OH-58 was on a photography mission. The photographer asked the crew to fly lower. The copilot, who was on the controls, descended to an altitude of about 60 to 75 feet above the ground and brought the aircraft to a stable hover. The aircraft then began an uncommanded turn to the right. The copilot closed the throttle and began an autorotation. The OH-58 landed hard, coming to rest upright.

Cause: Operation of the aircraft in a flight mode known to be conducive to loss of tail rotor effectiveness, inadequate flight performance planning, and marginal effectiveness of the OH-58 antitorque system.

Result: One fatality, one minor injury, and a destroyed aircraft at a cost of $157,127.

• A UH-60 crew heard a loud bang from the rear of the aircraft during a standard autorotation and the aircraft vibrated severely. As the aircraft slowed to near hover speed, it began a rapid turn to the right, which quickly progressed into an uncontrollable spin. The aircraft crashed on its right side. Investigation revealed that the main rotor pylon sliding cover left the aircraft during the early part of the autorotative approach. It then went into the main rotor system where it was deflected downward onto the fuselage and then rearward into the tail rotor system. One or two of the tail rotor blades were damaged at that point. As the aircraft was slowed and power applied during termination of the approach, the out-of-balance condition of the tail rotor caused the blades and gearbox to separate.

Cause: Incorrect installation of main rotor forward pylon cover by maintenance personnel and design error which allowed the cover to appear secure when it was misaligned.

Result: Two major injuries, one minor injury, and a destroyed aircraft at a cost of $3,012,175.

UH-1 pilot lost spatial orientation during medevac mission in adverse weather.

• A UH-1 was on a medevac mission at night, with a pilot and crew chief on board. The pilot overflew the pickup site and began a right descending turn to land. During the approach, the pilot lost spatial orientation because of a heavy rainshower and reflection of the aircraft's landing light. Control was lost, the main rotor blades hit a tree, and the aircraft crashed.

Cause: Medevac mission was attempted in adverse weather with only one pilot aboard the aircraft. Unit commander had authorized medevac missions with only one pilot on board.

Result: Two major injuries and a destroyed aircraft at a cost of $623,930.

• An OH-58 was crossing a ravine approximately 200 feet deep when the engine and main rotor low rpm lights and audio systems activated. The pilot made a sharp left turn toward level terrain over which he had just flown. The aircraft hit hard on the slope of the ravine in a left bank attitude and slid downslope.

Cause: Pilot unnecessarily turned left in an effort to reach a forced landing site after interpreting an engine rpm bleedoff/droop as engine failure.

Result: One fatality, one minor injury, and a destroyed aircraft at a cost of $153,387.

• A UH-1 was on a maintenance test flight. As the aircraft was flying about 300 to 400 feet above the ground, mast bumping occurred, followed by separation of the main rotor system. The aircraft then entered a high-speed descent and crashed. When the wreckage was recovered, the cyclic control tubes were not attached to the fore and aft or lateral cyclic control hydraulic servo lever assemblies. Laboratory analysis confirmed that the cyclic servo attaching bolts were not present at impact.

Cause: Improper maintenance and failure of maintenance personnel to document disconnect of flight controls, preventing required inspection to insure proper reinstallation.

Result: Two fatalities and a destroyed aircraft at a cost of $1,354,704.

If the upward trend of the last 7 months of FY 83 continues—and the record for the first quarter of this fiscal year shows that it is—FY 84 will be even more tragic than FY 82, the worst year in aviation safety since FY 73. ■

Aviation mishap prevention forum

Answers to last week's questions

1. What general standard safety measures will be included in the planning for firing exercises?

• Qualified instructor pilots or unit trainers having immediate access to positive control of the aircraft and weapon system being fired will accompany pilots and gunners who are not qualified and current in both the aircraft and the weapon system. Unit trainers may only be used when fully qualified IPs are not available and delay of training would adversely affect unit training/readiness. In all cases, final qualification checkrides will be administered by fully qualified IP or standardization instructor pilot.

• Pilots and gunners are qualified when they have successfully completed an approved qualification course or qualification or transition training in accordance with the applicable Aircrew Training Manual in the aircraft and weapon system being fired and when they have demonstrated flight and weapon proficiency to a designated IP in the applicable aircraft and weapon system.

• Pilots and gunners will be familiar with the impact area, firing limits, danger zones, and safety regulations for each firing range.

• The OIC will be responsible for all aspects of safety in the firing unit and on the assigned firing range. The OIC will appoint assistants. They may include, but are not limited to, the RCO, aviation safety officer, RSO, IP, and radio controller. The OIC will insure that the firing aircraft are properly located within the surface danger zone, correctly oriented in the target direction and safe to fire. When firing is conducted in such a manner or in areas where the OIC cannot supervise the firing from the ground, then the OIC, or assistant, should be airborne in a control aircraft. When the firing is conducted with a scout aircraft, it may be used to verify that the firing aircraft is properly oriented and safe to fire.

• Communications will be maintained at all times between the aircraft, the OIC, and the RCO at the firing range. Firing will be suspended immediately on loss of communications.

• The airspace routing to be used by armed aircraft flying from the ammunition loading site to the firing range, the range flight pattern, and return route to the loading site will be plotted on a map or chart. The course will be carefully selected so that accidental firing at any point on the course will present minimal risk to life and property.

• Commanders will insure that all crash rescue personnel will be knowledgeable of the safety precautions to be used around armed aircraft and the danger of movement in impact areas. **AR 385-63, chapter 13**

2. When storing aircraft inner tubes, a small amount of air should be left in the tube to keep surfaces from sticking. True or false? True. **TM 55-1500-204-25/1, page 2-59, par. 2-184**

3. What is the most common method of safety or lock wiring? The double twist method. **TM 55-1500-204-25/1, page 3-47, par. 3-170**

4. Must the magnetic compass be installed and operating for day, night, and IMC aircraft flights? Yes. **AR 95-1, with Change 1, page 4-5, table 4-2**

Questions for aviation personnel

1. A flashlight is required on board all aircraft during day, night, and IMC flights. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

2. May cotter pins be reused if they are visibly serviceable when removed? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

3. In which direction will cotter pin heads be pointed on rotating parts such as rotor heads, propellers, and the like? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

4. The FOD prevention officer is only a battalion-level position. True or false? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

Safety council meetings

As a result of the Army Aviation Policy Committee meeting held in November 1983 at Fort Rucker, Active Army units are no longer required to conduct monthly safety council meetings. Quarterly meetings are now required. This will be reflected in a future change to AR 385-95. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (H series) As aircraft was on the ground with engine running, an empty 5-gallon water can was pulled up into main rotor blade. □ (H series) Pilot tried to start engine with tiedown still on main rotor blade. Blade was damaged and FM antenna destroyed. Pilot did not remove tiedown, and copilot did not notice it during preflight. □ (H series) Tail rotor drive shaft access door was lost during flight. Crew chief did not refasten door after opening it for daily inspection. Pilot overlooked the unsecured door during preflight.

UH-1 Class E mishaps □ (V series) IP retarded throttle for simulated engine failure. Pilot lowered collective and needles failed to split. Caused by sprag clutch failure. □ (V series) Crew felt stiffness in controls, followed by illumination of master caution and hydraulic lights. Caused by failure of line from hydraulic pump. □ (M series) Rotor tachometer dropped to zero during hover. Caused by failure of tachometer generator shaft. □ (H series) Master caution and transmission oil pressure lights came on. Caused by failure of main transmission oil filter gasket. □ (H series) Severe vertical vibration occurred on base leg for landing. About 7 inches of blade covering had separated from blade spar. □ (H series) Low fuel light came on during flight. Aircraft had not been refueled since previous flight, and crew did not visually check fuel before this flight.

UH-60 Class D mishap □ Aircraft hit goose, damaging main rotor blade tip cap.

Attack helicopters

AH-1 Class E mishaps □ (S series) Copilot put aircraft into a 30-degree left bank and increased power more than was necessary to maintain altitude. Overtorque light came on. □ (S series) Low rpm light came on during hover. Caused by defective warning box. □ (S series) When pilot moved collective up during prerunup check, popping sound was heard. Throttle shear pin had snapped. Crew did not insure control linkage was free of ice during preflight.

Cargo helicopters

CH-47 Class D mishap □(C series) As cargo was being loaded by forklift, back plate of forklift hit between ramp and APU. Aircraft skin was dented and fiberglass cracked around ramp area.

CH-47 Class E mishaps □ (B series) Crew smelled burning electrical wires and saw smoke in forward cabin area. Caused by failure of No. 2 transformer rectifier. □ (B series) Fuel was seen coming from engine during MOC. Caused by malfunction of fuel control.

Observation helicopters

OH-58 Class A mishap □ (A series) Pilot began slow right turn while flying at an altitude of 100 to 150 feet agl and airspeed of about 35 knots. Aircraft yawed to right and turn rate accelerated. Pilot was unable to stop the turn using cyclic and antitorque pedal controls. Pilot closed throttle and initiated autorotation. Control was lost during autorotation, and aircraft crashed on its right side. Caused by operation of the aircraft in a flight environment known to be conducive to loss of tail rotor effectiveness and initiation of an incorrect emergency procedure. 8416

OH-58 Class D mishap □ (A series) IP was on the controls, hovering in parking area, when he decided to reduce friction on collective. Since student pilot was watching clearance of other aircraft in the vicinity, IP moved his left hand to the cyclic and his right hand to the student's collective friction. When friction was reduced, collective started down. As IP switched hands on the controls, his left thumb hit his collective. Aircraft hit the ground, breaking cross tubes.

OH-58 Class E mishaps □ (A series) N_1 and N_2 fluctuated during hover. Caused

(continued on back page)

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**8**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	1-25 Jan	**3**	**0**
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**14**	**13**

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 97 □ 25 Jan 1984

Operator's Manual and Checklist update

Listed below are the effective dates of the current aircraft operator's manuals and checklists with the number and date of the latest change. Please check your weekly AG Publications Center Bulletin for subsequent changes.

Fixed Wing TM 55-1510-	Aircraft	Basic Manual	Last Change	Basic Checklist	Last Change
201-10/4	RU-8D				
	U-8D/G	3 Apr 78		Jul 78	
201-10/5	U-8F	21 Mar 78	4, 23 Nov 82	Jul 78	3, 24 Nov 82
204-10/3	OV-1B	9 Mar 79	4, 23 Mar 82	Feb 79	2, 23 Mar 82
204-10/4	OV-1C	10 Apr 79	5, 2 Apr 82	Apr 79	2, 5 Apr 82
208-10	T-42A	27 Feb 79	2, 12 May 82	Feb 79	1, 7 Jan 82
209-10	U-21A	29 Oct 82		Oct 82	
209-10-1	RU-21A/D	29 Oct 82		Sep 82	
213-10	OV-1D/RV-1D	4 Aug 78	7, 28 May 82	Nov 78	3, 12 Dec 81
214-10	RU-21B/C	28 Oct 82		Oct 82	
215-10	U-21G	29 Dec 82		Dec 82	
215-10-2	RU-21H(GR-V)	29 Jan 83		Nov 82	
216-10	U-3A/B	11 Dec 78	2, 5 Apr 82	Dec 78	1, 8 Feb 82
218-10	C-12A/C/D	7 Oct 82	1, 1 Apr 83	Oct 82	1, 1 Apr 83
TO1C-7A-1	C-7A	1 Oct 70	10, 11 Jan 80	Oct 70	13, 11 Jan 80
	T-41	31 Oct 74	2, 18 Mar 77	Oct 74	

Rotary Wing TM 55-1520-	Aircraft	Basic Manual	Last Change	Basic Checklist	Last Change
209-10	CH-47A	9 Jan 79	5, 11 Jan 83	Dec 78	3, 26 Nov 82
210-10	UH-1D/H	18 May 79	18, 18 May 83	Feb 79	6, 18 May 83
214-10	OH-6A	17 Dec 76	11, 11 Jan 82	Dec 76	4, 8 Feb 82
217-10-1	CH-54A	8 Apr 77	3, 20 Aug 82	Mar 77	2, 10 Oct 79
217-10-2	CH-54B	15 Apr 77	3, 23 Aug 82	Mar 77	3, 4 Aug 82
219-10	UH-1B	16 Jan 69	19, 28 Jul 82	Dec 68	8, 11 Apr 79
220-10	UH-1C/M	8 Sep 80	13, 9 May 83	Sep 80	3, 7 Dec 82
221-10	AH-1G	18 Mar 80	2, 5 Feb 82	Mar 80	
227-10-1	CH-47B	23 Aug 78	3, 14 Nov 80	Dec 78	3, 30 Oct 80
227-10-2	CH-47C	23 Aug 78	11, 23 Nov 82	Nov 79	4, 15 Apr 82
228-10	OH-58A	7 Apr 78	28, 6 Jul 83	Jul 78	15, 14 May 83
223-10	TH-55A	30 Sep 76	6, 25 Feb 83	Oct 76	6, 1 Dec 82
234-10	AH-1S (MOD)	17 Nov 76	14, 25 Aug 82	Nov 76	3, 30 Nov 79
235-10	OH-58C	7 Apr 78	32, 6 Jun 83	Jul 78	17, 20 May 83
236-10	AH-1S (PROD)	11 Jan 80	7, 24 Jun 83	Jan 80	4, 17 Aug 83
237-10	UH-60A	21 May 79	22, 2 Sep 83	Dec 78	16, 4 Nov 83

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-717 during duty hours; 558-6487 after duty hours.

Mishap briefs

by failure of governor. ☐ (A series) Rotor tachometer malfunctioned. Caused by failure of tachometer generator.

Fixed wing

C-12 Class E mishap ☐ (C series) Pilot became dizzy and his vision blurred during flight. Aircraft was landed, and pilot was diagnosed by flight surgeon as having an inner ear infection.

OV-1 Class D mishap ☐ (B series) Right hatch opened shortly after takeoff. Crew did not insure hatch was locked before takeoff.

OV-1 Class E mishap ☐ (D series) Torque VIDS on No. 1 engine decreased to zero during climbout. Caused by failure of inverter.

T-42 Class E mishaps ☐ Aircraft shuddered, No. 2 engine lost rpm, and fuel pressure fluctuated during takeoff. Caused by fouled spark plugs on No. 2 engine. ☐ Pilot's entrance door opened in flight. Pilot did not insure positive locking in second detent of door handle.

U-21 Class C mishap ☐ (RU-21H) Right wing pod hit fence gate post as aircraft was being taxied to parking area. Ground guide was being used. Gate was not opened far enough by ground personnel.

Maintenance

UH-1 Class D mishap ☐ (H series) Postflight inspection revealed drive shaft cover on vertical fin was open and damaged. Hinges were bent and rivets popped. Pilot had told maintenance supervisor to secure cover. Maintenance supervisor had told mechanic to "button up the aircraft." Mechanic did not notice that cowling was not secured. Maintenance supervisor did not make sure cover was secured.

UH-1 Class E mishap ☐ (H series) Engine oil pressure dropped, and master caution and engine caution lights came on. Postflight inspection revealed engine oil reservoir was empty. Oil was found on underside of aircraft, aft cross tube, and underside of tail boom. Oil line fitting located under engine deck was not secured correctly. Fitting was only finger tight.

AH-1 Class E mishap ☐ (S series) Collective would not go down after takeoff. Areas around both collectives were checked for obstructions, but nothing was found. Extreme pressure was used on downwind for landing and collective freed. Plastic oil sample bottle was found under collective bellcrank linkage.

CH-47 Class E mishap ☐ (B series) DCP trim actuator would not program in forward flight. Speed trim amplifier box circuitry was not adjusted properly.

U-8 Class E mishap ☐ (F series) Smoke was seen coming from around No. 2 engine cowling during shutdown. Nuts were missing from No. 5 cylinder exhaust flange and had backed off of No. 1 and No. 3 exhaust flanges. No. 5 exhaust flange broke oil return line from No. 3 cylinder, allowing oil into open cowling. Oil-soaked harness caught fire.

OV-1 Class E mishap ☐ (RV-1D) Loose cannon plug to signal data converter for VIDS caused incorrect readout during flight.

Messages received

- Maintenance information message concerning UH-1 collective lever bearings (MIM-UH-1-84-MEM-01, 092000Z Jan 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 16 □ 1 Feb 1984

Accident review: UH-1 wire strike

Synopsis

A UH-1H hit two single-strand steel wires during takeoff from a tactical field site. The pilot made a left turn to land in an open area. Control was lost about 3 feet above the ground, and the aircraft crashed.

History of flight

The aviation unit was participating in a field training exercise. The pilot and crew chief of a UH-1 and the squadron commander flew around the area for awhile and then landed so the squadron commander could coordinate with the troop commander. About 30 minutes later, they flew to another area, where the squadron commander got out of the aircraft and told the pilot to refuel the UH-1 and return to pick him up.

The crew chief got in the right seat and the helicopter was flown to a hot refueling area. After the aircraft was refueled, the pilot and crew chief flew to their maintenance support area to get an oil sample bottle.

Arriving at the support area, the crew chief could not find a bottle and returned to the aircraft. The pilot brought the aircraft to a hover and departed to the northeast along a streambed. He began a climb to obtain a 10- to 20-foot clearance over a set of known telephone wires. The UH-1 hit a second set of wires about 20 feet higher than the first set. The pilot then began a slow, descending turn to make an emergency landing. About 3 feet above the ground and with 5 to 10 knots forward groundspeed, the aircraft pitched uncontrollably to the right and hit the ground right skid low, bounced, rolled right, and came to rest inverted. The pilot and crew chief received scratches and abrasions.

Crewmember experience

The 34-year-old pilot had more than 2,200 rotary wing hours, with more than 2,100 in the UH-1H. He was considered to be among the most conscientious and professional pilots in the squadron and was the acting unit safety officer.

Commentary

The pilot selected a departure route with three sets of powerlines and steeply rising terrain in his flight path when a departure route was available that had no obstacles. This departure route was selected because the landing zone was organized in such a manner that tents blocked the only adequate avenue of approach and departure. This situation existed because of poor use of assigned aviation safety personnel during the site selection and organization process.

If the pilot of the UH-1, who was the acting safety officer, had been included in the site selection process or planning for the use of the sites, he would have had the opportunity to express his concern about the hazardous approach and departure routes. The area was set up and functioning before the pilot saw it, and he saw it then only because he had a reason to fly there. He had assumed the area was set up as it had been when his unit used the same location several days before. When he arrived, the site was laid out differently, with tents blocking the best approach and departure paths. Since aircraft were already operating out of the area in this manner, the pilot chose to do the same.

No briefings had been conducted for the aviators concerning the area to familiarize them with its location and the hazards associated with it. The map the pilot was using did not have the wire hazards of the field site posted.

An environmental factor contributed to the failure of the crew to see the wires in time to miss them. The wires, through aging, had become rust colored. At the altitude being flown throughout the takeoff sequence, the rising, vegetation-covered terrain provided a rust-colored background for the wires, making them extremely difficult to see.

Evidence indicated that had the wire strike protection system been installed on the aircraft, it would have cut the wires and prevented the accident.

The helicopter was being flown by a single pilot from the left seat pilot station. While this had no significance in this accident and is not prohibited by the operator's manual, it does limit the pilot's ability to perform safely under other-than-normal conditions. The right pilot's seat was intended by the manufacturer to be the pilot's station and the cockpit area was designed to allow for natural and easy access to necessary switches and controls during all phases of flight, to include emergencies, if the pilot is seated at the right pilot's station during single-pilot operations. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (M series) Aircraft was on instrument training flight at night. Approximately 50 minutes after takeoff, pilot noticed that right cargo door had vibrated open about 2 feet. Fearing the door would separate from the aircraft, pilot cancelled IFR flight plan and began an approach to a nearby airfield. Aircraft was brought to an approximate 10-foot hover over the unlighted sod strip runway, which was covered with 4 to 6 inches of soft snow. As hover was stabilized, rotorwash began to blow the snow until pilot could no longer see the ground. Aircraft drifted to right rear and descended until right rear skid hit the ground. Pilot lowered collective full down. Aircraft landed hard and rolled inverted. 8417

UH-1 Class C mishap □ (H series) When IP turned hydraulic switch to off position during approach, master caution light would not reset. IP performed the hydraulic procedure again and reset master caution light. As approach continued, master caution light illuminated. While guarding the controls, IP tried to recycle hydraulic switch. Attempting to recycle the hydraulic switch, he turned the fuel switch to the off position, causing engine to stop. Aircraft landed in trees, damaging main and tail rotor blades, landing gear, and underside of aircraft.

UH-1 Class E mishaps □ (H series) Rpm limit light came on and rotor needle went to zero. Caused by sheared main rotor tachometer generator pin. □ (H series) High-pitched noise was heard from rotor area. Caused by defective main rotor mast assembly. □ (H series) Aircraft vibrated and oscillated during landing. Caused by defective hydraulic servo cylinder assembly. □ (M series) Fuel pressure fluctuated and crew heard loud squealing noise. Caused by failure of right fuel boost pump. □ (H series) Tail rotor chip detector light came on. Caused by defective 90-degree gearbox. □ (H series) Torquemeter gauge fluctuated during descent. Caused by failure of pressure transmitter.

UH-60 Class E mishap □ Main rotor tip path plane displayed uncommanded movements, including severe pitch vibration. Caused by blown fuse in stabilator amplifier.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**3**	**0**
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**13**	**13**

Attack helicopters

AH-1 Class E mishaps □ (S series) Howling sound was heard and No. 2 hydraulic light came on. Fluid had leaked out of No. 2 hydraulic system because of cracked "T" fitting. □ (S series) Crew smelled electrical fumes during hover. Master caution light and alternator and rectifier lights came on. Caused by failure of generator/alternator. □ (G series) As autorotation was entered during test flight, dual tachometer needles did not split. Torque remained at 5 psi. Postlanding inspection revealed transmission freewheeling unit did not disengage all the time.

Cargo helicopters

CH-47 Class E mishaps □ (B series) DCP trim actuator would not program in forward flight. Actuator was out of adjustment and could not be readjusted. □ (B series) Fuel was seen coming from engine fuel contol during maintenance operational check. Caused by malfunction of fuel control. □ (B series) Forward cyclic trim failed to retract from full forward position on final approach. Caused by failure of electroactuator.

Observation helicopters

OH-58 Class A mishap □ (A series) Aircraft was on a reconnaissance mission, hovering at 2 to 5 knots and 10 to 12 feet over a washed-out area. Pilot, flying from the right seat, noticed some loose communication wire on the floor of the washed-out area and brought aircraft to stable hover. As pilot and copilot diverted their attention to the wire, aircraft drifted left and descended. Main rotor blades hit large rock outcropping. The force of the rock strike jerked the transmission and rotor system from the aircraft and the fuselage fell to the ground. 8418

OH-58 Class C mishap □ (C series) Engine was being ground run after aircraft was modified from OH-58A to OH-58C. Pilot pulled power to 100 percent torque and was about to lower collective when engine disintegrated and caught fire. Mechanic on the outside of the aircraft sustained a cut to his head.

OH-58 Class E mishaps □ (A series) Engine tachometer read zero during takeoff. Caused by sheared N_2 tachometer generator drive shaft. □ (A series) Loud noise was heard from transmission area, followed by total loss of hydraulic pressure and illumination of hydraulic pressure light. All controls became extremely stiff. Running landing was made. Tube was cracked, causing loss of hydraulic fluid. □ (A series) During HIT check, pilot noticed slight hesitation in engine, followed by excessively high TOT reading. Caused by failure of third-stage compressor blade.

Fixed wing

C-12 Class D mishap □ (C series) Bird hit No. 1 engine propeller and outboard engine exhaust stub. Left wing deice boot was torn and exhaust stub was dented.

OV-1 Class E mishap □ (D series) Generator light came on. Caused by failure of regulator relay assembly.

T-42 Class E mishap □ Copilot saw fuel siphoning from right auxiliary fuel cap after takeoff. Fuel cap was not secured correctly during preflight inspection.

U-21 Class E mishaps □ (A series) When flaps were lowered to full down, all four panels appeared to be down, but flap motor circuit breaker popped. When pilot tried to raise flaps after resetting circuit breaker, right inboard flap came up, but the other three flap panels remained in full down position. Circuit breaker popped again. Split-flap landing was made. Flap actuator cable had pulled out from swage lock at actuator on right inboard flap, allowing flap to be blown back up by air pressure. Flap motor could not retract the other flaps because their actuators had bottomed out when flaps were extended. Suspect cable slipped when flaps were lowered. Right inboard flap, on which limit switch is located, apparently did not reach the full-down position, allowing flap motor to continue running and bind the other actuators. □ (G series) Left main gear light indicated unsafe. Tower personnel indicated all gear appeared to be down, and aircraft was landed. Caused by failure of left main gear microswitch.

Maintenance

UH-1 Class D mishap □ (H series) Hammer was found under No. 4 tail rotor drive shaft during preflight. Drive shaft was damaged. Aircraft had been worked on, inspected, and flown during hours of darkness.

UH-1 Class E mishaps □ (H series) Pilot noticed both airspeed indicators were not working during takeoff. When pitot tube was reinstalled after maintenance, airlines were connected in reverse order. □ (H series) Noise was heard from tail rotor drive shaft. No. 4 hanger bearing had been installed upside down, causing tail rotor drive shaft clamps to rub against drive shaft cover.

OH-58 Class D mishap □ (A series) Mechanic was attempting to determine the source of a high frequency vibration during runup with vibrex attached. As mechanic moved accelerometer in tail rotor area, a blade hit and severely lacerated his right index finger.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL36362 □ STACOM 98 □ 1 Feb 1984

The aviator's role in aircraft maintenance

We all know that aviators often declare their intention to write up aircraft or system deficiencies during flight but then sign off the flight on the 2408-13 as OK. These aviators either forget or are in a hurry to get home and find it easier and quicker to be less critical and declare the flight OK. The result is that maintenance deficiencies remain to be rediscovered by another flight crew and timely corrective action is delayed. Furthermore, delayed corrective action generally requires more effort and resources, thereby compounding the maintenance problem.

Of equal impact on the state of aircraft maintenance is the aviator who accepts an aircraft for flight that should rightfully be grounded. Mission orientation should not be so pervasive within a unit as to compel an aviator to accept maintenance that he knows to be substandard. Mission, supervisory, or peer pressure should not be the motivating factor that compels an aviator to accept an aircraft with suspected excessive tolerances or similar deficiencies without having the condition checked by a technical inspector.

When acceptance of substandard performance becomes commonplace and unit aviators develop such a permissive attitude, it soon becomes known to the lowest element on the maintenance totem pole. At this point, it does not take a doctor of psychology to tell us that the individual "who takes his turn on the duty roster, meets a board or two, attends various meetings and lectures, takes his PT every day, and, when available for his primary duty, is often responsible for the maintenance of two aircraft" takes the path of least resistance and puts off necessary maintenance because he is pushed for time and knows that the aircraft will be accepted in its present condition. The hard-working maintenance supervisor is in a position to reverse the situation—and often does. However, what are his options when he is located at the tail end of the supply chain and is faced with an arbitrary or unrealistic aircraft-in-commission rate because of mission commitments? Faced with a maximum maintenance effort and a shortage of skilled personnel, he, too, may succumb to the pressure and be drawn into this vicious cycle.

Who, then, can reverse this situation? You, Mr. Peter Pilot, by requiring equipment to be maintained by the book and up-to-book standards before accepting an aircraft for flight. In too many instances you have not been informed of your responsibilities to Army aviation and your authority in meeting those responsibilities.

In a nutshell, the maintenance you accept is the maintenance you are going to get. Since it is your mission to be above the best, why not be there with the best? ■

Wind awareness

During recent months, the Army-wide mishap rate has risen quite sharply. The causes seem to vary in complexity from simple pilot error to a wide variety of maintenance, training, and standardization-related areas. One general correlating factor in most OH-58 (loss of tail rotor effectiveness) mishaps and a good number of mishaps involving other aircraft, is the general lack of aviator proficiency in the tactical environment to determine wind speeds and direction. Wind effects on the safe operation of rotary wing aircraft do not seem to receive the same amount of attention as when we flew less powerful machines.

During recent field surveys to Korea, Hawaii, and CONUS, that lack of awareness was quite apparent. When asked about wind direction and velocity, very few aviators could "read the terrain" and make an intelligent decision. Most relied on previously reported winds from their respective basefields. Basic skills such as reading ponds, smoke, dust, deciduous trees, grass, etc., have eroded to the point of nonexistence. Coupled with this lack of the basic skill in determining wind direction and velocity, there is a general disregard for wind direction and the effect terrain has on wind and, thus, on the aircraft operating tactically. It is an accepted fact that due to design inadequacies in the OH-58, the effects of windspeed, gusts, and direction are very critical and, therefore, one of the foremost things in an aviator's mind should be the wind direction and velocity in relation to the nose of his aircraft. Inadvertent aircraft flight in excessive cross- and downwind conditions has proven to be extremely dangerous and a tremendous detriment to mission accomplishment.

Losses of aircraft and aircrews due to needless and unsafe operations can no longer be tolerated. Commanders should take immediate steps to insure their aviators are aware of the winds and the resultant effect on aircraft performance.

FM 1-202, chapter 4, is a good starting point to insure you are trained in wind awareness. The February or March 1984 issue of the **Army Aviation Digest** will carry an article on "Wind Observations, Capabilities and Limitations."

Know and stay within your limitations.

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-7174 during duty hours; 558-6487 after duty hours.

Aviation mishap prevention forum

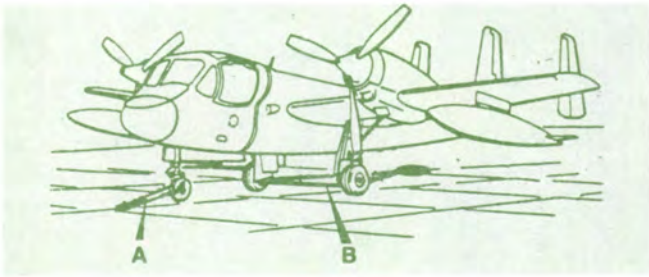
Attention Mohawk users

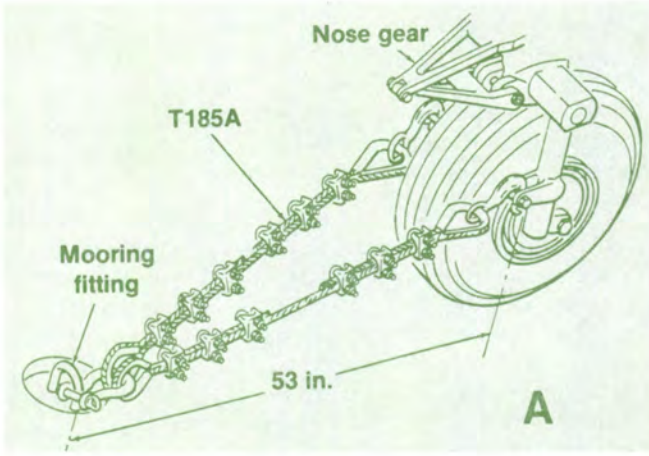
A recent OV-1D Class C mishap cost $61,000. During a run and rig check, both engines were brought up to 85 percent N_1. The No. 2 engine power lever was retarded to ground idle and then to reverse. As N_1 increased on the No. 2 engine, the nose of the aircraft yawed slowly right with the nose wheel lifting off the ground 2 to 3 inches. The No. 2 engine power lever was immediately moved to ground idle and the nose wheel struck the ground while moving to the right. The aircraft came to rest nose low as the nose gear failed. Both engines were secured and the operator exited the aircraft. The landing gear nose strut cracked and failed.

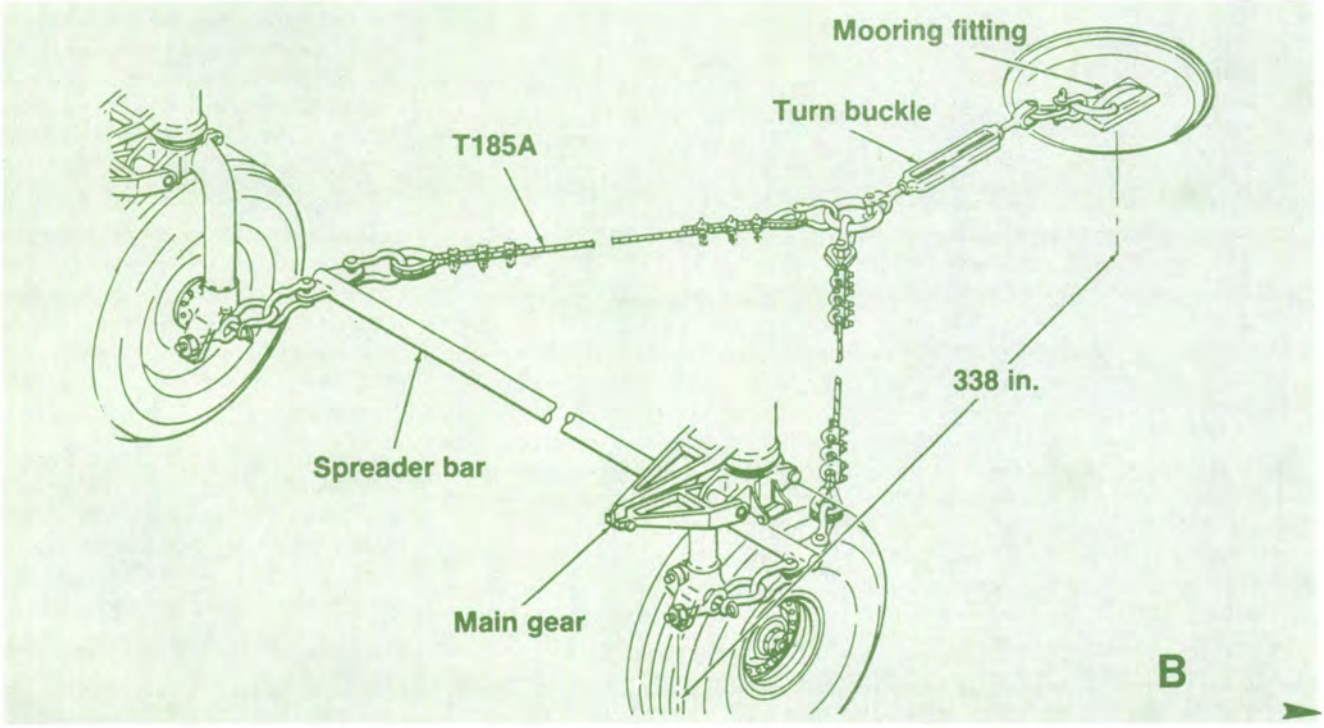
The operator did not adhere to the following caution in TM 55-1510-213-23-1:

Caution—Engine ground operations above FLIGHT IDLE power may cause damage and subsequent failure of the nose gear assembly unless aircraft is tied down for engine runup (refer to paragraph 1-102).

Many OV/RV runup ramps do not have the required mooring ramp fittings installed. Therefore, the special tiedown assemblies are not being used. When mooring fittings are installed in the runup ramp, check your TM 55-1510-213-23-1 for the ultimate load ratings of these fittings.







Aviation mishap prevention forum

Answers to last week's questions

1. A flashlight is required on board all aircraft during day, night, and IMC flights. True or false? False. A flashlight is required only for night flights. **AR 95-1, with Change 1, page 4-5, table 4-2**

2. May cotter pins be reused if they are visibily serviceable when removed? No! Cotter pins to be installed shall be new. Removal for any reason necessitates replacement of the cotter pin. **TM 55-1500-204-25/1, page 3-50B, par. 3-180**

3. In which direction will cotter pin heads be pointed on rotating parts such as rotor heads, propellers, and the like? Install cotter pins in rotating parts such as propellers, rotor heads, and the like with head in direction of rotation. **TM 55-1500-204-25/1, page 3-51, par. 3-180**

4. The FOD prevention officer is only a battalion-level position. True or false? False. The unit, section, or detachment FOD prevention officer will be designated in writing. This task may be assigned as an additional duty to a unit officer other than the ASO. The FOD prevention officer will delegate specific areas of responsibility (such as hangar, shop, parking area, runup area, wash rack, and ramp) to appropriate unit personnel. The FOD prevention officer will also conduct frequent inspections to insure the activity FOD program is viable and working. **AR 385-95, with Change 1, pages 4-1 and 4-2, par. 4-6**

Questions for aviation personnel

1. What is the primary purpose of maintaining aircraft historical records? **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures**

2. What are the four main reasons for replacing electrical wires? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

3. What field manual requires that aviators performing maintenance test flights must be qualified and current in mission, type, design, and series group of the aircraft for which the test flight is conducted? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. How many fire extinguishers are required for the FARE system? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

5. If a driver of a tank vehicle has not been trained in aircraft refueling operations, who is responsible for establishing and maintaining a safety program for the tank vehicle operators? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

PRAMs—just a reminder

- If mission is completed after a weather delay, PRAM is not required.
- If chip detector lights come on but no component is changed, PRAM is not required.
- Furnish name, rank, and duty position of mission briefer in paragraph 9e of PRAMs on Class A, B, and C mishaps.
- In supplemental PRAMs, include results of hot end inspections and ECOD, along with paragraphs 1 through 5.
- Use aircraft prefix (if applicable) for AH-1S, i.e., MAH-1S, PAH-1S, EAH-1S, FAH-1S.
- POC at the Safety Center on PRAMs is Mr. Naumann, AUTOVON 558-2001.

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Attitude Control (no-cost safety)

Today, state-of-the-art risk management in the services is the result of an enormous amount of flight technology gathered from the sciences of engineering, human factors, communication, and navigation, just to name a few. We hear of the high costs of technology almost every day. But whatever the cost of state-of-the-art technology, it is of no value without aircrew judgment. Mature and objective judgment for making decisions in flight is an essential element of airmanship.

What controls aircrew judgment? **Attitude.** This article offers specific examples of attitude control (no-cost safety) we aviators can understand. Investigations of thousands of military and civilian mishaps, caused by aircrews of all experience levels, have identified three deadly areas of attitude deterioration and subsequent aircrew vulnerability. Recognizing these factors may save your life.

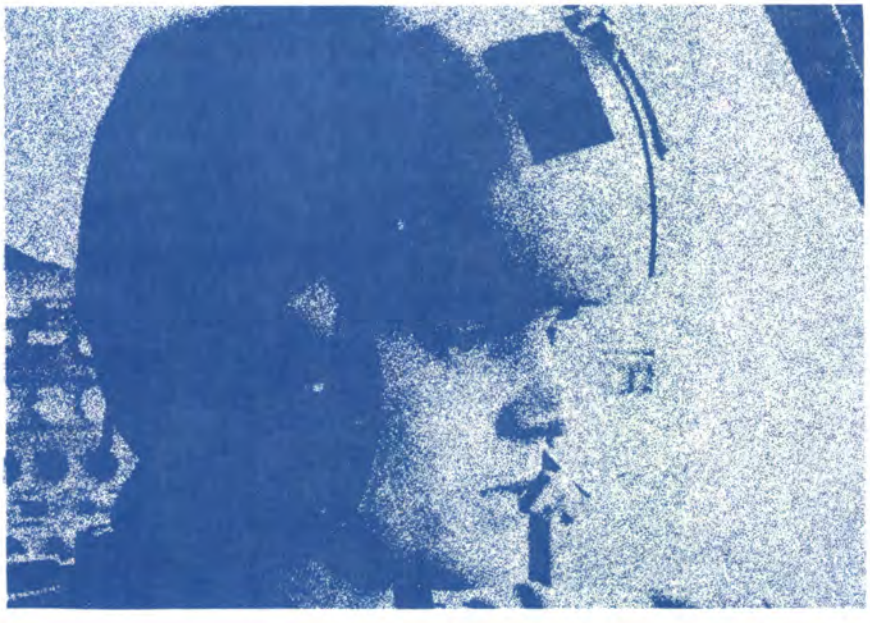
The first attitude killer is the **loss of discipline** during flight operations. Examples of loss of discipline, commonly called complacency, are disregarding tech manuals, operator's manuals, and regulations or just having a general apathetic attitude when it comes to the business of flying. Loss of discipline occurs in all areas of human endeavor from bull riding to the practice of medicine. Seldom, however, is lack of discipline as deadly as in flight operations. How do we maintain the discipline required for flight? Some ways to maintain discipline are controlling thoughts (self-discipline), relying on precise flight planning, using the tech data, and conducting intensive self-study of flight rules and regulations. This preparation makes decision-making easier when a critical flight situation develops.

The second factor affecting attitude is **psychological stress.** All aircrewmembers deal with the pressures of making decisions. Some of us do not realize the impact of peer or supervisor pressure on our flight decisions. The best way we can deal with this psychological stress is to set our own operational minimums. While on the ground, we can try to imagine every critical situation we might face before or during flight and the best response to that situation. Then pressure from others can be handled through that strength of character known as backbone. This means knowing our limitations while standing up for our convictions.

The third attitude factor in mishaps is **emotional instability**. A short-term condition can produce an unstable mental condition in an otherwise solid individual. Facing promotion, divorce, a new child, a lengthy TDY or PCS move can cause emotional instability. Most of these major life events cannot be avoided by any of us. So when we begin to feel the pressures of these events, we should communicate with someone who can help. Talking to a supervisor, peer, flight surgeon, chaplain, our family, or just a good friend may help.

The wise aviator realizes that these attitude factors of discipline, stress, and emotional instability can have a disastrous effect on our decision-making in flight. Just as we aircrews are dependent on sophisticated technology in today's aircraft, flight safety is dependent on our attitude. Although attitude costs nothing, it's worth a lot when it comes to preventing mishaps. ■

—adapted from an article by Major J.L. Nelson in TAC ATTACK



Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (V series) Crew heard loud noise during takeoff. Greenhouse had cracked because of cold weather and changing temperatures. □ (H series) During airmobile operation, soldier used small crew door as support, breaking the hinges. □ (H series) Aircraft was landed on ramp to offload passengers. Crew chief slipped and fell on snow-covered ramp. His flight helmet hit glide slope antenna as he fell, breaking antenna.

UH-1 Class E mishaps □ (H series) Master caution and transmission oil hot lights came on. Caused by faulty transmission oil temperature sending unit. □ (H series) As crew chief was loading troops into helicopter, he saw a jeep approaching aircraft from the rear. He asked the driver to stop and remain clear of aircraft until aircraft had departed. Driver ignored the warning and tried to drive around aircraft. Main rotor blade hit jeep antenna, chipping paint on blade. □ (H series) Lateral vibration in flight was caused by failure of transmission mounts. □ (H series) Sparks and smoke were seen coming from under instrument panel during landing. Caused by failure of main inverter. □ (H series) Master caution and transmission oil hot lights came on. Caused by failure of thermostatic switch.

UH-60 Class D mishap □ Main rotor blade tips hit tree branch during right turn. Blade tips were replaced.

UH-60 Class A mishap reported in 9 November 1983 issue as 8408 has been downgraded to Class B.

Attack helicopters

AH-1 Class C mishap □ (S series) IP was flying from the front seat and pilot was navigating from the back seat on NOE training flight. Aircraft hit three power cables. Control was maintained and aircraft was landed. Main rotor blades, front pylon cowling, and gunner's canopy were damaged.

AH-1 Class E mishaps □ (S series) Smoke and fumes filled cockpit during NOE flight. Pilot's and copilot's seats became extremely hot. Caused by failure of environmental control unit. □ (S series) Gunner's torque indicator went to 0 percent during landing. Caused by failure of torque transducer. □ (S series) Master caution and engine chip detector lights came on. Caused by shorted wire.

Cargo helicopters

CH-47 Class E mishaps □ (B series) Flight engineer told pilot that hydraulic fluid was leaking from flight boost manifold. Caused by leak in hydraulic line. □ (B series) No. 1 engine oil pressure went to 120 psi during hover. Caused by failure of pressure transmitter. □ (B series) No. 1 engine oil low light came on. Caused by water in cannon plug.

CH-54 Class E mishaps □ (A series) IP initiated simulated engine failure at altitude by retarding N_1 lever to ground idle position. During power recovery, N_1 increased to only 64 percent when throttle was placed in full open position. Caused by failure of fuel control. □ (A series) Flight engineer saw hydraulic fluid leaking from hoist. Hoist stopped working with 40 feet of cable extended. Jam nut had backed off from engine start line, causing hydraulic leak.

Observation helicopters

OH-6 Class E mishap □ Fuel filter light came on during flight. Caused by failure of pressure switch.

OH-58 Class E mishaps □ (A series) Control stiffness in flight was caused by failure of swashplate assembly. □ (A series) Aircraft took off from hot refueling point with grounding wire looped around skid tube. Aircraft jerked nose down and grounding wire broke. □ (A series) Master caution and fuel boost lights came on. Fuel boost circuit breaker popped and would not reset. Caused by failure of fuel boost pump.

Fixed wing

C-7 Class E mishaps □ Right engine stopped firing during taxi for takeoff. Caused by failure of right magneto. □ While lining up for runup check, pilot lost nose wheel steering and noticed loss of hydraulic pressure, followed by activation of hydraulic low pressure lights. Caused by failure of nose wheel steering actuator hose.

U-8 Class E mishap □ (F series) No. 2 engine cylinder head temperature fell to outside air temperature during descent for landing. Caused by cracked cylinder head.

OV-1 Class E mishaps □ (RV-1D) When landing gear handle was placed in up position after takeoff, gear indicators continued to show down and locked. Aircraft was landed without incident after low pass by tower. Failure of control valve allowed high pressure air from emergency gear extension system to leak into landing gear actuators, locking the gear down. □ (D series) During shutdown, propeller control auxiliary hydro pump would not shut off without turning off battery. Caused by malfunction of propeller blade switch.

C-12 Class E mishap □ (C series) As aircraft was flying in light icing conditions, crew and passengers heard unusual noise. ADF antenna lead had broken at quick disconnect, causing antenna wire to slap against fuselage.

U-21 Class E mishaps □ (A series) Left engine lost oil pressure and torque fluctuated during flight. Caused by ruptured O-ring in engine oil pump. □ (G series) Left main gear light indicated unsafe. Tower personnel indicated all gear appeared to be down and aircraft was landed. Caused by failure of left main gear microswitch.

Maintenance

UH-1 Class E mishaps □ (H series) Fire light came on during flight. Left outer fire element cannon plug was loose and right plug was dirty. □ (V series) Transmission oil pressure low light came on and pressure dropped. Caused by loose fitting on oil line.

AH-1 Class E mishap □ (S series) Fuel gauge fluctuated from 900 pounds to 0. Caused by loose wire.

CH-47 Class E mishap □ (B series) Aircraft shuddered and moved sideways after landing. Caused by imbalanced SAS.

OH-58 Class E mishaps □ (C series) Engine oil pressure and torque dropped to zero. Oil sample bottle cap was found in engine oil reservoir. □ (A series) Crew chief had tower operator call crew and tell them that crew chief thought transmission oil filler cap had been left off. Aircraft was landed, and it was confirmed that cap was off.

Messages received

• Safety-of-flight maintenance mandatory message concerning one-time inspection of UH-60 main rotor shaft (UH-60A-84-01, 192015Z Jan 84). Summary: Inspection of a UH-60 main rotor shaft revealed a flaw about 1 inch above the upper bearing journal. Laboratory examination indicated the flaw may have occurred during the heat treatment operation in the manufacturing process. Flight operation did not cause the flaw to increase in size or affect the serviceability of the shaft. To assure no other suspect main rotor shafts exist, an inspection will be conducted by factory teams following aircraft and records checks by field units. Contact: Lyell Myers, AVSCOM, AUTOVON 693-3300, commercial 314-263-3300.

• Maintenance information message concerning cancellation of an earlier message on the UH-1 collective lever bearings (MIM-UH-1-84-MEM-02, 171530Z Jan 84).

• Maintenance information messasge concerning several maintenance revisions and notices for the AH-1 (MIM-AH-1-MEM-84-02, 201600Z Jan 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	1-8 Feb	**1**	**4**
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**15**	**17**

Aviation mishap prevention forum

Night flying

Check out FM 1-204, Night Flight Techniques and Procedures. This FM is intended to serve as a reference for night vision, night flight, and night vision devices training. This sole-source document on night flight supersedes the following publications: TC 1-27, dated 30 September 1977; TC 1-29, dated 30 April 1976; TC 1-30, dated 30 September 1976; TC 1-31, dated 28 February 1977; TC 1-32, dated 30 June 1977; and TC 1-33, dated 29 August 1977. ■

Welding safety

Is your welding torch set an accident waiting to happen? It could be if you don't have check valves installed, or if your oxygen cylinder is overdue for inspection.

Check valves let gas flow only one way. If you get a flashback, the valve keeps the flame out of the regulator.

You get two valves with your torch set. The oxygen check valve, NSN 4820-00-828-7190, has right-hand threads. The acetylene valve, NSN 4820-00-828-7192, has left-hand threads—and is marked with a groove cut in the wrenching surface.

Your oxygen cylinder is due a pressure check every 5 years. You can tell if your cylinder is due by checking the last date stamped on the neck of the cylinder. If your cylinder is due, send it in for a check. Write "due pressure check" on the DA Form 2407.

You don't have to do this for the acetylene cylinder. It's checked every time it's filled. ■

—from PS, Issue 374

Loose caps

Beechcraft aviators, check your fuel and oil caps for security before you take off on a flight. Fuel and oil siphoning in flight continues to plague the C-12, U-21, and T-42 fleet. ■

Answers to last week's questions

1. What is the primary purpose of maintaining aircraft historical records? So that a component will not be continued in use beyond its predetermined maximum safe life span. **TM 55-1500-328-25, page 4-9, par. 4-8(a)**

2. What are the four main reasons for replacing electrical wires?

- Outer insulation burned or deteriorated.

- Metallic outer shield damaged or separated.
- Inner insulation swollen or blistered.
- Bare, kinked, brushed, or damaged. **TM 55-1500-204-25/1, page 3-114, par. 3-291**

3. What field manual requires that aviators performing maintenance test flights must be qualified and current in mission, type, design, and series group of the aircraft for which the test flight is conducted? FM 55-44. **AR 95-1, with Change 1, page 2-7, par. 2-21**

4. How many fire extinguishers are required for the FARE system? Three—one within reach of the pump operator and one for each nozzle. **FM 10-68, page 7-2, par. 7-2**

5. If a driver of a tank vehicle has not been trained in aircraft refueling operations, who is responsible for establishing and maintaining a safety program for the tank vehicle operators? The unit commander. **FM 10-68, page 8-12, par. 8-8** ■

Questions for aviation personnel

1. Alcohol impairs coordination, judgment, and night vision. True or false? **Reference: FM 1-204, Night Flight Techniques and Procedures**

2. An anticollision light system must be installed and operating on aircraft during what types of flight? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

3. A pitot heater must be installed and operating on aircraft during what types of flight? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. When refueling from a tank vehicle, how many people are required? **Reference: FM 10-68, with Change 3, Aircraft Refueling.** ■

New aircraft mishap report forms

Effective 1 October 1983, aviation safety officers and investigation board members were required to begin using the new DA Form 2397-R series. The format, different in many respects from the old 2397 series, has been changed to eliminate information which is not needed and to provide safety professionals, analysts, and commanders with some additional information they need. The retrieval process will also be simplified. The number of forms in the series has been reduced from 23 to 15.

Reports received at the Army Safety Center indicate users are still having some problems with the new forms. Guidance for using the report forms is found in DA Pam 385-95, Aircraft Accident Investigation and Reporting. Following is some additional guidance.

DA Form 2397-1-R

Block 1 - Use the mishap classification in chapter 5, AR 385-40. Classification parameters were changed by Interim Change I01, dated 21 December 1983, to AR 385-40.

Block 2 - New requirement. Select up to three events from 63 listed in Appendix G, DA Pam 385-95, for coding into the data bank. Permits quick retrieval of specific type mishaps.

Block 5 - Deletes distance and direction to nearest military installation. New requirement for grid coordinates in block 7a and city, state, and country in block 7b.

Block 9 - Adds unit identification code of the organization/chain of command deemed most responsible/capable of taking corrective action. Used for assigning mishap responsibility, tracking recommendations, qualifying for awards, etc.

Block 10a - Include injury cost in estimated cost by using table E-1, AR 385-40.

Block 10b - Completed only for mishaps involving more than one aircraft. Consult DA Pam 385-95 before completing.

Block 15 - Report fuel on board at takeoff, time of emergency, and termination. Requirement for amount of oil on board is deleted.

Block 19f - Pertains only to the "case aircraft" defined in par. 8-5, DA Pam 385-95. A complete DA Form 2397-1-R will be filled out for the aircraft and crew deemed most responsible for the mishap. Additional forms on other aircraft involved will not duplicate information shown on the case aircraft form.

Block 20 - Retains numbers identifying the characteristics of crash site terrain but groups them into four definitive headings.

Block 21 - Adds requirement for altitude agl.

Block 22 - Some subheadings, e.g., maintenance, have been eliminated. A definite or suspected maintenance factor should be shown in the appropriate personnel block, i.e., flight crew, ground crew, supervisory or other.

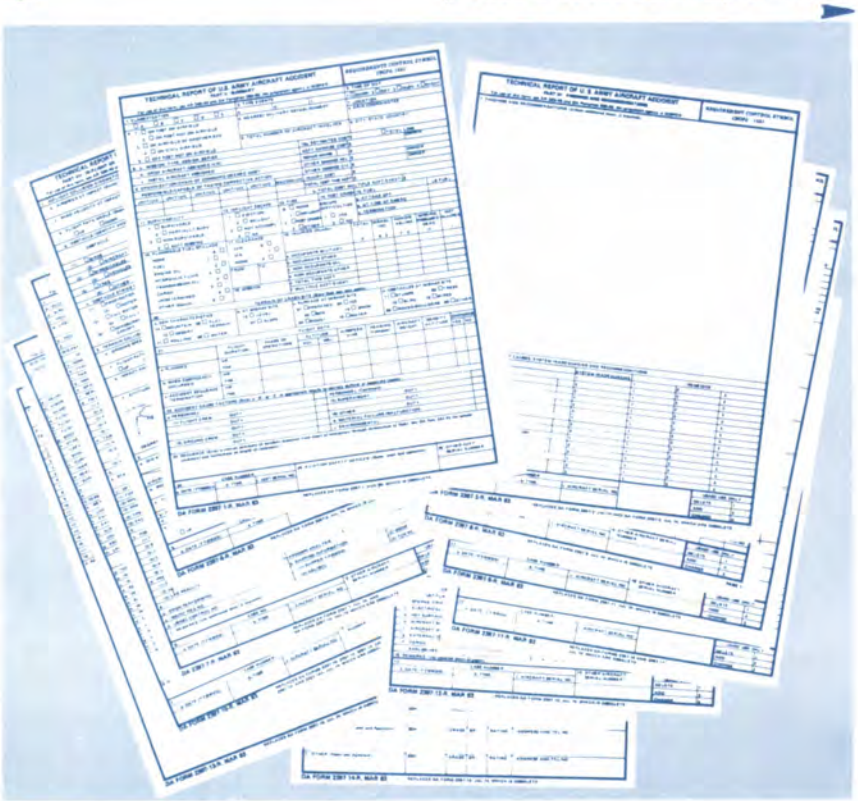
Block 26 - See par. 8-5, DA Pam 385-95, before completing. Used only when multiple aircraft are involved.

Block for personnel involved has been deleted. A 2397-8-R will be completed for all personnel identified in par. 8-12a, DA Pam 385-95.

DA Form 2397-2-R

Block 1 - Each finding will be followed by recommendations to correct or eliminate the system inadequacy, error, materiel failure, or environmental factor which caused the mishap.

Block 2 - New reporting requirement to provide a coded summary of mishap



New aircraft mishap report forms

causes, system inadequacies, and recommendations for data processing. Findings on 2397-2-R and analysis on 2397-3-R must support entries in this block. See pages 8-14 and 15, DA Pam 385-95, for list of mishap cause factors, system inadequacies, and remedial measures. Human-factor-oriented information previously reported on the old 2397-9 is now reported on the 2397-2-R.

DA Form 2397-6-R

Block 1 - Covers in-flight collision kinematics at instant of impact. Use actual figure in place of a range for airspeed, wind velocity, flight path angle, and vertical speed, e.g., airspeed of 105K is reported as 105K, not a range of 90-120.

Block 1j(5) - Answer yes or no as to whether wire protection system was installed.

Block 4 - Impact forces relative to aircraft axes (G's) space is provided for vertical, longitudinal, and lateral G's.

DA Form 2397-7-R

Block 2 - Eliminates secondary cause role and the space for listing technical publications. If a publication contributed to the mishap, identify it in finding and recommendations on 2397-2-R. The finding should be consistent with the coded summary of mishap cause factors in block 2 of 2397-2-R and be fully substantiated in the analysis part of 2397-3-R.

DA Form 2397-8-R

Eliminates many items of personal data, e.g., information on smoking. New requirements on rated crewmembers, e.g., NVG qualification and ATM task involved. Block 7 is added for maintenance and support personnel. The 2397-8-R form will be completed on all involved personnel identified in par. 8-12a of DA Pam 385-95.

DA Form 2397-9-R

Medical information previously reported on the 2397-11 is now reported on the 2397-9-R. The new form will be completed by the flight surgeon.

DA Form 2397-10-R

Reformatted to include information previously reported on other forms. The personnel protective field data has been reduced, eliminating information required on shirt, trousers, underwear, socks, life preserver, and oxygen mask. Evacuation/escape information previously reported on the 2397-12 is now in block 3. Survival/rescue information previously reported on the 2397-14 and 2397-14A is now reported in blocks 4 and 5.

DA Form 2397-11-R

Report weather data previously reported on the 2397-16.

DA Form 2397-12-R

Report fire data previously reported on the 2397-15.

DA Form 2397-13-R

Basically the same information previously reported on the 2397-18.

DA Form 2397-14-R

Basically the same information previously reported on the 2397-19. Also provides space for listing the names of the board members.

A new and expanded PRAM format will soon be available to meet the new reporting requirements. ■

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Accident review: T-42 training flight

Synopsis

As the T-42A was about 200 feet above the ground on final approach, the instructor pilot failed the No. 1 engine. About 5 feet above the ground, the pilot tried to extend the approach. Airspeed slowed below the velocity for minimum control, and the aircraft yawed left, went off the runway, and hit a dirt bank.

History of flight

An instructor pilot and rated student pilot were on a T-42A refresher training mission. After approximately 1 hour and 15 minutes of upper airwork, the crew returned to the airfield to complete the training in closed traffic.

As the aircraft was approaching the runway, about 200 feet above the ground, the IP failed the No. 1 engine by closing the engine mixture lever, requiring the pilot to make a single-engine landing. Airspeed was 120 knots, gear and flaps were down, and the No. 1 propeller was windmilling in the high rpm position. Up to this point, indications were that the approach would be completed with no problems.

About 5 feet above the ground, the aircraft started drifing left of the centerline. The pilot raised the nose of the aircraft slightly and added power to the No. 2 engine in an attempt to realign the aircraft with the runway centerline and to land beyond an arresting cable which crossed the approach end of the runway. The IP told the pilot to continue the landing and not to worry about the cable.

The aircraft continued to drift further toward the left edge of the runway. Airspeed slowed to 60 knots, and the aircraft began a slow roll to the left, leaving the runway at a 45-degree angle. The left wing tip scraped the ground about 185 feet from where the aircraft left the runway. The aircraft then hit a dirt bank about 5 feet high. The landing gear collapsed, causing extensive damage to the nose section. The aircraft bounced into the air, hit the ground, became airborne again, and crashed in a nose-down attitude.

Both pilots remained in the aircraft even though their seats separated from the attachment fittings on the floor. The pilot received minor injuries and the IP was not injured.

Crewmember experience

The 38-year-old IP had more than 600 fixed wing hours, with more than 500 in the T-42. The 37-year-old pilot had more than 350 fixed wing hours, all in the T-42.

Commentary

The pilot allowed the aircraft to drift off the runway because he did not compensate for the combination of an engine failure and a crosswind condition. He had flown the T-42 for only 4 hours in the previous 90-day period because he had been medically restricted from flying. Although it had nothing to do with his medical restriction, the pilot was on a self-imposed weight reduction and exercise program, which resulted in a mildly hypoglycemic condition that may have affected his performance.

The IP allowed the pilot to slow the aircraft to a speed below the velocity for minimum control and veer to the left off the runway. The IP should have taken corrective action when the pilot added power and raised the nose of the aircraft. He did not take corrective action because he was overconfident in the pilot's ability to control the aircraft and his own ability to regain control. ■

Followups

Additional information on mishap briefs previously published

Utility helicopters

UH-1 Class A mishap in 30 Mar 83 issue (8313) ☐ Downgraded to Class B. Aircraft hit two wires during takeoff from tactical field site. Pilot made left, descending turn to land in an open area. At an altitude of about 3 feet, control was lost and aircraft crashed and rolled inverted. The site was laid out in such a manner that aircraft were forced to take off over known wire hazards and steeply rising terrain. The pilot was not briefed on the hazards in the area.

UH-1 Class A mishap in 18 May 83 issue (8325) ☐ Aircraft entered uncommanded spin to right during termination of approach to mountain pinnacle. Pilot applied full left antitorque pedal to try to stop the turn. When recovery was not accomplished, pilot reduced throttle and entered autorotation. Aircraft hit the ground and came to rest inverted. The most probable cause of the uncommanded spin has been determined to be a disconnect in the antitorque control linkages between the cockpit and tail rotor control cable quadrant. This disconnect was caused by either a materiel failure in one of the components or failure to properly reinstall and connect a component during phase maintenance performed 20 flying hours earlier.

UH-1 Class A mishap in 1 Jun 83 issue (8330) ☐ Pilot allowed aircraft to yaw left during standard autorotation to sod touchdown area. As aircraft touched down in left yaw condition, right skid shoe dug into the sod. Pilot increased collective pitch and added full right pedal. Aircraft became airborne again, yawed further left, crashed, and came to rest on right side. IP was late with corrective action.

Attack helicopters

AH-1 Class A mishap in 11 May 83 issue (8323) ☐ IP and pilot were on night vision goggle training mission. IP, while operating the radios and flying the aircraft from the rear seat, allowed the aircraft to descend into trees and crash. Pilot was not helping to maintain obstacle clearance. He had just completed a high stress period at the controls and mentally relaxed when the IP took over. IP did not tell the pilot he was going to tune the radios.

Cargo helicopters

CH-47 Class B mishap in 15 Jun 83 issue (8334) ☐ Maintenance test pilot and copilot, while ground taxiing at night, noticed forward rotor blades suddenly dipping toward the ground. Excessive aft cyclic was applied and the aft end of the fuselage hit the ground with enough force to cause substantial damage to the aircraft. Aircraft was being flown with a cyclic-out-of-rig condition, which

8330

8323

had existed for about a week. Pilot disregarded the condition in his haste to complete the maintenance requirements. The out-of-rig condition was not corrected because supervisory maintenance personnel did not insure the procedures outlined in TM 55-1520-227-23-5 were followed which require a neutral rig check after adjustments to the flight controls. The out-of-rig condition and the pilot's incorrect flight control inputs resulted in the mishap.

Observation helicopters

OH-58 Class A mishap in 20 Apr 83 issue (8318) ☐ Aircraft, being operated within all specified performance criteria listed in the operator's manual, lost tail rotor effectiveness. Although the pilot properly executed the emergency procedure for loss of tail rotor effectiveness, the nap-of-the-earth altitude at which he was operating was too low to permit recovery before the aircraft hit trees and crashed.

OH-58 Class A mishap in 20 Apr 83 issue (8319) ☐ Pilot, operating the aircraft at an altitude of 5 to 10 feet above the trees and an airspeed of about 25 knots, allowed his tail rotor to hit the top of a tree. Antitorque control was lost. Aircraft descended in uncontrollable spin and crashed. After hitting the tree, pilot did not follow the proper procedure for loss of tail rotor control. He failed to reduce collective pitch and autorotate until after he became disoriented.

8332

8321

8319

OH-58 Class A mishap in 27 Apr 83 issue (8321) ☐ Copilot was operating the aircraft in a terrain flight mode, with a known tailwind condition. He allowed forward airspeed to decrease below effective translational lift, and the aircraft began an uncommanded turn to the right. The copilot correctly analyzed the emergency but had insufficient altitude to completely recover control of the aircraft before the tail rotor hit the ground. The pilot was concentrating on tactical navigation instead of dividing his attention between navigating tasks and supervising the copilot's action.

OH-58 Class A mishap in 18 May 83 issue (8326) ☐ Aircraft was being flown about 50 feet agl and 30 knots. Although pilot was operating the aircraft within allowable limitations as outlined in the operator's manual, he entered a flight regime conducive to loss of tail rotor effectiveness. Aircraft began an uncommanded turn to the right, which developed into a spin. Although the pilot correctly executed the emergency procedure for loss of tail rotor effectiveness, the altitude at which he was operating was too low to permit recovery before the aircraft hit trees and crashed.

OH-58 Class A mishap in 8 Jun 83 issue (8332) ☐ While pilot was trying to hover rearward from the crest of a hill, aircraft yawed slightly to right. Left skid hit ground and aircraft rolled to left. Main rotor blades hit ground and main transmission assembly separated from aircraft. Aircraft came to rest on left side. Pilot misjudged the height of the helicopter over the rough, sloping terrain. The pilot was confident that he could hover the aircraft rearward without a clearing turn or assistance from the copilot. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishap □ (H series) Pilot felt shudder in airframe and through the cyclic and heard loud bang from rear of aircraft. As pilot began a deceleration and added collective about 100 feet agl, aircraft yawed to right. Pilot realized he had a tail rotor malfunction and applied forward cyclic to try to streamline the aircraft. Right turn continued. Pilot closed the throttle and autorotated from 15 to 20 feet. Aircraft touched down in muddy field, spreading cross tubes. Suspect seizure of No. 3 hanger bearing.

UH-1 Class D mishaps □ (V series) During preflight, maintenance officer stopped to discuss fuel boost light problem with another maintenance officer. Copilot continued to preflight by checklist. Copilot opened vertical fin, inspected drive shaft, and closed cowling, apparently failing to secure it. Maintenance officer then inspected tail rotor but did not notice that cover was unsecure. Neither maintenance officer, copilot, nor crew chief noticed unsecure cover during final walk-around inspection before flight. After flight was completed, cover was found open and damaged. □ (H series) Main rotor blade hit tree during takeoff from confined area. Blade was damaged.

UH-1 Class E mishaps □ (H series) Fire warning light came on during hover. Caused by defective fire alarm control box. □ (H series) N_2 tachometer needle dropped to zero during landing. Caused by failure of tachometer generator drive shaft. □ (H series) Master caution and hydraulic pressure lights came on during takeoff. Caused by failure of hydraulic pressure switch. □ (H series) Engine oil pressure gauge and torquemeter dropped to zero, and engine oil temperature rose. Caused by failure of quick disconnect. □ (H series) Master caution and transmission oil lights came on. Caused by failure of transmission oil filter gasket.

UH-60 Class A mishap □ Two UH-60s were transporting troops. Weather briefing indicated weather along the flight route would be VMC. After 20 minutes of flight, weather began to deteriorate. Crews were forced to fly low level through valleys and over rising terrain. As weather continued to deteriorate, the second aircraft dropped back about 100 meters behind lead aircraft. Flight leader moved forward to try to find a route through the fog. Crew of second aircraft tried unsuccessfully to make radio contact with lead aircraft and reversed course down the valley to a point where they were able to cross into another valley and proceed to destination. While crew of lead aircraft was trying to transition to instrument flight, main rotor blades hit large dead tree on rising terrain. Aircraft rolled over and crashed almost inverted. Of the 10 people on board, 4 were killed and 4 sustained major injuries. 8419

Attack helicopters

AH-1 Class D mishaps □ (S series) Tail rotor blades hit tree during night vision goggles mission. Blades were damaged beyond repair. □ (S series) Aircraft was hovering along an abandoned railroad bed. A single row of trees was to the right side of the aircraft and numerous poles were along the left side of the aircraft. Both crewmembers were looking to the left when main rotor blades either hit tree branches or were struck by objects from brush and wood piles.

AH-1 Class E mishaps □ (S series) Pilot's and gunner's airspeed indicators became inoperative during flight. Baggage stored behind pilot's seat broke two airline couplings. □ (S series) Low rpm audio sounded and rotor tachometer needles fell to zero. Caused by failure of rotor tachometer generator. □ (S series) Rotor and engine N_2 needle failed to split when throttle was reduced to flight idle during simulated engine failure. Caused by failure of main input quill assembly.

Cargo helicopters

CH-47 Class E mishaps □ (B series) No. 2 engine fire light came on during landing. Caused by failure of fire detection element. □ (B series) No. 1 engine

(continued on back page)

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	1-15 Feb	**3**	**4**
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**17**	**17**

Aviation mishap prevention forum

Common misconceptions

If it is necessary to clear obstructions immediately after takeoff, should you use best angle-of-climb speed or best rate-of-climb speed? Best angle-of-climb speed. Simply stated the difference is this. The best **angle**-of climb speed produces the greatest climb in a given distance; the best **rate**-of climb speed produces the greatest climb in a given time. Distance, of course, is the determining factor for takeoff obstruction clearance.

Which is the more dense—moist air or dry air? Dry air. It is generally understood that high temperatures and high elevations result in a higher density altitude, but there seems to be a general impression that moist air has the reverse effect. The common misconception is that moist air is heavier than dry air. A dry parcel is therefore **denser** and **heavier** than a moist parcel. Since both engine and aircraft performance decrease with an increase in density altitude, you should remember that high relative humidities (small spreads between temperature and dewpoint), especially on hot summer days, will result in longer takeoff runs.

—from TB AVN 1-1180

Mohawk note

Be sure to turn in the gearbox, item 88, figure 113, TM 55-1510-204-23P-1, when you send in an OV/RV-1 engine for analytical teardown because of metal contamination. The gearbox is usually the cause of metal contamination—not the engine.

—from PS, February 1984

Use of DA Pam 385-95 procedures is a regulatory requirement

Guidance for investigating Army aircraft mishaps (using the DA Form 2397-R series) is found in DA Pam 385-95. While pamphlets are usually advisory, the procedures established in DA Pam 385-95 are made directive in nature. Accordingly, instructions given in DA Pam 385-95 for filling out the forms are not just general guidelines; they should be followed to the letter. Remember, AR 385-95 (par. 2-13) directs it: "Each Army aviation accident and hazard will be thoroughly investigated and reported in accordance with AR 385-40 and DA Pam 385-95."

Answers to last week's questions

1. Alcohol impairs coordination, judgment, and night vision. True or false? True. As a result of alcohol, you fail to apply the proper techniques of night vision. You begin to stare at objects, and your scanning techniques become disorganized. The degree to which alcohol affects night vision is determined by the amount of alcohol consumed. Hangover after-effects also impair visual scanning efficiency. **FM 1-204, page 1-9, par. 1-10b**

2. An anticollision light system must be installed and operating on aircraft during what types of flight? All day and night flights. **AR 95-1, page 4-5, table 4-2**

3. A pitot heater must be installed and operating on aircraft during what types of flight? IMC. **AR 95-1, page 4-5, table 4-2**

4. When refueling from a tank vehicle, how many people are required? Two; one to attend the pump and one for the nozzle. A fire extinguisher should be placed within reach of each man. **FM 10-68, page 8-14, par. 8-10**

Questions for aviation personnel

1. Under what conditions can a person under the influence of intoxicants or narcotics travel in Army aircraft? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

2. Dark adaptation is the process by which your eyes increase their sensitivity to low levels of illumination. True or false? **Reference: FM 1-204, Night Flight Techniques and Procedures**

3. Commanders should include a section in their unit SOP listing the required aviation life support equipment for their geographical area. True or false? **Reference: FM 1-400, Aviator's Handbook**

4. A fire truck should stand by during defueling operations. If this is not possible, can defueling operations still be accomplished? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

Mishap briefs

oil pressure fluctuated. Caused by failure of pressure transmitter. ☐ (B series) Master caution and transmission oil pressure lights came on. Caused by failure of transmission oil cooler.

Observation helicopters

OH-58 Class E mishaps ☐ (A series) Aircraft entered instrument meteorological conditions during takeoff from field site. Pilot used vertical helicopter instrument recovery procedures and landed at airfield. ☐ (A series) Engine exhaust clamp broke during flight, causing loss of exhaust stack.

Fixed wing

C-7 Class A mishap ☐ Immediately after takeoff, copilot smelled hydraulic fluid and saw fluid coming from under pilot's instrument panel and stairwell area. Flight attendant saw hydraulic fluid running down inside of nose wheel inspection window. Emergency was declared and nose gear was pumped down. Main gear was extended but pilot could not get right gear safe light. Aircraft was flown by tower and copilot visually checked right gear index marks. All indications were that gear was down and locked. When power levers were retarded for landing, gear warning horn did not sound, indicating locked condition. Right main gear collapsed on landing rollout. 8420

U-21 Class D mishap ☐ (A series) Pilot removed left wheel chock and aircraft was backed out of parking space on congested ramp. While aircraft was being backed, pilot thought he heard something. Ground guide did not indicate that anything had happened. Postflight inspection revealed that tip on left propeller was curled rearward. Lightweight chock apparently hit propeller as aircraft was backing.

Maintenance

UH-1 Class E mishap ☐ (H series) Engine topped at 3,000 feet msl during test flight. Engine inlet FOD cover had not been removed before barrier filters were replaced, causing air restriction. Cover was locally manufactured in such a way that it fit snugly over the engine inlet and allowed barrier filters to be replaced over the top of the cover. The unit is modifying all covers with a handle on top which, when in place, will not allow the barriers to be put back on. Covers are being painted orange and stenciled with "remove before replacing filters."

AH-1 Class E mishaps ☐ (S series) As pilot exited aircraft to refuel, he noticed excessive oil on side of aircraft and constant flow from underside. Caused by pinched transmission oil filter O-ring. ☐ (S series) Aircraft made several uncommanded fore and aft movements while flying about 1,000 feet agl. Pitch SCAS card was installed crooked in SCAS control box and contact pin was not seated correctly.

Messages received

- Maintenance information message concerning sprag clutches (MIM-GEN-84-MEM-01, 271930Z Jan 84).
- AVSCOM message concerning expedited return of unserviceable OH-58C attitude indicators (301900Z Jan 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM changes

The following changes to TMs have been received:

- Change 1, dated 30 Dec 83, to TM 55-1520-235-MTF for OH-58C helicopters.
- Change 31, dated 13 Jan 84, to TM 55-1520-228-23-1 for OH-58A/C helicopters.

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Medicines and the pilot

The 1981 fatal crash of a U.S. Marine Corps pilot attempting a landing on the aircraft carrier Nimitz highlights the potential hazards of drugs to flying. Investigators found that the pilot was taking the drug brompheniramine and that significant amounts were in his blood at the time of the accident.

This drug is commonly used to relieve the symptoms of a head cold. The drug, however, can produce serious "side effects" from the standpoint of safe piloting. These include diminished coordination and retarded alertness. Accident investigators attributed the accident to derogated pilot performance resulting from the effects of the drug. Other examples of drug-influenced accidents in all categories of flying occur each year.

Medicines that are commonly used from time to time in daily life may have a devastating effect upon pilots in the flight environment. All pilots should be aware of this potential safety hazard.

What is a drug?

Drugs are substances taken to bring about a specific result, substances other than those taken for daily nutrition. Daily nutrition normally consists of solid foods, water, milk, fruit juices, and/or other traditional nutrients. Alcohol, the most ancient and the most common drug, must be avoided by pilots during the 12-hour period prior to flight.

Certain potent drugs in the United States and other countries can be obtained through the prescription of a physician or a dentist. These drugs are those that the U.S. Food and Drug Administration and similar agencies in other countries have found to be effective for their intended purpose and relatively safe when used properly under guidance. There are more than 1,300 of these basic drugs in the U.S. alone, each known by its "generic" name, the one assigned to it by the American Medical Association and the pharmaceutical industry. These generic drugs often have brand names (trade names or proprietary names). There are more than 7,000 of these brand name prescription drugs. Many are the same generic drug but with different names, as mentioned, with others comprised of combinations of generic drugs.

In addition to the above drugs, there are in excess of 300,000 drug names available as "over-the-counter" drugs, which may be purchased without prescriptions. Through long tradition (or, in some cases, through various studies), it has been shown that these are reasonably safe under certain circumstances. There is no guarantee to date, however, that these drugs are effective for the purposes for which they are advertised. As with the prescription brand name drugs, many of the same basic drugs sold over the counter are given different names by different companies. Similar mixtures of drugs also are sold under a variety of names.

How drugs act

Drugs may be swallowed, injected, rubbed on the skin, or taken through a number of other routes. They may be in the form of tablets, powder, syrup or other preparation. They may act by attaching at the molecular level to specific receptor sites in various tissues of the body, by directly attaching to an infecting organism, by modifying a ➤

Medicines and the pilot

cell membrane, or through other mechanisms.

Drugs may act at the site of application or at a distant site. They may need to pass through the liver and be modified to have their ultimate effect. The body rids itself of drugs through excretion in the urine, modification by the liver or other route or mechanism of elimination. A given drug may have actions at more than one tissue site in the body and on more than one kind of tissue.

Drug actions that are not desired when a specific drug is taken for a specific purpose are known as side effects. Side effects such as drowsiness, altered thinking, dizziness, or nausea can make a drug particularly hazardous for pilots.

An additional consideration is that two different drugs taken at the same time may interact and have multiplied side effects constituting a severe hazard for pilots. In some cases, the drugs may neutralize one another, eliminating the reason for which they were taken.

Half life and effect

Following absorption of a drug through the stomach, intestines, skin or other part of the body (for example, a muscle following an injection), further distribution usually takes place through the blood plasma. After distribution, generally a fairly rapid process, the drug is progressively eliminated from the body or inactivated by the liver and the inactivation products steadily eliminated. Often final elimination of a drug or its breakdown products takes place in the urine or feces.

The concentration of a drug following peak absorption progressively decreases in the blood plasma. As the concentration decreases, the drug effect generally begins to diminish.

It has been found, as a general statement, that each absorbed drug diminishes in a given person at a relatively constant rate. For example, a given drug taken at 1345 hours may achieve a peak blood concentration at 1400. Three hours later, the blood concentration is half that found at 1400. Another three hours later (2000), half of the 1700 level exists, and at 2300 the 2000 concentration is found to have been halved. This drug would be said to have a half life of three hours.

Four half lives from an original drug peak dose will see 94 percent of it eliminated. For many drugs, the concentration after four half lives is sufficiently low that the drug effects are no longer manifest. The half life of a drug is the major determinant of frequency of repeat dosage.

Some drugs have a half life of a few minutes, while others may extend to two or three days. It is very important to have access to drug half-life data, because this will give information concerning the potential duration of drug effect.

Any time a question arises concerning a specific drug and its possible adverse effects on safe flight, the pilot should consult his or her aviation medical examiner, a flight surgeon, government aviation regulatory authority physicians or an authoritative source who can correlate the drug with its effects on flying.

There are drugs "disapproved" by the U.S. Food and Drug Administration; there are illicit drugs, and there are, from time to time, "new" drugs appearing on the market. Pilots should not take disapproved or illicit drugs. In regard to the "new" drugs, the advice of the aviation medical examiner, a flight surgeon, or a government regulatory authority doctor should be sought. ■

—adapted from FLYING SAFETY
Stanley R. Mohler, M.D.
Director, Aerospace Medicine
Wright State University School of Medicine
Dayton, Ohio

First aid kit inspections

Although paragraph 10-7 of TM 55-1500-328-25 contains instructions on inspecting and maintaining first aid kits in Army aircraft, we continue to receive calls concerning those components with expiration dates and scheduled inspections. When a first aid kit is received, the components should be inspected as stated in paragraph 10-7a of the above TM for completeness, condition of the components, and expiration dates of the appropriate items. If possible, those items which will expire within 2 years should be replaced with items that have at least 2 years before expiration. If this cannot be done, DD Form 1574 should contain the date of expiration of the component that will expire the earliest. The first aid kit should then be inspected on that date regardless of when the last inspection was made and the expired component should be replaced.

If any other component will expire before the next 2-year inspection date, the date of expiration of that component will be entered on DD Form 1574 and the kit again inspected on that date and the component replaced. The 2-year inspection requirement applies only if all items in the kit have at least 2 years before expiration.

Point of contact at the Safety Center is Mr. Laurel Sand, AUTOVON 558-4198/4202. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishaps □ (V series) After aircraft was landed, pilot continued a high hover to POL area. The area was covered with snow. Pilot lost depth perception and allowed aircraft to descend. Aircraft hit the ground in a right yaw, left ski first, at a ground speed of 15 to 20 knots. Left ski dug into the snow, and aircraft rolled over and came to rest inverted. 8421 □ (H series) Aircraft was on night vision goggles training flight. As aircraft landed to field site, tail rotor blades hit a sign. Aircraft pitched nose down and began rapid spin to right. Aircraft then landed hard, with extensive damage to landing gear, fuselage, tail boom, transmission, and drive train system. 8422

UH-1 Class C mishap □ (V series) Master caution and engine chip detector lights came on. As pilot started approach to landing, noise was heard from engine. On final approach, aircraft yawed and vibrated. Pilot closed throttle in an attempt to cushion landing, but aircraft landed hard.

UH-1 Class E mishaps □ (H series) Aircraft developed vibration during flight. Caused by worn main rotor drive link trunnion. □ (H series) Cyclic control binding in flight was caused by defective magnetic brake. □ (H series) As pilot was handing vibrex strobe to crewmember in left seat, cord hooked on emergency governor switch, putting governor into emergency mode. N_2 went to 7000 rpm and rotor to 347. Pilot was able to stop rpm from building any higher. □ (H series) Master caution and hydraulic lights came on. Caused by failure of irreversible valve preformed packing. □ (H series) Severe vibrations were felt during flight. Skin had peeled back on main rotor blade. □ (H series) Pilot felt stiffness in controls during climb, and hydraulic pressure light came on. Caused by failure of pump. □ (M series) Master caution and engine oil pressure lights came on. Caused by failure of pressure switch.

Attack helicopters

AH-1 Class E mishaps □ (S series) Aircraft filled with smoke and fumes during hover. Failure of engine oil pump caused smoke from excessive oil in engine. □ (S series) Transmission oil bypass light came on. Caused by failure of pressure switch.

Cargo helicopters

CH-47 Class D mishap □ (C series) Pilot heard loud bang and felt aircraft shudder. Pilot landed at airfield. Forward shock strut attachment cable failed on left rear ski. Ski rotated nose down and aft end hit cargo ramp, damaging ski and ramp.

CH-47 Class E mishaps □ (C series) Aircraft was established in a climb after takeoff. As thrust was reduced, pilots noted 10 percent split in torque. Torque continued to split until No. 1 engine torque read zero and No. 2 engine torque read 100 percent. Single-engine landing was made. Caused by malfunction of engine fuel control. □ (C series) No. 2 engine fire detection lights came on. Caused by malfunction of fire detection system control unit. □ (C series) Fluid was seen leaking from forward transmission input quill during landing. Caused by failure of input quill seal.

CH-54 Class C mishap □ (A series) Antenna broke during flight, causing damage to tail rotor blades.

Observation helicopters

OH-58 Class E mishaps □ (A series) Loud bang and grinding noise were

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	1-22 Feb	**4**	**4**
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**18**	**17**

heard from transmission/engine area. Aircraft yawed and engine began to overspeed. Caused by failure of main drive shaft. □ (A series) Loud whistling noise was heard from engine area during takeoff. Engine turbine would not move after shutdown. □ (A series) As pilot was hovering from parking ramp to takeoff area, piece of plastic bag wrapped around rotor blade. □ (A series) Master caution and fuel boost lights came on. Caused by failure of fuel boost pump.

Reference OH-58 Class A mishap reported as 8418 in 1 February 1984 issue of Flightfax. The synopsis stated that as pilot and copilot diverted their attention to a wire, aircraft drifted left and descended. Actually, the copilot did nothing wrong. The synopsis should have read: "As pilot diverted his attention to the wire, aircraft drifted left and descended."

Fixed wing

U-21 Class E mishaps □ (A series) When flap switch was placed in up position, smoke and fumes entered cockpit. Visual check of flaps showed them still down. Caused by failure of flap motor. □ (RU-21H) Pilot saw fuel siphoning from left wing fuel filler cap after takeoff. Fuel cap latch mechanism was worn.

OV-1 Class E mishaps □ (C series) No. 1 and No. 2 hydraulic indicators dropped to zero. Aircraft was landed without incident. Hydraulic line to nose gear actuator developed a leak during flight and enough fluid was pumped overboard to cavitate hydraulic pump. □ (D series) No. 1 engine chip detector light came on. Western gearbox was replaced.

U-8 Class E mishap □ (F series) Nothing happened when gear handle was lowered. Gear had to be manually lowered. Limit switch actuator was stuck in open position.

Maintenance

UH-1 Class E mishaps □ (H series) As aircraft was picking up passengers, transmission fluid was seen on the ground. Transmission lines were chafed because of constant rubbing and friction. □ (H series) Compressor stall occurred during flight. Suspect inlet guide vane actuator was out of adjustment. Jam nut on inlet guide vane feedback rod was not safetied. Jam nut had backed off and feedback rod was free to rotate.

UH-60 Class E mishaps □ Backup reservoir low caution light came on before takeoff. Aircraft was shut down and checked with no problems noted. When aircraft was restarted, No. 1 and No. 2 primary servo control circuit breakers popped. When they were reset, No. 1 tail rotor servo, No. 1 reservoir low, SAS off, boost off, and APU accumulator low lights came on. Backup pump would not supply hydraulic pressure even though it was running. Aircraft was shut down again. Wire bundle for plug P-244 was clamped incorrectly with wire tie to the main wire bundle. □ No. 1 engine would not ignite. Start speed sensor switch was out of adjustment.

CH-47 Class D mishap □ (A series) Battery compartment door came open during descent. Door latching mechanism was out of adjustment.

Messages received

• AVSCOM message concerning armor panels and armor plates on OH-58 aircraft (061340Z Feb 84). Message requests users advise on problems found in using armor shielding on the OH-58A/C and submit thoughts on the installation of armor shielding in the engine area of the OH-58C.

• FORSCOM message concerning UH-1 and AH-1G universal transmissions (032115Z Feb 84). A recent FORSCOM aviation resource management survey revealed that several universal transmissions had overflown the time between overhaul interval. This problem was the result of quality control personnel not visually verifying the part number of the universal transmission and automatically extending the time between overhaul from 1,100 hours to 2,000 hours.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM change

Change 33, dated 16 Jan 84, to TM 55-1520-235-10 for OH-58C helicopters, has been released. ■

Is PRAM required for weather delay?

There is some confusion in the field about whether or not a PRAM is required for aborted takeoffs and unplanned landings because of weather. A PRAM is not required when a takeoff from a base airfield must be aborted solely because of the onset of unforeseen weather phenomena that is beyond the capability of the crew or equipment, even though intent to fly was present. However, if a mechanical or similar problem occurs that would dictate an aborted takeoff in any event, a PRAM is required. If a flight departs for a certain destination and weather dictates an unplanned landing at an interim field site, a PRAM is not required if the PIC can complete the mission after waiting a reasonable time for the weather to abate. If the weather is so severe the mission has to be terminated, a PRAM is required.

The final judgment for submission of PRAMs rests with the commander of the aircrew. ■

Aviation mishap prevention forum

Hazards of nonsafety matches

As the nomenclature states, "nonsafety" means just that. Use caution when packing, storing, and handling these items.

Use the plastic matchbox, NSN 8465-00-265-4925, to store your matches in. This means you will have to use more than the single empty matchbox supplied in the survival kits.

When you repack your matches, put a piece of paper in the container lid shielding the matchsticks from the sandpaper (scratcher). Place a small piece of cotton in the bottom of the container. Insert the matches with the heads pointing down toward the bottom where the cotton will act as a cushion. Do not overstuff the matches in the box. The size matches you get (some matchsticks are thinner than others) will determine the number you can get into the matchbox. Using 1 or 2 plastic matchboxes, you can get about 20 to 45 matches stored in your survival kits safely.

Do not try testing the matchboxes by throwing them against a wall or on the floor to see if the matches will ignite inside the containers. This is not only dumb, but is hazardous to your health and well being. If properly stored, packed, and handled, they will not ignite. Don't be an accident looking for a place to happen. Natick Laboratories is the test center and they have the equipment, engineers, and testing facilities to do all testing.

—from U.S. Army Aviation Digest

Hold that load

NSN 1670-00-725-1437—type CGU-1B—is the only cargo tiedown assembly authorized for use in Army aircraft.

Replace all MB-1 type cargo tiedowns with a CGU-1B to stop possible cargo and aircraft damage and personnel injuries.

TSARCOM message DRTS-MCAPL 111900Z Aug 83 has the word.

—from PS, February 1984

Answers to last week's questions

1. Under what conditions can a person under the influence of intoxicants or narcotics travel in Army aircraft? During an emergency, if the person is a patient under proper care, and at the discretion of the pilot-in-command under exceptional circumstances when no compromise of safety is anticipated. **AR 95-1, page 2-5, par. 2-10**

2. Dark adaptation is the process by which your eyes increase their sensitivity to low levels of illumination. True or false? True. People dark-adapt to varying degrees and at different rates. During the first 30 minutes, the sensitivity of the eye increases roughly 10,000-fold, with little further increase after that time. **FM 1-204, page 1-6, par. 1-8a**

3. Commanders should include a section in their unit SOP listing the required aviation life support equipment for their geographical area. True or false? True. **FM 1-400, page 1-10, par. 1-6b**

4. A fire truck should stand by during defueling operations. If this is not possible, can defueling operations still be accomplished? Yes, if fire extinguishers are manned by trained firefighters. **FM 10-68, with Change 3, page 9-1, par. 9-3**

Questions for aviation personnel

1. There are two general types of hydraulic fluid. Both possess suitable characteristics, but they are not interchangeable and cannot be mixed. What are the two types and what are their colors? **Reference: FM 1-400, Aviator's Handbook**

2. Only _____ fluid is used in the hydraulic systems of Army aircraft because it will not damage the synthetic rubber seals installed in the systems. **Reference: FM 1-400, Aviator's Handbook**

3. Procedures for investigating and reporting aircraft mishaps are prescribed in what ARs? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. What is the difference between a gas and a vapor? **Reference: FM 1-300, Flight Operations and Airfield Management**

Twenty receive Broken Wing Award

The Broken Wing Award is given to aircraft crewmembers who demonstrate a high degree of professional aviation 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, dated 14 May 1982.

The Broken Wing Award is approved for inclusion in the recipient's official military permanent file (OMPF). This file is used for promotion and the various selection boards. All Broken Wing Awards received at MILPERCEN will be put in the OMPF. The normal process for placing the award in the OMPF is through the installation military personnel office, but the award can be forwarded to MILPERCEN by the recipient.

Twenty aviators received the Broken Wing Award from October through December 1983.

Broken Wing Award recipients

CW4 Harry G. Andersen
397th Medical Detachment,
New Hampshire Army National Guard,
Concord, New Hampshire

Captain Paul N. Baker
Troop D, 2/9th Cavalry,
Hunter AAF, Georgia

CW3 Robert A. Cox
Company B, 268th Attack Helicopter Battalion, Fort Lewis

CW2 Larry E. Creech
2nd Aviation Battalion, 2nd Infantry Division, Camp Casey, Korea

CW2 William S. Dugger
Company A, 159th Aviation Battalion, 101st Airborne Division, Fort Campbell

WO1 Raymond E. Fernelius (posthumously)
Company D, 25th Combat Aviation Battalion, 25th Infantry Division, Schofield Barracks, Hawaii

CW3 Marvin C. King
DOFT, 14th Company,
Fort Rucker

CW2 Frank J. Lathers
C Troop, 7/17th Cavalry,
6th Cavalry Brigade, Fort Hood

CW2 Harold F. Lucas
Company A, 7th Combat Aviation Battalion, 7th Infantry Division, Fort Ord

Captain Augustin C. Montemayor
Company B, Army Intelligence Center and School, Fort Huachuca

WO1 Sherman F. Morgan
155th Aviation Company, Fort Ord

CW4 Gary W. Norton
Company A, 2nd Aviation Battalion,
2nd Infantry Division,
APO San Francisco 96224

Captain Mark A. Richardson
DOFT, 14th Company, Fort Rucker

CW3 David W. Rosengrant
Company C, 160th Aviation Battalion,
101st Airborne Division, Fort Campbell

Captain Richard R. Ryles
214th Attack Helicopter Battalion,
Fort Lewis

Calvin W. Schade
U.S. Army Aviation Center, Fort Rucker

WO1 Ross H. Schoneboom
237th Medical Detachment, Fort Ord

CW2 Clayton F. Vorreyer
54th Medical Detachment, Fort Lewis

CW4 Larry E. Willer
Aviation Division, Directorate of Plans,
Training and Security, Fort Eustis

Major Alvin H. Zito
99th ARCOM Aviation Support Facility,
Washington, Pennsylvania

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Accident Prevention is a Combat Multiplier

Flightfax

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Fort Rucker, Alabama 36360

When the thermometer drops

Cold weather comes in many different varieties, depending on where you're located. And the problems it brings to aviation personnel are just as varied. What you have to do is be prepared for the worst conditions that winter may hurl at you.

Last week's **Flightfax** contained an article on snow operations, particularly takeoffs and landings. This week, we'll review problems with human factors, icing, static electricity, and survival.

Human factors

Bone-chilling cold takes its toll on the human body as well as on machinery. Physical and mental processes can be slowed down by the cold, and an extra margin of alertness is required for safe operations.

In cold weather, the correct use of personal gear, including clothes, is very important. The correct fit of shoes, socks, and gloves makes the difference between relative comfort for the person on the flightline and frostbitten fingers and toes. Multilayers of loose clothing provide more warmth than a bulky layer. Clothing should be kept as clean and as dry as possible.

In a cold environment, food intake should be increased to maintain proper body temperature. This increase in food requires more fluids, preferably hot drinks, as they warm the body. Be extremely cautious if you drink alcoholic beverages. Alcohol causes an increase in loss of body heat.

Since maintenance functions are often performed outside, mechanics must be prepared to deal with the elements. Mechanics working in the cold can lapse into hurry-up attitudes and omit steps they would not think of omitting otherwise. With their attention divided between their work and their growing discomfort, they may honestly think they have completed their work properly when actually they have not. Every step should be checked and rechecked for accuracy.

Ice

Icing on an aircraft is one of the most serious cold weather hazards. Icing occurs when the temperature is at or just below freezing and visible moisture, such as clouds, drizzle, rain, or wet snow, is present. Icing is rare when temperatures drop below -20° C. In tests with UH-1 aircraft, it was discovered that even small amounts of rotor blade ice (one-eighth of an inch over one-third of the blade span) had a significant effect on autorotational characteristics. Rotor blade ice accumulation of three-eighths to one-half inch was sufficient to prevent a safe autorotation.

When the UH-1 was flying at temperatures of -4° C. in light icing conditions, ice was generally shed symmetrically by the main rotors from the blade tip inboard to about 9 feet from the rotor hub. Asymmetrical shedding occurred at temperatures of -9° C. in light icing conditions. Asymmetrical shedding can create extremely severe vibrations.

Following are a few tips which may help to minimize the threat of in-flight icing.

• Fly at altitudes which are below the freezing level or clear of visible moisture. Remain under visual flight rules and stay clear of clouds. ►

When the thermometer drops

• When flying in the vicinity of a warm front, determine if temperatures in cold airmass are in the ice-producing range. Also determine the altitude of the inversion layer. This knowledge will help you make the right decisions if you encounter ice-producing conditions.

• Rotor blade icing begins near the blade root. This ice buildup can cause loss of lift, requiring an adjustment of power to maintain lift, which will increase the engine operating temperature.

• Shaking the cyclic is not a cure for asymmetrical shedding because it could place undue stress on the rotor system and may lead to a greater imbalance. Ice shedding can also cause foreign object damage from ice ingested into the engine. When icing is encountered, descend to an altitude clear of clouds. If icing is moderate to heavy, land.

• When the weather report contains the words "partial obscuration" or "obscuration," be extremely careful. Conditions encountered will usually be poorer than those reported by the ground observer.

• During preflights, check to see that blade and propeller surfaces are free of ice, frost, and snow. Do not remove ice from an aircraft with a blunt or sharp-bladed object. These can cause external and internal damage to aircraft components.

• Read FM 1-202, appropriate operator's manuals, and FM 1-230 for detailed information on how to cope with icing problems.

Static electricity

Static electricity creates serious problems during cold weather. It can be generated by the movement of the aircraft through the air or by brushing snow and ice from aircraft surfaces. It is especially dangerous during refueling operations, so fuel nozzles should be fully inserted into the aircraft filler neck at all times. Before aircraft are refueled, individuals should discharge any static charges built up in their bodies. This can be done by touching a properly grounded conductor.

Survival

Hopefully, you won't ever have to use your survival gear. But you must be prepared just in case. First of all, be sure you have signalling devices with you—and be sure your passengers know where to locate them in case you aren't able to tell them after a crash. These signalling devices should be in your cold weather survival kit, which should be in your aircraft during all flights in cold weather.

If you are not soon rescued, protection from the cold becomes a problem. Don't try to live in the aircraft. You need a shelter that is well insulated. Your cold weather survival kit should contain material from which you can construct a shelter. Warm clothing is also a necessity.

Get a fire going as soon as possible. Standing dead trees make the best firewood because they are reasonably dry and produce less smoke. To get maximum benefit from the fire, you should make some sort of reflector to radiate the heat toward you. A reflector can be fashioned from trees, logs, metal from the aircraft, or most any material that is available.

It is very important to stay dry because wet clothes cause you to lose body heat which results in hypothermia. If you get wet, change into dry clothes or dry your wet clothes. Keep your sleeping bag clean and dry by using some type of insulation, such as plenty of boughs, underneath it.

If drinkable water is available, use it instead of melting snow or ice. If you have a choice of snow or ice, melt the ice. If you must melt snow by heating, it should be compressed before it is put in a container. Your cold weather survival kit should contain combat rations for at least 3 days. If you need more food, you can fashion snares and traps to catch small animals.

Learn all you can about first-aid treatment for injuries, frostbite, snow blindness, and hypothermia. See FM 1-202 for symptoms and treatment.

Remember, all preparations for winter survival should be based on the worst weather conditions that can be expected along the proposed flight route. With proper knowledge, clothing, and survival equipment, chances are overwhelmingly in your favor that you can survive the most bitter cold.

Units operating in cold weather areas are responsible for conducting a thorough and well organized training program. This training must be geared to instill confidence, to develop skills in all areas of cold weather operations, and to insure safety.

Your ability to live with the cold, to cope with it, and to do a useful job in it depends on your appreciation of the fact that any time you have to be out in any weather where the temperature is much below freezing you are up against a relentless adversary. Be prepared for what that adversary will deal you. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishaps □ (H series) As aircraft was being refueled at field site, pilot noticed that No. 5 drive shaft cover was open. One dzus fastener hit tip of tail rotor blade. Fastener was then deflected through vertical fin. □ (M series) Directional control was lost about 35 minutes into flight. Both main rotor blades and synch elevator were damaged during landing.

UH-1 Class E mishaps □ (V series) Crew smelled fuel odor after turning on left auxiliary fuel switch. Line from auxiliary fuel tank to main fuel tank had deteriorated internally. □ (H series) IP felt binding in all quadrants of cyclic during takeoff. Caused by buildup of material on cyclic stick from normal wear of friction pads. □ (H series) Severe compressor stall was followed by series of loud bangs and vibrations. Caused by defective fuel control. □ (H series) Master caution and right fuel boost pump lights came on. Caused by failure of boost pump. □ (H series) Crew heard three loud bangs, and aircraft vibrated and yawed to left. Caused by engine compressor stall. □ (H series) When hydraulic control switch was turned off during flight, pedals became excessively stiff. Caused by defective tail rotor servo assembly. □ (H series) Master caution and hydraulic lights came on, and hydraulic power was lost. Caused by cracked hydraulic line.

UH-60 Class C mishaps □ In two separate instances, cargo hooks failed and fuel containers fell to the ground and burst.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	1-5 Oct	**2**	**0**
	November	2	2	November		
	December	0	0	December		
2nd Qtr	January	1	0	January		
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**2**	**0**

Attack helicopters

AH-1 Class A mishap □ (S series) Pilot had just finished firing six rockets and was lining up on target again when main rotor blades hit 60- to 65-foot tree. Transmission and mast section were broken off and the rest of the aircraft fell from about 45 feet agl, crashed in nose-low attitude, and rolled inverted. Copilot sustained major injuries and pilot had minor injuries. 8358

AH-1 Class E mishaps □ (S series) Tarp covering ammo was blown into main rotor blades during runup. Ground personnel had not secured tarp correctly. □ (S series) N_2 rpm bled off as collective was increased. When collective was reduced, N_2 increased. Caused by failure of overspeed governor. □ (S series) No. 2 hydraulic light came on. Caused by failure of pressure switch.

Cargo helicopters

CH-47 Class E mishaps □ (B series) Flight engineer saw large amount of oil flowing from pylon area during hover. Caused by crack in oil line fitting. □ (C series) CH-47 was slingloading an aircraft from 15 feet of water. Chain attached to CH-47 sheared. Chain and clevis assembly sprang up in a rubber-band effect into bottom of aircraft,

damaging sheet metal. Suspect misrigging of aircraft by scuba divers. □ (C series) No. 1 engine transmission oil pressure rose during flight. Caused by failure of pressure transducer.

Observation helicopters

OH-58 Class C mishaps □ (C series) Pilot told copilot to monitor torque gauge during takeoff and then proceeded to monitor gauge himself, allowing aircraft to drift left. Main rotor blade hit tree. □ (C series) During approach into 8- to 10-knot wind, pilot applied full left pedal to maintain heading. Aircraft began uncommanded turn to right. Pilot reduced left pedal input, causing velocity of spin to increase. Pilot reapplied left pedal while reducing collective. He then applied aft cyclic to level aircraft and landed. Left skid hit large rock during touchdown. □ (C series) Nose pitched down and aircraft vibrated severely during NOE flight. Vibration quickly became uncontrollable. Aircraft was autorotated to ground. Lower wire cutter had hit three wires.

Fixed wing

OV-1 Class E mishap □ (RV-1D) All No. 2 engine VDS indicators failed except No. 1 torque and amps. Only digital indications were available for No. 1 engine. Caused by failure of signal data converter and display unit.

U-3 Class E mishap □ (A series) No. 1 engine ran rough. Caused by deterioration of spark plug on No. 6 cylinder.

U-21 Class C mishap □ (A series) Fumes were detected in cockpit and passenger compartment during final approach. After aircraft was landed, smoke began to fill aircraft interior. About 1 minute later, smoke dissipated. Strong fumes of burning plastic remained. Caused by failure of vane axial fan.

U-21 Class E mishaps □ (A series) Liquid was seen streaming from under access plate around fillercap of right engine during flight. When access plate was pulled, water was found in splash pan. □ (RU-21H) Heater quit during taxi. Caused by inoperative combustion blower motor. □ (RU-21H) Aircraft encountered severe turbulence at 7,000 feet and could not climb more than 200 to 300 feet per minute for approximately 10 minutes. Airspeed fluctuated from 110 knots to 160 knots. Pilot diverted from flight plan route. Turbulence ceased at 15,000 feet and light icing was encountered at 13,000 feet. Aircraft was landed without further incident. Inspection revealed evidence of lightning strike on right wing pod.

Maintenance

UH-1 Class C mishap □ (H series) Pilot heard loud sound during maintenance operational check and immediately shut off throttle and fuel. Inspection revealed cloth rag had been drawn from inlet area into internal area of engine.

UH-1 Class E mishaps □ (V series) When throttle was retarded to engine idle stop during autorotation, flight idle solenoid failed and engine shut down. IP took control and completed autorotation. Corrosion and graphite buildup caused plunger to fail to slide through bracket smoothly. □ (H series) Fire warning light came on during flight. Portion of fire warning cable was chafing against aircraft. □ (H series) Engine oil temperature rose during flight. Caused by dirty engine oil strainer.

OH-6 Class E mishap □ Master caution and fuel filter lights came on during flight. As aircraft was hovering to ramp, engine quit. Nuts on fuel hose assemblies were loose. Fuel cell inspection had been done 10 days before, and this was the first flight since the inspection. Suspect nuts were not tightened when installed and the movement of the lines during the fuel cell inspection loosened the lines enough to cause suction of air.

OH-58 Class E mishap □ (A series) Low rpm audio and light activated. Two bleed air lines were bent near flared fittings.

Messages received

• Safety-of-flight maintenance mandatory message concerning transmission pylon bolts installed on certain AH-1S aircraft (AH-1-83-11, 211900Z Sep 83). Summary: Ninety-one AH-1S (MC) aircraft have incorrect transmission pylon bolts installed. The NAS 1230-7 self-locking bolts were manufactured without the plastic inserts installed in the thread area. These plastic inserts serve as the self-locking feature to prevent loss of bolt torque. The bolts can be distinguished from other bolts by the embossed letters "CS" on the head of the bolts. None of the bolts inspected have had evidence of torque loss. The purpose of this message is to locate the 91 aircraft which have the discrepant bolts. Contact: Ed Soteropoulos, AUTOVON 693-3300, commercial 314-263-3300.

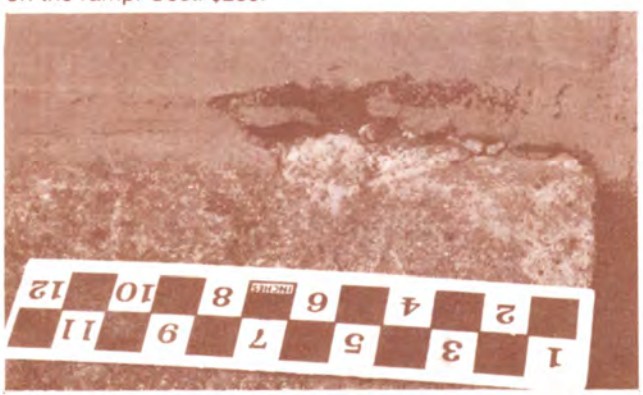
• Safety-of-use message concerning battery incident (SOU-UH-60A-83-01, 191510Z Sep 83).

For more information on selected mishap briefs, call AUTOVON 558-4202/4198.

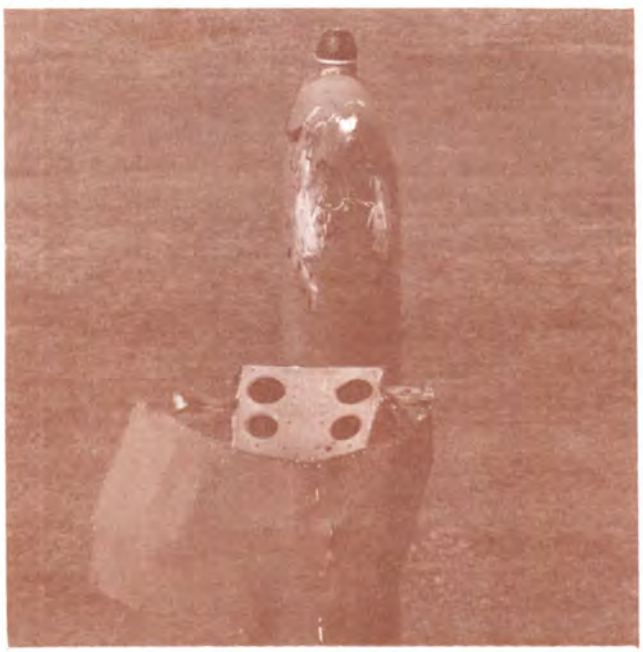
Aviation mishap prevention forum

Selected FY 83 lightning strike mishaps

■ During an intense thunderstorm with vivid cloud-to-ground lightning, the tail of a parked YC-7A aircraft was struck by lightning, resulting in localized extensive damage to the skin and stringers. No other damage to the aircraft, electrical wiring or components, or avionics systems was noted. Two holes in the parking ramp were found adjacent to the aircraft. It could not be determined if the damage to the ramp was caused by separate strikes or by the charge jumping from the aircraft to the ground. The aircraft was electrically bonded to an authorized grounding receptacle on the ramp. Cost: $285.



Holes in parking ramp were caused by lightning strike.



Lightning strike damaged tail of YC-7A.

■ Weather radar showed storm cells along the flightpath of a C-12C. A deviation of 20 degrees left was made to avoid the cells. The lightning strike occurred about 2 minutes later in clouds, but the clouds were clearly displayed on the aircraft radar screen as being to the right and approximately 10 miles from the aircraft. Cost: $25,000.

■ A lightning strike caused damage to the right rudder tip cap and approximately 15 rivets along the lower fuselage of an OV-1D. The UHF/VHF antenna was burned along the lower trailing edge. As the aircraft was descending through 6,500 feet msl, the pilots saw a flash and explosion which seemed to be in front of the aircraft. The autopilot turned itself off, and within 30 seconds, the VHF and UHF receivers were inoperative. The OV-1 broke out of the clouds and VFR flight was continued. A full weather briefing was received before the flight. Possible isolated thunderstorms in the area were forecast but none were reported. Cost: $1,000.

Answers to last week's questions

1. What are the safety goals of the U.S. Army?

• Reduce and keep to a minimum accidental manpower and monetary losses, thus providing more efficient use of resources and advancing the combat effectiveness of the Army.

• Provide a safe and healthy environment at all times for all Army personnel and others exposed to Army operations. **AR 385-10, page 1-1, par. 1-4**

Aviation mishap prevention forum

2. Survival time when a person is immersed in cold water will decrease with a steady decline in water temperature. Death from hypothermia will result if rescue does not occur promptly. If you are immersed in 32.5° F. water, what is your likely survival time? 15-45 minutes. **FM 1-202, page 1-39, par. 1-38**

3. What is hypothermia? Hypothermia is the loss of body heat due to exposure to a freezing or subfreezing environment. It is potentially more dangerous than any other cold weather injury. It can cause death in a short period of time. **FM 1-202, page 1-37, par. 1-36**

4. Aircraft shall not be serviced with oxygen wnen what conditions prevail?

- Aircraft is not grounded.
- Aircraft electrical switches are on.
- Ground powered equipment is operating within 50 feet of the servicing area.
- Aircraft is being serviced with fuel, oil, or anti-icing fluids.
- Any combustible materials, fluid, etc., are evident around oxygen servicing equipment. **TM 55-1500-204-25/1, page 1-16, par. 1-60**

5. A combustible liquid is one with a flashpoint at or below 100° F. (37.8° C.). True or false? True. **FM 1-300, page 4-7, par. 4-5**

Questions for aviation personnel

1. Can the commander withhold pass privileges to service members who are enrolled in the Alcohol and Drug Abuse Prevention and Control Program? **Reference: Interim Change I02 to AR 600-85, Alcohol and Drug Abuse Prevention and Control Program**

2. Could an E7 with 19 years of service be eliminated from the Army if discovered to have been smoking marijuana? Reference: **AR 600-85**

3. Must a service member have a waiver to reenlist if the service member is currently enrolled in the Alcohol and Drug Abuse Prevention and Control Program? **Reference: AR 600-85**

4. What does a unit leader do with any illegal drugs or drug paraphernalia that comes into his possession? **Reference: Interim Change I02 to AR 600-85**

5. At what blood-alcohol level is a service member determined to be alcohol impaired while on duty? **Reference: Interim Change I03 to AR 600-85**

6. If a service member is unexpectedly called to duty, can he be held liable for being intoxicated while on duty? **Reference: Interim Change I02 to AR 600-85**

7. May a physician direct a service member to submit to urine or blood-alcohol or breath tests? **Reference: Interim Change I02 to AR 600-85** ■

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When the still of the night

0450 - "Up and at 'em. What a life, o'dark thirty get up for a training mission by an alarm clock that sounds like a gong. A little fuzzy out at this time of day. Shaving, barbaric custom—don't fight hand-to-beard anymore. Oops—great, cut myself. Dumb move last night mixing scotch and wine—always makes ya a little shaky. Fortunately, I didn't get really blasted. Couple of aspirin and some eye drops will make me a new man."

0525 - "Boy, that coffee really hits the spot! Don't feel like eating anything else, probably give me an upset stomach. Actually, the thought of food is too much."

0550 - "Lots of dummies on the road this morning. Every SOB wants the center."

0600 - "Well, here we go again. Four-ship range mission, syllabus number who cares. We go out and shoot bedsheets and pretend it's war. Thank goodness for soft chairs. I could almost go to sleep. Wish I could have bagged in after the party last night. Good party. Ed was really rolling—always has great jokes. And Sally and her belly dance—get her going and...what? New tactic? Oh, for the new guy, same old..."

0800 - "Engine start—noisy this morning—almost hurts..."

0815 - "Come on, tower, clear us off! Finally—typical launch, now straight to the range. Lead, say airspeed—450? Must be the second element. So, I'm faster than usual. So what? It's their job to keep up."

0840 - "Okay! Focus the eyes, track and—focus, track—focus, track—FOCUS! ALTITUDE! OH, MY GO..."

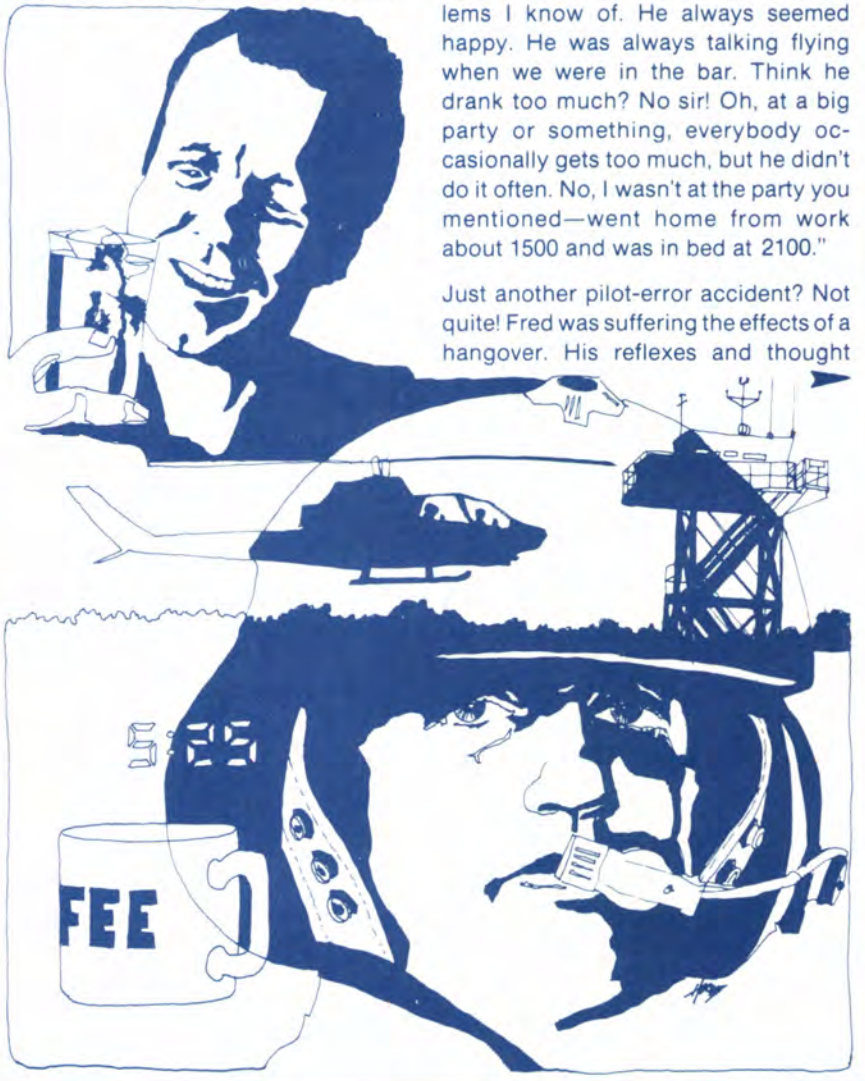
0841 - "All aircraft, this is Fantan Range Control on guard. The range is closed. Remain clear of the range until..."

Later:

"Beats me—Fred was one of the best, top gun, etc.! Good all-around pilot. Yes, I was at the party—stayed late since I wasn't flying the next day. When did Fred leave? Well, earlier—must have been around 2030, we had a last one and he split."

"Well, sir, I was number 2. He was a little erratic. No, not really erratic, just a little off; like being off on airspeed and a little jerky. You know, not as smooth as usual. Didn't have any outside problems I know of. He always seemed happy. He was always talking flying when we were in the bar. Think he drank too much? No sir! Oh, at a big party or something, everybody occasionally gets too much, but he didn't do it often. No, I wasn't at the party you mentioned—went home from work about 1500 and was in bed at 2100."

Just another pilot-error accident? Not quite! Fred was suffering the effects of a hangover. His reflexes and thought



When the still of the night

processes were just a little off, and he had lost the "edge" necessary for safe flight in a hazardous environment.

Leaving out considerations for regulations, policies, and procedures, the simple fact is that a hangover is not only miserable, it is potentially dangerous. Without getting into "doctor talk," let's look at the drinking/hangover process.

Intake of alcohol (in any drinkable form or mix) causes a lowering of blood pressure, dehydrating, deadening/death of some brain cells, and an overall slowdown of normal functions. In large quantities, common effects are slurred speech, staggering, and unconsciousness. Drink too much too quickly and the body will try to get rid of the "poison" through vomiting or diarrhea. If you continue to press your luck, death is Mother Nature's way of saying "that's enough."

Come the morning after, it's pain compounded by agony. The miserable state of affairs called a hangover is your body's attempt to get back to normal. Common symptoms: throbbing head, blurry vision, apparent hearing sensitivity, and overall weakness. Doesn't sound like the way to fly, does it?

Let's look at some of the cures possible for this malady. I won't try to list them all; they're as varied and numerous as the books in a library.

• Hair of the dog makes you feel great for a short time. Just like last night, you're getting a short-term effect that will be followed by another hangover. Do this often enough and you'll die from alcoholism.

• Coffee also makes you feel great (sort of). The caffeine will give you a boost, but another effect is dehydration—just exactly the effect you don't need. If the coffee is weak, the drying effect is less but so is the boost. You're better off with a glass of water.

• Genuine, sure-fire cures include such beauties as raw eggs, Bloody Marys without the booze, etc. Aside from the time it takes to swallow them, their liquid content, and food value, none provide any cure. Perhaps their proclaimed curative qualities stem from the psychological effort it takes to swallow them—if it sounds bad, it must be good.

What then can you do with the hangover you've built? Help your body rebuild. Drink plenty of liquids, rest, and eat good food. Minor help can come from aspirin, eye drops, etc., but the real cure is time. Don't attempt complicated or physically demanding tasks such as flying. The pain you feel will tell you how fast you should move.

And, of course, try not to do it again.■

—from USAF Safety Journal
Lt Col Michael F. Jacobs
Directorate of Aerospace Safety

An Army aviation safety film dealing with alcohol is available at your local Training and Audiovisual Support Center. The film is TF(VT) 46-6296, "Alcohol, Aviators, and Accidents—A Problem of Attitude."

Recap of AVSCOM messages

Following is a list of AIG 8881 addressed messages transmitted by AVSCOM (DRSAV-M) from 1 October through 31 December 1983.

UH-60A-83-09 Maintenance mandatory message concerning repetitive inspection for stabilator amplifier

UH-60A-83-10 Maintenance mandatory message on inspection and replacement of washer on collective bias tube assembly

CH-47-83-08 Safety-of-flight technical message concerning inspection of rotor head assemblies

UH-60A-83-11 Maintenance mandatory message concerning inspection of accessory module oil return screen for contamination

UH-60A-83-12 Maintenance mandatory message concerning inspection of tail rotor servo assembly

UH-60A-83-13 Safety-of-flight technical message concerning repetitive inspection of the forward sliding cover assembly

UH-60A-83-14 Safety-of-flight operational message concerning cargo hook operations

UH-60A-83-15 Maintenance mandatory message concerning cargo hook relief from limitations imposed by prior safety-of-flight messages

CH-47-83-09 Maintenance mandatory message concerning inspection of CH-47D integrated lower control actuators

CH-47-83-10 Maintenance mandatory message concerning one-time inspection of CH-47C sync shaft assemblies

OH-58-83-05 Safety-of-flight technical message concerning one-time inspection of certain OH-58 (round glass) helicopters

OH-6A-83-01 Maintenance mandatory message concerning daily inspection of tail rotor blades

OH-6A-83-02 Maintenance mandatory message concerning one-time inspection of main rotor swashplate bearing assembly for missing bearing cages

Addressees requiring copies of messages should contact their higher headquarters. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class B mishap □ (H series) Loud bang was heard and vibration was felt after takeoff from confined area. Suspecting loss of power, pilot landed straight ahead. Main rotor blades hit trees and aircraft landed hard. Skids spread and chin bubbles were broken. 8423

UH-1 Class D mishap □ (H series) After touchdown, just before aircraft came to a complete stop, crew heard something snap under aircraft. Right front of aircraft dropped down about 1 foot lower than normal. Forward cross tube had broken near cross tube mount strap.

UH-1 Class E mishaps □ (H series) Engine chip detector light came on during hover. Caused by failure of No. 3 and 4 engine bearings. □ (H series) Tail rotor pedals began to bind during landing. Caused by defective magnetic brake. □ (H series) Low oil pressure was caused by defective quick disconnect on oil line in cargo hook sling well. □ (H series) Tail rotor chip detector light came on. Caused by failure of 90-degree gearbox. □ (H series) Cyclic binding became severe, and running landing was made. Aircraft had been parked in snow blizzard. Snow in transmission area melted during flight. Water ran down cyclic push-pull tube and onto tail rotor push-pull tube and froze. □ (H series) Smoke was seen in right rear cabin. Heat duct vent at rear of cabin had stuck shut, causing such a buildup of heat that ducting melted and collapsed under floorboard. □ (H series) Cyclic control began to motor from right forward to left rear after landing. Caused by defective servo assembly. □ (H series) N1 gauge went to zero during flight. Caused by failure of tachometer generator.

Attack helicopters

AH-1 Class D mishaps □ (S series) Aircraft was No. 3 in a flight of 3, flying 30 to 50 feet agl over snow-covered terrain. Pilot was at the controls in the back seat and copilot was navigating from the front seat. After clearing several sets of powerlines, pilot looked to the left and saw that the terrain gradually sloped downward into a valley. Because they were in large, open, snow-covered fields with few objects to provide terrain definition, pilot continued to look into the shallow valley to his left front. Copilot was concentrating on his navigation and also looking to the left. A Scout pilot called and urged the Cobra crews to hurry. The No. 3 pilot accelerated to 50 knots to catch up. Aircraft was still descending, following the terrain contour as seen to the left front. The terrain directly in front of the aircraft, in an area not visible to the pilot, began to gradually rise. The combination of open snow-covered terrain, lack of ground contrast and terrain definition, and his concentration on navigation caused the copilot to not notice the rising terrain. Aircraft hit the ground, tearing off the landing gear. Pilot immediately added power and applied aft cyclic, bringing aircraft to a stabilized hover. Pilot of another aircraft confirmed that landing gear was missing. AH-1 was flown to airfield, arriving with approximately 30 minutes of fuel remaining. Pilot remained at a hover while ground personnel obtained 30 mattresses and pallets. Three stacks of mattresses and pallets were prepared, one for each side of the aircraft and one for the tail boom. Pilot set aircraft down with about 5 minutes of fuel remaining. Aircraft settled onto platforms without further incident. □ (S series) Pilot was transitioning from UH-1M to AH-1S. Pilot was accustomed to adjusting UH-1M seat fore and aft with left hand. Adjustment on left side of AH-1 seat is for vertical motion. When pilot pulled seat adjustment lever, with his weight on the seat, seat quickly dropped. Pilot's hand was sprained and cut.

AH-1 Class E mishaps □ (S series) Aft fuel boost pump light came on. Caused by failure of fuel pressure switch. □ (S series) During entry into traffic pattern, pilot was told that his vertical fin drive shaft cover was open. All five spring fasteners on fifth shaft cover had sheared. □ (S series) Transmission oil hot light came on. Caused by failure of oil cooler bearing.

Cargo helicopters

CH-47 Class A mishap □ (C series) Pilot heard loud noise while on short final for landing. Aircraft nosed up, rolled inverted, and crashed. 8424

CH-47 Class E mishaps □ (B series) No. 1 engine oil pressure dropped to zero. Caused by failure of engine oil pump. □ (C series) Crew preflighting aircraft saw hydraulic fluid in vicinity of right aft landing gear. Caused by cracked fitting on No. 2 engine starter.

Observation helicopters

OH-58 Class D mishap □ (C series) Aircraft hit bird during night flight. Right chin bubble was broken.

OH-58 Class E mishaps □ High frequency vibration was felt during runup. Caused by worn tail rotor drive shaft bearings. □ (C series) Transmission oil pressure light came on. Caused by failure of oil pressure switch. □ (A series) Engine oil pressure rose during hover. Caused by failure of oil pressure gauge.

Fixed wing

T-42 Class E mishap □ Nose wheel would not fully retract, giving unsafe gear indication in cockpit. Caused by defective retracting rod end bearing.

C-12 Class D mishap □ (C series) As pilot was taxiing to parking area, with nose wheel about 5 feet to right of taxi

line, left propeller hit a dark red, unmarked pole. Propeller blades were nicked and gouged.

OV-1 Class E mishaps □ (D series) Hydraulics failed during flight. Caused by failure of O-ring in right brake assembly. □ (D series) Hydraulic systems indicated zero pressure during flight. Hydraulic line for power steering switch was cracked at fitting.

U-21 Class E mishaps □ (RU-21H) Left fuel transfer light came on. Caused by failure of left fuel submerged pump. □ (A series) Right inboard flap actuator failed during taxi, resulting in loss of flap control. □ (A series) No. 1 engine chip detector light came on and engine oil pressure dropped to 10 psi. Caused by failure of engine.

U-8 Class C mishap □ (F series) Gear handle was placed down for landing. Gear warning horn sounded two times. Gear was recycled and everything appeared normal. As aircraft touched down, gear collapsed one-third of the way down the runway, damaging engines, inboard flaps, nose wheel doors, and VHF antenna.

Maintenance

UH-1 Class D mishap □ (H series) As fire button was depressed, loud noise was heard, followed by shift in lateral c.g. Left pod jettisoned, and copilot electrically jettisoned right pod to keep it from landing in congested area. Adapter wrench had not been inserted in locking bar on right side of pylon assembly, which failed to close hook assembly.

UH-1 Class E mishap □ (H series) Medium frequency vibration was felt after takeoff. Entire aircraft then began to shake. PC links were worn and out of adjustment.

AH-1 Class E mishaps □ (S series) Rotor tachometers indicated zero and transmission temperature indicated 165 degrees during runup. Crew chief had disconnected cannon plug after preflight for access to transmission drain plug and did not reconnect it. □ (S series) SCAS disengaged during flight. Caused by corrosion on cannon plug pins.

CH-47 Class D mishap □ (D series) Crew chief removed wheel chocks and placed them on ramp, then entered aircraft and closed ramp. One chock was in such a position that the ramp forced the chock against the fuselage, damaging sheetmetal.

CH-47 Class E mishap □ (C series) Crew chief saw hydraulic fluid leaking from rear of aft transmission. Fitting was cracked on pressure line from utility hydraulic pump. Crew chief had overtightened fitting.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**5**	**4**
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**19**	**17**

Messages received

- AH-1 maintenance information message concerning engine pressure torque transducer item replacement procedure (MIM-AH-1-MEM-84-03, 101330Z Feb 84).
- FORSCOM message concerning housing assembly for 540 main rotor system hubs. A recent FORSCOM aviation resource management survey revealed that the seals in some main rotor housing assemblies were installed backwards. FORSCOM recommends a one-time inspection of 540 main rotor systems for incorrectly installed seals.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM change

Change 1, dated 25 January 1984, to TM 55-1520-214-PMS for OH-6A helicopters, has been released. ■

Aviation mishap prevention forum

Aircraft Mishap Summary—October-December 1983

UH-1	Class	A	B	C	D	E	A+B+C	Avn Gnd	Total
Active Army	Number	2	2	8	16	241	12	2	269
Flying hours - 131,621	Rate*	1.52	1.52	6.08	12.16	183.10	9.12	1.52	204.37
Landings - 501,992	Cost	1,567,034	217,526	219,506	43,190	18,553	2,004,066	16,840	2,065,809
ARNG	Number	1	0	2	3	47	3	0	53
Flying hours - 37,799	Rate	2.65	0	5.29	7.94	124.34	7.94	0	140.22
Landings - 113,553	Cost	1,354,704	0	39,785	16,971	1,508	1,394,489	0	1,412,968
USAR	Number	0	0	0	0	10	0	0	10
Flying hours - 10,722	Rate	0	0	0	0	92.83	0	0	92.83
Landings - 31,304	Cost	0	0	0	0	0	0	0	0
UH-60	Class	A	B	C	D	E	A+B+C	Avn Gnd	Total
Active Army	Number	2	2	1	12	47	5	1	64
Flying hours - 23,255	Rate	8.60	8.60	4.30	51.60	202.11	21.50	4.30	275.21
Landings - 82,752	Cost	7,302,330	569,955	81,000	46,113	2,811	7,953,285	1,177	8,002,209
National Guard units flew the UH-60 92 hours, with 239 landings and no mishaps. Reserve units flew the UH-60 21 hours, with 56 landings and no mishaps.									
AH-1	Class	A	B	C	D	E	A+B+C	Avn Gnd	Total
Active Army	Number	0	0	2	9	121	2	0	132
Flying hours - 29,187	Rate	0	0	6.85	30.84	414.57	6.85	0	452.26
Landings - 104,640	Cost	0	0	66,296	22,174	7,087	66,296	0	95,557
ARNG	Number	0	0	0	1	2	0	0	3
Flying hours - 1,201	Rate	0	0	0	83.26	166.53	0	0	249.79
Landings - 3,759	Cost	0	0	0	100	0	0	0	100
CH-47	Class	A	B	C	D	E	A+B+C	Avn Gnd	Total
Active Army	Number	0	0	0	9	59	0	1	68
Flying hours - 11,833	Rate	0	0	0	76.06	498.61	0	8.45	574.66
Landings - 32,298	Cost	0	0	0	21,779	2,255	0	672	24,034
ARNG	Number	0	0	0	0	2	0	0	2
Flying hours - 1,058	Rate	0	0	0	0	189.04	0	0	189.04
Landings - 2,764	Cost	0	0	0	0	0	0	0	0
USAR	Number	0	0	1	1	3	1	0	5
Flying hours - 838	Rate	0	0	119.33	119.33	358.00	119.33	0	596.66
Landings - 2,808	Cost	0	0	10,000	7,800	0	7,800	0	17,800
OH-58	Class	A	B	C	D	E	A+B+C	Avn Gnd	Total
Active Army	Number	3	0	5	8	113	8	0	129
Flying hours - 57,063	Rate	5.26	0	8.76	14.02	198.03	14.02	0	226.07
Landings - 190,445	Cost	872,242	0	155,236	16,818	0	1,027,478	0	1,044,297
ARNG	Number	0	0	0	1	17	0	0	18
Flying hours - 9,648	Rate	0	0	0	10.36	176.20	0	0	186.57
Landings - 27,691	Cost	0	0	0	180	3,500	0	0	3,680
Reserve units flew the OH-58 1,979 hours, with 5,679 landings and no mishaps.									
Fixed Wing	Class	A	B	C	D	E	A+B+C	Avn Gnd	Total
Active Army	Number	1	0	2	6	124	3	3	133
Flying hours - 36,076	Rate	2.77	0	5.54	16.63	343.72	8.32	8.32	368.67
Landings - 38,977	Cost	2,037,996	0	40,358	16,388	0	2,078,354	61,000	2,094,742
ARNG	Number	0	0	1	0	14	1	0	15
Flying hours - 7,749	Rate	0	0	12.90	0	180.67	12.90	0	193.57
Landings - 9,846	Cost	0	0	10,800	0	4,997	10,800	0	15,797
USAR	Number	1	0	1	0	10	2	0	12
Flying hours - 1,686	Rate	59.31	0	59.31	0	593.12	118.62	0	711.74
Landings - 2,333	Cost	1,134,593	0	50,000	0	0	1,184,593	0	1,184,593

*All rates based on 100,000 flying hours

Aviation mishap prevention forum

Answers to last week's questions

1. There are two general types of hydraulic fluid. Both possess suitable characteristics but they are not interchangeable and cannot be mixed. What are the two types and what are their colors? Vegetable-based hydraulic fluid is composed essentially of castor oil and alcohol. It is dyed blue for identification. Mineral-based hydraulic fluid is processed from petroleum. It is dyed red for identification. **FM 1-400, page 1-22, par. 1-13c**

2. Only _____ fluid is used in the hydraulic systems of Army aircraft because it will not damage the synthetic rubber seals installed in the systems. Mineral-based. **FM 1-400, page 1-22, par. 1-13d**

3. Procedures for investigating and reporting aircraft mishaps are prescribed in what ARs? AR 385-40 and AR 385-95. **AR 95-1, page 2-5, par. 2-11**

4. What is the difference between a gas and a vapor? The terms "gas" and "vapor" are often used to mean the same thing, although there is a difference. A gas exists as a gas at ordinary temperature and pressure. A vapor is a gas-like form of a substance that is ordinarily a solid or liquid at ordinary temperature and pressure. Gases and vapors are divided into four groups depending on whether they are poisonous, asphyxiants, anesthetics, or irritants. Remember that each substance usually has more than one property. For example, it can be anesthetic and also poisonous. **FM 1-300, page 4-11, par. 4-5**

Questions for aviation personnel

1. May the pitot tube system be checked by the vacuum method? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

2. To become qualified as an instructor pilot examiner (IFE), an aviator must: _____ **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

3. Aircraft will not be intentionally flown into thunderstorms. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. How can you best prepare for a fire emergency during fueling operations? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

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Accident review: flight into IMC

Synopsis

The OH-58A pilot entered instrument meteorological conditions (IMC) while on a night VFR flight. He became spatially disoriented and lost control of the aircraft. The OH-58 hit the top of a tree and crashed, coming to rest on its right side.

History of flight

The pilot was assigned a mission to fly three passengers from one location on the military reservation to another and then return them to the original pickup point. After preflighting the aircraft, the pilot flew to the pickup point. The passengers were loaded and flown to their destination about 10 minutes away. They stayed about 2½ hours and were then flown back to the pickup point.

Another member of the unit, an OH-58 crew chief, asked the pilot for a ride to the unit field site. The pilot agreed. The aircraft was flown to a field strip, located in an airfield control zone, and refueled. The pilot and passenger then left the strip en route to the unit field site, which was in the same control zone.

The pilot called the airfield tower for clearance through the airfield control zone. He was told to remain clear of the runway centerline because there was an emergency in progress. The pilot acknowledged, returned to the strip, and held in flight for about 8 minutes. He called the tower again and requested clearance through the control zone. This was approved and the pilot proceeded.

After flying 2 to 3 minutes, the pilot was unable to find his unit field site because of an overcast condition and lack of ground reference lights. He began to fly in left orbits to search for the site. About 2 minutes later, the pilot entered instrument meteorological conditions. The OH-58 was about 500 feet above the ground and in a left turn when it entered IMC. The pilot tried to maintain control of the aircraft and started to climb to a higher altitude. He changed his transponder to emergency and called the tower three times to declare an emergency. He continued to try to control the aircraft, but he was unable to maintain or establish control as the aircraft banked left and right several times.

About 3 miles south of the airfield, the aircraft clipped the top of a tree and then crashed through several trees before coming to rest on its right side. The pilot sustained major injuries, and the passenger sustained minor injuries.

Crewmember experience

The 34-year-old pilot had more than 500 rotary wing flight hours, with more than 70 in the OH-58A. He had less than 1 hour of hooded flight training in the OH-58A.

Commentary

The pilot unintentionally entered IMC in the airfield control zone because he was not informed by the tower operator that the weather had deteriorated to IMC. He became spatially disoriented because of his low experience level in the OH-58, the absence of any documented instrument training in the OH-58, and the lack of any actual instrument flight in IMC anytime in his aviation career. Also, the available ambient light and the numerous left turns he

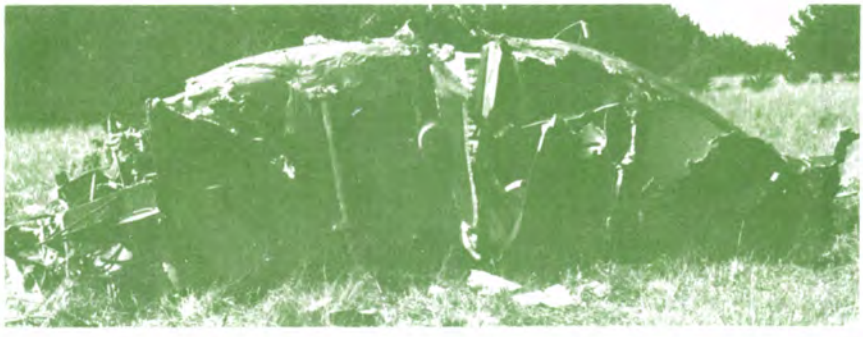
(continued on next page)

Flight into IMC

made just before and during the IMC portion of the flight contributed to the pilot becoming spatially disoriented.

During the sequence of the mishap, two communication problems surfaced that could have influenced the outcome of the mishap—the lack of communications between the pilot and passenger, as the passenger had no helmet or headset on, and the ongoing emergency at the airfield. When the pilot entered IMC and was having problems with control of the aircraft, he could have had his passenger activate the transponder to emergency and make the radio calls or frequency changes. When the pilot reached over, activated his transponder, and tried to call the tower, he became further disoriented within the cockpit.

The pilot made three attempts to call the tower to declare an emergency. The tower operator did not initially hear the entire transmission because of the activity in the tower. The operator had to make three more transmissions trying to understand what the pilot was trying to say. The operator heard no further calls from the pilot because the pilot had his hands full trying to control the aircraft.



At the time of the mishap and since 9 minutes before the mishap, the airfield control zone was under IMC. This condition was not broadcast to any aircraft in the control zone even though the weather information appeared on a weather monitor screen in the tower 4 to 7 minutes before the mishap. The tower operator did not see the new weather information and/or failed to recognize that the weather was, at that point, IMC. He allowed two more aircraft to operate in the control zone on VFR flight plans before the mishap. The crews of neither aircraft were informed by the tower operator that the control zone was IMC.

The tower operator was relatively inexperienced. The other controller on duty was a trainee. The operator did not recognize that the weather had changed to IMC even though the weather display monitor was located 2½ feet from him. There was no method within the tower to assure that the operators were immediately alerted when there was a significant change in the weather. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap □ (H series) Cargo tiedown strap came loose and fell out of aircraft but remained connected at ratchet point. Free end flapped against tail rotor drive shaft cover and tail boom, denting cover and tail boom.

UH-1 Class E mishaps □ (H series) Engine oil pressure rose above upper limits during flight. Caused by failure of oil pressure relief valve. □ (H series) Fire warning light came on. Caused by defective fire detector control. □ (H series) Master caution and transmission oil pressure lights came on. Gasket on transmission filter failed, resulting in loss of transmission fluid. □ (H series) Feedback in cyclic was caused by failure of left lateral servo cylinder. □ (M series) No. 1 hydraulic light came on and pedals became stiff during hover. Hydraulic pump pressure line failed at phenolic block.

UH-60 Class D mishaps □ As aircraft was landed, crew chief noticed that left cargo door windows were missing. When troops were offloaded earlier, one of them inadvertently pulled emergency release handle on door instead of open/close handle. □ Aircraft hit treetops during NOE flight, damaging three main rotor blade tip caps.

UH-60 Class E mishaps □ Master caution light came on during flight. Caused by failure of master caution box. □ No. 1 hydraulic reservoir low light and No. 1 and 2 tail rotor servo lights came on. Caused by defective hydraulic line quick disconnect fitting.

Attack helicopters

AH-1 Class E mishaps □ Engine oil pressure light came on. Caused by failure of oil pressure transducer. □ (S series) Engine oil pressure rose during climb. Caused by failure of turbine fan bearings. □ (S series) D.C. voltmeter went to zero during approach for landing. Caused by failure of reverse current relay. □ (S series) Crew smelled electrical fumes during hover. Master caution, alternator, and rectifier lights came on. Caused by failure of generator.

Cargo helicopters

CH-47 Class D mishaps □ (C series) Postflight inspection revealed that No. 6 drive shaft was scored. Zeus fastener was found in vicinity of drive shaft. When crew preflighted aircraft, they did not notice that tunnel cover zeus fastener was not secured. Worn retaining clip allowed fastener to fall out. □ (B series) Crew was performing upslope landings with SAS off. As forward landing gear hit the slope, pilot overcontrolled in the pitch axis. Left lower chin bubble and pilot's searchlight were broken. □ (C series) As empty fuel drums were being slingloaded, one drum was released. Roll pin worked loose on one side of grab hook keeper, allowing spring to slip off keeper and chain leg to fall out.

CH-47 Class E mishaps □ (B series) Malfunction of No. 1 SAS lower extensible link allowed hydraulic fluid to leak. □ (C series) Transmission oil pressure light came on during flight. Forward transmission oil had been drained and refilled by crew because aircraft was flown in dusty environment with filler cap in open position. Crew did not allow for line and filter capacity when transmission was replenished with oil after draining.

Observation helicopters

OH-58 Class D mishaps □ (A series) Main rotor blade hit tree during NOE flight. Blade tip cap was damaged. □ (A series) After aircraft was secured for the night, two other aircraft hovered by. Left rear passenger door was blown off its hinges by rotorwash from hovering aircraft.

OH-58 Class E mishaps □ (A series) Main rotor noise and vibration level increased during climb. When aircraft was landed, approximately 24 square inches of blade surface was missing from area adjacent to tip cap and aft of spar. □ (C series) Engine flamed out during runup. Caused by clogged fuel filter. □ (A series) Low rpm light and audio activated. Caused by electrical short. □ (A series) Engine oil temperature gauge indicated +5° C. during flight. Caused by failure of temperature bulb.

Fixed wing

U-21 Class E mishaps □ (A series) Pilot noticed during flight that left nacelle tank was siphoning fuel. Fuel cap was not secured correctly. □ (RU-21H) No. 1 engine oil pressure fluctuated and oil was seen streaming from engine accessory section vent. Caused by failure of oil cooler return line.

U-8 Class E mishap □ (F series) After completing preflight, pilot asked crew chief to latch cowling on engines. Pilot

did not doublecheck engine cowlings for security. During takeoff, left inboard cowling came off.

OV-1 Class C mishap □ (C series) Aircraft began shuddering after touchdown. Pilot reversed both engines and started braking, but vibrations were so severe that pilot's feet were thrown from the pedals. Full reverse was used, and as aircraft slowed pilot was able to get feet back on brakes and stop aircraft. Left main gear torque arm assembly failed at both upper attaching points, allowing wheel to rotate clockwise. Left main gear assembly had to be replaced.

OV-1 Class D mishap □ (D series) As pilot was taxiing to parking ramp at night, right wing tip navigation light lens hit 8-foot chain link fence pole. Lens was broken and wing tip cracked.

OV-1 Class E mishap □ (D series) No. 2 engine fuel pressure light came on. Caused by failure of engine-driven fuel pump.

Maintenance

UH-1 Class E mishaps □ (H series) During climbout, crew noticed there was no indication of airspeed or change in altimeter. Maintenance personnel had crossed pitot static lines and had not completed pitot static check following installation. □ (H series) Rotor and N_2 bled off with application of power on short final for landing. Variable inlet guide vane and bleed band were out of rig. □ (V series) Crew saw fluid on the ground after approach to pinnacle. Inspection revealed fuel on engine deck. Fuel was leaking from packing on fuel manifold. Manifold was crushed during installation.

AH-1 Class E mishaps □ (S series) Engine and transmission pressure rose during hover. O-ring in P-3 coupling was installed incorrectly, stopping air flow to oil cooler. □ (S series) Cyclic felt unusually stiff after takeoff. Cyclic friction was adjusted incorrectly. □ (S series) No. 1 hydraulic light came on, and large amount of fluid was seen coming from right side of aircraft. Two lines in transmission area had chafed together, causing hydraulic line to rupture. □ (S series) Crew heard loud whining noise. Master caution and No. 1 hydraulic lights came on, and tail rotor pedals became stiff. Loose jam nut on hydraulic accumulator cylinder allowed hydraulic fluid to drain from No. 1 system.

OH-58 Class E mishap □ (C series) As voltage regulator was being adjusted during engine runup, main generator kept falling off line. Crew chief was unable to tighten adjustment without increasing electrical load and forcing generator off line. Adjusting screw locknut was previously overtightened. As crew chief tried to loosen locknut, potentiometer broke free from voltage regulator case.

U-21 Class E mishap □ (RU-21H) Landing gear in transit light came on, left main gear light indicated unsafe, and gear warning horn sounded during takeoff. Set screw on landing gear safety switch was not tightened, allowing circuit to activate when power was applied.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**5**	**4**
	March	2	5	1-7 Mar	**1**	**0**
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**20**	**17**

TM changes

The following changes to TMs have been released:

- Change 34, dated 31 January 1984, to TM 55-1520-235-10 for OH-58C helicopters.
- Change 29, dated 27 January 1984, to TM 55-1520-228-10 for OH-58A helicopters.

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 99 □ 7 Mar 1984

Aircrew training manuals

Effective 1 October 1983, the Directorate of Evaluation and Standardization (DES) became the proponent of the Aircrew Training Manuals (ATM).

Questions and comments on the ATMs should be directed to the ATM coordinator, Mr. Jim Patton, AUTOVON 558-4603/4770. Written comments will be addressed to Commander, USAAVNC, ATTN: ATZQ-ES-SL, Fort Rucker, AL 36362.■

Instrument flight evaluation

AR 95-1, Change 1, Instrument Flight Evaluation (paragraph 3-30b), will consist of a minimum of one precision and one nonprecision approach. Evaluation in the second category will consist of a minimum of one approach.■

Orientation Flights

Paragraph 2-6b, AR 95-1, permits Army aircraft to be used for orientation flights as defined in DOD Regulation 4515-13R, chapter 9. The intent of paragraph 2-6b is to permit unqualified persons to fly **in** Army aircraft—not fly them. Paragraph 1-8a specifies the only persons authorized to fly Army aircraft; it intentionally excludes nonrated personnel, regardless of the purpose for the flight.■

Recommended changes to operator's manuals and checklists

Each operator's manual (-10) and checklist (-CL) provides an address to which recommended changes for suggested improvements are to be sent. Paragraph 1-10e, AR 310-3, gives the following guidance:

"Types of comments that should be avoided are those that—

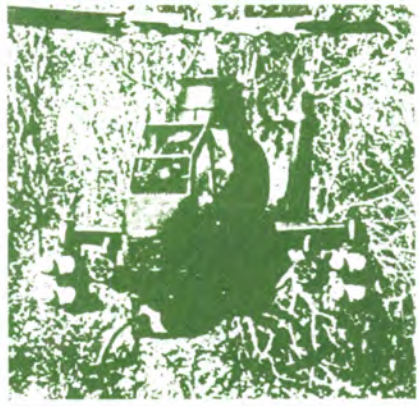
(1) Make only slight improvement in the text.

(2) Ask a question instead of giving an answer.

(3) Are based on minor differences of opinion or wording.

(4) Point out obvious editorial errors, misspelling, or errors in punctuation, unless the errors change the intended meaning."

If recommended changes meet the above criteria, contain valid reasons for the recommendations, and are forwarded through aviation unit commanders to the proponent(s) for the publication, there can be a significant improvement in the quality of -10's and -CL's.■



Clarification of TM 55-1520-236-10, AH-1S helicopters

The torque limits given in the various operator and maintenance manuals are always what is called "calibrated" torque limits. This limit does not take the engine torque variances into consideration. The "indicated" torque reading is different for each aircraft depending on the engine installed. Each engine has a torque value stamped on the data plate. Using this torque and the charts in Chapter 7 of the -10 manual will allow you to figure the "indicated" torque for the particular engine installed. Figure 5-1, page 5-2, is being changed to read:

"100% maximum calibrated torque. See Chapter 7 for indicated torque values."

CY 83 STACOM Index

STACOM 87, 19 Jan - CY 82 STACOM Index, Questions and Answers

STACOM 88, 2 Mar - AH-1 Skid Gear, Designation as PIC During Series Transition, AH-1 Transition, Armament System Preflight, Questions and Answers

STACOM 89, 23 Mar - Operator's Manual and Checklist Update

STACOM 90, 20 Apr - Marginal Wx-Deteriorating WX-IMC, Common ARMS Deficiencies, Change to OH-58A Checklist

STACOM 91, 1 Jun - Army Aviation Accident Prevention Awards, Safe Single Engine Airspeed, Master Clock, Installation and Area Aviation Standardization Committees, Maintenance Operation Check (MOC) Qualification

STACOM 92, 6 Jul - Night Hooded Flight, Airman's Information Manual (AIM), Ejection Seat Training, Aircrew Information/Reading Files, Procurement of Pink Filters for NVG Users

STACOM 93, 3 Aug - Lightning - A Striking Matter, Aircrew Information/Reading Files, Pilot in Command (PIC), Professional Leadership by Example

STACOM 94, 31 Aug - Operator's Manual and Checklist Update

STACOM 95, 21 Sep - US SAR Satellite Launched Worldwide Coverage, Performance Planning, UH-1 and AH-1 Gross Weight Validation Factor (Torque), Directional Control Margin, Maintenance Test Flight Evaluators (MTFE)

STACOM 96, 30 Nov - Survival Gear -How is Yours?; Night Goggle Qualified?; New Training Extension Courses■

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-3589 during duty hours; 558-6487 after duty hours.

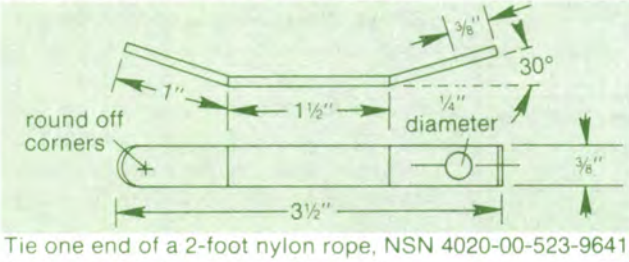
Aviation mishap prevention forum

Huey CCR receiver FOD

You Huey crew chiefs need to take a close look at the closed circuit refueling receiver on your UH-1E, -1H, and -1V birds. Chips and flakes from the plastic latch tool—item 7, figure 329, TM 55-1520-210-23P—have been found in the throat opening.

'Course the chips are flushed into the fuel cell when you refuel. This could stop up a fuel line filter.

Check the latch tool, too. Toss it if it's chipped or nicked. Fabricate a replacement latch tool from aluminum alloy plate, NSN 9535-00-084-4519, like so:



Tie one end of a 2-foot nylon rope, NSN 4020-00-523-9641, through the hole. Loop the other end around your wrist when you use the latch tool. Check your SSSC for nylon rope before you order it. ■

—from PS, February 1984

Answers to last week's questions

1. May the pitot tube system be checked by the vacuum method? No. Do not apply suction to pitot lines or pressure to static lines. **TM 55-1500-204-25/1, page 3-127, par. 3-300**

2. To become qualified as an instrument flight examiner (IFE), an aviator must: Successfully complete a course of instruction for IFEs at the U.S. Army Aviation Center or be an IP who successfully completes an IFE equivalency evaluation administered by an IFE selected by HQDA (DES). **AR 95-1, page 3-6, par. 3-26**

3. Aircraft will not be intentionally flown into thunderstorms. True or false? True. **AR 95-1, page 4-1, par. 4-2**

4. How can you best prepare for a fire emergency during fueling operations? Know the rate of flame spread for aviation fuel and how to use the fire extinguishers. Prepare yourself to make an instant decision and take instant action. **FM 10-68, page 8-17, par. 8-12** ■

Questions for aviation personnel

1. Aviation units will establish and maintain aircrew training and information reading files per what publication? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

2. Night vision goggles affect dark adaptation. If you dark-adapt before donning the goggles and remove them in a darkened environment, you can expect to regain full dark adaptation in about how many minutes? **Reference: FM 1-204, Night Flight Techniques and Procedures**

3. The aircraft mishap prevention survey is an effective means of evaluating the condition of a unit's aviation safety program. As a minimum, surveys will be made how often? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention** ■

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Mission briefings—necessary for mission success

Too many times, people undertake tasks they don't fully understand or for which they are not prepared. This includes aircraft crews. If a crew is not properly briefed as to what a mission is all about and is not fully prepared for the mission, the mishap record shows that the results are usually a great deal less than desirable. If there is a gap in communications or a misunderstanding anywhere along the line in planning, coordinating, and briefing the mission, the operation can be in deep trouble before the rotors turn.

Lack of or incomplete mission briefings were cited as factors in the following mishaps. Although this did not definitely contribute to the crash in every case, it could have.

• The aviation company was on a 3-day training exercise. The aviation personnel did not receive a briefing before the exercise began. The unit commander was not familiar with the requirement for a briefing, and the unit aviation safety officer did not attend the key personnel planning conference conducted before the exercise.

The crews of three UH-1 aircraft were assigned a tactical air assault insertion mission. The air mission commander (AMC) attended a briefing given by the operations officer, but the briefing was not conducted in accordance with the unit field standard operating procedures. The operations officer did not use the AMC checklist to brief the AMC, and then the AMC did not use the checklist to brief the flight crews. Several required items were not briefed. It was almost midnight, and everyone was anxious to get to bed because of the early morning flight.

The unit commander created an atmosphere of urgency associated with mission accomplishment. He was trying to make up time lost because of a weather delay. Because of the perceived sense of urgency, the flight was launched the next morning without a weather briefing. The aircraft had been preflighted the night before. A walk-around inspection, without the aid of a checklist, was done before the start of the mission. The crew of the lead aircraft checked the aircraft weight and balance computations but did not consider or prepare a performance planning card.

The three aircraft took off and flew to the pickup zone. The commander had told the crews to remove the passenger seats and to hurry up with the mission since they were late. Landing at the pickup zone, the three aircraft were

(continued on next page)

Six aircraft took off in weather conditions below that required for night VFR. The No. 2 aircraft crashed. The mission briefing did not include information on IMC breakup procedures.

Mission briefings

loaded with seven passengers each. The crew of the lead aircraft did not brief their passengers and took off without one of the passengers being secured because they did not want to take the time for the passengers to rearrange themselves so everyone would have a seatbelt. There was also no passenger manifest on file.

A few minutes after takeoff, the pilot of the lead aircraft began a shallow approach to a sloping area. The right skid hit tne ground about 100 yards short of the intended touchdown point. The pilot tried to maintain control of the aircraft with cyclic inputs, but the aircraft rolled onto its right side. One passenger, who was not wearing his seatbelt correctly, sustained minor injuries.

The pilot of the lead aircraft, in addition to operating under an atmosphere of perceived mission urgency, was suffering from fatigue. He had exceeded the unit's established limits for duty for the past 24-, 48-, and 72-hour periods and had slept only 5 hours in the past 24 and 11 hours during the past 48-hour period.

• Another UH-1 was the lead aircraft of a flight of four moving soldiers from one location to another. The copilot of the lead aircraft, who was at the controls, was unable to attend the premission briefing and received summary-type information from the other pilot on board. There was not a wire hazard map in the field operations office, and a route recon was not done before the flight, which was to be conducted below the highest terrain feature.

After flying along a highway for several minutes, the flight went into a tactical trail formation, flying about 125 feet above the ground and 90 knots airspeed. The copilot saw one set of wires and flew over them, watching them out the right side of the aircraft. When he looked back to the front of the aircraft, he saw more wires in his flight path. The pilot, who was navigating, looked up about the same time. The Huey hit the wires and crashed into trees.

AH-1 crashed after hitting trees during takeoff from an unlighted confined area at night. The pilot did not receive a preexercise maneuver briefing.

• A flight of six aircraft took off in weather conditions below that required for night VFR. The pilot of the No. 2 aircraft lost sight of the lead aircraft and inadvertently placed his UH-1 in a descending left turn after becoming spatially disoriented. The aircraft crashed and the three crewmembers were killed.

A current weather briefing was not obtained before the flight, and the mission briefing did not include information on inadvertent IMC breakup procedures.

The pilot had graduated from flight school a few months before the crash and had done no instrument work since graduating. The IP on board the aircraft had been on duty more than 7 hours beyond the maximum allowable limit and was known to be fatigued.

• A unit was engaged in a field training exercise. The unit had no specific procedures for night operations or airfield operations, and a preexercise maneuver briefing was not conducted for the aviation personnel.

An AH-1 pilot was assigned a night mission. The pilot did not get a weather briefing, did not prepare or consider a performance planning card, did not determine the correct weight and balance of the helicopter, and completed a through-flight inspection without the aid of a checklist. As the pilot prepared to take off from an unlighted confined area, the aircraft drifted aft and right at hover altitude. The main rotor blades hit several trees, and the AH-1 crashed.

• A UH-1 pilot had no formal mountain training or mountain flying experience, and the copilot's most recent mountain flying experience was 9 years before. The aviators were assigned a mission to transport some soldiers to a mountain range, but neither aviator was briefed on the mountainous terrain flight.

The helicopter was landed on a mesa, and the soldiers got out and completed their mission. They then got back in the aircraft and takeoff was made. The pilot tried to take off without considering the effects of weight, density altitude, and wind on aircraft performance. The commander did not require pilots to consider and plan operating limits of aircraft in relation to environmental conditions expected during the mission.

The aircraft entered effective translational lift and the pilot increased power, reducing the availability of left pedal control. The aircraft then encountered adverse winds near the mesa edge which increased the requirement for left pedal beyond that available. The aircraft spun to the right and crashed.

Planning a unit's missions is management's job. And the chain of command

up to the commander must become involved. Mission briefings which define all the parameters of the mission should be given by a member of the chain of command or by the operations officer in accordance with the unit SOP. This is particularly critical for single-ship, single-pilot missions, where the pilot is on his own, out from under direct supervision. While commanders and operations officers can't go on every flight, they can make sure the aircraft crew is prepared for the flight in every way possible. They can make sure before the flight that the crew has a thorough understanding of the mission, how the mission is to be flown, and the risks involved. Making sure the crew is fully briefed is the first critical step toward insuring mission completion. ■

Briefing the other crewmember

As the designation implies, the pilot-in-command (PIC) of an aircraft is in a command position. The PIC is the commander of the aircraft and assumes a lot of responsibility everytime he signs his name to the flight plan. That responsibility covers everything from flight plans to emergency procedures—from crew briefings to passenger briefings. With all of these areas of responsibility, no area seems to be more important than a good crew briefing.

Before a mission, the PIC makes all his plans, then he and the copilot talk about the mission, the weather, route of flight, transfer of controls, emergencies, crew communication, radio procedures, etc. After all the appropriate steps are taken before the start of the mission, the PIC and copilot preflight the aircraft with the crew chief and continue with the mission. This is how it should be—procedures followed, crew briefed, and mission accomplished.

The crew briefing is an essential part of following procedures, achieving maximum crew communication, and accomplishing the mission. That briefing is an important asset available to the PIC for the safe accomplishment of the mission. But wait a minute. Isn't something missing? Isn't there another crewmember who needs to know what's going on?

Let's think about what the PIC did. He very carefully planned his mission, he called in his copilot and gave him a thorough briefing, he received his weather and filed his flight plan, both he and the copilot preflighted the aircraft with the crew chief . . . That's it, the crew chief! What about briefing the "other crewmember," the crew chief? Doesn't he need to know something about the route of flight, weather, cargo, refueling, emergencies, crew communication, and any special instructions pertaining to the mission? These are just a few of the items that should be related to the crew chief to enable him to be an effective member of the crew. The information given to the crew chief is just as important as the information given to the copilot. There are times during the flight when the PIC needs to rely on the crew chief just as he relies on the copilot. He should have previously coordinated with the crew chief so there can be maximum communication among the crew.

Consider for a minute the crew communication required in ground taxi operations. Is communication with the crew chief essential? You better believe it is. How about clearing the tail of the aircraft in an NOE environment? Is there a need to communicate with the crew chief? You bet.

At some point during aircraft operations, either today or tomorrow, the PIC will need to communicate with the "other crewmember." Prepare that crewmember by telling him what you expect of him. The time you spend briefing the "other crewmember" will be time well spent.

Enhance crew effectiveness by thoroughly briefing **all** of the crew. The PIC is responsible for briefing the crew. The crew includes the crew chief. ■

—CW2 Francis E. White
243d Aviation Company (ASH)
Fort Lewis

Secretary of the Army John O. Marsh, Jr. (left) congratulates LTC Robert L. Stewart, the first Army astronaut, upon the successful landing of his space shuttle flight Challenger at the Kennedy Space Center. On hand also to greet Stewart, the first of two astronauts to walk untethered in space, was LTG Arthur E. Brown, Jr., Director of the Army Staff in Washington.

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (H series) Flight of five landed on road. After loading troops, lead aircraft picked up for hover check. As aircraft came to 2-foot hover, it began to drift right. Right ski hit 2- to 2½-foot-high snow bank. Aircraft rolled right and came to rest on right side. Main rotor blade severed tail boom and transmission separated from aircraft. 8425

UH-1 Class D mishap □ (V series) Master caution and engine chip detector lights came on during maintenance test flight. As pilot started a turn toward the airfield, loud squealing noise was heard and aircraft vibrated. Pilot lowered collective and started approach to open field. As pilot started to increase collective to slow aircraft descent and cushion the landing, aircraft yawed sharply to the left. Pilot then rolled off throttle and tried to cushion the landing with the remaining collective. Aircraft landed with about 15 knots airspeed in plowed field. Right chin bubble was broken and cross tubes were damaged.

UH-1 Class E mishaps □ (H series) Master caution and hydraulic lights came on. Caused by malfunction of hydraulic pressure switch. □ (H series) Fire light came on. Caused by malfunction of fire detector control box. □ (H series) Cyclic moved toward right rear quadrant during flight. Caused by failure of irreversible hydraulic valve. □ (H series) The night mission called for troops to be rappelled into a confined area. The rappel master was on board the aircraft. The crew was wearing night vision goggles. As the aircraft was brought to a hover and the ropes dropped, the crew chief told the pilot the aircraft was too high and to descend. As pilot began the descent, four rappellers were told by the rappel master to stand on the skid. Without a command from the rappel master or the crew, the unit platoon leader began to rappel. The other rappellers followed him. The ropes were 60 feet long. All four rappellers reached the end of the ropes and fell about 10 feet. Two of them required first aid. The platoon leader had not slept the night before because of staff duty. The rappel master was not wearing goggles and was unable to determine aircraft height. He was relying on the crew chief for height commands. □ As aircraft was hovering for takeoff, swarm of bees blanketed aircraft. Some bees penetrated interior of aircraft. Pilot landed to await departure of bees. Suspect attack was by African killer bees.

UH-60 Class D mishaps □ As troops were getting out of aircraft, squad leader threw smoke grenade through turning rotor blades, damaging one main rotor blade. □ Main rotor blades hit tree branches during NOE flight. Tip caps were damaged.

Attack helicopters

AH-1 Class C mishap □ (S series) Main rotor blades hit trees during takeoff from confined area.

AH-1 Class D mishaps □ (S series) AH-1 was cleared to land at night on a lighted pad. A UH-1 was parked on the pad, with a crew chief on top of aircraft. Ground personnel thought AH-1 was going to land on UH-1. When AH-1 pilot saw something on the pad, he stopped his descent and brought aircraft to a high hover to the rear of the UH-1. Crew chief jumped from the UH-1 to the concrete pad, injuring both of his heels. Pilot inside parked UH-1 realized what was happening and shined a light outside his door. AH-1 pilot saw light, hovered to the left, and landed on another pad. □ (S series) Main rotor blades hit tree branch during NOE flight.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	1-14 Mar	**2**	**0**
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**20**	**17**

AH-1 Class E mishaps □ (S series) N_2 tachometer needle dropped to zero. Caused by failure of tachometer generator. □ (S series) Master caution, alternator, and rectifier lights came on. Caused by failure of alternator relay. □ (S series) Engine oil pressure gauge went to 0 psi during takeoff. Caused by failure of transducer. □ (S series) Master caution and d.c. generator lights came on. Caused by malfunction of engine cutout relay.

Cargo helicopters

CH-47 Class C mishap □ (C series) Blowing dust in LZ caused pilot to lose visual reference. Aircraft began drifting toward trees, and pilot jettisoned sling-load, which was a 2½-ton truck.

CH-47 Class E mishaps □ (D series) Crew chief saw hydraulic fluid leaking from No. 2 flight boost module onto cargo ramp. Drain line on module had separated from fitting. □ (B series) No. 2 engine fire light came on. Caused by short in wiring in fire control handle. □ (C series) No. 2 engine low oil light came on and oil pressure fluctuated. Aircraft was landed and engine was filled with oil. Engines were started again. No. 2 engine failed at ground idle. Crew chief noticed that N_2 was not turning.

Observation helicopters

OH-58 Class D mishap □ (C series) Master caution light came on during takeoff from field site at night. Pilot was wearing night vision goggles. Pilot's attention was diverted to the light and tail rotor blades hit small tree. Cause of master caution light illumination is unknown.

OH-58 Class E mishaps □ (C series) Tail rotor chip detector light came on. Caused by water contamination and shorting of gearbox wires. □ (A series) As aircraft was hovering forward, it hit communication wire strung between two trees. Wire hit windscreen and slid up to upper wire cutter. Wire was cut into two pieces. Aircraft was landed with no damage. Wire was not on wire hazards map. □ (A series) Aircraft was shut down for engine oil sample and then would not crank. Caused by broken wire from starter generator to voltage regulator. □ (A series) Copilot felt forward jolt on cyclic and unusual feedback. Suspect isolation mount bearing wear.

Fixed wing

U-21 Class E mishaps □ (A series) When prop levers were pulled to feather position on shutdown, No. 1 propeller failed to feather. Caused by failure of pilot tube. □ (RU-21H) Heater stopped during flight. Temperature at altitude was -35° C. Caused by failure of combustion blower. □ (RU-21H) No. 1 engine lost power. Caused by bearing failure on input shaft of fuel control.

OV-1 Class E mishaps □ (D series) Right main landing gear would not retract. Cylinder attached to landing gear fairing was allowing fluid to bypass and return into hydraulic pump reservoir. □ (D series) No. 1 engine developed only 57 percent torque during takeoff. Caused by failure of signal data converter.

Maintenance

UH-1 Class D mishap □ (H series) Post-flight inspection revealed hole in outside edge of tail rotor. Dzus fastener was missing from 42-degree drive shaft cover. Dzus fastener did not have the correct grommet.

UH-1 Class E mishaps □ (H series) Crew chief smelled fuel and saw fuel leaking from connectors at cargo deck. Auxiliary fuel line was leaking at quick disconnect. O-ring was missing from quick disconnect and elbow. □ (H series) As aircraft was picked up, unusual noise was heard. Caused by incorrectly adjusted bleed band.

AH-1 Class E mishap □ (S series) Master caution and engine oil bypass lights came on. Engine oil reservoir was below sight glass. Crew chief had filled reservoir before flight.

OH-58 Class E mishap □ (C series) When copilot exited aircraft, he saw oil on left side. Transmission oil pressure transducer had been removed and oil line capped off with a plastic, threaded FOD cap. Oil was leaking from around the cap. Pilot had inquired about the plastic cap and was told by a crew chief that it was okay. Pilot failed to follow up his concern and flew the aircraft.

OV-1 Class E mishap □ (D series) Right main landing gear would not fully retract after takeoff. Landing gear oleo was overserviced.

Messages received

• Maintenance information message concerning revision of implementation date (MIM-MPSD-GEN-83-02, 281330Z Dec 83). After 1 January 1985, rotary wing maintenance test flights will be accomplished only by graduates of the Aircraft Maintenance Test Flight Course.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Aviation mishap prevention forum

Aircraft seatbelts

Some newly manufactured aircraft seatbelts, NSN 1680-00-516-6543, P/N 54H19651-10, are being supplied with the old style latch MS22013-1. The latest configuration for this belt employs the preferred shovel type latch MS3488. Units receiving seatbelts with the old style latch MS22013-1 should submit Standard Form 368, Quality Deficiency Report (QDR), to alert the source of supply of this problem. Address your QDRs to: Assistant to Commander for Quality Assurance, ATTN: QAI, Kelly Air Force Base, San Antonio, TX 78241, with an information copy to DRCPO-ALSE, 4300 Goodfellow Boulevard, St. Louis, MO 63120. Seatbelts with the old style latch MS22013-1 are authorized for continued use until further notice. DRCPO-ALSE point of contact is D.B. Hopkins, AUTOVON 693-3880. ■

—from U.S. Army Aviation Digest

Help needed in revising ASO Handbook

The Army Safety Center is revising the Aviation Safety Officer Handbook. We need your ideas and comments on the topics you would like to see included in the handbook. Call Major Childress at AUTOVON 558-4479/3164, or write to Commander, U.S. Army Safety Center, ATTN: PESC-TD, Fort Rucker, AL 36362. We'd appreciate your input by 30 April. ■

Answers to last week's questions

1. Aviation units will establish and maintain aircrew training and information reading files per what publication? TC 1-134. **AR 95-1, page 3-1, par. 3-2**

2. Night vision goggles affect dark adaptation. If you dark-adapt before donning the goggles and remove them in a darkened environment, you can expect to regain full dark adaptation in about how many minutes? Two minutes. **FM 1-204, page 1-7, par. 1-8d**

3. The aircraft mishap prevention survey is an effective means of evaluating the condition of a unit's aviation safety program. As a minimum, surveys will be made how often? Semiannually. **AR 385-95, page 2-1, par. 2-5**

Questions for aviation personnel

1. All aircraft will be grounded (earthed) at all times (on ramp or in hangar). True or false? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

2. A crew/passenger manifest is required for all flights. For tactical or tactical training flights, the passenger manifest will be prepared and retained by the supported unit. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

3. Can fuel that has been drained during defueling operations be returned to a fuel storage system or refueler? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

4. How are FOD hazards reported? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

Clarification

Reference the 15 February 1984 Forum. In answers No. 2 and 3, we used the word "operating." This word should have been "operational" in both answers. Also, in answer No. 2, table 4-2 of AR 95-1 specifically lists all day, night, and **IMC** flights as the types of flights requiring an anticollision light system. ■

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What's happening with the UH-60?

There's a great deal of serious concern in the Army aviation community about the recent UH-60 mishap record. A look at the Class A rate for FY 84 shows why. So far this fiscal year, the Black Hawk has the highest Class A mishap rate of any helicopter in the Army.

Since it was fielded in late 1979, the UH-60 has been involved in 13 Class A and 6 Class B mishaps. Twenty crewmembers and passengers were killed in seven of these mishaps.

The UH-60 has power, speed, sophisticated avionics, twin engines, and an automatic flight control system that practically flies the aircraft by itself. The Black Hawk is "state of the art" in reliability and crashworthiness. It is a "pilot's aircraft" . . . yet pilot error has been the cause of 10 of the 19 Class A and B mishaps. Following are briefs of seven of these pilot-error mishaps. If you fly the Black Hawk, carefully review these mishaps, keeping in mind that while the UH-60 is a "pilot's aircraft" it is not totally forgiving of pilot error.

• The UH-60 was participating in a fly-in/static display. The crew was asked to demonstrate the flight characteristics of the aircraft. The copilot was told by the airfield commander that no passengers were to be on board during the demonstration. The aircraft took off with a crew of three and three passengers. During a low-level, high-speed pass, the pilot put the aircraft into a right bank which exceeded 90 degrees. Because of the excessive bank, the aircraft lost altitude. The pilot realized he was losing control of the aircraft and banked to the left. While the aircraft was still in a 10-degree right bank, the main rotor blades, tail wheel, and right main landing gear hit the ground. The aircraft then slid to the left and hit a block building. Five of the six people on board sustained major injuries and one sustained minor injuries.

• A UH-60 pilot, flying from the left seat, began an approach to a large open area where other aircraft were parked. The pilot terminated the approach at 30 feet agl and hovered while looking for an area to complete the landing. As he did so, he allowed the aircraft to drift to the right and hit three powerlines. The wires paralleled the direction of flight of the aircraft and were not seen by the crew. Three major injuries resulted from the crash.

• Three UH-60s were on a night vision goggle proficiency training flight. As the flight proceeded up a narrow valley, at an airspeed of about 40 knots and an altitude of 100 feet above the treetops, the No. 2 aircraft's main rotor system hit a tree on rising terrain to the right of the aircraft. The aircraft went into an immediate right bank, yawed left, hit other trees, and crashed nearly inverted. All four people on board were killed. Supervision was also a factor in this mishap,

(continued on next page)

What's happening with the UH-60?

as the flight leader selected an unnecessarily low altitude in a deep narrow valley for the training mission, severely limiting lateral obstacle clearance.

• Another night mishap occurred when the crew overflew a pickup zone and began a wide right turn to return to the zone and land to a lighted "Y." During the turn, the gradual descent of the aircraft went unnoticed by the crew because they were concentrating on the intended landing area. The copilot was the first to notice that the aircraft was descending. He tried to warn the pilot, but the UH-60 hit the top of a tree. The pilot was able to continue a controlled landing into the pickup zone. Class B damage resulted.

• Two UH-60s were on a night support mission. They circled the landing zone once and set up for a final approach. The No. 2 aircraft was positioned slightly offset to the left of centerline of the lead aircraft so the pilot could maintain visual reference to lead's three formation lights. Separation between the aircraft was at least two rotor discs. As the lead aircraft neared the ground, its rotorwash induced blowing dust and sand. The No. 2 aircraft flew into the blowing dust, partially obscuring the pilot's vision. The copilot concentrated his attention on the lead aircraft's formation lights. As the lead aircraft set down, it turned slightly to the right from the final approach course heading. Trying to maintain his position from the lead aircraft, the No. 2 pilot drifted left. As he did, the main rotor blades hit a tree. The pilot was able to land without further damage. Class B damage resulted.

• An IP and pilot were on a night training flight. After completing several maneuvers, the IP asked the pilot what he would like to do next. The pilot requested a simulated single-engine run-on landing. With the IP on the controls, the aircraft was positioned on the right downwind leg of the runway at an approximate altitude of 1,000 feet agl and indicated airspeed of 120 knots. After the prelanding check, the IP pulled the No. 2 power control lever (PCL) from "fly" to "idle detent." He then flew the remainder of the downwind leg and turned left onto the base leg. As the IP started a 360-degree turn for traffic spacing, the pilot pulled the No. 1 PCL from "fly" to "off." He then inadvertently pushed the No. 2 PCL into "ECU lockout" and, in an effort to regain normal governing, pulled it past "idle" to "off," shutting the engine off. As a result, all engine power was lost at an altitude too low for an engine restart.

Pilot inadvertently shut off the operating engine during a simulated single-engine landing. Altitude was too low for an engine restart.

In an attempt to divide his attention between the collective that was creeping up when released and the power control levers, the IP allowed main rotor rpm to decay to a low state condition. He flared the aircraft and pulled collective pitch too low and too late because he could not judge his closure rate with the ground due to insufficient visual cues. The landing light was inoperative, and the IP, before the flight, did not extend and position the searchlight so it would effectively illuminate the ground in the event of an emergency. The UH-60 clipped several trees, hit tail wheel first in a nose-high attitude, pitched up, and came to rest on its right side. The IP, pilot, and crew chief sustained major injuries. Contributing to this mishap was the design of the idle detent cam on the engine control quadrant which allowed the inadvertent shutdown of the No. 2 engine.

• Two UH-60s were transporting troops. The weather briefing indicated weather along the flight route would be VMC. After 20 minutes of flight, the weather began to deteriorate. The crews continued to fly low level through valleys and over rising terrain. As the weather continued to deteriorate, the second aircraft dropped back about 100 meters behind the lead aircraft. The flight leader moved forward to try to find a route through the fog. The crew of the second aircraft tried unsuccessfully to make radio contact with the lead aircraft and

UH-60 pilot put the aircraft into a right bank exceeding 90 degrees during a flight demonstration. Control was lost and the aircraft crashed, injuring the three crewmembers and three passengers.

Aircraft hit a large tree on rising terrain as pilot was trying to fly through fog.

reversed course down the valley to a point where they were able to cross into another valley and proceed to destination. While the crew of the lead aircraft was trying to transition to instrument flight, the main rotor blades hit a large dead tree on rising terrain. The aircraft rolled over and crashed almost inverted. Of the 10 people on board, 4 were killed and 6 sustained major injuries.

Analysis of the night mishaps shows that planning, guidance, and parameters for conducting night flight (with and without night vision goggles) were not—and still have not been—adequately established. Commanders and operations officers do not have the needed information to enable them to adequately assess the risk factors associated with night flying (e.g., increased crew workload/coordination, fatigue, reduced visibility, required ambient light for night vision goggles, weather factors, training). Measures to correct these deficiencies are now receiving a priority effort from HQDA on down.

Four of the 19 mishaps involved both materiel and human cause factors. Inadequate maintenance supervision was cited in three of the four. Materiel problems included design of the forward pylon cover track and throttle quadrant and self-retaining bolt effectiveness for pitch change link bolts.

In the case of the pylon cover, the UH-60 crew heard a loud bang from the rear of the aircraft during a standard autorotation and the aircraft vibrated severely. As the aircraft slowed to near hover speed, it began a rapid turn to the right, which quickly progressed into an uncontrollable spin. The collective was lowered, stopping the spin, but the aircraft landed hard in an upright attitude. Investigation revealed that the main rotor pylon sliding cover left the aircraft during the early part of the autorotative approach. It then went into the main rotor system where it was deflected downward onto the fuselage and rearward into the tail rotor system, disabling the tail rotor system. The pylon cover was installed incorrectly. However, the cover track is designed in such a way that the cover appears secure when, in fact, the down pins are not engaged in their grommets.

Materiel factors were the direct cause of two mishaps. One involved a hydraulic pump leak, resulting in a fire on the ramp. The other was a high speed drive shaft flex coupling failure which caused foreign object damage to the engine.

We know from the study of UH-60 mishap experience that the crashworthiness features of the Black Hawk are saving lives that would otherwise be lost. Fifty percent of UH-60 occupants involved in nonsurvivable crashes survived, compared to only 4 percent for the UH-1H.

There is nothing in the mishap history of the Black Hawk to suggest that it is anything less than the best utility helicopter in the world. The problem with the Black Hawk is no different from the problem with all the other Army aircraft systems . . . it's a pilot-error problem. ■

Class A Aircraft Mishap Rate Per 100,000 Flying Hours

Aircraft	FY 82	FY 83	FY 84*
OH-58	4.43	4.66	4.65
AH-1	6.29	6.20	0
UH-1	2.95	1.06	2.39
UH-60	5.88	4.81	11.02
CH-47	3.64	4.52	4.77
OH-6	8.64	2.81	0

*Through 15 March

Army Fatalities

Aircraft	FY 82	FY 83	FY 84*
OH-58	6	1	2
AH-1	6	2	0
UH-1	16	4	2
UH-60	7	3	10
CH-47	7	11	0
OH-6	1	0	0

*Through 15 March

Class A Rotary Wing Aircraft Mishaps 1 October-15 March FY 84

	OH-58	AH-1	UH-1	UH-60	CH-47	OH-6
Rate	4.65	0	2.39	11.02	4.77	0
Number	5	0	7	4	1	0
Hours	107,436	46,974	293,218	36,307	20,964	12,022

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishap □ (M series) Inspection after night flight revealed foreign object damage to one main rotor blade 54 inches inboard of blade tip. Cause of damage is unknown.

UH-1 Class D mishap □ (H series) Main rotor blades hit tree during NOE flight, damaging tip caps.

UH-1 Class E mishaps □ (H series) Rotor and engine rpm increased rapidly during takeoff and aircraft started to climb. Caused by failure of fuel control. □ (H series) Fuel fumes were detected in cockpit during landing. Caused by cracked flow divider bracket. □ (H series) Low rpm audio light came on and engine tachometer dropped to zero during takeoff. Caused by broken N_2 tachometer generator shaft. □ (H series) Right pedal stuck during hydraulics-off landing. Caused by defective tail rotor servo. □ (H series) Master caution and d.c. generator lights came on. Caused by defective voltage regulator. □ (H series) Pilot felt moderate binding and feedback in fore and aft cyclic during hover. Caused by failure of hydraulic boost pump.

UH-60 Class A mishap □ As aircraft was being positioned over a slingload, on which two soldiers were standing, tail rotor suddenly stopped turning. Aircraft began a nose-down right spin. Copilot, who was on the controls, immediately applied power to bring aircraft to an altitude of approximately 40 feet and move it to the left to prevent injury to the soldiers standing on the load. Hovering autorotation was initiated from 40 feet agl. Aircraft landed hard in nose-down, right roll. Three crewmembers were injured. Caused by seizure of tail rotor gearbox. 8426

UH-60 Class D mishaps □ Rotorwash from hovering helicopter blew copilot's door off of parked helicopter. Aircraft was hovering about 50 feet agl. □ Main rotor blade hit tree during landing, damaging tip cap. □ As aircraft landed, passenger inadvertently jettisoned cargo door window. Window was broken.

UH-60 Class E mishaps □ No. 2 engine-out light and audio activated, and engine failed during runup. Vanes in IPS blower cracked, causing vibration. This caused P3 line to crack, resulting in engine failure. □ No. 1 engine torque went to 188 percent during flight. Caused by failure of electric control unit. □ Vertical vibration occurred during hover. Anti-flap stop was stuck in up position, disallowing full blade travel.

Attack helicopters

AH-1 Class D mishap □ (S series) Inspection revealed damage to right rear stabilizer. Suspect contact with earth mound.

AH-1 Class E mishaps □ (S series) Transmission oil pressure gauge fluctuated during landing. Caused by malfunction of oil pressure transducer. □ (S series) Master caution and transmission oil hot lights came on. Caused by cracked thermostatic switch. □ (S series) Aircraft developed uncommanded rolls to left and right during hover. Caused by failure of SCAS roll card.

AH-64 Class E mishaps □ Accessory gearbox pressure light came on during flight. Oil was leaking from seal of shaft-driven compressor. □ Malfunction in throttle rigging allowed No. 2 engine to go into lockout when forward pressure was applied to power lever.

Cargo helicopters

CH-47 Class D mishap □ (D series) As vehicle was being loaded into aircraft, antenna hit aircraft, tearing sheetmetal. Crew chief was not monitoring intercom system because left and right gunners' cords were too short to reach rear of aircraft. Flight engineer was stationed outside aircraft on left side of ramp and was not able to stop vehicle driver after he warned the crew of the problem over the intercom.

CH-47 Class E mishaps □ (C series) Unusual cyclic control feedback during flight was caused by failure of lower dual boost activator. □ (C series) Loud noise was heard and vibration felt from forward transmission area. Balance weight had separated from forward end of sync shaft.

CH-54 Class E mishap □ (A series) Crew chief saw blue smoke coming from main gear during taxi for takeoff. Caused by split oil line.

Observation helicopters

OH-58 Class E mishaps □ (C series) Airspeed indicator showed 140 knots at 60 to 70 knots airspeed. Caused by cracked pitot static outside drain line. □ (C series) Aircraft entered instrument meteorological conditions. While attempting to recover, pilot overtorqued engine to at least 105 percent. Aircraft was landed at field site. □ (A series) Passenger section filled with smoke when heater was turned on. Smoke was caused by oil which had gotten into heater system. □ (A series) Hydraulics light came on and controls became stiff

(continued on next page)

during landing. Hydraulic fitting had vibrated loose, allowing fluid to be pumped overboard.

Fixed wing

OV-1 Class E mishap □ (RV-1D) Landing gear would not retract after takeoff. Dump valve was unseated, preventing retraction.

U-8 Class D mishap □ No. 2 engine stopped during climbout. Exhaust valve was stuck in open position.

C-12 Class C mishap □ (A series) Crew saw flash of lightning near aircraft while flying at 18,000 feet in light rain. Post-flight inspection revealed two burned areas on aircraft exterior.

C-12 Class E mishap □ (B series) N_1 gauge fluctuated and then dropped to zero. Caused by failure of N_1 tachometer generator.

U-21 Class E mishap □ (G series) No. 2 power lever froze at cruise power. Outside air temperature was -10° C. at 9,000 feet. One hour later, temperature had risen to -5° C. and throttle unstuck. The rest of the flight was uneventful.

Maintenance

UH-60 Class E mishaps □ No. 1 and No. 2 engine percent increased during hover. Anti-jam nut had backed off, causing No. 1 LDS cable between collective and engines to be out of adjustment. □ Electrical short in crew chief pendant caused uncommanded jettison of slingload. Retaining clamp for wiring harness was not installed on crew chief pendant, allowing wire connected to emergency release button to contact hot wire.

AH-1 Class D mishaps □ (S series) Start at night was attempted with rear tiedown attached to main rotor blade. Tail rotor blades, 42-degree gearbox, and 90-degree gearbox were damaged. When crew chief stored front tiedown in ammo bay, he saw another tiedown in the compartment and assumed it was the rear tiedown. Instead, it was an extra tiedown.

AH-1 Class E mishaps □ (S series) Cyclic binding in flight was caused by incorrect cyclic friction, grease on uniball, and air in hydraulic lines. □ (S series) SCAS yaw light would not go out after engine start. SCAS card was not balanced correctly.

CH-47 Class E mishap □ (A series) No. 2 fire warning light came on. Fire warning sensing element was not positioned correctly, causing it to chafe against cowling.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	1-21 Mar	**3**	**1**
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**21**	**18**

Messages received

• Safety-of-flight message concerning inspection of aft-facing seats (U-21-84-01, 271600Z Feb 84). Summary: Forward-facing-only seats have been found installed facing aft in U-21 aircraft. This could result in serious injury or a fatality in the event of a crash. Units having U-21A/G and RU-21G/H aircraft configured with aft-facing seats should inspect the seats for proper installation and correction if required. Contact: John Dow, AVSCOM, AUTOVON 693-1639, commercial 314-263-1639.

• Maintenance information message concerning UH-1 and AH-1 engine and transmission oil life extension (MIM-UH-1-84-MEM-07, MIM-AH-1-84-MEM-05, 072000Z Mar 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM change

Change 32, dated 14 February 1984, to TM 55-1520-228-23-1 for OH-58A and C helicopters, has been released. ■

Aviation mishap prevention forum

Mohawk tiedown assembly

Reference the Forum in the 1 February 1984 issue. We have received several queries on how to order the OV/RV engine runup tiedown assembly (cable assembly tiedown) which is used during ground-test and adjustment of the engines and propellers. The following information is provided:

Nomenclature - cable assembly tiedown
P/N 134SEME 10104-1
NSN 1730-00-157-3316 (includes both fore and aft assemblies)
Stock fund item, cost - $3,992

This information is not in TM 55-1510-204-23P. If additional information is required, call Mr. Jerry Kahn, AVSCOM, AUTOVON 693-3764. ■

Correction

Reference the Forum in the 29 February 1984 issue. Question No. 2 referred to an instructor pilot examiner. This should have been instrument flight examiner. ■

Answers to last week's questions

1. All aircraft will be grounded (earthed) at all times (on ramp or in hangar). True or false? True. **TM 55-1500-204-25/1, page 1-18, par. a(7)**

2. A crew/passenger manifest is required for all flights. For tactical or tactical training flights, the passenger manifest will be prepared and retained by the supported unit. True or false? True. **AR 95-1, with Change 1, page 4-2, par. 4-2**

3. Can fuel that has been drained during defueling operations be returned to a fuel storage system or refueler? Yes, if it is passed through a filter/separator during defueling operations. **FM 10-68, page 9-3, par. 9-5**

4. How are FOD hazards reported? FOD hazards are reported through the Operational Hazard Report system. **AR 385-95, page 4-1, par. 4-3** ■

Questions for aviation personnel

1. With 20/20 vision, detection of a target depends on several factors. What are they? **Reference: FM 1-204, Night Flight Techniques and Procedures**

2. A cabin pressurization system accomplishes several functions in providing adequate passenger comfort and safety. It maintains a cabin pressure altitude of no more than _____ feet at the maximum designed cruising altitude of the aircraft. **Reference: FM 1-203, Fundamentals of Flight**

3. To become qualified as a maintenance test flight evaluator, a maintenance test pilot must successfully complete _____: **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. Effectiveness of firefighting and rescue work depends on speed. The importance of continuous training cannot be overemphasized. What are the four principal factors that make this training effective? **Reference: FM 10-68, with Change 3, Aircraft Refueling** ■

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Accident review: OH-58 tree strike

Synopsis

As the OH-58A was flying 5 to 10 feet above trees, the tail rotor blades hit the top of a tree. Antitorque effectiveness was lost, and the helicopter spun to the right. The pilot entered autorotation, and the aircraft hit several more trees and crashed.

History of flight

The pilot was assigned a service mission to inspect a training area for trash. He flew to the training area, picked up two observers, and completed a trash reconnaissance. The OH-58 was landed, the two observers got out, and two more observers got in to make another check of the area.

The second reconnaissance mission was completed. The pilot asked the observers if they would like to fly a little longer while he made a recon of a landing zone. Heavy equipment was to be moved into the area later in the day. This mission was assumed as necessary by the pilot although he had not been requested or assigned to do it.

While flying 5 to 10 feet above trees and at an airspeed of approximately 25 knots, the pilot heard two loud bangs and felt a slight shudder in the aircraft. The nose tucked down and the aircraft spun rapidly to the right three or four times. The pilot did not know that the tail rotor blades had hit a tree top. The pilot tried to maneuver the spinning aircraft into a clearing, saw he was going to overshoot the clearing, and closed the throttle to flight idle. Airspeed had slowed to less than 5 knots as the aircraft entered the trees.

The OH-58 hit the ground slightly nose low and in a left bank. The skids collapsed, and both tail rotor blades and one main rotor blade separated. The pilot sustained major injuries, and one passenger had minor injuries.

Crewmember experience

The 35-year-old pilot had more than 500 rotary wing flight hours, with almost 200 in the OH-58A.

Commentary

The altitude that the pilot selected for the flight was authorized but inappropriate for the purpose of the flight. The pilot incorrectly estimated the altitude of the aircraft and allowed his tail rotor to hit a tree. When the tail rotor hit the tree, the pilot did not follow the correct procedure for loss of tail rotor effectiveness as prescribed in the operator's manual. After the loss of pedal control and excessive right yaw, the pilot did not reduce collective pitch and autorotate until after he became disoriented. He delayed initiating the emergency procedures because of his lack of experience and lack of knowledge of the procedures. Although the pilot had recently attended a class and had seen a film on loss of tail rotor effectiveness, he was unable to relate the conditions which contribute to loss of tail rotor effectiveness or the appropriate emergency recovery procedures.

Though it did not contribute to the crash, the pilot flew the aircraft without preflighting it. He saw a maintenance test pilot preflight a portion of the aircraft for an earlier flight, but there was no postflight inspection done after that flight. Loose nuts, bolts, washers, and a tool were found on the engine deck at the crash site. ■

Aviation mishap prevention forum

UH-60 battery assault

Careless battery maintenance can get you a face full of potassium hydroxide (KOH). That smarts!

Like maybe you "assault" the battery by leaving a filler can loose so it can vibrate out. Or maybe you dropped a screw into the battery case. Either goof could short a cell and cause it to overheat. You can get a dose of caustic KOH on your hands, arms, face . . . even in your eyes!

Take a gander at the battery now. Be sure the battery filler cap screws are in straight (not crossthreaded) and torqued 8 to 10 lb-in. Use torque wrench, NSN 5120-00-117-4832, from your TK-90/G battery service tool kit.

When you store or transport the battery, be sure the cover is in place and latched.

Use rubber gloves, apron, and face shield for added protection when you inspect, clean, or service the battery. TM 11-6140-203-14-2 has the maintenance info. ■

—from PS, March 1984

First aid for the eyes

Sulfacetamide sodium ophthalmic ointment, USP, NSN 6505-00-183-9419, is located in aircraft first aid kits, survival kits, and survival vests. With such a wide distribution of this medicine, here are some notes that might be of assistance.

• If the ointment has been frozen, thaw completely at room temperature before using. **Do not heat** to hasten defrosting. This will result in the chemicals separating and may do more harm than good.

• If the ointment has been heated, sitting in an aircraft in the hot sun, for instance, where the temperature has exceeded 85° F., check the ointment for separation or discoloration before using. If there is separation or discoloration, **do not use.**

• Before using, check the tube for expiration date printed in the yellow box on the bottom part of the tube or pressed into the metal crimped edge sealing the tube. ■

—from U.S. Army Aviation Digest, February 1984

Evacuation of the sick and wounded

FM 8-35, Evacuation of the Sick and Wounded, has been revised, and the new one is dated 22 December 1983. The manual describes the principal methods of evacuating sick and wounded personnel on land, in the air, and on water. It is for the use of personnel of both medical and nonmedical Army units. It is applicable to peacetime, general war, limited war, and cold war. Information in the manual is complementary to and should be used in conjunction with the following publications: FM 8-10, FM 8-20J, FM 8-21, and FM 8-41. ■

Answers to last week's questions

1. With 20/20 vision, detection of a target depends on several factors. What are they? Target size and distance (relative target size); overall brightness (luminance); brightness and color contrast between target and background; location of eye focus; angle between central visual axis and target. **FM 1-204, page 1-6, par. 1-7**

2. A cabin pressurization system accomplishes several functions in providing adequate passenger comfort and safety. It maintains a cabin pressure altitude of no more than _____ feet at the maximum cruising altitude of the aircraft. 10,000 feet. **FM 1-203, page 7-11, par. 7-13b**

3. To become qualified as a maintenance test flight evaluator, a maintenance test pilot must successfully complete: A test flight phase of the Aviation Maintenance Officers Course and an equivalency evaluation administered by an MTFE selected by HQDA (DES). **AR 95-1, with Change 1, page 3-7, par. 3-28.1**

4. Effectiveness of firefighting and rescue work depends on speed. The importance of continuous training cannot be overemphasized. What are the four principal factors that make this training effective? Increased speed of reaction, improved teamwork, and a reduction in fear and carelessness. **FM 10-68, with Change 3, page 10-6, par. 10-10 and 10-11**

Questions for aviation personnel

1. Should aircraft personnel restraint equipment be cleaned with soap, water, and a strong bleach? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

2. May aircraft personnel restraint equipment be redyed or painted when it has lost its color? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

3. An instrument approach to a straight-in landing may be initiated regardless of ceiling and visibility. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. What two problems in Army aircraft should basic rescue training be concerned with? **Reference: FM 10-68, with Change 3, Aircraft Refueling** ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (H series) As aircraft approached field location from which it had departed only 10 minutes earlier, it hit a wire about 150 feet above a river. Control was lost and the aircraft crashed. A wire strike protection system was installed on the aircraft, but the wire hit the aircraft just below the main rotor blades and above the protective system. 8427

UH-1 Class C mishap □ (H series) Copilot requested clearance from ground control to hover taxi from parking area to departure point. Ground control acknowledged the request and told copilot to remain in position. Copilot thought he heard the word "cleared" and left the parking area. Aircraft approached a runway that had not been specified or briefed as being used for departures. Before reaching the runway, the crew noticed a fixed wing aircraft taking off. Almost simultaneously, ground control told the UH-1 crew to stop. Pilot applied aft cyclic to stop forward flight, causing tail rotor to hit the ground. Aircraft spun right. Pilot shut off engine and autorotated to hard landing.

UH-1 Class D mishaps □ (H series) While at a hover, with a left quartering headwind, student pilot applied aft cyclic, causing tail rotor to hit the ground. As there was no aircraft vibration, IP thought that only the tail skid had hit the ground and continued training. When aircraft was preflighted by a night training crew, both tail rotor blades were found to be damaged. □ (H series) Pilot attempted engine start with air inlet cover not removed.

UH-1 Class E mishaps □ (H series) Several loud bangs were heard and aircraft vibrated. Caused by failure of fuel control. □ (H series) Airspeed indicator was at zero during climbout. Dirt plug had lodged in pitot static tube. □ (H series) Pilot felt feedback in cyclic and loss of hydraulic assistance when cyclic was moved forward and aft. Caused by failure of servo cylinder. □ (H series) Loud humming sound was heard, master caution light came on, and smoke entered cockpit. Caused by failure of hydraulic pressure line. □ (H series) N_2 tachometer failed on takeoff. Caused by failure of tachometer generator. □ (H series) Engine fuel pump light came on. Caused by failure of fuel pressure switch.

UH-60 Class D mishaps □ Main rotor blades hit tree during NOE hover. Blade tip caps were damaged. □ Main rotor blade was damaged while it was being unfolded during load-out. Gusty winds and rotorwash from three AH-1 aircraft contributed to blade flapping.

UH-60 Class E mishaps □ Crew saw smoke coming from nose of aircraft during landing. Caused by malfunction of windshield wiper motor. □ APU oil temperature hot light came on during runup. Caused by failure of seal in vicinity of APU generator quad mount.

Attack helicopters

AH-1 Class E mishaps □ (S series) Crew heard loud bang, noticed engine exhaust cover hanging from right inboard pylon, and saw right ammo bay door was open. Pitot tube cover, two air intake covers, one flight jacket, and two helmet bags were lost overboard. Crew had left ammo bay door open. □ (S series) Transmission oil pressure decreased below limits during hover. Caused by failure of oil pressure transducer. □ (S series) Loud bang was heard from behind pilot's seat. Postflight inspection revealed ECU centrifugal impeller had disintegrated. □ (S series) Fire light came on. Caused by frayed sensor wire.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	1-28 Mar	**3**	**1**
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**21**	**18**

Cargo helicopters

CH-47 Class E mishaps □ (D series) No. 1 flight boost caution light came on. Caused by failure of hydraulic solenoid valve. □ (C series) No. 1 engine oil pressure and N_1 dropped to zero during runup. Caused by sheared engine oil pump shaft.

Observation helicopters

OH-58 Class E mishaps □ (A series) During engine start, copilot did not realize that fuel boost switch was not in fuel boost position. When copilot realized fuel boost switch was not on, he elected to complete an engine shutdown. During shutdown, copilot momentarily released starter button and failed to close throttle to full-off position, resulting in TOT of 1,000 degrees. Pilot, standing outside aircraft, reached over left seat and shut down engine. □ (C series) Aircraft yawed sharply to right during NOE flight. Copilot, who was at the controls, applied full left pedal to stop the yaw. Torque rose to 105 percent for 1 second. Suspect aircraft entered flight regime conducive to loss of tail rotor effectiveness.

Fixed wing

U-21 Class C mishap □ (F series) Because of an unforecasted thunderstorm over the destination airfield, U-21 crew was told to hold at an intersection 10 NM southeast of their destination at 5,000 feet. After holding was established, aircraft received lightning strike. Autopilot disengaged, master warning light came on, radar screen went blank, and several communication/navigation radios failed. Pilot requested vectors for an immediate landing at alternate airfield. Landing was completed without further incident. One blade of each propeller, right horizontal stabilizer tip, static wick tips, and rivet heads on left wing were burned.

U-21 Class E mishap □ (A series) Pilot saw fuel siphoning from left nacelle fuel cap during level-off. Fuel cap was secured incorrectly.

U-8 Class E mishaps □ (F series) No. 2 engine chip detector light came on. Fifteen seconds later, engine ran rough and then failed. Suspect failure of piston crankshaft nut. □ (F series) No. 1 engine surged during flight. Caused by malfunction of fuel system.

OV-1 Class E mishaps □ (D series) Right engine oil temperature gauge indicated high oil temperature and pressure gauge indicated low pressure. Caused by malfunction of VIDS unit. □ (D series) Gear would not retract after takeoff. Caused by air in landing gear system.

C-12 Class D mishap □ (C series) As aircraft began to taxi forward for takeoff, pilot noticed feedback through pedals. Nose wheel tire had separated from rim.

C-12 Class E mishap □ (C series) Takeoff power could not be developed on No. 1 engine. Caused by sticking high pressure bleed valve.

Maintenance

UH-1 Class E mishap □ (H series) On through-flight inspection, as stabilizer bar was being checked, dampner was found to be loose. On initial preflight, dampner was checked and was not loose but did have a slightly odd noise. No unusual noises or vibrations were noticed on the first flight. Suspect dampner mounting bolts were undertorqued. It is possible that recommended torque was used but self-locking nut torque was not added.

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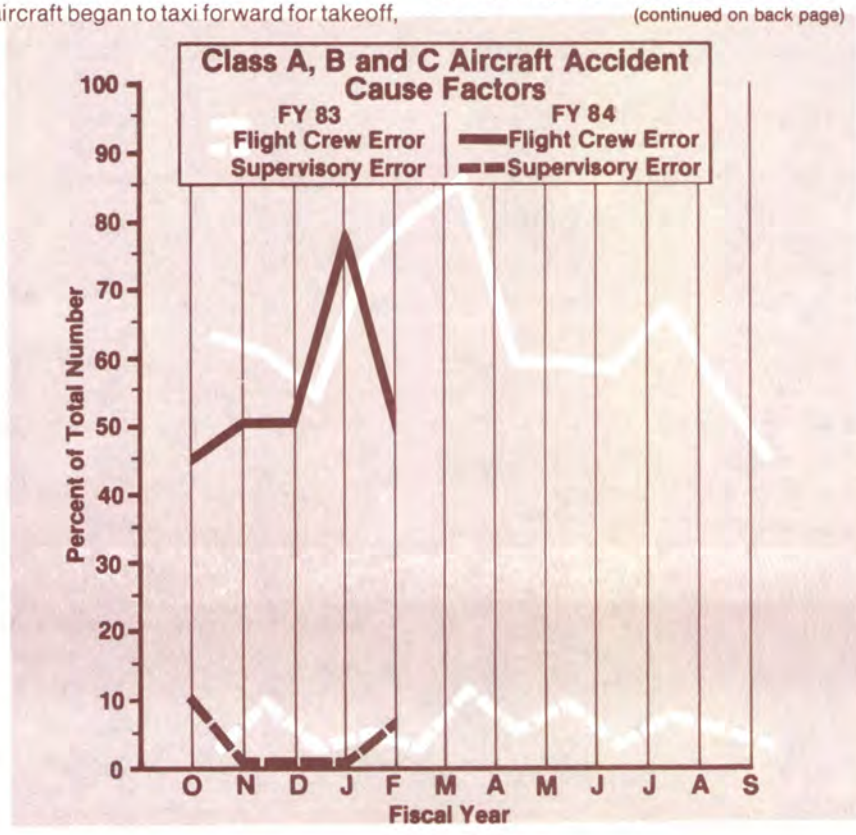

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 100 □ 28 Mar 1984

Origin and concept of STACOM

The Deputy for Standardization (now the Directorate of Evaluation and Standardization (DES)), USAAVNC, assumed the expanded mission of worldwide aviation standardization assistance and evaluation as an extension of DCSOPS, DA, early in calendar year 1975. As knowledge was gained of the common problems and deficiencies found in aviation standardization, it was concluded that a lack of understanding or misinterpretation of current aviation policies and procedures was a significant obstacle to effective implementation of the DA Aviation Standardization Program.

Since DES was the focal point of aviation standardization, the decision was made by the Commander, USAAVNC, that DES would establish and maintain direct communication with the field regarding aviation standardization matters. This was to be accomplished by a 24-hour telephone answering service and frequent articles in FLIGHTFAX under the STACOM heading. The telephone numbers are AUTOVON 558-3589 during duty hours and 558-6487 after duty hours. FLIGHTFAX was chosen as the "parent" publication because of its frequency of publication and wide distribution. STACOM was to serve primarily as a means of directly disseminating necessary information to assist in correcting the deficiencies and misunderstandings noted in aviation unit standardization programs. STACOM would also serve as a forum for response to selected questions, as a method of alerting the field to important changes to operating procedures, policies, etc., and as a means for DES to discuss specific areas of aviation standardization.

Although references to and interpretation of DA and MACOM-level directives and Federal Aviation Regulations appear in STACOM, the publication is informative only and cannot be used as an official source for interpretation of regulation and policies. The Directorate of Evaluation and Standardization continues to encourage direct communication for official interpretations of your aviation-related problems/questions and will respond by official written communication. Being informative in nature and for use as needed by the aviation community, there is no official requirement to maintain all copies on file. Response to the STACOM concept from the field has been excellent. Letters and phone calls are received daily. Let's keep aviation standardization "Above the Best."

STACOM No. 1 was published 18 February 1976; this STACOM message is No. 100. If you have questions about or need copies of previous STACOMS, please contact us at DES. ■

Recommended changes to publications and blank forms

Paragraph 3-29, Change 1, AR 95-1, informs all personnel who make recommendations for changes to ATMs, field manuals, technical manuals, and training circulars to forward DA Form 2028 through the aviation unit commander to the proponent of the publication. This is done to keep commanders aware of the need for changes to publications affecting their missions, e.g., maintenance and training. It also affords opportunities for them to assess unit training needs. For example, a misunderstanding of a maintenance or operating procedure may be solved at the local level, thereby eliminating the need for DA Forms 2028 to be forwarded to the proponent agency. Cases like this may result in a significant savings in administrative paperwork and manhours.

Some requests for clarification of parts of AR 95-1 indicate there is a need for local command interest to resolve answers prior to submitting DA Forms 2028. Recently, two persons (an O-3 and an E-6) wanted to know if a remote heading indicator or gyro heading indicator satisfy the AR 95-1 (Table 4-2) requirement for a magnetic compass for VFR flights. Both of these heading indicators are magnetic compasses and meet the requirements of AR 95-1. TM 55-1500-328-25 and FM 1-5 are the references for this information. This is an example of how training at the local level can reduce some unnecessary flow of paper. Far more important is the fact that valuable knowledge can be gained faster if aviation unit commanders respond to inquiries made by their personnel through the 2028 program with timely, effective training. This can occur only if unit personnel make their commander aware of their needs. ■

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-3589 during duty hours; 558-6487 after duty hours.

Mishap briefs

AH-1 Class D mishap □ (S series) As aircraft was hovering to parking area, maintenance stand sitting in center of parking pads was blown into synchronized elevator of another aircraft.

AH-1 Class E mishaps □ (S series) Master caution light came on. Caused by loose wire to engine chip detector plug. □ (S series) No. 2 hydraulic light came on. Caused by cracked hydraulic line tee fitting. Crew chief overtorqued fitting.

CH-47 Class E mishaps □ (A series) Flight engineer saw hydraulic leak in aft of aircraft during runup. Lock nut on No. 1 flight boost pressure line was overtorqued, causing it to crack. □ (D series) High frequency noise was heard in aft transmission area. Inspection revealed utility reservoir was empty. Jam nut on utility system was loose, allowing hydraulic fitting to leak fluid.

OH-58 Class E mishaps □ (C series) Magnetic compass light was inoperable during runup. Crew chief had removed light bulb without making logbook writeup or replacing bulb. □ (A series) N_2 bled off during hover. Caused by incorrect torque on pneumatic line from governor to fuel control. □ (A series) Pilot smelled fuel during flight. Aircraft was landed, and fuel was seen spilling on engine deck. Fuel was dripping from fuel nozzle. Caused by loose connection at nozzle.

Messages received

• Safety-of-flight maintenance mandatory message concerning one-time inspection of wire harness routing for feeder harness between No. 1 and No. 2 junction boxes on the UH-60A (UH-60A-84-02, 161430Z Mar 84). Summary: During a ground runup, malfunction indications were traced to wire chafing, which had occurred to the wire bundle between the left and right relay panel. The wire bundle had come in contact with the cooling fins of the left relay panel. To assure no further incidents of this nature, a one-time inspection will be conducted. Contact: Lyell Myers, AUTOVON 693-3300, commercial 314-263-3300.

• Maintenance information message concerning inspection of UH-1H support assembly (MIM-UH-1-84-MEM-03, 022000Z Mar 84).

• Maintenance information message concerning use of nonstandard/locally manufactured heavy-duty skid shoes on UH-1 aircraft (MIM-UH-1-84-MEM-04, 051530Z Mar 84).

• Maintenance information message concerning TB 53-2840-229-50-1, one-time inspection of T-53-L-13B/BA turbine engines for sand and dust impactment and clearances between the first-stage gas producer nozzle and wheel (MIM-T53-84-MEM-03, 141545Z Mar 84). This TB was issued in error and is rescinded.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM changes

The following changes to TMs have been received:

• Change 20, dated 31 January 1984, to TM 55-1520-214-23 for OH-6A helicopters.

• Change 35, dated 17 February 1984, to TM 55-1520-235-10 for OH-58C helicopters.

• Change 9, dated 30 March 1984, to TM 55-2840-241-23 for gas turbine engines, model T63-A-720. ■

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 25 □ 4 Apr 1984

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Finger trouble

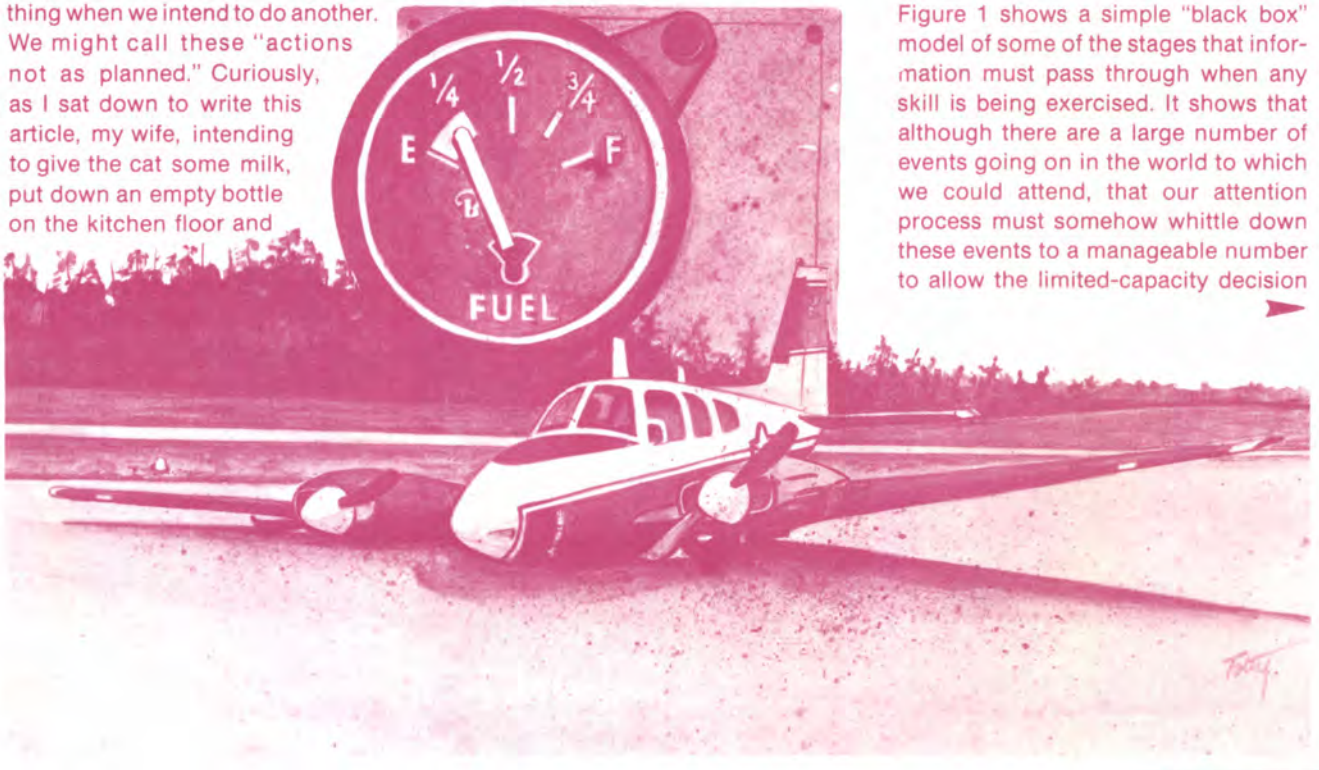
This article by Roger Green, RAF Institute of Aviation Medicine, first appeared in the ***USAF Safety Journal.***

Last time I wrote an article for an air safety magazine, one or two particularly perceptive readers pointed out to me that I was an ignorant fool writing about something which I did not understand. I feel I can avoid such criticism of this article by admitting straight away that I do not understand the problem. My only mitigating plea is that I don't believe anybody else understands the problem particularly well either.

The subject I want to discuss is why we sometimes do things we don't specifically intend to, or sometimes do one thing when we intend to do another. We might call these "actions not as planned." Curiously, as I sat down to write this article, my wife, intending to give the cat some milk, put down an empty bottle on the kitchen floor and placed the bowl of milk outside the front door. I expect your wives (perhaps even one or two of you) have done similar things. In fact if you try to think back to things that you have done, or nearly done, like this, there are some common mistakes which you probably remember having made. You may have gone to the bathroom to wash your hands and found yourself brushing your teeth. You may have been making a cup of tea, started thinking about something else, and found that you had put six or seven spoonfuls of sugar into the cup. And who hasn't tried to change into fourth in a car with only three gears? Well I haven't of course, but I am told that other people do these things all the time. The point of this article is that people do similar strange things in aircraft.

You don't believe me? Well, I know one pilot who does. While taxiing back to the ramp after landing, he decided to raise the canopy to cool off; however, he raised the landing gear by mistake. (I should like to point out to those pendants among you that I am well aware that it is impossible to raise the gear of any aircraft when on the ground; it is the aircraft which descends.) From a practical safety point of view, it is important to try and understand the mechanism of such errors in case there is anything that can be done to reduce their incidence.

Figure 1 shows a simple "black box" model of some of the stages that information must pass through when any skill is being exercised. It shows that although there are a large number of events going on in the world to which we could attend, that our attention process must somehow whittle down these events to a manageable number to allow the limited-capacity decision



Finger trouble

channel or central processor to deal with them. The output of this processor is some form of motor activity such as limb movement or speech. Such a model rather suggests that we can attend to only one thing at a time, yet we know that it is quite possible to do two or three things all at once. For instance we can drive and talk simultaneously—as long as the driving is not too demanding. Clearly then, if something is well practiced, we don't need to concentrate very hard on its execution.

The literature on skill sometimes divides skill acquisition into three phases: the cognitive phase—in which you do need to concentrate on each aspect of your activity; the associative phase—during which individual components of the skills are "welded" together; and the automatic phase—where the whole skill has become laid down as a "motor program" or "subroutine" which can be executed quite automatically once an initiation decision has been made by the central processor.

We might reasonably insert another box in our diagram (see figure 2) to suggest that we have a store of these motor programs or subroutines (e.g., for walking, talking, driving, flying, putting on earrings) which are activated by some conscious decision and whose execution is occasionally monitored by the central processor (to make sure they are running), but which use sensory information and control motor output quite independently of the central processor.

Although it is simplified, such a model enables some structure to be put on the variety of errors that we see, and there are clearly a number of places in the model where error can occur. First, it may be possible to engage or activate the wrong program, i.e., the right decision is made but the wrong action is taken. An example of this would be our

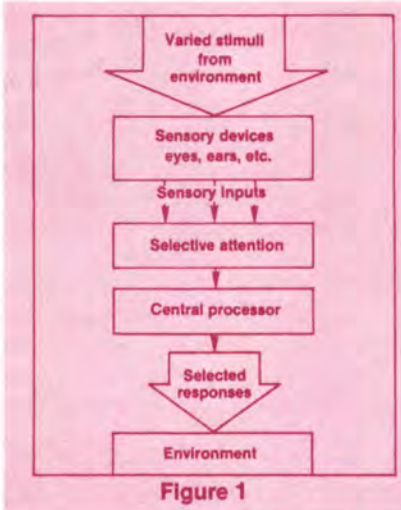


Figure 1

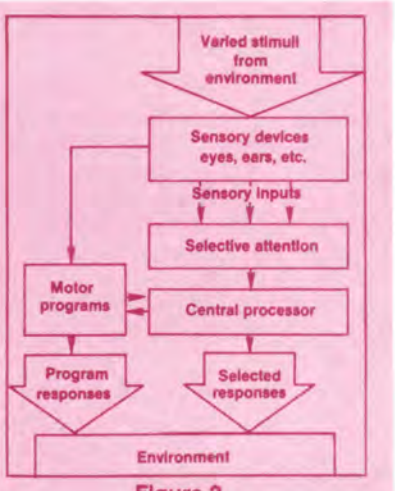


Figure 2

earlier case of the pilot who raised the gear, or a man who picked up the ringing phone and shouted "Come in!" to the person at the other end. Another example of such an incident would be the Jaguar pilot who put out the speed brake when he meant to put out the slats. These examples do seem to show that in such errors the confused subroutines usually have something in common. In the wheels-up aircraft, the landing gear and canopy selectors are operated by the same finger; "come in" and "hello" are both verbal responses to some form of auditory announcing signal; and in the Jaguar, speed brake and slats are both operated with the left thumb. From the point of view of our model, these three errors are identical in nature.

Normally, if an incorrect program is initiated, we will quickly realize that something is amiss the first time that the central processor has a monitoring look at execution of the program. But the second form of problem which might arise occurs when the central processor is fully occupied for some reason and has no spare capacity for monitoring the execution of ongoing programs. This is what is often meant by "distraction," and the power of distraction is such that if the wrong subroutine has been initiated it may be executed for a long time before errors are noticed. Dumping seven or eight spoonfuls of sugar into a cup of tea while distracted is a good example.

One of my favorite such stories concerns a man who went into a restaurant during WW II and saw some lemon meringue pie, which was then scarce, but of which he was particularly fond. He bought a slice and was looking at it—savoring it for a while—when a friend joined him. They had an argument about the American election. When it was over, he realized, to his disgust, that he had eaten the pie but had no recollection of doing so.

Another feature of the distraction problem is that motor programs seem to be laid down in fairly general terms—probably for maximum flexibility—and if the central processor does not track things at certain critical points, then perceptual substitutions can occur and the wrong stimulus can be adequate to allow the subroutine to proceed. For example, I remember that my father once cleaned his teeth with Tru-gel (hair fixative) instead of toothpaste, and I myself have squirted shaving cream from a tube onto my toothbrush only

being warned that something was wrong by the funny smell. A similar example is that of the lady who used to come downstairs in the morning, throw her dog a couple of biscuits, and then put on her earrings. One morning she threw the earrings to the dog and it was only when she had trouble putting them on that she realized that she was trying to fasten dog biscuits to her ear.

The stimulus need not be visual of course; it may be tactile or kinesthetic. It appears that for some pilots, gear-up and gear-down programs are in fact just different branches of the same program. The behavioral routine might thus be written, "Initiate. Put hand on landing gear handle. If up, move down. If down, move up." Obviously such a program will work well most of the time, but if for some reason the wheels are already down when the central processor intends to initiate a gear-down, then gear-up action may well result. Personally, I know of at least two incidents where this happened. In one case the pilot of a light aircraft was returning to his own airfield. Immediately after takeoff he checked the fuel gauge, realized he had less petrol than he thought and cursed himself for not refueling. With his central processor thus occupied (distracted) he failed to initiate the gear-up program and dragged his undercarriage all the way home. Obviously, when he reached the field he was very concerned with making a straight-in approach and getting on the ground as quickly as possible. But when he initiated his landing gear program, he clearly didn't monitor his execution well enough because he proceeded to retract the already lowered wheels!

A last example, which I must relate, illustrates how complicated these "actions not as planned" can be and concerns a man who went out to his back yard in order to fill up his coal scuttle. On returning to the house, he felt the call of nature. He went into the bathroom and, without realizing what he was doing, proceeded to pour all the coal from the coal scuttle into the toilet.

When faced with a problem such as this, psychologists are bound to ask whether there are any individual differences which predispose some people to commit such errors. It is a reasonable bet that people will vary in this respect, since there are obvious individual variations in most other physiological and psychological parameters that one can think of. You may have already decided that many of the examples which have been described above are, in fact, examples of what might be termed "absent mindedness," and we all know that some people are clearly more absent minded than others. While there are no formal tests to identify individuals who are likely to do this sort of thing, you probably already know whether you tend to do it or not. If you do, the only real advice that can be offered to you at the moment is to be careful.

There is one last observation that I would like to make about this topic. Earlier, I talked about these subroutines being laid down as a result of the process of training and experience. In fact, one could almost define training as the process of laying down such programs. It is ironic that as one becomes more experienced at executing a certain skill, and as the motor program concerned with that skill becomes progressively more automated, then the amount of central processor control or monitoring over that skill becomes less and less. Thus a situation exists in which the more experienced you are at doing something, the more likely you are to find yourself doing that thing when you didn't specifically intend to. In support of this contention, I can cite the accidents concerning wheels-up landings which have occurred in the RAF in the recent past. All of these accidents resulted from the errors of experience which have been discussed here and happened not to novice aircrews but to squadron commanders and other highly experienced and apparently competent crewmembers. Probably all of them regarded themselves as careful and able pilots and felt that they would have been the last people to make such mistakes. If it can happen to them it can happen to anybody.

How then can these mistakes be avoided? I must return to the point that I made in opening this article and say that I don't know. However, I suspect that one can discipline oneself to some extent to insure that all skilled actions are properly monitored by one's central processor. It is especially important to do this if there is any suspicion that the capacity of the central processor is reduced or otherwise occupied by fatigue or distraction. Finally, if there are any readers who have now decided that all this article has said is that it's very easy to get into finger trouble, but that you have to be dead careful to avoid it, please don't bother to write to tell me so because I already know. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (H series) Shallow approach was made to a concrete pad which protruded about 1 foot above the ground. Pilot misjudged termination point, and right skid hit leading edge of pad. Skid was bent. □ (H series) IP felt thump in airframe during night approach to tactical landing site. Dents in tail rotor blades were apparently caused by debris blown up by rotorwash. □ (H series) Tail rotor blades hit tree during confined area operation.

UH-1 Class E mishaps □ (H series) Smoke was seen coming from the area below the copilot's feet. Caused by failure of main inverter. □ (H series) Antitorque pedals were stiff during hover. Caused by defective tail rotor servo cylinder. □ (H series) Loud squealing sound was heard from transmission area. Caused by failure of hydraulic pump. □ (M series) Tail rotor pedals became stiff and No. 1 hydraulic light came on during landing. Caused by loss of hydraulic fluid through broken line. □ (H series) Engine oil light came on and oil pressure indicated zero. Caused by defective engine.

UH-60 Class A mishap □ As aircraft was being flown at 60 knots airspeed and 70 feet agl with empty pallet, wind lifted the pallet, causing it to hit tail boom and slide up side of tail boom into main rotor system. Control of the aircraft was lost and it crashed into trees. One fatality and two injuries. 8428

UH-60 Class C mishap □ No. 1 converter light came on, followed by static in intercom system. Left accessory module and main transmission lights then came on. Smoke was seen coming from control access area after shutdown. "C" clamp securing main rotor cable bundle failed, allowing electrical cables to chafe amd short out. Left accessory module, No. 1 hydraulic pump, No. 1 a.c. generator, gearbox input assembly, and oil cooler radiator were damaged.

UH-60 aviation-related mishaps □ While mechanic was lifting main rotor blade onto aircraft, blade lifting cradle sheared, causing blade to fall. Blade, spindle, and lifting cradle were damaged. □ Helicopter had been washed and was being towed to parking ramp by a truck. Tail wheel hit a pothole, causing towbar to pop free of tail wheel. Ground guide yelled for truck driver to stop. Truck was stopped, but helicopter was not. Helicopter crashed into rear of truck, causing extensive damage.

Attack helicopters

AH-1 Class C mishap □ (S series) Aircraft hit wires during flight. Vertical stabilizer, tail rotor blades, mast, and push-pull tubes were damaged.

AH-1 Class E mishaps □ (S series) Master caution and No. 1 hydraulic lights came on. Caused by failure of hydraulic pressure switch. □ (S series) N_1 tachometer went to zero during hover. Caused by failure of tachometer generator. □ (S series) Engine oil pressure light came on. Caused by failure of oil pressure light sending unit. □ (S series) Engine oil pressure decreased during flight. Caused by failure of oil pressure transducer.

Cargo helicopters

CH-47 Class D mishap □ (D series) Flight of four landed in pickup zone at night. After touchdown, No. 4 pilot asked No. 3 pilot to move to the left for more separation between aircraft. No. 3 aircraft was hovered to the left and landed on small tree. Tree punched hole in landing gear panel and door panel.

CH-54 Class E mishap □ (B series) Hydraulic pressure was lost during flight. Caused by cracked second stage hydraulic tube assembly.

Observation helicopters

OH-58 Class E mishaps □ (A series) As starter switch was released during runup, engine flamed out and would not start again. Fuel hose from fuel cell to shutoff valve collapsed. □ (A series) Pilot inadvertently landed on two small mounds. As collective pitch was lowered, aircraft rocked back and tail skid hit the ground, setting up pylon rock and spike knock. Pilot added collective, brought aircraft to hover, and repositioned to level ground. Inspection revealed no damage. □ (A series) Master caution and generator lights came on during autorotation. N_1 and N_2 continued to decrease. Autorotation was continued to landing. Fuel spray nozzle screen was mashed, restricting fuel flow. Each time the throttle was rapidly reduced to idle, fuel starvation occurred and engine quit.

OH-58 aviation-related mishaps □ Brakes failed on tractor which was being backed up to OH-58 which was to be towed. Tractor hit aircraft, bending fairing and breaking windows. □ Commercial lawn mower hit aircraft parked at airfield. □ As UH-1 was being ground handled out of hangar, tail rotor blade hit main rotor blade of OH-58. Blade of OH-58 was damaged.

Fixed wing

U-21 Class E mishaps □ (A series) Fuel pressure dropped below 5 psi. Caused by failure of boost pump. □ (RU-21A) Fuel was seen siphoning around fuel cap during flight. Cap was not seated correctly.

OV-1 Class D mishap □ (D series) Pilot saw several birds in his flight path during GCA but was unable to take evasive action. Four birds hit aircraft. Stabilizer was dented and torn.

Mishap briefs

OV-1 Class E mishaps □ (RV-1D) When gear selector was positioned for landing, landing gear did not extend. Hydraulic pressures were confirmed at zero. Hydraulic failure and emergency gear extension checklist items were completed and aircraft was landed. Caused by failure of hydraulic line fitting in right main landing gear wheel. □ (D series) Right main gear indicated unsafe during approach. Caused by failure of microswitch.

C-12 Class E mishap □ (C series) No. 2 engine torque decreased and tgt increased during climb. Caused by pencil-size hole in engine high pressure bleed valve diaphragm.

Maintenance

UH-1 Class E mishaps □ (H series) Tail rotor chip detector light came on during landing. Internal spring on 42-degree gearbox input seal had popped out of seal into gearbox during installation of input coupling assembly and was crushed between coupling and input duplex bearing. □ (H series) Postflight inspection revealed oil leaking by engine chip detector. Helicoil for engine chip detector was not installed during depot overhaul, resulting in chip detector being stripped as it was initially screwed into gearbox assembly.

OH-58 Class E mishap □ (C series) N_2 tachometer needle dropped to zero during flight. Caused by loose ground wire on tachometer generator.

C-12 Class E mishap □ (A series) White smoke was seen coming from No. 2 engine and fluid was streaming along cowling. Single-engine landing was made. Caused by loose fuel line fitting to flow divider.

Messages received

• Safety-of-flight maintenance mandatory message concerning one-time inspection of tail rotor assemblies (OH-6A-84-01, 211400Z Mar 84). Summary: Category I QDR was received reporting receipt of four OH-6A metal blade tail rotor assemblies with improperly manufactured bushings installed. The faulty bushings did not have sufficient radius or countersink on the inside diameter at the flanged end to clear the radius of the adjacent bolt head. This message requires a one-time inspection to locate and replace improperly manufactured bushings used with the bolt which secures the metal tail rotor blade. Contact: Larry Wieschhaus, AUTOVON 693-1687, commercial 314-263-1687.

• Maintenance information message concerning operation of OH-58C aircraft with defective transmission oil pressure transducer (drive train) (MIM-OH-58-84-MEM-02, 022015Z Mar 84).

• Maintenance information message on UH-1 stabilizer bar support assembly (MIM-UH-1-84-MEM-06, 191500Z Mar 84).

• Maintenance information message concerning change of command name and office symbol for submitting EIR/QDR, DA Form 2410, and DA Form 2028 (MIM-MPSD-GEN-84-01, 091430Z Mar 84).

• Maintenance information message on T53 engine (MIM-T53-84-MEM-04, 191530Z Mar 84). This message advises that MIM-T53-84-MEM-02 was a limited issue message for a specific area. Worldwide distribution was not required.

• AVSCOM message concerning repair of vibrex blade balancing kit (152000Z Mar 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	7	10
	November	2	2	November	3	3
	December	0	0	December	0	0
2nd Qtr	January	1	0	January	4	0
	February	0	0	February	4	4
	March	2	5	March	3	1
3rd Qtr	April	6	0	1- 4 Apr	0	0
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	21	18

TM change

Change 30, dated 29 Feb 1984, to TM 55-1520-228-10 for OH-58 helicopters, has been released. ■

Aviation mishap prevention forum

Mishap reporting: owning unit versus responsible unit

The new DA Form 2397-1-R provides for the unit identification code (UIC) of both the (1) organization to which the mishap aircraft is assigned and (2) organization most responsible/capable of taking corrective action.

The second UIC is to prevent aviation units from being charged with mishaps over which they have no control; e.g., jeep is driven under turning rotor blades by a nonorganic driver, combat-equipped troop kicks out an aircraft window, nonorganic pilot error, or rappeling injury with no aviation unit cause factors.

Since DA Form 2397 investigations are no longer required for property damage losses under $10,000 or injuries less than loss of workday, the Safety Center is developing a new PRAM format which will upgrade the information reported. Though it may be awhile before the new PRAM is available, we are presently entering in the computer UIC data on both the owning unit and the unit most responsible.

Until further notice, units should continue to report the UIC of the owning unit in block 4b of the PRAM. If the unit most responsible has a different UIC, it should be reported in block 4d. The narrative should fully explain the task errors and/or system defects of the unit most responsible for the mishap. ■

Answers to last week's questions

1. Should aircraft personnel restraint equipment be cleaned with soap, water, and a strong bleach? No! Do not use bleach. **TM 55-1500-204-25/1, page 3-142, par. 3-311**

2. May aircraft personnel restraint equipment be redyed or painted when it has lost its color? No! Do not expose wet webbing to freezing temperatures or to direct sunlight during cleaning, drying, or storage. Redyeing or painting is prohibited. **TM 55-1500-204-25/1, page 3-142, par. 3-311**

3. An instrument approach to a straight-in landing may be initiated regardless of ceiling and visibility. True or false? True. **AR 95-1, with Change 1, page 4-3, par. 4-5**

4. What two problems in Army aircraft should basic rescue training be concerned with? How to approach and get into the aircraft and how to get personnel out. **FM 10-68, page 11-10, par. 11-7** ■

Questions for aviation personnel

1. In determining jungle flying techniques, density altitude becomes an overriding consideration. True or false? **Reference: FM 1-202, Environmental Flight**

2. Each commander, from major command through company or detachment level, will have a formal, written aviation accident prevention plan that is compatible with the mission and the functions of the organization. True or false? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

3. What AR governs the safeguarding of aircraft accident investigation report (DA Form 2397-R series) attachments, copies, or extracts? **Reference: DA Pam 385-95, Aircraft Accident Investigation and Reporting**

4. JP-4 is a fuel consisting of gasoline light petroleum distillates, with rigidly specified properties. JP-4 and Jet B are basically alike. Jet B is equivalent to JP-4 in all respects except that its freezing point is -56° F. (-49° C.) instead of -72° F. (-58° C.). True or false? **Reference: FM 1-400, Aviator's Handbook** ■

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 26 □ 11 Apr 1984

Accident review: misjudged hover height

US Army Aviation Training Library
Fort Rucker, Alabama 36360

Synopsis

As the pilot of an OH-58A was hovering rearward, the left skid hit the ground. The helicopter then rolled to the left, causing the main rotor blades to hit the ground. The OH-58 came to rest on its left side.

History of flight

An OH-58 pilot and copilot were assigned a zone reconnaissance mission. Using a flashlight, the pilot began his preflight inspection before daylight. After the aircraft was inspected and all checks performed, the pilot calculated performance planning data. He used temperature and pressure altitude data from the previous day, along with weight figures from an "on-file" weight and balance form for a load with three passengers.

When the copilot arrived, the aircraft was again started and 4-foot hover checks were performed. The aircraft hovered at 2 psi over the predicted hover value of 59 psi, and the pilot decided not to do an out-of-ground-effect hover check until he had burned off some of the fuel. The crew flew the aircraft to the helicopter rearming pads and shut down to receive a detailed mission briefing.

About 45 minutes later, the crew took off from the pads. Just before reaching a predetermined phase line (PL), the copilot told the pilot they were approaching the PL and pointed it out to him. The pilot descended and decelerated the aircraft, terminating at a hover over a slight ridgeline. The terrain in front of the aircraft sloped downhill away from the aircraft. The terrain immediately under the aircraft was also concave.

The copilot identified some targets as the pilot chose to back away from the crest of the hill to elude the "enemy" and not disclose his intended direction of travel from the PL. As the helicopter was being hovered backward without a clearing turn, the pilot added power to increase his hover height. The aircraft yawed to the right and seemed to sink. The pilot added more power, but the heel of the left skid hit the rising terrain. The pilot tried to add more power to pick the aircraft up, but it rocked forward. The left skid toe caught on a rock protruding 6 inches from the ground, and the aircraft rolled to the left. As the roll progressed, the main rotor blades hit the ground and the transmission was torn away. The aircraft came to rest on its left side. Neither crewmember was injured.

Crewmember experience

The 29-year-old pilot had almost 600 rotary wing flight hours, with more than 350 in the OH-58A. The 26-year-old copilot had almost 300 rotary wing flight hours, with almost 100 in the OH-58A.

Commentary

The pilot did not make a clearing turn or ask for the copilot's assistance in maintaining terrain clearance. The copilot was preoccupied with navigation tasks and target acquisition/identification. The pilot misjudged the height of the helicopter over the rough, sloping terrain and was hovering at least 2 feet lower than he thought he was.

During the performance planning phase of the mission, the pilot used data on the previous days' weather rather than current data and used weight and balance data that did not conform to the actual aircraft weight and configuration. He recorded the data on note paper rather than the required DA Form 488-7R. As a result of this use of inaccurate data, the in-ground-effect hover check required 2 pounds of torque more than the pilot had planned. Based on this check, the pilot elected not to recalculate performance data or decrease gross weight but rather to refrain from out-of-ground-effect hover maneuvers during the nap-of-the-earth zone reconnaissance mission. Thinking he did not have the power required to hover out of ground effect, the pilot had a tendency to hover lower over irregular terrain than he normally would have if he had known that power was available for out-of-ground-effect hover.

Although it did not contribute to the mishap, the pilot did an abbreviated through-flight inspection of the aircraft instead of a complete preflight inspection. Critical preflight procedures, such as fuel sampling and dynamic component inspection, were not accomplished. ■

Foreign objects found in engines

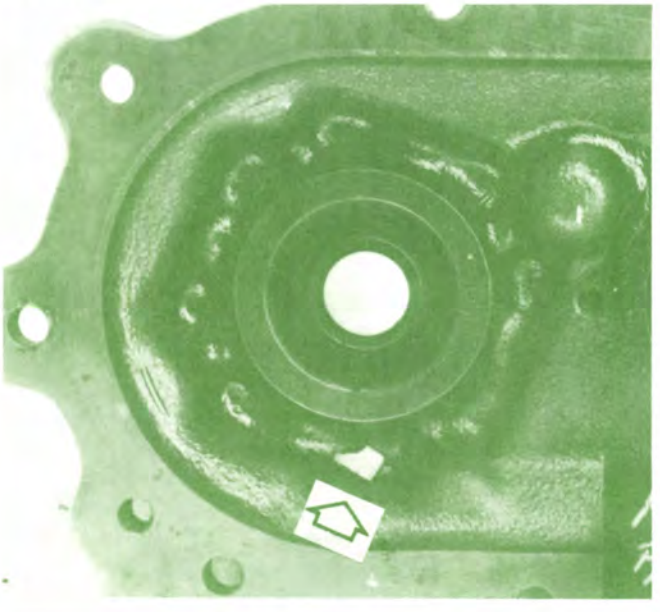
Disassembly and examination of two engines shipped to Corpus Christi Army Depot because of abnormal iron and metal particles in the oil samples revealed that in both cases a mechanic's tool had been used to remove the gearbox cover seal. In one case, excessive wear and damage inside the torquemeter boost pump were caused by the broken tip from a mechanic's scribe. The tip broke off and was lost into the boost pump when the scribe was used to remove the gearbox cover seal.

In the other case, disassembly of the engine disclosed that the overspeed governor and tachometer drive, when rotated by hand, were rough and binding. Further disassembly of these components revealed a piece of wedge-shaped ferrous metal in the housing cover. Light to heavy indentation marks were found on the gearteeth of all three internal spur gears. When the piece of metal was compared to the damaged gearteeth on one of the spur gears, the indentation marks and the piece of metal matched. The metal appeared to be the tip from a mechanic's screwdriver or similar tool.

The mechanics must have known they had broken their tools. Where did they think the tips went?

A seal puller or some other tool designed to remove the gearbox cover seal should have been used. Granted, the scribe and screwdriver were handy and it might have taken a few minutes more of the mechanics' time to get the correct tool. But this shortcut cost the Army thousands of dollars in repairs.■

Mechanic's scribe was used to remove gearbox cover seal. Arrow in photo above points to damage marks in seal recess. Photo below shows damage and scribe tip which was found inside torquemeter boost pump.



Metal object, probably the tip of a screwdriver, was found in gearbox cover. The indentation marks on the damaged gearteeth matched the size and shape of the metal object.

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap □ (H series) Aircraft was on photo mission. Because of extremely cold temperatures at mission altitude, crew planned to remove window panels on both cargo doors when photo location and altitude were reached. Photographer on left side of aircraft disregarded instructions and tried to remove window panel without assistance. When window was partially removed, it began to fall out of the aircraft through opening in cargo door. Plexiglass shattered and window panel frame hit and damaged cargo door.

UH-1 Class E mishaps □ (H series) Pedals became stiff during takeoff. Caused by failure of tail rotor servo. □ (H series) High frequency vibrations during flight were caused by failure of No. 3 tail rotor drive shaft hanger bearing. □ (H series) Transmission hot warning light came on. Caused by failure of thermostatic switch. □ (H series) Loud whistling noise was heard during flight. One main rotor blade had separated about 3 inches from tip cap. □ (H series) IP heard loud bang and felt a thud on the floor behind copilot's seat. Seat spring had broken. □ (H series) Transmission oil pressure fluctuated from 50 to 0 psi. Caused by defective oil pressure relief valve. □ (H series) Master caution and hydraulic pressure lights came on and flight controls became stiff. Hydraulic pressure line was leaking. □ (H series) Unusual motoring was felt in cyclic control during hover. Caused by defective left lateral servo.

UH-60 Class D mishap □ Postflight inspection revealed FOD to main rotor blade. Aircraft had been operating in landing zones with large amounts of blowing debris.

UH-60 Class E mishap □ Several caution panel lights came on during flight. Caused by failure of left relay panel.

Attack helicopters

AH-1 Class C mishap □ (S series) Main rotor blades hit tree during NOE tactical mission.

AH-1 Class E mishaps □ (S series) Smoke and fumes in cockpit were followed by alternator and rectifier lights. Caused by bearing failure in generator. □ (S series) Engine oil pressure exceeded 100 psi. Caused by defective oil pressure transducer. □ (S series) Transmission oil light came on. Caused by failure of transmission oil temperature sensing switch.

Cargo helicopters

CH-47 Class D mishap □ (A series) Aircraft hit bird during night flight. Main rotor blade was damaged.

CH-47 Class E mishaps □ (C series) Smoke was seen coming from heater exhaust during runup. Malfunction of heater was caused by trapped residual fuel. □ (C series) Engine oil pressure dropped to 10 psi. Caused by failure of pressure transmitter. □ (C series) Transmission oil hot light came on. Caused by bent pin.

Observation helicopters

OH-58 Class C mishap □ (A series) Loud bang was heard and engine lost power during takeoff. Aircraft landed hard, damaging gear and main rotor blade.

OH-58 Class D mishaps □ (A series) IP stabilized at 15-foot hover and started left pedal turn. Pilot told IP to stop because he was too close to a tree. IP stopped turn and moved forward. As aircraft descended at slow rate, tail rotor blades and aft portion of tail boom hit lower limbs of tree. □ (C series) Aircraft touched down hard, causing spike knock and spreading aft cross tube.

OH-58 Class E mishaps □ (A series) IP allowed sink rate to build during hydraulics-off approach and did not apply corrective action in time to prevent spike knock. □ (A series) Main rotor blades hit and cut 7-strand aluminum wiring during NOE flight. Aircraft was landed without incident. □ (A series) After aircraft was picked up to hover, intense vibration was accompanied by loud knocking noise from transmission area. Caused by failure of transmission pylon isolation mount. □ (A series) Aircraft was being rotor tracked at 1,000 feet agl. When throttle was reduced to flight idle during rotor rpm check, engine flamed out. Autorotation was completed. Investigation revealed that paint resin caused flight idle detent plunger to stick in

down position; allowing throttle to be retarded to the off position.

Fixed wing

OV-1 Class E mishap □ (D series) Left main landing gear indicator showed an unsafe condition. Caused by failure of down lock switch.

C-12 Class D mishap □ (C series) Flock of seagulls flew into flight path of aircraft. Three blades hit aircraft, damaging left main gear door, right wing, and left exhaust stack of No. 2 engine.

U-21 Class E mishap □ (G series) Flaps would not retract after landing, and smoke filled cabin area. Flap motor burned out.

T-42 Class E mishap □ Complete electrical failure occurred during flight. Caused by failure of left alternator.

Maintenance

UH-1 Class D mishap □ (H series) Maintenance personnel were not paying attention to other aircraft operating in the maintenance area. As tail rotor blades were being tracked, rotorwash from a passing OH-58 caused blades to flap into rubber hose on end of tracking stick. Tail rotor blades, tail rotor hub, 90-degree gearbox, and 42-degree gearbox were damaged.

UH-1 Class E mishaps □ (H series) Hydraulic warning light came on. Caused by loose pressure switch. □ (H series) Fuel gauge dropped to zero during flight. Wire bundle was installed incorrectly during replacement of fuel boost pump. Wires grounded, resulting in inaccurate indication. □ (H series) Airspeed indicator remained at zero during takeoff. Pitot static lines were not reconnected after installation of MWO for wire protection system.

OH-58 Class E mishaps □ (A series) Transmission oil pressure light came on. Postflight inspection revealed that transmission oil had transferred to engine oil. Mechanic had installed seal backwards. □ (A series) Pilot entered autorotation during test flight to check engine and rotor rpm. As throttle was decreased to idle, N_1 and N_2 decreased and engine-out light came on. Pilot continued autorotative descent and landed. Caused by incorrectly installed fuel control throttle arm.

Messages received

• Safety-of-flight maintenance mandatory message concerning inspection of CH-47A/B/C/D engine transmission warning system (CH-47-84-04, 232400Z Mar 84). Summary: A CH-47C was at a hover when a noise was heard and fire and smoke were seen in the aft cabin area. The aircraft pitched up and crashed inverted. Fire destroyed the aircraft except for the aft pylon area. Preliminary results of the CCAD teardown analysis revealed that the No. 1 engine transmission failed. Consequently, the oil scavenge system line became blocked with debris, causing pressurized oil to be vented through the transmission breather. The vaporized oil was ingested into the engine inlet area and ignited. The fire was then drawn through the engine transmission drive shaft housing into the pylon, resulting in burning through a pair of aluminum flight control tubes. The aft rotor blades then went to flat pitch, causing the aircraft to crash. Corrective measures to prevent recurrence are explained in this message. Contact: C.W. Caesar, AUTOVON 693-1639, commercial 314-263-1639.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	1-11 Apr	**0**	**0**
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**21**	**18**

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Aviation mishap prevention forum

Fixed wing landing gear mishaps

Fourteen fixed wing Class E maintenance-induced landing gear mishaps occurred during the first quarter of FY 84. Awareness of past problem areas is the first step toward preventing similar problems in the future. Read these mishap briefs and pass the word to your fellow workers.

• T-42A pilot received unsafe nose gear indication. Link had come loose from indicator rod.

• RU-21H landing gear down lights remained on during after-takeoff check. Gear could not be raised. Before the flight, crew chief had installed new carpet and failed to reengage landing gear emergency clutch disengage lever. Pilot did not detect improperly positioned lever.

• C-12C gear-in-transit lights would not go out after takeoff. Left main gear squat switch was not rigged correctly.

• C-7A landing gear remained down and locked after gear selector lever was placed in up position. Attempts to raise gear were unsuccessful. Caused by lack of lubricant on capsules and torque arm universal joints.

• U-8F main landing gear indicators showed gear were partially up. Tower personnel said all gear appeared to be down. Landing gear sensitive downlock switch was out of adjustment.

• RU-21H right main gear indicated unsafe. Actuator spring was out of adjustment.

• U-21A nose gear down light remained on after takeoff. Nose gear uplock switch was sticking.

• C-12C gear-in-transit lights would not go out after takeoff. Left main gear squat switch was not rigged correctly.

• C-7A landing gear warning light flickered during climb. Nose gear uplock switch was out of adjustment.

• C-7A nose wheel steering inputs would not move nose wheel during runup. Nose wheel was shimmed incorrectly.

• C-7A copilot's brakes were found to be inoperative during taxi check. Caused by incorrectly installed brake control actuating rod assembly.

• C-12C IP received unsafe gear indication. Caused by loose wire.

• OV-1D gear did not extend and hydraulic pressure went to zero. Gear were blown down and aircraft landed. Caused by loose hydraulic line to brake cylinder.

• OV-1D indicator for left main landing gear showed gear was in transit. Caused by insufficient lubrication of extension arm bearing of left main gear. ■

Answers to last week's questions

1. In determining jungle flying techniques, density altitude becomes an overriding consideration. True or false? True. **FM 1-202, page 3-7, par. 3-11**

2. Each commander, from major command through company or detachment level, will have a formal, written aviation accident prevention plan that is compatible with the mission and the functions of the organization. True or false? True. **AR 385-95, with Change 1, page 2-1, par. 2-3**

3. What AR governs the safeguarding of aircraft accident investigation report (DA Form 2397-R series) attachments, copies, or extracts? AR 385-40. **DA Pam 385-95, page 1-1, par. 1-6**

4. JP-4 is a fuel consisting of gasoline light petroleum distillates, with rigidly specified properties. JP-4 and Jet B are basically alike. Jet B is equivalent to JP-4 in all respects except that its freezing point is -56° F. (-49° C.) instead of -72° F. (-58° C.). True or false? True. **FM 1-400, page 1-18, par. 1-10a** ■

Questions for aviation personnel

1. Flight characteristics of aircraft are directly dependent upon conditions of weight and balance. What are the definitions of empty weight and basic weight? **Reference: TC 1-201, Tactical Flight Procedures**

2. There are poisonous fish in some tropical waters. As a general rule, most fish with exotic coloring and grotesque shape and without scales are poisonous, while most fish with dull coloring, normal shape, and scales are edible. True or false? **Reference: FM 1-202, Environmental Flight**

3. Any type of mushroom should be considered poisonous and should not be eaten. True or false? **Reference: FM 1-202, Environmental Flight**

4. Where can you find a sample FOD prevention SOP? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention** ■

Shortfax

There we were... IFR at night with no lights

You may not think too much about that little flashlight you're supposed to have in your aircraft at all times, but it just might save your life some day. A T-42 crew was at 7,000 feet on an IFR flight plan when their panel lights started dimming. Within 30 seconds, complete electrical failure had occurred. There was no visible horizon, so you can imagine how dark it must have been in the airplane.

The crew directed their trusty flashlight on the attitude indicator, maintained control of the aircraft, and turned back toward their home field. Still using the flashlight, they isolated the fault to the inverters and made an IFR letdown to VFR conditions.

On final for landing, with everything in the aircraft completely dark, the flashlight was still shining bright. Using the light to check the flap settings and monitor airspeed and altitude, the crew landed with no damage at the airfield.

You can bet this crew will never be caught without a flashlight in their aircraft. The important thing is to have a flashlight with good batteries readily available at all times. The batteries should be checked often and every time before a night flight. ■

A hatched-up program

A group of birds decided to form a safety program. So they called a meeting and the duck stood up and said, "I think we should have a lot of safety meetings. That way we can get together with the flock and bawl them out."

But the rooster said, "No, that takes too much time and we've got to get the progam off the ground." The argument went on. The parrot said, "We don't need meetings. Everyone will be safe because they know it's the thing to do."

All the birds cheered, for they knew that no one gets hurt on purpose. Then the mockingbird said, "What we need is a lot of posters. If we put posters all over the place, we'll have safety." The thrush said, "We don't want posters," and the sparrow said they would do just as well if they had some slides. The goose stood up and said, "What we really need is a safety officer who'll be stern." But the starling thought it was more important that the ASO be a "good mixer." The bluejay figured if the safety turkey laid off the safety surveys, he'd automatically be popular with everyone.

So finally the hawk arose and smoothed his feathers. Everyone grew quiet. "Friends," he said, "All this is secondary. I'll tell you what we need. What we need is sincerity." And all the birds applauded and stomped and whistled.

"Yes, sir," repeated the hawk, quite pleased with himself, "above everything we must be real sincere—even if we don't mean it."

And so they hatched a safety program—and it was for the birds. ■

PRAMS—just a reminder

The Vice Chief of Staff of the Army has directed that the name, grade, and duty position of the mission briefer be included in block 9e of PRAMs submitted on all Class A, B, and C mishaps. The Safety Center is monitoring this data. See USASC message 291500Z Nov 83. Point of contact at the Safety Center is Mr. Naumann, AUTOVON 558-2001. ■

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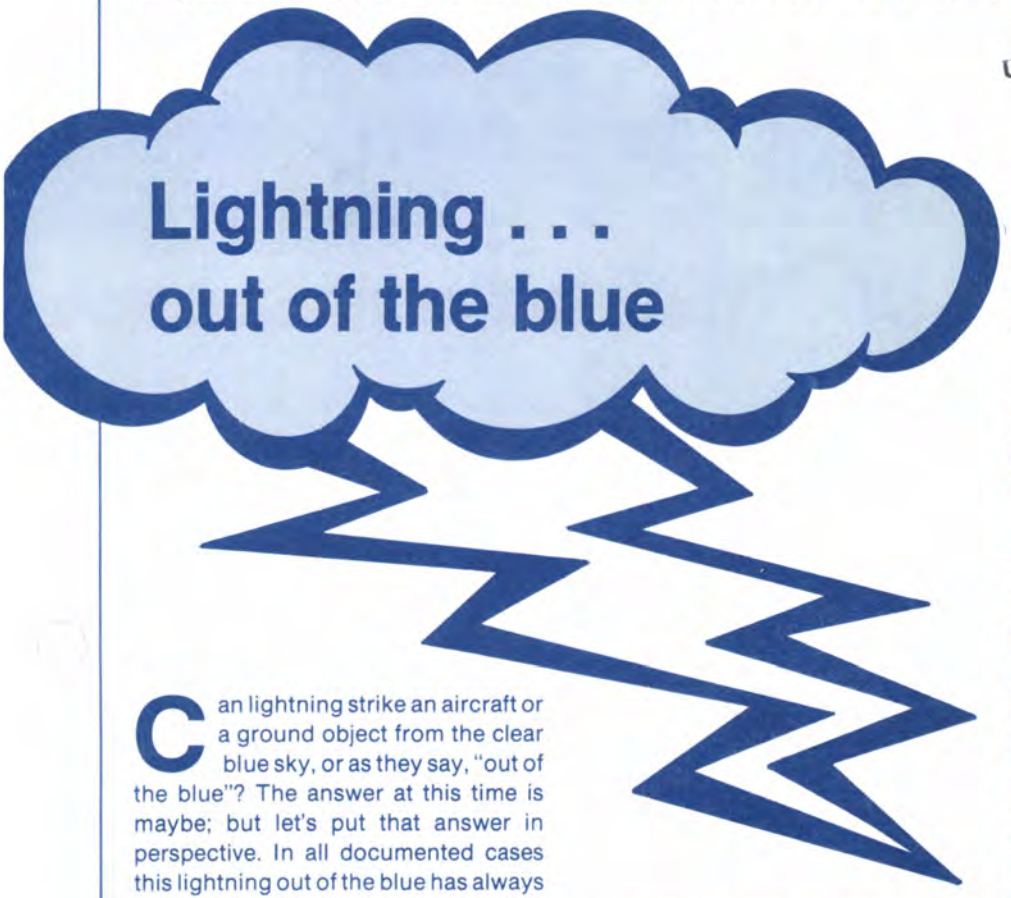
Lightning . . . out of the blue



Can lightning strike an aircraft or a ground object from the clear blue sky, or as they say, "out of the blue"? The answer at this time is maybe; but let's put that answer in perspective. In all documented cases this lightning out of the blue has always been associated with an active thunderstorm nearby.

In about 90 percent of cloud-to-ground flashes, negative charge is exchanged from a cloud base to the ground. The other 10 percent are called positive stroke lightnings. These usually travel from near the cirrus anvil at the top of thunderstorms or from "clear" air near the mid or upper part of the storm cloud to the ground. Although less frequent, these strikes are most intense and often occur unexpectedly.

Aircraft lightning

We don't know as much about the lightning that strikes your aircraft. It appears to behave like lightning that emanates from a tall building. Tall buildings seem to collect charge and to initiate the stepped leader process. Of course, you could just happen to be in the path of a naturally occurring flash, but there is increasing evidence to indicate that sometimes your aircraft may initiate or trigger the lightning flash process. This is especially possible if your aircraft has become charged by flying in clouds, in precipitation, and near the freezing level. Throw in some convective activity (imbedded CBs) and you've increased your strike probability significantly.

Research

Although we don't know all the ways lightning affects your aircraft, we are learning more each year, thanks to several research projects. The NASA-Langley Research Center in Hampton, Virginia, has been researching lightning since 1978. As part of NASA studies, a fully instrumented (for lightning measurement) F-106B was flown into some 150 thunderstorms in the past 3 years. This aircraft has been struck by lightning 176 times. In 1982 they increased their "success" (success means getting hit by lightning) by penetrating at higher altitudes using a ground-based lightning detection system.

Storm hazards program

The F-106B aircraft participated in 15 experiments in 1982 to improve our knowledge of the effects of thunderstorm hazards on the design and operation of aircraft. Much of this effort was devoted to lightning because of the possible problems associated with lightning strikes to advanced aircraft which use composite materials and solid state micro-electronics. Composite materials are poor conductors and must withstand the heat generated by current flow through high resistance. Also, microelectronics have a lower tolerance to voltage fluctuation and are consequently more vulnerable to lightning.

Lightning hardening

NASA did extensive research before conducting this experiment. They worked closely with the NOAA National Severe Storms Laboratory in Norman, Oklahoma, and with the Air Force Rough Rider program in the past. More than 10 special instruments were installed on their aircraft to measure nearly every characteristic of lightning and to help guide the aircraft into regions of high lightning potential. In addition, several modifications for lightning hardening were accomplished.

Lightning . . . out of the blue

• Insured positive electrical bonding between external mounted electrical component hardware and the aircraft structure.

• Installed transient suppressor lines to ground on each of the aircraft's 15 volt, alternating current (VAC) power distribution buses.

• Used transient suppressors at all probable points of entry of lightning surges into the aircraft electrical and avionics systems.

• Provided electromagnetic shielding of critical electrical circuits.

• Improved electrical bonding of internal fuel system hardware.

• Paid careful attention to proper routing and restraining of the lightning current-carrying conductors from the nose boom mounted sensors.

• Used JP-5 or Jet A fuel instead of much more volatile JP-4.

• Eliminated external fuel tanks to get rid of unwanted lightning strike attachment points.

• Removed all paint on the wings to reduce dwell time of lightning attachments and burn-through possibilities.

Results

Although the experiment is still in progress, some preliminary results are available. First, each thunderstorm penetrated displayed somewhat different characteristics. Some had a lot of turbulence and rain but very little lightning; others had little turbulence or rain but heavy lightning. Lightning, precipitation, and turbulence did not correspond in location and time for the thunderstorms studied. This conclusion is backed up by other recent research. It is very likely that the stage of thunderstorm development plays a key role in the lightning encounter. Very little lightning, though still heavy precipitation, can occur in dissipating cell stages and frequent lightning can occur in new development cells. Since a thunderstorm complex can be composed of several cells at different stages of development, all conditions are possible in nearly all storm systems.

Secondly, new and unique information has been obtained about strike patterns with respect to lightning attachment mechanisms and the resulting lightning strike zones on the exterior of the aircraft. On several occasions each year the flash has swept aft across the top or bottom of the midspan area of the wings, a region thought to be relatively immune on swept wing aircraft. This indicates a need for increased emphasis on design and protection for the surfaces of integral wing fuel tanks in swept wing aircraft.

Crews have not experienced electrical transients or electrical shocks as a result of strikes. The peak strike rate for the 3-year period occurred at ambient temps between -40° C. to -45° C.; while published lightning statistics for military and commercial aircraft indicate that most strikes occur at or near the freezing level (0° C.). It is possible that because most thunderstorm penetrations occur in the terminal area (on descent or climbout) the historical data on strikes are biased when they show 0° C. as the most common temperature for strikes.

Although these findings may change as more data are gathered, results to date give us added confidence that careful designs can minimize lightning damage even if strikes cannot be avoided. It behooves all crews to learn more about the "ingredients" for lightning during their flight weather briefings.

What to do

Stay clear of thunderstorms. Don't expect to be immune from lightning when you are flying even 25 miles from the radar precipitation echo if there are other cells nearby and cirrus above you. Your radar may not show an actively building cell which is just about ready to produce lightning. A little help from your charged aircraft may do the trick.

During your weather briefing, find out if any part of your trip will be in the clouds, near CBs, or in precipitation. Try to arrange it so as few of those "ingredients" as possible are present, even if it means a delay or a reroute. Your awareness of weather should definitely not end with the weather briefing. Check again just before you leave to see if there are any last-minute changes. Also, check frequently en route and listen to weather broadcasts.

Be continuously aware of the location of potential threat areas with respect to your flight plan. Yes, it is a great deal of trouble to reroute or delay, but the payoff is worth it. ■

—from Flying Safety
Lt Col Joseph A. Zak
Chief, Aerospace Sciences Division
Tactical Air Command
Langley AFB, VA

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (H series) Main rotor blade hit tree during hover in confined area. □ (H series) Aircraft was on final approach to field site where several other aircraft were parked. Pilot of one of the parked aircraft anticipated the effects of rotorwash and was holding door handle. Pilot lost his grip on handle and door sprang open past the full open position. Area around upper door hinge was damaged.

UH-1 Class E mishaps □ (M series) Master caution and No. 1 hydraulic lights came on during landing. Caused by ruptured hydraulic line from No. 1 reservoir. □ (H series) Rpm warning light came on and N_2 tachometer dropped to zero during takeoff. Caused by failure of tachometer generator. □ (H series) Bird hit aircraft and went into swashplate assembly. Partial control lockup of cyclic and collective lasted for 3 or 4 seconds. Aircraft was landed with no damage. □ (H series) Aircraft vibrated during flight. Caused by failure of bearing on mixing lever at stabilizing bar attachment point. □ (H series) Whistling sound was heard, followed by cyclic feedback and illumination of master caution and hydraulic lights. Caused by failure of irreversible valve. □ (H series) Master caution and transmission oil pressure lights came on. Crack in transmission oil filter housing allowed case to warp, causing filter gasket to fail.

UH-60 Class E mishaps □ Grinding noise was heard. Postflight inspection revealed oil coming from No. 2 engine gimbal through drain tube. Caused by failure of flex pack coupling on engine drive shaft assembly. □ Tail rotor deice light came on during flight in moderate icing conditions. Caused by failure of deice system. □ Copilot hovered over slingload and pilot keyed FM radio. As service member started to hook up load and touched cargo hook, he received an electrical shock and was knocked unconscious. Service member finished hookup operations after regaining consciousness.

Attack helicopters

AH-1 Class D mishaps □ (S series) Pilot received no airspeed indication on takeoff. Airspeed pitot tube line was broken behind pilot's seat. Suspect improper storage of flight gear behind seat caused break in line. □ (S series) Copilot brought aircraft to NOE hover. Aircraft began to fall through. Excessive power was applied to stop rate of descent. Trunnion bolts had to be replaced because of overtorque.

AH-1 Class E mishaps □ (G series) Master caution and No. 2 hydraulic lights came on. Caused by failure of lateral servo assembly. □ (S series) Transmision oil pressure dropped during flight. Caused by defective oil pressure transducer. □ (S series) Loud noise was heard from engine, and N_1 and torque increased. Compressor was eroded due to sand. □ (S series) Master caution and rectifier/alternator lights came on. Caused by failure of alternator bearing.

Cargo helicopters

CH-47 Class C mishap □ (C series) Aft rotor blades hit hangar as aircraft was taxiing on airfield. End caps on three blades were damaged.

CH-47 Class E mishaps □ (C series) As aircraft was hovering, hydraulic fluid began to spray from parking brake solenoid onto IP's legs and throughout right side of cockpit. Parking brake lever and arm blew out of valve, causing leakage, and valve body was cracked. □ (C series) No. 2 flight boost and SAS lights came on and flight boost gauge indicated zero. Caused by failure of upper seal on No. 2 yaw SAS cylinder assembly.

Observation helicopters

OH-58 Class C mishap □ (A series) Excessive vibration made flight impossible. Aircraft was autorotated to landing. Outboard 8 inches of main rotor blade had separated in flight.

OH-58 Class D mishap □ (A series) TOT rose rapidly to 850° C. during engine start. Pilot immediately closed throttle and began emergency shutdown procedures, but TOT continued to rise to 940° C. Engine had to be replaced because of cracks to first-stage turbine nozzle shield.

OH-58 Class E mishaps □ (C series) Engine-out light and audio activated

during low-level flight. Postflight inspection revealed front of N_1 tachometer generator separated one-half inch aft of cannon plug. □ (C series) Transmission oil pressure light came on and oil pressure dropped below 30 psi. Caused by failure of transducer. □ (A series) Sharp impact was felt, followed by vibrations and unusual rotor noise. Bird had hit rotor system during night flight. □ (A series) Aircraft yawed right as aircraft was about 7 feet above touchdown point. Left pedal was fully increased to stop turn but was ineffective. Aircraft then yawed right 90 to 100 degrees. Forward cyclic was added, collective reduced, and aircraft landed with slight forward movement. Winds were 30 degrees from left, which placed aircraft in a mode known to be conducive to loss of tail rotor effectiveness.

Training helicopters

TH-55 Class C mishap □ Student was on first supervised solo flight. On third approach, low rpm condition occurred. During recovery, student bumped anti-overspeed device and began jockeying the throttle on and off. Student was slow on pedals. Aircraft descended to about 50 feet and yawed into a tailwind condition which exceeded the student's ability to control the aircraft. Aircraft descended in a spin and crashed in nose-low attitude, rolling onto left side.

Fixed wing

C-7 Class D mishap □ Bird hit aircraft during flight, denting leading edge of right wing.

C-7 Class E mishaps □ No. 1 engine lost rpm. Boost pumps were turned on and engine regained power. Caused by failure of drive shaft on engine-driven fuel pump. □ Right main landing gear did not indicate safe during before-landing check. Caused by defective gear down lock switch.

OV-1 Class E mishap □ (D series) Left drop tank transfer light and aft fuel boost pump light came on during flight. Caused by failure of fuel pump.

Maintenance

UH-1 Class E mishaps □ (V series) Crew smelled something burning and landed. Hot oil was spraying into interior of transmission pylon area. Incorrect assembly of O-ring and retainer within hydraulic filter body caused failure of O-ring. □ (H series) Pilot noticed egt fluctuating during landing. Caused by loose wiring harness cannon plug.

UH-60 Class E mishaps □ After 1.1 hours of flight, crew discovered large quantity of oil on right side of aircraft and in No. 2 engine compartment. O-ring was not installed on chip detector. Mechanic said he did not know O-ring was required. □ After landing, crew chief noticed oil leaking from oil cooler. Cooler thermal bypass valve was installed incorrectly.

AH-1 Class E mishaps □ (S series) Aircraft began to bank to left during takeoff to hover. Roll SCAS card was out of adjustment. □ (S series) Inoperable fuel gauge was caused by incorrectly soldered forward fuel cell probe coaxial wire connector.

CH-47 Class E mishaps □ (C series) No. 2 hydraulic boost light came on and pressure was lost. Yaw flex line rubbed against rigid line to No. 2 SAS link, causing rigid line to burst. □ (B series) No. 1 engine torque split during landing. Caused by loose wire to cannon plug on engine N_2 actuator.

OH-58 Class E mishaps □ (A series) Pilot noticed high frequency vibration in antitorque pedals. Tail rotor was out of track. □ (C series) Transmission oil pressure gauge dropped during takeoff.

(continued on back page)

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	1-18 Apr	**1**	**3**
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**22**	**21**

Aviation mishap prevention forum

Number changes

Some units requesting aviation statistical information from the Safety Center may be getting different numbers from the ones they received earlier. For example, last year a commander might have requested a statistical printout of his unit and learned from the printout that the unit had three Class A and two Class B mishaps for FY 82. A new commander takes over in 1984 and requests the same information for FY 82. He learns that the unit had two Class A and three Class B mishaps in FY 82.

Why the difference? Effective 1 October 1983, the criteria for Army aircraft mishap classifications were changed to conform to DOD criteria. The Safety Center has converted mishap classifications for FY 81, 82 and 83 to conform to the DOD criteria. This is why your statistics may be a little different from what you previously received. ■

Foot problems

The Safety Center received 56 ground accident reports (DA Form 285) on the UH-60 aircraft over the past 3 years. Twelve of these described foot and leg injuries to service members who walked too close to the UH-60 or tried to jump in or out of the aircraft as it was being towed or pushed. These 12 injuries cost the victims considerable pain and the Army almost $120,000 and more than 13 months of lost work time.

If you ground handle the UH-60, be aware of the wheels at all times. The weight of an aircraft rolling over a foot and leg does more than a little damage. ■

AR 385-40

The Safety Center receives telephone calls and DA Forms 2028 almost daily about AR 385-40 dated 1 September 1980. After 3 years in the field, this regulation has received more than the normal requests for change.

AR 385-40 is presently being updated and rewritten, and the new draft will soon be sent to HQDA for approval and publication. So if you have suggested changes, most likely they will be incorporated in the updated version of the regulation. ■

Clarification

Reference the Forum in the 22 February 1984 **Flightfax**. The item titled "Hold That Load" was a reprint from **PS**. We have learned that the TSARCOM message referred to did not say to remove all MB-1 tiedowns, only the tiedowns manufactured by ANCRA Corporation. Tiedowns with P/N 42189-10 and manufacturer's code 31272 will be removed from service. ■

Answers to last week's questions

1. Flight characteristics of aircraft are directly dependent upon conditions of weight and balance. What are the definitions of empty weight and basic weight? Empty weight is the aircraft's weight as it rolls off the assembly line and before fuel, oil, and mission equipment are added. This term is used for design purposes and usually does not affect service activities. Basic weight is the empty weight plus trapped and unusable fuel and oil and all fixed equipment. The basic weight of an aircraft, as delivered, is the first entry on DD Form 365C (Chart C—Basic Weight and Balance Record). The last weight, moment, and index entry on DD Form 365C is considered the current weight and balance status of the basic aircraft. **TC 1-201, page 2-1**

2. There are poisonous fish in some tropical waters. As a general rule, most fish with exotic coloring and grotesque shape and without scales are poisonous, while most fish with dull coloring, normal shape, and scales are edible. True or false? True. **FM 1-202, page 3-11, par. 3-21**

3. Any type of mushroom should be considered poisonous and should not be eaten. True or false? True. **FM 1-202, page 3-11, par. 3-21**

4. Where can you find a sample FOD prevention SOP? AR 385-95, Appendix C. **AR 385-95, page 4-2, par. 4-7** ■

Questions for aviation personnel

1. Are fuels with the same NATO code numbers interchangeable? **Reference: TB 55-9150-200-24, with Change 3, Engine and Transmission Oils, Fuels, and Additives for Army Aircraft**

2. Which regular Army uniform (suitable for everyday field wear) has been developed for personnel who handle aviation fuels? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

3. Personnel who are not essential to the mission will not be carried in an aircraft with incapacitating or toxic chemicals on board. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. Aerodynamics concerns the motion of air and other gaseous fluids and other forces acting on objects in motion through the air (gases). In effect, aerodynamics are concerned with which of the following: the object (aircraft), the movement (relative wind), the air (atmosphere), or all of these? **Reference: FM 1-203, Fundamentals of Flight** ■

Mishap briefs

Caused by incorrectly installed transmission oil filter seal.

OV-1 Class E mishap □ (RV-1D) When gear selector was positioned for landing, landing gear did not extend. Hydraulic pressures were confirmed at zero. Hydraulic failure and emergency gear extension checklist items were completed, and aircraft landed without incident. Undertorqued hydraulic line fitting in right main landing gear wheel well backed off.

Messages received

• Safety-of-flight maintenance mandatory message concerning revision to compliance period for one-time inspection of tail rotor assembly of H-6 series helicopters (OH-6A-84-03, 302200Z Mar 84). Summary: This message revises the time compliance period for prior safety-of-flight message number OH-6A-84-01 and eliminates a possible ambiguity concerning which tail rotor assemblies require inspection. Contact: Larry Wieschhaus, AUTOVON 693-1687, commercial 314-263-1687.

• Safety-of-flight technical message concerning inspection of H-6 series

helicopter main rotor blade and damper attaching pins (OH-6A-84-02, 042100Z Apr 84). Summary: A Category I QDR was received reporting a total of eight defective OH-6A main rotor blade/damper attaching pins (cracked on retaining lever at cam lock attaching point). This message establishes initial and recurring inspection requirements for the main rotor blade/damper attaching pins. Contact: Larry Wieschhaus, AUTOVON 693-1687, commercial 314-263-1687.

• Safety-of-flight maintenance mandatory message concerning one-time inspection of UH-60 tail rotor pylon cover hinge bracket (UH-60A-84-03, 042115Z Apr 84). Summary: Field inspections of UH-60 tail rotor pylon cover hinge brackets have revealed cracks in the brackets. This message requires inspection of the brackets. Contact: Lyell Myers, AUTOVON 693-3300, commercial 314-263-3300.

• Safety-of-flight maintenance mandatory message concerning one-time inspection for certain defective turnbuckle bodies in main mixing lever to pitch horn control link assemblies (UH-1-84-01, 302145Z Mar 84). Summary: Rod ends have been found to be extremely loose in the turnbuckle bodies. Laboratory analyses revealed that the threads in the bodies were deformed and undersized. This message applies to UH-1D/H/V/EH-1H/X series aircraft. Contact: Ken Luber, AUTOVON 693-1708, commercial 314-263-1708.

• Maintenance information message concerning packaging of crashworthy fuel cells returned to the depot for repair (MIN-84-GEN-MEM-02, 301800Z Mar 84). This message alerts field maintenance and supply personnel that crashworthy fuel cells are being damaged due to improper packaging and provides additional guidance on how fuel cells should be packaged for return to depot for repair.

For more information on selected mishap briefs, call AUTOVON 558-4202/4198.

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Unplanned doesn't have to be unprepared

The Army is still losing personnel and equipment because of unplanned flight into instrument meteorological conditions (IMC). While the number of mishaps from this cause has decreased substantially over the past few years, we can still expect at least two or three a year.

These mishaps are almost always catastrophic, resulting in fatalities, injuries, and destroyed aircraft. All six aircraft involved in IMC mishaps over the past 2 years were destroyed. Eight people were killed and 12 injured. Only one of the pilots and copilots had more than 600 flight hours. This was a UH-60 pilot with approximately 1,000 hours. **Four of the six mishaps involved supervision.**

In two separate incidents, OH-58 pilots were the only crewmembers on board when their aircraft entered IMC. One of the OH-58 pilots took off from a field site at night to fly to the airfield because weather conditions were rapidly deteriorating. A field training exercise was just about over, and the unit commander wanted to avoid another night in the field. **This was the first time the pilot had flown at night without a copilot.**

Weather conditions at the time of departure were within the guidelines for VFR flight, and the airfield was only a few miles away. Shortly after the OH-58 pilot took off, the aircraft entered a fog layer and was then seen emerging from the top of the fog layer in a climbing turn, as required by vertical helicopter IFR recovery procedures. While following this procedure, the pilot apparently decided to try to return to low-level visual flight conditions. The OH-58 was seen at a low altitude in a right descending turn just before it crashed. The pilot was killed.

The other OH-58 pilot who was flying without a copilot was also on a night VFR flight. En route to the unit field site, he had to go through an airfield control zone. Unable to find the field site because of an overcast condition and lack of ground reference lights, the pilot began flying in left orbits, searching for the site. About 2 minutes later, the pilot entered instrument meteorological conditions. **The tower operator did not tell the pilot that the weather had deteriorated to IMC.** The pilot tried to maintain control of the aircraft and started to climb to a higher altitude. He was unable to maintain or establish control as the aircraft banked left and right several times. The OH-58 hit the top of a tree and crashed. **The pilot had no documented instrument training in the OH-58 and no actual instrument flight in IMC anytime in his aviation career.**

A UH-1 pilot, also flying without a copilot, was on a medevac mission. After overflying the pickup point, the pilot began a right descending turn to land. During the approach, a heavy rainstorm severely reduced his visibility and he became spatially disoriented. The aircraft continued to descend, and the main rotor blades hit a large tree. The UH-1 crashed through the trees and came to rest on its left side. **The detachment commander authorized the mission to be flown with only one pilot on board.**

Another UH-1 crashed as it was being moved from a field site to an airstrip. The ceiling was estimated to be below 100 feet, and visibility was limited due to darkness and clouds. **The air mission commander had directed that five aircraft be repositioned to the airstrip in weather conditions less than those prescribed for VFR flight.** When the UH-1 pilot picked his aircraft up above the trees, it entered clouds. The low-time pilot became disoriented, and the aircraft was seen in a left turn which continued until impact on a ridgeline. The pilot, copilot, and crew chief were killed.

(continued on next page)

This AH-1 crashed when the pilot became disoriented after entering IMC.

Unplanned doesn't have to be unprepared

Four people were killed and six seriously injured when a UH-60 crashed while flying through fog. Two UH-60s were transporting troops. The weather began to deteriorate about 20 minutes after takeoff. The aircraft were flying low level through valleys and over rising terrain. The flight leader told the No. 2 pilot to drop back and **he would try to find a route through the fog.** When radio contact could not be made with the flight leader, the No. 2 pilot reversed course, crossed over into a parallel valley, and proceeded to destination.

The crew of the No. 1 aircraft lost visual reference because of the fog and tried to transition to instrument flight. Before they could do so, the main rotor blades hit a large tree and the aircraft crashed almost inverted.

Supervision played a part in the crash of an AH-1 whose pilot flew into IMC. As a flight of four Cobras 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 further.** The flight leader continued on, became disoriented, and lost his composure. The aircraft hit the side of a hill, injuring both occupants.

Although unplanned entry into IMC can occur at any altitude, the most critical is close to the ground or obstacles such as mountains, trees, or buildings. The difference between planned and unplanned entry into IMC is usually dramatic because of several factors. Unplanned entry into IMC is unexpected, requires immediate transition to instrument flight, and usually causes the pilot to become extremely anxious about the possibility of a collision with the terrain or some other object. Unplanned entry can result in poor cockpit coordination, jerkiness on the controls, and poor instrument scan.

The briefing before the flight usually focuses on who will do what in the event of an emergency, such as an engine failure. The crew should also discuss what each will do in case of unplanned entry into IMC. During the flight, the crew should be mentally prepared for the possibility of entering IMC and know exactly the steps they will take if this should happen.

The 5 Cs

Successful transition from visual meteorological conditions to instrument meteorological conditions requires the logical application of a step-by-step procedure to avoid loss of control, confusion, and a catastrophic mishap. An inadvertent IMC procedure was developed several years ago. Labeled the 5 Cs—control, coordination, clearance, course, and call—this procedure gives the pilot something to follow when confronted with inadvertent IMC.

The 5 C procedure is a fast-acting antidote to confusion and anxiety during the first 10 to 15 seconds after IMC penetration. It is during the first few seconds that the battle with inadvertent IMC is won or lost. If aircraft control can be maintained during this initial crucial period, the chances of surviving an IMC experience are greatly enhanced.

Whether or not all 5 Cs will apply in each IMC circumstance will depend on existing conditions, e.g., terrain, obstacles, etc. The procedure is to be carried out in conjunction with and as a part of the unit vertical helicopter IFR recovery procedure plan.

Control of the aircraft is the most important factor in recovering from unplanned flight into IMC, so that is the first C. You must convince yourself ahead of time that should you enter IMC and lose ground reference your only option is to immediately transition to instrument flight. Level the wings in the attitude indicator, maintain heading, adjust to climb power, and adjust to climb airspeed. Once you make the transition, control is established by crosschecking the flight instruments. If you fail to make this transition, you're in serious trouble. The four subsequent Cs depend on the successful accomplishment of the first C.

The second C is Coordination. As we said earlier, before a crew begins a flight, they should discuss what each will do in case of unplanned entry into IMC. It should be understood that the pilot at the controls will concentrate on the instruments and the copilot will look outside.

Next comes Clearance. To insure that the highest terrain feature along the route of flight will be cleared, gain altitude with a straight controlled climb.

The fourth C is Course. Select and turn to the appropriate heading.

The last C is Call. Make required radio calls for assistance. Coordinated radio frequencies should be specified and posted in the aircraft.

FM 1-202, Environmental Flight, gives slightly different procedures to follow if enemy weapons are active and the terrain along the route rises rapidly.

Why have inadvertent IMC recovery plans when regulations specify certain weather minimums for VFR flight? We're certainly not advocating entry into IMC, and we know that the best approach is to land before entering IMC. But, as you can see from the mishaps for the past 2 years, pilots are sometimes forced to cope with instrument meteorological conditions.

Practice of the 5 Cs under visual meteorological conditions will boost your confidence in your ability to control the aircraft in IMC. Remembering the 5 Cs and being able to make them work may some day get you out of a bad situation. ■

Aviation mishap prevention forum

ACP Tree destroyed by storm

You former Fort Rucker flight students will probably be sad to learn of the demise of an old friend. We just learned that ACP Tree, the unofficial checkpoint north of Brantly, was recently destroyed by a storm. ■

Publication changes

If you received a reply to your DA Form 2028 (Recommended Changes to Publications and Blank Forms) and it agreed that the publication needs some changing, don't change anything yet. The information you got is not considered Department of the Army policy until it appears in an Army publication. However, your command may implement the changes locally by making them a part of the standing operating procedures. ■

AOAP pubs

The Army Oil Analysis Program is more than just another Program with a capital P. It's a vital part of your everyday maintenance operation. The following pubs are the "big titles" on the AOAP library shelf. Check 'em out!

- AR 750-22 with C1, Army Oil Analysis Program
- DA Pam 750-5, Army Oil Analysis Program (AOAP); Guide for Leaders
- TB 43-0106, Aeronautical Equipment Army Oil Analysis Program
- TB 43-0210, Nonaeronautical Equipment Army Oil Analysis Program
- TB 43-0211, Army Oil Analysis Program (AOAP) Users Guide for Nonaeronautical Equipment

Use DA Form 12-9A for pams and the AR and DA Form 12-34C for TBs to get on regular distribution for these pubs. Get your pubs people to order current copies of all the pubs on a DA Form 4569 through AUTODIN. ■

—from PS, Issue 376

New manual

A new manual, Standards of Serviceability for Transfer of Aircraft, TM 55-1500-326-23, dated 10 February 1984, is hot off the press. This manual supersedes TM 55-1500-326-24, dated 29 October 1976, including all changes. The manual prescribes the amount of inspection and maintenance necessary to assure that ample reliable flight hours are remaining on the aircraft and components to satisfy immediate operational and logistical requirements of the receiving activity when the aircraft is being transferred within CONUS, overseas, or into combat operations. ■

Correction

Reference the Forum in the 28 March 1984 **Flightfax**. Answer No. 3 should have read: To become qualified as a maintenance test flight evaluator, a maintenance test pilot must successfully complete: A test flight phase of the Aviation Maintenance Officers Course **or** an equivalency evaluation administered by an MTFE selected by HQDA (DES). ■

Answers to last week's questions

1. Are fuels with the same NATO code numbers interchangeable? Yes. **TB 55-9150-200-24, with Change 3, page 2-2, par. 2-5b**

2. Which regular Army uniform (suitable for everyday field wear) has been developed for personnel who handle aviation fuels? To date, no regular Army uniform (suitable for everyday field wear) has been developed for personnel who handle aviation fuels. **FM 10-68, with Change 3, page 5-2, par. 5-3a**

3. Personnel who are not essential to the mission will not be carried in an aircraft with incapacitating or toxic chemicals on board. True or false? True. **AR 95-1, with Change 1, page 2-7, par. 2-18**

4. Aerodynamics concerns the motion of air and other gaseous fluids and other forces acting on objects in motion through the air (gases). In effect, aerodynamics are concerned with which of the following: the object (aircraft), the movement (relative wind), the air (atmosphere), or all of these? All of these. **FM 1-203, page 1-1, par. 1-1a** ■

Questions for aviation personnel

1. What manual determines alternate and emergency turbine fuels for fixed and rotary wing aircraft? **Reference: TB 55-9150-200-24, with Change 3, Engine and Transmission Oils, Fuels, and Additives for Army Aircraft**

2. The smoker effectively loses _____ percent of his night vision capability at sea level. This is equivalent to a physiological altitude of 5,000 feet. **Reference: FM 1-204, Night Flight Techniques and Procedures**

3. Aircraft parts, components, or assemblies which have been subjected or exposed to fire and/or salt water immersion will not be reused locally under any circumstances. True or false? **Reference: AR 750-1, Army Materiel Maintenance Concepts and Policies**

4. Aircraft mishap investigation boards will investigate aircraft mishaps to the degree necessary to identify causes and provide recommendations that will remedy the causes and minimize the chances for similar recurrences. True or false? **Reference: DA Pam 385-95, Aircraft Accident Investigation and Reporting** ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class E mishaps □ (H series) Tail rotor chip detector light came on after takeoff. Caused by malfunction of 90-degree gearbox. □ (H series) Transmission oil pressure gauge fluctuated. Caused by faulty pressure relief valve. □ (H series) Crew heard grinding noise and smelled smoke coming from inverter area. Caused by failure of inverter bearings. □ (H series) Transmission oil pressure light came on, followed by loss of oil pressure. Main transmission internal oil filter gasket blew out.

UH-60 Class D mishaps □ After landing in sod area, aircraft settled into mud. Landing light, which was not completely stowed, came into contact with higher ground. Light was broken. □ As crew attempted to release load, sling became tangled around cargo hook. Once on the ground, load was released but sling would not slide off the hook. As crew chief tried to push the nylon loop off the hook, the hook closed on his hand, cutting off tip of one finger.

UH-60 Class E mishaps □ Crew heard high-pitched whine. No. 1 engine failed on short final for landing. Caused by failure of IPS blower on engine. □ The unit had a mission to fly eight UH-60 helicopters from one airfield to another. Weather information was obtained for two routes. The operations officer chose the alternate route because of the better forecast and launched the eight aircraft VFR. During the flight, an intermittent weather condition involving isolated low clouds was encountered and the area was circumnavigated. Some time later, the weather deteriorated to a point where the flight lead decided to abort the mission. The flight returned to the takeoff point. Weather was considerably worse than forecast. Perceived pressures on operations and aircrews to launch the flight affected the go-no-go decision process. The crews were flying at night over unfamiliar terrain. The unit SOP specified a maximum of five UH-60 aircraft in a flight. The unit commander was away at the time the flight was launched.

Attack helicopters

AH-1 Class E mishaps □ Transmission oil pressure dropped during landing. Caused by failure of oil pressure transducer. □ (S series) Master caution and hydraulic lights came on, followed by loss of hydraulic pressure. Pressure line to No. 1 hydraulic system burst between hydraulic pump and hydraulic servo. □ (S series) Master caution and No. 1 hydraulic lights came on, and anti-torque pedals became stiff. Caused by failure of hydraulic toggle switch.

Cargo helicopters

CH-47 Class E mishaps □ (D series) Transmission oil pressure light came on. Caused by failure of pressure switch. □ (C series) No. 1 engine fire light came on. Caused by cracked sensing element. □ (C series) No. 2 engine failed during runup. Caused by malfunction in engine quadrant assembly.

Observation helicopters

OH-58 Class D mishap □ (A series) Pilot placed his kneeboard on instrument panel during runup. As aircraft reached operating rpm, vibrations caused kneeboard to slide off of instrument panel, knocking hole in chin bubble.

OH-58 Class E mishaps □ (A series) Pilot heard loud roaring noise and felt vibration in pedals and airframe. Failure of bearing resulted in outer race spinning in freewheel housing assembly. □ (A series) Master caution and engine oil bypass lights came on. Pilot did not check engine oil tank filler cap during preflight, and cap came loose during flight, allowing oil to be pumped overboard. □ (A series) Engine flamed out during deceleration check. New digital watch indicated deceleration time to be

(continued on back page)

FY 84 Class A Mishap Countdown

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	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	1-25 Apr	**2**	**3**
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**23**	**21**

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 101 □ 25 Apr 1984

Clarification of DOD Flight Information Publication (FLIP) General Planning (GP) and Department of the Army Technical Bulletin (TB AVN 1170)

Paragraph 9-1 of the FLIP GP explains aircraft categories as does paragraph 5, TB AVN 1170. The misunderstandings come about when one reads the **notes** in paragraph 9-1 of the GP versus paragraph 5b of TB AVN 1170. Future changes will require that military helicopters use the approach category minima that is published for the airspeed being flown instead of category "A" minima as is now implied in the note of GP paragraph 9-1. Remember: An aircraft fits in only one category and that category shall be the highest category in which it meets the specifications. If it is necessary to maneuver at speeds in excess of the upper limit of the speed range for the aircraft's category, the minima for the next higher approach will be used. Approach Category - (A) speed less than 91 knots; (B) 91 knots or more but less than 121 knots; (C) 121 knots or more but less than 141 knots; (D) 141 knots or more but less than 166 knots; (E) Speed 166 knots or more. If additional clarification is needed, contact Mr. Helfenberger or Mr. Newport at AUTOVON 284-7773. ■

Night vision goggle update

MACOM representatives, in concert with DES, USAAVNC NVG section, recently completed a week-long effort to streamline night vision goggle training and redirect additional emphasis to realistic tactical training. Numerous excellent changes were recommended. As they are only recommendations (and not yet approved guidelines), they will not be addressed here. Hopefully, within a few weeks the recommendations will be solidified and disseminated to the field.

Pilot versus copilot duties during NVG flight and the practice of removing the IR filter from the variable daylight filter were two items discussed on which command emphasis is needed for the correct procedures to be followed.

NVG copilot duties

In accordance with Note 1, TC 1-134, ATM Commander's Guide, each individual ATM, and all other pertinent material on NVG flight, "No single-pilot NVG flight will be conducted. Crew workloads preclude safe operations by a single pilot." What does this mean? Basically, it has been determined that to conduct repeated safe NVG operations requires two pilots (pilot and copilot). Since two pilots are required, it is imperative that two pilots be used. The pilot has duties which require him to look outside the cockpit all the time (i.e., fly the aircraft and insure obstacle avoidance), and the copilot has duties which require him to divide his attention in and out of the cockpit (i.e., navigate, complete operational checks, monitor instruments). What we are trying to say is that the aviator flying the aircraft is performing pilot duties and, therefore, has no requirement to perform before-takeoff checks, tune radios, or do any other crew duty that requires him to look inside the cockpit (copilot should perform these checks).

This may sound like a radical departure from standard procedures; however, division of attention (in and out of the cockpit) has been a cause factor in a number of NVG mishaps. Unless the aircraft is on the ground, the pilot should not perform any function that requires him to look inside the cockpit (short of actual emergency procedure functions). If it becomes necessary for the pilot to look inside during flight, then a transfer of controls should be effected. Copilot duties would include all before-takeoff and landing checks (can be performed by gunner in AH-1 with limitations), navigation tasks, tuning radios, and insuring maintenance of altitudes and airspeeds. Again, this may sound like a radical departure from the norm, but it is in the interest of safe NVG flight.

Removal of IR filter

Units are still removing the IR filters in the variable daylight NVG filters to increase the amount of light reaching the goggles. According to the Army Aeromedical Research Laboratory, this allows an excessive amount of light which is sufficient to damage the NVG image intensifier tubes. Normal useful life of the intensifier tubes will be significantly reduced and an increase in the number of black spots will be present. The IR filters should not be removed nor the variable filters altered in any way.

NVG section

DES has established an NVG section within Flight Standards that will serve as a single source for all NVG matters. The section is comprised of NVG SIPs for each type of aircraft. Any questions or requests for assistance (telephone or written) should be directed to this section. We will maintain a complete file of NVG-related material for dissemination and a worldwide list of points of contact for NVG matters (i.e., DARCOM, AVSCOM, DA). If you have any suggestions, SOPs, or innovative ideas on ways to improve NVG training, please give us a call.

Name	Aircraft	Telephone
CW4 Dean Resch	CH-47	AV 558-6784/6309
CW3 Doug Joyce	UH-1	AV 558-2442/6309
CW3 Pat Sheehan	AH-1	AV 558-2442/6309
CW3 Charles Bos	OH-58/OH-6	AV 558-2442/6309
CW2 Phil Rohman	UH-60	AV 558-2442/6309

Mishap briefs

1.41 seconds during flameout cycle. Oil smoke was seen coming from exhaust stacks. Engine was shut down and no discrepancies found. Engine was restarted and again flamed out during deceleration check timed at 1.45 seconds. Maintenance personnel then did a minimum fuel flow check and found minimum fuel flow to be less than required. During previous flight, using standard aircraft stop watch, times appeared to be 2 seconds as required.

Fixed wing

C-12 Class E mishap □ (C series) Left engine torque fluctuation occurred and loud noise was heard during flight. Caused by perforated diaphragm on high pressure bleed valve.

OV-1 Class E mishap □ (D series) Aircraft was aligned with the runway so IP could train student in emergency procedures for engine failure during takeoff. IP retarded No. 2 engine and student reacted to aircraft yaw to the right by applying left brake. IP got on the controls and noticed that left brake pedal offered no resistance to his foot pressure. As aircraft stopped on runway, IP was told by tower personnel that flames and smoke were coming from left main landing gear. Using portable fire extinguisher, student pilot extinguished the fire that had started to build on left tire. Investigation revealed that brake disc next to brake housing had broken into five sections due to overheating. Loss of this disc allowed self-adjusting pin shaft to extend beyond brake housing and when brake was applied, brake fluid was forced through housing onto the remaining hot brake disc and ignited.

U-21 Class C mishap □ (D series) Right main gear collapsed during touchdown, damaging No. 2 engine propeller and outboard flaps.

Maintenance

UH-1 Class E mishaps □ (H series) As engine was started, crew chief saw fuel leaking from fuel control servo filter. O-rings on filter were incorrectly installed. □ (V series) Crew chief saw fuel coming from fuel control governor during engine start. Caused by pinched fuel control governor preformed packing.

CH-47 Class E mishap □ (B series) No. 2 engine transmission oil pressure indicated 0 psi during runup. Plate behind transmission filter was installed backwards, and No. 1 and 2 engine transmission oil lines were also backwards.

C-12 Class E mishap □ (C series) Oil was seen seeping from trailing edge of No. 1 engine cowling during flight. Incorrect O-ring was installed in engine oil filter cover.

Messages received

• Safety-of-flight maintenance mandatory message concerning one-time inspection and repair of UH-60 stabilator amplifier (UH-60A-84-04, 101930Z Apr 84). Summary: Factory analysis of the stabilator amplifier has revealed a possible flaw in the capacitors. The stabilator amplifier integrity cannot be checked by normal system operational requirements. Contact: Lyell Myers, AUTOVON 693-3300, commercial 314-263-3300.

• Maintenance information message concerning UH-60 supplemental covert illumination for night vision goggle training flights (MIM-UH-60A-MEM-84-01, 101830Z Apr 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

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Accident review: late with corrective action

Synopsis

The UH-1H pilot allowed the nose of the aircraft to yaw left during a standard autorotation. As the aircraft touched down, the front part of the right skid shoe dug into the sod. The instructor pilot was late with corrective action. The Huey became airborne again, yawed further left, and rolled onto its right side.

History of flight

A pilot and instructor pilot were on a UH-1H training flight. The pilot's first approach was a steep approach to a sod area. The second approach was a running landing to the sod with hydraulics off. During the landing, the pilot allowed the airspeed to decay below effective translational lift before touchdown. The IP helped the pilot by adding forward cyclic. As the aircraft touched down, it slid to the left. This seemed unusual to the IP as he was expecting the aircraft to slide to the right. On the third landing, performed by the IP, the aircraft again slid to the left.

The fourth approach was a standard autorotation. The pilot began the autorotation at an altitude of 1,000 feet above the ground and an airspeed of 90 knots. He entered the maneuver early and allowed the airspeed to slow to approximately 65 to 70 knots. The IP told the pilot to regain an 80-knot attitude. During the autorotative approach, the pilot noticed that the

touchdown point would be short of the approach end of the touchdown zone. He was told by the IP to continue the autorotation.

The deceleration, begun at 125 feet, was slight and gradual. The pilot held that attitude until he applied initial collective pitch at 20 to 25 feet. The nose of the aircraft drifted about 5 degrees to the left. At this point, the IP tried to help the pilot by adding forward cyclic and right pedal; however, the aircraft touched down with the nose yawing to the left. Once on the ground, the aircraft began to slide to the left, with the front part of the right skid digging into the sod. The aft end of the aircraft rose and the right front nose section and rotor blades dipped to the right. The IP tried to keep the aircraft from tipping further to the right front by increasing collective pitch and adding full right pedal.

The Huey again became airborne, yawed further to the left because of the decrease in rotor rpm, and touched down in a slight right roll and nose-low attitude. The right front skid collapsed, the right chin bubble and main rotor blades hit the ground, and the aircraft came to rest on its right side. The IP and pilot escaped with bruises and muscle strains.

Crewmember experience

The 40-year-old IP had more than 3,300 rotary wing hours, with almost 2,800 in the UH-1H and more than 600 as an IP. The 26-year-old pilot had more than 500 rotary wing hours, with almost 300 in the UH-1H.

Commentary

The pilot did not correctly align the aircraft with the landing direction before the touchdown portion of the autorotation as outlined in TC 1-135. Throughout the deceleration and cushion collective pitch portions of the maneuver, he allowed the aircraft to yaw to the left. It was concluded that this was caused by improper antitorque pedal control. The pilot was also qualified in the AH-1, and low-time AH-1 pilots tend to hover and land with a yaw because of reduced straight-ahead visibility from the rear seat. The pilot was confident that the IP would be able to recover from any emergency condition.

The IP was late in correcting the yaw induced by the pilot and then, once the aircraft touched down, applied collective pitch rather than follow the slide with cyclic. By applying collective pitch, the IP decayed the remaining main/tail rotor rpm. When the aircraft became airborne again, it was unresponsive to any further pilot input. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (H series) Aircraft was on training flight. After hydraulics-off go-around, climb was established. As aircraft reached 400 to 500 feet above the ground, it rolled inverted. Main rotor system separated from aircraft, and aircraft crashed into trees. Three fatalities. 8429

UH-1 Class D mishap □ (H series) Pilot was preparing aircraft for a scheduled flight later in the day. Engine was started and all before-takeoff checks were made except the HIT check. The ground handling wheels were intentionally left on the aircraft in case the mission was cancelled. This was to facilitate the quick return of the aircraft back into the hangar. Pilot believed that the flight would probably be cancelled due to deteriorating weather conditions. Leaving the wheels on is a violation of the unit's SOP and dash 10 preflight procedures. During the HIT check, aircraft became airborne and ground handling wheels extended. As helicopter was lowered to the ground, right skid landed partially on right wheel that had rotated under the skid. Hole was punctured in outside of skid tube below ground handling wheel attaching point.

UH-1 Class E mishaps □ (H series) Aircraft yawed right and engine rpm decreased. Caused by defective overspeed governor. □ (H series) Loud clanking noise was heard during hover. Caused by defective engine. □ (H series) Tail rotor chip detector light came on. Caused by failure of 90-degree gearbox. □ (H series) Engine tachometer failed during flight. Caused by sheared tachometer generator drive shaft. □ (H series) Transmission oil pressure fluctuated. Caused by defective oil pressure relief valve. □ (H series) Master caution and hydraulic lights came on. Caused by failure of hydraulic pressure switch.

UH-60 Class E mishaps □ Crew smelled burning odor during runup. Caused by failure of APU generator. □ No. 2 hydraulic pump light came on. Caused by failure of pump. □ Master caution and No. 1 tail rotor servo lights came on. Aircraft yawed 20 degrees to right. Rivet inside tail rotor gearbox cowling chafed input hydraulic line to No. 1 tail rotor servo, causing failure of line. Suspect hydraulic line clamp failed to hold the line in the correct position.

Attack helicopters

AH-1 Class D mishap □ (S series) As turret weapons were fired, rounds landed short, causing damage to main rotor blades and turret.

AH-1 Class E mishaps □ (S series) Aircraft shuddered, lights went out, and power was lost. Lights came back on and aircraft was unstable due to loss of SCAS. Rpm audio activated, and crew smelled electrical odor and saw smoke in cockpit. Aircraft was landed and shut down. Caused by thermal runaway of battery, which melted all the cells. □ (S series) Master caution and transmission oil bypass lights came on. Caused by malfunction of transmission oil bypass valve. □ (S series) Oil pressure dropped to zero during takeoff. Caused by defective transducer. □ (S series) Engine and transmission oil temperature rose during hover. Caused by frozen oil cooler turbine bearing.

Cargo helicopters

CH-47 Class C mishap □ (C series) Aft rotor blades hit telephone pole during taxi. All three blades were damaged. Ground guide was used.

CH-47 Class E mishaps □ (C series) No. 2 flight boost and SAS caution lights came on, followed by loss of fluid and zero reading on No. 2 flight boost gauge. Caused by ruptured pressure line and sheared boost pump shaft. □ (C series) After takeoff, smoke began pouring from center windshield right side brace. Moderate rain may have caused water to seep into electrical harnesses. Cockpit had several water leaks.

Observation helicopters

OH-6 Class E mishap □ Fuel filter light came on as aircraft was picked up to hover after being refueled. Fuel sample revealed water and contaminants. Caused by incorrect procedure on recirculation of fuel and purging of fuel hoses.

OH-58 Class E mishaps □ (A series) Unusual noise was heard and cyclic control felt stiff during NOE quick stop. Caused by sticking hydraulic servo actuator. □ (C series) Postflight inspection revealed metal chips and filings on engine deck. FOD screen on starter generator became dislodged and was sucked into generator cooling fan. □ (A series) N_2 tachometer failed during landing. Caused by loose cannon plug on tachometer.

Fixed wing

U-21 Class C mishap □ (A series) When HIT check was done on No. 2 engine during runup, temperature was +37° C. above base line. Inspection revealed

No. 1 and No. 2 engines were out of tolerance. Hot end inspection of both engines indicated overtemp. ITT gauges were faulty.

U-21 Class E mishaps □ (A series) Stall warning horn came on during flight. Broken wire on stall warning heating element caused short and activation of horn. □ (RU-21H) No. 1 engine was shut down to demonstrate autofeather feature during transition training. When engine restart was initiated, No. 2 generator dropped off line and start was aborted. On second start, left ignition did not illuminate and 2-amp bus overload circuit breaker popped. Smoke was seen in cockpit. Single-engine landing was made. Caused by failure of bus overload circuit breaker.

OV-1 Class D mishap □ (D series) Binding was felt in right brake pedal during taxi. Caused by sheared wheel half retention bolts.

U-8 Class E mishap □ (F series) As engine power was reduced from climb to cruise, left engine began running rough. Retaining screw for condensor in right magneto had vibrated free, grounding out magneto.

T-42 Class D mishap □ Large buzzard hit copilot's side of windshield. IP took control and landed.

C-12 Class E mishap □ (C series) As pilot adjusted power and prop levers to climb from takeoff setting, cabin door caution light came on. Aircraft was returned to airport and landed. Crew chief did not check door handle for locked indication after closing cabin door.

Maintenance

UH-1 Class E mishaps □ (H series) Crew chief saw hydraulic fluid pumping overboard during runup. Caused by pinched O-ring in irreversible valve. □ (H series) Loud popping noises were heard and N_2 fluctuated. Variable inlet guide vanes were out of adjustment.

UH-60 Class E mishap □ No. 2 engine oil pressure light came on. Oil tank cap came loose in flight, allowing engine oil to be siphoned out. Crew chief did not secure oil tank cap correctly.

AH-1 Class E mishaps □ (S series) Aircraft made three uncommanded left and right roll motions during flight. SCAS was disengaged and mission terminated. Roll SCAS card was installed without alignment pins. Card was not properly seated and SCAS imbalance existed. □ (S series) Inverter light would not go out during runup. Crew chief had replaced attitude gyro earlier in the day. Ground wire on a.c. power failure relay had pulled loose during gyro replacement and was not detected. Relay was not properly grounded, causing false activation of inverter light. □ (S series) Airspeed indicators did not work properly during takeoff. Pitot static system lines were installed incorrectly.

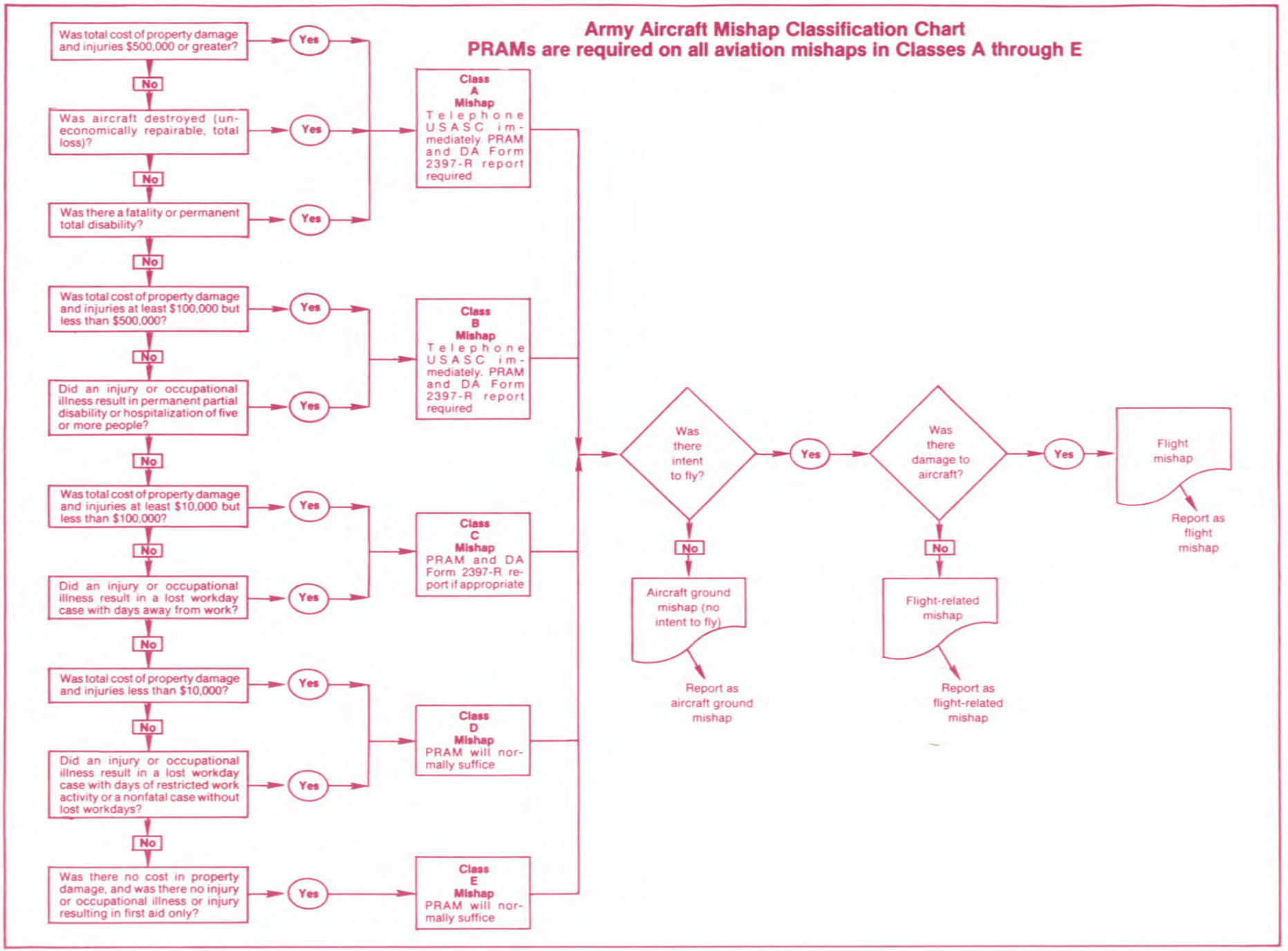
Messages received

• Safety-of-flight maintenance mandatory message concerning UH-1 turnbuckle bodies (UH-1-84-03, 161400Z Apr 84). Summary: This message is the second amendment to safety-of-flight message UH-1-84-01 and provides the additional guidance mentioned in the first amendment (UH-1-84-02). This second amendment applies only to turnbuckle bodies, P/N 204-011-137-1, NSN 5340-00-865-7927, that were found to exceed the .008 inch limit. Contact: Ken Luber, AUTOVON 693-1683, commercial 314-263-1683.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**3**	**3**
	May	8	1	1-2 May	**0**	**0**
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**24**	**21**


Army Aircraft Mishap Classification Chart
PRAMs are required on all aviation mishaps in Classes A through E
Was total cost of property damage and injuries $500,000 or greater?
Yes
No
Was aircraft destroyed (uneconomically repairable, total loss)?
Yes
No
Was there a fatality or permanent total disability?
Yes
No
Class A Mishap Telephone USASC immediately. PRAM and DA Form 2397-R report required
Was total cost of property damage and injuries at least $100,000 but less than $500,000?
Yes
No
Did an injury or occupational illness result in permanent partial disability or hospitalization of five or more people?
Yes
No
Class B Mishap Telephone USASC immediately. PRAM and DA Form 2397-R report required
Was total cost of property damage and injuries at least $10,000 but less than $100,000?
Yes
No
Did an injury or occupational illness result in a lost workday case with days away from work?
Yes
No
Class C Mishap PRAM and DA Form 2397-R report if appropriate
Was total cost of property damage and injuries less than $10,000?
Yes
No
Did an injury or occupational illness result in a lost workday case with days of restricted work activity or a nonfatal case without lost workdays?
Yes
No
Class D Mishap PRAM will normally suffice
Was there no cost in property damage, and was there no injury or occupational illness or injury resulting in first aid only?
Yes
Class E Mishap PRAM will normally suffice
Was there intent to fly?
No
Aircraft ground mishap (no intent to fly)
Report as aircraft ground mishap
Yes
Was there damage to aircraft?
No
Flight-related mishap
Report as flight-related mishap
Yes
Flight mishap
Report as flight mishap

DA Form 2397-R series reporting requirements for mishap classifications

Mishap Classification	Definition	Reporting Requirements				DA Form 2397-R Series Requirements													
		PRAM	Telephone USASC	Board Requirements	Form 2397-R	-1-R	-2-R	-3-R	-4-R	-5-R	-6-R	-7-R	-8-R	-9-R	-10-R	-11-R	-12-R	-13-R	-14-R
Class A (intent to fly)	Mishaps costing $500,000 or more in combined personnel injuries and property damage, **or** the aircraft is destroyed, **or** a fatality or occupational illness resulting in permanent total disability occurs.	Yes, within 5 duty days	Yes, immediately	Yes, minimum of 4 members	X	X	X	X	X	A	A	A	X	A	X	X	A	X	X
Class B (intent to fly)	Mishaps costing $100,000 or more but less than $500,000 in combined personnel injuries and property damage, **or** an injury or occupational illness resulting in permanent partial disability or hospitalization of five or more personnel occurs.	Yes, within 5 duty days	Yes, immediately	Yes, same as Class A	X	X	X	X	X	A	A	A	X	A	X	X	A	X	X
Class C (intent to fly)	Mishaps costing $10,000 or more but less than $100,000 in combined personnel injuries and property damage, **or** an injury or occupational illness results in loss of one or more workdays.	Yes, within 5 duty days	No	Yes—when 1 or more on board, president will be a commissioned officer. Warrant officers may serve on a one-man board but must be senior to individual involved in mishap.	X	X	X	X	X	A	A	A	X	A	X	X	A	X	X
Class D (intent to fly)	Mishaps costing less than $10,000 in combined personnel injuries and property damage, **or** an injury or occupational illness results in a lost workday case with days of restricted work activity or a nonfatal case without lost workdays.	Yes, within 5 duty days	No	No	◄ Series As Requested by USASC ►														
Class E (intent to fly)	Mishaps resulting in forced landing, precautionary landing, or human factors event with no injury or occupational illness, or injury required only first aid.	Yes, within 5 duty days	No	No	◄ Series As Requested by USASC ►														
Aircraft Ground Mishap (no intent to fly)	No flight plan filed; however, the engines are in operation. Injury, illness, or property damage occurred.	Yes, within 5 duty days	As appropriate	As appropriate for Class A, B, C, D, and E mishaps	X	X	X	X	X	A	A	A	X	A	A	A	A	X	X

X - Form is mandatory if a DA Form 2397 series Technical Report is required by AR 385-40.

A - Form requirement is determined by criteria in chapter 8, DA Pam 385-95.

Note: Commander, USASC, may request forms and additional information when necessary.

Aviation mishap prevention forum

Answers to last week's questions

1. What manual determines alternates and emergency turbine fuels for fixed and rotary wing aircraft? TB 55-9150-200-24. **TB 55-9150-200-24, with Change 3, pages 2-7 and 2-8, table 2-3**

2. The smoker effectively loses _____ percent of his night vision capability at sea level. This is equivalent to a physiological altitude of 5,000 feet. 20 percent. **FM 1-204, page 1-9, par. 1-10a**

3. Aircraft parts, components, or assemblies which have been subjected or exposed to fire and/or salt water immersion will not be reused locally under any circumstances. True or false? True. Such items will be condemned locally or, if considered reparable by competent inspection, will be returned through maintenance or supply channels for inspection and overhaul. All items which are to be condemned or returned for inspection and overhaul will require a statement on all applicable accompanying documentations, including DD Form 1577 or DD Form 1577-2, as applicable, to the effect that the item has been subjected or exposed to fire and/or salt water immersion. **AR 750-1, page 5-7, par. 5-30**

4. Aircraft mishap investigation boards will investigate aircraft mishaps to the degree necessary to identify causes and provide recommendations that will remedy the causes and minimize the chances for similar recurrences. True or false? True. **DA Pam 385-95, page 1-1, par. 1-5** ■

Questions for aviation personnel

1. Before each nuclear cargo mission, the pilot-in-command will become familiar and comply with what ARs? **Reference: FM 55-375, Air Transport Procedures—Transport of Pershing Warhead Section in Shipping and Storage Container, M483, by U.S. Army Helicopters**

2. At what distance must no-smoking signs be posted from refueling areas? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

3. Who may submit Operational Hazard Reports? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

4. What are the objectives of an FOD prevention program? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention** ■

For the birds

Between October 1979 and the end of 1983, more than 150 bird strikes on Army aircraft were reported. Birds take their toll in broken windshields and greenhouses, dents in wings and fuel tanks, and engine damage. Birds also like to set up housekeeping in engines, cowls, wheel wells, etc. Aviation units have reported that nests removed from aircraft in the morning were sometimes rebuilt by 2 p.m. All places where birds might build nests should be checked before each flight, particularly during the migration seasons.

You certainly can't predict what a bird will do and there may come a day when you are not able to avoid hitting one. Just be sure you are wearing your helmet visor down. Many pilots have escaped serious injury from glass and bird fragments because their helmet visors were down. ■

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The role of vision in spatial disorientation

This article, by Colonel Grant B. McNaughton, MC, Directorate of Aerospace Safety, is reprinted from **Flying Safety**.

We normally think of spatial disorientation (SDO) or pilot's vertigo as due to tumbling of our gyro—the balance organ or vestibular apparatus in our inner ear. While it is certainly true that vestibular inputs can cause vertigo, the vestibular apparatus is not the only source of conflicting information leading to SDO. Other sources of orientation information (hence conflicting inputs) include vision, the somato-sensory (feel of the aircraft and seat of the pants) system, and, to some extent, hearing. Of all these sources, the most consistent and possibly most important cause of SDO is conflict between two functional components within the visual system itself.

Though in some respects an oversimplification, the concept of a two-mode visual system is important to understanding the role of vision in SDO. The two modes are:

- A **focal mode**, which "focuses," used for tasks requiring acuity or resolution; e.g., reading the 20/20 line or the let-down plate, identifying the bogey, or aiming the gun. The focal mode is exclusively visual and requires good lighting and good optical resolution. It also requires conscious attention.
- An **ambient mode**, which orients us to the "ambient" environment, tells where we are, and whether we or the environment is moving. The ambient mode is hard-wired to the same terminals in the brain into which feed our other sources of orientation information—vestibular, somato-sensory and hearing (figure 1). Rather than being an isolated ambient visual system, we actually have an ambient orientation system. In this system, vision and the other senses each contribute a share of the inputs. The ambient mode functions quite well at low light levels and does not require acuity correction. For example, though you can't read in the dark, you can orient, provided there is some light (figure 2). The ambient mode functions at a reflex rather than a conscious level and, provided the stimulus is visible, orientation responses appear to occur on an "all or none" basis. The ambient mode acts in concert with the other senses to subserve spatial orientation, balance, posture and gaze stability.

An important aspect of these two modes of processing is that they can be dissociated, as demonstrated by the fact that you can read while walking. This dissociation has some impact on night driving, for example. You steer by your ambient mode, which is relatively unaffected at night. As long as you can steer, you have confidence in your ability to drive, so you drive at the same speed as during daytime, or commonly a little faster. The problem is that your focal vision (hence hazard recognition) has been selectively degraded, and you may not see obstructions such as joggers, animals, or potholes in time. (Also, your reactions are slower at night.)

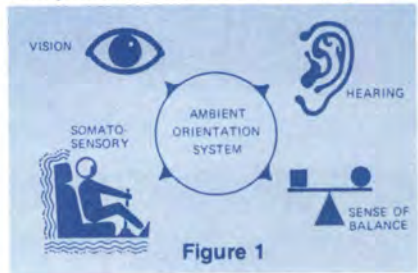


Figure 1

There are other fundamental differences between the two modes. The focal mode is confined to the optical center of the eye but the ambient includes the entire retina—over 3,000 times as much area. The ambient mode functions on the "mass rule" and reacts in proportion to the amount of it that is stimulated. Big objects or big motions are more commanding. This, coupled with the fact that the ambient mode is not particularly discerning (i.e., it can be fooled), provides the basis for the overwhelming sense of self motion—known as the "vection" illusion—generated by full visual simulators. It also accounts

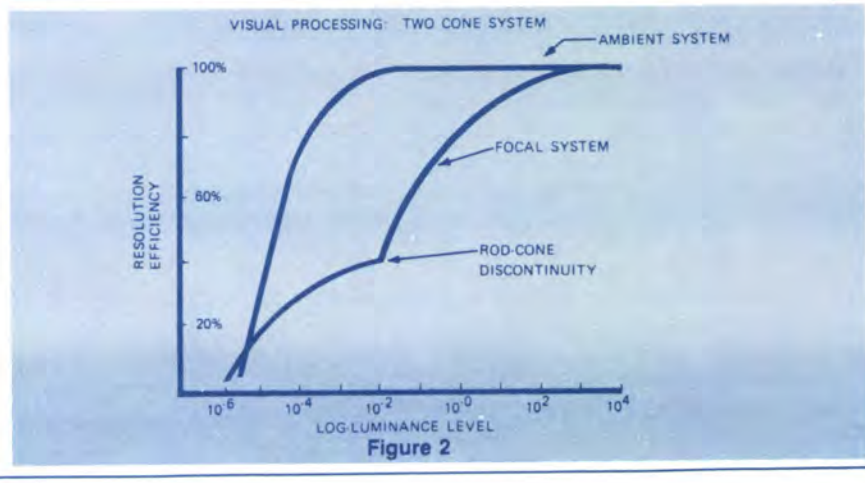


Figure 2

The role of vision in spatial disorientation

for the disorienting "Star Wars" effect of bubble-type canopies at night.

Another difference: Whereas the focal mode actively focuses on objects for recognition and detail, the ambient passively takes in the "quality" of the surroundings—for example, the quality of "surfaceness" of a surface, or the "horizoness" of a horizon.

Of interest is the discovery that visual areas of the brain subserving the ambient mode appear to contain receptors specifically responsive to lines, and are quite ready to accept uncritically any line with the quality of "horizoness" as a horizon line. Thus, the commanding nature of sloping cloud decks or terrain, of a lighted shoreline or highway through an uninhabited region at night, or other false or misplaced horizons can subtly misorient the pilot. In keeping with the mass rule, the larger or longer the horizon, the more commanding.

Think of the most disorienting situations: formation, flying in and out of clouds, then, suddenly, totally IMC; flying high above the desert on a moonless night, no discernible horizon, and stars and ground lights blending; taking off into weather; night weather penetration with your external lights on; approaching through rain, snow, or weather with landing lights on. And you can think of others. In all these situations, you're visual; you're not under the bag. This does not imply you can't get disoriented under the bag; you can, from your unbridled vestibular inputs, but not nearly so easily as when your ambient visual system is bombarded with confusing and reflecting stimuli. What's common to these situations is:

- Lack of a true horizon or reference to the surface.
- Mass stimulation of the ambient visual system (by watching your flight lead, canopy reflections, clouds, stars, rain, blowing snow, lights, etc.) causing the vection illusion.
- Situation worsened by anything which tumbles your gyros, such as accelerations (linear or angular), or abrupt head motions.

Whereas excessive erroneous inputs to the ambient mode cause one type of SDO (the powerful vection illusion), lack of ambient inputs causes another: the target displacement illusion. This can occur in shooting an approach over "black hole" terrain, devoid of lights or any visual cues to the ambient mode. As you maneuver toward the distant approach lights, with no ambient inputs as a "reference point," it may appear that the target lights, not you, have moved. This is something akin to the autokinetic effect in which a stationary light will appear to move when gazed at; it can be somewhat confusing. Point sources of light provide no orientation information—either in relative attitude or in distance. Yet there is a common tendency to "go visual" too soon despite the lack of valid external orientation cues upon which to establish visual dominance. As a result, you become a set-up for the powerful vestibular illusions and can get into some unplanned attitudes.

If the runway lacks VASIs, the lack of ambient cues allows for another tendency: that is to fly a "banana" shaped approach, convexity downward. (The reason for this is that the eye, lacking other references, will attempt to maintain the same angle subtended by the visible runway—the near and far ends. In order to hold that same angle, you wind up flying the arc of a big circle, the chord of which is the visible portion of the runway, landing short or bending things shy of the runway.)

To cope effectively with SDO, you must establish visual dominance on valid, orientation cues. In other words, increase the ratio of "matching" cues to "mismatching" or conflicting cues. Under IMC, the only valid orientation cues are your instruments—primarily the attitude indicator. If single ship, reduce the disorienting mismatching visual inputs by turning down/off unnecessary light, inside and out, to reduce canopy glare and reflections; by lowering the seat; or by going heads-down. Then simultaneously expand the effectiveness of your valid orientation cues by leaning forward and concentrating on them—again primarily the attitude indicator. Make the attitude indicator indicate straight and level for at least 30 to 60 seconds (to allow the vestibular inputs time to subside).

Unfortunately, the most disorienting situation is formation flight in reduced visibility—IMC or at night. Though you may not be able to go heads-down (or sneak a peek) at the attitude indicator, tell lead you're disoriented and request flight parameters—primarily attitude. If possible, have him fly straight and level 30 to 60 seconds to settle your own gyros. If that doesn't help, try getting to VMC for reference to a horizon or the surface. Lead should also consider transferring lead to you—to let you get your ambient mode out of "Star Wars" and devote the full attention of your focal mode to the necessary gauges. (This should all be briefed ahead of time.)

Spatial disorientation is a common problem. It is to be expected under situations in which your visual system is either bombarded with disorienting cues or denied valid orienting cues—true horizon or surface—thus setting you up for the equally disorienting vestibular illusions. The best course is prevention by maintaining visual dominance (focal mode) on valid orientation cues (gauges). If SDO occurs, increase the ratio of matching to mismatching orientation cues by getting your head out of the Star Wars reflections and focusing on the appropriate gauges. In formation flying, have a plan and brief it. SDO is a killer. Don't take it lightly. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (M series) Aircraft was being used for an aviation orientation flight for a prospective applicant for rotary wing aviator training. IP was at right pilot's station, nonrated officer was at left pilot's station, and copilot and mechanic were in cargo/passenger area. Aircraft was flown within the local area for more than 2 hours, during which nonrated officer was allowed to manipulate the controls. Aircraft was returned to airfield and refueled. Flight continued with nonrated officer doing hovering maneuvers under the supervision of the IP. While trying to make left hovering turn, nonrated officer allowed aircraft to assume nose-high attitude. IP tried to apply control inputs to correct the condition. Nonrated officer applied full aft and right cyclic which caused aircraft to roll to right. Main rotor and tail rotor blades hit the ground. Main rotor system and transmission separated from airframe and aircraft hit hard in upright attitude. IP violated provisions of AR 95-1 by allowing nonrated officer to operate aircraft. 8359

UH-1 Class C mishaps □ (H series) As aircraft was taking off, seagull hit and broke copilot's windshield. □ (H series) Exhaust cover with inlet cover, pitot cover, tail rotor tiedown, and 40-foot nylon rope used for main rotor tiedown came loose from right rear seat where it was secured by two seatbelts and flew out of open door. Aircraft shuddered momentarily. When aircraft was landed, rope was found wrapped around tail rotor controls. □ (H series) Power turbine wheels of engine failed during low-level autorotation. When power turbine blades separated from power turbine wheels, they caused damage to both tail rotor blades and tail rotor drive shaft cover.

UH-1 Class E mishaps □ (H series) Fluid was seen on pad as aircraft was picked up to a hover. After aircraft was landed, oil was seen leaking from defective transmission tail rotor output quill. □ (H series) Banging noise was heard from rear of aircraft, power was lost, and nose yawed to left. Caused by failure of fuel control. □ (H series) Excessive binding in pedals during landing was caused by defective magnetic brake. □ (H series) Hydraulic and engine chip detector lights came on. Caused by failure of master caution box. □ (M series) Severe vibration during hover was caused by seizure of feather bearing. □ (H series) Transmission oil pressure fluctuated from 8 to 50 psi. Caused by faulty wire from transmitter.

UH-60 Class A mishap □ Aircraft hit powerlines as pilot landed at field site. Aircraft was hovering at 35 to 40 feet and drifted right into powerlines. Aircraft crashed after hitting wires and came to rest on left side. 8360

UH-60 Class E mishaps □ Master caution and No. 2 reservoir low lights came on. Caused by failure of pitch trim actuator. □ Aircraft vibrated during flight. Caused by failure of No. 1 stabilator amp pitch rate gyro. □ No. 1 engine lost power and then flamed out. Two air restarts were attempted without success. Caused by crack in P3 line. □ Smoke and fumes were detected during takeoff. Caused by burned-out searchlight motor.

Attack helicopters

AH-1 Class E mishaps □ (S series) Pilot felt severe vertical vibration during flight. Feather bearing failure caused seizure in flapping axis. □ (S series) Tips of main rotor blades hit trees during NOE flight. □ (S series) While hovering to parking spot, pilot pulled in power to clear other aircraft. After clearing aircraft, pilot noted overtorque of 101 percent for about 2 seconds.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	1-12Oct	**3**	**2**
	November	2	2	November		
	December	0	0	December		
2nd Qtr	January	1	0	January		
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**3**	**2**

Cargo helicopters

CH-47 Class E mishaps □ (C series) NOE deceleration had just been completed and turn was made to begin climbing up steep ridgeline. As power was being increased and climb established, 4 percent split in torque was noted by IP. IP tried to adjust torque with No. 1 engine trim. As beep was increased, No. 1 engine suddenly lost power. Emergency engine trim was used to increase rpm and torque. Caused by failure of No. 1 engine normal beep trim switch. □ (B series) Copilot pulled power to slow rate of descent during approach with slingload. No. 1 engine torque remained at reduced power setting and No. 2 engine compensated. Static beep failed for No. 1 engine. Rotor rpm decreased to 219. Go-around was made. After 15 minutes of attempts to increase beep on No. 1 engine, emergency beep responded and No. 1 engine was matched with No. 2 engine. Caused by malfunction of N1 actuator.

Observation helicopters

OH-58 Class A mishap □ (A series) During takeoff from field site, crew heard two or three loud bangs from engine area and engine failed. IP attempted autorotation. Aircraft crashed on uneven terrain and came to rest upright. Caused by failure of compressor. 8361

OH-58 Class C mishap □ (A series) Pilot released starter button and turned generator on line during maintenance operational check. Pilot heard groaning sound from engine and looked over his shoulder to check position of crew chief. Engine groaned again and pilot decided to shut it down. Pilot then heard another groan, followed by loud bang and fireball about 3 feet out from engine compartment. Power turbine disintegrated, causing damage to fuselage and rotor blade. Crew chief was severely injured by shrapnel from power turbine.

OH-58 Class E mishaps □ (A series) Pilot felt shudder in controls and heard metal-to-metal sound from transmission area. Failure of drag pin assembly allowed excessive movement in pylon mount bearing. □ (A series) Engine oil bypass light came on. Oil tank cap was not secured correctly. □ (A series) Observer's helmet cord became tangled with left passenger door emergency release. Observer quickly leaned forward and caused door to be ejected. Door cleared aircraft and fell to open field without any damage. □ (C series) Aircraft was on second flight since refueling. There was enough fuel to meet the requirements for the flight. Weather was encountered that caused excessive deviation from flight plan route. Aircraft was landed short of destination because of low fuel. □ (C series) Aircraft entered downwind condition and started to descend during left turn at slow airspeed. Copilot applied collective to stop descent and overtorqued aircraft to 104 percent for 3 to 4 seconds. □ (C series) Hydraulics failed during hover. Caused by sheared hydraulic pump shaft. □ (A series) Aircraft yawed right, engine rpm audio activated, and engine-out warning light came on. Postflight inspection of engine revealed two holes in top and bottom of engine compressor housing and two gouges on right side of compressor housing where compressor blades chafed through compressor housing.

Training helicopters

TH-55 Class C mishap □ Student pilot had completed two takeoffs and landings of his first supervised solo flight. While hovering down the lane for his third takeoff, student allowed aircraft to drift off the lane. When told to return to the lane, student turned tail of aircraft into an 8- to 10-knot wind. Student lost control and aircraft landed hard. Oleo strut, drag strut, fore and aft cross beams, and stabilizer assembly were damaged.

Fixed wing

C-7 Class E mishap □ Landing gear would not retract on takeoff. Nose gear pressure was low because of faulty charging valve.

C-12 Class E mishap □ (A series) Rated student pilot was doing a power approach precision landing. As maximum brakes were being applied at 70 knots airspeed, gust of wind from 30 degrees to the right lifted right wing. Right brake locked up and right outboard tire blew out. Rated student pilot failed to properly position flight controls for the surface winds encountered.

OV-1 Class E mishaps □ (D series) As aircraft was climbing through an estimated 500 feet msl, altimeter indicated airfield altitude. As aircraft was leveled at an estimated 1,100 feet, altimeter indicated 500 feet. Postlanding inspection revealed air line from airspeed indicator to altimeter was leaking. □ (D series) Crew saw sparks and flames coming from forward portion of No. 2 engine nacelle. Pilot secured engine and extinguished fire. Caused by failure of No. 2 alternating current deice generator. □ (D series) Left main gear gave

(continued on next page)

Mishap briefs

unsafe indication. Caused by failure of down-lock microswitch.

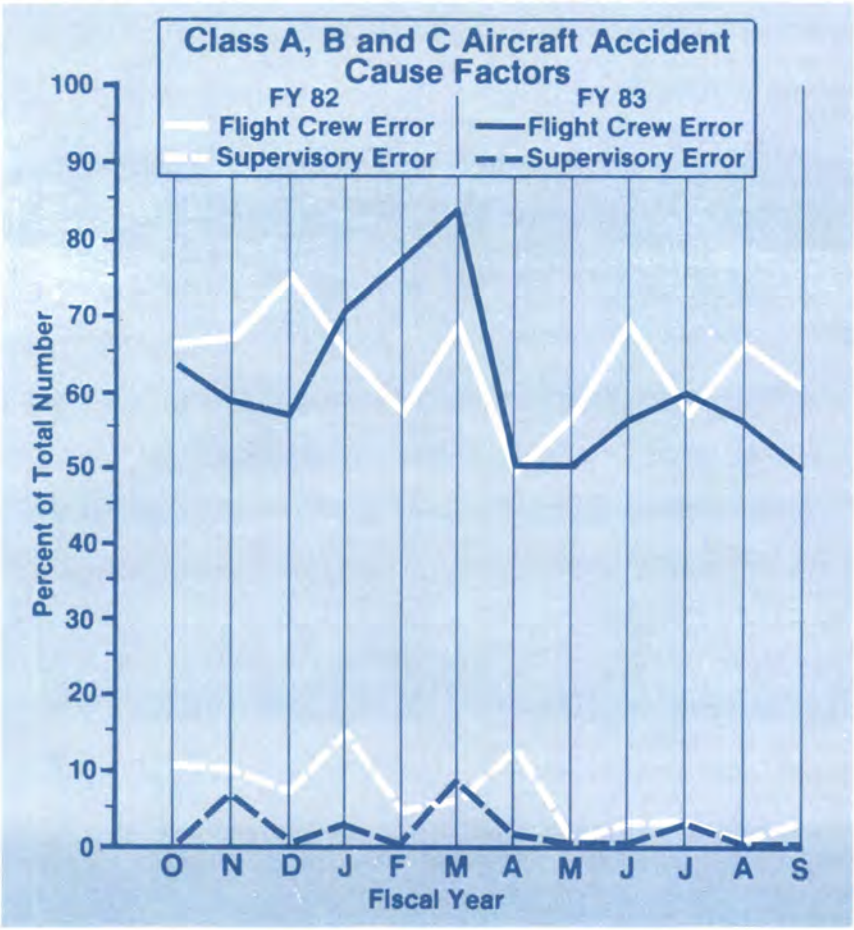
U-8 Class E mishaps □ (F series) Airframe vibrated when engine was restarted after feathering check. Exhaust valve seat on No. 1 cylinder dislodged from cylinder head and prevented valve from seating properly. □ (F series) Crew smelled fuel during landing. Caused by leaking fuel pump. □ (F series) Left main gear would not indicate down and locked. Caused by broken wire from landing gear position switch.

U-21 Class E mishap □ (F series) After takeoff, No. 1 and 2 torque indicators decreased and stabilized at 1200 rpm without decreasing power levers. Subsequent power changes did not affect torque indications. Caused by failure of No. 1 inverter.

Maintenance

AH-1 Class E mishaps □ (S series) Pilot noticed lateral binding in cyclic controls during flight. Inspection revealed slight seep in lateral servo and wire bundle rubbing against control. □ (S series) Collective stiffness was felt during takeoff. Collective friction was out of adjustment.

CH-47 Class E mishap □ (C series) No. 2 hydraulic pressure dropped to zero and caution light came on. Incorrect clearance between rigid hydraulic line and mounting blocks allowed hydraulic line to chafe and fail.



OH-58 Class E mishaps □ (A series) Hydraulic caution light came on and feedback was felt in controls. Running landing was made. Threads on tee fitting on collective servo were stripped, allowing loss of pressure, and fluid fitting was installed incorrectly. □ (C series) Master caution light came on. Sheet metal filings, rivet heads, and other debris were found in forward nose of aircraft. Foreign objects fell into nose section when wire cutter MWO was being performed.

Messages received

- OH-6 maintenance information message concerning special inspection tolerances, crashworthy fuel system inspection/refueling, and ADF antenna security (MIM-OH-6A-83-MEC-01, 161530Z Sep 83).
- AH-1 maintenance information message on 90-degree gearbox fairing alteration (MIM-AH-1-MEA-83-05, 221900Z Sep 83).
- Message concerning change to engine oil weight and balance requirements (231400Z Sep 83).

For more information on selected mishap briefs, call AUTOVON 558-6595/4198.

ELTs for Army aircraft

Emergency locator transmitters (ELTs) are now approved for selected Army aircraft where there is a legitimate requirement because of area or type of operation and owning units have requested the ELT. Your request for the ELT should be submitted through your MACOM to the DARCOM Project Office for Aviation Life Support Equipment, ATTN: DRCPO-ALSE, 4300 Goodfellow Boulevard, St. Louis, MO 63120. Point of contact for the ELT is Mr. Ed Daughety, AUTOVON 693-3307. ■

Aviation mishap prevention forum

Answers to last week's questions

1. Can the commander withhold pass privileges to service members who are enrolled in the Alcohol and Drug Abuse Prevention and Control Program? Yes. **Interim Change I02 to AR 600-85**

2. Could an E7 with 19 years of service be eliminated from the Army if discovered to have been smoking marijuana? Yes. Officers, warrant officers, and senior enlisted (E6-E9) who are identified as illegal drug abusers will be processed for separation from the service. **AR 600-85, page 1-4, par. 3** (Note: Final determination will be at DA.)

3. Must a service member have a waiver to reenlist if he is currently enrolled in the Alcohol and Drug Abuse Prevention and Control Program? Yes. **AR 600-85, page 1-7, par. 1-16**

4. What does a unit leader do with any illegal drugs or drug paraphernalia that comes into his possession? Turn them over to the local provost marshal, according to AR 190-22. **Interim Change I02 to AR 600-85**

5. At what blood-alcohol level is a service member determined to be alcohol impaired while on duty? .050 (milligrams of alcohol per 100 millimeters of blood or above). **Interim Change I03 to AR 600-85**

6. If a service member is unexpectedly called to duty, can he be held liable for being intoxicated while on duty? No. To be in violation of AR 600-85 (Interim Change I02) a service member must have known or should reasonably have known prior to becoming impaired that he or she had duties to perform. **Interim Change I02 to AR 600-85**

7. May a physician direct a service member to submit to urine or blood-alcohol or breath test? Yes. When a physician has a reasonable suspicion that the service member has used a controlled substance or abused alcohol, he may do so to ascertain whether the service member requires counseling, treatment, or rehabilitation in the Alcohol and Drug Abuse Prevention and Control Program. **Interim Change I02 to AR 600-85**

Questions for aviation personnel

1. Why is an aircraft oxygen system filled slowly? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

2. When a grinder is equipped with an attached shield, a protective face shield or goggles are not required to be worn by the operator. True or false? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

3. Crewmembers performing a tour of duty as staff duty officer, officer or noncommissioned officer of the day, or similar duties should be scheduled for at least 8 hours off duty before flight time. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

4. Personnel who are authorized to start and run up aircraft and taxi airplanes for the purpose of maintenance operational checks and are not qualified per paragraphs 1-8a(1), (2), or (3) of AR 95-1 will: **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

5. The use of automatic petroleum-dispensing nozzles is authorized for all petroleum-dispensing systems. In addition, the use of a lock or latch-open device that permits unattended operation is allowed. True or false? **Reference: FM 1-300, Flight Operations and Airfield Management** ■

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Second quarter Class A aircraft mishap review

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Eleven Class A aircraft mishaps occurred during the second quarter of this fiscal year, compared to three for the second quarter of FY 83. Two of the 11 mishaps resulted in 5 fatalities. Nine of the 11 mishaps involved human error. Following are synopses of the human error mishaps.

• An OH-58 pilot began a slow right turn while flying at an altitude of 100 to 150 feet agl and airspeed of about 35 knots. The aircraft yawed right and the turn rate accelerated. The pilot was unable to stop the turn using cyclic and antitorque pedal controls. Control was lost during autorotation, and the aircraft crashed on its right side.

Causes: Pilot operated the aircraft in a flight environment known to be conducive to loss of tail rotor effectiveness and initiated an incorrect emergency procedure. Marginal antitorque effectiveness of the OH-58 was also a factor.

Result: Two minor injuries and a destroyed aircraft, at a cost of $146,932.

• An OH-58 pilot on a reconnaissance mission was hovering at 2 to 5 knots and 10 to 12 feet over a washed-out area. The pilot, flying from the right seat, noticed some loose communications wire on the floor of the washout and brought the helicopter to a stable hover. As the pilot was looking at the wire, the aircraft drifted to the left and descended. The main rotor blades hit a large rock outcropping, and the aircraft crashed.

Cause: Inadequate division of attention.

Result: Destroyed aircraft, at a cost of $143,782.

• A UH-1M was on an instrument training flight at night. About 50 minutes after takeoff, the pilot noticed that the right cargo door had vibrated open. Fearing the door would separate from aircraft, the pilot flew to a nearby private airfield and began an approach for a precautionary landing. The aircraft was brought to a 10-foot hover over the unlighted sod strip runway, which was covered with soft snow. The snow was picked up by the rotorwash from the aircraft, and the pilot lost visual reference with the ground. The aircraft descended until the right rear skid hit the ground. The pilot lowered the collective full down, and the aircraft landed hard and rolled over.

Cause: Pilot failed to use proper snow landing technique.

Result: Destroyed aircraft, at a cost of $247,758.

• Two UH-60s were transporting troops. After about 20 minutes of flight through valleys and over rising terrain, the weather began to deteriorate. The No. 2 aircraft dropped back and the flight leader moved forward to try to find a route through the fog. Shortly thereafter, after failing to make radio contact with the lead aircraft, the No. 2 pilot reversed course, crossed into a parallel valley, and proceeded to destination. It was later discovered that the lead aircraft had hit a large tree on rising terrain and crashed as the crew was trying to pick their way through the fog.

Cause: Crew attempted to maintain visual flight in instrument meteorological conditions.

Result: Four fatalities, six major injuries, and a destroyed aircraft, at a cost of $4,800,000.

• After a UH-1 was landed at an airfield, the pilot began a high hover over an open area covered with snow. The pilot

UH-60 crew tried to maintain visual flight in IMC. Aircraft hit large tree on rising terrain and crashed.

Second quarter review

lost depth perception and inadvertently allowed the helicopter to descend. The left ski hit the ground and dug into the snow, causing the UH-1 to roll onto its left side.

Causes: Loss of depth perception by the pilot and excessive hover speed.

Result: Destroyed aircraft, at a cost of $619,000.

• A flight of five helicopters landed on a road covered by ice and hard-packed snow. On each side of the road were banks of snow 18 to 30 inches high. After loading troops, the lead UH-1 was picked up to a hover. The aircraft drifted to the right and the rear ski hit a snowbank. The aircraft then rolled onto its right side.

Causes: Improper coordination of aircraft controls for takeoff to a hover and improper selection of landing area.

Result: Destroyed aircraft, at a cost of $922,704.

• As a UH-60 was being positioned over a slingload on which two soldiers were standing, the tail rotor suddenly stopped turning. The aircraft began a nose-down right spin. The copilot, who was on the controls, immediately applied power to climb the aircraft and move it to the left to prevent injury to the dismounted soldiers. A hovering autorotation was initiated from 40 feet and the aircraft landed hard in a nose-down, right roll attitude.

Causes: Tail rotor gearbox failed because of insufficient lubrication. Maintenance personnel failed to properly service gearbox and crew did not detect the lack of lubrication during preflight inspection.

Result: One major injury, two minor injuries, and a destroyed aircraft, at a cost of $4,643,000.

• A UH-1 took off from a field site to search for a fuel truck. After searching for 10 minutes, the crew returned to the field site. During the approach to land, the aircraft hit a wire strung about 150 feet above a river. Control was lost and the aircraft crashed. A wire strike protection system was installed on the aircraft, but the aircraft hit the wire just below the main rotor blades and above the protection system.

Causes: Failure of pilot to see wire before hitting it and failure of unit chain of command to disseminate known hazard information.

Result: Destroyed aircraft, at a cost of $922,704.

• A UH-60 was being flown at 60 knots airspeed and 70 feet above the ground with an empty pallet beneath the aircraft. The airflow lifted the 300-pound pallet, causing it to hit the tail boom and slide up the side of the tail boom into the main rotor system. Control was lost and the aircraft crashed into trees.

Cause: Attempt to transport inappropriate external load.

Result: One fatality, two major injuries, and a destroyed aircraft, at a cost of $4,981,280.

These mishaps could have been prevented if the personnel involved had followed current established procedures and exercised good sound judgment in the execution of aviation missions. A concerted effort on the part of all Army aviation personnel is required to reduce the number of human-error mishaps. ■

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	1-9 May	**1**	**1**
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**24**	**22**

Selected mishap briefs

nformation based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap □ (H series) Two large birds appeared in front of aircraft. One of them dived and hit aircraft just behind copilot's door and left cargo door bubble window. Window exploded inward, hitting crew chief's leg.

UH-1 Class E mishaps □ (H series) Crew heard loud noise from front of aircraft. Caused by malfunction of main inverter. □ (H series) Pilot noticed high frequency vibration during flight. Trailing edge of tail rotor blade had separated about 14 inches along skin seam. □ (V series) Unusual noise was heard from rear of aircraft and vibration was felt in floor and collective. Caused by failure of No. 1 hanger bearing. □ (V series) Master caution and hydraulic lights came on. Caused by failure of hydraulic pressure switch. □ (H series) Master caution and tail rotor chip detector lights came on. Caused by failure of 90-degree gearbox.

UH-60 Class E mishaps □ Low rotor light and audio activated. No. 1 engine oil pressure indicated zero. Caused by failure of No. 1 signal data converter. □ Master caution and No. 2 reservoir low lights came on, followed by loss of hydraulics. Caused by failure of pressure relief valve. □ Smoke and fumes entered cockpit and cabin area. Windshield wiper motor had shorted out.

Attack helicopters

AH-1 Class E mishaps □ (S series) Loud grinding noise was heard. Master caution and No. 1 hydraulic lights came on. Caused by cracked No. 1 hydraulic line and fitting on collective servo. □ (S series) No. 2 hydraulic light came on during landing. Caused by failure of hydraulic pressure switch. □ (S series) Master caution and No. 1 hydraulic lights came on, followed by stiffness in antitorque pedals. Caused by ruptured hydraulic reservoir pressure line. □ (S series) Roll SCAS channel light would not go out and roll SCAS could not be engaged during landing. Caused by failure of SCAS circuit card assembly.

Cargo helicopters

CH-47 Class E mishaps □ (C series) No. 2 flight boost and SAS lights came on, followed by loss of fluid and zero reading on No. 2 flight boost gauge. No. 2 flight boost pressure line was ruptured and boost pump shaft was sheared. □ (C series) Flight engineer heard loud bang in rear of aircraft. Investigation revealed high frequency vibration in vicinity of drive shaft. Caused by malfunction of combining transmission. □ (C series) Smoke was seen coming from No. 2 generator during runup. Block of wood, which looked like packing material, was found inside generator.

Observation helicopters

OH-58 Class B mishap □ (A series) Pilot attempted a left turn, but with full left pedal applied, aircraft would not turn left and began uncommanded right turn which progressed into right spin. Aircraft made three or four revolutions before hitting the ground in right-side-low attitude. Before impact, pilot tried to fly out of the condition, but this action was taken too late. Preliminary indications are that loss of tail rotor effectiveness occurred. 8430

OH-58 Class E mishaps □ (A series) Crew smelled electrical odor and console lights failed. Caused by malfunction of rheostat switch. □ (A series) Diffuser orifice broke loose from safety, causing oil loss. □ (C series) During pretakeoff check, pilot tested governor control range and found maximum beep of 103% instead of required 104%. Caused by failure of double check valve.

Training helicopters

TH-55 Class D mishap □ Engine ran rough and aircraft shuddered. IP entered autorotation. Engine quit about 350 feet agl. Aircraft landed in plowed field and engine caught fire. Caused by failure of No. 2 injector line.

Fixed wing

U-21 Class E mishaps □ (A series) Heater quit and smoke and fumes entered cockpit. Caused by failure of ignition assembly. □ (A series) No. 2 engine ITT fluctuated between 300° C. and 600° C. during runup. Chrome around harness block was cracked.

Maintenance

UH-1 Class E mishaps □ (H series) Preflight inspection revealed two holes in engine bulkhead. Crew chief had installed incorrect cargo tiedown rings in aft bulkhead. □ (H series) When pilot adjusted instrument lights during takeoff, lights went out. Circuit breaker

popped and pilot smelled burning odor. Wire bundle near static air manifold was chafing against braided line, causing short. Line had been oversprayed with black paint, making it hard to see. Braided lines in overhead console for roof-mounted pitot tube were very close to other wires and exposed terminals. Entire fleet was examined and all roof-mounted pitot tube lines were wrapped to prevent chafing.

UH-60 Class E mishap □ Smoke entered cabin from right rear bulkhead during flight. Maintenance personnel had inadvertently dislodged combustion drain line during cargo loading.

AH-1 Class D mishap □ (S series) Speed wrench was found under No. 4 drive shaft after flight. Hanger bearing and support were damaged. □ (S series) Pilot could not get electrical power to aircraft systems during engine runup. Crew chief had left battery switch on after completing electrical power checks and battery power had deteriorated.

CH-47 Class D mishap □ (C series) Bic-type lighter was found in drive shaft area after flight. Drive shaft was scored.

OH-58 Class E mishap □ (C series) Crew chief found transmission oil level to be low and went to POL conex to get a can of 23699 oil. Crew chief inadvertently took a can of Dexton II hydraulic fluid stacked on the shelf next to the 23699 oil. About two-tenths of a quart was added to transmission. Can was noticed by technical inspector after helicopter departed. Crew was notified after they had flown 1 hour and 20 minutes. Transmission oil was flushed and filter changed twice.

U-21 Class D mishap □ (A series) Damage was found to right main landing gear door and tube assembly. It is not known when damage occurred. Landing gear cam control had been out of adjustment for some time. It was set too close to roller bearing. This caused pin that goes through support assembly and tube assembly to wear elongated hole. Hole allowed support assembly and roller bearing to ride over top of cam control. This caused right landing gear doors to close earlier than normal. Inboard door's forward lower edge caught on tire as it passed into wheel well, causing skin damage. Outboard door was pulled against landing gear, causing turnbuckle to break.

Messages received

• Message from HQDA, 252038Z Apr 84, subject: Requirement to View OH-58 Loss of Tail Rotor Effectiveness (LTE) Videotapes. The requirement for OH-58 aviators to view the ARNG tape "How Not to Crash By the Book" and the USAAVNC tape "OH-58 Accident Prevention, Part 1 and 2" is rescinded. All copies of the tapes should be returned to USAAVNC, ATTN: ATZQ-PT-TA-ETV, Fort Rucker, AL 36362. CPT Snellen, AUTOVON 558-4909/3808, is the primary POC for additional information on the July 1984 distribution of the new OH-58 LTE videotape.

• Safety-of-flight maintenance mandatory message concerning repetitive inspection of UH-60 pitch control rod attaching bolts for security (UH-60A-84-05, 231715Z Apr 84). Summary: Investigation revealed a main rotor pitch control rod bolt was missing from a UH-60 which crashed in 1983. This message requires crews to repetitively check and insure that a nut cotter pin is installed and secured on each pitch control rod bolt. Contact: Roger Heidenreich, AUTOVON 693-3300, commercial 314-263-3300.

• Safety-of-flight maintenance mandatory message concerning one-time inspection of UH-60 tail rotor gearbox and intermediate gearbox oil levels (UH-60A-84-06, 231700Z Apr 84). Summary: A recent accident has been attributed to failure of the tail rotor gearbox. The gearbox had been improperly serviced. This message requires a one-time inspection to insure that gearboxes are correctly serviced with oil. Contact: Lyell Myers, AUTOVON 693-3300, commercial 314-263-3300.

• Safety-of-flight maintenance mandatory message concerning one-time inspection of UH-1 TAMMS 2410 reporting system (UH-1-84-04, 252015Z Apr 84). Summary: In 1978, the Army initiated, on an attrition basis, a changeout of the thin wall masts to the thick wall masts on all UH-1 aircraft except UH-1C/M. Routine tracking of the status of the changeout has been through the DA Form 2410 program. In order to conform and/or update the status in the TAMMS record, an immediate inspection will be made to determine if any UH-1 aircraft are still equipped with the thin wall mast. Contact: LTC Don Foster, AUTOVON 693-1248, commercial 314-263-1248.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM change

Change 1, dated 20 January 1984, to TM 55-1520-228-MTF for OH-58A helicopters, has been released. ■

Followups

Utility helicopters

UH-1 Class B mishap in 22 Jun 83 issue (8338) ☐ Engine lost power during hover and aircraft landed hard. Failure of P1 bellows caused compressor stalls and engine overspeed.

UH-1 Class A mishap in 3 Aug 83 issue (8344) ☐ When IP gave student a simulated engine failure, aircraft yawed to right and engine and rotor rpm decayed. Student would not release the controls to the IP, and IP could not move throttle to regain engine power. Aircraft crashed in wooded area. IP misjudged the proper entry point for a simulated engine failure to insure a safe touchdown of the aircraft in the event of an actual emergency.

UH-1 Class A mishap in 10 Aug 83 issue (8346) ☐ Fuel control malfunctioned, causing interruption of fuel flow to engine, which resulted in compressor surges. Compressor surges ceased when power demand was reduced. When power demand was increased in order to land at airfield, engine failed. Forced to autorotate, copilot turned toward a landing area on the far side of a highway, beyond the autorotative glide capability of the aircraft. Aircraft hit powerlines and a pole and crashed on the edge of the highway.

UH-1 Class A mishap in 12 Oct 83 issue (8359) ☐ IP violated the provisions of AR 95-1 and permitted a nonrated officer to manipulate the flight controls. While the aircraft was at a hover, erratic control inputs by the nonrated officer resulted in the advancing main rotor blade hitting the ground and subsequent destruction of the aircraft.

UH-60 Class A mishap in 20 Jul 83 issue (8342) ☐ Aircraft was participating in a fly-in/static display. Crew was asked to demonstrate the flight characteristics of the aircraft. During a high-speed pass, pilot put the aircraft into a right bank which exceeded 90 degrees. Because of the excessive bank, aircraft lost altitude and crashed.

UH-60 Class A mishap in 14 Sep 83 issue (8353) ☐ Aircraft crashed during test flight. Incorrect/incomplete installation of the main rotor pitch change link caused separation of the pitch change link from the pitch horn. The technical inspector released the aircraft without inspecting the phenolic washer application. The pilot and copilot did not review the logbook or inspect the rotor system as required by the operator's manual checklist. Design of the retaining bolt allowed the bolt to be separated from the pitch horn assembly.

Attack helicopters

AH-1 Class A mishap in 14 Sep 83 issue (8351) ☐ Antitorque control was lost during hover. Aircraft entered uncontrollable right spin and crashed. No. 1 hanger bearing overheated and failed because of a lack of lubrication, causing a disconnect in the tail rotor drive train. Pilot did not follow emergency procedures for loss of antitorque control outlined in the operator's manual.

AH-1 Class A mishap in 5 Oct 83 issue (8358) ☐ Main rotor blades hit large tree during live fire training exercise. Control was lost and aircraft crashed. Pilot almost totally focused his attention on the target alignment tasks. The rocket firing system of this aircraft requires both crewmembers to simultaneously focus their attention inside the aircraft and requires an abnormal nose-high attitude during firing operations.

Cargo helicopters

CH-54 Class B mishap in 24 Aug 83 issue (8349) ☐ Main rotor blades hit steel pole as aircraft was taxiing at airfield. Ground guides did not insure aircraft remained clear of obstacles. Pilot and copilot channelized their attention toward the ground guides and did not see the pole.

Observation helicopters

OH-58 Class A mishap in 21 Sep 83 issue (8355) ☐ As pilot was flying over trees, he allowed forward airspeed to decrease below 20 knots. Aircraft entered uncommanded right turn and crashed. Loss of tail rotor effectiveness resulted from the pilot's relatively low level of experience and associated training in the OH-58, which influenced him to rely on groundspeed instead of airspeed as a reference for continued flight into a downwind condition.

OH-58 Class A mishap in 28 Sep 83 issue (8357) ☐ Pilot of No. 1 aircraft in a flight of two diverted his attention from outside the aircraft to clearing fog from the windscreen. Pilot's visibility was further restricted by light precipitation and a low ceiling. Main rotor blade of No. 1 aircraft hit right skid of No. 2 aircraft. No. 1 aircraft crashed in nose-low attitude. No. 2 aircraft landed in open field.

OH-58 Class A mishap in 12 Oct 83 issue (8361) ☐ Engine failed during takeoff from remote training site. IP began an autorotation, but there was not enough rpm to cushion the aircraft on touchdown. Engine failure was caused by sudden disintegration of engine compressor section, initiated by the log jamming of several blades from the third-stage compressor. This caused many of the remaining compressor blades to fail through overstress. ■

Aviation mishap prevention forum

Answers to last week's questions

1. Before each nuclear cargo mission, the pilot-in-command will become familiar and comply with what ARs? AR 50-5, AR 50-5-1, and AR 95-27. **FM 55-375, page 2-1, par. 2-1**

2. At what distance must no-smoking signs be posted from refueling areas? 50 feet. **FM 10-68, with Change 3, page 5-3, par. 5-5a**

3. Who may submit Operational Hazard Reports? Any person (military or civilian) assigned, attached to, or employed by the U.S. Army and other armed services of the United States or host nations may submit OHRs. **AR 385-95, with Change 1, page 3-1, par. 3-4**

4. What are the objectives of an FOD prevention program? The objectives of an FOD prevention program are to find and correct potential hazards and to eliminate the causes of FOD. Training, designing, investigating, disciplining, and motivating are key factors of a sound program and provide a better understanding of FOD causes and costs. A good FOD prevention program can enhance combat readiness by saving materiel, manpower, and money. **AR 385-95, with Change 1, page 4-1, par. 4-2** ■

Questions for aviation personnel

1. The witness interview is an extremely important part of the aircraft mishap investigation. True or false? **Reference: DA Pam 385-95, Aircraft Accident Investigation and Reporting**

2. When practicing engine-out operations, other emergency procedures, and during maintenance test flights, passengers may be carried on Army aircraft. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

3. What are the definitions of operating weight, total weight, and gross weight in relation to aircraft weight and balance? **Reference: TC 1-201, Tactical Flight Procedures**

4. What do you look for if you suspect a soldier of having heat exhaustion? **Reference: FM 21-10, Field Hygiene and Sanitation** ■

Aviation fuel contamination test kit

The aviation fuel contamination test kit (AFCTK), NSN 6630-01-008-5524, LIN Z82146, is a lightweight portable kit for field use in analyzing aviation fuel to insure absence of solid and liquid contaminants immediately prior to filling aircraft fuel tanks. This kit is a small portable unit weighing less than 26 pounds.

The AFCTK will not—repeat—will not replace the Testing Kit, Petroleum, NSN 6630-00-310-8564, LIN W05673, managed by S9M, Defense Personnel Support Center, Philadelphia, PA. (Purposes of these two kits are not the same.) Requests for this kit (LIN W05673) should be submitted to S9M.

MERADCOM is in the process of updating the kit managed by S9M. Earliest availability of AFCTK to the field is scheduled for second quarter of FY 85. ■

—from USATROSCOM Material Readiness Information Bulletin

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 31 □ 16 May 1984

Deadly delay

US Army Aviation Training Library
Fort Rucker, Alabama 36360

Since July 1970, 35 Army crewmembers have died because they did not eject or ejected too late from OV-1/RV-1 aircraft. During the same period, 26 crewmembers ejected successfully. Why are we losing more people than we're saving?

Research indicates that when the pilot has caused the emergency situation, he tends to stay with the aircraft, trying to salvage a pilot-error mishap. When the emergency situation results from a materiel failure, the accident record shows pilots' ejection decisions are easier made.

In Vietnam, there was no delay in the ejection decision when reacting to a hit by hostile fire. Yet in peacetime, the decision to eject from a disabled aircraft is not always an easy one to make. One common thread running through most of our Mohawk fatal mishaps concerns the placement of the aircraft in a configuration from which the pilots could not recover because of low altitude.

While no commander likes to lose an aircraft, it's not tragic when he does. But it is tragic when aircrewmembers are lost when they had the capability of saving their lives. Ejection systems serve only one purpose—to save the crew. But these systems can't save lives if they aren't used or are used too late.

All too often, Mohawk fatal accident reports read: "Pilot, overly concerned with saving the aircraft, delayed ejection until after safe egress was no longer possible" or "Pilot attempted recovery up to the time of impact."

In a recent OV-1 accident involving fatalities, the pilot did not eject and the flight test engineer ejected just before impact. The premission briefing required that the test pilot command ejection of the flight test engineer and then eject himself if the aircraft descended below 3,000 feet above the ground in a loss of control situation. During the experimental test flight, the pilot lost control of the aircraft and then directed all of his attention toward trying to recover the aircraft.

The pilot must make his decision to eject in time for the ejection sequence to fully operate before ground impact. Therefore, delaying the decision to leave an out-of-control aircraft is and has been the single most critical factor in determining the success or failure of in-flight escape. No matter how good the escape system, you've got to give it time to work.

Since the first Air Force ejection in 1949, approximately 5,000 Air Force crewmembers have ejected from crippled aircraft, excluding combat ejections. This gives the Air Force considerably more ejection experience than the Army. Their analysis of Air Force accidents shows that the majority of their fatalities were not due to mechanical malfunctions of the ejection system but were the direct result of delayed ejection decisions.

From information gained through mishap investigations, Air Force experts

Deadly delay

The pilot of this OV-1 did not eject when aircraft control was lost. The flight test engineer ejected just before impact.

believe that the most critical element in delayed ejections is lack or loss of situational awareness. This doesn't mean that the pilot is disoriented. He knows what's going on, but, after recognizing his emergency, he becomes so engrossed in trying to correct the problem that he isn't totally aware of how rapidly the situation is deteriorating. This loss of awareness of the overall situation, such as altitude above the ground, vertical velocity, the recovery envelope of the aircraft, or the safe ejection envelope, usually results in unsuccessful late ejections or no ejection attempt at all.

The Mohawk operator's manual contains an ejection envelope chart giving the ejection seat capability and the minimum altitudes at which ejection must be initiated. The chart does not include additional altitudes required for human reaction time. It warns that efforts to recover from spins or uncontrolled flight should not be continued below 5,000 feet agl. This warning, though, is sometimes ignored. Maybe if pilots were more aware of their aircraft's recovery envelope, they would pay more heed to this warning and not stay with the aircraft until it reaches the no-recovery point.

We understand a pilot's professional desire to save his airplane. But by delaying the ejection decision, pilots waste valuable time that could mean the difference between a successful and a fatal ejection. "Pilot error" guilt or fear of reprisal may explain a pilot's delay or lack of decision to abandon the aircraft.

We know that the aviation system cannot tolerate willful violations, disregard of standard operating procedures, etc. But we must also accept the fact that mistakes will be made. Commanders' attitudes must reinforce the idea that aircrewmembers are more important than hardware.

A pilot should not be paralyzed into being unable to make the ejection decision by the fear that he is throwing away a serviceable aircraft through what may turn out to be pilot error. We are not saying abandon the aircraft as a routine emergency measure. We are simply saying make the decision before it's too late.

Actually, the decision should be made on the ground. Some pilots are not mentally ready when an emergency occurs. Plan your course of action in advance, and if the time comes, stick to your plan. Know what your aircraft can do and what it can't do. Keep it in its envelope, but if things get really bad, step over the side without hesitation or fear. And remember, the person in the other seat probably won't eject unless you tell him to. It's your responsibility to make sure he gets out of the airplane before it's too late. Once the situation is perceived as lost, the only appropriate action is to eject as soon as possible. Give your seat a chance to work for you.

Believe your instruments, not your senses. Remember, those ejection altitudes for controlled and out-of-control conditions are minimum recommended altitudes with no margins for safety.

Hopefully, Army OV-1 pilots will adopt the philosophy of one Air Force pilot who successfully ejected: "My philosophy toward ejection had always been . . . if I ever lost control, or if I ever got into a situation where I could not determine the attitude or capability of my aircraft, then I would eject regardless of who was to blame." ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (H series) Main rotor blades hit tree during landing. Both blades were damaged. □ (H series) The unit was supporting an ROTC demonstration at a high school. During the final portion of the engine shutdown, the pilot had left the aircraft and was coordinating with ground personnel. The crew chief was beside the aircraft waiting for the blades to stop when he saw another aircraft on final approach for landing. He moved away from his aircraft and began ground guiding for the approaching aircraft. About the same time, a group of students approached the aircraft that was almost shut down. The pilot saw that they were getting too close to the turning blades and sent another crew chief to tell them to move back. As the crew chief approached the students, he got too close to the blade path. A gust of wind caused a blade to flex down and hit the crew chief's head. Ten stitches were required to sew up the wound. The crew chief did not have on a helmet.

UH-1 Class E mishaps □ (H series) Transmission oil pressure dropped to zero and caution light came on. Loud grinding noises were also heard. Quick disconnect on left side of transmission was excessively worn, allowing connection to back off and restrict fluid passage. □ (V series) Engine oil pressure dropped to zero and temperature rose. Caused by malfunction of main inverter. □ (H series) Engine oil pressure dropped to 73 psi. Caused by defective oil pressure relief valve. □ (H series) Severe vertical vibration occurred during flight. Pitch change link rod end bearings were worn excessively.

UH-60 Class D mishap □ Aircraft with sling load attached entered unforecast instrument meteorological conditions at night. Because of the nature of the load, aircraft could not be flown above 55 knots. Pilot was unable to control aircraft and load and had to drop load. Aircraft was landed without further incident.

UH-60 Class E mishaps □ No. 2 engine was inadvertently brought past idle to stop during autorotation rpm check. Engine could not be restarted. Caused by failure of engine starter valve. □ No. 1 hydraulic pump and backup pump lights came on. Caused by failure of hydraulic pump.

Attack helicopters

AH-1 Class A mishap □ (S series) Aircraft was flying about 1,000 feet agl when crew heard a loud bang. Aircraft yawed to left, N_1 and N_2 increased, and main rotor rpm decreased. Pilot entered autorotation and selected the best available landing site, which in the dark appeared to be a field. Pilot made zero ground run landing to the site, which turned out to be a marshy area. Aircraft rolled about 30 degrees to right as it partially submerged in the marsh. Main rotor blade struck water/mud and tail rotor drive shaft was severed due to sudden stoppage. Suspect short shaft failure. 8431

AH-1 Class D mishap □ (S series) While aircraft was at hover during turret firing training mission, TSU/turret malfunctioned, causing guns to slew 110 degrees to right while TSU/guns indicated a 0 degrees firing position. Shots were fired in this direction, striking another AH-1 located to right rear of aircraft. Gun system had operated correctly during four previous firings on the same flight. Crew of aircraft that was hit was not aware their aircraft had been damaged until postflight inspection.

AH-1 Class E mishaps □ (S series) Fuel pressure fluctuated during flight. Caused by failure of aft fuel boost pump. □ (S series) Transmission oil pressure gauge fluctuated from maximum to zero several times. Caused by failure of transducer. □ (S series) Airspeed indicator read zero during flight. Locally fabricated pitot static tubing behind pilot's seat had broken. □ (S series) Master caution and transmission oil hot lights came on. Caused by broken wire to thermal probe for hot light.

Cargo helicopters

CH-47 Class D mishaps □ (C series) During shutdown, crewmember noticed left aft work platform lying on top of No. 1 engine. Aft pylon and work platform were damaged. □ (B series) While aircraft was taxiing, flight engineer noticed that ramp extension which was strapped to the apron beside the aircraft had started to work loose from its tiedown strap. Pilot stopped aircraft and sent flight engineer to secure ramp extension. While flight engineer was walking to ramp extension, it was blown free of tiedown strap and struck right fuel cell of aircraft.

CH-47 Class E mishaps □ (C series) During takeoff, crew chief saw hydraulic leak in SAS cylinder assembly link. Caused by failure of O-ring. □ (A series) Smoke in aft pylon area was caused by failure of utility hydraulic cooler fan. □ (C series) Combining transmission oil pressure fluctuated and then dropped to 18 psi. Caused by malfunction of transmission pressure transducer.

Observation helicopters

OH-58 Class D mishap □ (C series) Main rotor blades hit tree limbs during NOE training mission. Blade tip caps were damaged.

OH-58 Class E mishaps □ (A series) Smoke filled cockpit during hover. Caused by short in navigation flasher. □ (A series) D.C. amp gauge dropped

to zero and caution lights came on. Caused by sheared starter generator drive shaft. □ (A series) Engine flamed out during start. Caused by failure of double check valve. □ (C series) Fuel filter caution light came on. Fuel cell had deteriorated inside, causing fuel filter to clog.

Fixed wing

OV-1 Class E mishap □ (D series) During night mission at 18,000 feet msl, one engine began to sputter. Technical observer saw flashes at No. 2 engine and told pilot engine was on fire. Pilot confirmed fire, feathered engine, and discharged both extinguishers into engine. As aircraft was passing through 8,000 feet msl, windows completely fogged over. Defog switch was placed in override position, but 5 miles from airport, visibility was still obscured. On final approach, windows were still clouded, but pilot was able to see fire truck beacon on runway. On short final, pilot could see runway lights and landed. Suspect compressor stall due to atmospheric change at high altitude.

C-12 Class E mishaps □ (C series) Takeoff power could not be developed on No. 1 engine. Caused by failure of high pressure bleed valve. □ (A series) Pilot put gear down manually and then tried to retract gear. Gear would not retract. Pilot had stacked the spring, causing locking mechanism not to disengage.

U-21 Class E mishaps □ (A series) Left engine fuel pressure fluctuated and boost pump circuit breaker kept tripping. Caused by faulty left boost pump. □ (RU-21H) Right fuel transfer light came on. Caused by failure of fuel pressure solenoid.

Maintenance

UH-1 Class D mishap □ (H series) Test pilot was checking VIGV rigging for "full open" indication. When collective was lowered, engine had three compressor stalls in succession. Engine personnel had not followed TM in rigging VIGV system.

UH-1 Class E mishaps □ (H series) Crew chief saw oil on bottom of aircraft after shutdown. Line between transmission and oil cooler had been chafed through by wire bundle. □ (H series) N_2 increased to 6650 rpm. Rpm was readjusted to 6600 and flight continued. Ten minutes later, N_2 decreased to 6500. Rpm was again increased to 6600. Remote control lever was improperly drilled and would not match torque tube assembly, limiting the ability to properly adjust droop cam compensator. Droop cam had been adjusted to maximum limit since installation of remote control lever.

AH-1 Class E mishaps □ (S series) Engine oil temperature exceeded normal limits during takeoff. Caused by sand and dirt in oil cooler. □ (S series) Oil was seen leaking from external transmission oil filter. Oil filter O-ring was installed incorrectly. □ (S series) Test pilot could not get collective down during hover check. Shear pin was shimmed incorrectly.

OH-6 Class D mishap □ Cargo compartment filled with smoke during runup. Rag left in upper transmission housing area by mechanic had been ingested into impeller assembly. Pilot did incomplete preflight.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM change

Change 34, dated 6 April 1984, to TM 55-1520-228-23-1 for OH-58A and C helicopters, has been released. ■

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	1-16 May	**3**	**2**
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**26**	**23**

Aviation mishap prevention forum

Answers to last week's questions

1. The witness interview is an extremely important part of the aircraft mishap investigation. True or false? True. Witnesses will be advised that the sole purpose of the investigation is accident prevention and that, within the Army, their statement will be used for accident prevention/safety purposes only. **DA Pam 385-95, page 4-1, par. 4-1**

2. When practicing engine-out operations, other emergency procedures, and during maintenance test flights, passengers may be carried on Army aircraft. True or false? False. **AR 95-1, with Change 1, page 2-5, par. 2-8**

3. What are the definitions of operating weight, total weight, and gross weight in relation to aircraft weight and balance? Operating weight is the basic weight of the aircraft plus crew, oil, crewmember baggage, and emergency or special equipment. Total weight is the operating weight plus takeoff fuel weight (weight of fuel used in warm-up and taxi should not be included). Gross weight is the total weight of an aircraft and its contents. Takeoff gross weight is the operating weight plus the variable and expandable load items that vary with the mission. Landing gross weight is the takeoff gross weight minus items expended during flight. **TC 1-201, page 2-1**

4. What do you look for if you suspect a soldier of having heat exhaustion? Sweating, trembling, confusion, paleness, rapid breathing, complaint of headache and tingling of hands and feet. Individual may vomit. **FM 21-10, page 13** ■

Questions for aviation personnel

1. When holding above 14,000 feet msl (non DME), the inbound leg is flown for how many minutes and when below 14,000 feet msl the inbound leg is flown for how many minutes? **Reference: Airman's Information Manual, dated March 1984**

2. When VFR, initial call-up at a tower-controlled airport should be made at what distance from the airport? **Reference: Airman's Information Manual, dated March 1984**

3. Maintenance of aviation life support equipment will be performed only by trained, qualified personnel, either military or civilian. True or false? **Reference: AR 95-17, The Army Aviation Life Support System Program**

4. Corpus Christi Army Depot is the prime recipient and evaluator of all Army aircraft components/parts selected for teardown and analysis. True or false? **Reference: DA Pam 385-95, Aircraft Accident Investigation and Reporting** ■

Mini-STACOM—flights into turbulence

Paragraph 4-2c(2) of AR 95-1 authorizes flights into forecast severe turbulence when approved by the MACOM. The UH-1H operator's manual (paragraph 5-13b(2)) prohibits intentional flight into **known or forecast** severe or extreme turbulence. If a MACOM authorizes flights into forecast severe turbulence, does the authorization apply to UH-1 helicopters?

If an operator's manual restricts an aircraft in any way, e.g., flights in icing, IMC, turbulence, etc., the restriction cannot be lifted by AR 95-1 or by a MACOM regulation or policy. U.S. Army Aviation Systems Command is the only agency authorized to change an aircraft restriction appearing in an operator's manual and only then by a formally coordinated and approved flight release or official change to the manual. MACOM authorization for flights into forecast severe turbulence applies only to aircraft that are not restricted by the operator's manual or other AVSCOM directives. ■

Mohawk damaged during runup

A recent OV-1C mishap was caused by the aviator performing an engine maintenance operational check (MOC) with the chin cowl open. During the engine runup, the propeller was reversed, which sucked the chin cowl into the propeller. Two prop blades, the right canopy, and the chin cowl were damaged.

TM 55-1510-204-10/4, with Change 6, pages 8-7 and 8-8, states: "Cowling latches - secure." TM 55-1510-204-23-1, with Change 3, page 4-21, par. 4-9, Operational Checks (Engine Operation) Preparation, states: "Insure all fairing and cowling fasteners are properly secured."

This is not an isolated incident. Similar mishaps have occurred in the past. Close and latch all cowlings before engine MOC is begun. ■

New map available

The new Army Aviation Facilities Map depicts Army aviation facilities worldwide including certain civil airfields having Army tenant units.

DOD organizations requiring this map may obtain it by forwarding their request on a COMM CARD or in a letter to Director, USAATCA-ASO, Cameron Station, Alexandria, VA 22314.

A one-copy initial distribution of the aviation facilities map was made to all FLIP accounts. Additional copies are available if required. ■ **—from TB AVN 1-1183**

Shortfax

Four receive Broken Wing Award

Four aviators received the Broken Wing Award from January through March 1984.

WO1 Robert F. Coker
B Company, 159th Aviation Battalion, 101st Airborne Division, Fort Campbell

CW4 Larry S. David
B Company, 159th Aviation Battalion, 101st Airborne Division, Fort Campbell

CW2 Jerry L. Haney
B Company, 158th Aviation Battalion, 101st Airborne Division, Fort Campbell

WO1 Kevin M. McKenna
Company A, 7th Combat Aviation Battalion, Fort Ord

AVSCOM messages

Following is a list of AIG 8881 addressed messages transmitted by AVSCOM (DRSAV-M) from 1 January through 31 March 1984.

CH-47-84-01 Safety-of-flight technical message concerning changes to inspection of CH-47A/B/C/D rotor assemblies

CH-47-84-02 Safety-of-flight operational message concerning additional change to night operations in CH-47C aircraft

CH-47-84-03 Safety-of-flight technical message concerning urgent MWO to change the dual AFCS circuit wiring on YCH-47D and CH-47D helicopters

UH-60A-84-01 Maintenance mandatory message concerning one-time inspection of main rotor shaft for serial numbers beginning with C

OV-1-84-01 Maintenance mandatory message concerning OV-1 and RV-1 inspection of escape hatch pneumatic release pin

OV-1-84-02 Safety-of-flight technical message concerning OV-1B inspection of forward and aft SLAR attachment fittings

U-21-84-01 Safety-of-flight technical message concerning U-21A/G and RU-21D/H inspection of seats

UH-1-84-01 Maintenance mandatory message concerning one-time inspection for certain defective turnbuckle bodies of link assemblies

OH-6A-84-01 Maintenance mandatory message concerning one-time inspection of tail rotor assemblies on H-6 series helicopters

OH-6A-84-02 This message will be transmitted in April

OH-6A-84-03 Maintenance mandatory message concerning revision to compliance period for one-time inspection of tail rotor assemblies on H-6 series helicopters

CH-47-84-04 Maintenance mandatory message concerning inspection of CH-47A/B/C/D engine transmission warning system

CH-47-84-05 Safety-of-flight technical message concerning inspection of CH-47D transmission mounting units

UH-60A-84-02 Maintenance mandatory message concerning one-time inspection of wire harness routing for feeder harness between No. 1 and No. 2 junction boxes

Addressees requiring copies of messages should contact their higher headquarters. ■

Published by the U.S. Army Safety Center, Fort Rucker, AL 36362, AUTOVON 558-2062. Use of funds for printing of this publication has been approved by The Adjutant General, Headquarters, Department of the Army, 23 Feb 79, in accordance with the provisions of AR 310-1. Distribution to Army commands for accident prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition. Data is subject to change and should not be used for statistical analysis. Direct communication is authorized by AR 10-29.

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 32 □ 23 May 1984

Accident review:
Loss of tail rotor effectiveness

Synopsis

An OH-58A pilot flying over water slowed his airspeed below effective translational lift so the copilot could photograph a lighthouse. The pilot then started a right turn which progressed into an uncommanded spin. Control could not be regained, and the helicopter was autorotated into the water.

History of flight

An OH-58 pilot needed an aircraft for an ATM flight. He wanted to take along as copilot an aviator newly assigned to the company. He was told he would have to get approval from the operations officer. The morning of the flight, the pilot picked up the keys for the aircraft and filed his flight plan, but he did not get approval for the mission from the operations officer.

After flying for about an hour and a half, the pilot landed at an airfield and refueled. A new flight plan was filed and a weather briefing obtained.

The pilot took off again and flew along a coastline at altitudes varying from 100 feet msl to 800 feet msl and an airspeed of about 60 knots. The copilot flew for awhile and then the pilot resumed control.

As the flight proceeded along the coastline, the pilot flew by a lighthouse. He turned the aircraft and decreased airspeed so the copilot could take pictures of the lighthouse from his left front seat. As this point, while the aircraft was at an airspeed of about 20 knots and altitude about 250 feet above the water, the pilot increased power, added forward cyclic, and began a right turn to miss some cliffs to the front of the aircraft. The aircraft appeared to accelerate momentarily, then began a slow, uncommanded turn to the right. Left pedal was applied in an attempt to stop the turn, but this was unsuccessful.

As the aircraft turned further right into the wind, the remaining left pedal was applied. The right turn continued. Collective was then reduced, followed by a reduction in left pedal and additional forward cyclic. The aircraft continued in the descending right spin. After four or five revolutions, collective was again reduced, causing the nose of the aircraft to tuck slightly and the rate of spin to increase. The throttle was closed and the spin stopped momentarily. In an effort to keep from ditching, the pilot applied throttle to try to make a power recovery. The aircraft began to turn again with collective applied. It entered the water in a tail-low attitude, rolled to the right, floated inverted for several minutes, and sank.

Both crewmembers were wearing overwater survival gear. They inflated their water wings without difficulty after exiting the aircraft. A few minutes later, the crew was picked up by a fishing boat.

Crewmember experience

The 28-year-old pilot had more than 1,000 rotary wing flight hours, with almost 700 in OH-58As. The 26-year-old copilot had more than 450 rotary wing flight hours—5 in the OH-58A.

Commentary

Although it had nothing to do with the outcome of the mission, the fact that the pilot took the aircraft without approval showed a lack of self-discipline. The operations officer stated that he would not have approved the flight because he did not approve flights involving single-engine aircraft over water unless it was absolutely necessary.

The pilot placed the aircraft in a flight envelope conducive to loss of tail rotor effectiveness, i.e., low airspeed, downwind, and out-of-ground effect. As a result, the helicopter began the uncommanded turn to the right. The pilot was focusing his attention on positioning the aircraft abeam the lighthouse by looking across the copilot's station out the copilot's door instead of paying attention to the airspeed. Therefore, he was unaware that he was allowing the aircraft to get into the conditions known to cause loss of tail rotor effectiveness.

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishap □ (H series) Loud bang was heard from rear of aircraft during hover, accompanied by left yaw. Hovering autorotation was completed. Inspection revealed that engine had failed, spewing debris out aft end and damaging tail rotor system.

UH-1 Class D mishaps □ (H series) Approximately 3 feet above the ground during landing sequence, two passengers exited the aircraft on the right side without warning. Aircraft tipped to left due to center of gravity shift. Main rotor blade hit small tree. □ (H series) Passenger crossing in front of aircraft slipped in the mud, and his gear caught on the nose-mounted pitot tube, cracking the mount.

UH-1 Class E mishaps □ (H series) Transmission oil temperature rose 130 degrees. Caused by faulty temperature gauge. □ (H series) Medium to high frequency vibration was felt through airframe and tail rotor pedals. Caused by failure of hanger bearing. □ (H series) Engine oil temperature fluctuated during flight. Caused by failure of temperature gauge. □ (H series) Master caution light came on. Caused by defective hydraulic pressure switch. □ (H series) Master caution and engine oil pressure lights came on. Caused by faulty cannon plug connection.

UH-60 Class D mishap □ Stabilator hit the ground and was damaged during landing on uneven terrain.

UH-60 Class E mishap □ Crew heard high-pitched noise and felt feedback through collective. Caused by sheared input transmission gimble bolts.

Attack helicopters

AH-1 Class D mishaps □ (S series) Aircraft hit trees during NOE flight, damaging tail rotor blade and tail fin. □ (S series) During approach to landing, aircraft entered heavy dust cloud. Pilot flying in aft crew station took the controls and applied collective pitch and left cyclic to fly out of the dust cloud. When visual reference was regained, pilot reduced collective pitch and saw torque descending through 51 psi. Inspection revealed all four blade grip retaining bolts had rotated.

AH-1 Class E mishaps □ (S series) Loud grinding noise was heard during landing. Master caution and alternator/rectifier lights came on and SCAS disengaged. Caused by failure of alternator. □ (S series) Engine oil temperature rose during hover. Caused by failure of oil cooler bearings. □ (S series) Pilots heard hydraulic pump cavitating. Master caution and hydraulic lights came on. Caused by cracked hydraulic fitting. □ (S series) Engine oil pressure fluctuated excessively during landing. Caused by defective transducer.

Cargo helicopters

CH-47 Class D mishaps □ (B series) Flight engineer was supervising internal loading of M102 Howitzer and operating the aircraft's winch. Five artillery personnel were lifting the trail of the Howitzer as it was being winched tube first into cargo compartment. Trail was loaded with ammunition and equipment. Because of the weight of the trail, lifting personnel were forced to place the trail down on the aft portion of the ramp. This caused the tube, which was locked in normal travel position, to penetrate about 2 inches through ceiling of cargo compartment. □ (C series) Torque needles split during landing. External load was jettisoned to recover rpm. Caused by failure of No. 1 engine N_2 actuator.

CH-47 Class E mishaps □ (C series) No. 2 engine failed on final approach. Caused by internal disintegration of inlet and compressor sections. □ (A series) Utility hydraulic pressure gauge increased to 3800 psi and then dropped to 0 psi. Caused by failure of utility hydraulic pump.

Observation helicopters

OH-58 Class D mishap □ (C series) Tail rotor blades hit tree during hover. Both blades were dented.

OH-58 Class E mishaps □ (A series) As aircraft was picked up to hover, it yawed 40 degrees to left, rpm decreased, rpm light and alarm activated, and engine-out light came on. Aircraft was autorotated. As pilot moved fuel valve handle to off position, he noticed handle did not have to be moved from detent position to be turned off. Suspect fuel handle was not fully on during runup, causing fuel starvation and engine failure. □ (A series) Aircraft was started with main rotor blades tied down. Maintenance inspection revealed no damage. □ (A series) Collective stuck during takeoff and then freed. Caused by worn uniball assembly.

Training helicopters

TH-55 Class A mishap □ Student pilot was on solo flight. Aircraft began a series of right, descending, tight turns from about 500 feet agl, which progressed into a right spin. Aircraft crashed in field. Pilot was killed. Suspect pilot was distracted from his flying duties while trying to tune his radio and allowed main rotor and tail rotor rpm to deteriorate due to improper manual throttle and collective coordination. 8432

Fixed wing

OV-1 Class E mishap □ (D series) Right main gear indicated in-transit during landing. Emergency gear extension system was activated and aircraft landed. Down-lock switch wiring on right main gear blew back between down-lock switch and compressor platform, causing interference with down-lock switch operation.

U-21 Class C mishap □ (D series) Engine turbine temperature exceeded 850° C. for more than 2 seconds during flight. Suspect seizure of starter generator.

C-12 Class E mishap □ (A series) No. 1 engine torque dropped during climb and maximum power could not be achieved. Caused by malfunction of engine nose cone.

C-7 Class D mishap □ Loud grinding noise was heard from nose area as main landing gear retracted. Pilot saw damaged right nose gear door wedged between nose wheel assembly and nose wheel structure assembly. Pilot returned to airfield and landed. Loss of safetied retaining ring and subsequent loss of grooved retainer pin assembly for right nose wheel door caused door to hang free and be driven into nose wheel structure assembly when gear was retracted.

Maintenance

UH-1 Class E mishaps □ (H series) Airspeed went to zero during final approach. Plenum for pitot static system next to air line connector was cracked. Suspect maintenance personnel bent air line while installing wire cutter system. □ (H series) Loud bangs were heard and aircraft yawed. Engine inlet variable guide vane was out of rig.

AH-1 Class E mishap □ (S series) Airspeed indicators dropped to zero after takeoff. Copilot's airspeed indicator was not installed correctly, allowing pitot static lines to separate from indicator.

CH-47 Class E mishaps □ (C series) Crew chief saw oil leaking from bottom of combining transmission during flight. Eight nuts on top of combining transmission were not torqued to specifications. □ (C series) Master caution and cargo hook open lights came on. Cargo hook switch was out of adjustment.

Messages received

• Safety-of-flight operational message concerning ALQ-144 IR jammer installed on certain AH-1S(MC), AH-1T, UH-1N, and UH-60 aircraft (GEN-84-02, 071415Z May 84). Summary: Two incidents have occurred recently involving the unsealed ALQ-144 silicone carbide IR source. This particular IR source was the general failure mode which resulted in severe damage to the ALQ-144 system. The purpose of this message is to restrict use of the IR jammers equipped with the unsealed silicone carbide IR source. Contact: Ed Soteropoulos, AUTOVON 693-3300, commercial 314-263-3300.

• Safety-of-flight maintenance mandatory message concerning UH-60 engine output shaft (UH-60A-84-07, 101600Z May 84). Summary: The purpose of this message is to confirm/reinstate the 100-hour torque check and to revise the inspection procedure of the disc coupling to output shaft fasteners. Contact: Robert Lawyer, AUTOVON 693-3300, commercial 314-263-3300.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM change

Change 2, dated 30 March 1984, to TM 55-1520-228-PMD for OH-58A/C helicopters, has been released. ■

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	1-23 May	**3**	**2**
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**26**	**23**

Aviation mishap prevention forum

AVSCOM Supply Letter

Mohawk personnel should read AVSCOM Supply Letter No. A4-84, dated 16 March 1984. The purpose of this supply letter is to expedite shipment of T53-L-701 engine QDR/EIR exhibits to Corpus Christi Army Depot for investigation/repair.

Training film available

Field training exercises and summer training can create many problems. The film, "Hot Weather Training," covers some of the hazards of summer exercises. Safety aspects are discussed for:

- Personal clothing and personal hygiene.
- Equipment care and maintenance.
- Preventive maintenance checks.
- Driver training.
- Convoy movements.
- Ammunition handling.
- Refueling site.
- Terrain survey.

This film is available from your local TASC. Ask for "Hot Weather Training," TF/TVT 20-6274. ■

—from Army Trainer

Use the right tools!

Cadmium- and zinc-plated tools are a big no-no around aircraft engines. The plating chips easily, and chips that get into the lube system contaminate any magnesium they touch.

Cadmium chips that touch titanium- or nickel-base alloys can cause parts to become brittle, crack, and possibly fail under stress. Cadmium tools used on a hot surface like an exhaust manifold will create poisonous gases.

Aircraft mechanic tool kits come with chrome-plated tools—you can spot 'em by their bright finish. Chances are, any dull-finish tools sport cadmium or zinc. So turn 'em in soonest for chrome-plated or unplated tools.

When you order replacement tools, put Advice Code 2B—do not substitute—on your supply request. ■

—from PS, Issue 377

Huey 7-day PMD

Is a 7-day PMD inspection due on a Huey if it is not flyable due to phase maintenance?

Phase maintenance is a higher category of maintenance/inspection than a PMD. Therefore, a 7-day PMD is not due when the bird is in phase maintenance . . . no matter how long the bird is down.

However, you pull the 7-day PMD if your Huey is down for more than 7 days for a specific item of maintenance.

Forget the NOTE on page 2-3 of FM 55-411. It does not apply to phase maintenance inspections. ■

—from PS, Issue 377

Answers to last week's questions

1. When holding above 14,000 feet msl (non DME), the inbound leg is flown for how many minutes and when below 14,000 feet msl the inbound leg is flown for how many minutes? 1½ minutes and 1 minute. **Airman's Information Manual, dated March 1984, page C4-S7-8, par. 347J(4)(a)**

2. When VFR, initial call-up at a tower-controlled airport should be made at what distance from the airport? 15 miles. **Airman's Information Manual, dated March 1984, page C4-S3-1, par. 221a**

3. Maintenance of aviation life support equipment will be performed only by trained, qualified personnel, either military or civilian. True or false? True. **AR 95-17, page 3-1, par. 3-2**

4. Corpus Christi Army Depot is the prime recipient and evaluator of all Army aircraft components/parts selected for teardown and analysis. True or false? True. **DA Pam 385-95, page 6-16, par. 6-22** ■

Questions for aviation personnel

1. If an ELT must be tested by transmitting an actual signal, how should this be accomplished? **Reference: Airman's Information Manual, dated March 1984**

2. Wind direction issued by air traffic facilities is _____ and wind velocity is _____. **Reference: Airman's Information Manual, dated March 1984.**

3. Today's unit field sanitation teams must be able to perform what critical tasks? **Reference: FM 21-10, Field Hygiene and Sanitation**

4. Where should DA Forms 2028 (Recommended Changes to Publications and Blank Forms) for FM 10-68 be sent? **Reference: FM 10-68, with Change 3, Aircraft Refueling** ■

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL36362 □ STACOM 102 □ 23 May 1984

Operator's Manual and Checklist update

Listed below are the effective dates of the current aircraft operator's manuals and checklists with the number and date of the latest change.

Fixed Wing TM 55-1510-	Aircraft	Basic Manual	Last Change	Basic Checklist	Last Change
201-10/4	RU-8D				
	U-8D/G	3 Apr 78		Jul 78	
201-10/5	U-8F	21 Mar 78	4, 23 Nov 82	Jul 78	3, 24 Nov 82
204-10/3	OV-1B	9 Mar 79	5, 5 Jan 84	Feb 79	3, 5 Jan 84
204-10/4	OV-1C	10 Apr 79	5, 2 Apr 82	Apr 79	2, 5 Apr 82
208-10	T-42A	27 Feb 79	2, 12 May 82	Feb 79	1, 7 Jan 82
209-10	U-21A	29 Oct 82	1, 10 Feb 84	Oct 82	
209-10-1	RU-21A/D	29 Oct 82		Sep 82	
213-10	OV-1D/RV-1D	4 Aug 78	8, 22 Feb 84	Nov 78	4, 22 Feb 84
214-10	RU-21B/C	28 Oct 82		Oct 82	
215-10	U-21G	29 Dec 82		Dec 82	
215-10-2	RU-21H(GR-V)	29 Jan 83		Nov 82	
216-10	U-3A/B	11 Dec 78	2, 5 Apr 82	Dec 78	1, 8 Feb 82
218-10	C-12A/C/D	7 Oct 82	2, 13 Mar 84	Oct 82	1, 1 Apr 83
TO1C-7A-1	C-7A	1 Oct 70	10, 11 Jan 80	Oct 70	13, 11 Jan 80
	T-41	31 Oct 74	2, 18 Mar 77	Oct 74	

Rotary Wing TM 55-1520-	Aircraft	Basic Manual	Last Change	Basic Checklist	Last Change
209-10	CH-47A	9 Jan 79	5, 11 Jan 83	Dec 78	3, 26 Nov 82
210-10	UH-1D/H	18 May 79	18, 18 May 83	Feb 79	6, 18 May 83
214-10	OH-6A	17 Dec 76	11, 11 Jan 82	Dec 76	4, 8 Feb 82
217-10-1	CH-54A	8 Apr 77	3, 20 Aug 82	Mar 77	2, 10 Oct 79
217-10-2	CH-54B	15 Apr 77	3, 23 Aug 82	Mar 77	3, 4 Aug 82
219-10	UH-1B	16 Jan 69	19, 28 Jul 82	Dec 68	8, 11 Apr 79
220-10	UH-1C/M	8 Sep 80	13, 9 May 83	Sep 80	3, 7 Dec 82
221-10	AH-1G	18 Mar 80	2, 5 Feb 82	Mar 80	
227-10-1	CH-47B	23 Aug 78	3, 14 Nov 80	Dec 78	3, 30 Oct 80
227-10-2	CH-47C	23 Aug 78	11, 23 Nov 82	Nov 79	4, 15 Apr 82
228-10	OH-58A	7 Apr 78	28, 6 Jul 83	Jul 78	15, 14 May 83
223-10	TH-55A	30 Sep 76	6, 25 Feb 83	Oct 76	6, 1 Dec 82
234-10	AH-1S (MOD)	17 Nov 76	14, 25 Aug 82	Nov 76	3, 30 Nov 79
235-10	OH-58C	7 Apr 78	34, 31 Jan 84	Jul 78	17, 20 May 83
236-10	AH-1S (PROD)	11 Jan 80	8, 16 Jan 84	Jan 80	4, 17 Aug 83
237-10	UH-60A	21 May 79	24, 23 Mar 84	Dec 78	16, 4 Nov 83

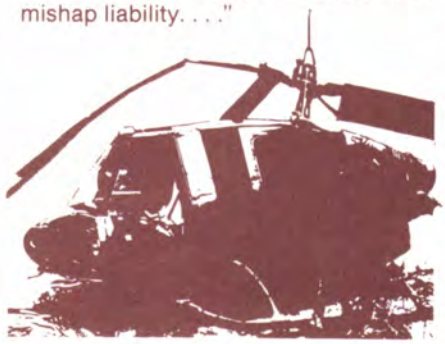
Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-3589 during duty hours; 558-6487 after duty hours.

Flying 9 to 5 may be safest

Every year the accident reports contain a few tantalizing hints of crashes in which the pilot was functioning on little sleep; and flying fatigued is one of those things "everybody knows" is a problem. It turns out the problem may have a lot more to do with when you fly rather than how much you've slept in the preceding 24 hours.

The Navy took a look at a batch of Class A mishaps. Using flight surgeon reports, the investigators determined the number of hours the pilot had worked in the prior 24/48 hours, the number of missions flown in that period, the number of continuously awake hours, the number of hours on duty, the amount of sleep the pilot had snagged, and the number of hours flown in the preceding 24 to 48 hours.

For fighter and helicopter pilots, the hours worked in the prior 24 hours was a factor. However, and this was the surprise, the Navy researchers report that "Variables often associated with manifestations of fatigue such as missions flown in the last 24/48 hours, hours continuously awake prior to mishap, hours continuous duty prior to mishap, hours duration of last sleep, hours worked in last 48, hours slept in last 24/48, and hours flown in last 24/48 were not significantly associated with mishap liability. . . ."



Then why are they breaking all those aircraft? "Factors such as quality of sleep and circadian desynchronization may be of utmost importance," say the sleuths. "Circadian desynchronization" means being awake when your body thinks it's time to sleep. There are thought to be hundreds of finely tuned rhythms controlling many of the body's mental and physical functions. These internal clocks are responsible for the phenomenon of jet lag, which may well turn out to be simply an extreme example of what happens anytime there's a sudden change in the pattern of sleep and wakefulness.

It's not hard to see why the Navy folks thought these cuckoo clocks might be at fault for their errant fliers. Taking a look at when the ill-fated flights departed, they found a very strong indication that taking off during other than 9 to 5 business hours could be a definite danger.

Flights departing between 0600 and 0900, and those going off 1800 to 2100 "tended to possess high mishap potential." A lot of that time is daylight, so the investigators don't think the higher accident rate is a matter of night flight. Flying between 1800 and 2100 was just about twice as dangerous as launching during 9 to 5 type "business" hours. The rate continues to soar for the late night hours of 2100 to 0600 the next day, with a particularly deadly combination of night flight, with its additional hazards and bodies operating when they are used to being asleep.

This study points to the possibility that significant safety gains could be made through a better understanding of wake-sleep cycles and ways to control the ill effects of interrupting the body's natural clock pattern. ■

—adapted from Aviation Safety

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 33 □ 30 May 1984

"I thought I would be able to see the wires"

I knew I wasn't supposed to be that low but, because of the weather, I thought I would be able to see the wires. I didn't ask the passenger to help me look for wires because I felt I could keep us clear of any obstacles. Besides, I didn't plan on being low enough for it to be a problem."

But the pilot did go that low and he did hit wires. His OH-58 hit three electrical cables about 35 feet above the ground and crashed. The cables were marked on the pilot's map, but the pilot did not know about the cables because he didn't do a map reconnaissance of his intended route. Command regulation required that single-pilot missions be flown no lower than 50 feet above the highest obstacle, and unit policy stated that pilots would maintain 300 feet agl unless specifically required to fly at a lower altitude.

Thirty-eight wire strike mishaps involving damage were reported over the past 3½ years. Five people were killed and 31 injured in these mishaps. Ten aircraft were destroyed. The other 28 mishaps included 1 Class B, 23 Class Cs, and 4 Class Ds.

Human error is almost always the cause of wire strikes. It is rare that wire strikes occur after an in-flight materiel-related emergency. Most wire strikes happen during cruise flight at altitudes below 60 feet agl, although some have occurred above 150 feet. Most fatal wire strikes occur at airspeeds above 60 knots.

Some of the causes of wire strikes listed in mishap reports include: unauthorized low-level flight; deviation from NOE route; overconfidence; approach to unauthorized confined area; no wire recon and no hazard map; unauthorized high-speed maneuver in confined area; wires not marked on map; wires were on map but pilot did not look at map; misjudged clearance during hover.

In one case, a pilot with more than 3,000 rotary wing hours left the altitude at which he was supposed to be flying and made a low pass over a resort area. While flying about 100 knots and 100 feet over water, the UH-1 hit wires. The pilot managed to get the aircraft to the shore, where it crashed with major injuries to the four occupants. The pilot had a reputation for liking to fly at low altitudes and did so quite often, although not dictated by the mission. No wire strike prevention policy in the world will work in a case like this.

It is virtually impossible to locate all wires by an aerial reconnaissance over unfamiliar terrain. Though wires may not be seen, their presence should be expected across rivers and lakes; along roads and railroad tracks; between hills, poles, structures; and between any pole and a structure. Even when only a single pole or building in open country is spotted, wires may be present.

One pilot, who had been told to recon a river, decided he could not do a good job from 300 feet, which was the minimum altitude restriction for flights outside the military reservation. He went down to 75 to 100 feet and his helicopter hit a powerline crossing the river. Three occupants of the helicopter were killed in the crash.

The position of the sun, types of wires, time of day, and existing atmospheric conditions can drastically affect the crew's ability to see wires. A change in one or more of these variables can be a deciding factor as to whether wires can

"I thought I would be able to see the wires"

be readily spotted, seen with difficulty, or not seen at all. Even large powerlines suspended from a tower can be virtually impossible to see on a clear day if other adverse environmental conditions exist.

A UH-1 hit wires during a late afternoon flight. The helicopter was flying at 25 feet agl and 45 knots en route to a landing zone. Long shadows were present and poles and wires blended into the dark background of freshly plowed fields. Because of these conditions, the pilot did not see the wires in time to miss them. Adequate hazard maps were not available to the crew.

One cause of wire strikes is too much airspeed for the altitude being flown, particularly in areas of unknown hazards. One UH-1 pilot was flying at 90 knots when he hit wires about 100 feet above the ground. The wires were a dark color and extremely hard to see. The high speed being flown reduced the time available to see and react to the wires. A wire hazard map was not maintained in the field operations office, and a route recon was not done before the flight. The pilots in the unit maintained individual wire hazard maps, but the wires that were hit were not marked on this pilot's map.

The wire strike protection system has been installed on many Army aircraft and has proven to be effective in reducing the number of aircraft lost to wire strikes. But this system is not a cure-all for wire strikes. Recently, as a UH-1 was landing at a field site, it hit a wire strung over a river. The aircraft hit the wire just below the main rotor blades and above the wire strike protection system. Control was lost and the aircraft crashed. The wires were not marked on the pilot's map.

Several years ago, the Safety Center published a seven-point program to prevent wire strikes. And the number of wire strikes has decreased substantially over the years. But we had eight in the first half of FY 84. So it's time to stress these seven points again.

1. **SOPs and directives.** SOPs and directives relative to terrain flight should reflect the safest procedures possible for the types of missions being flown. Detailed responsibilities for the pilot at the controls, pilot not at the controls, and other crewmembers should be specified. The procedures should be reinforced regularly at aviation safety meetings.

2. **Supervision.** Commanders and supervisors must insure 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.

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 strikes before every terrain flight mission.

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.

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 should also 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. Wires can be constructed in a matter of minutes.

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 in searching for wires. During terrain flight, the pilot's full attention should be to flying. Navigation, setting radio frequencies, and monitoring instruments should be a function of the other crewmember. If the pilot must direct his attention away from flying, he should land or climb to a higher altitude.

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.

One mistake is all it takes for you to be a wire strike fatality . . . flying down a river or valley at 80 to 90 knots, getting lost, or failure to update your hazard map.

Unit commanders, operations officers, and platoon leaders share some of the responsibility for wire strike mishaps, but the final responsibility lies with the crew in the cockpit. Remember, the closer you are to the ground, the greater your chances of a wire strike. Go slow when you go low. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (H series) Aircraft descended to low level over a lake and then climbed to avoid powerlines. Near the lake shore, aircraft reportedly made a steep climb and turn, followed by a dive back toward the lake shore. This same maneuver was repeated again, but descent was not terminated before ground impact. Suspect pilot entered a maneuver from which he could not recover in the altitude available. 8433

UH-1 Class E mishaps □ (H series) Vertical vibration was felt during flight. Caused by separation of skin on main rotor blade 3 inches inboard from blade tip. □ (H series) Master caution and hydraulic lights came on. Ruptured hose caused loss of hydraulic fluid. □ (H series) Engine oil temperature rose to 120 degrees during taxi. Caused by stuck oil flow thermostat. □ (H series) Master caution and transmission oil pressure lights came on. Caused by failure of oil pressure relief valve. □ (H series) Binding was felt in left rear quadrant of pilot's and copilot's cyclic control. Caused by failure of bellcrank.

UH-60 Class E mishaps □ Master caution and pitch bias fail lights came on during approach to landing. Caused by failure of pitch bias actuator. □ Loud whine was heard from No. 2 engine. Engine was replaced.

Attack helicopters

AH-1 Class D mishap □ (S series) Pilot in back seat placed NVG carrying case on left side of instrument glare shield with daytime filter bag attached to carrying strap. When runup was completed and pilots were preparing to conduct HIT check, pilot in rear seat removed carrying case from instrument glare shield. As he was removing the case, the shoulder straps fell from the glare shield and caught the governor switch, placing it in emergency position. Aircraft was at full operating rpm and collective was full down. Main rotor hub was damaged.

AH-1 Class E mishaps □ (S series) Alternator light came on. Caused by defective relay. □ (G series) Master caution and engine chip detector lights came on. On landing, smoke was seen coming from exhaust stack. Caused by failure of No. 3 and 4 engine oil bearing pack. □ (S series) Master caution and engine oil pressure lights came on during landing. Caused by failure of oil pressure switch. □ (S series) Transmission oil pressure exceeded limitations during landing. Caused by failure of transmission transducer.

Cargo helicopters

CH-47 Class E mishaps □ (A series) No. 2 engine egt limits were exceeded during flight. Caused by fuel control malfunction. □ (C series) No. 2 hydraulic light came on. Caused by ruptured hydraulic pressure line.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	7	10
	November	2	2	November	3	3
	December	0	0	December	0	0
2nd Qtr	January	1	0	January	4	0
	February	0	0	February	4	4
	March	2	5	March	3	1
3rd Qtr	April	6	0	April	2	3
	May	8	1	1-30 May	3	2
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	26	23

Observation helicopters

OH-6 Class E mishap □ Fuel filter light came on during takeoff. Caused by failure of fuel filter bypass switch.

OH-58 Class D mishap □ (A series) Pilot was distracted during preflight by a request for an ident-a-plate in his possession. While the individual who had asked for the card was present, pilot asked him to observe transmission oil level while pilot rocked transmission. After this, pilot continued preflight, leaving main rotor tiedown on horizontal stabilizer. During runup, pilot heard thump and felt shudder in airframe. He then saw main rotor tiedown hit the ground in front of aircraft. Tail rotor blade was damaged.

OH-58 Class E mishaps □ (A series) Compressor stall occurred during NOE flight. Caused by defective bleed valve. □ (C series) Pedals went limp during hover check. Aft shear link of secondary tail rotor control system failed, causing loss of directional control.

Fixed wing

OV-1 Class E mishaps □ (D series) Pilot's canopy cracked during climb. □ (D series) No. 1 engine had several compressor stalls, with flames coming out of exhaust pipe. Caused by malfunction of engine.

Maintenance

UH-1 Class D mishap □ (H series) As aircraft was being refueled, pilot noticed two punctures in forward tail rotor drive shaft cover. Screwdriver had been closed inside drive shaft cover. When engine exhaust deflector was installed, screwdriver was placed on tail boom below tail rotor drive shaft next to drive shaft cover hinge and forgotten.

UH-1 Class E mishaps □ (H series) Transmission oil pressure light came on during flight. When mechanic installed main transmission oil line quick disconnect fitting, he did not torque fitting correctly, resulting in loss of oil. □ (H series) IP gave pilot simulated engine failure at altitude. During verbal check, N_1 went through flight idle. Flight idle cam stop was installed incorrectly. □ (H series) Master caution and right fuel boost pump lights came on. Fuel line marker was found inside fuel boost pump filter.

AH-1 Class E mishaps □ (S series) Pitch channel SCAS caused feedback in cyclic during hover. Pedals were out of rig and pitch SCAS channel was out of adjustment. □ (S series) When starter trigger was depressed, starter generator did not motor. Wire to generator CB pole was not connected correctly.

CH-47 Class D mishap □ (D series) As aircraft taxied past another CH-47 parked on the ramp, rotorwash blew tunnel covers up, damaging covers. Mechanic had left covers unsecured after maintenance was performed.

Messages received

• Safety-of-flight maintenance notice message clarifying the AH-1 and UH-1 operator's and crewmember's checklist manuals relative to low g flight and mast bumping (AH-1-84-01 and UH-1-84-05, 142300Z May 84). Summary: Message references several technical manuals and implements urgent changes to the manuals relative to low g maneuvers and mast bumping. Contact: Ed Soteropoulos, AUTOVON 693-3300, commercial 314-263-3300.

• Safety-of-flight technical message concerning K747-003-205 main rotor blade installed on certain AH-1S aircraft (AH-1-84-02, 171530Z May 84). Summary: Twenty-five root fitting assemblies (NSN 1615-01-042-2318, P/N K747-061-5) were assembled by the manufacturer with soft bushings. All but two have been located and exchanged. The finite life of the fitting has effectively been reduced to 600 from 5,000 flight hours with the soft bushings installed. Because of the drastic reduction in life, it is imperative that the two remaining discrepant fittings be located and exchanged. Contact: Ed Soteropoulos, AUTOVON 693-3300, commercial 314-263-3300.

• T53 engine maintenance information message concerning clarification of AVSCOM message MIM-T53-84-MEM-01 (MIM-T53-84-MEM-05, 111830Z May 84).

• Maintenance information message concerning T53-L-703 900-hour engine hot end inspection (MIM-T53-84-MEM-06, 111900Z May 84).

• Maintenance information message concerning wire strike modification work order and battery compartment wire chafing problem for AH-1S aircraft (MIM-AH-1-MEM-84-04, 171540Z May 84).

• AVSCOM message concerning installation of UH-1 thick wall masts (171630Z May 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Aviation mishap prevention forum

Answers to last week's questions

1. If an ELT must be tested by transmitting an actual signal, how should this be accomplished? Tests should be conducted only during the first 5 minutes after any hour. Test should be no longer than three audible sweeps. Airborne tests are not authorized. **Airman's Information Manual, dated March 1984, page C5-S2-2, par. 454b(1)(2)(4)**

2. Wind direction issued by air traffic facilities is _____ and wind velocity is in _____. Magnetic and knots. **Airman's Information Manual, dated March 1984, page C4-S3-5, par. 225**

3. Today's unit field sanitation teams must be able to perform what critical tasks? Inspect water containers and trailers; disinfect unit water supplies; check unit water supply for chlorine; inspect unit field food operations; and control insects in unit area. **FM 21-10, page 69**

4. Where should DA Forms 2028 (Recommended Changes to Publications and Blank Forms) for FM 10-68 be sent? Commandant, U.S. Army Quartermaster School, ATTN: ATSM-TD-TL, Fort Lee, VA 23801. **FM 10-68, page 1-1, par. 1-3** ■

Questions for aviation personnel

1. Never warm a frozen area of the body by placing it in hot water or next to an open fire or by rubbing it with snow. True or false? **Reference: FM 21-10, Field Hygiene and Sanitation**

2. When is an aircraft considered to be clear of a runway when exiting? **Reference: Airman's Information Manual, dated March 1984**

3. A go-around is a procedure for remaining airborne following a decision to discontinue an intended landing. When is a go-around used? **Reference: FM 1-203, Fundamentals of Flight**

4. Aviators performing maintenance test flights must be qualified and current per FM 55-44 in mission, type, design, and series group of the aircraft for which the test flight is conducted. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations** ■

UH-1 particle hose . . . no handholds

Some mechanics are cracking the threaded insert in the diffuser housing when they try to stop a leak at the fluid passage bolt.

They grab the particle hose assembly (item 46, figure 96, TM 55-1520-210-23P-1) with one hand and tighten the bleed air line "B" nut with an 11/16-inch wrench. Results: damaged boss diffuser threads (item 19, figure 17, TM 55-2840-229-23P-1), kinked hose, more leaks.

Here's how to stop a fluid passage bolt leak:

- Hold the fluid passage bolt (item 47, figure 96, TM 55-1520-210-23P-1) with a 13/16-inch wrench while you back off the bleed air line "B" nut with an 11/16-inch wrench. This is so you won't kink the bleed air line when you tighten the fluid passage bolt.
- Disconnect the nut on the 3 and 4 oil bearing line (item 11, figure 64, TM 55-2840-229-23P) with a 9/16-inch wrench.
- Now you can hold the fluid multiple connector (item 49, figure 96, -210-23P-1) with a 1-inch wrench as you tighten the fluid passage bolt.
- Reconnect the oil bearing line.
- Hold the fluid passage bolt as you tighten the bleed air line "B" nut. No bum threads, no kinks, no leads. ■

—from PS magazine

Water in helicopters?

Recent teardown analysis and oil analysis reports show that moisture is the main cause of gearbox failures. Moisture causes corrosion on the bearings and gears, which causes abrasive wear and creates high iron and copper readings in oil samples.

In one case, a unit requested a teardown analysis because a transmission had seized on runup. As the transmission was being prepared for shipment, the mast could not be removed. When the transmission was received at Corpus Christi Army Depot, they had problems removing the mast. After the mast and all of the other quills were removed, it was discovered that rust was the cause of the transmission seizure.

The exact cause of the high number of moisture-related failures cannot be pinpointed, but the moisture is most likely getting in the gearboxes when aircraft are being washed. Although not the cause of the mishap, washing compound was found in the fuel sample taken after a recent Class A mishap.

Some of the ways you can prevent water from entering gearboxes when aircraft are washed are by making sure that filler caps are installed, not using high pressure water hoses, not spraying water directly on input and output seals, and covering vents. ■

Followups

Additional information on mishap briefs previously published

Utility helicopters

UH-1 Class A mishap in 1 Jun 83 issue (8329) ☐ Crew heard high-pitched whine and loud bang, followed by yaw to left. Pilot was forced to autorotate into trees. Main input pinion gear failed because of incorrect techniques during assembly/installation of input gear assembly. Misalignment of the pinion gear with the bevel gear resulted in failure of the pinion gear and subsequent disengagement of the main rotor drive system.

UH-1 Class A mishap in 22 Jun 83 issue (8337) ☐ Air mission commander directed reposition of five aircraft during environmental conditions less than those prescribed for flight under visual flight rules. The crew of one of the aircraft became spatially disoriented after entering instrument meteorological conditions. Aircraft crashed on an open ridgeline.

Attack helicopters

AH-1 Class A mishap in 25 May 83 issue (8327) ☐ IP initiated high-speed simulated engine failure at an altitude too low to comply with the minimum power recovery altitude of 200 feet above the ground. When an actual engine failure occurred, there was not enough altitude or time to maneuver to a suitable landing area. An emergency landing was made in a heavily wooded area. Engine failure was caused by an eroded fuel control assembly.

Cargo helicopters

CH-47 Class B mishap in 11 May 83 issue (8324) ☐ Pilot planned to discharge his passengers at a mountain pinnacle pad with only the aft landing gear touching the ground. Terminating the approach at a hover about 15 feet above the pad, pilot, flying from the left seat, was not in a position to determine rotor blade clearance from rock ledge. Copilot and crew chief allowed pilot to maneuver aircraft too close to ledge. Forward rotor blades hit ledge.

CH-47 Class B mishap in 29 Jun 83 issue (8339) ☐ As forward wheels were lifted off the ground, rear of aircraft began uncommanded lateral movement to left. Pilot lowered thrust to put the aircraft back on the ground. As rotor rpm decreased, aft red rotor blade hit forward tunnel cover and left side of fuselage. Aft left wheel swivel lock failed because of excessive wear to rear locking/centering camshaft. Excessive amounts of air trapped in the aft pivoting and swiveling actuators of the hydraulic flight control system caused sloppy control response. Worn swashplate bearing also delayed and interfered with flight control response to pilot inputs.

Observation helicopters

OH-58 Class A mishap in 25 May 83 issue (8328) ☐ Pilot was on NOE training mission. A gusty 10- to 20-knot tailwind caused tail of aircraft to pitch up and nose to yaw right. Pilot misinterpreted the response of the aircraft to the tailwind as loss of tail rotor effectiveness. He neutralized the anti-torque pedals and reduced collective pitch, resulting in an acceleration of the right turn into a right spin. Aircraft continued to spin until it hit the ground in a nose-low attitude.

OH-58 Class A mishap in 14 Sep 83 issue (8352) ☐ Downgraded to Class C. Tail rotor effectiveness was lost during approach to hover. Aircraft hit the ground hard. ■

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 34 □ 6 Jun 1984

Accident review: failure to follow procedures

Synopsis

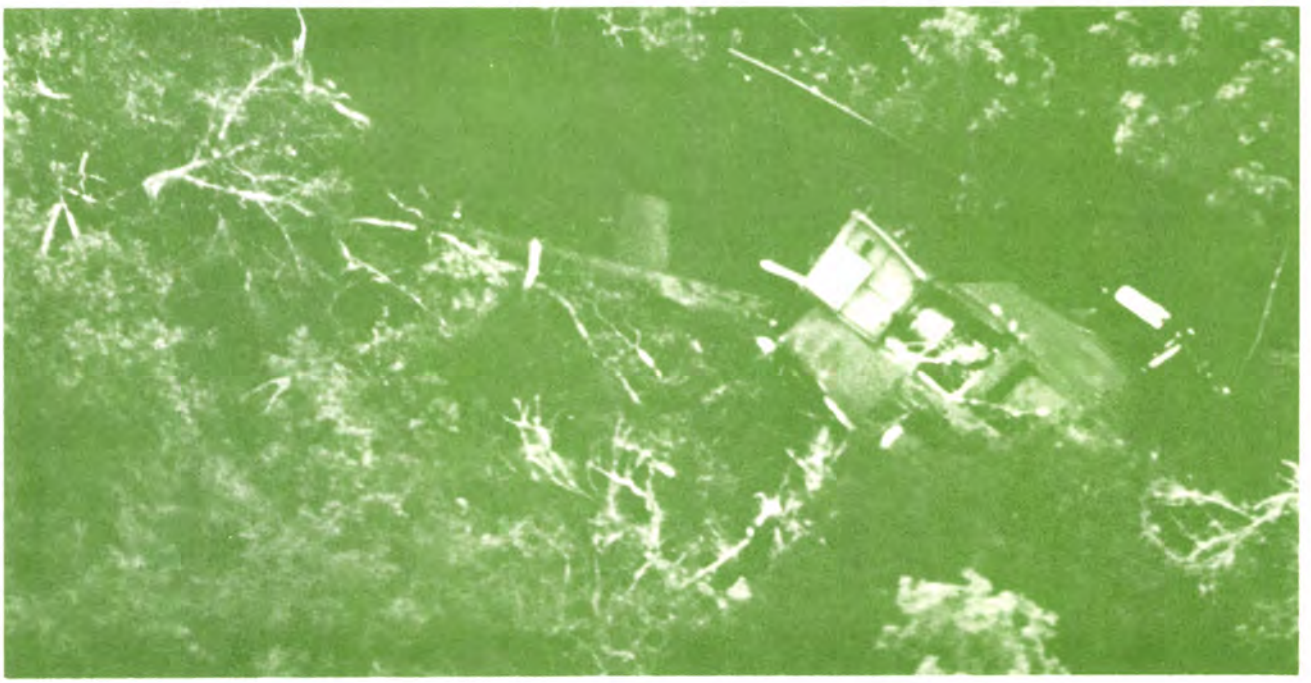
When the AH-1S pilot rolled on the throttle to recover from a high-speed, low-level simulated engine failure, the engine failed to respond. The IP took the controls and made a forced landing in an area covered by scrub oak trees and dense undergrowth. The aircraft sustained substantial damage.

History of flight

The AH-1S crew took off from the airfield to join seven other helicopters at a training area for a battle drill. During the drill, in addition to participating in the simulated tactical scenario, the IP administered the flight portion of the pilot's annual aviator proficiency and readiness test (AAPART) to fulfill annual requirements. The IP also evaluated the pilot for PIC status.

When the drill was completed, it was decided that the aircraft could return to their home airfield in separate flights or individually, as desired. The IP decided to continue the AAPART and the PIC flight evaluation, separate from the other aircraft.

After the AH-1 had leveled off and gained cruise airspeed, the IP took the controls, made an abrupt cyclic climb to about 500 feet above the ground, and returned control of the aircraft to the pilot. As soon as the pilot regained cruise airspeed, the IP initiated a simulated engine failure. The pilot satisfactorily completed the emergency procedures and terminated the maneuver with a power recovery about 150 feet above the ground. As soon as the aircraft regained airspeed to 120 knots, the IP gave the pilot another high-speed simulated engine failure. The pilot again completed the emergency procedures without incident until the power recovery was attempted. When the pilot rolled the throttle to the full-on position, he noted that the engine was not responding and rpm was decreasing. The pilot told the IP, who took the controls and made a slight turn to the right to land in an area covered by scrub oak trees and dense undergrowth.



Failure to follow procedures

The AH-1 hit the trees in a level attitude with little or no forward airspeed and came to rest leaning to the left about 60 degrees. The pilot sustained minor injuries and was able to exit the aircraft without assistance. The IP sustained fatal injuries when his torso flexed forward and downward far enough to allow his face to hit the top of the telescopic sight unit. The IP's shoulder straps were both loosely adjusted. One was fully extended, while the other was within 2 inches of full extension. The inertia reel locked on impact, but the excessive slack in the shoulder harness allowed the upper body to flex forward.

Crewmember experience

The 33-year-old IP had more than 2,600 rotary wing flight hours, with more than 2,400 in the AH-1S. The 22-year-old pilot had more than 350 rotary wing hours, with 200 in the AH-1S.

Commentary

There was no evidence to indicate that a successful autorotation could not have been completed had suitable terrain been within the autorotative glide capability of the aircraft. However, when the IP initiated the simulated engine failure at 150 feet rather than first climbing to a higher altitude, in violation of AR 95-1 and a local command regulation, he forfeited the additional time and altitude that may have allowed him to maneuver the aircraft to a more favorable landing area. Evidence indicates the IP did not take advantage of a higher altitude because he was trying to expedite the maneuver in order to be able to stay up with the remainder of his flight.

The IP should have considered the possibility of an actual emergency arising from a simulated maneuver and planned accordingly. He did not comply with the general rule of planning all simulated engine failure maneuvers as if they were to be conducted to the ground. As a result, when the engine failed to respond at 75 feet above the ground, there was no place to land except on unsuitable terrain.

The IP did not inform the flight leader of his intention to conduct emergency procedures training or of his location. The absence of a reported successful power recovery would have immediately alerted the flight leader to the possibility of a downed aircraft. As it was, almost an hour elapsed before the wreckage was found in the heavily wooded area. The pilot could not contact anyone on the survival radios and left the crash site in an effort to find some help. In doing so, he lost track of the relative location of the crash site. Because of the nature and extent of injuries, the delay did not materially affect their overall severity. Had either pilot received life-threatening but nonlethal injuries, the delay in locating the wreckage might well have had a substantial impact on the resulting severity.

The engine fuel control assembly installed on the aircraft eroded internally. Surface metal particles from the valve body bore section of the fuel control flaked loose. Two pieces of the metal were found between the pressure regulator stop and the valve body, causing fuel to recirculate internally and disrupting metered fuel flow to the engine at low rpm throttle settings. As a result, when the throttle was reduced to flight idle during a high-speed simulated engine failure, fuel starvation occurred. Metallurgical analysis of the metal particles and matching fuel control surfaces revealed a distribution of small cavities and associated brittle fracture mechanisms. Accordingly, the basic cause of the failure was attributed to inadequate quality control during overhaul of the engine fuel control. ■

Aviation mishap prevention forum

Answers to last week's questions

1. Never warm a frozen area of the body by placing it in hot water or next to an open fire or by rubbing it with snow. True or false? True. **FM 21-10, page 19**

2. When is an aircraft considered to be clear of a runway when exiting? When all parts of the aircraft have crossed the holding line. **Airman's Information Manual, dated March 1984, page C2-S3-3, par. 60**

3. A go-around is a procedure for remaining airborne following a decision to discontinue an intended landing. When is a go-around used? When the control tower landing clearance is withheld, when for any reason the approach does not develop as planned, and when other traffic does not permit a safe landing. **FM 1-203, page 6-19, par. 6-17**

4. Aviators performing maintenance test flights must be qualified and current per FM 55-44 in mission, type, design, and series group of the aircraft for which the test flight is conducted. True or false? True. **AR 95-1, with Change 1, page 2-7, par. 2-21** ■

Questions for aviation personnel

1. What reference could be used to determine an approved commercial engine oil to replace MIL-L-23699? **Reference: TB 55-9150-200-24, Engine and Transmission Oils, Fuels, and Additives for Army Aircraft**

2. Are parachutes required for crewmembers on flights involving aerobatics? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

3. All occupants of an aircraft involved in an accident must be transported to a medical facility for examination and, if necessary, treatment of injuries. Crewmembers involved in the accident are restricted from operating vehicles or equipment after the accident until released by a flight surgeon or other medical doctor. True or false? **Reference: DA Pam 385-95, Aircraft Accident Investigation and Reporting**

4. In reference to aircraft weight and balance, define allowable gross weight and useful load. **Reference: TC 1-201, Tactical Flight Procedures** ■

Wrong torque wrench used

A U-21A was parked and both engines were shut down by the checklist. As the IP was getting out of the aircraft, he saw smoke and flames coming from the vicinity of the exhaust stacks. The civilian ground guide saw the same thing and ran to get a fire extinguisher. When he got back to the aircraft, the smoke and flames had dissipated.

The fuel adapter assemblies located from the 4 o'clock to the 7 o'clock position were found leaking between the adapter assembly (NSN 2915-00-897-3964) and the engine flange. These assemblies were allowing fuel to leak against the engine hot combustion housing and exhaust stack.

The fuel adapter assemblies had been removed during a phase inspection 53 hours before. When they were installed, a torque wrench (NSN 5120-00-542-4484) was used to torque the fuel adapter assembly bolts. The bolts require a torque of 32 to 36 inch pounds. The wrench used was a 30 to 150 inch pounds torque wrench, calibrated 3 months before. The accuracy of the low side torque was rechecked 3 days after the mishap, with an indication of 10 inch pounds too low. Instead of the bolts being tightened to 32 to 36 inch pounds, they had been tightened to 22 to 26 inch pounds.

When using torque wrenches, remember the following from TM 55-1500-204-25/1:

The selection or choice of the type of torque wrench to use for a particular application is in many cases a matter of personal choice or preference. However, in aircraft maintenance applications, the rigid frame with the indicating dial and the audible indicating torque wrenches are used in preference to the flexible beam type wrench. The audible indicating torque wrench is preferred since it can be used in places of limited accessibility where it would be difficult to read a dial or scale while performing the tightening operation.

When selecting a torque wrench for a particular application, the range of the wrench must be considered. When practical, the required torque value should be between the 30 and 80 percent points of the torque wrench range. The accuracy of most torque wrenches tends to decrease at the extremes of the torque range. The best accuracy is obtained between the 30 and 80 percent points of the range. The graduation increments on the torque wrench should not be greater than 10 percent of the torque value being measured. ■

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 103 □ 6 Jun 1984

UPDATE

Everything that could have possibly ever happened to Army aircraft operator's manuals has already happened and there is nothing—absolutely nothing—else that can be changed. Right? If you believe that little line, you obviously haven't heard of Project UPDATE. UPDATE is a relatively new computerized process by which The Adjutant General (TAG) prints and distributes changes and revisions to Army publications.

Last year, TAG began printing and distributing "phone-book" style circulars in an effort to expedite distribution and reduce costs. This type publication is not new to Army aviators because we have been using a similar product since the 1960s—the DOD Flight Information Publication (FLIP).

You may remember when the Army converted from Jeppesen publications to FLIP; there were those who vowed that such a thing could never work. Some, however, welcomed the change because it eliminated the need to post changes. Well, that is one of the features of UPDATE. Periodically a new manual is distributed and the old one is discarded.

Last winter, U.S. Army Materiel Development and Readiness Command (DARCOM) agreed to convert a technical manual to UPDATE. The manual selected as the first of its kind is the one technical publication that has the highest user interest in the Army; the one manual that stirs the emotions of virtually every Army aviator; as much a part of Army aviation tradition as SOS is to an Army breakfast. You guessed it—the Huey dash ten, TM 55-1520-210-10. The revised UH-1H/V operator's manual was ready for publication this spring and because of its high visibility and user interest was the ideal choice.

You will notice the following differences in the new manual:

- "Phone book" style on paper similar to FLIP GP.
- Format is virtually unchanged. That is, the same nine-chapter arrangement has been retained.
- Some illustrations have been rearranged to aid in computerizing the manual. For example, all performance data charts are at the end of chapter 7, following the supporting text.
- Print is smaller and margins are reduced to eliminate costly unused "white space" on pages.
- Changes have been made in the use of color. In place of color you may find shading and hashed marks for highlighting; i.e., the height velocity diagram "avoid" red area will be shaded in the new-look book.

The UPDATE dash ten replaces the current operator's manual, but the same rules do not apply to the checklist (-CL). The corresponding dash CL is plasticized to afford better protection from moisture, oil, and general wear and tear. A note on the cover of the new checklist advises aviators to use it only with the UPDATE dash ten.

This is only the beginning. Expect to see more UPDATE manuals in 1985. ■

Actual or simulated hydraulic failure

A recent UH-1 mishap occurred while the aircrew was conducting simulated hydraulic failure. It is believed that the aircrew lost control of the aircraft when the hydraulic switch was placed in the ON position during a right turn to crosswind. An excessive control input is possible when pressure is being applied to any one of the controls when the hydraulic pressure is restored to normal. If there is not a blocking force applied to counteract this pressure applied by the pilot at the controls, the servo can fully extend in less than 1 second. This rapid extension of the servo may result in an abrupt attitude change that exceeds the capability of the pilots to recover.

During actual or simulated hydraulic failure while in flight, do not return the hydraulic control switch to the ON position until the aircraft is in straight and level flight, the aircraft is in trim, and both pilots have their hands on their respective cyclic and feet on their respective pedals. The SIP/IP/IFE/PIC will designate who will operate the hydraulic control switch. After proper identification of the hydraulic control switch, the switch can then be turned on. ■

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-3589 during duty hours; 558-6487 after duty hours.

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap □ (H series) Severe vibration was felt and aircraft was landed. Engine exhaust diffuser cover had hit and damaged top of main rotor blade.

UH-1 Class E mishaps □ (V series) Airspeed indicator did not register after takeoff. Pitot static system was clogged with insect remains. □ (H series) Engine oil temperature rose during flight. Caused by defective thermostat. □ (H series) As aircraft was being refueled, oil was seen running down side of aircraft below 42-degree gearbox. Chip detector was hanging out of gearbox. Lock pins and O-rings on chip detector were excessively worn, allowing plug to vibrate loose. □ (H series) Peculiar sound was heard during hover. When aircraft was shut down, plastic bag flew away from main rotor system. □ (H series) Torque dropped to zero. Caused by failure of torque pressure indicator. □ (H series) Master caution and hydraulic lights came on. Caused by broken hydraulic line. □ (H series) Warning light and audio activated. N_2 tachometer generator failed, causing shaft to shear.

Attack helicopters

AH-1 Class E mishaps □ (S series) Pilot noted reduction in engine noise during hover and suspected compressor stall. Aircraft began to descend and pilot completed hovering autorotation. Another aircrew saw flames coming from tailpipe. Suspect bearing failure caused engine to fail. □ (S series) Failure of oil cooler turbine fan caused transmission oil temperature to exceed limits during flight.

Cargo helicopters

CH-47 Class E mishaps □ (A series) Servo cylinder failed during flight, causing cyclic stick to move laterally 1½ to 2 inches. □ (C series) Smoke was seen coming from oil cooling compartment, followed by oil leakage. Caused by cracked fitting on hydraulic cooling fan. □ (B series) As cargo net was lifted, one of the lifting leg hooks slipped up on the apex fitting and slid through the fitting notch, causing the load to fall from the net. Blowing dust and sand prevented the crew from seeing the hook slipping from the fitting.

Observation helicopters

OH-58 Class E mishaps □ (A series) Master caution and generator lights came on. Voltmeter indicated zero output. Caused by bent generator armature. □ (A series) When hydraulic boost switch was turned off during runup, collective flight control came up about 3 inches. Pressure was needed to hold collective down. This happened without moving the cyclic contol. Collective worked normally when hydraulic power was restored. Caused by malfunction of servo activator. □ (A series) Master caution and fuel boost pump lights came on. Caused by failure of boost pump. □ (C series) Copilot noticed unusual pedal response during hover. After aircraft was landed, loud noises were heard from engine area. Compressor stall was caused by faulty bleed air valve.

Fixed wing

U-21 Class E mishaps □ (A series) No. 1 torque dropped to zero during takeoff. Caused by malfunction of bypass valve in fuel control. □ (A series) Fuel was seen siphoning from left nacelle fuel ►

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
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1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	1-6 June	**2**	**1**
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**29**	**25**

Mishap briefs

cap during flight. Fuel cap was not positioned correctly.

T-42 Class E mishap □ Gear handle would not extend enough to lower gear. Gear was lowered manually. Gear switch lever was frozen in switch indent portion of switch.

C-12 Class D mishap □ (A series) Crew saw lightning at aircraft's 10 o'clock position. Crew chief heard thumping noise in tail of aircraft. Postflight inspection revealed evidence of lightning strike on left engine propeller blade and exit points on left outboard flap trailing edge and left elevator control surface.

C-12 Class E mishap □ (C series) Gear would not retract after takeoff. Caused by malfunction of right main gear squat switch.

Maintenance

UH-1 Class E mishaps □ (H series) Inverters would not come on line during runup. Support maintenance had issued inverters which were set up for an AH-1. Inverters were not tagged for specific aircraft. □ (H series) Airspeed indicators were inoperative after takeoff and altimeters were giving erroneous readings. Pitot and static air lines were installed incorrectly. Lines were not tagged. □ (H series) During flight, pilot noticed that date on DA Form 2408-18 for drive shaft hanger bearing service was date service was actually performed instead of due date for next service. Pilot returned to unit for record update. □ (H series) During OGE hover check, pilot noted stiffness in left rear quadrant of cyclic control. Stiffness was caused by IFF/transponder antenna cable rubbing against one of the cyclic control tubes in the floor and restricting the movement of the cyclic. Cable was positioned incorrectly when transponder antenna was installed.

AH-1 Class E mishap □ (S series) Forty-two-degree gearbox chip detector light came on. Insulation on wire was chafing on gearbox cover.

U-21 Class E mishaps □ (A series) No. 2 engine was shut down during checkride and could not be restarted. Inspection revealed bend in throttle rod shaft which caused binding on the shaft. Binding would not allow proper operation of engine fuel control. □ (A series) Loud banging noise was heard during flight. Access panel at rear of nose gear doors had come loose. Suspect maintenance did not properly secure panel.

Messages received

• Safety-of-flight maintenance mandatory message concerning UH-60 engine output shaft (UH-60A-84-09, 182130Z May 84). Summary: This message clarifies the bolt inspection and revises certain paragraphs and the suspense date of UH-60A-84-07 message dated 101600Z May 84. Contact: Major Rees, AUTOVON 693-1890, commercial 314-263-1890.

• Maintenance information message concerning air filter assemblies used on UH-1H, UH-1M, EH-1H, EH-1X, AH-1G, and TH-1G aircraft (MIM-T53-84-MEM-07, 181530Z May 84).

• Maintenance information message concerning OH-58 cross tube fitting assembly (MIM-OH-58-84-MEM-03, 221615Z May 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

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OH-58 first half FY 84 review

The Army Safety Center received 334 OH-58 Preliminary Reports of Aircraft Mishap (PRAM) from October 1983 through March 1984. Stated in perhaps more meaningful terms, we are averaging at least a mission abort or delay for every 320 hours of OH-58 operation.

Five Class A mishaps occurred. Two involved loss of tail rotor effectiveness (LTE). One was weather related; the pilot flew the aircraft into the ocean while trying to avoid clouds. One was NOE related; a main rotor blade struck a large rock during desert operations. The remaining Class A mishap involved an unsuccessful autorotation; the pilot entered the autorotation based on cues indicating a power droop. One crewmember and one passenger were killed as a result of these mishaps.

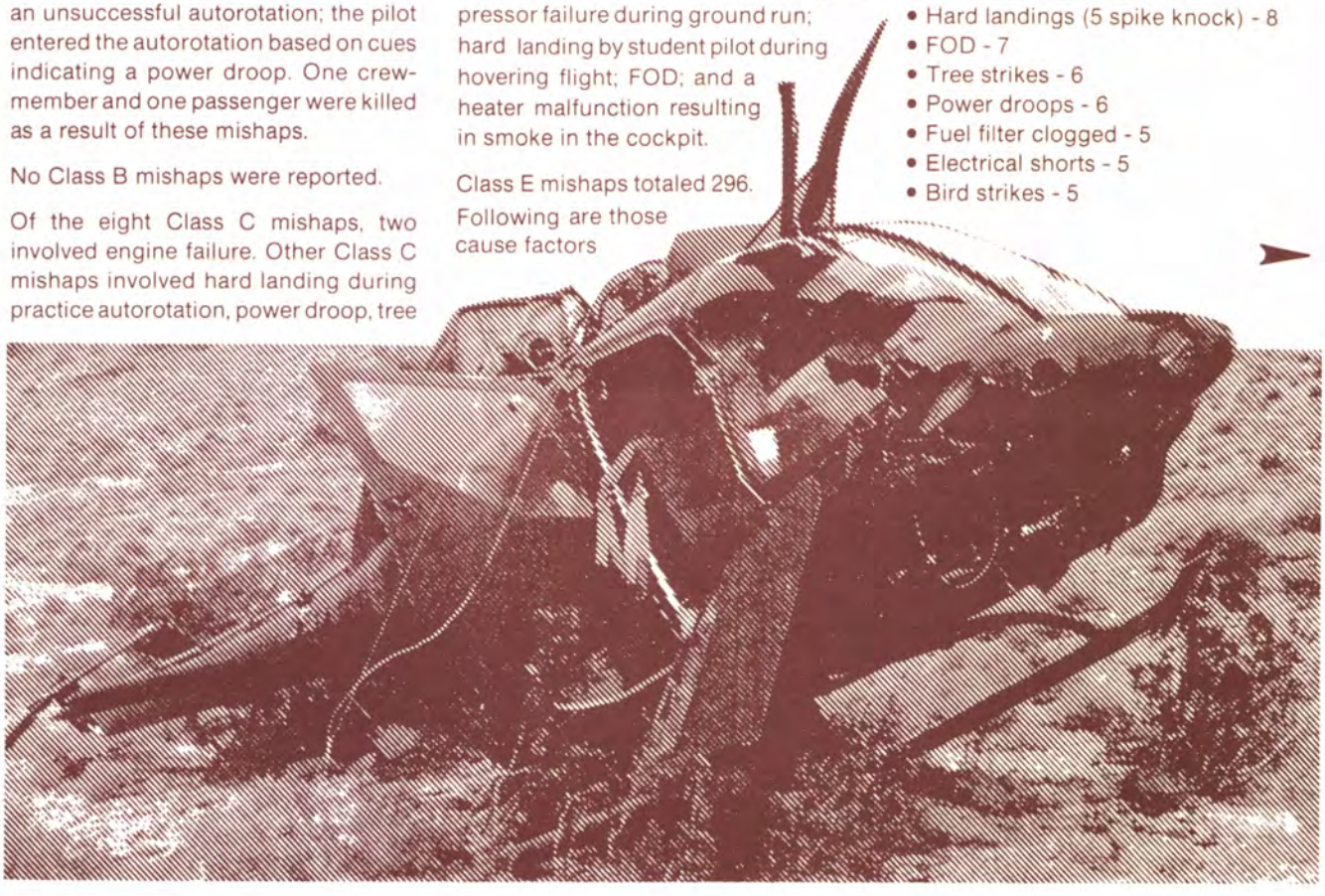
No Class B mishaps were reported.

Of the eight Class C mishaps, two involved engine failure. Other Class C mishaps involved hard landing during practice autorotation, power droop, tree strike, hanger bearing failure, intermeshed rotor blades on parking ramp, and mechanic's fingers hit by tail rotor blades during tracking.

Twenty-five Class D mishaps were reported. There were five tree strikes, five hot or improper engine starts, three hard landings during practice autorotations, two doors blown off by rotorwash from other aircraft, and two bird strikes. The other Class D mishaps were caused by the following: lower wire cutter striking ground during autorotative landing; refueling personnel throwing helmet into main rotor blades; oil seal improperly installed; overtorque/overtemp; compressor failure during ground run; hard landing by student pilot during hovering flight; FOD; and a heater malfunction resulting in smoke in the cockpit.

Class E mishaps totaled 296. Following are those cause factors occurring four or more times:

- Fuel boost pump failures - 29
- Chip detector lights (11 engine, 4 transmission, 3 tail rotor) - 18
- Oil pressure high or low (7 engine, 6 transmission) - 13
- Unforecast weather (3 inadvertent IMC) - 10
- Engine failures (6 on ground, 2 hover, 2 cruise flight) - 10
- Hot starts - 9
- Tachometer generator malfunctions - 9
- High frequency vibrations - 9
- Transmission oil hot lights - 8
- Generator malfunction - 8
- Hard landings (5 spike knock) - 8
- FOD - 7
- Tree strikes - 6
- Power droops - 6
- Fuel filter clogged - 5
- Electrical shorts - 5
- Bird strikes - 5



OH-58 first half FY 84 review

OH-58 was on NOE flight. Pilot's attention was directed toward strands of communication wire lying on the ground. Main rotor blade hit rock outcropping and aircraft crashed.

- Wire strikes - 4
- Heater malfunction (smoke in cockpit) - 4
- Governor malfunction - 4
- Engine oil temperature high - 4

Army-level corrective actions

LTE and power droop

In March 1984, the Army approved a $182 million retrofit plan to modify the OH-58A and C model fleets. Three product improvements are now programmed:

1. Power droop correction kit: primarily a fuel control modification with installation beginning in FY 85 and completed in FY 87.

2. Improved tail rotor: a larger diameter tail rotor that will result in 18 percent more thrust; installation to begin in FY 85 and be completed in FY 86.

3. Stability control augmentation system (SCAS): a digital 3-axis SCAS to reduce pilot workload and increase control in cross- and tailwind conditions; installation beginning in FY 88 and completed by FY 90.

In addition to the above materiel corrections, HQDA has placed an operational limitation on OH-58 aircraft. The March 1984 message, subject: Aviation Safety in FY 84, General Thurman Sends, states:

"In order to prevent loss of tail rotor effectiveness accidents with the OH-58s which have not had the power droop and improved tail rotor product improvements installed, the following restriction is imposed: OH-58s without the above PIPs (Product Improvement Programs) will maintain a minimum of 35 knots indicated airspeed in forward flight regardless of altitude. The exceptions are:

"A. Approved OH-58 terrain flight training and operations.

"B. Landing, takeoff, and hover-in-ground-effect.

"C. Maintenance test flights.

'D. Life-threatening situations/actual emergencies.

"E. Special missions when approved by aviation commander (O-5 or higher) on a case-by-case basis."

Corrective actions in final development include: a revision of the aeroscout training program to provide more hands-on NOE stick time for student pilots and specific instructions geared to LTE avoidance; a training film for the Army on LTE; and warnings placed in the aircrew training manual for those tasks which can place the aircraft in the LTE hazard envelope. These corrections should be implemented by the end of the summer.

Fuel boost pump failures

Despite being limited to Class E mishaps, the number of boost pump failures remains alarming. Depending on the manufacturer, the older boost pumps had a mean time before failure as low as 400 hours. A new canister-type fuel pump is now in the supply system. Besides having a greatly extended service life, the required man-hours for change is reduced from 8 to 1. This new boost pump, NSN 2915-01-124-5222, P/N 206-062-687-101, may not be listed in your parts manual. The pump is listed in the current Army Master Data File.

Instrument training

Proposed changes to AR 95-1 and the ATM have been sent to the major Army commands that will require OH-58 and AH-1 aviators to demonstrate their ability to control these specific aircraft in simulated instrument conditions. If approved, the changes will require some hooded flight for OH-58 aviators. These proposed changes resulted from surveys indicating that many OH-58 and AH-1 aviators were conducting all of their instrument training in other aircraft or simulators very different from their primary aircraft.

Mishap prevention recommendations

Safety officers

Look closely at your Class E mishaps.

Investigate and analyze them to determine the root causes. Although these mishaps don't carry an accident price tag, their potential to reduce combat readiness is high. Remember the aborted Iranian rescue? Class E mishaps caused the abort; a Class A mishap prevented another try! Concentrate especially on those Class E mishaps that might have been a Class A, B, or C were the conditions different at the time of the mishap. Compare your mishap data with that listed in this article. If you are having unique problems, find out why.

Maintenance personnel

We hope we have given you some useful information on the fuel boost pump problem, and we applaud your reducing the number of power droop mishaps with special attention being directed to fuel control adjustments and critical air lines. One aviation safety officer recently told us that of 10 reported power droops, 8 were traced to problems correctable at unit level, i.e., loose B nuts and cracked lines. Look at the mishap data provided in this article and direct your training and supervision to those areas and components causing the most trouble. Check with your safety officer and have him provide you with any problems identified as unique to your unit. Ask for safety officer assistance when you are experiencing materiel problems. Speedy information is often available through safety channels.

Aviators

LTE remains the most dangerous hazard. Another Class A mishap involving LTE happened in April, bringing the FY 84 total to three Class A LTE mishaps with one fatality. Read what your dash 10 says about LTE and avoid the hazard regime when possible, i.e., airspeed below 35 knots, cross- or tailwinds from 65 to 330 degrees with respect to the aircraft's nose. Both of these conditions must be present to have LTE except when winds are extremely high. Be prepared for power droop and limit its potential by flying with smooth collective applications. Don't let a power droop mislead you into thinking that you have had an engine failure. When you have a mission abort or delay, let your safety officer know about it. It's his job to get something done about such problems.

Pilot misinterpreted a low rotor rpm audio alarm and sudden downward movement of the aircraft as an engine failure. Pilot was unable to reach his selected forced landing area. Aircraft hit the side of a ravine at a high rate of descent and airspeed.

Commanders and operations officers

We realize that you have received plenty of guidance and suggestions from on high recently. Hence, we will let you concentrate on those.

Conclusion

Aviators generally get it from both barrels whenever someone is speaking or writing about aviation accidents. Pilot error usually receives top billing when blame time rolls around. Perhaps this is not surprising when you consider that the pilot is the last line of defense for accident prevention, and, as such, the pilot becomes a natural for blame. The best defense against the accusation of pilot error is professionalism. Thanks to some professional aviators, we can credit many more saves than losses. Here are just a few:

- Four in-flight engine failures. All aircraft landed with no further damage.
- Ten encounters with unforecast weather, one in severe turbulence and three in inadvertent IMC. All aircraft safely recovered.
- Three encounters with LTE. All aircraft safely landed.
- One main drive shaft failure in flight. Aircraft landed without further damage.

These examples come from only the Class E data. There are more saves in the other categories of mishaps.

A poster, popular years ago at Fort Rucker, depicted a lady of the night leaning against a lamp post. The caption read, "If you're going to be one, be a PRO!" Although the innuendo regarding the status of an Army aviator may be a bit dated, the caption hits the mark. ■

This article was written by Major Charles D. Moore, Scout systems manager at the Army Safety Center. Major Moore recently left the Safety Center for another assignment. Questions or comments concerning this article should be directed to Major Walt Garner, AUTOVON 558-6595/3901.

Aviation mishap prevention forum

New field manual

FM 34-22, Military Intelligence Battalion Combat Electronic Warfare and Intelligence (Aerial Exploitation) (Corps), dated March 1984, establishes doctrine for and describes the organization and employment of the AEB. This is the third of four manuals describing the MI group (CEWI) (corps). The others are FM 34-20, FM 34-21, and FM 34-23 (to be published).

This manual is intended for commanders, staffs, officers, and NCOs of the MI group, subordinate battalions, and other MI units and personnel. It is of general interest throughout the Active Army, Reserve Component and National Guard, and to U.S. Army service schools. ■

Static electricity in the desert

Static electricity is a common problem in the desert. Grounding becomes very important in all operations, especially refueling.

A ground between the fuel supply vehicle and the vehicle is critical. Grounding rods need to be driven deeper in sand than in other soils. Fuel bladders need grounding, too. ■

—from PS, Issue 378

Mike boom fix

Some microphone boom attachment holes get elongated from fair wear and tear. A loose boom means you can't keep the mike close enough for your lips to brush against it when you speak into it—that means poor voice transmission. Here's how to "fix" the boom:

- Unhook the 2 ear cup tension cross straps.
- Unscrew the bolt that holds the swivel assembly on the helmet. Remove the outside washer.
- Peel back the chafing ear cup pad to get to the swivel assembly post screw on the inside of the helmet. Hold the bolt on outside helmet with pliers as you remove the post screw.
- Scuff the concave side of one of the slotted washers with 80-grit sandpaper, NSN 5350-00-543-3600.
- Ditto the same size area on the inside of the helmet.
- Clean both areas with a cloth dampened with denatured alcohol, NSN 6810-00-201-0906. Let it dry.
- Put a thin coat of adhesive, NSN 8040-00-273-8717, on the scuffed-up areas (washer and helmet). Allow 3 to 5 minutes for the adhesive to get tacky, then stick the washer to the helmet.
- Put the microphone boom and swivel assembly back on and tighten snug.

In about 2 hours your swivel assembly will hold the mike exactly where you need it . . . no droopy mike . . . no garbled talk. ■

—from PS magazine

Answers to last week's questions

1. What reference could be used to determine an approved commercial engine oil to replace MIL-L-23699? TB 55-9150-200-24. **TB 55-9150-200-24, page 3-12, table 3-3**

2. Are parachutes required for crewmembers on flights involving aerobatics? Yes. **AR 95-1, with Change 1, page 2-6, par. 2-16**

3. All occupants of an aircraft involved in an accident must be transported to a medical facility for examination and, if necessary, treatment of injuries. Crewmembers involved in the accident are restricted from operating vehicles or equipment after the accident until released by a flight surgeon or other medical doctor. True or false? True. **DA Pam 385-95, page 3-1, par. 3-2**

4. In reference to aircraft weight and balance, define allowable gross weight and useful load. Allowable gross weight is the maximum gross weight with which the aircraft may take off under any given set of runway and atmospheric conditions. This weight must never exceed the maximum allowable gross weight published in the aircraft operator's manual. Useful load is the difference between empty weight and gross weight. It includes fuel, oil, crew, passengers, cargo, and other material carried. **TC 1-201, page 2-2** ■

Questions for aviation personnel

1. What five factors should you consider when planning the layout of a FARE system? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

2. Knowledge of Newton's Laws of Motion helps aviators better understand aerodynamics. Name and explain his three laws. **Reference: FM 1-203, Fundamentals of Flight**

3. What is meant by the camber of an airfoil? **Reference: FM 1-203, Fundamentals of Flight**

4. The U.S. Army Safety Center is the Army-wide sole source for coordination and issuance of control numbers for teardown and analysis. True or false? **Reference: DA Pam 385-95, Aircraft Accident Investigation and Reporting** ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (M series) After about 20 minutes of flight, copilot announced a decrease in rotor rpm. Aircraft flew into trees and crashed. One fatality and four injuries. Suspect materiel failure. 8434

UH-1 Class E mishaps □ (H series) N_1 tachometer failed during flight. Caused by sheared tachometer generator shaft. □ (H series) Excessively high HIT check reading was caused by defective deicer valve. □ (H series) Engine oil pressure fluctuated from 0 to 90 psi. Caused by defective oil pressure indicator. □ (H series) Three loud bangs were heard and aircraft yawed severely. Caused by fuel control malfunction. □ (H series) Master caution and transmission oil hot lights came on. Caused by failure of transmission thermal switch. □ (H series) Transmission oil pressure gauge fluctuated between 0 and 50 psi. Caused by short in oil pressure gauge cannon plug.

UH-60 Class E mishap □ No. 2 engine failed when No. 1 engine was retarded to 6 o'clock position for simulated engine failure. Caused by failure of No. 2 engine boost pump.

Attack helicopters

AH-1 Class E mishaps □ (S series) Tranmission oil bypass light came on. Caused by failure of pressure switch. □ (S series) Engine oil pressure exceeded 100 psi during hover. Caused by failure of pressure transducer. □ (S series) Transmission oil temperature increased to 150° C. during hover. Caused by failure of oil pressure sending unit. □ (S series) Linear actuator would not increase or decrease N_1 during runup. Caused by failure of linear actuator motor.

Cargo helicopters

CH-47 Class C mishap □ (D series) External load, consisting of a 2½-ton truck, released and fell to the ground as aircraft was landing.

CH-47 Class E mishaps □ (B series) No. 1 engine torque split and N_1 increased during hover taxi. Caused by failure of N_1 control box. □ (C series) No. 1 engine PTIT increased and N_1 decreased during runup. Engine then failed. Hot end inspection revealed 18 clogged fuel nozzle injectors.

Observation helicopters

OH-58 Class B mishap □ (A series) Aircraft flying low over highway hit wire. Aircraft began to shake and started uncommanded turn to left. Cyclic and collective were stiff. Pilot landed with 5 to 10 knots forward airspeed in partially plowed field. After ground contact, aircraft spun left 10 to 15 degrees and stopped. Tail boom, tail rotor drive shaft, main transmission mounts, and main rotor push-pull tube were damaged. Wire strike protection system was installed on aircraft. Wire went over upper cutter but below main rotor blades. 8435

OH-58 Class D mishap □ (C series) As aircraft was being refueled, pilot's kneeboard vibrated from glare shield where it had been placed. Board fell onto and cracked chin bubble.

OH-58 Class E mishaps □ (A series) Engine oil pressure dropped after takeoff. Caused by malfunction of oil pressure gauge. □ (A series) Copilot felt binding in left rear quadrant of cyclic travel during hover. Caused by sticking magnetic brake. □ (A series) Transmission oil hot light came on during hover. Caused by failure of temperature sensor switch.

Fixed wing

U-21 Class E mishap □ (RU-21B) Left ►

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	1-13 June	**1**	**2**
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**28**	**26**

Mishap briefs

bleed air failure light came on during flight. Bleed air sensing line at switch had burned through.

Maintenance

UH-1 Class E mishaps □ (H series) Engine oil pressure gauge went to zero when throttle was reduced to engine idle for shutdown. Caused by loose oil pressure gauge cannon plug. □ (H series) Several loud noises were heard during takeoff. Inspection of engine after landing revealed a plastic ID/credit card holder in intake area. The ID card of a shop mechanic was found in the holder. Mechanic had reported his ID missing several weeks earlier, which coincided with his working on the aircraft. He thought he had lost the folder at home. Mechanic usually kept the holder in his pocket and wore coveralls while working on aircraft. Later he speculated that the holder came out of his pocket either while bending over or working beneath the aircraft and worked its way down and out his coveralls.

UH-60 Class E mishap □ No. 2 engine oil pressure light came on and oil pressure dropped below 20 psi. Caused by failure of crew chief to correctly secure engine oil filler cap.

OH-58 Class E mishaps □ (C series) Postflight inspection revealed oil on right engine door and right side of aircraft. O-ring for engine oil cap filter was installed incorrectly, causing oil leak. □ (A series) Only 60 percent N_1 could be obtained during runup. N_1 rigging was out of adjustment. □ (A series) High frequency vibration was felt throughout airframe. Maintenance personnel had applied pro seal to entire blade tip instead of blade cap screws as required.

U-21 Class E mishaps □ (A series) No. 2 engine would not develop minimum torque on takeoff. Caused by loose clamp on bleed air line to copilot's attitude indicator, which allowed bleed air leak. □ (A series) During gear retraction after takeoff, all gear indicators showed gear had remained in down position. Suspect lock washer had not been installed on screw that connects electrical wire to landing gear relay switch. Wire was disconnected and nut was found, but lock washer was not found.

Messages received

• Safety-of-flight maintenance mandatory message concerning revised inspection of CH-47A/B/C/D engine transmission warning system (CH-47-84-08, 301530Z May 84). Summary: Safety-of-flight message CH-47-84-04 imposed one-time and recurring 25-hour inspections on components of the engine transmission warning systems to insure their proper operation. It also advised of a near-term change of a pair of flight control tubes from aluminum to steel and of long-term retrofit of CH-47A/B/C aircraft to install vent lines from the engine transmission oil breather vent to the reservoir on the combiner. This message revises engine transmission warning system inspections as the result of further investigations, corrects message CH-47-84-04 in regard to the 114DS665 bearings, and provides update information on the flight control tube change from aluminum to steel and the breather line installation. Contact: C.W. Caesar, AUTOVON 693-1639, commercial 314-263-1639.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

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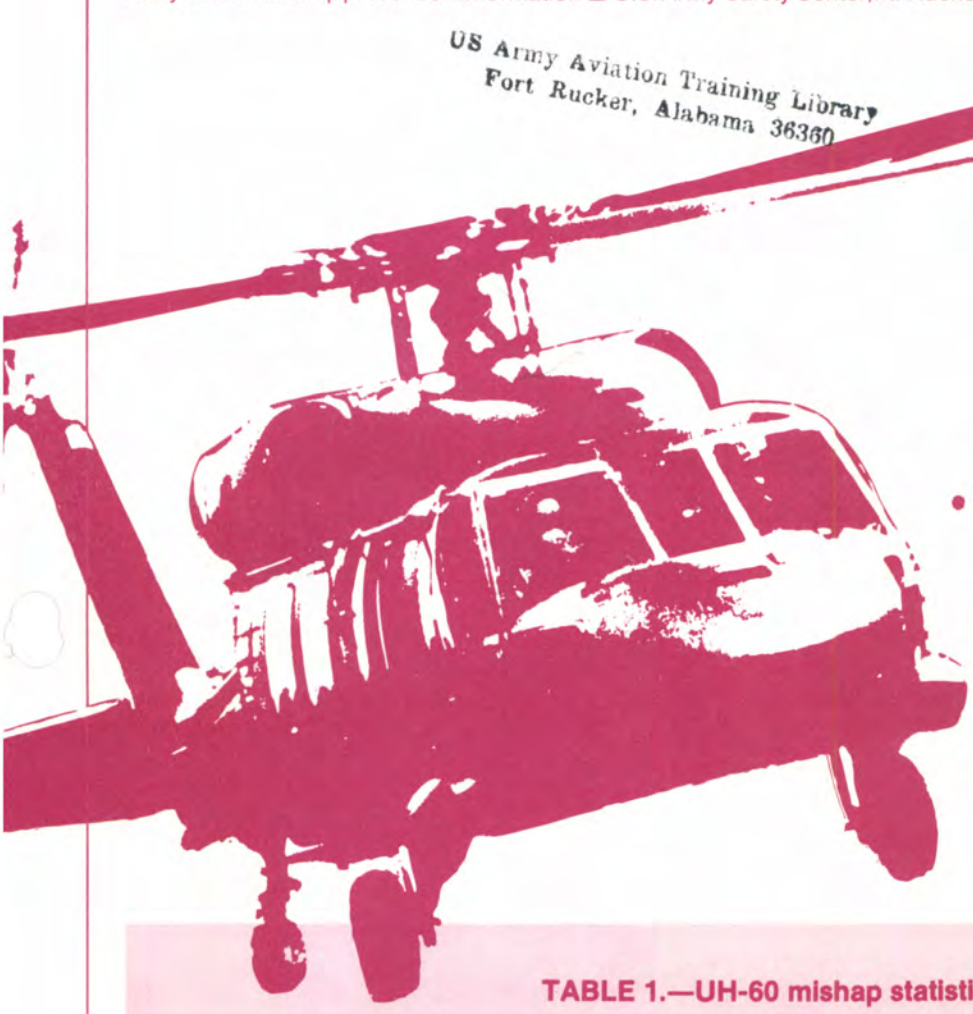

More on the UH-60

After the article "What's Happening With the UH-60?" ran in the 21 March 1984 issue, our Analysis Division looked a little deeper into the UH-60 problem. They compared pilot-error mishaps for the UH-60 and the UH-1 because the UH-1 is the aircraft most akin to the UH-60 in terms of mission and flight environment. As you can see from table 1, pilot-error percentages for the two aircraft are not significantly different. Table 2 shows the pilot-error causes for UH-60 Class A, B, and C mishaps versus all other Army aircraft, fixed and rotary wing.

As with all other aircraft systems, the most frequent cause of pilot error in

(continued on next page)

TABLE 1.—UH-60 mishap statistics

FY	Flt Hrs	Class A-C*		Injuries		Class A-C Total Cost ($)	Definite Pilot Error (% of Class A-C Mishaps)	
		Mishaps	Rate	Fatal	Nonfatal		UH-60	UH-1
79	6,530	1	65.36	0	0	485	100	72
80	18,434	10	54.25	0	0	130,661	70	67
81	33,748	28	82.97	0	14	2,925,728	54	64
82	50,983	55	107.88	7	4	9,341,031	49	62
83	62,398	40	64.10	3	10	10,049,961	63	57
84**	43,156	9	20.85	11	8	20,960,295	56	60

* Army classification based on criteria existing at time of the mishap.

** As of 31 March.

UH-60

UH-60 mishaps is lack of self-discipline, that is, problems of attitude, motivation, attention, composure, or overconfidence. These self-generated errors were responsible for 41 percent of the UH-60 Class A through C mishaps and 43 percent of all other aircraft Class A through C mishaps.

Figure 1 compares the flight time of UH-60 and UH-1 aviators who were cited as definite causes of mishaps. Although there were 61 Black Hawk aviators involved in mishaps during this period, flight time was reported for only 36. The fact that the UH-60 aviators have significantly less total flight time than the UH-1 aviators does not mean that this was responsible for their mishap-causing errors. Only 9 percent of all UH-60 aviator errors were due to inadequate unit training/experience, compared to 12 percent for all other aviators.

So the bottom line is that pilot error is the largest problem with the UH-60 just as with all other aircraft, and the causes of UH-60 pilot errors do not differ from those for all the other Army aircraft. ■

TABLE 2.—Pilot-error causes for UH-60 Class A, B, and C mishaps versus all other aircraft FY 79 through first half FY 84

	UH-60		Other aircraft	
	No.	Percent	No.	Percent
Inadequate school training			19	3
Inadequate unit training/experience	2	9	89	12
Inadequate self-discipline	9	41	325	43
Environment			15	2
Inadequate design	4	18	38	5
Inadequate facilities			10	1
Inadequate maintenance	2	9	34	5
Inadequate written procedures	3	13	44	6
Inadequate supervision	1	5	75	10
Alcohol/drugs	1	5	93	12
Habit interference			4	< 1
Improper manufacture, QC			2	< 1
Improper use of tools			1	< 1
Total	22	100	749	100

FIGURE 1.—Total flight time of aviators cited as definite causes of UH-1 (FY76-83) and UH-60 (FY79-present) Class A-C mishaps

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishap □ (H series) During practice engine failure, student pilot allowed tail skid to hit runway. Aircraft pitched forward and lower wire cutter dug into the runway. Landing gear and underside of aircraft were damaged.

UH-1 Class D mishap □ (V series) During runup, pilot turned around to insure crew and other occupants were secured. As he did, he inadvertently put governor switch in emergency position. Aircraft shuddered and engine rpm was noted at 7000.

UH-1 Class E mishaps □ (H series) Master caution and right fuel boost lights came on. Caused by failure of fuel boost pump. □ (H series) Engine oil temperature rose during hover. Caused by defective oil temperature gauge. □ (H series) N_1 gauge read zero during flight. Caused by tachometer failure. □ (H series) Master caution and transmission oil pressure lights came on. Caused by faulty oil pressure relief valve. □ (V series) Several loud noises were heard, accompanied by left yaw and rise in engine rpm. Caused by compressor stall. □ (H series) Main generator failed after takeoff. Caused by malfunction of reverse current relay. □ (H series) Erroneous torquemeter readings during hover were caused by stuck torque valve.

UH-60 Class D mishap □ Aircraft hit powerlines during flight, damaging landing gear, tail wheel, actuator, fairing, and tail boom.

UH-60 Class E mishaps □ Tail rotor transmission temperature light came on during hover. Caused by defective oil temperature probe. □ Aircraft vibrated severely and loud banging sound was heard. Anti-flap cam had stuck in up position.

Attack helicopters

AH-1 Class D mishap □ (S series) Aircraft was landing at training area for fuel and was guided into position for landing by ground guide. Aircraft was hovered over unimproved road and was signaled to land. As aircraft settled onto the ground, it rocked back on the heels of the skids. Tail boom was 6 to 8 feet off of road. VHF antenna and tail boom were damaged.

AH-1 Class E mishaps □ (S series) Right yaw hardover occurred during flight. Pliot had to use excessive left pedal to maintain proper heading and trim. Caused by failure of yaw channel transducer. □ (S series) After throttle and collective were reduced during simulated high-speed engine failure, rotor rpm and N_2 rpm dropped below 295 and 6000 respectively. Needles did not split. Power recovery was initiated at 800 feet agl. Caused by failure of freewheeling unit of transmission input drive quill to disengage. □ (S series) Master caution and No. 2 hydraulic lights came on. Caused by failure of No. 2 hydraulic pressure switch.

Cargo helicopters

CH-47 Class C mishap □ (B series) Aircraft seemed to be unusually unstable during landing. As rotor blades were coasting down, loud bang was heard. Aft rotor blade had hit forward left top of fuselage. Rotor system rotated counter to normal rotation and blade fell backwards to left side, hitting the ground and forcing aft rotor head's green pitch varying housing to maximum elevation. Shock absorber had fractured and separated from aft rotor blade root.

CH-47 Class E mishaps □ (B series) Hydraulic fluid was seen dripping from No. 2 flight boost area. Caused by failure of packing seal at hydraulic fitting. □ (C series) Loud noise was heard from utility hydraulic cooling fan area. Fan blades had disintegrated. □ (C series) Master caution and No. 2 engine transmission lights came on. Caused by failure of self-closing valve. □ (C series) Transmission oil pressure light came on. Caused by disconnected cannon plug.

Observation helicopters

OH-6 Class C mishap □ Power was lost and engine-out light came on after 5 minutes of flight. Autorotation resulted in hard landing. Main rotor blades severed tail rotor section.

OH-58 Class D mishap □ (A series) Crew did not secure right rear door when aircraft was parked. Rotorwash from UH-1 on short final dislodged door from OH-58.

OH-58 Class E mishaps □ (A series) Generator would not come on line during runup. Caused by sheared shaft on generator starter. □ (A series) Fuel filter light came on. Fuel filter element was changed. □ (A series) Master caution and fuel boost lights came on. Caused by failure of fuel boost pump.

Fixed wing

C-7 Class E mishaps □ Left propeller was reversed during taxi. When throttles were selected to normal, propeller would not return to high rpm. Caused by defective propeller blade switches. □ Right engine fuel low pressure light came on. Caused by defective fuel pressure switch.

U-21 Class D mishap □ (A series) Right engine cowling popped open and hit nacelle filler cap area during flight. Caused by failure of rear cowl latch.

Maintenance

UH-1 Class E mishaps □ (H series) Cockpit filled with smoke during runup. WD-40 had been used to help loosen a

cross-threaded fitting in customer bleed air line. After reassembly, maintenance crew had failed to write up that a maintenance operational check was due for proper operation of the systems fed by the air line and to check for air leaks. When pilots checked the operation of the bleed air system, WD-40 was ducted into cockpit. □ (H series) Master caution and right fuel boost lights came on. Caused by incorrectly installed boost pump wiring.

AH-1 Class A ground mishap □ Mechanic started aircraft for a maintenance operational check to adjust voltage regulator. A second mechanic was on right ammunition bay door reading the checklist and a third mechanic was at voltage regulator access door on left rear of airframe. Rpm was increased to 6000 with the application of some left pedal. As rpm was being beeped up to 6600, aircraft began to turn left. As turn increased, operator became confused and added more left pedal, which intensified the left turn rate. Aircraft rotated three complete revolutions and came to rest about 15 feet from original parking spot. Mechanic stationed near voltage regulator access panel was hit by the aircraft. He later died. 8436

AH-1 Class E mishap □ (S series) Pilot heard noise from hydraulics compartment, followed by failure of No. 1 hydraulic system. Caused by chafed hydraulic line.

OH-58 Class E mishap □ (A series) Crew smelled smoke during landing. Loose wire to landing light was arcing.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	1-20 June	**3**	**5**
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**30**	**29**

Messages received

• Safety-of use message concerning Tuxco model AF-5 hydraulic fluid dispenser (SOU-GEN-MEM-84-01, 081530Z Jun 84). Summary: Misuse of this hydraulic fluid dispenser by pressurizing it with high pressure air or nitrogen has on several occasions resulted in rupture of the dispenser and serious personnel injuries. The dispenser requires modification to minimize the possibility of further misuse and injuries. This message reiterates and reinforces prior safety warnings relating to misuse of this hydraulic fluid dispenser. It also notifies addressees of availability of a safety retrofit (pressure relief tank valve assembly, NSN 4910-01-127-7365) and requires the addressees to immediately requisition the tank valve assembly and modify the dispensers. Contact: Ray Boland, AUTOVON 693-1613, commercial 314-263-1613.

• Message concerning AH-1S 10KVA alternator (051330Z Jun 84). Summary: Poor reliability of the 10KVA has resulted in increased demands and not-mission-capable-supply back orders. Engineering changes have been made to improve the reliability, and production contracts have been awarded for replenishment spares. Production, however, will not begin to yield new 10KVA alternators until FY 85. In the meantime, the alternators must be overhauled. Expedite the return of all unserviceable 10KVA alternators through normal supply channels for direct shipment to CCAD. Contact: Bill Sparacino, AUTOVON 693-1221, commercial 314-263-1221.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

TM change

Change 2, dated 3 May 1984, to TM 55-1520-214-PMS for OH-6A helicopters has been released.

Aviation mishap prevention forum

Duck loses bout with helicopter

This item is reprinted from The Maryland Sun.

A high-flying duck went head-to-head with a state police helicopter cruising at 120 mph Saturday night—and lost.

"We were taking a girl with a crushed hand from Peninsula General Hospital in Salisbury to the hand center at Union Memorial Hospital in Baltimore," said Cpl. Steve L. McCarter, who was piloting the chopper about 2,000 feet above Vienna when the collision took place.

"The first thing I knew, the wind is rushing by my ears, and there's feathers all over the place."

The unidentified duck, which weighed about 7 pounds, crashed through the helicopter's plexiglass windshield about 10 p.m., struck Corporal McCarter in the face, **breaking the pilot's face visor and knocking his helmet off his head.** It then ricocheted off the pilot's forehead and broke a small window on the top of the helicopter before careening to the back of the craft and landing in the lap of a state police medic.

"It was like someone punched me in the face," Corporal McCarter said of the duck's impact. The pilot said if he had been knocked unconscious, the medic could have flown the helicopter.

"We had good control," he said. "I slowed down to about 90 mph. There was enough of the window left to crouch down and see."

The pilot landed at the Cambridge airport, and the patient was transferred to another helicopter and taken to Union Memorial.

Dan McCarthy, a spokesman for the state police, said that while pilots often have trouble with birds bouncing off helicopters' windshields, it was the first time one had broken through. The windshields "can take a lot of shock," the pilot said. "This thing hit it just right."

Coporal McCarter, treated and released for minor injuries at Peninsula General Hospital, was back on duty yesterday. The duck wasn't so lucky. "It was dead on arrival," said Corporal McCarter. "Totally pulverized."

After being photographed by police, the duck was unceremoniously thrown into a Cambridge dumpster. ■

Answers to last week's questions

1. What five factors should you consider when planning the layout of a FARE system? Spacing between aircraft, wind direction, vapor collection, drainage, and camouflage. **FM 10-68, with Change 3, page 7-4, par. 7-4**

2. Knowledge of Newton's Laws of Motion helps aviators better understand aerodynamics. Name and explain his three laws.

• Inertia - A body at rest will remain at rest and a body in motion will remain in motion at the same speed and direction until affected by some external force.

• Acceleration - The force required to produce a change in the motion of a body is directly proportional to its mass and the rate of change of its velocity. Note: The acceleration of an object is defined as its time rate of change of velocity.

• Action-reaction - For every action, there is an equal and opposite reaction. **FM 1-203, page 1-1**

3. What is meant by the camber of an airfoil? The camber of an airfoil refers to the amount of curvature of the airfoil. **FM 1-203, page 2-4**

4. The U.S. Army Safety Center is the Army-wide sole source for coordination and issuance of control numbers for teardown and analysis. True or false? True. **DA Pam 385-95, page 6-16, par. 6-22** ■

Questions for aviation personnel

1. An aircraft is designed for specific weight limitations which cannot be exceeded without compromising safety. Overloading an aircraft may cause structural failure or result in reduced engine and airframe life. Loading Army aircraft beyond the maximum gross weight limitation is prohibited. How does increased weight affect aircraft performance? **Reference: TC 1-201, Tactical Flight Procedures**

2. Name five of the seven most important factors affecting the aerodynamic force on an airfoil. **Reference FM 1-203, Fundamentals of Flight**

3. Name the two components of total aerodynamic force. How do they act on an airfoil with respect to the relative wind? **Reference: FM 1-203, Fundamentals of Flight**

4. How is fuel tested for contamination once it is in the aircraft fuel tank? **Reference: FM 10-68, with Change 3, Aircraft Refueling** ■

UH-60 restraint systems differ from others

The crew restraint system in the UH-60 releases differently from the ones in other Army helicopters. An AH-1 pilot, the first person on the scene of a recent UH-60 mishap, was unable to release the restraint system of the UH-60 pilot. He said he had never seen a Black Hawk seatbelt and didn't realize it was different from the ones in other helicopters.

The pilot's and copilot's seats in the UH-60 each contain a shoulder harness, lap belt, and crotch strap connected to a common buckle assembly. The common attachment buckle has a single-point release. In some Black Hawks, this buckle rotates to release all the belts and straps simultaneously (figure 1). You just put your fingers in the grooves on top of the buckle and rotate (in either direction). In other Black Hawks, a short strap is attached to the buckle (figure 2). You just give the strap a little jerk and the belts and straps will release.

The crew restraint system in the AH-64 is the same as that in figure 1.

ASOs, make sure all your aviation personnel are aware of the differences in these restraint systems. ■

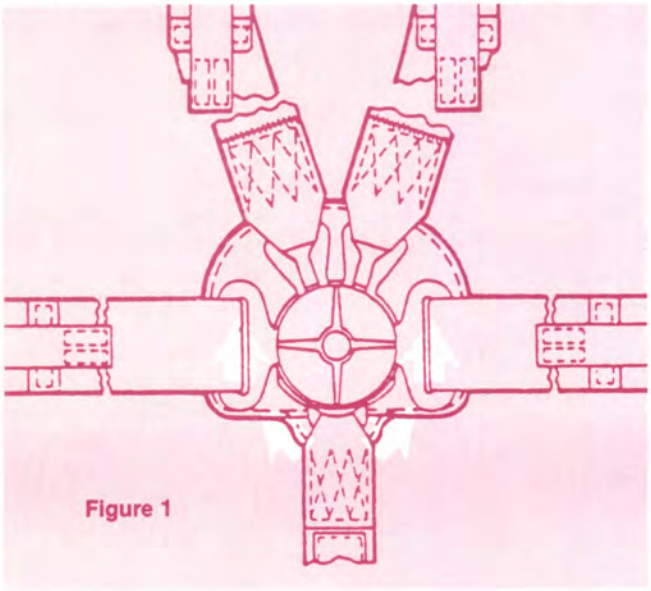

Figure 1

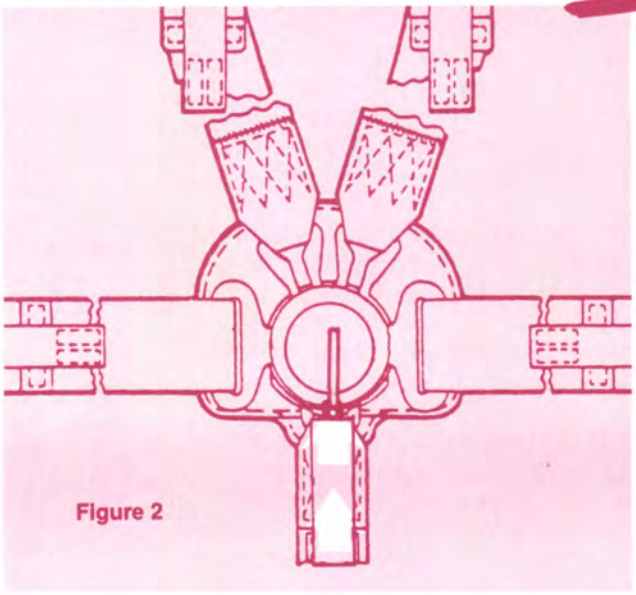

Figure 2

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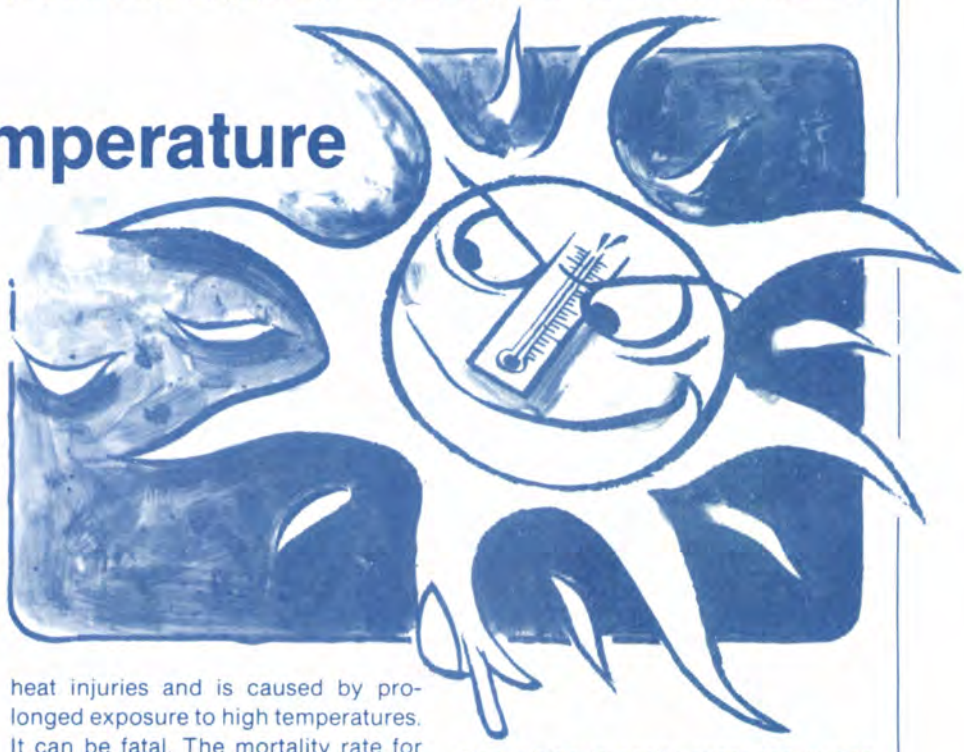
Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 37 □ 27 Jun 1984

When the temperature soars



This is the time of year when you'd probably rather be at the beach, sipping a cool one by the pool, or sitting under the air conditioner. But many of you have the types of jobs where you're subjected to the summer heat a great deal of the time.

Airfields can be extremely hot places, and heat stress during ground operations can be extreme for aviators as well as for ground personnel. Awareness is the key to prevention.

Types of heat injuries

Heat cramps are caused by excessive loss of salt from the body. Severe cramps in the arms, legs, stomach, and back can be promptly relieved by replacing the salt which was lost through sweating. The victim should be taken to a cool, shady place and given salt water to drink, but only if there is a plentiful water supply. If the daily water supply is less than 2 quarts per person per day—as may be the case in a desert environment—give only plain water.

Heat exhaustion is caused by excessive loss of water and salt. Symptoms are dizziness, headache, vomiting, cool moist skin, profuse sweating, rapid breathing, weakness, and fainting. Cramps may also occur. The victim should be moved to a cool place and the outer clothing removed. Elevate the feet and move the legs up and down or massage them. Replace the water and salt loss by mixing one-fourth teaspoon of table salt in 1 quart of water and slowly giving the victim all the salt water he will drink.

Heat stroke is the most severe of the heat injuries and is caused by prolonged exposure to high temperatures. It can be fatal. The mortality rate for victims who do not receive prompt and adequate treatment is high. Symptoms of heat stroke are lack of sweating, severe headache, flushed dry skin, disorientation or coma, rapid breathing, elevated body temperature, and mental confusion. Wide-open pupils and muscular twitching are possible. Get medical help without delay. If possible, immerse the victim in cool water while waiting for an ambulance. If this is not possible, soak his clothing or wrap him in a wet sheet while fanning to hasten evaporation. Do not give water to an unconscious person.

Sunburn is caused by overexposure of the skin to the ultraviolet radiation of the sun. Protective creams, oils and lotions can go a long way toward preventing severe sunburn. Clothing also prevents the heat of the sun from being absorbed by the body.

Research has shown that effective human performance is impaired when the temperature is above 100° F., a condition which is easily exceeded during the summer months. Studies have also demonstrated wide differences in heat tolerance in groups of young people. Many variables affect a person's tolerance to heat. These include age, physical condition, alcohol/coffee intake, clothing, sweat rate, and degree of hot weather acclimatization. Prior heat injuries will cause a person to be more susceptible to the heat.

Generally, aviators aren't affected as much as ground crews by extreme heat because of their limited physical activity and the cooler temperatures at higher altitudes. Most of the aviator's heat stress occurs during the preflight, engine start, and pretakeoff phase of the mission. The heat load in the cockpit is severe because of reduced air movement and the personal equipment worn by the aviator. It takes 15 to 20 minutes at higher altitudes just to dissipate the heat accumulated on the ground. Tolerance levels of crews flying prolonged low-level missions,➤

When the temperature soars

where no high altitude cooling off period exists, should be closely monitored.

Recommended actions

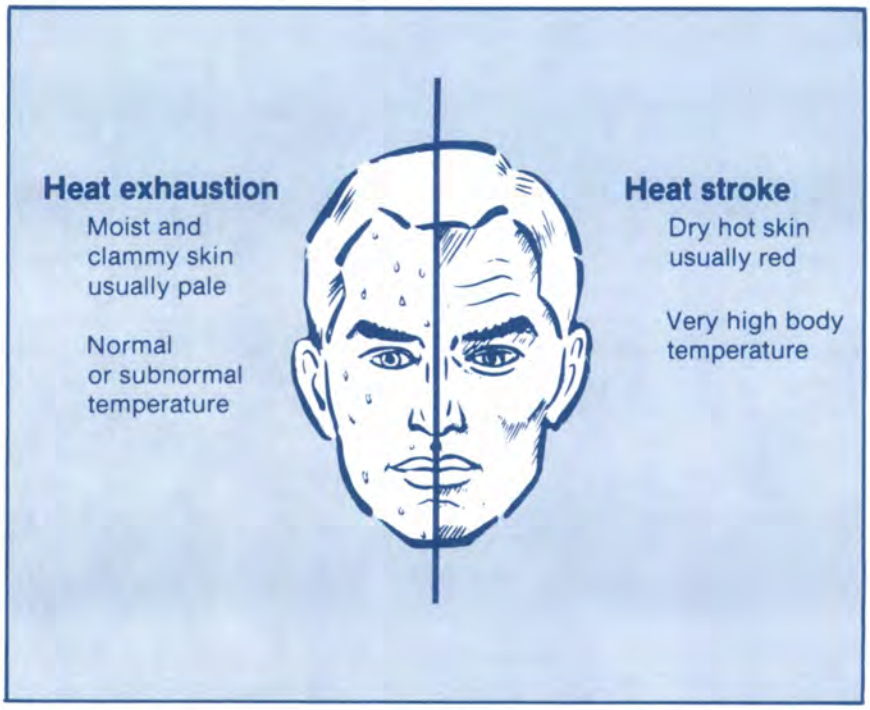
Here are a few recommended actions to help aircrews and ground personnel cope with heat.

• Acclimatize. This takes time—usually 10 to 14 days—and consists of following a work schedule that allows a gradual increase in the expending of energy until the body becomes capable of accomplishing normal workloads without being adversely affected by the heat. Regardless of how good an individual's health and physical condition may be, a minimum period of time is necessary for acclimatization. It cannot be rushed. Acclimatization is not permanent. It can disappear in a week or two once out of the hot environment.

Be particularly cautious during the first few days of hot weather or the first few days after moving to a hot geographical area. Work should be scheduled to allow alternate periods of work and rest. Keep in mind that regardless of the degree of acclimatization, water and salt losses must be replaced constantly.

• Drink more liquids—preferably water—than thirst dictates. When you get thirsty, your body is already about a quart low. Make a habit of drinking water on a scheduled basis. Coffee, carbonated drinks, and alcohol should be avoided, as they tend to further dehydrate you. Discomfort and reduced efficiency can result from water losses of even 1 to 5 percent. Some Middle East countries require their aircrews to drink three plus gallons of water a day to avoid the effects of heat stress. Even the early stages of dehydration can lead to emotional alterations and impaired judgment.

As you lose water, you also lose salt. Normally, you get enough salt in your food, but you may need to add a little to your diet in times of extremely high heat and humidity. You should consult a flight surgeon before taking supplemental salt.



• When possible, wear loose fitting clothing to allow circulation of air and enhance the cooling evaporation of sweat.

• Avoid unnecessary exposure to the heat, such as strenuous exercise, prior to flights. The slow dissipation of stored excess heat in the body could work against you if you go straight to the flight line after a strenuous game of handball.

• Adjust work schedules. When possible, schedule work hours so the majority of outside maintenance work can be completed during the cooler morning and evening hours. Take advantage of available shade and use camouflage nets or tarps to create shade when there is none. Appendix A, TB Med 507, "Prevention, Treatment and Control of Heat Injuries," describes how the Wet Bulb Globe Temperature index is computed and tells when outside activities should be suspended.

Aside from the more serious effects of extreme heat on the body, personnel should be aware that painful burns and blisters can result from touching tools and aircraft surfaces that have been exposed to the sun. Gloves and mats or pads should be used when practical. When the sun is shining and the outside air temperature is 96° F., the skin of a parked olive-drab aircraft can register 136° F. and a shoulder harness buckle can be as hot as 150° F. This can be even higher in the desert.

Heat stress can be an extremely hazardous problem in aircraft operations. The consequences of a possible error by a crewmember subjected to the heat make it necessary that personal efficiency and alertness not be compromised. Be aware of what the heat can do and act accordingly.■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (M series) Aircraft was on maintenance test flight. Indications are that aircraft lost power and pilot overshot his intended landing area, made a low-altitude, 180-degree turn back to the area, and bled off rotor rpm to extend the glide. Aircraft crashed nose low with low rotor rpm. Test pilot and maintenance technician were killed. 8437

UH-1 Class D mishaps □ (M series) Front tiedown was left on main rotor blade. When engine was started, tiedown wrapped around tail rotor hub, momentarily stopping main rotor. Tiedown ropes broke and continued to wrap around tail rotor. □ (H series) Bird hit and broke left chin bubble as aircraft was on final approach for landing.

UH-1 Class E mishaps □ (H series) Severe vibration was felt during flight. Collective and cyclic inputs had little effect on aircraft control. Caused by disintegrated scissors lever bearing. □ (H series) Engine oil temperature rose to 100° C. Caused by failure of oil cooler. □ (H series) Master caution and hydraulic lights came on, and feedback in controls was felt. Caused by failure of fitting on high pressure hydraulics line from hydraulic pump. □ (H series) Unusual feedback in cyclic was caused by defective left lateral irreversible valve. □ (H series) Master caution and right fuel boost pump lights came on. Caused by malfunction of fuel pump. □ (H series) Engine oil temperature rose above 100° C. Caused by failure of flow control valve.

Cargo helicopters

CH-47 Class E mishaps □ (C series) Loud noise was heard from aft transmission area. Caused by failure of thrust bearing. □ (C series) Crew chief saw fluid spraying out of utility pressure filter. Caused by failure of O-ring in pressure input fitting.

Attack helicopters

AH-1 Class E mishaps □ (S series) After completion of OGE hover check, pilot (in rear seat) noticed that torque was climbing through 95 percent and told copilot to watch the torque. At 97 percent torque, pilot decreased collective. Overtorque light came on and torque was seen at 103 percent. □ (S series) Transmission oil pressure fluctuated during hover. Caused by failure of oil pressure transducer. □ (S series) SCAS roll channel came out of balance, causing feedback in cyclic control. □ (S series) Both tgt gauges were below 300 degrees during hover. Dirt had gotten in tgt lead harness assembly, causing gauges to malfunction.

Observation helicopters

OH-58 Class E mishaps □ (C series) Secondary fuel was not supplied to engine during start. Air was found in fuel line. □ (C series) During postflight inspection, pilot found contaminated oil in tail rotor gearbox. Aircraft was flown in rain, and excess water entered gearbox through cap assembly. □ (C series) Turbine oil temperature rose to 860° C. during flight. Postflight inspection revealed high temperature discoloration on combustion section where diffuser scroll enters combustion chamber. Suspect internal failure of engine. □ (A series) Engine oil temperature gauge reading decreased to 30° C. during landing. Caused by failure of temperature bulb.

Fixed wing

U-21 Class E mishaps □ (A series) HIT check on No. 1 engine was 30 degrees below base line. Caused by faulty ITT gauge. □ (RU-21H) Left fuel gauge dropped to 150 pounds during flight. Caused by failure of fuel quantity indicator.

(continued on back page)

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	1-27 June	**3**	**5**
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**30**	**29**

Followups

Additional information on mishap briefs previously published

Attack helicopters

AH-1 Class A mishap in 6 Jul 83 issue (8340) ☐ Copilot, who was flying from the back seat, told pilot that engine rpm was dropping off. Pilot diagnosed the problem as a governor malfunction and placed aircraft into an autorotative approach to a downhill landing site. Aircraft landed hard and main rotor blades flexed down. One of the blades penetrated the forward cockpit, killing the pilot. The drop in engine rpm was inadvertently caused by one of the crewmembers accidentally and unconsciously retarding the throttle control. Pilot incorrectly diagnosed a governor malfunction and then did not follow the published emergency procedure for a low-side governor failure.

AH-1 Class A mishap in 17 Aug 83 issue (8347) ☐ Aircraft hit trees and crashed during reconnaissance mission. Pilot and copilot incorrectly divided their attention between flying the aircraft and reconnaissance tasks.

Utility helicopters

UH-60 Class A mishap in 12 Oct 83 issue (8360) ☐ Aircraft hit powerlines and crashed during approach to landing. Crew did not conduct an adequate search/inspection of the intended landing area.

UH-1 Class B mishap in 15 Jun 83 issue (8333) ☐ OH-58 was to be slingloaded from accident site. As UH-1 picked up OH-58 and copilot moved cargo release switch to the ARM position, OH-58 dropped to the ground. Copilot cyclic cargo switch intermittently remained in the depressed position. Pilot and copilot did not insure cargo release switch was in the ARM position before takeoff and hookup.

UH-1 Class A mishap in 22 Jun 83 issue (8336) ☐ Master caution light came on as aircraft was on base leg for landing. A check of the engine instruments revealed engine rpm was decreasing and rotor rpm was below normal. Pilot entered autorotation. On short final approach, pilot saw several storage tanks in his intended landing area and began rapid deceleration. Tail boom hit the ground and aircraft rotated forward and landed hard. The outer bearing of the N_2 tachometer generator seized from lack of lubrication, resulting in increased friction which led to failure of the generator's drive shaft and an indication in the cockpit of rapidly decaying N_2 rpm. Pilot did not confirm the cockpit indications as an engine failure or tachometer generator failure and made an unnecessary autorotation.

Observation helicopters

OH-58 Class A mishap in 1 Jun 83 issue (8331) ☐ Pilot became disoriented after inadvertently entering IMC and aircraft crashed. Airfield tower operator allowed aircraft on a VFR flight plan to continue flight operations in an airfield control zone after the weather had deteriorated to IMC.

OH-58 Class A mishap in 6 Jul 83 issue (8341) ☐ Pilot brought aircraft to a hover, cleared himself from the right and left, and began to hover to the rear. Main rotor blades hit main rotor blade

of another OH-58 parked to right rear of hovering aircraft. Control was lost and hovering aircraft came to rest inverted. Pilot was hovering backward without the assistance of a ground guide. Habit interference was also a factor. The normal parking arrangement required that the aircraft be hovered rearward to the taxi lane.

OH-58 Class A mishap in 3 Aug 83 issue (8345) ☐ Pilot operated aircraft in a flight environment known to be conducive to loss of tail rotor effectiveness. Aircraft began uncommanded right turn over trees. Pilot could not recover and aircraft crashed.

Fixed wing

U-21 Class B mishap in 15 Jun 83 issue (8335) ☐ Downgraded to Class C. Aircraft was landed gear up.

OV-1 Class A mishap in 17 Aug 83 issue (8348) ☐ Pilot, returning to home base, was told that the sky was clear with 7 miles visibility. About 500 feet above the ground, aircraft entered fog. Pilot executed a missed approach and asked for another visual approach. Tower operator told pilot that ceiling was estimated at 500 feet and visibility was one-quarter mile with fog. Pilot made another missed approach, diverted to an alternate airport, and attempted one approach there without success. He then diverted to another airport but ran out of fuel before he could land. Pilot and technical observer ejected successfully. ■

Aviation mishap prevention forum

Meal restriction

During the Army National Guard Instructor Pilot/Aviation Safety Officer Conference held recently at North Little Rock, Arkansas, a question arose regarding the "Meal, Ready to Eat" (MRE). Some of the packages contain a statement that the meal should not be consumed by aviation crewmembers or parachutists.

To find out why this restriction is on the packages, we called the Army Natick Research and Development Center. We were told that the Air Force requested the restriction on meal menus 3, 6, and 8 because of the bean component which causes flatulence and may cause discomfort at high altitudes.

Unless Army crewmembers are planning to fly at high altitudes in unpressurized aircraft, there is no reason not to eat these meals.■

SPH-4 helmet

To increase the materiel readiness posture for the SPH-4 helmet, NSN 8415-00-144-4981, regular, and NSN 8415-00-144-4985, extra large, the time between inspections is changed from 90 days to 120 days. TM 10-8465-206-13 is being revised to reflect this change.■

—from USAAVSCOM Materiel Readiness Information Bulletin

TMDE EIR Digest

Units with test, measuring and diagnostic equipment (TMDE) need to get on distribution for the TB 34-0001-61-series Digest devoted solely to TMDE. It is published by the U.S. Army Central TMDE Activity, Lexington, KY. Submit a DA Form 12-34C, stating how many copies are needed with each distribution. You can't get back issues or one-time requests.■

—from PS magazine

Answers to last week's questions

1. An aircraft is designed for specific weight limitations which cannot be exceeded without compromising safety. Overloading an aircraft may cause structural failure or result in reduced engine and airframe life. Loading Army aircraft beyond the maximum gross weight limitations is prohibited. How does increased weight affect aircraft performance?

- Increases takeoff distance for fixed wing aircraft.
- Increases obstacle clearance distance for rotary wing aircraft.
- Reduces rate of climb.
- Reduces cruising speed.
- Increases stalling speed for fixed wing aircraft.
- Decreases velocity-never-exceed (V_{ne}) and speed at which rotary wing aircraft will encounter retreating blade stall.
- Reduces maneuverability.
- Reduces range.
- Reduces ceiling.
- Increases landing distance for fixed wing aircraft.
- Increases power and lift requirements.
- Increases susceptibility to settling with power for rotary wing aircraft. **TC 1-201, pages 2-2 and 2-3**

2. Name five of the seven most important factors affecting the aerodynamic force on an airfoil. The seven factors are airstream velocity, airstream density, airfoil surface area, airfoil shape, angle of attack, viscosity effects, and compressibility effects. **FM 1-203, page 2-6**

3. Name the two components of total aerodynamic force. How do they act on an airfoil with respect to the relative wind? Lift acts perpendicular to the relative wind and drag acts parallel to the relative wind. **FM 1-203, page 2-8**

4. How is fuel tested for contamination once it is in the aircraft fuel tank? By a visual check. **FM 10-68, with Change 3, page 2-4, par. 2-9b** ■

Questions for aviation personnel

1. Close supervision of newly rated aviators and those undergoing refresher and mission training is essential to accident prevention. They should be teamed with the most experienced aviators for operational missions. True or false? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

2. What is minimum breakaway torque? **Reference: TM 55-1500-204-25/1, with Change 33, General Aircraft Maintenance Manual**

3. Is torque applied to the nut or to the bolt head? **Reference: TM 55-1500-204-25/1, with Change 33, General Aircraft Maintenance Manual**

4. Nomex fabric is a high temperature resistant and inherently flame retardant synthetic fabric with no hot-melt point or drip characteristics. The fabric is light in weight and will not support combustion, but it will begin to char at 700° to 800° F. The fabric has good abrasion resistance similar to nylon and is also nonabsorbent like nylon and other synthetic fabrics. True or false? **Reference: TM 10-8400-202-13, Nomex Flight Gear** ■

Mishap briefs

OV-1 Class E mishaps □ (D series) No. 2 engine chip detector light came on. Caused by failure of western gearbox bearing. □ (D series) Crew smelled electrical burning odor. Postflight inspection revealed film had jammed, causing camera control to overheat. □ (B series) After gear was extended, pilot noticed loss of pressure on hydraulic gauge. Hydraulic hose had separated from hydraulic pump fitting on right engine.

U-8 Class E mishap □ (F series) Pilot saw fuel streaming from left auxiliary tank during climbout. Caused by failure of O-ring on filler cap to seal properly.

Maintenance

U-8 Class E mishap □ (F series) Gear failed to retract after takeoff. After aircraft was landed and floor boards removed, crumpled wad of adhesive-backed aluminum tape was found lying between landing gear relay and aluminum tube which supplies air pressure to the right wing deice boot. The tape had shorted between the relay contact and the deice line, causing the wiring to short circuit to the weakest point in the system, the safety switch located on right main landing gear shock strut. The contact points in the safety switch had arced and stuck, causing switch to be inoperative. Aircraft had recently returned from a civilian contract maintenance facility where it had undergone major modification for installation of new engines, props, brakes, main landing gear doors, engine cowlings, and nacelles.

OV-1 Class E mishap □ (D series) Pilot noted erratic airspeed indications during takeoff. Pitot and static lines were reversed.

U-21 Class D mishap □ (A series) Postflight inspection revealed 2-inch crack in sheetmetal on each side of a patch on underside of left horizontal stabilizer about 12 inches from attaching point. Patch had been installed incorrectly, possibly resulting in failure.

U-21 Class E mishap □ (A series) Landing gear would not extend electrically. During recent gear motor change, maintenance personnel had failed to install roller bearing. This allowed excess play in gear motor shaft.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

High visibility belt available

A highly reflective belt that may be suitable for a variety of uses is now available through the supply system. The belt is 2 inches wide, is adjustable from 31 inches to 55 inches, is lightweight, adapts well to cold or warm weather uniforms, and comes in eight colors. The belts will make your flight line personnel, refuelers, pathfinders, etc., highly visible. Personnel can be color coded by job classification if desired.

The part number of the belt is 26BVF and the NSN is 8465-01-163-8835. The approximate cost of the belt is $6.67 each for orders under 1,000. When your supply people order the belts, they should indicate the color and the color code number desired. The following colors are available: green 27, blue 23, red 12, yellow 18, orange 17, white 15, fluorescent lime-yellow 20, and fluorescent red-orange 13. White, fluorescent lime-yellow, and fluorescent red-orange can be purchased in any amount. A minimum order of 100 units is required for the remaining colors. It should be noted that the fluorescent colors may stain other vinyl surfaces.

Point of contact at the Safety Center is Laurel Sand, AUTOVON 558-2947/6510. ■

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Microburst—a deadly killer

Much has been written about the crash of Pan American Flight 759 at Kenner, Louisiana, on 9 July 1982. Being the worst accident of its kind in the history of aviation, investigators conducted an extensive search to determine its cause. Result: The probable cause of the accident was the aircraft's encounter during the initial climb phase of flight with a microburst-induced wind shear which caused an unarrested descent and subsequent ground impact. While this accident has received the most attention, it's not the only one associated with microbursts. At least 27 civilian airline accidents and incidents involving microbursts have occurred since 1964. These have resulted in 491 deaths and 206 persons injured. While these accidents have been occurring for years, it's only recently that the cause has been determined.

What is a microburst?

Microbursts and their larger cousins, macrobursts, are part of the family of thunderstorm downbursts. A microburst is simply a strong vertical radial outflow of air near the surface beneath a column of rapidly descending air. A microburst is always associated with convective clouds and may be visible or invisible depending upon whether there is a visible rain shaft associated with it.

Microbust characteristics

- Microbursts range in size from 400 meters to 4 kilometers (¼ to 2 ½ miles).
- Peak winds last normally 2 to 5 minutes.
- Strongest winds are normally 150 feet above the surface.
- Most front-side winds are about 25 knots (speeds over 50 knots occur approximately 5 percent of the time).
- Horizontal wind shear (front-side to back-side winds) is greater than 50 knots about 10 percent of the time. Twenty-knot shear is the most frequent.
- Visible and invisible microburst intensities are about the same.
- Microbursts occur mostly in the afternoon and early evening (the same frequency as thunderstorms).

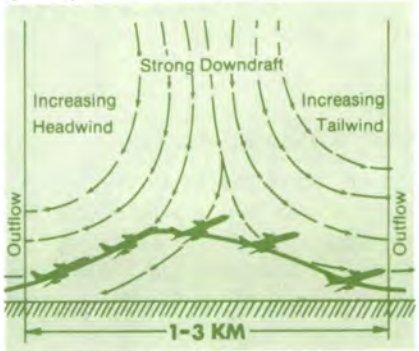

FIGURE 1.—Schematic representation of takeoff accident in a microburst situation. The aircraft first encounters a headwind and experiences increasing performance. This is followed in short succession by a downdraft and a strong tailwind, both causing serious performance loss, possibly resulting in a crash.

Pilot precautions

First and foremost, the aviator should avoid thunderstorms. This is a concept that has long been used by pilots, but microbursts are not always so readily identifiable or avoidable. Microbursts may be hidden in a harmless looking rainshower or even in the rain-free air beneath the cloud bases. So what does the pilot do?

- Stay alert and abreast of the weather situation.
- Look for localized blowing dust which may be associated with microbursts.
- Plan ahead. Be able to respond immediately if a microburst is encountered.

Improving safety

The detection and forecasting of microbursts leave much to be desired. Special instruments have been developed and used, but they are only located at some major airports. This leaves much of the nation unprotected. The NEXRAD-type radar is being developed; a doppler radar, it will have the capacity to detect these small-scale circulations. However, the NEXRAD will not be operational for several years. Therefore, weather personnel are taking an active role in educating our customers to the microburst hazard. Also, we are advising of the conditions that may produce microbursts. In addition, our observers and forecasters have increased their awareness of telltale signs such as large clouds of dust below convective clouds or sudden shifts in wind speed or direction. These actions coupled with a local warning and advisory program (PIREPS, PMSV, ATC, etc.) should aid in the detection and avoidance of microbursts.

References

Korose, Robert J., 1984: Microburst Wind Shear, Air Weather Service letter, 31 May 1984.

McCarthy, John and Serafin, Robert, 1984: The Microburst Hazard to Aircraft, Weatherwise 121, 1984. ■

—1LT William D. Hall, USAF
Staff Weather Officer
Det 9, 5th Weather Squadron
Fort Rucker

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishaps □ (H series) Aircraft crashed during test flight. Suspect red blade PC link fatigue failure. Three fatalities. 8438 □ (V series) Aircraft began an approach to a tank trail to pick up an injured soldier. Copilot terminated the approach at a 2- to 3-foot hover on the trail and immediately lost visual reference in blowing dust. Aircraft drifted to left and main rotor blades hit trees. Aircraft turned to right and tail rotor blades hit trees. Aircraft then came to rest on left side. 8439

UH-1 Class B mishap □ (H series) Pilot heard loud bang from rear of aircraft. Nose of aircraft yawed right and pitched up, and engine rpm exceeded rotor rpm. Pilot entered autorotation and aircraft crashed on runway. 8440

UH-1 Class E mishaps □ (H series) Antitorque pedals became stiff during flight. Caused by defective tail rotor servo assembly. □ (H series) Master caution and transmission oil pressure lights came on. Caused by defective oil pressure relief valve. □ (H series) Pilot could not move cyclic left of center after takeoff. Caused by corrosion of force gradient. □ (H series) Low rpm audio and light activated. Caused by failure of N2 tachometer generator. □ (H series) Binding was felt in pedals during flight. Caused by worn tail rotor magnetic brake. □ (H series) Aircraft vibrated severely during flight. Caused by disintegrated bearing.

UH-60 Class D mishaps □ Stabilator hit tree during landing. Stabilator was dented. □ Pilot did not decelerate early enough during downwind landing, causing stabilator to hit the ground.

UH-60 Class E mishaps □ Main transmission module oil pressure dropped to 20 psi, followed by illumination of transmission oil pressure light. Caused by failure of oil cooler thermostat. □ No. 1 engine tgt increased rapidly during flight. Caused by failure of electrical control unit.

Attack helicopters

AH-1 Class D mishap □ (S series) Tail rotor blades hit bush during landing. Both blades were damaged.

AH-1 Class E mishaps □ (S series) Noise was heard while aircraft was at ground idle. Master caution and No. 2 hydraulic lights came on. Hose assembly had blown out from fitting at firewall. □ (S series) Master caution light came on. Engine chip detector, 42-degree gearbox chip detector, and transmission pressure switch had loose connections. Aircraft had been firing weapons, and it is suspected that vibrations caused connections to vibrate loose. □ (S series) Transmission oil bypass light came on. Caused by failure of transmission seal. □ (S series) Zero engine oil pressure reading was caused by corroded cannon plug connector.

Cargo helicopters

CH-47 Class C mishap □ (A series) As external load (bridge section) was being positioned over the water, flight engineer misunderstood instructions and released the load before contact with the water. Bridge section hull was ruptured.

CH-47 Class D mishaps □ (C series) Pickup zone was watered down. Pilot picked up external load of two conex containers. As aircraft moved forward from watered-down area, it was engulfed in dust cloud, and pilot lost all ground reference. Rotor rpm began to decay, and pilot beeped normal engine trim to maximum. Rpm continued to decay, and pilot released the load. □ (C series) As aircraft was hovering by a parked CH-47, rotorwash caused green blade of parked aircraft to flap down and hit No. 1 section tunnel cover. □ (D series) As slingload was lifted off the ground, center hook open caution light came on. Load was returned to the ground to be transferred to front hook. Hookup man would not hook up the load while in a standing position but rather crouched down. As a result, pilot had to hover at a lower than normal altitude. Another aircraft was hovering nearby, and downwash caused additional control problems. Right front wheel hit and damaged slingload.

CH-47 Class E mishaps □ (A series) Transmission oil pressure light came on during takeoff. Caused by failure of oil pressure transducer. □ (A series) No. 1 generator light came on during takeoff. Caused by failure of bearing in generator. □ (B series) No. 1 engine chip detector light came on. Caused by failure of engine transmission.

Observation helicopters

OH-6 Class E mishap □ Battery had overheated during previous flight but went undetected by crew. After aircraft was refueled, crew could not start aircraft because of dead battery. Battery cover was bowed.

OH-58 Class B mishap □ (A series) As pilot was repositioning aircraft after hot refueling operation, aircraft rolled over onto side. 8441

OH-58 Class C mishap □ (A series) Aircraft hit three powerlines during takeoff from field site. The wire strike protection system severed two wires, but the third wire hit upper part of main rotor system. Aircraft was at 20 to 30 feet and had just entered effective translational lift when it hit the wires. Pilot landed in open field. Wires were corroded, blending into the background, and wire support poles were hidden in tall trees.

OH-58 Class D mishap □ (A series) Landing zone was grassy but appeared to be free of obstacles. Aircraft touched down on small tree stump, which punctured left chin bubble.

Training helicopters

TH-55 Class C mishaps □ Student pilot was performing simulated engine failure with 180-degree turn. IP took con-

trol of aircraft about 100 feet agl and rolled out of turn about 75 feet agl. Aircraft hit the ground hard, bounced, and came to rest on right side. ☐ Student pilot on first supervised solo flight had completed one trip around the pattern. On second trip around the pattern, student pilot overshot the turn to final. While trying to realign the aircraft with the proper lane, student pilot lost control and crashed into trees.

Fixed wing

C-7 Class E mishaps ☐ Hydraulic system failed during takeoff. Caused by ruptured tube assembly. ☐ Right engine low fuel pressure light came on. Caused by defective fuel pressure switch.

OV-1 Class E mishaps ☐ (D series) IP induced failure of No. 2 engine. After completion of engine shutdown and restart procedures, propeller would not unfeather. Caused by failure of propeller auxiliary motor. ☐ (D series) Left drop tank light came on. Caused by inoperative fuel transfer pump.

U-21 Class B mishap ☐ (A series) Right main gear would not indicate down and locked. Gear was manually lowered, but still indicated unsafe. Low pass was made by tower. Tower personnel said gear appeared down. On touchdown, right main gear collapsed. 8442

U-21 Class E mishaps ☐ (A series) Landing gear would not retract after takeoff. Caused by failure of actuator adapter switch. ☐ (RU-21H) Left generator failed during flight. Caused by worn brushes.

Maintenance

UH-1 Class E mishap ☐ (H series) Controls became stiff, and master caution and hydraulic pressure lights came on. Caused by overtorque of hydraulic line fitting.

AH-1 Class E mishaps ☐ (S series) Loud noise was heard from hydraulic pump area. Master caution and No. 2 hydraulic lights came on. Caused by incorrectly tightened hydraulic fitting in turret. ☐ (S series) Aft fuel boost pump light came on, FM and VHF radios failed, and essential bus circuit breaker would not reset. Wiring to nonessential bus had been spliced and not sealed, causing short circuit.

CH-47 Class E mishap ☐ (B series) Copilot got no response when he tried to increase rpm with No. 1 and 2 normal engine trim. Beep resistors were out of adjustment. ☐ (C series) No. 1 generator went off line and could not be recovered. Caused by generator wire chafing against tunnel cover support.

OH-58 Class E mishap ☐ (C series) Engine rpm was reduced to idle for rapid refueling. Five minutes later, engine flamed out. Fuel control was not rigged correctly for hot weather operation.

OV-1 Class E mishap ☐ (D series) No. 2 hydraulic pressure went to zero. Caused by incorrect torque on hydraulic fitting.

Message received

• Safety-of-flight technical message concerning inspection of OV-1 main landing gear torque arms (OV-1-84-03, 191600Z Jun 84). Summary: An OV-1C with lightweight landing gear recently sustained damage when the upper torque arm on the left main gear shock strut failed during landing rollout. The fracture occurred at the upper attachment bolt holes in the arm. Aircraft should be inspected to find and correct discrepant main landing gear torque arms. Contact: James Mitchell, AUTOVON 693-1639, commercial 314-263-1639.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202. ■

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**3**	**5**
4th Qtr	July	5	7	1-4 July	**1**	**1**
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**31**	**30**

Aviation mishap prevention forum

Countdown to "Numero Uno"

Better get crackin' soonest if you want to rate "number one" in the competition for the 1984 Chief of Staff, Army, Award for Maintenance Excellence. Time's running out. The good word on how to compete is in DA Cir 750-84-5 (1 May 84). Latch onto a copy and move out smartly.

A couple of tips:

Judges say be sure to back up with good info all accomplishments that meet award requirements.

Also, your unit's submission must follow exactly the format in Appendix A of the circular. If some of the items don't apply, say so and explain why. Don't just leave out an entry. That could leave you out in the cold. ■

—from PS magazine

Multiplace liferaft (LRU-1P)

Aviation units requiring multiplace liferafts may now procure a seven-place liferaft under NSN 4220-00-071-1889. The following three items must also be procured to complete the major end item:

- Carrying case, NSN 4220-00-689-8173, which may be ordered from S9C Defense Construction Supply Center (DCSC), Columbus, OH.
- Accessory equipment container (empty), NSN 4220-00-289-4326, ordered from FPZ, Kelly Air Force Base.
- CO2 bottle/inflation valve assembly, NSN 4220-00-535-7231, also ordered from Kelly Air Force Base. TM 55-4220-202-14 is the supporting manual for the LRU-1P liferaft assembly. AVSCOM item manager is Margaret LaRue, AUTOVON 693-3808/3809. ■

—from U.S. Army Aviation Digest

New FM 55-411

The new FM 55-411, Army Aircraft Quality Control and Technical Inspection, dated April 1984, is hot off the press. This publication supersedes FM 55-411, dated 30 January 1981.

The manual describes the duties and responsibilities of aircraft maintenance quality control personnel—specifically the technical inspector. It is designed as a general reference for aviation unit maintenance (AVUM) and aviation intermediate maintenance (AVIM) inspectors. Specific instructions are found in technical manuals and Army regulations. Subjects such as nondestructive inspections, the preventive maintenance inspection system, diagnostic equipment, etc., are only briefly discussed. Subjects of this nature are covered in depth in other technical publications. ■

Answers to last week's questions

1. Close supervision of newly rated aviators and those undergoing refresher and mission training is essential to accident prevention. They should be teamed with the most experienced aviators for operational missions. True or false? True. **AR 385-95, with Change 1, page 2-3, par. 2-9**

2. What is minimum breakaway torque? The torque necessary to start the nut off the bolt with no axial load on the nut and with the bolt completely through the nut. **TM 55-1500-204-25/1, with Change 33, table 2-4, note 1**

3. Is torque applied to the nut or to the bolt head? Apply torque to a bolt head only when a torque wrench cannot be used on the nut. **TM 55-1500-204-25/1, with Change 33, page 2-28, par. 2-82**

4. Nomex fabric is a high temperature resistant and inherently flame retardant synthetic fabric with no hot-melt point or drip characteristics. The fabric is light in weight and will not support combustion, but it will begin to char at 700 to 800 degrees F. The fabric has good abrasion resistance similar to nylon and is also nonabsorbent like nylon and other synthetic fabrics. True or false? True. **TM 10-8400-202-13, page 2-1, par. 2-2** ■

Questions for aviation personnel

1. Commanders will insure that procedures are analyzed to identify and control hazards in aviation systems, facilities, and operations. True or false? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

2. Can self-tapping screws be used to replace standard bolts, nuts, screws, or rivets in the original structure? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual, with Change 33**

3. How should aircraft tires be stored? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual, with Change 33**

4. Apply Bernoulli's Principle to the flow of air over an airfoil. **Reference: FM 1-203, Fundamentals of Flight** ■

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 104 □ 4 Jul 1984

Mission briefings

During recent visits to the field, Directorate of Evaluation and Standardization (DES) has found that confusion exists within units on how to comply with the latest DA guidance on aircrew briefing requirements. The requirements were outlined in the March 1984 message "General Thurman Sends," subject: Aviation Safety FY 84. The message requires that all aircrews assigned an aviation mission be briefed by the chain of command or operations officer. This applies to all missions, including single-pilot/single-ship missions.

Currently, much confusion exists in regard to the requirement for the pilot-in-command (PIC) to back brief the mission briefer on those elements which are essential for successful mission completion. This back briefing should be presented after all premission planning and preparations, excluding preflight, have been completed, but prior to departing on the mission. In the very near future, DA will publish those key elements that should be addressed in the back brief. The back brief informs the chain of command or operations officer of the PIC's mission preparation and plan for mission execution. This serves to increase chain of command involvement in order to insure better planned, smoothly executed missions.

During future visits, DES will closely evaluate the mission briefing/back briefing procedures. Also, some aviators have misunderstood the restriction in paragraph 6 of General Thurman Sends message 151325Z Mar 84. Paragraph 6 **should not** be construed as restricting the pilot from completing an out-of-ground-effect hover in accordance with tasks 2002 and 5008 of TC 1-137. ■

Thru-flights

Asterisks appear on checklists to indicate steps that must be performed on intermediate stops (thru-flights) prior to takeoff. In some cases, an asterisk appears in the operator's manual by a numbered step and by some, but not all, of the alphabetized sub-steps under that numbered step. For example, a numbered step in the OH-58C dash 10 tells the pilot that overhead switches and circuit breakers must be set for a thru-flight start. Asterisks appear by only three sub-steps to indicate that position lights, anticollision light, and battery switches are to be set. All other switches and circuit breakers need not be checked, provided that by-the-book shutdown procedures were followed. In this example, only the numbered step has the asterisk in the abbreviated -CL, making it necessary for the pilot to remember which of the sub-steps are asterisked in the dash 10. To expedite thru-flight pretakeoff procedures, not all steps require action by the pilot—only the ones with asterisks. ■

C-12 operator's manual

Distribution has been completed for change 2 to TM 55-1510-218-10, dated 13 March 1984. This change revises performance data and places it in a commercial format which is more compatible with the C-12 mission. TM 55-1510-218-10 through change 2 and TM 55-1510-218-CL with change 1 are the official publications for operators of C-12A, C, and D series aircraft. Previous editions or locally produced manuals will not be used. ■

Directional control margin

Numerous inquiries indicate confusion concerning the correct use of the "directional control margin" chart in TM 55-1520-236-10, figure 5-2, sheets 1 and 2. The purpose of these charts is to determine wind azimuth and relative speed where at least 10 percent pedal margin can be maintained for a given pressure altitude, temperature, and gross weight.

Use of the following procedures should answer questions about this chart. Use of the example in figure 5-2, sheet 1, indicates the intersection of gross weight and density altitude lines is in area C. **If no winds are predicted,** and the intersection of the gross weight and density altitude lines falls **outside the yellow**, mark "yes" in the safe pedal margin block of the PPC. If winds are predicted, refer to figure 5-2, sheet 2, to determine where the control margin may be less than 10 percent.

- To find the wind azimuths, go to area C (as determined from sheet 1). The left vertical line of area C represents 10 percent control margin. As you move toward the right vertical line of area C, the control margin approaches zero.

- The intersection of the left vertical line and the 90-degree azimuth angle is the worst case wind condition. For area C this is about 13 knots. If the predicted winds are less than 13 knots, mark "yes" in the safe pedal margin block of the PPC. If the predicted winds are greater than 13 knots, then check "no" in the safe pedal margin block of the PPC. Next determine the azimuths where 10 percent margin can be maintained. The predicted winds, for example, are 10 knots gusting to 15 knots.

- To find the maximum azimuths, follow the 15-knot arc to the left vertical line of area C. The intersections of these points are 61 degrees at the top

(continued on next page)

Stacom

and 119 degrees at the bottom.

These are the azimuths where less than 10 percent pedal margin may exist and should be annotated in the remarks section of the PPC. Note 1: Checking "no" in the safe pedal margin block will not preclude flight. To **insure** safe pedal margin, the aircraft gross weight may be adjusted or the aircraft must be maneuvered so the wind falls **outside** these azimuths. Note 2: This information is only valid for a helicopter at a stabilized hover at 100 percent rpm and does not predict capabilities in flight such as in a maneuvering mode during NOE operations.■

Recording night vision goggle flight time

Confusion has arisen between the NVG exportable training package and FM 1-300 concerning the logging of day goggle (DG) and night goggle (NG) time on aviator Individual Flight Record and Flight Certificate, DA Form 759-1. If the time flown was DG, it will be annotated in column e or k under day VFR and in column q with DG entered following the time flown. If the time flown was NG, it will be annotated in column g or m under night VFR and in column q with NG entered following the time flown, as depicted in FM 1-300, change 1, page 7-5. If DG and NG are flown on the same day, separate lines will be used to record this time. Column totals and subsequent references to DG or NG time will be consolidated and reflected as NVG time.

In the remarks block of the aviator's DA Form 759, when listing the aviator's qualification in use of NVGs, the mission, type, and design of aircraft should be listed in lieu of the ATM. Reference FM 1-300, aviators are currently capable of completing all required ATM iterations utilizing NVGs. It should be remembered that flying at night unaided entails different techniques due to degraded visual abilities. With regard to the increased emphasis on NVG flight, it is recommended that pilots occasionally perform unaided night flight to retain familiarity with these skills.■

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-3589 during duty hours; 558-6487 after duty hours.

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362 □ Vol. 12, No. 39 □ 11 Jul 1984

Not only in the desert

Dust. Choking, blinding clouds of sand and soil swept from the earth's surface and driven by the wind—or a helicopter's rotors.

Lawrence of Arabia riding across the endless sweep of desert engulfed in a swirl of sand is romantic. The romance pales quickly if you happen to be the pilot of an aircraft caught in such conditions.

Operations in desert conditions are covered in Chapter 2, FM 1-202, Environmental Flight. Unfortunately, sand and dust problems aren't limited to the desert. Even an area with a high average annual rainfall, but with sandy soil, can become hazardous after only a few days of drought, particularly if there are also high temperatures and strong winds.

Warnings about aircraft operating in conditions of sand and dust are repeated often. If you're wondering why, it's because these kinds of mishaps are still happening.

Experienced aviators

During a night training mission, an assault helicopter platoon leader was the pilot of one of four UH-1 aircraft engaged in a false troop insertion. The aircraft departed individually in the early morning hours and joined up at a landing strip where they were shut down and a mission briefing was conducted. The danger of possible brownout conditions was stressed repeatedly during the mission briefing.

The flight, with the accident aircraft in the lead position, departed in a staggered left formation. As they neared their destination, the formation overflew the drop zone landing area and began their approach to the east, with the lead helicopter lined up with a dirt road running through the drop zone. When the UH-1 was about 8 feet above the ground, rotorwash started to pick up sand, causing the copilot to make a comment about brownout. The pilot replied that he was not concerned about the dust and continued his approach. He terminated the approach approximately 1 foot agl and the aircraft started drifting forward and to the right. The copilot cautioned the pilot about this movement. The pilot replied, "I see it," and tried to correct by pulling up on the collective and applying left lateral cyclic as the right skid hit the ground.

The aircraft yawed left and rolled to the right about the horizontal axis of the right skid, causing the main rotor blades to strike the ground. The aircraft came to rest on its right side, with extensive damage to all components. This time the crew was luckier than the aircraft; there were no serious injuries.

Why would an experienced pilot make these kinds of mistakes? First, he was fatigued. The crewmembers had rested only 5½ hours during the previous 24-hour period and had received only 3½ hours of uninterrupted rest the night before the accident. (This was in spite of the fact that the unit policy specified a 16-hour duty day limit as recommended by AR 95-1.) Second, when he encountered blowing dust, the pilot

Not only in the desert

shifted his outside visual reference point to an area approximately 5 to 8 feet out his left door and, as a result, failed to recognize the aircraft was entering critical flight conditions conducive to dynamic rollover.

Another experienced aviator was piloting an OH-6 during a night VFR tactical training mission. He failed to take immediate action when he lost visual ground reference due to blowing dust after takeoff to a 3-foot hover. He sustained the hover without any outside reference for about 20 seconds while turning the landing light on and off rather than immediately landing the aircraft or making a maximum performance takeoff.

The aircraft drifted, and the main rotor blades hit a tree. All four main rotor blades were torn from the aircraft. The tail boom fractured after striking the skid and the aircraft came to rest on its left side. Neither crewmember was injured, but the aircraft was destroyed.

This pilot was also fatigued. He had had inadequate rest the night before and had worked a 17-hour duty day immediately prior to the mishap. He was a scout platoon leader in an attack helicopter company undergoing a Level 1 ARTEP during annual training. He had previous operational experience in dusty conditions and may have been overconfident in his ability to handle the situation. The portion of the landing zone from which he chose to operate was inadequate for night helicopter operations due to excessively dusty conditions. To make matters worse, visibility through the lower portion of the windshield was reduced by residue created by inadequate cleaning.

Inexperienced aviators

Night landings in a dusty area can prove double trouble to an inexperienced aviator. A UH-1H with the copilot at the controls sustained $302,946 in damages. It was to have been a normal night approach to a field location. The pilot had warned the copilot of the dusty condition of the LZ surface, but he allowed the approach to terminate at a 3- to 5-foot hover in blowing dust created by the main rotor downwash. Visual ground reference was lost, and the aircraft drifted to the right and forward of the intended landing area.

Instead of taking positive control of the aircraft to perform a safe landing or abort the approach, the pilot was overconfident in the copilot's ability and allowed him to continue the approach. He again instructed the copilot to land. When the copilot did not immediately do so, the aircraft drifted towards a nearby tree line. At this point, the pilot, not knowing his exact speed or location relative to the trees, lost his composure and abruptly lowered the collective pitch while drifting right and forward over sloping terrain. The aircraft struck the sloping ground hard, making initial contact with the right skid, and rolled right to an inverted position.

Decisions

Sometimes the dirt and dust encountered do not directly contribute to a mishap but they may be a factor in the events leading up to one.

An AH-1S was in a flight of five aircraft scheduled to participate in an ARTEP support mission. Delayed due to rain and low ceilings, the flight proceeded to a refueling point where they received an additional briefing. The accident aircraft was the last to refuel and the wet canopy became very dirty as sand blown by the other aircraft stuck to it. The crew discussed aborting due to the condition of the canopy but elected to continue with the mission. During a scout/attack team mission, the crew decided to move to a more advantageous firing position. The pilot overflew an enemy armored column, then made a low, slow attack on the column and broke off to the right, banking the aircraft about 50 to 70 degrees. The aircraft began to settle and the pilot overtorqued to keep from crashing. The dirty canopy distracted the crew and hampered their tactical training and flying abilities.

The amount of activity in a rapid refueling point can create dusty conditions in a short period of time. Commanders should take all possible steps to reduce dust and debris in field refueling areas.

Debris in an area of operations caused a fatality when a piece of plywood propelled by rotorwash became a lethal projectile. The dust induced by the hovering helicopter may have prevented the aircrew from seeing the piece of wood. Strict cargo security and clearing of personnel from the hovering area should be stressed.

Maintenance

Loss of visual reference is not the only way that dust can contribute to aircraft losses. Lack of preventive maintenance was a contributing factor in the loss of an AH-1G. The unit maintenance SOP directed certain procedures with reference to the environment, e.g., dust, volcanic ash. Failure to follow procedures contributed to leakage and seepage of seals.

Communication

A UH-60 was damaged to the tune of $107,618 during a night tactical support mission. Two aircraft were separated by 1½ to 2 rotor diameters. When the lead aircraft's rotorwash induced blowing dust and sand, the second aircraft encountered partial brownout. The pilot then channelized his attention on the lead aircraft because of its close proximity and allowed his aircraft to slide to the left 15 to 20 feet. The copilot did not detect the drift. The crew chief

did notice it and issued a warning over the intercom system. The pilots did not hear the warning because of intracockpit communications about the dusty conditions and the fact that the crew chief's head was extended outside the door. Rotor noise and other noise also disrupted the communication.

As the aircraft slid left at an altitude of 1 to 2 feet agl, the main rotor blades hit and severed a pine tree. The pilot was able to land without further damage.

There isn't always enough evidence to determine the exact cause of a mishap. That was true in a mishap involving a UH-60 which resulted in $376,774 in damages and $1,985 in injury costs. The investigation board concluded that either of two hypotheses could have resulted in this mishap. One involved takeoff in dusty conditions.

There were two aircraft in the flight. The accident aircraft was the second of the two to take off. Although the pilot waited a few minutes for dust generated by rotorwash to dissipate, when he took off he lost outside visual reference because of blowing dust. When a high-pitched whine was heard, the pilot rapidly lowered the collective to abort the takeoff. This caused the aircraft to hit the ground hard enough for the red main rotor blade to flex down and sever the tail rotor drive shaft. The aircraft bounced into the air, and the pilot again lowered the collective, causing another hard impact which resulted in separation of the left main and tail landing gear. The aircraft bounced again, further damaging the tail boom and stabilator assembly.

Preventive measures

There will be times, particularly during field training, when it is impossible to avoid dusty conditions. Landing zones which have a high volume of traffic or are located near roads heavily traveled by wheeled or tracked vehicles can quickly become hazardous to flying operations. Such areas should be avoided whenever possible. If they must be used, a running landing or maximum performance takeoff will minimize chances that the aircraft will become engulfed in a dust cloud. If terrain does not permit a running landing, an approach to touchdown should be made. A landing should not be made to a hover.

Maintenance personnel must be ever vigilant in checking and rechecking aircraft that have been subjected to blowing sand and dust. Filters will have to be changed more often, controls must be checked to be sure sand has not accumulated and affected tension or freedom of movement, and dust covers and excluder plugs must be used without fail. Inspections are vital to be certain the aircraft is airworthy, particularly if it has been parked for a long period of time near dusty roads or landing zones.

Cleaning becomes even more important. Residue left on windshields can attract dirt and could make the difference in partial or total loss of visual references if blowing dust is encountered. Improper removal of dirt can mar the surface of a windscreen and affect visibility.

Crew rest policies should be meticulously followed. Fatigue not only leads to mistakes but it can add to vision problems, particularly during night operations in dusty conditions.

In many parts of the world, dust storms caused by nature are rare. Those caused by helicopter operations are almost totally avoidable through vigilance and careful following of flight procedures. ■

Aviation mishap prevention forum

Nonstandard SPH-4 flyers protective helmets

The following is a reprinted ALSE maintenance advisory message (84-1), 312000Z Jan 84, subject: Nonstandard SPH-4 Flyers Protective Helmets, Regular and X-large, Purchased Under Contract DLA 100-83-C-4592, Gentex Corporation, Part Number 0104-0350, Issued Under NSN 8415-00-144-4981, Regular, and NSN 8415-00-144-4985, X-large.

Subject part numbered helmets are being issued with earcup retention assembly and chinstrap assembly not conforming to current Natick Research and Development Center specifications.

Earcup retention assembly nonconformities are as follows:

- The attachment clips differ from current issue.
- The earcup retainer assembly does not contain a grommet to facilitate the connection of the standard chinstrap post and screw.
- Earcup retainer contains a Velcro overlap in addition to the nape strap.

The chinstrap assembly attaches with double dot fasteners on both ends and contains a chin pad. The standard chinstrap assembly has double dot fasteners on one end and secures to the other end with post and screw.

Stocking of parts for helmets purchased under this contract is not authorized due to nonstandard retention and chinstrap assemblies and those parts not authorized for Army use. No spare parts were procured with these nonstandard part numbered helmets.

Helmets can be used as issued; however, when the chinstrap **or** earcup retainer assembly must be replaced you must also replace the other. To say it another way, both assemblies must be replaced with standard assemblies when one or the other is replaced.

Maintenance point of contact for this action is Mr. James Angelos, DRSAV-MCAPS, AUTOVON 693-3880/3889. ■

—from U.S. Army Aviation Digest

U/RU-21 propeller assembly

The U/RU-21 propeller assembly is being prematurely removed and returned by field locations when AVIM level maintenance is required, thereby causing unnecessary demands on the supply system and a shortage of propeller assemblies.

The repair instructions for the propeller blade are being revised for publication in the next revision to TM 55-1510-209-23. You may save time by calling AUTOVON 693-3300, Mr. Ed Branhof, or 693-6381, Mr. Stanley Sokol, for a copy of these revised instructions. ■

—from USAAVSCOM Materiel Readiness Information Bulletin

Answers to last week's questions

1. Commanders will insure that procedures are analyzed to identify and control hazards in aviation systems, facilities, and operations. True or false? True. **AR 385-95, with Change 1, page 2-2, par. 2-6**

2. Can self-tapping screws be used to replace standard bolts, nuts, screws, or rivets in the original structure? Never use self-tapping screws to replace standard bolts, nuts, screws, or rivets in the original structure. **TM 55-1500-204-25/1, page 2-40, par. 21-126**

3. How should aircraft tires be stored? Store tires in racks so that each is in a vertical position and each holding its own weight. Flat spots, which form on the tread during vertical storage, will not harm the tire. **TM 55-1500-204-25/1, page 2-59, par. 2-182b(1)**

4. Apply Bernoulli's Principle to the flow of air over an airfoil. Air traveling over the top of an airfoil must travel faster than the air traveling under the bottom since it has a longer distance to travel. Therefore, the air over the top must have a greater velocity (they both reach the trailing edge at the same time). This velocity differential between the upper and lower surfaces results in a pressure differential also (static pressure is lower on the top). Simply stated, this pressure differential between the upper and lower surfaces of an airfoil produces lift. **FM 1-203, pages 1-1 to 1-4 and 2-5 to 2-6** ■

Questions for aviation personnel

1. Should any air be left in an aircraft tire tube during storage? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual, with Change 33**

2. Should bearings which are subject to heavy load or high speeds be reused? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual, with Change 33**

3. Does an increase in humidity cause an increase or a decrease in air density (and in turn a corresponding change in lift)? **Reference: FM 1-203, Fundamentals of Flight**

4. Aircraft engaged in overwater flight will adhere to what requirements? **Reference: AR 95-17, The Army Aviation Life Support System Program** ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class B mishap □ (M series) IP was performing power check during transition training flight. Aircraft was at 50 feet, with some forward airspeed and left crosswind of 10 to 20 knots, when it began a right turn that could not be stopped with left pedal. IP reduced collective and closed throttle. Aircraft landed hard. 8443

UH-1 Class D mishaps □ (H series) Engine rpm decreased to 6400 during climb. Pilot increased rpm to 6600 using increase/decrease switch and added more collective pitch to increase climb rate. Rpm decreased to 6300. Collective was decreased and rpm increased to 6850. Pilot again increased collective and rpm bled to 6300. Rpm could be maintained at 6600 with collective, but this resulted in a 200 fpm rate of climb. Pilot interpreted the problem as a fuel control malfunction and entered autorotation. Governor switch was placed in emergency and pilot regained rpm with manual throttle control. Pilot changed intended point of landing at a 2-foot skid height to a point 20 feet to the front of the aircraft. Rpm decreased to 5500 despite full throttle application. Aircraft landed hard, damaging both skids and cross tubes. Inspection revealed that wiring harness had shorted, causing bleed air valve to remain open and degrade engine performance. Pilot demanded power in excess of that available. □ (M series) Aircraft was on transition training flight. At 5-foot hover, aircraft began slow spin to right. SIP added left pedal, but rate of spin increased. SIP then neutralized the pedals and reduced collective. At 180-degree point in the spin, SIP applied left forward cyclic and headed down the center of a ravine in an attempt to fly out of the spin. Aircraft continued to spin and landed hard, bending skids and cross tubes and breaking chin bubble. □ (H series) Forty-two-degree gearbox oil sample was taken immediately before preflight. IP did not visually check to make sure gearbox oil cap was correctly installed. Aircraft was flown with cap not installed. Gearbox had to be replaced.

UH-1 Class E mishaps □ (H series) Loud noise was heard during hover. Caused by defective engine. □ (H series) Aircraft was shut down immediately after pickup to a hover due to overtemp indication on engine oil temperature gauge. Caused by failure of thermal control valve. □ (H series) Master caution and engine chip detector lights came on. High frequency vibration was felt and unusual noise was heard. Inspection revealed assembly drive carrier bearing had disintegrated and sheared some internal bolts. □ (H series) IP felt six sudden, hard jerks on cyclic, followed by extreme constant forward pressure on cyclic. Caused by malfunction of right lateral irreversible valve. □ (H series) After refueling at civilian airport, pilot hovered aircraft to reposition for takeoff. Garbage drum located about 55 feet from helicopter was blown into parked car.

Attack helicopters

AH-1 Class C mishap □ (S series) As IP was checking his map during hover, pilot in rear seat attempted to reduce collective friction and inadvertently reduced the throttle. IP reacted to the low rpm audio and light by taking the controls. He noted N2 at 92 percent and torque at 111 percent and decreasing. Aircraft was landed without further damage.

AH-1 Class E mishap □ (S series) While at a hover with live munitions, pilot attempted to maneuver into firing position. Pilot was unaware of high weight

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**4**	**5**
4th Qtr	July	5	7	1-11 July	**1**	**1**
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**32**	**30**

Mishap briefs

and the need to fire while in-ground-effect. He looked outside aircraft for clearance from obstacles and inadvertently increased torque for less than 2 seconds. Overtorque light came on. Inspection revealed no damage.

Cargo helicopters

CH-47 Class E mishaps □ (C series) Medium to high frequency vibration was felt during landing. Malfunction of AGB valve was caused by air in lines. □ (C series) No. 2 engine would not start. Caused by leak in start fuel system line.

Observation helicopters

OH-58 Class D mishaps □ (C series) Vertical fin hit wire during NOE flight. Vertical fin and tail rotor blade were damaged. □ (A series) As IP wearing night vision goggles was making hovering autorotation, he misjudged skid height and allowed aircraft to touch down hard in nose-low attitude. Cross tube was damaged.

OH-58 Class E mishaps □ (C series) Master caution and d.c. generator lights came on during hover. Caused by sheared generator drive shaft. □ (A series) Pilot felt a pull on the aircraft during takeoff from LZ. Inspection revealed single strand of wire had been cut by lower wire cutter.

Fixed wing

U-21 Class C mishap □ (A series) Aircraft landed gear up, damaging engines, propellers, and aircraft belly.

U-21 Class E mishap □ (A series) No. 1 engine torque fluctuated during flight. Caused by fuel control malfunction.

T-42 Class E mishap □ Fuel was seen siphoning from left auxiliary fuel cap during climbout. Crew did not insure fuel caps were secured correctly during preflight inspection.

Maintenance

AH-1 Class E mishaps □ (S series) Pilot heard loud squealing noise, and master caution and No. 1 hydraulic lights came on. Caused by yaw channel SCAS actuator line chafing on wire bundle. □ (S series) Transmission oil bypass light came on. Oil line failed due to chafing.

CH-47 Class E mishap □ (C series) No. 2 engine fire control handle light came on. Caused by loose connection on fire detector element.

Messages received

- Safety-of-flight maintenance mandatory message concerning one-time inspection of CH-47D floor beams (CH-47-84-10, 261930Z Jun 84). Summary: CH-47-84-09 message provided the background information for this message and imposed operating restrictions on certain CH-47Ds that had suspect beam repairs made in critical areas at time of modernization. Inspection repair/rework will be accomplished by contractor/depot teams at Fort Campbell. Contact: Dennis Menckowski, AUTOVON 693-1418, commercial 314-263-1418.
- OH-6A maintenance information message concerning time before overhaul (rotor and drive system) (MIM-OH-6A-84-MEM-01, 221745 Jun 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

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Accident review: disorientation in IMC

US Army Aviation Training Library
Fort Rucker, Alabama 36360

Synopsis

The pilot of a UH-1H became spatially disoriented shortly after takeoff from a field site. As the pilot tried to transition to instrument flight, control was lost and the aircraft crashed and burned.

History of flight

The unit was in the field supporting an infantry platoon. Five helicopters were committed to the mission to pick up troops at first light. The plan called for the aircraft to start up, vacate their deployed positions (hover holes), and line up in formation on a strip on the reservation. The mission had been accomplished as planned for three days and cancelled on the fourth day because of unfavorable weather conditions.

On the fifth day, the aircraft were started, and the No. 1 aircraft, with the air mission commander as pilot, was moved onto the strip to provide a reference for formation lineup of the other aircraft. During this move, the air mission commander turned on the landing light to check the weather. The ceiling was estimated to be below 100 feet, and visibility was limited due to darkness and clouds. A nearby hill, which provided the commander his weather estimate, was in the clouds, and the decision was made to continue with the form-up of the flight, shut down, and wait for favorable weather conditions.

The No. 2 aircraft crew acknowledged the decision and lifted out of their hover hole, which was located about 300 yards south of the position of the No. 5 aircraft. As the No. 2 aircraft ascended 20 to 30 feet above 50-foot-high trees, a stratus cloud layer was encountered. The pilot descended to just above treetop level and proceeded to the strip. As the No. 2 aircraft passed the position of the No. 5 aircraft, the copilot mentioned to the pilot that fog appeared to be present in the valley northeast of No. 5.

As No. 2 was maneuvering on the strip, the pilot of No. 5 radioed that he was coming out of his hover hole. The UH-1 was seen to lift vertically from the hover hole, headed in a northeasterly direction, to just above treetop height. The aircraft then started to enter clouds. It climbed 50 to 60 feet above treetops in the clouds, paused, turned left, and then began a descent, picking up airspeed and eventually going out of sight of the witnesses. Shortly afterward, a loud bang was heard and a bright glow was seen. The helicopter had crashed on a rising slope and rebounded into the air, hitting two large trees before coming to rest on level terrain. Distance from the hover hole to initial impact was about 1,000 meters. All three crewmembers were killed.

Crewmember experience

The 29-year-old pilot had almost 500 rotary wing flight hours, with more than 400 in the UH-1H. He had 32 hooded instrument flight hours, one-half hour of actual instruments, and 73 hours in the UH-1 synthetic flight training simulator (SFTS). The 28-year-old copilot had almost 250 rotary wing flight hours, with almost 200 in the UH-1H. He had 20 hooded instrument flight hours, no actual instrument flight experience, and 54 hours in the SFTS.

Commentary

Evidence indicates that when the aircraft entered unexpected instrument meteorological conditions, the pilot tried to make an instrument takeoff from the left seat position and failed to maintain aircraft control. Primary cause factors were spatial disorientation, apprehension, and inexperience in actual or simulated instrument flight in the aircraft, combined with the reduced instrumentation on the left side of the aircraft.

The air mission commander used poor judgment in directing the repositioning of the five aircraft during environmental conditions which he knew to be less than those prescribed for flight under visual flight rules in AR 95-1 and local command regulation. It was concluded that the air mission commander made this decision because of excessive motivation for mission accomplishment and a common unit practice of operating rotary wing aircraft under VFR during tactical operations when environmental conditions were less than the minimums prescribed by regulation.

Timely and accurate weather information and forecasts were not available to the aviation personnel on which to base operational decisions necessary for the support of tactical training operations.

Most of the unit pilots-in-command routinely performed their duties from the left crew station. The UH-1 Maintenance Instruction Manual designates the right crew station as the pilot's position, primarily because of the arrangement of flight instruments and switches within the cockpit. In the event of inadvertent entry into IMC, as was the case in this mishap, and during most other emergency situations, the most advantageous position from which to cope with the emergency is from the right pilot's station. ■

Aviation mishap prevention forum

Respirators won't leave you breathless

Looking for a way to protect yourself from paint splashes and chemical nasties? Then take a look at the respirator, NSN 4240-00-022-2524. It's authorized by Appendix A of CTA 50-970.

Don't confuse this gem with your M17- or M24-series protective masks. The respirator only covers the lower half of your face, and it's not designed to deal with NBC stuff. It will, however, keep you from breathing **organic** vapors like cleaning fluids and solvents (ketone, acetone, and others) and spray paint, dust, varnish, and lacquer mists. That NSN will get you either a single or double respirator.

The single comes with 25 cartridges (which filter out the organic vapors) and 50 prefilters (which protect you from spray paint mists or drops). The double version comes with 50 cartridges and 100 prefilters.

You can't get the cartridges or prefilters separately. Once you've used up those that come with the kit, your respirator has outlived its time. Toss it and request a new respirator.

Maintenance tips

Clean your respirator after each day's use like so:

- Remove the filters, headbands, and valves from the rubber facepiece.
- Immerse all parts, except the filters, in a warm solution (140° to 160° F.) of a germ-killing detergent.
- Scrub the rubber parts of the mask gently using a soft brush.
- Rinse thoroughly in clean water and let dry.

Replace the cartridges in your mask at the first trace of contaminant odor detected while you're wearing it. To replace the cartridge, unscrew it and replace it with a new one. Be sure that the rubber gasket is evenly seated in the filter holder.

Use prefilters for protection against mists of paint sprays. Replace when breathing becomes difficult.

To replace prefilters, remove the prefilter ring from the front of the cartridge. Put the prefilter in the retainer and replace the entire assembly on the cartridge front.

Before storing your respirator, make sure it's clean. Place it in a cool, dry area that is free from airborne contamination. Be sure to check your respirator again before using.

Here are some things to keep in mind when you use your respirator:

- Use it only in well-ventilated areas where plenty of oxygen is available.
- Don't use it around toxic contaminants.
- Leave the area immediately if breathing becomes difficult, you get dizzy, or you taste or smell the contaminant.
- Never alter or modify your respirator.
- Make sure your mask is properly fitted. ■

—from PS, Issue 379

5-dram samples needed

The 5-dram (5/8-oz) bottle is the only one you use for aircraft oil samples. That's because using a 3-ounce or larger container may take up to half the lubricant in some aircraft components.

Draw 3 ounces, for example, out of the 42-degree gearbox in the UH-1 and you could be gearing up for trouble. That system only holds 6 ounces of lubricant. If you fly that bird without replacing the oil you drew out, the parts could wear out too soon or fail altogether.

But just putting in more lubricant doesn't help. If you add oil too many times to the reservoir between 25-hour samplings, the lab won't be able to detect a trend toward excessive component wear or failure.

So use the 5-dram bottle, NSN 8125-00-933-4414, and you can pick up a couple of other advantages, too. Like—

- $$ savings. The 5-dram container costs about 10 cents, compared to 22.5 cents for a 3-ounce bottle.
- Time savings. Lab people can quickly spot the small amber bottle. That's important, because aircraft samples get priority treatment in all labs.

So, bird mechs, cram your 5-dram samples into those amber bottles—and keep them coming! ■

—from PS magazine

TOW/Cobra armament advice

Armament subsystems on your AH-1S TOW/Cobra can deliver awesome firepower, but they need help from you. For instance, think "ON" when your aircraft engines are on. Armament system power must be on, or the telescopic sight

unit (TSU) will bounce. That means expensive internal damage to the TSU.

So, before you start the engine, push in aircraft AC and DC circuit breakers. After the engine starts, turn on armament system circuit breakers. That way you stabilize the TSU. . . and prevent damage.

Hold the trigger

Another "fingertip" problem-stopper concerns the M134 minigun and 40mm grenade launcher. Bursts for either weapon are preset. When you fire them, hold the trigger until the bursts end. The bursts stop automatically.

If you pull, jerk or turn loose the trigger before the burst ends, the gun almost surely will jam.

No step

They're handy, they're in the right place, but weapons racks on the wings **are not steps!** Boots damage rack components! If you're working around or getting on the aircraft, use the steps or nonslip footholds on the struts.

Fairing covers

Fairing covers over the weapons' turret have two snap fasteners and two Dzus fasteners each. Be sure you put back all of them, or the covers can come off during flight.

Fire extinguishers

Hot weather reminder: Do not keep fire extinguishers in cockpits when the temperature climbs above 90° F.

When the sun beats in, the cockpit bakes in that heat, and an extinguisher can explode. Remove it after each flight and store it in the hangar.■

—from PS magazine

Answers to last week's questions

1. Should any air be left in an aircraft tire tube during storage? A small amount of air should be left in each tube to prevent inner surfaces from sticking together. Do not store completely deflated tubes. **TM 55-1500-204-25/1, page 2-59, par. 2-184b(1)**

2. Should bearings which are subject to heavy load or high speeds be reused? Bearings which are subject to heavy load or high speeds will not be reused when condition is questionable. Bearings authorized for emergency reuse shall be replaced when replacement bearings are available. **TM 55-1500-204-25/1, page 3-21, par. 3-63a(12)**

3. Does an increase in humidity cause an increase or a decrease in air density (and in turn a corresponding change in lift)? A decrease. Humid air is less dense than dry air. **FM 1-203, pages 2-9 and 2-10**

4. Aircraft engaged in overwater flight will adhere to what requirements? All persons aboard Army aircraft flown beyond gliding distance of land will wear life preservers. The following survival equipment is the minimum required on all Army aircraft during flights made in excess of 30 minutes flying time or 100 nautical miles from the nearest shoreline:

- A survival kit, overwater, containing a one-person life raft will be carried for each person aboard. A multiplace raft may be substituted for one-person rafts on utility and cargo aircraft. OV/RV-1 aircraft will be equipped with overwater seat survival kits.

- Life preservers will be either worn or made readily available to all occupants of multi-engine aircraft. OV/RV-1 crewmembers will wear overwater survival vests containing life preservers.

- OV/RV-1 crewmembers and all persons aboard single-engine aircraft will wear standard constant-wear, anti-exposure suits when the water temperature is 60° F. or less or when these temperatures are forecast for any part of the route flown. On all other multi-engine aircraft, constant-wear type antiexposure suits will be worn by crewmembers. This quick-donning type of suit will be made available to other personnel aboard.

- Ferry flight equipment will be in accordance with U.S. Army Aviation Systems Command (AVSCOM) ferry flight packet instructions. The command providing delivery aircrews must provide the proper ALSE. **AR 95-17, page 2-2, par. 2-9** ■

Questions for aviation personnel

1. Which of the following should be stenciled on filter separator housing: next change due date; number of elements inclosed; date elements were last changed; maximum acceptable pressure? **Reference: FM 10-68, with Change 3, Aircraft Refueling**

2. When staking new bearings into a housing, why should pressure be applied gradually and evenly around the housing? **Reference: TM 55-1500-204-25/1, with Change 33, General Aircraft Maintenance Manual**

3. Name the three types of drag, the sum of which comprises total drag on an aircraft. **Reference: FM 1-203, Fundamentals of Flight**

4. Do O-rings used in aircraft maintenance have an indefinite shelf life? **Reference: PS Magazine, Issue 372, November 1983** ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (H series) Bird hit and broke pilot's overhead window. □ (H series) Student pilot applied excessive forward cyclic after landing from autorotation. Tip of lower wire cutter hit runway and broke off. □ (H series) Aircraft landed hard, damaging cross tubes and wire cutter tip.

UH-1 Class E mishaps □ (H series) Engine tachometer failed during flight. Caused by sheared tachometer generator. □ (V series) Fluid was seen seeping from transmission pylon. Caused by cracked hydraulic check valve. □ (H series) Master caution and right fuel boost pump lights came on during climb. Caused by failure of boost pump. □ (H series) Transmission oil temperature indicator became inoperative during hover. Caused by defective switch. □ (H series) Master caution light flickered during takeoff. Caused by defective caution panel. □ (H series) Compressor stall during flight was caused by failure of fuel control.

UH-60 Class D mishap □ Vertical vibration was felt during approach for landing. Ground personnel saw something fly off the rotor system. Antiflap assembly had broken off.

UH-60 Class E mishaps □ Left accessory module light came on during flight. Postflight inspection revealed oil leak at No. 1 engine gimble seal. □ A few minutes after takeoff, pilot was told that tail rotor cowling was open. Cowling had been opened for preflight and then was not fastened.

Attack helicopters

AH-1 Class D mishap □ (S series) Loud banging sounds were heard during runup. Main rotor blade tiedown had not been removed. Tail rotor blades and gearboxes were damaged.

AH-1 Class E mishap □ (G series) Aircraft pitched 20 degrees nose down followed by 20 degrees nose high during landing. Caused by failure of SCAS pitch amplifier.

Observation helicopters

OH-6 Class A mishap □ Aircraft, involved in an authorized search for escaped prisoners, was operating at low altitudes and variable airspeeds. Aircraft hit and broke two high-tension wires 135 feet above the ground. Transmission and rotor were torn from aircraft and airframe crashed. Pilot and two civilian observers were killed. 8444

OH-58 Class D mishap □ (A series) Seatbelt left hanging outside aircraft damaged panel behind left passenger door.

OH-58 Class E mishaps □ (A series) Crew chief read the dash 10 checklist to the pilot throughout preflight and runup procedures. Pilot checked fuel valve handle to insure it was in detent position, but he failed to notice that handle was in off rather than on position. Aircraft was at 3- to 4-foot hover when it began to yaw left and descend. Hovering autorotation was made. Engine operated about 11 minutes before flameout. Fuel valve handle was slightly out of rig while in off position, allowing enough fuel flow to engine to enable pilot to hover. □ (A series) During approach for landing, rated student pilot asked IP if his feet were on the pedals. IP said no, and pilot said they were jammed. IP took control, got no response from the pedals, and initiated go-around. Aircraft was flown to nearest airfield where a run-on landing could be made. On 2-mile final, pilot noticed his bleed air was jammed in the pedals and used his foot to kick it free and hold it in place

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**4**	**5**
4th Qtr	July	5	7	1-18 July	**1**	**1**
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**32**	**30**

clear of the pedals while IP made run-on landing. Pilot's bleed air vent housing was cracked, allowing rotating vent to pop out, roll forward, and jam pedals. □ (C series) Collective was lowered and aircraft tilted rearward during upslope landing. Loud banging noise was heard and vibrations were felt in airframe. Vibrations and noise continued for 15 to 20 seconds. Suspect spike knock. Caused by improper control input and/or slope landing techniques.

Fixed wing

C-12 Class E mishap □ (C series) No. 1 engine power lever could not be retarded or advanced from 99 percent N1 during climb. Single-engine landing was made. Inspection revealed cam following pin jammed in engine cam box due to burrs on cam race.

U-21 Class E mishap □ (F series) During climb after takeoff, pilot in right seat noticed that inspection panel of right engine was not properly secured. Panel was not secured correctly after preflight inspection.

T-42 Class E mishap □ Right engine tachometer failed during flight. Caused by defective tachometer generator.

OV-1 Class E mishap □ (D series) During taxi, pilot noticed that power steering was not operating. Caused by failure of sensitive switch.

Maintenance

UH-1 Class E mishaps □ (H series) Rpm bled off during hover. Customer bleed air line from engine deck to bleed air manifold was positioned incorrectly. When torque approached 35 psi, line flexed and contacted N1 throttle linkage, causing N1 to be under manual control. N1 was insufficient for high gross weight of aircraft to maintain N2. □ (H series) Master caution light came on during landing. Mounting nut on test/reset switch on master caution box was loose, causing a short. □ (H series) Copilot discovered loose bolt on scissors and sleeve assembly during postflight inspection. Incorrect torque on shear nut allowed bolt to vibrate and work within mounting bracket.

U-21 Class E mishap □ (A series) After gear extension, pilot noticed right main gear showed unsafe. Gear was manually extended and aircraft landed. Gear down lock microswitch was adjusted incorrectly during phase maintenance.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Let your seats stroke

Recent field surveys have revealed that items are being stored under the pilot and copilot seats of the UH-60 Black Hawk. Placing articles under the crew seats of the Black Hawk is not authorized. It defeats a primary crashworthy feature (stroking) designed to protect occupants during a crash sequence. Stroking seats absorb impact loads that otherwise would be absorbed by crewmembers. We want you to walk away from the crash, so don't store articles under seats.■

Cross-talk

What we say	What we really mean
It's in the process	We forgot about it until now
We'll look into it	You can forget it, too
Take this up at our next meeting	We hope you'll forget about it before then
Project	A major approach to doing a minor job
Under consideration	Never heard of it before
Under active consideration	We're trying to locate the correspondence
We're making tests	We need more time to think up an answer
The members say	We're giving you the opinion of the last one who called up
Let's get together on this	You're probably as mixed up as I am
Reliable source	The last person I talked to
Informed source	The guy who told the last person I talked to
Unimpeachable source	The guy who started the rumor
Activate	Make more carbons, enlarge the distribution list
Have an analysis team meeting	Let's spread the responsibility
Forwarded for your consideration	You hold the bag for awhile
Liaison man	The guy who sits between the expeditor and coordinator
A program	Any assignment that can't be completed by one phone call
To implement a program	Hire more people and expand the office
Reorientation	Getting used to working again
A conference	A place where conversation is substituted for the dreariness of labor and loudness of thought
Will advise you in due course	If we figure it out, we'll let you know

—from the Hot Dope Sheet, 2d MAW

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362-5363 □ Vol. 12, No. 41 □ 25 Jul 1984

Third quarter Class A aircraft mishap review

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Fort Rucker, Alabama 36360

Nine Class A aircraft mishaps occurred during the third quarter of this fiscal year compared to 18 for the third quarter of FY 83. Six of the nine mishaps resulted in eleven fatalities, and five of the nine involved human error. Following are synopses of the human error mishaps.

• A UH-1 was on a training flight, with the crew performing hydraulics-off maneuvers. During a right turn, the instructor pilot, using the floor mike, told the student pilot that the hydraulic switch was coming on. Because of climb power and a right crosswind, the student pilot had pressure exerted on the left pedal. As the hydraulic power returned, the left pedal pressure caused the servo to extend fully in less than one-half of a second. The aircraft rolled to the right and crashed in a wooded area.

Cause: Tail rotor thrust, combined with the right cyclic applied, caused the aircraft to develop a roll to the right from which the instructor pilot was not able to recover. The instructor pilot could not block left pedal input because of his right foot being on the floor mike.

Result: Three fatalities and a destroyed aircraft at a cost of $1,348,704.

• A student pilot was on a TH-55 solo flight. The aircraft began a series of right, descending, tight turns from about 500 feet above the ground, which progressed into a right spin. The aircraft then crashed in a field.

Cause: Suspect pilot was distracted from his flying duties while trying to tune his radio and allowed main rotor and tail rotor rpm to deteriorate due to improper manual throttle and collective coordination.

Result: One fatality and a destroyed aircraft at a cost of $135,590.

• A UH-1 was No. 2 of a flight of three in a loose trail formation. Without notifying or receiving permission from the air mission commander, the pilot broke formation and descended to an altitude of 50 to 75 feet, flying at this altitude for about 2 miles. The pilot then passed over a lake heavily used by wind surfers and water skiers and made a steep cyclic climb and a 180-degree turn with approximately a 60-degree angle of bank, followed by a steep dive. After pulling out of the dive, the pilot repeated the maneuver but could not stop the excessive rate of descent in the dive. The aircraft crashed in a near level attitude.

Cause: While performing maneuvers prohibited by regulations, the pilot induced a descent which could not be stopped.

Result: One fatality, three major injuries, three minor injuries, and a destroyed aircraft at a cost of $1,302,704.

• A UH-1 was on a maintenance test flight. About 15 minutes into the flight, witnesses saw the aircraft in what appeared to be an autorotational descent. A power loss occurred during recovery, and the pilot reentered autorotation. About 200 feet above the ground, the pilot bled off rotor rpm to extend the autorotative glide. Low rotor rpm resulted in separation of the transmission cowling, which severed a rigid connecting link. The aircraft entered an uncontrollable left spiral and crashed.

Cause: Suspect materiel failure and failure of the pilot to follow correct emergency procedures.

Result: Two fatalities and a destroyed aircraft at a cost of $595,758.

• A UH-1 was on a mission to pick up an injured soldier. The copilot at the controls selected an unimproved road for a landing site without making a high reconnaissance of the area. On short final, the copilot realized the landing site might not be suitable but delayed making a decision to go around or continue the approach to the ground until the aircraft had decelerated below effective translational lift. Rotorwash from the aircraft created a dust cloud, and the crew lost visual reference with the ground. The aircraft drifted left and the main rotor blades hit a tree. Control of the aircraft was lost, and it crashed.

Cause: The copilot selected an unsuitable landing area and used an incorrect approach termination procedure. The pilot-in-command failed to adequately supervise the actions of the copilot.

Result: Two minor injuries and a destroyed aircraft at a cost of $626,565.

With the 21 Class A mishaps occurring during the first half of this fiscal year, the Army had 30 class A aircraft mishaps for the first three quarters. Many of these mishaps happened because pilots failed to follow established procedures. ■

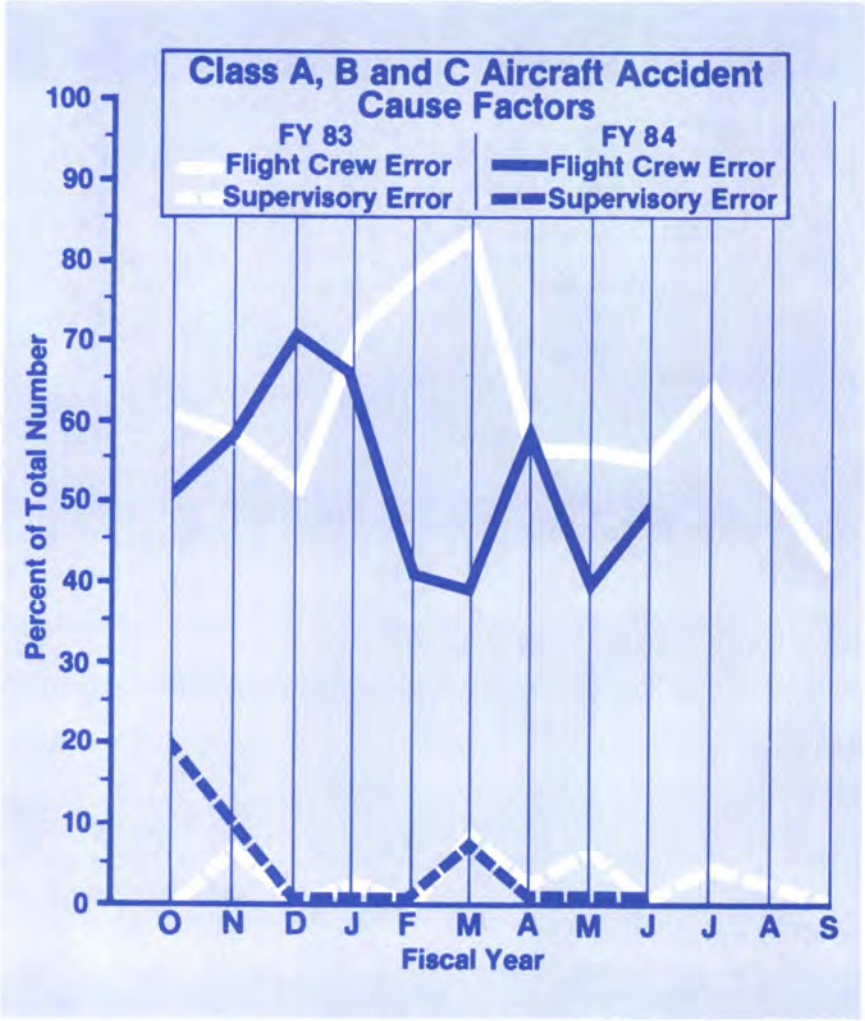
Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishap □ (H series) Aircraft made low approach to a go-around on an approved pinnacle helipad. At 50 to 100 feet agl, low rpm light came on and rpm dropped to 6000. Pilot ran out of left pedal, and aircraft turned slowly to right and settled to the ground. Cross tubes were spread, chin bubble broken, and tail boom dented.

UH-1 Class D mishap □ (H series) As IP lowered collective to full down position, loud noise was heard from right front of aircraft. Aircraft began to settle in unusual attitude and roll right. IP stabilized the aircraft lightly on the skids while crew chief checked for damage. Right portion of forward cross tube was completely severed at right cross tube strap. While pilot maintained the aircraft light on the skids, IP got out, checked the damage, and helped crew chief secure right forward skid to the aircraft using litter straps. IP decided to return aircraft to home field because a recovery team could not arrive before fuel was depleted. Aircraft was flown to home field by IP and positioned so that rear portions of skids were light on the ground. Maintenance personnel placed jacks beneath aircraft and IP lowered aircraft's hard points onto the jacks with no further damage.



UH-1 Class E mishaps □ (H series) Engine oil temperature rose above 100° C. during takeoff. Before engine could be shut off, temperature reached 140° C. Caused by failure of oil cooler bearing. □ (H series) Hydraulic light came on during hover. Elbow tube and hose fitting failed, causing loss of hydraulic oil. □ (H series) When hydraulic switch was turned off, cyclic moved rapidly to left rear quadrant. Aircraft pitched up 20 degrees and rolled left 30 degrees. Switch was turned on and normal flight was regained. Cyclic hardover was caused by failure of irreversible valve. □ (H series) Engine oil pressure dropped to zero during descent. Caused by failure of pressure indicator. □ (H series) Rpm fluctuated during flight. Caused by defective overspeed governor.

UH-60 Class D mishaps □ Crew heard loud bang, and No. 2 engine torque dropped. Single-engine landing was made. No. 2 engine drive shaft separated from input module flange. This allowed drive shaft to drop in forward support tube, causing damage to support tube and shearing drive shaft. □ Loud whining noise was heard from No. 2 engine. Pilot started toward the ground to release sling load. About 6 feet off the ground, pilot inadvertently released the load, consisting of 500 gallons of fuel.

Attack helicopters

AH-1 Class E mishaps □ (S series) Roll SCAS hardover on final approach was caused by failure of control transducer. □ (S series) Master caution and engine oil bypass lights came on during takeoff. Caused by failure of No. 3 and No. 4 engine bearing packs. □ (S series)

Engine oil pressure fluctuated during hover. Caused by faulty oil pressure transducer. □ (S series) As aircraft was proceeding NOE through an open field, en route to a firing position, a parachute from a 155mm flare was sucked up from the ground by rotorwash. The parachute and flare were then blown through the main and tail rotor systems. □ (S series) Master caution and transmission oil hot lights came on, and engine and transmission oil temperatures rose. Caused by failure of engine oil cooler bearings.

Cargo helicopters

CH-47 Class D mishap □ (A series) Water trailer was being lifted off the ground. As load was clearing the ground, strap on left rear of load caught under the frame area. Load overturned as it cleared the ground.

Observation helicopters

OH-58 Class E mishaps □ (A series) Aircraft was in rapid POL area, with collective full down and engine at idle. CH-47 behind OH-58 picked up and hovered from left rear to front of OH-58. OH-58 was turned left on POL pad at rather rapid rate. Right pedal was not effective. Pilot suspected possible stressing of vertical fin. No damage was found. □ (A series) Transmission oil hot light came on. Caused by hole in oil cooler duct hose. □ (C series) Aircraft was No. 5 in a 6-aircraft formation. When formation began right turn, pilot sitting in right seat increased collective to maintain position in formation and exceeded torque limitation to 102 percent. □ (C series) Master caution and fuel filter lights came on. Caused by failure of fuel filter pressure switch. □ (C series) Low rpm light and audio activated during landing. Caused by failure of N1 tachometer generator.

Fixed wing

C-7 Class E mishaps □ Left engine low fuel pressure light came on and fuel pressure fluctuated during flight. Caused by defective fuel pressure switch. □ When main landing gear selector was placed up during takeoff, right gear lagged left gear retraction by 12 seconds. Caused by binding in right gear fittings.

U-21 Class E mishaps □ (A series) Left main landing gear indicated unsafe during approach. Caused by broken wire on gear down lock indicator switch wire bundle. □ (RU-21H) Left generator failed during flight. Caused by worn-out brushes.

Messages received

• Safety-of-flight emergency message grounding all series UH-1 aircraft (except C/M models) (UH-1-84-06, 122040Z Jul 84). Summary: Preliminary analysis of a recent UH-1H accident indicated a fatigue failure of the pitch change link clevis, P/N 204-011-136-1, NSN 5340-00-839-3934. This is the only known failure of this part during the many years and millions of operational flying hours of the UH-1 series helicopter. Analysis revealed that the part had been replated, and the failure may have been initiated by hydrogen embrittlement. A visual inspection will be performed on UH-1 helicopters to determine if installed clevises show any indication of having been replated. If evidence of replating is present, part will be immediately removed from service. Contact: Ken Luber, AUTOVON 693-1683, commercial 314-263-1683.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202. ■

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**3**	**5**
4th Qtr	July	5	7	1-25 July	**2**	**3**
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**32**	**32**

Drug quiz

Commanders have the authority to test for drug abuse during health and welfare inspections or in cases where they have probable cause to suspect violation of the Uniform Code of Military Justice. Urinalysis tests are also routinely performed following any aviation mishap. By drug abuse, we mean the use of any chemical substance for nonmedicinal purposes which results in the impaired physical, mental, emotional, or social health of the user. And remember, flight crewmembers should not take medications or drugs of **any** kind without clearance from a flight surgeon.

To test your knowledge of drug abuse, take the following quiz. Some questions have more than one answer. The answers are on page 6. This quiz is reprinted from "Let's Talk About Drug Abuse," published by the Alcohol, Drug Abuse, and Mental Health Administration, Department of Health and Human Services.

1. During which period(s) was drug abuse a problem in the United States?
   (a) during the Civil War
   (b) in the 1950s
   (c) in the 1960s
   (d) All of the above

2. Which age group has the highest percentage of drug abusers?
   (a) 10-17
   (b) 18-25
   (c) 26-35
   (d) 36-60
   (e) 61 and over

3. How do most drug abusers make their first contact with illicit drugs?
   (a) through "pushers"
   (b) through their friends
   (c) accidentally
   (d) through the media

4. Which of the following is the most commonly abused drug in the United States?
   (a) marijuana
   (b) alcohol
   (c) cocaine
   (d) heroin

5. Which of the following poses the greatest health hazard to the most people in the United States?
   (a) cigarettes
   (b) heroin
   (c) codeine
   (d) LSD
   (e) caffeine

6. Which of the following is not a narcotic?
   (a) heroin
   (b) marijuana
   (c) morphine
   (d) methadone

7. Which of the following is not a stimulant?
   (a) amphetamine
   (b) caffeine
   (c) methaqualone
   (d) methamphetamine

8. Which of the following drugs is not known to cause physical dependence?
   (a) alcohol
   (b) morphine
   (c) peyote
   (d) secobarbital
   (e) codeine

9. Which of the following poses the highest **immediate** risk to experimenters?
   (a) inhalants
   (b) marijuana
   (c) nicotine
   (d) LSD

10. Overall, why is intravenous injection the most dangerous method of using illicit drugs?
   (a) because the drug enters the system so rapidly
   (b) because nonsterile equipment and solutions can cause serious complications
   (c) because users usually get a larger amount of the drug by this method
   (d) (a) and (c) only
   (e) (a), (b), and (c)

11. When does a person who uses heroin become physically dependent?
   (a) immediately (first time)
   (b) after four or five times
   (c) after prolonged use (20 times or more)
   (d) different for each person

12. When people become dependent on heroin, what is the primary reason they continue to take it?
   (a) experience pleasure
   (b) avoid withdrawal
   (c) escape reality
   (d) gain acceptance among friends

13. Which of the following has (have) been used effectively to treat drug abusers?
   (a) methodone maintenance
   (b) detoxification (medically supervised drug withdrawal)
   (c) drug-free therapy
   (d) psychotherapy
   (e) all of the above

14. Which of the following are social costs of drug abuse?
   (a) loss of employee productivity
   (b) increased possibility of auto accidents
   (c) depletion of already scarce drug abuse services
   (d) (b) and (c) only
   (e) (a), (b), and (c)

15. What is the most unpredictable drug of abuse on the street today?
   (a) PCP
   (b) heroin
   (c) LSD
   (d) alcohol

Aviation mishap prevention forum

Don't be a sharpy!

Corroded Chinook flight control system bellcranks can cause the bird's controls to bind—or fail—in midair.

Your CH-47 has lots of bellcranks in its flight control system. Some are more exposed to the elements than others. Eyeball them all for a scaly, blistered appearance. The paint will be discolored, usually with deposits of gray or white powder.

No corrosion is allowed. If you spot it, the bellcrank has to be cleaned and treated. You may be able to do the job without removing the part.

But never use knives, screwdrivers, or other sharp tools to check bellcranks for corrosion. You'll scratch the part and remove the protective finish. The result is more corrosion.

Treat corrosion, scratches, gouges, and other minor damage according to paragraph 11-119 in TM 55-1520-227-23-4. ■

—from PS magazine

Questions for aviation personnel

1. The aviator can directly affect angle of attack by varying collective pitch. What other factors, over which the aviator has little control, also affect angle of attack? **Reference: FM 1-203, Fundamentals of Flight**

2. What is the proper way to store aircraft rubber goods, kits, or accessories containing rubber goods? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual, with change 33**

3. How often should you check and record the pressure differential of the filter/separator? **Reference: FM 10-68, with change 3, Aircraft Refueling**

4. What is metal fatigue? **Reference: DA Pamphlet 385-95, Aircraft Accident Investigation and Reporting** ■

Black Hawk field problems/logistics assistance

If you need technical or logistical help, the first step is to call or visit your local AVSCOM Logistics Assistance Representative (LAR). If the local LAR cannot solve your problem on-site, he will request assistance from the AVSCOM in-house LAR (Mr. Dave Adams, AUTOVON 693-3469 or commercial (314) 263-3469). If Mr. Adams cannot solve the problem, he will request assistance from AVSCOM Engineering. AVSCOM Engineering requires 48 hours for urgent requests and 15 days for normal requests. Upon completion of the engineering effort, corrective data or parts disposition will be passed to the in-house LAR who will then pass the information to your local LAR who will in turn solve your problem. Sounds easy and it should work great if only you follow the ground rules:

- First point of contact is **always** your local Black Hawk LAR. If not available, phone problem to AVSCOM in-house LAR.
- In all cases, priorities must be established. Everything is not urgent.
- Be specific. Need facts with points of contact.
- Follow up in all cases with local or in-house LAR.
- Do not (except in emergencies) contact AVSCOM Engineering directly. ■

—from USAAVSCOM Materiel Readiness Information Bulletin

Answers to last week's questions

1. Which of the following should be stenciled on filter separator housings: next change due date; number of elements inclosed; date elements were last changed; maximum acceptable pressure? Date elements were last changed. **FM 1-68, page 2-7, paragraph 2-14**

2. When staking new bearings into a housing, why should pressure be applied gradually and evenly around the housing? Uneven pressure may deform bearing outer race and cause roughness or binding. **TM 55-1500-204-25/1, with change 33, page 3-28a, paragraph 3-69b(7)**

3. Name the three types of drag, the sum of which comprises total drag on an aircraft. Parasite, profile, and induced. **FM 1-203, page 2-12**

4. Do O-rings used in aircraft maintenance have an indefinite shelf life? Yes, O-rings used in aircraft maintenance have an indefinite shelf life, so ignore the expiration date stamped on the package. Always perform a serviceability inspection before using one, though. If it's cut, nicked, brittle or flawed, get rid of it. No need taking your chances on a bum O-ring. TM 55-1500-204-25/1 will be changed to reflect this information. POC at AVSCOM is Mr. Steinert, AUTOVON 693-1639. **PS Magazine, Issue 372, November 1983** ■

Answers to drug quiz

1. (d) All of the above. Drug use is as old as history, and certain periods of U.S. history are associated with special drug abuse problems.

2. (b) 18-25

3. (b) Through their friends.

4. (b) Alcohol. Many people in the United States have trouble with alcohol, and estimates show that about 10 million are dependent on the drug.

5. (a) Cigarettes. Approximately 300,000 deaths annually from coronary disease, other heart disease, lung cancer, respiratory disease, and other types of cancer have been linked to cigarette smoking.

6. (b) Marijuana. In the past, marijuana was legally classified as a narcotic, but it isn't now. Marijuana's psychopharmacological effects (the way a drug works on a person's mental and physical system) differ from the effects of narcotics.

7. (c) Methaqualone. Methaqualone is a nonbarbiturate sedative-hypnotic called a "lude" or "soaper" on the street. But it, like the stimulant drugs, is also a drug of abuse.

8. (c) Peyote. Physical dependence on mescaline (the active ingredient of the peyote cactus) or other hallucinogens has not been verified.

9. (a) Inhalants. Sniffing aerosols or other volatile substances can result in immediate death.

10. (e) The danger of contracting hepatitis or other infection is often overlooked by drug users who inject with nonsterile equipment.

11. (d) Different for each person. Although the time it takes for a person to become physically dependent on heroin varies, we do know that repeated use ultimately causes physical dependence. Some people become physically dependent after using heroin as few as three or four times.

12. (b) Avoid withdrawal. When people stop taking heroin after they have become physically dependent, they develop withdrawal symptoms: vomiting, muscle spasms, profuse sweating, insomnia, and other physical conditions. If they once again begin to take the drug, withdrawal symptoms disappear.

13. (e) All of the above. All have been used successfully, both individually and in combination, to treat drug abusers.

14. (e) Hours lost from productive work, increased traffic accidents caused by driving under the influence of drugs, and dollars spent on treatment and law enforcement programs—these are the social costs we all pay, one way or another, for drug abuse.

15. (a) Phencyclidine (PCP, "angel dust"). Phencyclidine is an unpredictable and highly dangerous drug. Its use has been associated with bizarre and violent behavior, with accidents, and with psychotic episodes. ■

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Fort Rucker, Alabama 36360

A debt which must be paid

You've been working 12 hours a day 7 days a week for 3 weeks. You haven't been sleeping well because of the high temperature and humidity. On top of that, your hay fever is giving you fits. You feel completely washed out, but you've just got to test fly that UH-1 coming out of maintenance this afternoon. What to do? Tell your supervisor you're over the maximum duty period for crew rest and too tired to fly or go ahead and do this mission? If you're a typical pilot, you won't complain, especially if others in the unit have been working just as hard. You'll take the mission and do your best, which may not be good enough this time to get you and your aircraft back down in one piece.

Why do people work themselves into these situations and then hate to admit they're tired? They do it for many reasons—pride, sense of responsibility, conscientiousness, poor work practices, being undermanned and overcommitted. Whatever the reason, pilots who step to their aircraft tired make more mistakes and catch fewer of them.

An IP who had worked 11 consecutive days landed his T-42 gear up. Another IP who had been on duty 35 of the last 48 hours became spatially disoriented and placed his UH-1 in a left descending turn from which he could not recover. A CH-47 pilot who had been working 13-hour duty days for several weeks induced rotor overspeed while entering autorotation. This cost the Army $82,000. A pilot who had worked more than 16 hours and then slept about 3½ hours terminated an approach at a 1-foot hover and allowed his UH-1 to drift in blowing dust. When the right skid touched the ground, the pilot applied collective pitch instead of reducing pitch to place the aircraft on the ground. This caused the Huey to roll onto its right side.

Fatigue was listed as a cause factor in 34 Class A, B, and C mishaps in a recent 3½-year period. Fatigue can be caused by many things. Some of these are excessive flying and duty time, experience levels, cockpit temperature, humidity, self-regulated crash diets, missed meals, task oversaturation, hypoglycemia, a recent illness, emotional problems, and sleep loss. Sleep loss or lack of quality sleep may contribute to fatigue more than anything else. There have probably been times when you felt like forgetting everything and sleeping for a week. When this happens, your body and mind are trying to tell you that you are a prime candidate for a mishap.

There are two types of fatigue, acute and chronic. Acute fatigue is more common and is caused primarily by excessive mental or physical activity. It is temporary and can usually be relieved by a period of sleep or rest and relaxation. Research has shown that short-term fatigue affects flying skills by disrupting timing flow and perceptual field.

Chronic fatigue is a long-term problem and is frequently induced by continual stress and sleeping difficulties. Stress has been cited as a contributing factor in several aircraft mishaps. An extended period of time is usually required for recuperation from chronic fatigue.

Fatigue can affect pilots in many ways. It produces carelessness, sloppiness, slowed or inappropriate reactions, overconfidence, and a tendency to forget or omit items. Some common signs of fatigue are irritability, headache, poor coordination, muscle and joint discomfort, continual yawning, and burning and scratchy eyes.

Controlling fatigue

Whatever the average workday, there will always be people putting in more time. Long duty hours and lengthy exercises will continue. Following are some things you can do to reduce the likelihood of fatigue:

- Only you know how tired you are. Learn to recognize the symptoms of fatigue. Before every mission, include fatigue when assessing your personal capability of performing the mission. It's tough to ask to be removed from a mission, but the consequences can be a lot tougher.

- The "8 hours of rest per night" requirement is a good guideline, but the amount of sleep may have less effect on performance than where in the usual sleep-wake cycle a task is performed. Set a goal of getting at least **your** usual amount of sleep before a mission.

(continued on back page)

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class B mishap □ (H series) Aircraft was No. 4 in a flight of four on a training mission. All four aircraft landed near a tree line. Following simulation of unloading troops, the aircraft were to pick up to a hover, make a right 180-degree turn, and take off. Aircraft 1, 2, and 3 lifted off and departed. As No. 4 lifted off and made a right turn, the heel of the right skid hit the ground. Main rotor blades hit ground and aircraft came to rest on right side. 8445

UH-1 Class D mishap □ (H series) High-pitched noise was heard and high frequency vibration felt during flight. Pilot began immediate descent to open field. Egt rose to near red line and N1 was fluctuating. Crew felt engine and rotor rpm beginning to decay. Full autorotation was entered with the throttle closed position to minimize engine damage. Crew had to extend glide to make open field. Aircraft bounced once and landed with damage to rear cross tube landing gear straps and FM antenna.

UH-1 Class E mishaps □ (H series) Series of compressor stalls occurred, aircraft yawed about 20 degrees, and engine and rotor tachometer needles split momentarily. Caused by malfunction of fuel control. □ (H series) Nose yawed to right and torque fluctuated during landing. Caused by failure of bleed band activator. □ (H series) Master caution and hydraulic lights came on, and cyclic control became stiff. Running landing was made. Caused by failure of flexible hydraulic line. □ (H series) Engine oil temperature rose to 110 degrees. Caused by failure of deicing valve. □ (H series) Transmission oil pressure indicated zero during flight. Caused by failure of oil pressure transmitter. □ (H series) N2 engine needle dropped to zero. Caused by failure of N2 tachometer generator.

UH-60 Class E mishaps □ Whistling noise was heard during flight. Inspection revealed crack in main rotor blade on surface underneath boot. □ Left accessory module light came on. Caused by oil leak at No. 1 engine gimble seal.

Attack helicopters

AH-1 Class C mishap □ (S series) Aircraft was at 15-foot hover for firing mission. Pilot moved master arm switch from standby to arm. Armament switches were pressed in TSU guns, track action bar was depressed, and 40mm gun was engaged tc fire. Ten to fifteen rounds of ammo impacted beneath aircraft. Both main rotor blades and bottom of fuselage were damaged. Malfunction of interface control unit allowed grenade launcher to fire almost straight down.

AH-1 Class E mishaps □ (S series) IP fired one pair of 2.75-inch rockets at a target. One rocket on left side of aircraft failed to leave rocket launcher, resulting in hang fire. This was caused by the fins on the rocket opening inside the tube. The IP saw the rocket launcher on fire with six rockets remaining. He selected the inboard jettison switch and depressed the collective head switch to jettison the pods. Both pods failed to jettison. The IP depressed inboard and outboard jettison switch and both pods jettisoned. □ (S series) IP on night vision goggles training mission felt slight feedback in pedals and smelled smoke. Alternator rectifier light and d.c. generator light came on. IP landed aircraft, took off his goggles, and realized smoke was so bad it was hard to see out of the cockpit. Generator alternator showed signs of electrical fire damage. □ (S series) Copilot's torquemeter read 105 percent and pilot's read 97 percent during flight. Caused by failure of pilot's torque oil pressure transducer.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**3**	**5**
4th Qtr	July	5	7	July	**2**	**3**
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**32**	**32**

Cargo helicopters

CH-47 Class D mishap □ (D series) While aircraft was making left turn of 8 degrees bank at 110 knots, sling load became unstable and hit aircraft. Underside of aircraft was damaged.

CH-47 Class E mishaps □ (C series) Transmission oil hot light came on. Caused by faulty connection in C-box temperature bulb wiring. □ (C series) Utility hydraulic pressure went to zero. Caused by failure of utility pump.

CH-54 Class E mishap □ (A series) Right corner windscreen panel began to separate from frame during flight.

Observation helicopters

OH-58 Class E mishaps □ (C series) D.C. generator and master caution lights came on. Caused by failure of voltage regulator. □ (C series) While hovering out-of-ground-effect with tailwind, copilot made 90-degree left turn. Pilot saw torque at 105 percent and landed. □ (C series) Master caution and fuel boost pump lights came on. Caused by failure of boost pump. □ (A series) Engine-out light came on when throttle was rolled to flight idle during shutdown. Caused by failure of rpm sensor. □ (A series) Master caution and engine chip detector lights came on. Caused by short in upper engine chip detector.

Fixed wing

C-12 Class E mishap □ (D series) Pilot placed gear handle in up position after liftoff. Red lights in gear handle were on, but a few seconds later lights went out and gear retraction noise was heard. Aircraft was flown to airfield and gear lowered manually. Grounding bolt on landing gear motor was found to be loose.

OV-1 Class E mishap □ (C series) Smoke was seen trailing from left main landing gear after takeoff. Caused by ruptured cell in left main gear cylinder.

U-21 Class E mishap□ (A series) Smoke and electrical fumes came from vicinity of master switches during flight. Caused by failure of electromagnetic relay.

Maintenance

UH-1 Class C mishap □ (H series) Loud noises were heard from rear of aircraft during engine runup, followed by rise in egt to 700° C. When engine was removed 2 days later, 6-inch socket driver fell out of engine inlet area.

UH-1 Class E mishaps □ (V series) When pilot entered standard autorotation, he retarded throttle past idle detent, causing shutdown. IP took controls and landed. Flight idle solenoid was out of adjustment. □ (H series) N2 fluctuated during hover. Droop compensator was out of rig.

AH-1 Class D mishap □ (S series) During shutdown, copilot saw damage to drive shaft cover. Spin-style wrench with adapter and dzus tip were found in drive shaft area. Crew chief did not remove tool after maintenance, and crew failed to detect tool during preflight inspection.

OH-6 Class E mishap □ Fuel filter light came on. When starter generator was replaced, fuel differential pressure switch wire was allowed to get under starter generator V clamp. Wire was very taut and pulled loose during flight.

OH-58 Class E mishaps □ (C series) During preflight, pilot found drag pin bearing slipped out of its race. Bearing was staked incorrectly. □ (A series) Transmission oil hot light came on during landing. Maintenance personnel had replaced transmission pressure switch and failed to replace fluid. Aircraft was parked on a slope, causing fluid in sight gauge to appear to be at a safe level.

U-21 Class E mishap □ (A series) Fuel was seen siphoning from left main fuel cap during takeoff. Fuel cap had been replaced before flight and adjustment/tension nut was adjusted incorrectly.

Messages received

- Safety-of-flight maintenance mandatory message concerning supplemental inspection criteria for pitch change link clevis (UH-1-84-07, 171645Z Jul 84). Summary: This message provides the procedure for using X-ray inspection of the clevis to more accurately determine crack initiation or propagation. The X-ray inspection will be performed only on those clevises which have previously been determined as suspect based on the visual inspection criteria provided in safety-of-flight message UH-1-84-06. Contact: Mike Behnen, AUTOVON 693-1525, commercial 314-263-1525.

- Safety-of-flight emergency message grounding all series UH-1 aircraft with thin wall masts (UH-1-84-08, 181830Z Jul 84). Summary: A command decision has been made to ground all UH-1 helicopters with thin wall masts. Aircraft will remain on red X status until thick wall masts are installed. Contact: Ken Luber, AUTOVON 693-1683, commercial 314-263-1683.

- Maintenance information message concerning UH-1 transmission oil system quick disconnect (MIM-UH-1-84-MEM-08, 191845Z Jul 84).

- Maintenance information message concerning deletion of recordkeeping for certain UH-60 components (MIM-UH-60A-MEM-84-03, 191905Z Jul 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202. ■

Aviation mishap prevention forum

Answers to last week's questions

1. The aviator can directly affect angle of attack by varying collective pitch. What other factors, over which the aviator has little control, also affect angle of attack? Blade flapping, blade flexing, and gusting winds or turbulent conditions. **FM 1-203, page 2-13**

2. What is the proper way to store aircraft rubber goods, kits, or accessories containing rubber goods? Store them in a dark, cool, dry place, protected from excessive heat and exposure to strong air currents, dampness,and dirt. **TM 55-1500-204-25/1, page 2-56, par. 2-180a(1)**

3. How often should you check and record the pressure differential of the filter/separator? Daily. **FM 10-68, with change 3, page 2-7, par. 2-14c; page 8-13, par. 8-9a(2)**

4. What is metal fatigue? When metal is subjected to excessive, continuous stress, overload, or excessive vibration over a period of time, the ability of the metal to withstand established stress limitations progressively decreases. Such a condition is called metal fatigue and can result in metal fracture, shear, or warp. **DA Pamphlet 385-95, page D-1, par. D-1** ■

Aircraft fuel tester/sampling device

The aircraft fuel tester/sampling device, NSN 4910-01-129-7273, is used for daily or preflight sampling of fuel for all aircraft to check for water in fuel cells. The device has a built-in screwdriver bit with flat blade and phillips type to provide means for opening access panels. This device can also be used to determine the octane rating of the fuel being used. This is a stock fund item with a unit price of $3.46. Stock is currently on hand. The item is authorized as follows:

- One each - fly away equipment aircraft
- One each - AVUM #1
- One each - AVUM #2
- One each - AVIM tool complex
- One each - AVIM nondivisional
- One each - general support tool crib

—from USAAVSCOM Materiel Readiness Information Bulletin

Cowling latch PM

Opening the OH-58 latches the right way can stop maintenance downtime and parts replacement. Could keep you from getting a steel-punctured thumb, too!

If you pop open the engine cowling side panel latches with a tool or your thumb, you'll damage the bird when the spring-loaded latch hits the cowling skin or the cotter pin breaks the latch spring. Next time you open the cowling, you could get a thumb full of steel spring.

Adding a doubler to reinforce the panel is expensive and time-consuming. So, open the latches with both thumb and finger to stop the spring-loaded latch from striking the skin hard or the pin from breaking the spring. ■

—from PS, Issue 379

Trigger switches NSN

Use NSN 1680-01-043-8759 to get a replacement intercom trigger switch for your Huey's cyclic stick. It's shown as item 12, figure 353, in TM 55-1520-210-23P-2. The NSN doesn't show up on the AMDF, so use a DD Form 1348-6. Note in the remarks block that the NSN is not on the AMDF.

The RIC (routing identifier code) for this $7.76 item is FPZ. Use the highest priority you can justify.

Don't try to replace your trigger with NSN 5930-00-176-0193 (part of cyclic stick, item 26, figure 352). The two items aren't interchangeable.

It takes a little extra effort to order the right trigger. But it's a heap cheaper than replacing the entire grip assembly control at $348 a whack! ■

—from PS, Issue 379

Questions for aviation personnel

1. What publication must be referred to for specific requirements of maintenance operational checks and maintenance test flights? **Reference: FM 55-411, Army Aircraft Quality Control and Technical Inspection, dated April 1984**

2. Aircraft designated for transfer are inspected as soon as practical for condition and completeness of equipment. Adjustment of shortages for aircraft that are incomplete is accomplished according to AR ———. **Reference: FM 55-411, Army Aircraft Quality Control and Technical Inspection, dated April 1984**

3. The commander, USASC; commander, AVSCOM; commanders of field organizations/units; aviation safety officers; maintenance officers; and presidents of aircraft accident investigation boards are authorized to select components/parts for teardown and analysis. True or false? **Reference: DA Pamphlet 385-95, Aircraft Accident Investigation and Reporting** ■

FY 85 USASC aviation safety courses

Four specialized DA-level aviation safety training courses will be presented at the Army Safety Center during FY 85.

The Aviation Safety Officer Course (ASOC) is an 8-week course. The objective of this course is to provide education and training in the techniques of managing an effective safety program as it applies to aviation accident prevention. Upon successful completion of the ASOC, the appropriate Additional Skill Identifier (ASI 1S: commissioned officer) or Special Qualification Identifier (SQI Suffix B: warrant officer) will be awarded.

Personnel eligible to attend the ASOC include Army aviators assigned, or selected for assignment, to ASO/FST positions; Civil Service Army flight instructors; contract civilian Army flight instructors; installation command safety directors, or their assistants, where such installations have Army aircraft assigned; other military personnel as approved by the Deputy Chief of Staff for Operations; and foreign military training sponsored allied students as approved by the Security Assistance Training Field Activity, Army Training and Doctrine Command.

Proficiency in basic algebra and trigonometry is required. High school level physics or equivalent is mandatory. A review of these subjects prior to attendance is advisable. A minimum of 3 years of experience in aviation units is required.

The Chief, Aviation Management Branch, Professional Development Division, Office of Personnel Management Directorate, MILPERCEN, manages the quota allocation of 35 students per class. ASOC quotas are further suballocated by MILPERCEN to appropriate agencies based upon worldwide aviation safety requirements.

Course Schedule

Class	Start	Close
85-1	10 Jan 85	6 Mar 85
85-2	18 Apr 85	12 Jun 85
85-3	1 Aug 85	25 Sep 85

The Aviation Accident Prevention Course for Officers (AAPC-O) is a 2-week course. The objective of this course is to train Army aviation personnel of the Active and Reserve components in the techniques of establishing and conducting aircraft accident prevention programs and in conducting aircraft accident investigations. Rated Army aviators (commissioned and warrant officer) of the Active and Reserve components, DA civilians, and contractor civilians assigned to aviation safety, maintenance, flight or operations positions may attend. Previous formal safety training is not required. Nonrated DA civilians may substitute completed FAA Private Flying Certificate in lieu of Army rating.

Course Schedule

Class	Start	Close
85-1	4 Mar 85	12 Mar 85
85-2	13 May 85	24 May 85

The Aviation Accident Prevention Course for NCO (AAPC-NCO) is a 2-week course. The objective of this course is to train noncommissioned officers and DA civilians in the techniques of supervising Army aircraft mishap prevention programs from the standpoint of the firstline supervisor. Graduates will be able to identify and control hazards primarily in the aircraft maintenance and operations areas. Active Army and Reserve component enlisted personnel in grades E6 and above in aviation-related MOS (67 series, 68K, and 71P), performing at firstline supervisory level in Army aviation units and staffs; DA civilians GS-5 through GS-9; and U.S. Army wage grade maintenance supervisors may attend. No previous formal safety training is required.

The AAPC-NCO is an Additional Skill Identifier producing course which awards ASI A2 to those enlisted servicemembers holding an MOS in the 67-series or MOS 68K/71P who successfully complete the academic requirements and participate in the aviation mishap prevention survey.

Course Schedule

Class	Start	Close
85-1	15 Oct 84	26 Oct 84
85-2	1 Apr 85	12 Apr 85

Aviation Safety Officer Refresher Course (ASORC) is a 1-week course designed to provide school-trained aviation safety officers/safety professionals with up-to-date information on the Army Safety Program and accident prevention process. This course includes an aviation systems review. Attendees must be graduates of the Army Safety Center or University of Southern California ASOC and must have completed the ASOC a minimum of 1 year before attending the ASORC.

Additional information concerning safety courses conducted by the Army Safety Center is contained in the U.S. Army Formal Schools Catalog, DA Pam 351-4.

Course Schedule

Class	Start	Close
85-1	1 Oct 84	5 Oct 84

Point of contact at the Safety Center is Ms. Fran Souders, AUTOVON 558-4479/3164. ■

A debt which must be paid

• Nutrition is very important. Well-balanced meals eaten at proper intervals will prevent hypoglycemia. Eat a high protein meal early in the duty day to help combat fatigue.

• Exercise daily. Studies have proven that people in good physical condition are more mentally alert, have a greater capacity for work, are more cheerful, and have a better outlook on life than those who neglect their physical condition. You should, however, avoid strenuous exercise immediately before a flight.

• Avoid excessive alcohol and caffeine. They depress sleep and make it more difficult to adapt to schedule changes. Caffeine is present in many soft drinks as well as cocoa, tea, and coffee.

• Drink plenty of fluids to prevent dehydration, but not coffee. Too much coffee causes dehydration. So does alcohol. Water, juices, and milk are the best liquids for hydration. Drink enough fluids to keep the color of your urine relatively light.

• Avoid long exposure to the sun before a flight.

• Smokers are more susceptible to fatigue. The more you smoke, the less oxygen goes to your brain. If you can't quit entirely, at least cut down before flights.

Maintenance personnel are also subject to fatigue. Two mechanics left a screwdriver in the No. 2 engine inlet of a CH-47. The maintenance test pilot performed the preflight inspection while several maintenance functions were still in progress and did not see the screwdriver. It cost $40,000 to repair the damage that occurred when the engine was started. The mechanics and maintenance test pilot had been working extremely long hours for 5 days, were skipping meals, and were getting little rest. The maintenance test pilot admitted that everyone had been putting in too many long hours and were exhausted. Supervisors of maintenance personnel should be alert for fatigue symptoms and insure their personnel are given adequate rest periods.

Commanders and supervisors should discourage conditions which would enable the development of bad habits such as overexertion, moonlighting, heavy smoking, alcohol overindulgence, etc. Commanders, flight surgeons, and aviation safety officers should have an intimate knowledge of their personnel so they can monitor them for signs of fatigue and intervene when necessary.

AR 95-1 requires commanders to design a crew rest program tailored to their unit missions and include it in their SOPs. Supervisors should always comply with the crew rest policy when planning missions and assigning crews. Good management and supervision are indispensible factors in reducing fatigue.

Fatigue is a difficult problem to cope with because it often goes unrecognized. The ultimate responsibility for minimizing fatigue rests with each crewmember and maintenance person. Personnel should get sufficient sleep and proper nourishment and not engage in off-duty activities which would prevent them from reporting for duty fully rested and mentally alert. It is also the responsibility of each crewmember to tell the supervisor or commander when he has reached or is approaching the prescribed flight-time limits.

Fatigue is truly a debt which must eventually be paid. ■

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362-5363 □ Vol. 12, No. 43 □ 8 Aug 1984

Accident review: aircraft limitations exceeded

US Army Aviation Training Library
Fort Rucker, Alabama 36360

Synopsis

A UH-60 pilot was demonstrating the flight characteristics of the aircraft. The pilot completed a low-level, high-speed pass over the runway. During a second high-speed pass, the pilot put the aircraft into a right bank which exceeded 90 degrees. Control was lost and the UH-60 crashed and slid into a block building.

History of flight

A UH-60 was flown to an airfield to participate in a fly-in and static display scheduled for the next day. The pilot knew that he would also be doing a flight demonstration. That night, the pilot attended a party, where he was asked by two people if they could ride in the aircraft the next day. The pilot approved the request.

The next morning, the copilot requested permission from the airfield commander to fly passengers. The commander emphatically replied in the negative. When the aircraft was started for the flight demonstration, there were six personnel on board—the pilot, copilot, crew chief, and three passengers. Two of the passengers were the ones who had approached the pilot the night before and the third passenger simply boarded the aircraft as it was being started. At no time during the runup or flight did the pilot and copilot discuss the passengers. A safety briefing was not given to the passengers before the flight.

The pilot hovered the aircraft to the north end of the airfield where he did his engine health indicator test and hover performance checks. The pilot then made a vertical takeoff to an altitude of 1,500 feet above ground level (agl), followed by two 360-degree descending, spiraling turns to about 700 feet agl. He then flew south along the runway, making a left descending turn into a valley east of the runway.

The pilot did a hazards recon of the valley, came to a hover behind the trees which were between the valley and the runway, and did a masking/unmasking maneuver. When this maneuver was completed, the pilot flew across the runway from east to west to set up for a low-level, high-speed pass down the runway from north to south with a cyclic climb and right break. This maneuver was accomplished without incident, but the pilot did attain 190 knots indicated airspeed on the pass, which exceeded the aircraft limitation of 170 knots in its present configuration.

The next maneuver was scheduled to be a low-level, high-speed pass over the same track as the previous maneuver, with a 90-degree right bank and return for landing. As the pilot was

(continued on back page)

A UH-60 pilot placed his aircraft in a bank angle which exceeded 90 degrees. Altitude was lost, and the aircraft crashed, injuring its six occupants.

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (H series) Aircraft hit tree during hover in confined area. Main rotor blade was damaged. □ (H series) Large bird flew into aircraft, breaking windscreen. □ (H series) Copilot saw wires on short final approach to LZ and warned pilot. Pilot flared aircraft to stop forward movement, but aircraft hit wires and landed hard on tail skid and heels of skid tubes.

UH-1 Class E mishaps □ (H series) Master caution and transmission oil pressure lights came on during takeoff. Caused by failure of internal filter transmission gasket. □ (H series) Engine oil temperature rose. Caused by failure of oil flow valve. □ (H series) Engine quit on short final for landing. Caused by seizure of power turbine. □ (H series) N2 dropped and low rpm audio sounded. Caused by low side governor failure. □ (H series) Master caution and hydraulic lights came on. Caused by failure of O-ring in hydraulic valve. □ (H series) Aircraft was trail in a flight of two. Lead aircraft saw wire and made cyclic climb. Pilot of trail aircraft initiated climb but not in time to miss wire. Lower wire cutter on trail aircraft cut wire and aircraft was landed with no damage. □ (H series) N2 tachometer went to zero and rotor rpm light came on during landing. Caused by failure of N2 tachometer generator.

UH-60 Class B mishap □ Aircraft hit and severed three ½-inch aluminum powerlines located about 400 meters short of the intended LZ. Aircraft was about 50 feet agl with a forward airspeed of 25 knots when the strike occurred. The cables were cut by the right main landing gear strut, and the recoiling of the severed powerlines damaged one main rotor blade and two tail rotor paddles. Aircraft was landed without further damage 40 meters from the strike. 8446

UH-60 Class E mishaps □ Excessive vibration was felt throughout airframe during takeoff. Caused by failure of antiflap assembly. □ Stabilator failed during takeoff. Caused by deficient stabilator amplifier.

Attack helicopters

AH-1 Class C mishap □ (S series) Aircraft hit tree while crossing a ridge. Main rotor blade, tail rotor blade, and synchronized elevator were damaged.

AH-1 Class E mishap □ (S series) N2 dropped and rotor decayed to 91 percent during takeoff. Caused by malfunction of overspeed governor.

Cargo helicopters

CH-47 Class E mishaps □ (C series) Fuel was seen coming from No. 2 engine during flight. Quick disconnect had come loose on engine deck. □ (C series) No. 1 generator kicked off and would not reset. Caused by failure of power protection panel for generator.

Observation helicopters

OH-6 Class B mishap □ Two aircraft were on a night vision goggles training mission. Pilot in trail aircraft flew his aircraft into a lake. Both pilots egressed unassisted. 8447

OH-58 Class A mishap □ (C series) Two aircraft were on a mountain navigation training mission. The No. 2 aircraft went into a nose-low, left bank, hit trees, and crashed. Pilot and copilot were killed. 8448

OH-58 Class E mishaps □ (C series) While flying through a valley, pilot saw a wire pass under chin bubble. Aircraft hit the top wire of a set of three high tension wires. Wire was severed by wire cutter, with no damage to aircraft. □ (A series) Resistance to left cyclic movement was felt during takeoff. Caused by

failure of swashplate and support assembly bearings. □ (A series) Binding in collective was caused by corrosion on bellcrank bolts. □ (C series) Vertical vibration was felt during flight. Top of main rotor blade peeled back 4 inches from tip. □ (A series) IP noticed N2 at 104 percent during hover. Caused by failure of linear actuator.

Fixed wing

OV-1 Class D mishap □ (D series) Vibration was noticed when brakes were applied after extended taxi. Right tire was on fire. Suspect failure of right main landing gear assembly caused brake to drag during taxi.

OV-1 Class E mishaps □ (D series) Left propeller would not come out of reverse thrust during landing. Caused by failure of control relay. □ (D series) No. 2 engine torque dropped to zero and circuit breaker popped during takeoff. Caused by failure of engine torque inverter.

C-12 Class E mishap □ (C series) When power was applied for takeoff, No. 1 engine had high tgt, low torque, and high fuel flow. Caused by failure of low pressure bleed valve to close.

Maintenance

UH-1 Class E mishaps □ (H series) Egt gauge fluctuated between zero and 500° C. during approach for landing. Poor solder repair to previous break in wire at cannon plug allowed connection to fail. □ (H series) Hydraulic light came on. Hydraulics were lost and control surges were felt. Hydraulic pressure line to tail rotor servo failed. Tube was crimped incorrectly during installation.

UH-60 Class E mishaps □ No. 2 fuel pressure light came on during landing. Fuel line O-ring separated. O-ring was the wrong size. □ Several caution lights came on during landing. Tail rotor servo pressure line was chafing against cowling fastener rivets, causing line to fail.

AH-1 Class E mishap □ (S series) Aircraft developed severe vibration during runup. Shims were not installed correctly. This did not allow swashplate to seat properly. When aircraft was run up, swashplate assembly seated, causing vibration.

OH-58 Class E mishap □ (C series) Engine flamed out during runup. When crew chief washed aircraft, he flushed fuel vent tube with water hose, putting 3 to 5 gallons of water in fuel cell. Crew chief mistook fuel vent tube for engine deck drain.

U-21 Class E mishap □ (A series) Fuel was seen siphoning from right engine nacelle fuel cap. Caused by twisted fuel cap chain retainer clip.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202. ■

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**3**	**5**
4th Qtr	July	5	7	July	**2**	**3**
	August	4	3	1-8 Aug	**0**	**0**
	September	6	0	September		
	Total for Year	40	23	Total to Date	**32**	**32**

Aviation mishap prevention forum

Answers to last week's questions

1. What publication must be referred to for specific requirements of maintenance operational checks and maintenance test flights? TM 55-1500-328-25. **FM 55-411, page 3-7**

2. Aircraft designated for transfer are inspected as soon as practical for condition and completeness of equipment. Adjustment of shortages for aircraft that are incomplete is accomplished according to AR _____. AR 735-11. **FM 55-411, page 3-8**

3. The commander, USASC; commander, AVSCOM; commanders of field organizations/units; aviation safety officers; maintenance officers; and presidents of aircraft accident investigation boards are authorized to select components/parts for teardown and analysis. True or false? True. **DA Pamphlet 385-95, page 6-16, par. 6-22** ■

Questions for aviation personnel

1. What TM addresses specific techniques and procedures used in shop welding? **Reference: TM 55-1500-204-25/1, with change 33, General Aircraft Maintenance Manual**

2. Why should dust plugs, dust caps, and moisture seals be used in aircraft systems when lines or units are disconnected for maintenance, repair, shipping, storage, and bulk material in freestock? **Reference: TM 55-1500-204-25/1, with change 33, General Aircraft Maintenance Manual**

3. Nondestructive inspection (NDI) is a tool of quality control inspection. Aircraft components may have suspected metal flaws which must be confirmed or denied in some manner. It may be that a defect is visible but the seriousness of it is not known. The defect must be evaluated by a technical inspector. That is when the technical inspector turns to NDI. The details and procedures of NDI are fully discussed in FM _____ and TM _____. **Reference: FM 55-411, Army Aircraft Quality Control and Technical Inspection, dated April 1984**

4. Arrival procedures (approach). An approach for straight-in landing may be initiated, regardless of ceiling and visibility. Descent on Category II approaches is restricted to the highest DH published for the procedure selected. True or false? **Reference: AR 95-1, with change 2, Army Aviation: General Provisions and Flight Regulations** ■

Airframe and powerplant license

It has been noted recently that there are many U.S. A&P-certificated maintenance technicians holding certificates with incorrect addresses. The certificate holder must remember that the U.S. Federal Aviation Administration (FAA) records are centralized in its record system at the Oklahoma City FAA Aeronautical Center and not maintained at individual district offices.

The FAA considers it mandatory that the certificate holder notify its Airman Certification Branch of any change in the holder's permanent address. Failure to do so could result in the denial of certificate privileges.

Change of Address Notification, AC Form 8060-55, may be obtained from any FAA district office. It is the responsibility of the certificate holder to obtain this form and process it. The form should be mailed to Airman Certification Branch, AAC-260, Mike Monroney Aeronautical Center, P.O. Box 25082, Oklahoma City, OK 73125. ■

—from General Aviation Airworthiness Alert #72

OV-1 landing gear mishaps

Thirty-one OV-1 mishaps involving landing gear occurred during the first 7 months of this fiscal year. Following are examples of these mishaps. Awareness of past mishaps helps prevent similar errors in the future.

- Aircraft touched down hard, bounced, and touched down again. Right main landing gear wheel and axle were broken and nose wheel tire was flat.
- Unsafe gear indication was caused by failure of down lock switch.
- Unseated landing gear dump valve prevented retraction of gear.
- Loose hydraulic line to brake cylinder caused loss of hydraulic pressure.
- Failure of lift check valve did not allow landing gear to retract completely, subjecting upper and lower fairings to wind damage.
- Control valve failed, allowing high pressure air from emergency gear extension system to leak into landing gear actuators, locking the gear down.
- Brakes were unevenly applied during rollout, causing tire to blow out.
- Left main gear torque arm assembly failed at both upper attaching points, allowing wheel to rotate clockwise. Left main gear assembly had to be replaced.
- Right main landing gear would not fully retract. Caused by overserviced landing gear oleo.

Aviation mishap prevention forum

• Gear would not retract. Caused by air in landing gear system.

• Landing gear did not extend. Loss of hydraulic pressure was caused by hydraulic line fitting in right main landing gear wheel well backing off.

• Strut was overserviced, causing right main tire to hang up on cuff door when retracted.

• Landing gear would not retract. Caused by air in landing gear system. ■

Vertical helicopter IFR recovery procedures (VHIRP)

The following item was first printed in the **U.S. Army Aviation Digest.** It was written by Mr. Jesse M. Burch, Jr., Army Air Traffic Control Activity, Aeronautical Services Office, Cameron Station, Alexandria, VA.

Recently the Aeronautical Services Office sent a letter to the various major commands and other Army activities soliciting their views on the following questions:

• Does a VHIRP fill a valid Army requirement?

• Does a VHIRP encourage commanders and aviators to exercise poor judgment and fly missions when weather conditions are such that they should not?

• Should the requirement for a VHIRP be eliminated?

In asking for a response to the above questions the following background information was provided:

• Two accidents occurred during one weekend in 1977 in which more than 25 people were killed. Both accidents were attributed to inadvertent IMC; both were administrative flights. As a result of these accidents the Army Aviation Officer directed that an operational procedure be devised to reduce the potential for such occurrence in the future. The initial procedure developed was generally known as the inadvertent IMC recovery procedure.

• Conceptually, the inadvertent IMC recovery procedure was intended to provide a standard reaction to instrument conditions encountered unexpectedly. It also provided instructions for the pilot on how to maintain control of the aircraft and what to do after control was established. Unfortunately, the latter instructions constituted an ATC clearance that had not been approved by FAA. Implementation of these procedures could have had disastrous results since the aircraft involved would be climbing, unknown to ATC and other IFR aircraft, into controlled airspace.

• The current VHIRP has been coordinated with, and agreed to by, FAA. It responds to the Army's requirement to provide safe recovery of helicopters encountering unexpected IMC while conducting tactical flight training in designated tactical flight training areas and to the FAA's concerns regarding noninterference with legitimate IFR traffic. When established, it is designed to get the aircraft from the point of encountering IMC to a place where a safe landing may be made and the pilot will not be cited for violating the FARs. Each procedure is designed on a case-by-case basis to accommodate the unique conditions at each location and is approved by FAA. In some locations lack of airspace, density of air traffic, or incompatibility with national airspace requirements preclude FAA approval and establishment of a VHIRP. When this occurs, the requirement for a VHIRP is waived.

• The significant differences between the inadvertent IFR recovery procedure and VHIRP are as follows:

VHIRP	IFR recovery procedure
(1) FAA coordinated	No FAA coordination/approval
(2) Airspace sterilized at recovery fix	No airspace/traffic separation provided
(3) Constitutes ATC clearance	No approved ATC clearance
(4) No violation	Possible violation
(5) Backup recovery procedure tactical flights only	Emergency procedure to be used by civil and military police alike

The overwhelming response to the Aeronautical Services Office letter was in favor of retaining the VHIRP requirement.

For information pertaining to VHIRP refer to AR 95-1, paragraph 1-16; AR 95-50, paragraphs 1-8, 1-25, and 4-5. ■

Insects strike again

A civilian pilot in Colorado was preflighting his aircraft when he found a yellow-green leafy substance in the drain and vent tubes. The pitot tube was clear because it was covered. A university professor analyzed the substance and found it to be the nest of an alfalfa leaf cutter. The professor said the insects were initially imported to Arizona as a fertilizer and have spread to Colorado. These insects, as well as other types, like to build nests in small places such as drain, vent, and pitot tubes. The nest of the alfalfa leaf cutter expands when moisture is applied to it, closing the tubes.

Be on the lookout for all types of nests in your aircraft. They could definitely cause trouble. ■

Aircraft limitations exceeded

positioning the aircraft for the maneuver, his routine was interrupted by the landing of a fixed wing aircraft. The UH-60 pilot made a 360-degree turn while the fixed wing aircraft cleared the runway.

The final pass was begun at an altitude of approximately 110 feet and airspeed of about 140 knots. At the end of the runway, the pilot put the aircraft into a right bank which exceeded 90 degrees. The aircraft initially yawed left, followed by a right yaw and a steeply banked right diving turn toward the ground. The pilot attempted recovery by increasing power to 100 percent torque available. Feeling that a crash was imminent, he tried to level and flare the aircraft just before ground contact. The UH-60 crashed in a nose-high, right-bank attitude and then hit a block building, breaking into four major sections and numerous smaller sections.

The six occupants remained in their seats throughout the crash sequence. The pilot, copilot, crew chief, and one passenger sustained major injuries. Two passengers sustained minor injuries.

Crewmember experience

The 27-year-old pilot had more than 600 rotary wing flight hours, with more than 300 in the UH-60. He had received no formal training or flight evaluation to insure he was qualified to perform the maneuvers he was performing during the flight demonstration even though a unit disposition form (DF) authorized him to perform these maneuvers.

The 24-year-old copilot had more than 200 rotary wing flight hours, with more than 60 in the UH-60.

Commentary

This mishap occurred because the pilot entered an uncoordinated right turn with a bank angle in excess of 90 degrees and in a nose-low attitude which exceeded the aircraft's capability to maintain flight without a loss of altitude. This uncoordinated maneuver, coupled with high airspeed and low altitude, made it impossible to recover control of the aircraft.

Lack of flight discipline of the crew was evidenced by the following:

- Violation of orders that passengers would not be transported aboard the aircraft. The passengers, who were totally unfamiliar with the aircraft, were allowed on board without the benefit of a safety briefing.

- The aircraft was operated in a manner which exceeded flight limitations listed in the operator's manual.

- During the demonstration, right turns were made over a built-up area. Left turns would have been over a large, sparsely populated valley.

- The pilot flew the demonstration the day after a night of excessive alcohol consumption and less than 12 hours after drinking alcoholic beverages.

Command must also share some of the burden of this mishap. A unit DF authorized flight agility demonstrations involving nonstandard flight maneuvers not described in the Aircrew Training Manual or the aircraft operator's manual and for which the crew had received no training. Numerous pilots in the unit were required to perform flight maneuvers for which no task, condition, or flight standard had been developed. ■

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362-5363 □ Vol. 12, No. 44 □ 15 Aug 1984

Accident review: Incorrect weather forecast

Synopsis

An OV-1D was returning to home base after a night mission. The pilot could not land because of bad weather. After two attempts to land at other airfields, the aircraft ran out of fuel. The pilot and technical observer ejected successfully.

History of flight

As an OV-1 pilot was getting his weather briefing before a night mission, he asked about possible fog formation because of the temperature/dew point spread. The forecaster stated that fog formation was not anticipated.

The aircraft, with the pilot and technical observer on board, departed the airfield on an IFR flight clearance issued through air traffic control (ATC). During the flight, the pilot was told that the weather at home base was clear with 7 miles visibility. When the mission was completed and the pilot was preparing to land, he was issued the following weather advisory for his airfield: "Wind calm, sky clear with 7 miles visibility." The actual weather was: "Sky partially obscured, ceiling estimated at 500 feet overcast and 2 miles visibility due to fog."

The pilot reported the field in sight and asked for a visual approach. The tower operator issued an advisory clearance to land. About 500 feet above the ground, the aircraft entered fog. The pilot executed a missed approach and asked for another visual approach. The pilot and technical observer saw the runway lights, but the aircraft was not in a position to complete a safe landing. The tower issued another advisory clearance to land and the following weather: "Sky partially obscured, ceiling estimated 500 feet, visibility one-quarter mile with fog." The pilot acknowledged the weather and continued a visual approach to a point about 500 feet above the runway where he made another missed approach.

The pilot then asked for a frequency change to air traffic control to obtain an instrument approach elsewhere. He told ATC that he had about 500 pounds of fuel remaining. ATC acknowledged the fuel status and transmitted the weather for another airfield (hereafter referred to as airfield No. 1) as "seven-eighths sky coverage at 1,200 feet, visibility 3 miles with fog." The pilot asked for an approach to airfield No. 1, which was 16 nautical miles north of his home airfield. During the approach, as the pilot descended to the minimum descent altitude at the missed approach point, no lights associated with a runway could be seen. The approach and runway lights were off.

After making a missed approach, the pilot asked for clearance to another airfield (hereafter called airfield No. 2). ATC handed off the aircraft to approach control after telling the controller on duty that the aircraft had only 15 minutes of fuel remaining. Approach control acknowledged and accepted the handoff. During initial contact with approach control, the pilot asked for radar vectors "as short as you can get it" for an ILS at airfield No. 2.

Twenty seconds later, the pilot declared an emergency, citing zero fuel. Approach control acknowledged the situation but did not realize it was an emergency. During the radar vectoring sequence, the pilot made repeated emergency calls citing zero fuel and twice asked for a recommended heading to turn the aircraft away from built-up areas if he had to abandon it.

Immediately after being vectored onto the final approach course to airfield No. 2, the aircraft surged, followed by a gradual decrease in power and engine temperature readings. The pilot diagnosed the simultaneous flameout of both engines and transmitted to approach control that he was ejecting. As the aircraft slowed to about 100 knots airspeed, the pilot ordered the technical observer to eject and then ejected himself.

The pilot sustained a bruised elbow and a mild back strain. The technical observer sustained a bruised elbow. The aircraft crashed in a sparsely populated area 3.2 nautical miles from the end of a runway at airfield No. 2.

Crewmember experience

The 45-year-old pilot had more than 1,500 fixed wing flight hours, with almost 600 in the OV-1D.

Commentary

The rapid onset of low stratus ceilings and dense fog at the pilot's home field at the time of arrival did not favorably compare to the forecast weather of clear skies with 7 miles visibility. The phenomenon was not localized, was present throughout the local flying area, and commenced before the first approach to the airfield was attempted.

Failure of the weather detachment to

(continued on back page)

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishap □ (H series) Crew heard loud noise from rear of aircraft and landed. Cover of No. 4 engine bearing had come off and hit tail rotor blade.

UH-1 Class E mishaps □ (H series) Stiffness was felt in cyclic during hover. Caused by defective hydraulic pump. □ (H series) Transmission oil pressure fluctuated during hover. Caused by sticking oil pressure relief valve. □ (H series) Master caution and hydraulic lights came on. Caused by cracked check valve. □ (H series) High frequency vibration in pedals was caused by failure of tail rotor drive shaft hanger bearing. □ (H series) Egt rose to 600 degrees during climb. Caused by failure of solenoid on deice valve. □ (H series) Master caution and transmission oil hot lights came on. Caused by failure of temperature switch. □ (H series) Excessive feedback was noted in cyclic during hover. Caused by failure of irreversible valve.

Attack helicopters

AH-1 Class C mishap □ (S series) AH-1 was 1,000 meters behind an OH-58 flying down a narrow draw. Crew of AH-1 temporarily lost sight of OH-58. AH-1 was slowly descending down the draw when visual contact with OH-58 was regained. As both pilots looked at OH-58, main rotor blade hit tree branch.

AH-1 Class D mishaps □ (S series) As aircraft was crossing a ridgeline, left skid hit a rock. Skid was broken. Aircraft was flown to airfield and landed on sandbags. □ (S series) Three days later, the pilot involved in the mishap described above was being given a post-mishap flight evaluation. During an evasive maneuver, aircraft settled onto rocky terrain, damaging right skid tube and shoe. Pilot has been grounded pending an eye examination.

AH-1 Class E mishaps □ (S series) Master caution and transmission oil bypass lights came on, and transmission oil temperature rose. Caused by failure of transmission oil cooler drain valve. □ (S series) Pilot of AH-1 was told to land immediately because of a possible maintenance problem. That morning, the pilot, who was also the platoon maintenance officer, had told a maintenance crew to remove a vibrex system from the aircraft. The pilot had already completed his preflight. The maintenance crew began work immediately but stopped for lunch. Before leaving the aircraft, the maintenance crew closed all doors and secured all panels in accordance with the unit SOP to prevent FOD. The crew had written up the removal of the lateral cyclic retaining nut on the previous day's Form 13. The pilot returned to the aircraft about 30 minutes before launch time and inspected it for removal of the vibrex. Seeing all the doors and panels in place, he assumed the reinstallation was complete. He did not physically check to see that all work was done. After the aircraft took off, the platoon sergeant came back from lunch and found a large torque wrench in the platoon area. Knowing the tool would have been turned in if the work had been completed, he went to the maintenance crew to ask if the work was finished. The crew said the work had not been finished. The pilot was then notified, and the aircraft was landed without damage.

Cargo helicopters

CH-47 Class D mishaps □ (B series) External load electrical cord came apart at quick disconnect during flight. Aircraft was landed and attempt was made to reconnect cord. Because of a crosswind and turbulence, aircraft had to be repositioned to make a hookup. Aircraft hit the load, tearing skin on bottom of aircraft. □ (B series) When sling load was landed at drop zone, box of detonators was missing. A22 bag was closed incorrectly by the supported unit as load was rigged for lifting.

CH-47 Class E mishap □ (C series) Fuel was seen leaking from heater fuel control. Fuel line fitting packing was worn out.

Observation helicopters

OH-58 Class D mishaps □ (A series) Pilot noticed TOT was high at 749° C. during flight. Pilot reduced torque to 40 psi and TOT was still high at 720° C. Pilot established approach to nearest suitable landing site. At 50 feet agl, low rotor rpm audio came on and TOT reached 950° C. because of increased power demand. Elbow assembly on diffuser became disconnected, causing high TOT and engine overtemp. □ (C series) As aircraft was hovering for takeoff, power droop and loss of rpm occurred. Suspecting an engine malfunction, pilot made hovering autorotation to sloped area, resulting in bent cross tube. □ (A series) Main rotor blades hit tree limb during NOE flight. □ (C series) Crew was on training flight at night. Student pilot pulled initial pitch too high and continued to hold the collective full up until told by the IP to lower it. Aircraft hit the lane in level attitude, bounced slightly, and came to rest 20 degrees right of landing heading. Tail boom, tail rotor drive shaft, and skid were damaged.

Fixed wing

C-7 Class E mishap □ Aircraft was scheduled for a 15.3-hour ferry flight, part of it over water. The flight progressed normally for 7½ hours. Without warning, a loud thud was heard and aircraft yawed left. Left engine rpm was at 3500, low propeller oil light came on, and oil was seen over left engine nacelle. Left throttle was retarded and left propeller was feathered. Left engine shutdown and cleanup procedures

were performed. Descent was begun, with about 3½ hours of daylight remaining. Upon reaching 1,500 feet msl, additional power was required to stop descent while maintaining 90 to 95 knots. Aircraft continued to descend until takeoff power was used to stabilize aircraft at 50 feet msl. Crew made preparations for ditching. Realizing takeoff power could not be maintained for long without jeopardizing right engine, crew began to lighten the load by jettisoning all equipment and items not immediately needed for flight or survival. Takeoff power was maintained for about 10 minutes. As load was reduced and additional fuel consumed, power was gradually reduced to 45 inches manifold pressure and 2600 engine rpm. Fuel consumption was about 800 pounds per hour. After 2 hours at 50 feet msl, a gradual climb was begun, first to 100 feet msl and then to 200 feet msl after which minimal power reductions were made in an attempt to reduce fuel flow until climb power was reached. Some time later, right engine oil low light came on, indicating only 11 gallons of oil remaining in engine. The high power required was consuming 3 to 4 gallons per hour. At this consumption, insufficient oil remained to reach destination unless power could be further reduced and oil consumption controlled. During the next hour, gradual power reductions were made while darkness set in. Airspeed was gradually increased to 95 knots. Two hours after oil low light came on, right main generator failed, requiring crew to go to emergency bus with minimal electrical draw. Final headings and coordination were made with a Coast Guard aircraft which had been escorting the C-7 for several hours. Radios and unnecessary equipment were turned off. During the final hour of flight, altitude was increased to 500 feet msl so time would be available to perform ditching procedures in the event of oil or fuel starvation. During the last hour, Marine and Coast Guard helicopters rendezvoused with the C-7, and a Navy P3 was sent to act as a flare ship in the event of a ditching. A successful landing was made 17.6 hours after takeoff. About 300 pounds of fuel and an undetermined amount of engine oil remained after landing. Caused by runaway propeller which, it is believed, eventually sheared the crank shaft.

OV-1 Class D mishap □ (D series) Right hatch opened during takeoff. Pilot confirmed that landing gear was still down and sufficient runway remained for landing. Technical observer did not secure hatch mechanism correctly.

U-21 Class E mishaps □ (A series) Torque dropped from 1,000 pounds to approximately 400 pounds. Fuel pump seal was seeping, which allowed JP4 to enter fuel control input drive shaft bearing, causing bearing to overheat and disintegrate. □ (A series) Left engine torque reading dropped to zero

during flight. Caused by short circuit in cannon plug.

Maintenance

AH-1 Class E mishaps □ (S series) Master caution and transmission oil hot lights came on. Quick disconnect from transmission to oil cooler was incorrectly fastened and vibrated loose. □ (S series) About 30 seconds after takeoff, aircraft began to slowly rock on its axis and then became almost uncontrollable. Rate gyro cannon plug was not connected. □ (S series) Cyclic was stiff in all quadrants during flight. Force quadrant pads were dirty and friction was out of adjustment.

(continued on back page)

FY 84 Class A Mishap Countdown

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	May	8	1	May	4	3
	June	4	5	June	3	5
4th Qtr	July	5	7	July	2	3
	August	4	3	1-15 Aug	1	0
	September	6	0	September		
	Total for Year	40	23	Total to Date	33	32

Aviation mishap prevention forum

Establishing an Air Force or Naval publications account

Air Force publications. Some of the equipment used by the Army is procured through the Air Force. However, publications to support these interservice items are not always obtained. An Air Force publications account is established using the following guidelines:

- Complete two copies of Air Force Technical Order (AFTO) Form 43.
- Complete one copy of AFTO Form 187 (Resupply and Initial Distribution Form).
- Mail copies to Commander, Oklahoma City Air Logistics Center, ATTN: OC-ALC/M-MDUB, Tinker AFB, OK 73145.

Naval publications. The Navy Index of Publications (NAV Sup 2002) is used to order Naval publications. NAV Sup 2002 is available only in microfiche and can be obtained by calling customer service, AUTOVON 442-4307. There is no charge for Naval publications, but there is a charge for blank forms. Permanent distribution of the index is obtained by writing to Naval Publications and Forms Center, 5801 Tabor Road, ATTN: CODE 1032, Philadelphia, PA 19120.

Once an account is established, order Naval publications using DD Form 1348M (for requisitioning instructions, refer to AR 725-50). An authorized Department of Defense activity address code (DODAAC) number is available from the unit supply document register and must be assigned to DD Form 1348M when ordering Naval publications. After establishing a proper unit identification code (UIC), publications are mailed to the address on the DODAAC. Publications can also be ordered by telephone (AUTOVON 442-3321) following the request format on DD Form 1348M. Permanent distribution of publications is obtained by writing to Commanding Officer, Naval Air Technical Services Facilities, 700 Robins Avenue, ATTN: CODE 321, Philadelphia, PA 19111. For coordination by telephone, call AUTOVON 442-4307. Binders are available for storage of publications through the same procedure as ordering publications.

Military specifications and standards are also available through the Naval Publications and Forms Center, AUTOVON 442-4307. DD Form 1425 is used to request a copy of the index of specifications and standards. Once the initial index has been received, request all further orders using DD Form 1425. ■

—from FM 55-411, dated 30 April 1984

Answers to last week's questions

1. What TM addresses specific techniques and procedures used in shop welding? TM 9-237. **TM 55-1500-204-25/1, with change 33, page 7-66, par. 7-72**

2. Why should dust plugs, dust caps, and moisture seals be used in aircraft systems when lines or units are disconnected for maintenance, repair, shipping, storage, and bulk material in freestock? To prevent leakage and contamination. **TM 55-1500-204-25/1, with change 33, page 7-48c, par. 7-42**

3. Nondestructive inspection (NDI) is a tool of quality control inspection. Aircraft components may have suspected metal flaws which must be confirmed or denied in some manner. It may be that a defect is visible but the seriousness of it is not known. The defect must be evaluated by a technical inspector. That is when the technical inspector turns to NDI. The details and procedures of NDI are fully discussed in FM — and TM — . FM 55-414 and TM 43-0103. **FM 55-411, page 4-6**

4. Arrival procedures (approach). An approach for straight-in landing may be initiated, regardless of ceiling and visibility. Descent on Category II approaches is restricted to the highest DH published for the procedure selected. True or false? True. **AR 95-1, with change 2, page 4-3** ■

Questions for aviation personnel

1. Increased blade efficiency while operating in ground effect is due to what two separate and distinct phenomena? **Reference: FM 1-203, Fundamentals of Flight**

2. What causes translating tendency? **Reference: FM 1-203, Fundamentals of Flight**

3. The amount of lift that can be developed by an airfoil depends on five major factors. What are they? **Reference: FM 55-414, Fundamentals of Rotor and Power Train Maintenance**

4. Preflight (flight weather planning). IFR flight. Destination weather must be forecast to be equal to or greater than the published weather planning minimum for the approach procedure to be flown at ETA through one hour after ETA. When there are intermittent weather conditions, predominant weather will apply. Aviators flying helicopters may reduce destination and alternate Category A visibility minimums by 50 percent, but not less than ¼-mile or metric equivalent. Reduction of visibility for approaches labeled "COPTER ONLY" is not authorized. Category II approach procedures may not be used in destination or alternate weather planning. True or false? **Reference: AR 95-1, with change 2, Army Aviation: General Provisions and Flight Regulations** ■

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 105 □ 15 Aug 1984

NVG messages

Two Department of the Army messages relating to pilot-in-command and night vision goggles remain in effect until rescinded, regardless of the effective date of change 2, AR 95-1. The messages are HQDA DACS-ZB, DTG 151325Z Mar 84, subject: GEN Thurman sends, SAB and HQDA DAMO-TR/FD, DTG 251305Z Jun 84, subject: Night Vision Goggles (NVG) Training and Operations Message Number 2. ■

Night vision goggles training and operations

During recent visits to the field and from numerous inquiries worldwide, Directorate of Evaluation and Standardization (DES) has found that confusion exists on how to comply with the latest Department of the Army (DA) directives on night vision goggles (NVG) training and operations. The requirements were enumerated in DA message 251305Z Jun 84, subject: Night Vision Goggles (NVG) Training and Operations Message Number 2. This message is directive in nature and applies to all United States (Active, Reserve, and National Guard Bureau (NGB)) units. The following is to clarify areas which have been frequently misunderstood:

A. General.

1. The term "NVG" refers to night flight using night vision devices.

2. The term "DVG" refers to day flight using night vision devices with day filters. Additionally, the utilization of a compatible, visual flight simulator in the night mode using night vision devices will be treated as DVG flight.

3. All goggle flight evaluations will be conducted **NVG.**

4. Above NVG message applies to rotary wing operations only.

5. Training tempo. Failure to complete any phase of training within prescribed calendar days will result in the aviator undergoing an NVG flight with an NVG instructor pilot (IP)/standardization pilot (SIP) other than his instructor to determine training level and additional flight hours required to complete appropriate training requirements. (Listed minimum NVG flight hours still apply.)

B. Specific areas. (Appropriate paragraph of referenced message will be indicated.)

1. (Paragraph 6). Currency goals percentages are to be applied to TOE/TDA **authorized** positions.

2. (Paragraph 7A). Should read, "Unit Status Report (USR). If NVG established goals are not met, report other than 1 in block 56, section A, DA Form 2715, as outlined in par. 3-9C(6)(f) of AR 220-1."

3. (Paragraph 9D).

a. Pink filtered light requirement is met whether installed per authorized MWO or appropriate Air Worthiness Release.

b. Terrain flight restrictions do not apply during traffic pattern flight at commander-approved airfields/heliports with adequate lighting (runway edge lights, obstruction lights, etc.).

c. Terrain flight restrictions will not be construed so as to authorize unaided night terrain flight operations when NVG flight is prohibited.

4. (Paragraph 10). Unit trainer (UT) will not conduct NVG qualification training (includes NVG qualification training in an aircraft in which not previously NVG qualified). UT may conduct NVG refresher training provided the first NVG training flight is conducted by an NVG IP/SIP and the aviator is released by the unit commander to be trained by the UT. (NOTE: Continuous evaluation does **not** apply if training is conducted by UT.)

5. (Paragraph 11B(4)). Aviators previously NVG qualified but assigned a **primary** aircraft in which not NVG qualified and assigned against an NVG designated position shall be trained under the requirements established for NVG refresher training (minimum NVG flight hours as listed in Refresher Flight Training Table in appropriate Aircrew Training Manual (ATM)). Those aviators assigned against an NVG designated position will revert to ARL 3 while undergoing NVG qualification training.

6. (Paragraph 11C). Regardless of Flight Activity Category (FAC), all aviators assigned against NVG designated positions must complete mission training requirements (minimum 15.0 hours) prior to progressing to ARL 1 (tasks determined by commander).

7. (Paragraph 12). Continuation training **requirements** apply only to those aviators assigned against an NVG designated position.

a. Failure to meet semiannual/annual requirements will be subject to AR 95-1 and AR 600-105 like all other Aircrew Training Program requirements IAW paragraph 2-7(d), FC 1-210 (Commander's Guide).

b. Aircraft series for NVG currency shall be as defined by AR 95-1, paragraph 3-8 (Similar Aircraft).

c. Annual NVG flight evaluation must be conducted in the designated crew station(s) that NVG duties are to be performed. This will not be construed so as to require two separate, complete flight evaluations; proficiency must be demonstrated in each crew station designated.

8. (Paragraph 13) An aviator must be a designated PIC in the aircraft series and unit mission prior to NVG PIC designation. ■

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-3589 during duty hours; 558-6487 after duty hours.

Accident review:
Incorrect weather forecast

pass along a special weather observation taken about 20 minutes before the aircraft was vectored to a point 16 miles northwest of the airfield or failure of tower personnel to record and disseminate the observation contributed to the accident.

Fogging of the glass in the temporary tower facility at the pilot's home airfield restricted visibility of the tower operators. Because of the high temperature and humidity, the air conditioner in the temporary tower was operated continuously on the night of the accident. Tower personnel said they had to manually clean the window repeatedly throughout the night to see out of the facility. Failure to keep the glass cleared caused the personnel to not notice the rapid weather deterioration.

A communication breakdown occurred between ATC and the tower controller at airfield No. 1. The controller thought the pilot was making a low approach when, in fact, he was trying to land. Approach lights and runway lights were off because of energy conservation reasons, and the controller did not turn them on. Had they been turned on, the aircraft could have landed. ■

Mishap briefs

CH-47 Class E mishap □ (C series) Crew smelled fuel and crew chief saw fuel leaking from No. 2 engine area. Hole had been chafed in start fuel line.

OH-58 Class E mishap □ (A series) Feedback was felt through cyclic and collective. A few seconds later, master caution and hydraulic lights came on. Running landing was made. Incorrect torque on hose from hydraulic pump drain to pressure relief valve connection allowed hose to back off and fluid to escape.

Messages received

- Safety-of-flight maintenance mandatory message concerning one-time inspection of UH-60 main rotor spindle assembly pitch control arm attaching bolts (UH-60A-84-12, 301420Z Jul 84). Summary: Examination of prior maintenance actions reveals that earlier attempts to remove these bolts, P/N SS 5110-06-045, from service have not been fully successful. The modification team which replaced these bolts did not keep complete records of spindles which were modified. These bolts, which have a limited fatigue life, were originally installed on the first 26 aircraft plus 3 spares. The spindle assembly numbers are P/N 70102-08100-041/-045. A one-time inspection of the main rotor spindle assemblies will be done to locate and remove any remaining P/N SS 5110-06-045 bolts which might still be in service.
- Maintenance information message concerning OH-58A and C improper seal assembly installation on main rotor hub assembly (MIM-OH-58-84-MEM-04, 022300Z Aug 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

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Human factors—errors in judgment

The following article by L. Homer Mouden and John H. Enders, Flight Safety Foundation, was adapted for our readers from **Flight Safety Digest.**

It is only relatively recent that the term "human factors" has really become recognized as a discipline in its own right within aviation. Earlier aviation human factors work was often done in an incomplete fashion and within a highly skeptical aviation community.

Evolution years

In the years following World War II, the continual search for higher performance military aircraft also placed more demands upon the control systems and the display of flight and systems information in the cockpit.

This evolution was happening to the airplane, not to the man. No such improvements were concurrently taking place in man's physical capabilities: his speed of reaction, the power in his muscles, the strength of his skeletal structure, or the overall capacity of his brain. Today, we are operating newer, more sophisticated aircraft with the same type of human beings. We face the problem, therefore, of making it possible for that same human to assimilate the vast amounts of information necessary to make the proper judgments and decisions and to control the modern, high-performance machine in a safe and efficient manner.

At the same time, we recognize that the man is the most versatile factor in the man/machine flight "system." If properly maintained, the machine will repeatedly operate as designed. Man is less predictable. He is subject to moods, to the lack of timely information, to fatigue, to illness, and to damage to his ego. Yet, the human mind possesses remarkable capabilities to receive, process, and store information, to recall that information and use it in a decision-making process. Judgment is a unique attribute of the human mind, drawing on far more bits of information and experience and making decisions based upon the assembly of this knowledge and experience than any computer yet designed.

We tend to think of human error mostly occurring in the cockpit. We used to call it "pilot error." We tend to forget that human error can be—and often is—committed in design, in maintenance, in ramp servicing, in weather forecasts, and even in the board room or operations directorates. Human error on the flight deck gets most of the attention, however, because that is where everything comes together to present the pilot with a decision problem at a critical time in flight.

With adequate training and a thorough knowledge of the capabilities and limitations of himself, the aircraft, the environment, and the operating system—and if he has received timely and effective information—each crewmember will be able to exercise good judgment in evaluating any operating problems and taking the correct action. Then why do they fail?

Human judgment factor

We have built much of our safety record on lessons learned from accident investigations. Whether the probable cause was determined to be materiel failure, powerplant failure, pilot confusion, or inadequate fuel load, there was a human judgment problem associated with it.

Unfortunately, accident investigators are sometimes unsure why the flight crew took certain reactions that have been deduced from an examination of the wreckage. The tragedy about accident-derived information is that it is after the fact. Incident data, on the other hand, can be a gold mine of information. Incidents that involve design faults or maintenance problems are generally shared—eventually. However, if we are concerned about human error and want to collect incident data

(continued on next page)

Human factors—errors in judgment

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about human mistakes, the attitude quickly changes.

Admitting a mistake is sometimes a difficult thing to do. So, every day, somewhere, people are making mistakes. In the design process, mistakes are made, but several levels of checking catch most of the errors. In manufacturing, mistakes are made, but there are procedures for detecting faulty parts or misassembled pieces.

Operational disadvantages

In maintenance, a mechanic or engineer may make a mistake, but inspection procedures are developed to discover these mistakes. When we get into the operational regime, however, the pace quickens and mistakes do not enjoy the luxury of comparatively leisure reinspection.

If these potentials for incidents or accidents were known before they eventually became an actual incident or accident, it might be possible to analyze them and identify the real reasons why they happened. It would then be possible to identify the actual contributing factors.

With an accurate indication of what occurs, the frequency of similar occurrences and the benefit of self-analysis by the individual involved as to why it occurred, it should be possible to identify the real contributing factors—even human factors. Was it a design deficiency, inadequate marking, insufficient knowledge of the system or procedures, or information which had been presented in such a way that it could be misunderstood?

Such questions can seldom be answered with the knowledge gained from one single accident or incident, but all are the result of errors in judgment somewhere in the system.

Pilots, engineers, controllers, and, in fact, all employees of an organization know this. And, yet, they are often reluctant to disclose the information which could contribute to corrective action.

Incident reports are some of the most valuable tools available to management for assessing the validity or effectiveness of an airline's policies, procedures, and practices. However, unless all incidents are reported objectively and factually, an analysis of such incident reports as are available could present a false or unreliable picture of the real problems.

Thus, any program that can encourage the reporting of incidents, occurrences, or events that could have been serious or hazardous will assist in evaluating the potential problems. If these are identified and can be eliminated or modified, the next catastrophic accident may have been averted. We may have increased the overall margin of safety for one flight—or for the entire aviation industry.

Army hazard report

The Army has a means of reporting aviation hazards. The Operational Hazard Report (OHR), DA Form 2696-R, can be signed or submitted anonymously. The purpose of the OHR program is to obtain information pertaining to mishap-producing conditions before mishaps occur and to take timely corrective action to change or eliminate the conditions. The OHR program has brought about many changes in aviation operations, maintenance, and systems during its lifetime, increasing the margin of safety for the aviation user.

There are many aviation hazards out there yet to be identified. Old ones abound and new ones crop up every day. You see them, but do you report them so they can be corrected? ■

Eye hazard on the OH-58

CW3 David M. Battle, Army Flight Activity #111, 79th ARCOM, Hagerstown, Maryland, sent us the following information about a potential injury-producing hazard on the OH-58.

With the hot weather, just about everyone flies with the doors removed from their OH-58s. The other evening as I was getting into the rear seat, I almost impaled my right eye on the upper door jettison pin which is located just below the yellow door jettison handle. The pin is about 2½ inches long and pointed and is normally left free to flap around on its own. It's very easy for the pin to vibrate into a horizontal position, and it's hard, if not impossible, to see this little dagger, particularly at night. It sits just about at eye level. Had I not uncharacteristically had on my helmet (due to extraneous ramp noise), the pin would have certainly gone into my right eye. As it is, I only have a deep scratch on the side of my helmet.

Our fix is to tape the pin against the door frame with a 2-inch square of duct tape while the doors are removed. Before reseating the pins when reinstalling the doors, thoroughly clean the pins with a cleaning solvent to insure that no stray adhesive remains on the pin which could possibly cause it to stick at a most inopportune time, such as when and if one might have to jettison the door.

The pin on the copilot's side can be just as dangerous if not more so in case someone comes crawling in the left side when the blades are turning and all they are concentrating on is getting into the aircraft. Getting out of the aircraft also has some painful potential.

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class E mishaps □ (H series) Master caution and engine fuel pump lights came on. Caused by failure of fuel control. □ (H series) Engine oil temperature rose to 95° C. for 10 minutes. Caused by failure of thermostat flow control. □ (H series) Master caution and chip detector lights came on. Chips were found on 90-degree chip detector. □ (V series) Master caution and low fuel lights came on. Caused by stuck float switch in fuel cell.

UH-60 Class D mishap □ Aircraft was landed to a confined helipad with the main gear slightly off the front of the pad and the tail wheel on the pad. After touchdown, aircraft rolled forward about 2 feet as collective was lowered to full down. Brakes were applied to stop forward movement. As aircraft moved forward, its tail wheel assembly hit helipad marking light, damaging landing gear actuator and wiring harness.

UH-60 Class E mishaps □ Aircraft was hovering at 35 feet with an external load. Low rotor horn sounded and main generators came off line. Collective was decreased to regain rotor rpm and aircraft yawed. Load was released about 5 feet from the ground. Aircraft was hovered to side of load and landed. Water was found in electrical cannon plugs, and drag beam switch was out of adjustment. □ Aircraft entered cloud layer during takeoff for medevac mission. Crew went through inadvertent IMC procedures and climbed above cloud layer. Aircraft could not land at field site because of ground fog and returned to home base.

Cargo helicopters

CH-47 Class C mishap □ (C series) Forward rotor blades hit powerlines as aircraft was flying 360 feet agl. Aircraft was landed with damage to rotor blades, greenhouse windows, windshield, and forward pylon cowling. Haze restricted crew from flying at higher altitude.

CH-47 Class E mishaps □ (A series) Master caution and transmission lights came on. Chip detector was covered with metal particles. □ (C series) Utility pressure was noted at 150 psi during runup. Crew chief checked accumulator pressure in rear of aircraft and gauge showed only 1200 psi, 1300-2200 psi below normal operating range. Inspection revealed utility hydraulic pump sheared input shaft. □ (B series) No. 2 engine chip detector light came on. Transmission showed evidence of imminent failure.

CH-54 Class E mishap □ (A series) Transmission oil temperature rose during flight. Transmission oil cooler bearing froze, causing belts to break.

Observation helicopters

OH-58 Class A mishap □ (A series) Pilot stopped at landing site to check on the availability of some equipment and to drop off his crew chief. When pilot picked aircraft up to a 3- to 5-foot hover, it began a right roll until main rotor blade hit the ground. After rotor contact, aircraft rolled back to left and came to rest on left side. Pilot sustained serious injuries. 8449

OH-58 Class D mishaps □ (A series) Main rotor blade hit tree during training flight. □ (C series) N1 peaked at 15.5 percent during start. TOT was below 200° C. when throttle was opened to engine idle stop. When throttle was opened beyond engine idle stop, TOT jumped to 1,000° C. before pilot or IP could close throttle. Suspect failure of fuel control.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**3**	**5**
4th Qtr	July	5	7	July	**2**	**3**
	August	4	3	1-22 Aug	**2**	**0**
	September	6	0	September		
	Total for Year	40	23	Total to Date	**34**	**32**

OH-58 Class E mishaps □ (C series) Severe vibrations were felt throughout aircraft during flight. Main rotor blade tip had separated from blade. □ (C series) Pilot and copilot could not communicate during runup. Caused by failure of ICS control box.

Attack helicopters

AH-1 Class D mishap □ (S series) As IP was demonstrating simulated forced landing, he increased throttle to full open before reaching 100 feet agl. During pitch application, rotor rpm and N2 decreased to 90 percent. IP checked throttle again and found it to be full open, but rotor rpm and N2 continued to decay. IP applied remaining pitch about 5 feet agl. Aircraft landed hard, damaging aft cross tube.

AH-1 Class E mishaps □ (S series) Smoke was seen coming from rear of aircraft during landing. Battery vent had clogged, causing battery to overheat. □ (S series) As aircraft was in stabilized 3-foot hover, roll channel SCAS had violent right roll hardover. SCAS was disengaged and control regained. Caused by failure of SCAS roll rate gyro.

Fixed wing

T-42 Class E mishap □ Landing gear had to be lowered manually. Caused by failure of gear motor.

C-12 Class E mishaps □ (D series) Gear retracted about halfway and stopped. In-transit gear handle light came on. Emergency gear extension was completed and aircraft landed. Gear motor controller was intermittently allowing gear to continue to motor past its down limits, causing current limiter to blow. □ (A series) As aircraft was climbing through 13,500 feet, pilot's altimeter froze. After 1 minute, altimeter needle unlocked and spun rapidly to 15,000 feet. This occurred again about 3 minutes later at 18,600 feet. Small piece of rubber was in pitot static system. □ (D series) No. 2 engine chip detector light came on. Caused by failure of engine.

U-21 Class E mishaps □ (A series) During climb, pilot noticed engine cowl was loose at inboard rear lock. Pilot had failed to secure cowling before takeoff. □ (D series) Pilot moved flap switch to approach position during descent for landing. Within a few seconds, aircraft began abrupt deceleration, yawed left, pitched down, and began to roll right. IP looked at right wing and saw right outboard flap segment apparently full down and right inboard flap segment full up. Pilot disengaged autopilot. IP took controls, slowed aircraft to 120 knots, and experienced greatly reduced aileron authority. Airspeed was increased to 130 knots. Large amount of left aileron was required to maintain level flight. Flaps would not retract. Landing was made without damage. Caused by failure of right inboard flap actuator. When pilot selected approach flaps, right inboard flap did not move. Since right inboard was depressing up-limit switch, flaps would not retract.

Maintenance

UH-1 Class E mishap □ (H series) Master caution and left fuel boost pump lights came on. Wire running from condenser to fuel pump grounded against aircraft frame. Wire was repositioned and insulation added.

CH-47 Class D mishap □ (C series) Grease rag blew up into main aft transmission drive shaft during hover. While rag was rotating on drive shaft, it tore off two electrical wires in transmission.

CH-47 Class E mishaps □ (C series) No. 2 engine power was lost and could not be recovered. Maintenance personnel had failed to reconnect P-3 air line when engine was flushed. □ (C series) Master caution and No. 2 engine chip detector lights came on. Retaining nut on engine chip detector wire had fallen off, allowing chip wire to come loose and ground to engine. Loose nut was not found during daily inspection or preflight.

C-12 Class D mishap □ (C series) Outboard wheel on right main landing gear contacted right gear door during retraction, damaging door. Gear door linkage was not adjusted so that gear would clear the doors following replacement of landing gear actuator.

Messages received

- Maintenance information message concerning urgent change to TM 55-1520-227-10-2, CH-47C Operator's Manual (MIM-CH-47-MEM-84-10, 061930Z Aug 84).

- Maintenance information message concerning T700-GE-700/701 engine quick disconnect pins and revised compressor rotor stage 1 blade erosion blending limits (MIM-T700-84-MEM-02, 031600Z Aug 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Aviation mishap prevention forum

Answers to last week's questions

1. Increased blade efficiency while operating in ground effect is due to what two separate and distinct phenomena? Reduction of the velocity of the induced airflow and reduction of the rotor tip vortex. **FM 1-203, page 3-6**

2. What causes translating tendency? Lateral tail rotor thrust. **FM 1-203, page 3-8**

3. The amount of lift that can be developed by an airfoil depends on five major factors. What are they? Area (size or surface area of the airfoil), shape (shape or design of the airfoil sections), speed (velocity of the air passing over the airfoil), angle of attack (angle at which the air strikes the airfoil), and density of air (amount of air in a given space). **FM 55-414, pages 1-2 and 1-3, par. 1-6**

4. Preflight (flight weather planning). IFR flight. Destination weather must be forecast to be equal to or greater than the published weather planning minimum for the approach procedure to be flown at ETA through one hour after ETA. When there are intermittent weather conditions, predominant weather will apply. Aviators flying helicopters may reduce destination and alternate Category A visibility minimums by 50 percent, but not less than ¼-mile or metric equivalent. Reduction of visibility for approaches labeled "COPTER ONLY" is not authorized. Category II approach procedures may not be used in destination or alternate weather planning. True or false? **AR 95-1, with change 2, page 4-1** ■

Use of instrument approach procedures

TB AVN 1186, dated 3 July 1984, is a special edition and cancels TB AVN 1170, dated 1 March 1983. It is strongly recommended that all aviators review this TB before their next instrument flight.

This TB provides information to aviators on the use of instrument approach procedures published by U.S. Government agencies and eliminates the use of AC 90-1A, Civil Use of U.S. Government Instrument Approach Procedure Charts, dated 10 April 1968, which contains outdated information.

Information in the TB is a consolidation of data contained in numerous FLIP documents, charting specifications, and other directives. Numerous changes have occurred since publication of AC 90-1A and this bulletin provides the latest information available. ■

Questions for aviation personnel

1. Emphasis should be placed in which areas during training of POL personnel (drivers and operators included)? **Reference: FM 10-68, with change 3, Aircraft Refueling**

2. Why should aircraft hoses be neither too short nor too long? **Reference: TM 55-1500-204-25/1, with change 33, General Aircraft Maintenance Manual**

3. Give a definition for "translational lift." **Reference: FM 1-203, Fundamentals of Flight**

4. Effective translational lift can be said to occur at an airspeed of 16 to 24 knots. What characteristics of the helicopter determine the exact airspeed? **Reference: FM 1-203, Fundamentals of Flight** ■

New field manuals

Two new field manuals have recently been released. FM 55-44, Standardized Maintenance Test Flight Procedures, dated 8 June 1984, supersedes FM 55-44, dated 30 December 1981. This manual provides maintenance test flight evaluation requirements and procedures as developed by the U.S. Army Aviation Logistics School in coordination with the Directorate of Evaluation and Standardization, U.S. Army Aviation Center, Fort Rucker. It augments the standard test flight procedures of the applicable aircraft maintenance test flight checklist, and it establishes the criteria for implementing and maintaining worldwide standardized maintenance test flight procedures.

FM 55-414, Fundamentals of Rotor and Power Train Maintenance, dated 27 June 1984, supersedes TM 55-406, 4 February 1969; TM 55-414, 10 October 1970, and TC 55-17, 8 September 1980. This manual is a guide for Army repairers on maintaining aircraft rotors and power trains. It contains descriptions, construction features, operating principles, elementary repair procedures, and basic repair shop allied subjects. ■

Send DA 2410's to AVSCOM

Mechanics, you now send your DA Forms 2410 directly to Aviation Systems Command. There's no need to pass them to Data Processing for conversion to punch cards or tape. And you don't send them to the Materiel Readiness Support Activity. Send forms to: Commander, USAAVSCOM, ATTN: DRSAV-MPSD, 4300 Goodfellow Boulevard, St. Louis, MO 63120. ■

—from PS Magazine

Time out for safety

Different people feel differently about time. Some live by the clock. They try to make every second count. They're extremely time conscious. Others couldn't care less what time it is. They feel no time pressure, never glance at a timepiece.

But whatever their overall time orientation, some people use time as an excuse for skipping safety. "I haven't got time for that," or "It takes too long," or "I can't take time," they say. But consider . . .

How long does it take to put a fence in front of an engine? A couple of minutes? How long to put on a pair of safety glasses or goggles? Three or four seconds? How long to lock the wheels on your work stand? Less than 5 seconds surely. How many seconds does it take to remove your ring, secure your clothing, get the proper tool, insert a pair of ear plugs, or put on ear defenders?

Now let's go to the other side of the scale and see how things balance out.

How long does it take for things to get back to normal after a serious injury? A few days, a week, a month, the rest of your life? How long does it take to learn braille? How long to recover from a head or back injury? How long does it take to become proficient in the use of an artificial hand, foot, leg, or arm?

Trying to save the seconds it takes to observe a safety practice is gambling hours, weeks, months, or perhaps a lifetime of recovery. Is it worth it? Give it a few seconds thought.

It would be great if we could wrap safety up in a neat little package that would cover everything from A to Z and all the variations in between, but we can't.

We can cover a lot of territory with just four words. They are:

Inspection—not just before your quality control inspector is due or a higher headquarters evaluation, but be on the lookout all the time for potential problems.

Detection—be conscientious and knowledgable enough to find what you are looking for.

Correction—correct the problems you can and report those you can't.

Protection—this is the payoff. This is why we put safe habits and attitudes to work for us.

It all comes down to the fact that we cannot afford the time to violate safety rules. Life is too short to take long chances.■

—from SAC MSET Review

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Accident review: nonrated officer at the controls

Synopsis

A nonrated officer was manipulating the controls of a UH-1M while at a 3-foot hover. An abrupt right aft cyclic control input caused the tail stinger and advancing main rotor blade to hit the ground. The transmission and remnants of the main rotor assembly tore free from the airframe, and the aircraft came to rest upright.

History of flight

A pilot was approached by an officer who had an application pending for flight school. The officer asked the pilot to take him on an orientation flight around the local area. The pilot, who was also an IP, said he would if the officer could get permission from operations for the flight. Later, the officer told the pilot he had obtained permission.

The pilot drew an aircraft logbook from operations and performed his premission planning and preflight inspection. When the UH-1 left the airfield, the pilot was in the right front seat and the officer was in the left front seat. There was also a rated passenger and another nonrated passenger on board.

After climbing to an altitude of about 1,500 feet and flying for approximately 1 hour, the pilot returned to the airfield. During the flight at altitude, the nonrated officer was allowed to manipulate the controls.

At the airfield, the pilot demonstrated two approaches to the sod autorotation lane adjacent to a runway. He then demonstrated the procedures for takeoff to a hover and landing from a hover. After the demonstration, the pilot asked the officer if he would like to try it. The officer replied "Yes" and successfully accomplished the maneuver four times, with the pilot guarding the controls. On the fifth attempt, as the aircraft lifted off the ground, the officer began having difficulty maintaining control. The aircraft started turning to the left in a nose-high attitude. The pilot applied right pedal to stop the left rotation. The officer applied abrupt right rear input to the cyclic, which the pilot was unable to correct before the aircraft rolled to the right.

The advancing main rotor blade hit the ground to the right rear of the aircraft. The aircraft came to rest upright with extensive damage. The vertical fin, main transmission, and remainder of the main rotor blades separated during the crash sequence. The four occupants were not injured.

Crewmember experience

The 34-year-old pilot had almost 2,600 rotary wing flight hours, with more than 400 in the UH-1M. He had more than 100 instructor pilot hours.

Commentary

A series of errors and oversights relating to operational control of the aircraft, mission approval and organization, understanding, and interpretation of regulations resulted in an unauthorized mission being flown. The nonrated officer was told by the flight operations officer that he could fly in the aircraft but not in the front seat. The officer told the pilot the flight was approved but did not stress the limitations. The pilot thought he was within his authority to perform the flight and the demonstrations.

Contrary to AR 95-1, the pilot permitted the officer to manipulate the flight controls, not only at altitude but during the complex task of hovering. He then diverted his attention outside the cockpit while the aircraft was in hover flight and did not take control of the aircraft in time to prevent the crash. ■

Aircrew family survival

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A small lone tear no longer able to be held back rolls down her cheek. Yet, almost surprisingly, she still manages a smile as you bend down to give the kids one last big hug before you leave. Then as you grab your flight bags and start out the door, she reminds you to call home soon and wishes you a safe flight.

Sound all too familiar? Hopefully, for those who are constantly having to leave home, the family attitude at departure time is as healthy as the scenario just described. If it isn't, you and your family may be on the road to a painful breakup.

In earlier days the early morning calls, last-minute crew or mission changes, extended periods of absence, were all accepted parts of the military aircrew's way of life. But then in those days the military was a closer-knit community, to which not only the members but their families belonged—a protected and, to some, a treasured fraternity. Today such is often not the case, with the exception being some of the more isolated bases or stations. The reasons for this communal breakdown are many, but most can be traced to a complex driving force—changing social and personal values.

The aircrew family of the 1980's has different demands and new values that make temporary duty (TDY) assignments more stressful and more likely to result in family members resenting the military way of life. The traditional aircrew family—father flies off into the sunset while mom and the kids stay home to fend for themselves while he is away overnight or for up to months at a time—is becoming less and less the norm.

The two-career family has received increasing attention by behavioral scientists due to the large number of couples who, through financial necessity, or because of the changing expectations of women in our culture, have both spouses working outside the home. It is for these families that TDY can become the most challenging to the marital vows. The working wife of the aviator must now juggle her own work schedule with the childrens' requirements, household chores, and the myriad of unexpected occurrences that are common in family life. Whatever, for either the career wife or the housewife, TDY results in stress and while the demands upon her increase, her sources of support decrease.

The separation resulting during her spouse's absence is complicated by several factors. How well the couple communicates will determine how stressful the TDY experience will be. The husband's amount of job involvement will also impact the family's adjustment. The nature of the wife's job involvement, the skill of the couple's parenting if there are children, the social and family resources available, and so forth must be considered when evaluating the stress of TDY.

To address the aspects and all the inherent implications of social change would be an enormous task. Suffice it to say that conditions exist today which lend themselves to producing excessive levels of stress that if not countered through the implementation of an effective coping mechanism can lead to an "overload" situation; ultimately, resulting in the breakdown of the family unit. Therefore, the following suggestions are put forth to assist your family in dealing better with the stressors which are present today.

First: Spouses should consider their own needs for recreation, adult time, and self-satisfying activities, and that these needs are met before and during the TDY. Strange as it may seem, total

devotion to the husband, children, family, and friends may not be the best strategy for handling TDY stress. Instead, making certain that your own needs are met first—or along with everyone else's wants—may prevent a special kind of stress known as "burnout." Burnout is not a new idea to anyone who has tried to meet an ever-increasing number of demands with a constantly decreasing supply of resources. For instance, role overload can simultaneously deplete time, sleep, and patience.

Second: The aircrew and spouse are advised to improve their listening skills. Earlier in the article we talked about the importance of communication. Communication is a faddish thing to talk about these days and you can read about its importance in most popular magazines. What is important about communication though is "How to be effective?" Since we are only talking about survival here, let's consider just the essentials of effective communication.

• The best communication is done by the best listeners. Listen to what your spouse or children are saying before responding; ask for clarification if their messages are unclear.

• Talk about feelings. There are only about four basic feelings: joy, fear, sadness, and anger. Say "I am feeling . . ." and "This is what I want you to do about it . . ." Feelings are like instruments on the dashboard of a car, and they can be used as signals. We can use feelings to tell us to "pay attention . . . take action!"

• Talk about things going on now; mistakes or transgressions of the past rarely contribute to solving present problems. Unsettled past problems are best settled in discussions that are designed to resolve them.

• Communication can be used not only for problem-solving and negotiation, but also for sharing good news, compliments, and appreciation.

• Especially when communicating with children, it is important to be very clear. Say "do it" statements such as "clean up your room" or "get dressed," not "I sure wish you would clean up your room" or "I want you to get dressed." The differences in the statements may seem very subtle, and they are, but they result in very different outcomes because they are very different communications. Try it both ways and see for yourself.

Third: Children must be encouraged to help with jobs normally taken care of by the parents as a team.

• Carefully assess the difficulty of the chore and assign it only if a child can successfully accomplish it.

• Be lavish with praise when things go right, and flexible and understanding when they go wrong.

• Don't be a perfectionist. Cooperation and "survival" are the main goals. Save the "white glove inspections" for when the "commander" returns and can help.

• Give children a part in deciding on the distribution of projects and the consequences of not completing their duties. Use criticism sparingly. Words like lazy, sloppy, selfish, etc., can become self-fulfilling prophecies.

Fourth: Another "survival" suggestion has to do with improving organization. The better organized the family, the easier it is for it to function when one of the parts is absent.

• Make as many preparations as possible in advance of TDY; buy groceries, take care of yard, automobile, and household chores while both spouses can help.

• Put paperwork in order ahead of time, such as bills, tax information, etc.

• Discuss the handling of emergencies before the husband "takes off." Place a list of emergency phone numbers next to the telephone; go over how to turn off water, electricity and heater, and see that first aid materials are available.

• Have a backup driver available for helping with the childrens' activities that require transportation. Car pools can be very handy.

• Since TDY is inevitable for aircrew families, once these organizational matters are established, they can be relied upon with quick reviews, minor modifications, and additions in the future.

Finally: Social support is an extremely important part of our "survival kit," especially for the family with very young children. Social support is a fancy way of saying, depend upon friends and family as much as needed. Don't be shy about asking for help even though you are not in dire need. Other aircrew families are usually excellent resources, because they know from experience what TDY means to family life, and may be happy to help so they can feel more comfortable asking you for help. There are no medals awarded to families for facing stress alone, and you will be much more pleasant to come home to if you have gotten help and support during the TDY.

You may wish to add many other extras to your own personalized "survival kit." Our intent has been to alert aircrew families that there are many unusual stresses associated with flying aircraft, not only for the aircrew but also for their families. Many of these stresses can be managed and reduced by making certain that families have reviewed and adhere to their "survival" procedures.

—from the Canadian Armed Forces Flight Safety Magazine
adapted from an article written by Captain John C. Patterson and Colonel George Troxler, MD, of the U.S. Air Force

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class D mishaps □ (H series) While maneuvering the aircraft to a suitable landing site, pilot told crew chief to provide terrain clearance instructions. The area consisted of rolling terrain with several evergreen bushes. Crew chief cleared aircraft to the left. Tail rotor blade hit a bush and was dented. □ (H series) Engine start was attempted with engine inlet cover installed. Suction caused inlet bulkhead to deform and contact short shaft dust boot, scoring boot. □ (H series) After aircraft touched down, panel marker used to mark landing zone became unsecured and entered main rotor system. Marker had been tied to tall grass.

UH-1 Class E mishaps □ (H series) Binding was felt in all quadrants of cyclic control system. Caused by defective cyclic servo. □ (H series) Severe vertical vibration occurred during flight. Upper skin on main rotor blade separated at tip and inboard for 7 inches. □ (H series) Left pedal stuck during takeoff. Caused by failure of magnetic brake. □ (H series) Hydraulic caution light came on and stiffness was felt in controls. Caused by failure of preformed packing. □ (H series) Transmission oil pressure light came on. Caused by failure of transmission pressure switch. □ (V series) Rotor rpm dropped to zero and transmission oil temperature rose to 150 degrees during takeoff. Caused by disconnected cannon plug on right side of aircraft near transmission pressure transmitter.

UH-60 Class D mishap □ During hot refueling operation, tractor-type lawn mower passed about 10 meters to front of aircraft. Mower cut through a pile of rocks. Debris flew into main rotor system, damaging rotor blade tip cap.

Attack helicopters

AH-1 Class D mishaps □ (S series) Rated student pilot was performing low-level, high-speed autorotation. After initial pitch pull, student pilot leaned forward for a better view of the lane and inadvertently pulled back on cyclic, causing tail skid to strike the lane. □ (S series) Preflight inspection revealed dent in tail rotor drive shaft and cover. Investigation revealed that damage was caused by rear main blade, which was not secured, flexing down and hitting tail rotor drive shaft cover when another aircraft hovered nearby.

AH-1 Class E mishaps □ (S series) Crew left ammo bay door partially unlatched and door came open during flight. □ (S series) Main rotor blades hit small tree during landing from hover at field site. Pilot was following ground guide's instructions. □ (S series) Left tube of night vision goggles dimmed and then went out during hover. Aircraft was landed without incident.

Cargo helicopters

CH-47 Class D mishap □ (D series) Pilot, wearing night vision goggles, was attempting a tandem hookup to a howitzer when ground reference was lost. Aircraft drifted sideways, pulling howitzer onto its side.

CH-47 Class E mishap □ (D series) No. 2 engine low oil light came on. Oil filter O-ring failed.

CH-54 Class D mishap □ (A series) Aircraft was transporting two metal cargo boxes, rigged as a 4-point load. As aircraft was hovering, one of the forward rings failed at its weld to the box. Aircraft was landed and hook was resecured to a structural part of the box. The rest of the rings were inspected and appeared serviceable. About 2 minutes after takeoff, the other forward cargo ring on the box failed. Aircraft was slowed to 40 knots and returned to airport. As pilot was hovering over the intended landing spot, the remainder of the box attachment points failed, and the load fell to the ground.

Observation helicopters

OH-6 Class B mishap □ Engine failed during flight. Tail boom was severed during landing. 8450

OH-6 Class D mishap □ Aircraft, No. 4 in flight of four, hit wire during takeoff. Pilot's attention was directed to the formation flight. Wire strike protection system was not installed.

OH-58 Class E mishaps □ (A series) Unusual feedback was felt in cyclic during flight. Master caution light flickered. Hydraulic filter pressure button had popped. □ (A series) Master caution light, engine-out light, and low rpm audio activated. N2 needles split

Mishap briefs

and N1 decreased. Caused by engine failure. □ (C series) Rotor rpm decreased to 63 percent during hover. Caused by failure of tachometer. □ (C series) White smoke was seen coming from battery vent during hot refueling operation. Caused by thermal runaway of battery. □ (C series) When throttle was reduced during landing, N2 and rotor needles did not split. Inspection revealed sprag clutch would not release.

Fixed wing

U-21 Class E mishaps □ (A series) Gear failed to extend during landing. Gear was extended manually. Caused by failure of electromagnetic relay. □ (H series) Pilot saw three birds in front of aircraft. One bird hit leading edge of left inboard wing.

C-12 Class E mishap □ (C series) Gear light came on during climb. When gear was extended for landing, right main showed unsafe. Gear appeared down to pilots and tower personnel. Caused by failure of landing gear motor.

T-28 Class D mishap □ Engine rpm began to surge from 2400 rpm, at 23 inches of manifold pressure, up to 2900 rpm. Pilot reduced throttle to 2700 rpm, but prop lever control was unable to control rpm. At 2700 rpm, maximum manifold pressure was 20 inches. Caused by failure of prop governor.

Maintenance

UH-1 Class D mishap □ (H series) Severe jolt was felt during OGE hover check. Postflight inspection revealed FM antenna was missing and tail rotor blades were damaged.

UH-1 Class E mishaps □ (H series) Excessive vertical vibration occurred during climb. Crew chief had made an unauthorized adjustment to one of the main rotor blade trim tabs. □ (H series) Postflight inspection revealed transmission fluid on tail boom. Leak was coming from transmission internal filter gasket. Nuts holding gasket were not torqued correctly.

AH-1 Class E mishap □ (S series) Rpm decreased and low audio sounded during hover. JP4 fuel was found in P1 bellows cavity of fuel control. Fuel control unit will be replaced because of possible contamination of silicon oil normally found in P1 cavity.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**2**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**3**	**5**
4th Qtr	July	5	7	July	**2**	**3**
	August	4	3	1-29 Aug	**2**	**0**
	September	6	0	September		
	Total for Year	40	23	Total to Date	**34**	**32**

Messages received

• Safety-of-flight technical message concerning amendment to TB 55-1520-241-20-28 dated 10 May 84, subject: Inspection of CH-47A/B/C/D Flight Control Tubes in the Aft Cabin Area (CH-47-84-11, 161930Z Aug 84). Summary: Replacement steel flight control tubes were distributed to CH-47A/B/C/D units in accordance with the distribution schedule cited in par. 7c of TB 55-1520-241-20-28. However, the tubes are not being installed in a timely manner. Some units have completely changed out the aluminum with the steel tubes in accordance with this TB, but most units are scheduling the change-out to be accomplished during the next scheduled maintenance action. This is unsatisfactory. This message directs installation of steel flight control tubes on CH-47 helicopters within a required suspense time. Contact: John Jones, AUTOVON 693-1415, commercial 314-263-1415.

• Maintenance information message concerning additional urgent changes to TM 55-1520-227-10-2, CH-47C Operator's manual (MIM-CH-47-MEM-84-11, 171935Z Aug 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Aviation mishap prevention forum

Answers to last week's questions

1. Emphasis should be placed in which areas during training of POL personnel (drivers and operators included)? Aviation fuels and fuel contamination, dangers of fires and fuel spills, and firefighting techniques. **FM 10-68, with change 3, page 8-12, par. 8-8**

2. Why should aircraft hoses be neither too short nor too long? A hose too short will put too much tension on assembly, and a hose too loose will flap and possibly become chafed. **TM 55-1500-204-25/1, with change 33, page 7-48B, par. A-3**

3. Give a definition for "translational lift." Improved rotor efficiency resulting from directional flight (normally forward). **FM 1-203, page 3-9**

4. Effective translational lift can be said to occur at an airspeed of 16 to 24 knots. What characteristics of the helicopter determine the exact airspeed? Rotor system size, blade area, and rpm. **FM 1-203, page 3-9** ■

Deal yourself a seal

You Cobra mechanics need a new seal deal when you order seals for the air induction baffle assembly. The part numbers listed in TM 55-1520-236-23P, for example, are on the way out. NSN 9390-01-130-1886 gets seal material to use on all Cobra air induction baffle assemblies. Use TM 55-1520-236-23, Appendix D, as your authority. Order the material by the foot, as much as you need to make new seals. ■

—from PS magazine

Questions for aviation personnel

1. How are helicopter tires identified? **Reference: TM 55-1500-204-25/1, with change 33, General Aircraft Maintenance Manual**

2. Are flexible hoses and hose assemblies used in aircraft oxygen systems? **Reference: TM 55-1500-204-25/1, with change 33, General Aircraft Maintenance Manual**

3. What is meant by the term "dissymmetry of lift"? **Reference: FM 1-203, Fundamentals of Flight**

4. Define gyroscopic precession. **Reference: FM 55-414, Fundamentals of Rotor and Power Train Maintenance** ■

Did you know

- That lubricating oil, military specification MIL-L-7808 or MIL-L-23699, contains an additive which is poisonous and absorbed readily through the skin?
- That you should handle pyrotechnic flares with the same care as high explosives?
- That you should not use air bottles or booster pumps for tire inflation unless they are designed for that purpose?
- That you should use extreme caution when prying out foreign material imbedded in tire treads?
- That noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss?
- That an explosion or fire may result if petroleum-based products come in contact with components of the oxygen system? ■

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It's their airspace, too

As a UH-1 was entering the airfield traffic area, the pilot and copilot noticed a large number of birds. The pilot turned on the landing light and selected a flight path clear of the birds. While the crew was concentrating on another aircraft which was also landing, a buzzard dived toward the UH-1. The pilot shielded his head with his arms as the buzzard hit the upper part of the left windshield, breaking the greenhouse. Glass flew into the pilot's face and over his body. His helmet visor was down, saving his eyes.

Another UH-1 was flying 100 feet above the ground at 100 knots when a seagull hit and shattered the chin bubble. The seagull ended up inside the aircraft between the pilot's pedals. The copilot took control and landed.

Before an OH-58 pilot could take evasive action, a bird flew through the copilot's windshield, hit the copilot in the face, and continued on out the door. The copilot's visor was down, providing complete protection from the bird and glass fragments.

As an Army helicopter was approaching a civil airport for landing, a goose hit one of the main rotor blades. The pilot was able to land without further incident or injury. This particular airport is bordered by two rivers which are major flyways for migrating waterfowl.

These are just a few examples of the 207 bird strikes to Army aircraft reported in the past 4½ years. As the fall migration season approaches, aviation crews should be particularly alert to the hazards of bird strikes. And since you cannot always avoid a bird bent on self-destruction, there are some things you should know about the habits of birds.

Most bird strikes to Army aircraft occur below 1,000 feet, with about 70 percent occurring during the takeoff, climb, final approach, and landing phases of flight. But strikes have also been reported above 5,000 feet.

Regardless of the size of the bird, it should be considered a potential hazard. The speed of the aircraft dictates the force of impact. The faster you are flying, the greater the impact forces. Each time the aircraft's speed doubles, the force quadruples.

Conditions that attract birds vary at each base and airfield. Hazards may be seasonal or year round. Birds are attracted by food, water, or shelter. Bird activity increases around newly planted farmlands and during grain harvest season. Birds are more active in the mornings and evenings than at midday.

While there is no sure way to avoid the birds every time, keeping the following points in mind may help reduce the possibility or severity of a bird strike.

- Watch for birds while taxiing for takeoff. If possible, do not take off or land if flocks of birds are on or adjacent to the runway.
- Try not to fly over wildlife refuges. Operations within 30 miles of these refuges are considered hazardous.
- During cruise, watch for flocks of birds and try to climb above them. A bird will usually try to avoid a collision by diving or sideslipping to lose altitude.
- If high bird concentrations are encountered, slow the aircraft to minimize impact forces.
- Remember that flocking birds may fly between their roosting and feeding areas during the early morning and evening.
- If possible, avoid flying low in the vicinity of swamps, garbage dumps, wooded hilly areas, or any other place that may be attractive to birds.
- Windshield and greenhouse penetrations are the greatest potential danger to aircrews from bird strikes. Helmet visors worn in the down position have protected many pilots from serious injury from glass and bird fragments.
- When pilots sight birds, they should notify other pilots and the control tower of the hazard.

Bird avoidance model

In an effort to reduce bird strikes, the U.S. Air Force Bird/Aircraft Strike Hazard team has developed a predictive bird avoidance model (BAM). The purpose of the model is to estimate bird strike risk on low level routes given date and time of flight, low level route number, and type of aircraft. The BAM considers both changes in aircraft mission profiles and bird populations within a particular geographic region and it is versatile enough to accommodate various aircraft types, schedules, and missions. In addition, the BAM considers the timing of bird movements as well as the intensity of migration, taking into account differences in bird behavior and variations in the regional availability of habitat.

The computer-generated bird risk analysis is operational and available to all DOD users for both existing and proposed low level routes. Data can be obtained by sending requests to The BASH Team, Air Force Engineering and Service Center/Directorate of Environmental Planning, Tyndall AFB, Florida 32403. Requests should include

(continued on next page)

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (H series) Flight of four aircraft landed and was hovering to parking area. Tail of No. 2 aircraft pitched up. Copilot, concerned his aircraft was getting too close to the No. 1 aircraft, added collective and cyclic to fly out of formation. Aircraft climbed about 50 feet while in a nose-low attitude and rotated 270 degrees to right. Pilot took control, briefly stabilized the aircraft, then got off the controls. Copilot immediately lowered collective. Descent could not be stopped before ground impact. Skids collapsed, main rotor blades hit tail boom, and aircraft rolled 90 degrees to left. 8451

UH-1 Class D mishaps □ (H series) During takeoff, pilot was told by pilot of another aircraft that vertical drive shaft cover was open. Cover was bent and rivets were pulled out. Caused by improper preflight inspection. □ (H series) Main rotor blade hit tree during contour flight, damaging blade tip skin.

UH-1 Class E mishaps □ (H series) Ringing noise was heard from transmission area. Master caution and segment panel lights came on, and stiffness was felt in controls. Caused by ruptured packing for hydraulic on/off solenoid valve to T-fitting connection. □ (H series) Transmission oil pressure fluctuated from 45 psi to below 10 psi. Caused by failure of pressure relief valve. □ (H series) Pilot heard loud noise after takeoff. Skin had separated from leading edge of main rotor blade. □ (H series) Master caution and low rpm warning lights came on. Caused by failure of tachometer generator. □ (H series) Aircraft developed unusual vibration during climb. Loud sounds were heard and feedback from cyclic was felt by both pilots. Caused by excessive wear on pitch rod end bearings. □ (H series) Aircraft yawed left and began to settle. Low rpm audio and light activated. N1, N2, and rpm decreased. Caused by failure of fuel control.

UH-60 Class E mishaps □ Right storage compartment door came loose and exited aircraft through left cargo door. Aircraft was landed with no damage. Crew failed to insure door was secure. □ No. 2 reservoir low light and boost light came on during landing. Caused by cracked pressure relief cap on pitch trim assembly.

Attack helicopters

AH-1 Class D mishap □ (S series) After shutdown, crew found drive shaft cover between 42-degree and 90-degree gearboxes had cracked in half and separated from aircraft, leaving a hole in vertical fin. Technical inspector found that eyelet turn-lock fasteners had failed, allowing cover to open.

AH-1 Class E mishaps □ (S series) Master caution and transmission oil hot lights came on. Caused by failure of bearing in transmission oil cooler fan. □ (S series) Transmission oil pressure dropped to 20 psi during hover. Caused by cracked elbow fitting in transmission oil supply line.

Cargo helicopters

CH-47 Class C mishap □ (B series) Crew heard loud thumping sound and felt a shudder through the aircraft during climbout. Bird had hit and damaged leading edge of forward rotor blade.

CH-47 Class D mishap □ (C series) Rotor rpm began to decay during short final for landing in mountainous terrain. No. 1 and No. 2 engine beep failed to increase rpm. Crew jettisoned external load and regained control of aircraft and rpm.

CH-47 Class E mishap □ (B series) Loud noise was heard from aft transmission area. No. 1 hydraulic and SAS lights came on. Caused by failure of No. 1 hydraulic boost pump.

Observation helicopters

OH-6 Class C mishap □ Pilot noticed TOT was rising, and collective reduction had no effect. Pilot then heard noise from engine compartment and smelled unusual odor. Pilot entered autorotation, and aircraft landed hard, severing tail boom.

OH-58 Class D mishap □ (A series) Pilot saw N2 rise to 105 percent during runup. Pilot continued with remainder of crosscheck and by the time he returned to N2, it had risen to 110 percent.

OH-58 Class E mishaps □ (A series) Loud noise was heard from rear of aircraft during hover. Caused by failure of compressor. □ (C series) Engine governor failed during flight. □ (A series) Right passenger door blew off during OGE hover check. Pilot failed to insure door was secured correctly.

It's their airspace, too

low level route number for existing routes and longitude/latitude of turn points for proposed routes.

A pamphlet entitled "Bird/Aircraft Strike Hazard (BASH) Guidance Package," produced by the Air Force BASH team, was recently distributed to Army aviation safety officers. Anyone desiring a copy of this pamphlet may request it by writing Commander, U.S. Army Safety Center, ATTN: PESC-M, Fort Rucker, AL 36362-5363, or by calling AUTOVON 558-2062/6483, commercial 205-255-2062/6483.

Stay alert and keep your visor down. ■

Fixed wing

T-42 Class E mishap □ Loud bang was heard as landing gear was being retracted. Tower personnel indicated that nose gear was hanging at 45 degrees. Gear was recycled and landing made. Caused by fatigue failure of clevis pin in nose gear retract assembly.

OV-1 Class E mishaps □ (D series) No. 2 propeller would not reverse and would not unfeather after landing. Caused by failure of propeller assembly. □ (D series) No. 2 engine began rapid succession of compressor surges and egt rose to 700° C. Cracked T1 sensor housing gave erroneous inputs to fuel control. Gasket between hot air valve and diffuser assembly failed, allowing inadequate air supply to engine compressor.

U-8 Class E mishap □ (F series) Left engine misfired during flight, and chip detector light came on. Caused by hole in side of piston, which burned away rings.

C-12 Class E mishap □ (A series) No. 2 engine tgt rose to 685 degrees. Caused by failure of thermocouple.

Maintenance

UH-1 Class E mishaps □ (H series) Engine failed during runup. Inspection revealed that cannon plug on main fuel shutoff valve had been disconnected during drive shaft repack. Mechanic did not record removal of the plug. Technical inspector did not know plug had been disconnected and therefore did not check it. □ (H series) Loud popping noise was heard from engine area during climb. Bleed band actuator was out of adjustment.

AH-1 Class E mishap □ (S series) Unusual noise was heard, and master caution and No. 1 hydraulic lights came on. Hydraulic pressure line to yaw control servo was leaking. Caused by chafing from a wire bundle tie.

U-8 Class E mishap □ (F series) Stall warning horn sounded above normal rotation airspeed during takeoff roll. IP was unable to abort takeoff safely due to insufficient accelerate-stop distance. After takeoff, IP returned to airfield and landed. Stall warning horn remained on from takeoff to landing. Stall warning vane was installed incorrectly.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**1**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**3**	**5**
4th Qtr	July	5	7	July	**2**	**3**
	August	4	3	August	**2**	**0**
	September	6	0	1-5 Sep	**0**	**0**
	Total for Year	40	23	Total to Date	**33**	**32**

Messages received

• Safety-of-flight maintenance mandatory message concerning one-time inspection and permanent inspection of UH-60 tail cone canted hinge bulkhead radius blocks underneath the head of tail cone to pylon bolts (UH-60A-84-10, 231620Z Aug 84). Summary: During a 500-hour phase inspection, it was discovered that a radius block was missing from the tail cone fold fitting. This was considered a manufacturing error; however, it is possible for a block to debond and come off when the bolts are removed to fold the pylon. With the radius block missing, the bolt head could damage the bulkhead, which is a primary structural member. This message directs a one-time inspection of all affected aircraft to assure that all radius blocks are installed. It also directs that this area be inspected any time the pylon is folded. Contact: Robert Lawyer, AUTOVON 693-3300, commercial 314-263-3300.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Aviation mishap prevention forum

Familiarization chart

A technical data familiarization chart will be used and maintained by quality control personnel, and shops will also maintain a chart. The chart is used to insure that maintenance personnel are familiar with the contents of each technical manual pertaining to their responsibilities. It lists all technical manuals pertinent to the equipment for which the shop has maintenance responsibilities. The manuals are listed in columns at the left of the chart. Names of the maintenance personnel are listed diagonally across the top of the chart. Maintenance personnel initial the appropriate block to indicate an understanding of the technical manuals. As changes are received, the latest change number is posted and the initials are erased from the familiarization chart. The technical inspectors and maintenance personnel reinitial the chart as they review the changes. Individual shops maintain separate charts listing the personnel and manuals pertaining only to that shop. **Inspectors will check the individual charts on a monthly basis** to insure that:

- All assigned shop personnel are listed.
- All personnel have initialed the chart to indicate that they are familiar with manual contents.
- All manuals used by the shop are listed and changes are posted. ■

—from FM 55-411, dated April 1984

Ill winds blow no good

Loose gear and parts lying near a helicopter give maintenance folks big headaches when the rotors start turning.

Wind from whirling blades blows around whatever it can. Like when someone left the front cowling of an OH-58 near the passenger door. Someone else started up the engine for a maintenance check. The bird stayed on the ground, but the cowling took off—right into the tail rotor blades. Result—damaged blades, gearbox, cowling.

So clean up the maintenance area before someone starts the engine. You'll save more than the cost of a bottle of aspirin. ■

—from PS magazine

Seat cover PM

Take a look at the seat cover straps on the troop and gunner seats of your UH-60 helicopters. Could be they're getting chafed by the rivet head in the tube bracket.

Here's a simple fix: Replace the headed rivet, NSN 5320-00-883-9391, in the top right and left seat tube brackets with countersunk rivets, NSN 5320-00-866-4660. ■

—from PS magazine

Answers to last week's questions

1. How are helicopter tires identified? Helicopter tires are identified by the word "helicopter" on the side wall. **TM 55-1500-204-25/1, with change 33, page 2-56, par. 2-182a(1)**

2. Are flexible hoses and hose assemblies used in aircraft oxygen systems? No. **TM 55-1500-204-25/1, with change 33, page 7-36f, par. 7-41**

3. What is meant by the term "dissymmetry of lift"? The difference of the lift between the advancing half and the retreating half of the rotor disk. **FM 1-203, page 3-12**

4. Define gyroscopic precession. If a force is applied against a rotating body, the reaction will be about 90 degrees from the point of application, in the direction of rotation. This unusual fact is known as gyroscopic precession. It pertains to all rotating bodies. For example, if you push the 3 o'clock point on a clockwise rotating wheel, the wheel would move as if it had been pushed at the 6 o'clock point. The rotors on helicopters act as gyroscopes and are subject to the action of gyroscopic precession. **FM 55-414, page 1-3, par. 1-7** ■

Questions for aviation personnel

1. Aviators will be credited with completion of the annual written examination for AAPART purposes, regardless of the date during the ATP training year in which the examination is successfully completed. True or false? **Reference: AR 95-1, with change 2, Army Aviation: General Provisions and Flight Regulations**

2. When should a torch or flame be used on aircraft aluminum or steel tubing? **Reference: TM 55-1500-204-25/1, with change 33, General Aircraft Maintenance Manual**

3. Personnel shall remain at least __ feet away from front of operating turbine-powered aircraft inlet ducts, and will not approach closer than _____feet to inlet ducts from rear or side of aircraft. **Reference: TM 55-1500-204-25/1, with change 33, General Aircraft Maintenance Manual**

4. What two factors control blade speed during flight? Are these two factors fixed or can they be used to compensate for dissymmetry of lift? If not, what variable can be used to compensate for dissymmetry of lift? **Reference: FM 1-203, Fundamentals of Flight** ■

Stacom

Standardization Communication □ Directorate of Evaluation & Standardization, USAAVNC, Ft. Rucker, AL 36362 □ STACOM 106 □ 5 Sep 1984

DES update

The ultimate goal of the Department of the Army Aviation Standardization Program is to improve combat readiness. Standardization, realistic training, and accident prevention are the means to that end. Each member of our aviation team must be dedicated to excellence and high standards as we approach fiscal year 85. Aviation, the Army's newest branch, and now a full-fledged member of the combined arms team, must put its best foot forward through aggressive accident prevention programs and a strong commitment to improve individual and unit proficiency.

As the Department of the Army proponent for flight standardization, we will continue our two-prong approach to support the enhancement of aviation readiness. Evaluation of your standardization program will be accomplished during the Flight Standardization Evaluation Team's visit to your installations. Aviation Standardization and Training Seminar (ASTS) will provide training assistance and gather feedback. Both evaluation and training assistance are equally important to our success in standardization.

The tactical scenario will continue to be the primary vehicle for conducting flight standardization evaluations. Tactical flight evaluations allow an assessment of both the individual aviator's ability to employ his aircraft system in a simulated combat environment and the unit's ability to accomplish a combat mission. Mission scenarios will be consistent with the unit's ARTEP requirements. Operations at night using night vision goggles (NVG) and in a nuclear, biological, chemical (NBC) environment will be evaluated. Aviators will be evaluated on their ability to perform several tasks simultaneously. A scout pilot, for example, should be able to navigate while transmitting spot reports, adjusting artillery, or conducting target handoffs. This type of rigorous evaluation will assist commanders in determining the status of their standardization program and training readiness. Additional areas of special emphasis during FY 85 include the following:

- The ability of battle captains and air mission commanders to plan, brief, and execute a simulated combat mission.
- Management of the Aircrew Training Program.
- Aviator knowledge of assigned aircraft weapons systems to include their operation, capabilities, and limitations.
- Instructor pilot's ability to conduct aviation training required by the ATM and directed by the commander.
- Aviator knowledge of the cause, characteristics, and preventive measures associated with the loss of tail rotor effectiveness.
- The effectiveness of night, night vision goggle, and gunnery training programs.
- Aviator proficiency in the operation of aircraft survivability equipment.

FY 85 will witness the continued growth of our ASTS program. Developed to provide assistance to the units in the field, the ASTS program is extremely flexible and is not force-fed. Visits to units are conducted only upon request and the team composition will be tailored to meet the specific requirements of the units being visited. Specific areas in which expertise can be provided include the following:

- Instructor pilot fundamentals.
- The Aircrew Training Program.
- The threat—training and doctrine.
- Tactical employment of aviation units.
- Standardization maintenance test flight procedures.
- Accident prevention.
- Aviation life support equipment.

Training flights will be conducted with the unit trainers to polish their instructor pilot techniques, and informal seminars will be held with unit commanders to discuss their standardization, training, and accident prevention programs.

ASTS is a total team effort committed to providing you assistance. Our success in the area of standardization and training is heavily reliant on your feedback.

Along that line, we encourage you to insure maximum unit and individual participation when the ASTS team comes to your unit. As we work on tactics and doctrines at the Aviation Center, we need you to share with us your employment techniques and procedures. The standardization instructor pilots on the ASTS team will demonstrate techniques successfully employed by the other units. At the same time, they can learn from observing how your aviators conduct tactical missions. That type feedback fosters development of the best possible "how-to-fight" manuals and enhances the efficiency of the training base.

Aviation is in an innovative era. Tactical initiatives, especially, will cause the ATM program to be dynamic. The Army Flight Standardization Program will keep us on an even keel. Both the evaluation and assistance teams are comprised of total professionals—experts in their fields—who are dedicated to excellence. Their evaluation, observations, and training offer the commander an invaluable tool by which he can improve his unit's training posture and mission accomplishment capability. The Aviation Standardization Program continues as the model

(continued on back page)

Stacom

for Army-wide standardization efforts. We must all remain committed to maintaining that level of excellence. ■

Anticollision lights

Anticollision lights, as originally designed, were not of sufficient intensity to cause hazards during ground operations. The Army standard dual element strobe light system does not cause hazards on the ground when operated in the RED mode. Some Army aircraft have been modified with white strobes and are not configured with the red lower intensity light. These white strobe lights may cause a safety hazard when operated on the ground where other flight crews and ground personnel may be affected by the brilliance and pulse of the light. In such cases, the white strobe light must not be on until the aircraft is ready for takeoff. The same rule applies when taxiing and parking after a flight.

Paragraph 1-17a(1), AR 95-1, will be changed to include these exceptions in the use of anticollision lights. Until that change occurs the following provisions of FAR Part 91, paragraph 91.73(d) apply: "The anticollision lights need not be lighted when the pilot-in-command determines that, because of operating conditions, it would be in the interest of safety to turn the lights off." ■

Change 2 to AR 95-1

The word "no" was inadvertently omitted from line 2, paragraph 4-5b(8), of change 2 to AR 95-1 (effective 15 August 1984). The sentence should read: "Aviators flying helicopters may reduce category A visibility by 50 percent but **no** less than one-fourth mile or metric equivalent." This error will be corrected in change 3.

The mission symbol "s" does not appear in paragraph 1-19c(6) of change 2 to AR 95-1. This was an error that occurred in the development of the change, and it will also be corrected in a future change. ■

Questions and answers

Question: Is the UH-1 20-minute fuel caution light required for flight as a part of the fuel quantity indicating system specified in Table 4-2, AR 95-1?

Answer: The fuel caution light is not a part of the fuel quantity indicating system required by AR 95-1. However, it is a part of the caution and warning system. Therefore, a very important part of the total fuel system which enhances flight safety and corrective maintenance action should be initiated.

Question: The new CH-47C Operator's Manual does not contain a "continuous torque available" chart. Does this mean that the continuous torque available entry is no longer required on the PPC?

Answer: Listing continuous torque on the PPC is no longer required. The chart was intentionally deleted from the CH-47C -10 and is being deleted from other manuals. Hover performance predictions are based on maximum torque available and not on continuous torque. Even though the entry **was** required on PPCs it was of no practical value. PPCs appearing in revised ATMs will not require the continuous torque entry. If there is a need to know continuous torque available, it may be found on the cruise charts. ■

Information contained herein generally precedes the formal staffing and distribution of Department of the Army official policy. Subject information is provided to all commanders to enhance aviation operations and training support. Call AUTOVON 558-3589 during duty hours; 558-6487 after duty hours.

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Army aircraft mishap prevention information □ U.S. Army Safety Center, Ft. Rucker, AL 36362-5363 □ Vol. 12, No. 48 □ 12 Sep 1984

Accident review: UH-60 test flight

Synopsis

A UH-60 was on a maintenance test flight. An unsafetied retention bolt for the main rotor pitch change rod vibrated free. The unrestrained upper pitch change rod resulted in loss of control over the main rotor system. The aircraft crashed in an open field.

History of flight

Work began on a UH-60 to comply with a TSARCOM maintenance information message (MIM). The MIM required the removal of rubber boots from around the upper pitch change link rod end bearings and installation of protective phenolic washers on both the rod end bearings and the damper bearings. Application of the MIM required disassembly of the rod end bearings, which is a grounding fault requiring an entry in the aircraft logbook.

Removal of the rubber boots was begun by the crew chief, who was directly supervised by the aviation maintenance officer. Following the removal of the boots, the maintenance officer gauged the rod end bearings and dampers to determine their serviceability. He found that the yellow main rotor blade pitch change link rod end bearing and three damper bearings exceeded allowable tolerances. The maintenance officer told the crew chief to complete the washer application but to leave all the boots unsafetied and finger tight until replacement of the unserviceable parts could be completed. Logbook entries were made which accurately reflected the above, to include the unserviceable pitch change link and three dampers.

Ten days later, the maintenance officer announced that he wanted to test fly the aircraft the next morning instead of the first of the following week as originally planned. This change concerned the crew chief, who asked his platoon sergeant to postpone the test flight to give him enough time to complete all of the work required. The platoon sergeant refused to postpone the flight but agreed to get him some assistance. The personnel assigned to assist were unaware of the modification begun 10 days earlier.

Work began on the aircraft. The platoon sergeant and another mechanic began to replace the unserviceable pitch change link and three dampers. The sergeant removed the old pitch change link, bench-rigged the new one, and told the mechanic to install, torque, and cotter-pin the link. The sergeant cannibalized three serviceable dampers from another aircraft and left these for the mechanic to install. The mechanic completed his work. In the meantime, the assigned crew chief had finished mounting the stabilator on the aircraft and was making entries in the logbook. The crew chief asked the mechanic if he had completed everything on the rotor head. The mechanic, not having seen the logbook, responded that he had. Hearing this, the crew chief signed off the MIM and replacement of the pitch change link and dampers as being completed.

After making the logbook entries, the crew chief summoned the technical inspector (TI). They went through the logbook together and began the inspection, with the crew chief indicating the work which had been completed. The assisting mechanic pointed out to the TI work he had done on the rotor head. The TI inspected the work he was shown and found it to be correct. The TI then took the logbook to his office and completed the required entries, signing off both the replacement of the unserviceable parts and the MIM application which he did not completely inspect. The aircraft was released for the test flight.

The copilot, who was assigned to fly ►

UH-60 test flight

with the maintenance officer, was told to preflight the aircraft for an early morning flight. The copilot did a brief preflight inspection of the aircraft, which did not include the rotor head, while the crew chief cleaned and prepared it to be moved from the hangar. The logbook, which was still in the quality control office, was not checked. The maintenance officer was having problems with another aircraft he was test flying, so the UH-60 flight was delayed until after lunch.

Another crew chief was assigned to replace the regular crew chief, who had been given the afternoon off. Also, the unit maintenance technician had volunteered to help prepare the aircraft for the test flight. About mid-afternoon, the maintenance officer arrived. He inspected the stabilator, checked the logbook, and asked the maintenance technician if the rotor head was okay. The technician said it was.

The aircraft was run up and some adjustments made to three of the pitch change links. Following the last adjustment, the maintenance officer directed that the pitch change link upper and lower jam nuts be torqued but not safetied. The aircraft was then returned to the parking area where the crew chief got out. The maintenance test pilot, copilot, and maintenance technician then began the test flight.

About 14 minutes after takeoff, the crew contacted the airfield tower for landing clearance to a heliport. A minute or so later, the UH-60 broke up in flight and crashed. All three occupants were killed.

Crewmember experience

The 26-year-old maintenance test pilot had more than 650 rotary wing flight hours, with more than 450 in th UH-60. The 27-year-old copilot had more than 750 rotary wing flight hours, with almost 500 in the UH-60.

Commentary

A series of errors and oversights related to maintenance, as well as an inadequate preflight inspection of the aircraft, resulted in the aircraft being test flown with three upper pitch change link rod end bearing retaining bolts unsafetied and incorrectly torqued. This ultimately resulted in the blue pitch change link rod end bearing retaining nut being vibrated off its bolt, the bolt being thrown from the mount, and the rod end bearing separating from the pitch horn. This separation resulted in an uncontrolled main rotor blade causing vibrations great enough for an in-flight structural failure.

The assigned crew chief did not comply with TM 38-750 when he signed off as completed work he did not complete. The mechanics helping to prepare the aircraft for the test flight were unaware that the pitch change link retaining bolt/nuts had been left loose and unsafetied after previous maintenance actions. When they were asked by the crew chief if they had finished the work on the rotor head, they said they had. At this time, the crew chief signed off, as completed, both the replacement of the unserviceable parts and completion of the installation of the phenolic washers to the pitch change rod end bearing as required by the maintenance information message.

The TI signed off, as inspected, the phenolic washer application although he did not inspect it. When the TI arrived at the rotor head, the individual who had replaced the unserviceable pitch change link and dampers pointed out the items he had replaced. The TI inspected that work and returned to his office where he mistakenly signed off, as inspected, the MIM application, as well as the other faults listed in the logbook, even though the pitch change rod end bearing retaining bolt nuts were loose and unsafetied. This action released the aircraft for test flight.

The pilot and copilot did not correctly perform the required preflight inspection. The copilot did not inspect the rotor system or review the logbook. The pilot, who was in a hurry to complete the flight because of an appointment he wished to keep, did not inspect the rotor system faults for which the aircraft was being test flown. This action resulted in the aircraft being flown with loose and unsafetied nuts.

Without adequately considering the amount of work to be completed on the aircraft, the maintenance officer directed that the test flight be rescheduled to the earlier date. This action required the assignment of several other personnel to help the crew chief and introduced an element of haste which ultimately resulted in the aircraft being released for a test flight while still in a nonflyable status.

Although errors in maintenance procedures resulted in the aircraft being flown with loose and unsafetied retaining nuts, the design of the retaining bolt allowed it to separate from the pitch horn assembly. In TM 55-1520-237-23P, the bolt is described as a self-retaining bolt. It is, in fact, an impedance-type bolt as opposed to a self-retaining bolt. Because of the oscillating loading present in the rotor system above the swashplate, the bolt vibrated free after the loss of the nut. When this occurred, control of the blue blade was lost. ■

Correction

Page 2 of the 22 Aug 1984 issue carried a warning on an eye hazard on the OH-58. Reference paragraph 2, the pilot was getting into the **right** seat, not the **rear** seat. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishap □ (H series) Aircraft hit tree during hover, damaging both main rotor blades.

UH-1 Class D mishap □ (H series) Postflight inspection revealed hole aft of tail boom attaching point. Crew had heard a noise during poncho paradrop mission, but assumed noise was ammo can hitting skid. Dropmaster did not throw load clear of aircraft. Poncho snagged on the skid and ammo can swung up into tail boom.

UH-1 Class E mishaps □ (V series) Egt rose about 30° C. during flight. Caused by failure of deice valve cannon plug. □ (H series) Engine oil temperature rose to 150 degrees. Caused by failure of thermostat flow control. □ (H series) Crew smelled fuel during flight. Caused by deteriorated fuel line. □ (H series) Master caution and transmission oil pressure lights came on during hover. Caused by temporary blockage of transmission oil sensing system. □ (H series) Crew heard metal-to-metal grinding noise. Caused by failure of inverter. □ (V series) Compressor stall was caused by faulty fuel control. □ (H series) Master caution light came on. Caused by failure of engine air filter pressure switch. □ (H series) High frequency vibration was felt in anti-torque pedals. Caused by failure of bearing.

UH-60 Class D mishaps □ Aircraft hit bird during flight. Left chin bubble was broken. □ Crew heard loud high-pitched whine during final approach for landing. IPS blower exhaust fan blade broke loose, causing clamp on exhaust tube to fracture and allow exhaust vent to come off.

UH-60 Class E mishap □ Aircraft developed vibration and unusual noises were heard. Main rotor blade skin bonding had separated aft of trim tab.

Attack helicopters

AH-1 Class D mishap □ (S series) Tail rotor blades hit tree during hover, damaging blades.

AH-1 Class E mishaps □ (S series) N_2 and rotor tachometer needles did not split when throttle was reduced. Caused by failure of clutch ring on sprag clutch. □ (S series) Pilot increased throttle to 6600 rpm after completion of hovering autorotation. Transmission oil pressure light remained on and oil pressure decreased. Loss of oil was caused by crack in elbow fitting. □ (S series) Instrument and panel lights failed during takeoff for night mission. Six wires leading into NVG circuit board had worked loose from soldering point, causing loss of lighting. □ (S series) Transmission oil temperature rose during hover. Oil cooler was blocked by dried grass and leaves. □ (S series) Engine oil pressure rose during hover. Caused by failure of oil pressure transducer.

AH-64 Class E mishaps □ No. 1 engine chip detector light came on. Input oil seal was leaking and engine nose gearbox chip detector had metal particles. □ APU fire light came on during flight. Caused by connector pin on flame detector grounding out.

Cargo helicopters

CH-47 Class E mishaps □ (C series) No. 2 hydraulic flight boost and SAS lights came on. Caused by ruptured hydraulic line. □ (C series) Master caution and transmission oil lights came on. Aft transmission oil pressure dropped to zero. Caused by failure of transmission oil pressure transducer.

Observation helicopters

OH-58 Class E mishaps □ (A series) High frequency vibration was felt through pedals during flight. Normal trunnion wear caused tail rotor to lose balance. □ (C series) After refueling at field site, pilot repositioned aircraft about 100 feet, with the tail in the wind. Pilot then attempted to position aircraft for takeoff. A second OH-58 was behind the aircraft preparing for takeoff. Pilot made left pedal turn with left quartering tailwind, experienced minor control problems, and torque momentarily went to 105 percent. Pilot should have made right pedal turn because of the wind and rotorwash of the second OH-58. □ (C series) Transmission oil pressure light came on. Caused by malfunction of oil pressure switch. □ (A series) Pilot heard loud bang during hover at field site. Large piece of plastic was found wrapped around blade.

Fixed wing

C-12 Class E mishap □ (D series) Fuel was seen flowing over left aileron about 18 inches from tip. Postflight inspection revealed stuck vent float valve on left wing.

C-7 Class E mishap □ As main landing gear was being retracted, left engine began backfiring. Caused by failure of No. 10 cylinder.

OV-1 Class D mishap □ (D series) Right hatch blew open during descent, breaking hatch plexiglass and support bracket. Airframe vibrations may have caused hatch latch to unlock. Hatch locks were verified in accordance with the checklist before takeoff. Because of technical observer's relative inexperience, pilot had observer verify the latching handle locked in the aft position by applying pressure on the handle without depressing lock tab. Handle moved forward slightly. Pilot then had observer depress the tab and pull handle full aft. Observer verified the handle locked in the full aft position by applying forward pressure with no forward movement. Pilot confirmed this visually. There was no latch safety line installed on the hatch. As final verification, pilot had observer physically check each of the four locking pins in place. Hatch locking mechanism has been inspected and found to be in adjustment. Latch safety lines plainly visible to the pilot have been installed.

U-21 Class E mishaps □ (A series) Left engine exhaust began emitting smoke during climb. Oil was leaking through vents and onto leading edge of wing. Caused by ruptured O-ring in oil pressure line. □ (A series) Flaps would not retract from full down position after landing. Caused by burned-out flap motor.

T-42 Class E mishap □ Right engine would not respond when power was reduced for descent. Throttle control support clip came apart, allowing throttle cable to free float and cause engine to remain at cruise during throttle retardation.

Maintenance

UH-1 Class E mishaps □ (H series) Blue-colored flash was seen near pilot's feet during flight. After aircraft was landed, plug that powers magnetic compass instrument light was found disconnected and burned. Unit personnel, after repositioning compass, had capped magnetic compass connector to protect it while compass instrument light plug was disconnected. They did not cap lighting wire to prevent it from coming in contact with a ground. □ (H series) Engine oil temperature rose above red line during flight. On landing, crew chief found that oil cooler fan was not turning. Key from turbine shaft was lodged between turbine and oil cooler housing. Key apparently dropped out of its slot during installation.

AH-1 Class E mishap □ (S series) Transmission oil bypass light came on. Caused by loose wire to bypass switch.

Messages received

- Safety-of-flight technical message concerning inspection of OV-1 and RV-1 bracket for cracks (OV-1-84-04, 272000Z Aug 84). Summary: A category I EIR was received from the field citing cracks in the channels that support and provide the pivot point for the rudder idler bellcrank. Twelve aircraft were inspected and six were found to be cracked. A one-time inspection will be made to identify and repair discrepant brackets. Contact: Jim Mitchell, AUTOVON 693-1639, commercial 314-263-1639.
- Maintenance information message concerning UH-1 tail rotor hub and blade assembly self-locking nut (MIM-UH-1-84-MEM-09, 311400Z Aug 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**7**	**10**
	November	2	2	November	**3**	**3**
	December	0	0	December	**0**	**0**
2nd Qtr	January	1	0	January	**4**	**0**
	February	0	0	February	**4**	**4**
	March	2	5	March	**3**	**1**
3rd Qtr	April	6	0	April	**1**	**3**
	May	8	1	May	**4**	**3**
	June	4	5	June	**3**	**5**
4th Qtr	July	5	7	July	**2**	**3**
	August	4	3	August	**2**	**0**
	September	6	0	1-12 Sep	**1**	**0**
	Total for Year	40	23	Total to Date	**34**	**32***

*Army personnel only. Total number of fatalities in Army aircraft flight accidents is 34.

Aviation mishap prevention forum

New toolbox

A new toolbox is in the supply system. Reports from the field indicate that damage has occurred to aircraft bulkheads and floors due to the square sharp toolbox corners. **Be extremely careful** when moving this type toolbox in and around your aircraft. The following information is provided to enable you to readily identify the new toolbox:

Nomenclature: Toolbox Portable
NSN: 5140-00-289-8911
Type II Class I Size II
Manufacturer: Ivey Tool Co.

These toolboxes were manufactured in accordance with the appropriate military specification. ■

Fixed wing landing gear mishaps

Three Class D and 35 Class E maintenance-induced landing gear mishaps have been reported to date in FY 84. Following are synopses and causes of a few of these mishaps.

• T-42 unsafe nose gear indication was received on before-landing check. Caused by link coming loose from indicator rod.

• U-8 main landing gear indicators showed gear were partially up. Landing gear sensitive switch was out of adjustment.

• RU-21 right main gear indicated unsafe. Actuator spring was out of adjustment.

• OV-1 landing gear did not extend and hydraulic pressure was zero. Hydraulic failure and emergency gear extension checklist items were completed. Hydraulic line fitting in right main landing gear wheel well backed off.

• OV-1 right main landing gear did not retract after takeoff. Overserviced strut caused tire to hang up on cuff door when retracted.

• U-21 right main landing gear cam control was set too close to roller bearing, causing wear in the pin holes of the support assembly and tube assembly. The elongated hole allowed the support assembly and rollover bearing to ride over the top of the cam control. This caused the landing gear doors to close earlier than normal. The inboard door's forward lower edge caught on the tire as it passed into the wheel well, causing skin damage.

• C-7 pilot heard grinding noise after takeoff and saw damaged right nose gear door wedged between nose wheel assembly and nose wheel structure assembly. Loss of safetied retaining ring and subsequent loss of grooved retainer pin assembly for right nose wheel door caused door to hang free and be driven up into nose wheel structure assembly when gear was retracted.

• C-12 landing gear did not retract after takeoff. Caused by loose grounding bolt on gear motor.

• C-12 outboard wheel on right main landing gear contacted gear door during retraction, damaging the door. Gear door linkage was not adjusted so that gear would clear the doors following replacement of landing gear actuator.

Remember to use the maintenance manual, have QC check your work, perform landing gear retract tests and have QC witness them, and conduct PMDs and scheduled inspections by the checklist. If you still have doubts about how to work on the landing gear, ask for assistance from your maintenance supervisor, maintenance officer, or your friendly technical inspector. ■

Clarification on collateral investigations

There is some confusion regarding the language of paragraph A-5c(5), DA Pam 385-95. The purpose of the language in paragraph A-5c(5) was to call to the attention of commanders that in many cases collateral investigations are conducted without respondents. This paragraph established a desire that prior to approving a finding that may lead to an adverse action against someone who was not a respondent that the individual be given an opportunity to review the collateral investigation report and give any input desired in his/her own behalf. There was no intent to create a situation whereby commanders would have to provide a "hearing" for individual rebuttal. Eliminations, flight evaluation board, letter of reprimand, report of survey, and MOS reclassification are but few of the many adverse administrative actions where a right for rebuttal is included in the procedures. In these cases adverse allegations arising in the collateral investigation report can be rebutted during the processing of the adverse action prior to its finalizing.

The language of paragraph A-5c(5) was drafted to state that the individual **should** be given a chance to rebut information developed during collateral investigations conducted using informal AR 15-6 procedures. This was not made mandatory and was only a suggested action with the idea that commanders should get both sides of the issue before making a decision that they later have to amend or reverse. There was no intent to require that all collateral investigations use the formal procedures of AR 15-6, nor was it intended that commanders provide a separate hearing to persons who may be the subject of an adverse administrative action that results from collateral investigation findings or recommendations. The wording of this provision of DA Pam 385-95 will be changed to more clearly reflect this intent.

Point of contact at the Safety Center on collateral investigations is Major Ivey, FTS 533-3818/3005, AUTOVON 558-3818/3005. ■

Aviation mishap prevention forum

Answers to last week's questions

1. Aviators will be credited with completion of the annual written examination for AAPART purposes, regardless of the date during the ATP training year in which the examination is successfully completed. True or false? True. **AR 95-1, with change 2, page 3-8**

2. When should a torch or flame be used on aircraft aluminum or steel tubing? A torch or flame should never be applied to tubing or fusible alloy, as excessive heat will destroy both strength of heat-treated tubing and melting characteristics of fusible alloy. Boiling water will not melt fusible alloy after a flame has been applied. **TM 55-1500-204-25/1, with change 33, page 7-15, par. 1 (note)**

3. Personnel shall remain at least __ feet away from front of operating turbine-powered aircraft inlet ducts, and will not approach closer than ____ feet to inlet ducts from rear or side of aircraft. 25 feet and 5 feet. **TM 55-1500-204-25/1, with change 33, page 1-19**

4. What two factors control blade speed during flight? Are these two factors fixed or can they be used to compensate for dissymmetry of lift? If not, what variable can be used to compensate for dissymetry of lift? Rotor rpm and aircraft airspeed control blade speed in flight. Both are variable to some degree, but must remain within certain limits. Thus, angle of attack is used to compensate for dissymmetry of lift. **FM 1-203, page 3-12** ■

Hazardous commercial refueling practice

Parts of a refueler's rubber protective mat were recently found inside the fuel cap seat on a U-21. Apparently, the mat used to protect the paint had begun to deteriorate and crumble. If not detected, bits of the mat could have fallen into the fuel bladder. Army aviators using commercial facilities should be aware of this possible hazard. ■

Questions for aviation personnel

1. Many factors are essential to the safe and efficient operation of an aircraft. One of these is the balance of the aircraft. To be balanced, the weight of an aircraft must be distributed so that the center of gravity falls within specified limits. When an aircraft is not balanced correctly, several unsafe conditions are produced. What are these conditions? **Reference: TC 1-201, Tactical Flight Procedures**

2. How many working days after reporting for duty does an aviator have to present individual flight records to the unit to which assigned? **Reference: AR 95-1, with change 2, Army Aviation: General Provisions and Flight Regulations**

3. Requests about aircraft mishap reports will be answered in accordance with AR _____. **Reference: AR 95-1, with change 2, Army Aviation: General Provisions and Flight Regulations**

4. Does the tail rotor experience dissymmetry of lift? If so, how is it corrected? **Reference: FM 1-203, Fundamentals of Flight** ■

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A matter of professional discipline

Each year, many aviation mishaps are caused by failure to use the checklist. To quote just two reports, "The preflight was not conducted in accordance with the -10 checklist," and again, "The preflight inspection was not conducted using a checklist as required by AR 95-1."

Failure to use checklists has resulted in engines being started with main rotor blades tied down, unsecured engine cowlings, hot starts, rags left in engine inlets, and tools left in drive shaft areas, just to mention a few. Aside from the embarrassment, these things can cause accidents, injuries, and death.

One pilot overslept and arrived at his aircraft 20 minutes before the scheduled takeoff time. He did not use the checklist to do his preflight and did not fasten the No. 1 engine access door locks. The door opened and the safety chain broke during descent for landing. The door and hinges were damaged.

Another pilot did not use his checklist and started his aircraft with the main rotor blades tied down. When it was all over, the aircraft had sustained almost $24,000 in damages.

A pilot who was known to take shortcuts did not do his preflight in accordance with the checklist and did not latch or check the security of the left side engine cowling. During flight, the cowling came off and hit the tail rotor. Both tail rotor blades and hub assembly separated from the aircraft, resulting in complete loss of tail rotor thrust. The aircraft was destroyed and both occupants injured during the landing.

Even though AR 95-1 requires operator and crewmember checklists be used for all ground runup, before takeoff, before landing, and for shutdown checks, aviators sometimes don't use them. Why is this?

Every pilot who does not use a checklist has a "reason." Probably the main "reason" given is that "it takes too long." Besides, you know it by heart and you trust your memory. This is dangerous indeed, as short-term memory is unreliable and subject to stress.

It doesn't take much longer to use the checklist. And that's a DA approved checklist, not the homemade type. Operating on the theory that no matter how good something is it can be made better, people have been known to take pencil and scissors to the prescribed checklist, performing surgery. They think their version saves time and gets the job done just as well.

There is no need to dwell on the purpose of checklists. Many man-hours and dollars went into the development, verification, and publishing of them. All aviation personnel know they're supposed to use them. They play a definite and vital role in your safety. If you follow the checklist conscientiously each time it is required, you are a professional. If you deviate from required checklists, you are jeopardizing your life. This really doesn't make much sense. Commanders put this under the heading of "negligence" and "lack of professional discipline."

Commanders, supervisory, and safety personnel are concerned about this type of negligence. If checklist discipline is lacking, then discipline may be lacking in other areas as well. Discipline is a prime factor in attaining and maintaining a professional unit. This pertains to maintenance personnel as well as aviators. They react the same way to fatigue, pressure, anxiety, and discomfort, and they can and do make mistakes. Like pilots, mechanics and inspectors have to maintain a constant lookout for complacency and overconfidence. Like homemade preflight checklists, homemade maintenance procedures won't do. Sticking to the book is the only answer. There are precise procedures to follow when performing aircraft maintenance. Omitting any steps in these procedures can only be labeled "negligence."

When the professional aviator who has performed all inspections and cockpit checks by the book begins to lift off, he knows he's not taking off with some defect that by-the-book checklist procedures would have exposed. He knows there will be no self-induced mishap because he failed to check some items. He can concentrate on his flying and be ready to detect and cope with a genuine emergency should he have to.

So everyone knows that checklists are required. What can be done to insure they are properly used? A major solution would be to apply on-the-spot corrective action when failure to follow the checklist occurs. But the best insurance is professional discipline—discipline to use the checklist on every flight.■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishap □ (H series) Aircraft began uncommanded right turn with full left pedal during hover after landing. Pilot tried to fly out of turn. Before enough airspeed could be gained, aircraft hit ground left skid first.

UH-1 Class D mishap □ (H series) Aircraft drifted to right during night approach to confined area, and tail rotor blade hit tree. Blade, tail rotor hub, and gearboxes were damaged.

UH-1 Class E mishaps □ (V series) Hydraulic switch was turned off as part of test flight. Cyclic went hard aft and left. Caused by failure of right servo irreversible valve. □ (H series) Master caution and engine oil pressure lights came on during hover. Engine oil pressure dropped to zero. Caused by failure of engine oil pump. □ (H series) Engine oil temperature rose rapidly to 105° C. Caused by failure of thermal valve to oil cooler. □ (H series) Engine oil pressure fluctuated between 65 and 90 psi. Caused by broken oil pressure gauge cannon plug wire. □ (H series) Master caution and transmission oil pressure lights came on. Caused by failure of transmission oil pressure line.

UH-60 Class C mishap □ Main rotor blades hit tree during landing in confined area. Crew was using night vision goggles.

UH-60 Class E mishap □ Master caution and several other caution lights came on. Caused by failure of pitch trim servo.

Attack helicopters

AH-1 Class E mishaps □ (S series) Aircraft was in descent at 80 knots during simulated forced landing, with collective at flat pitch and throttle full open. Pilot decelerated with aft cyclic and rotor climbed to 341 rpm and remained there for 1 second. Engine did not overspeed. □ (S series) Pilot's transmission oil pressure gauge dropped to zero. Caused by failure of oil pressure transducer. □ (S series) Master caution and engine oil pressure lights came on during landing. Caused by failure of engine oil pressure switch.

AH-64 Class B mishap □ Aircraft was involved in a preacceptance flight test to validate compass swing and several other flight writeups. Aircraft was hovered to the airport compass rose where compass readings were taken at 360 degrees and 90 degrees. During this part of the flight, aircraft was being flown by an Army pilot in the back seat. Before repositioning aircraft to 180 degrees, and with the collective full down and rotor at flat pitch, controls were transferred to the front seat pilot. Before moving the aircraft, front seat pilot released cyclic to stow a clipboard. Cyclic moved forward without command and allowed main rotor blades to strike pilot night vision sensor turret. Initial investigation indicates that back seat pilot had turned off force trim which disconnected cyclic magnetic brake system. This was not announced to the front seat pilot during change of controls, and front seat pilot believed that force trim system was still engaged. 8452

Cargo helicopters

CH-47 Class C mishap □ (C series) As load consisting of M102 howitzer was lifted off the ground, it was unintentionally released. Initial investigation indicates that a supported unit soldier may have placed his foot on the crewmember winch/hoist control grip, causing the load to be released. □ (D series) Aft rainshield failed during

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	7	10
	November	2	2	November	3	3
	December	0	0	December	0	0
2nd Qtr	January	1	0	January	4	0
	February	0	0	February	4	4
	March	2	5	March	3	1
3rd Qtr	April	6	0	April	1	3
	May	8	1	May	4	3
	June	4	5	June	3	5
4th Qtr	July	5	7	July	2	3
	August	4	3	August	2	0
	September	6	0	1-19 Sep	4	3
	Total for Year	40	23	Total to Date	37	35*

*Army personnel only. Total number of fatalities in Army aircraft flight accidents is 37.

flight. Rainshield and work platforms were damaged.

CH-47 Class D mishap ☐ (A series) As aircraft was hovering with concrete block on sling, attachment eyes on block failed. Sling legs recoiled into bottom of aircraft, causing sheetmetal damage.

CH-47 Class E mishap ☐ (A series) Pilot's and copilot's rotor tachometers dropped to zero. Caused by failure of tachometer generator.

Observation helicopters

OH-58 Class D mishaps ☐ (C series) As aircraft was hovering downwind, gust of wind caused aircraft to yaw to right. Tail rotor went left and hit tree limb. ☐ (A series) Main rotor blades hit tree during NOE takeoff.

OH-58 Class E mishaps ☐ (A series) When heater switch was turned on, generator ammeter went to zero. All electrically operated engine and flight instruments went off line and all communications equipment failed. Caused by broken wire on battery relay to bus bar. ☐ (A series) Crew smelled fumes during takeoff. Caused by thermal runaway of battery. ☐ (A series) Fuel boost pump light came on. Caused by failure of pressure switch. ☐ (A series) N2 and torque gauge fluctuated during hover. Caused by failure of fuel control.

Training helicopters

TH-55 Class C mishaps ☐ Student pilot was on first unsupervised solo flight. During fourth approach, aircraft began to drift right. Student pilot lost control and aircraft hit the ground and came to rest on right side. ☐ After aircraft was towed to ramp, engine was started by using an APU mounted in the back of a pickup truck. When engine started, mechanic unplugged APU and moved pickup about 30 feet from aircraft. Leaving gear shift lever in park, engine running, and driver's door open, mechanic got out of truck and went to aircraft to check engine for leaks. Another mechanic, who had just engaged the aircraft rotor system, looked up to see truck moving backward toward rear of aircraft. As truck passed near rear of aircraft, tail rotor blade hit open door of truck. Truck gear shift lever was loose and out of adjustment. Lever could be moved from park to reverse with less than 1 pound pressure. Truck should have been parked parallel to aircraft with engine turned off and parking brake set.

Fixed wing

OV-1 Class E mishaps ☐ (B series) After takeoff, pilot noticed that both main gears were indicating down, nose gear was indicating up, and hydraulic pressure was zero. No-hydraulics landing was made. Caused by deteriorated hydraulic line. ☐ (D series) Crew felt surges and vibration, and engine temperature fluctuated. Caused by failure of fuel control. ☐ (D series) No. 1 inverter failed during flight.

Maintenance

AH-1 Class E mishaps ☐ (S series) Collective remained 2 to 3 inches above full down position during runup hydraulic check. Collective and linear actuator linkages were rigged incorrectly. ☐ (S series) Master caution light came on during hover. Condensation had formed on electrical contacts of transmission chip detector, allowing corrosion. Corrosion was not removed during routine servicing.

CH-47 Class E mishap ☐ (A series) No. 2 engine fire detector light came on during takeoff. Flashlight was found in engine compartment.

OH-58 Class E mishaps ☐ (A series) Pilot noticed increase in rotor speed with no control changes. Crosscheck of instruments showed TOT at 710° C. and rotor speed at 388 rpm. Pilot and copilot agreed that high side governor failure had occurred and landed. Metal tube from governor to fuel control was installed incorrectly, causing stress fatigue fracture. ☐ (A series) Crew smelled strong fuel odor during takeoff. Faulty fitting had been installed during MWO on fuel tank.

U-21 Class E mishaps ☐ (A series) No. 2 secondary low pitch light came on and propeller rpm began to decrease. Secondary idle stop switch was out of adjustment. ☐ (G series) Fuel was seen siphoning from left wing cap during flight. Fuel cap was adjusted incorrectly.

OV-1 Class D mishap ☐ (D series) Gear would not retract after takeoff. Gear emergency extension linear control valve was out of adjustment.

Messages received

- Maintenance information message concerning UH-60 high speed shaft vibration (MIM-UH-60A-MEM-84-05, 041600Z Sep 84).
- Maintenance information message concerning UH-60 change to the powertrain manual, reduction in tail rotor retention plate bolt torque (UH-60A-84-06, 291600Z Aug 84).

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

Correction

The 1 August 1984 issue of FLIGHTFAX carried aviation safety course schedules for FY 85. The Aviation Accident Prevention Course for Officers (AAPC-O) 85-1 starts 4 March 85 and ends 15 March 85, **not** 12 March 85. ■

Followups

additional information on mishap briefs previously published

Utility helicopters

UH-1 Class A mishap in 28 March 84 issue (8427) ☐ As aircraft approached field location from which it had departed a few minutes earlier, it hit a wire strung across a river. Control was lost and aircraft crashed. Wires were inadequately marked and not visible to the crew in time to take evasive action. The wires were not marked on the pilot's map. Unit operations officer did not provide adequate maps or overlays of known hazards for aviators to post their individual maps. Pilot did not exercise his individual responsibility to obtain current hazard information.

UH-1 Class A mishap in 14 Mar 84 issue (8425) ☐ Air mission commander selected an inappropriate landing area, a gravel road covered with packed snow and ice, for five aircraft involved in airmobile mission. On each side of the road were banks of hard-packed snow. After passengers were loaded, pilot of lead UH-1 tried to bring his aircraft to a hover under conditions conducive to dynamic rollover. Aircraft drifted right until right rear ski hit snowbank. Aircraft then rolled right and came to rest on right side.

UH-1 Class A mishap in 19 Oct 83 issue (8401) ☐ Aircraft was participating in airmobile insertion into mountain training area. Copilot terminated the approach at an out-of-ground-effect hover while at a high gross weight. Right pedal turn, which was begun to align the helicopter with the desired landing axis, could not be stopped with full left pedal. Pilot took control and tried to fly out of the situation, but aircraft hit two trees and crashed. Pilot did not anticipate the development of an emergency because of an inadequate unit mountain flying training program.

UH-1 Class A mishap in 16 Nov 83 issue (8410) ☐ Detachment commander authorized night medevac mission with only one pilot. As pilot approached field pickup site, he entered a heavy rainstorm. At the same time, he was blinded by the reflection of his aircraft's searchlight. Spatial orientation and aircraft control were lost. Aircraft descended into trees and crashed.

UH-60 Class A mishap in 2 Nov 83 issue (8406) ☐ Aircraft was No. 2 in a flight of three on a night vision goggles proficiency training flight. As the flight proceeded up a narrow valley, crew of No. 2 aircraft lost reference to a visual horizon. Because of spatial disorientation or some momentary distraction, crew failed to recognize that they were drifting right of their intended flight path. Main rotor blades hit a tree on rising terrain, and aircraft went into an immediate right bank and crashed. Premission planning was also a factor. The commander approved the mission altitude without properly considering the terrain along the mishap leg of the flight.

UH-60 Class A mishap in 21 March 84 issue (8426) ☐ Aircraft was at stable hover over external load, before the load was hooked up. Suddenly, aircraft began rapid spin to right. Application of left antitorque pedal had no effect and spin continued. Aircraft crashed in left-side-low attitude. Tail rotor gearbox seizure resulted from excessive heat produced by insufficient lubrication. Gearbox was not serviced with oil following replacement of an input seal. The fact that the gearbox had been drained was not recorded, allowing the servicing to be overlooked. During the preflight inspection, the crew did not detect that the gearbox had not been serviced correctly.

Cargo helicopters

CH-47 Class A mishap in 29 Feb 84 issue (8424) ☐ As aircraft was at a stabilized hover, it pitched nose up and crashed inverted. Failure of the No. 1 engine mechanical transmission was caused by failure of its pinion gear section's support roller bearing. This bearing was the first in a series of bearings that failed. As the bearings failed, it is probable that debris generated by the failures restricted and blocked the flow of return oil from the No. 1 engine mechanical transmission to its reservoir on the combining transmission. As a result of this blockage, pressurized oil continued to be pumped into the No. 1 engine transmission until it was overfilled. When this occurred, the pressurized oil flowed out of the transmission through its breather vent, was vaporized and ingested into the No. 1 engine, and ignited, resulting in a fire which burned through an aluminum aft rotor control tube.

Observation helicopters

OH-58 Class A mishap in 7 Dec 83 issue (8414) ☐ Crew encountered heavy rainshowers en route to a tactical mission location at night. Flying about 100 feet over water, pilot turned aircraft 180 degrees while reducing collective and applying aft cyclic in an attempt to reduce altitude and airspeed before penetrating the rainshowers a second time. During the turn, pilot looked inside aircraft to scan his instruments. As he looked back outside, aircraft hit the water and flipped over. Pilot set his force trim improperly, failed to cross-check aircraft instruments, incorrectly used his copilot, and failed to recognize the severity of the weather, resulting in a task overload.

OH-58 Class A mishap in 9 Nov 83 issue (8409) ☐ Copilot brought aircraft to out-of-ground-effect hover about 100 feet above the ground. Uncommanded turn to right could not be stopped and aircraft crashed. Copilot placed aircraft into conditions known to be conducive to loss of tail rotor effectiveness and then did not use the proper emergency recovery procedures. ■

What about this new SPH-4 TPL suspension system?

The U.S. Army Aeromedical Research Laboratory at Fort Rucker is evaluating, in connection with the HGU-56 helmet project, a new product called a thermoplastic liner (TPL). The following information should help to answer the flood of inquiries received on this new product.

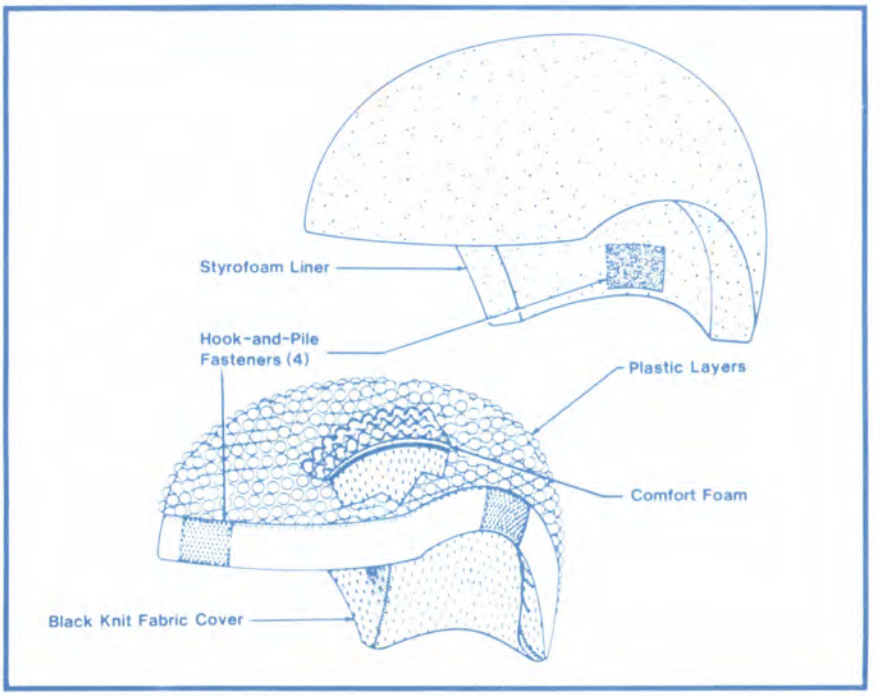
To quote from a 1984 Gentex brochure, "The TPL consists of layers of plastic which have been molded to create protrusions which, when the liner is heat-softened, partially collapse to conform to the contour of the individual's head. The entire assembly is lined with a soft cover which is worn next to the user's head. The TPL attaches to a styrofoam liner with hook and pile fastening tape." The standard retention assembly remains intact.

As with all new products, questions on limitations of the TPL surfaced early. Current concerns include the stability of the TPL when exposed to the heat of closed cockpits, compatibility with the chemical defense mask, long-term field sanitation implications, and problems of "field fitting" where precise force draft convection ovens currently used to "soften the liner" are not available.

At the present time, results of initial laboratory tests relating to improved impact protection and greatly increased comfort of fit are very promising. Twenty-two aviators have been fitted and are flying with this product at Fort Rucker, and a functional field test by 86 crewmembers of the Army Development Employment Agency (ADEA) at Fort Lewis has been approved and will commence this month.

ALSE personnel should note that the TPL is still in testing and not yet approved for wear in general by Army aircrewmembers. It is not available through the supply system, but we will keep you posted.

For further information on this topic, contact CW4 Joseph R. Licina, U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL 36362-5000, AUTOVON 558-6881. ■



Mini-STACOM

Category II ILS approaches

Paragraph 4-5b(5) of change 2, AR 95-1, specifies minimums that apply if an Army aircraft executes a category II instrument approach. It does not describe aircrew and equipment requirements for the approach. The provisions of FAA Advisory Circular 120-29 with changes 1 through 3, dated 9/25/70, and reprinted in October 1979 are mandatory for Army flight crews and equipment. (Some equipment required for two-engine aircraft is dual ILS, dual GS, flight director and radar altimeter.) An Army aircraft may execute a category II ILS approach only when the equipment and flight crew meet the requirements of that circular. ■

UPDATE

Revised UH-1H/V Operator's Manuals in the UPDATE "phone book" style will be distributed by 1 October 1984. New plasticized checklists will be packed with individual operator's manuals (-10) to insure simultaneous distribution. Because of this method of distribution, checklists will far exceed the current needs of individual units. Excess checklists **must** be retained by units as replacement stockage for lost or damaged checklists. Order forms will be included in the revised operator's manuals to permit increases or decreases in the number of manuals actually required by individuals and/or units. These forms are important to the success of the entire UPDATE program. ■

Aviation mishap prevention forum

Answers to last week's questions

1. Many factors are essential to the safe and efficient operation of an aircraft. One of these is the balance of the aircraft. To be balanced, the weight of an aircraft must be distributed so that the center of gravity falls within specified limits. When an aircraft is not balanced correctly, several unsafe conditions are produced. What are these conditions? These unsafe conditions include insufficient control, structural safety factors, increased takeoff distance and stalling speeds, and decreased range and rate of climb. **TC 1-201, page 2-3**

2. How many working days after reporting for duty does an aviator have to present individual flight records to the unit to which assigned? Five working days. **AR 95-1, with change 2, page 1-4**

3. Requests about aircraft mishap reports will be answered in accordance with AR ____. AR 385-40. **AR 95-1, with change 2, page 2-5**

4. Does the tail rotor experience dissymmetry of lift? If so, how is it corrected? Yes. It has advancing and retreating blades just as the main rotor. It is corrected by a blade flapping action in teetering rotor systems. **FM 1-203, pages 3-12 and 3-13** ■

Hook them to the seat

Soldiers wearing rucksacks in Hueys can't strap in safely if the seatbelts are anchored to the floor. Passenger and medic belts moored to floor fittings are too short to hold anyone wearing bulky gear. So hook up those belts to rings on the seats themselves, not to the floor. ■

—from PS magazine

CH-47 bubble trouble

You can burst your unit's bubble budget by ordering more than two bubble windows—NSN 1560-01-124-1048—for each of your big birds. The two bubbles go in the next-to-last windows. If you use more bubbles, you muck up the Chinook's flight characteristics and instrument readings. That sets up a safety-of-flight situation.

Only two bubble windows are authorized. See maintenance information message MIM-CH-47-83-MEM-12, 071730Z Dec 83. ■

—from PS magazine

Protect wire strike tip

The breakaway tip of the wire strike protection system (WSPS) is not long for this world if you're the least bit careless. If you should push a toolbox into the tip or hit it with a tool, for example, you'll damage the rivets or knock off the tip. Whichever, it means a repair or replacement job.

The easiest way to keep the WSPS in tip-top shape is to keep heavy boxes, tools, or equipment out of its reach. Here's a way to remind yourself that the tip is there.

Highlight and protect that tip during maintenance with something bright and soft. A tennis ball, NSN 7810-00-516-0152, or a styrofoam ball will do the job. Paint it a bright color as an eyecatcher. NSN 8010-00-958-8148 gets a 1-pint can of fluorescent orange paint.

The cover does double duty by protecting your head from a close encounter of the painful kind.

Remember to take the cover off the tip after maintenance. ■

—from PS magazine

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Fourth quarter Class A mishap review

Fifteen Class A aircraft mishaps occurred during the fourth quarter of FY 83, compared to 20 for the fourth quarter of FY 82. Three of the 15 mishaps resulted in 10 fatalities. Eleven of the 15 mishaps involved human error. Following are selected synopses of the human error mishaps.

• A UH-60 pilot participating in a fly-in/static display was asked to demonstrate the flight characteristics of the aircraft. The airfield commander told the pilot that no passengers should be on board during the demonstration; however, the aircraft took off with a crew of three and three passengers. During a high-speed pass, the pilot put the aircraft into a right bank which exceeded 90 degrees. The pilot could not regain control, and the aircraft hit the ground and then a building.

Cause: attempt to perform a high-speed, steep right bank at an altitude insufficient to assure ground clearance.

Result: three major injuries, three minor injuries, and a destroyed aircraft, at a cost of $3,009,540.

• A UH-1 IP and three student pilots were on a training flight. As the IP initiated a simulated engine failure, he noticed rapidly decaying rotor rpm. The student flying the aircraft would not release the controls to the IP upon command. The IP continued to try to gain the controls and recover the aircraft until impact in a swampy area.

Cause: failure of student pilot to relinquish the controls to the IP upon command.

Result: one fatality, one minor injury, and a destroyed aircraft, at a cost of $1,075,594.

• During an observation mission, an OH-58 began an uncommanded right turn. The pilot reduced collective pitch and left pedal input and added forward right cyclic, which seemed to aggravate the turn. The aircraft made four revolutions before hitting the ground.

Cause: operation of aircraft in a flight environment known to be conducive to loss of tail rotor effectiveness and the marginal tail rotor capability of the OH-58 helicopter.

Result: one major injury and a destroyed aircraft, at a cost of $145,822.

• An AH-1 was being flown by the copilot from the front station at an altitude varying from 10 to 40 feet above the trees and an airspeed of about 35 knots. The pilot was concentrating most of his attention outside the aircraft. The AH-1 hit the tops of several trees and then crashed.

Cause: improper division of attention by pilot and copilot between flying the aircraft and recon tasks.

Result: one major injury, one minor injury, and a destroyed aircraft, at a cost of $1,426,513.

• A UH-60 was on a maintenance test flight. Witnesses saw the aircraft yaw to the left and the nose tuck down. Parts were seen flying from the aircraft before it crashed on its left side.

Cause: incorrect/incomplete maintenance procedures during installation of the main rotor pitch change link.

Result: three fatalities and a destroyed aircraft, at a cost of $3,811,720.

• An OH-58 began an uncommanded right turn during a reconnaissance mission. The pilot could not recover and the aircraft crashed.

Fourth quarter Class A mishap review

Cause: loss of tail rotor effectiveness.

Result: two major injuries, one minor injury, and a destroyed aircraft, at a cost of $161,802.

• The lead OH-58 of a flight of two took off from a field site about 1 minute before the No. 2 aircraft. The pilot of the No. 2 aircraft tried to catch up with the lead aircraft because he had an inoperative radio magnetic indicator. The No. 2 pilot was having visibility problems because of rain and fogging on the inside of the windscreen. As the No. 2 pilot tried to climb into position on the right side, he lost sight of the lead aircraft. His main rotor hit the right skid of the lead aircraft. The No. 2 aircraft crashed, and the lead aircraft landed without incident.

Cause: inattention of the pilot of the No. 2 aircraft and failure to insure clearance during climb.

Result: three major injuries and a destroyed aircraft, at a cost of $160,992.

• An AH-1 pilot on a training exercise at an aerial gunnery range hovered his aircraft rearward into a 60- to 65-foot tree. The main rotor blades hit the tree at the 45-foot level, and the transmission and mast section were torn from the aircraft. The fuselage fell to the ground and rolled inverted.

Cause: pilot channelized his attention on target alignment tasks and did not maintain adequate clearance from obstacles.

Result: one major injury, one minor injury, and a destroyed aircraft, at a cost of $2,935,692.

• A UH-60 pilot on a training exercise terminated an approach to landing at a 30-foot skid height. As he hovered the aircraft to select an area to complete the landing, the aircraft drifted to the right and the main rotor system hit three powerlines which were strung parallel to the flightpath of the aircraft. The wires broke and wrapped around the upper mast and main rotor hub. The aircraft fell vertically to the ground and came to rest on its left side.

AH-1 pilot channelized his attention on target alignment tasks and hovered into tree.

Cause: pilot selected an approach path into the morning sun, which limited the ability of the crew to see the wires.

Result: two minor injuries and a destroyed aircraft, at a cost of $3,001,720.

• A UH-1 IP was giving a nonrated officer, who was a prospective applicant for rotary wing aviator training, an orientation flight. The IP allowed the nonrated officer to manipulate the aircraft controls and perform hovering maneuvers. While trying to hover the aircraft, the nonrated officer allowed the aircraft to assume a nose-high attitude. The IP tried to correct the condition, but the nonrated officer applied control inputs which caused the aircraft to roll to the right. The main rotor and tail rotor blades hit the ground and the aircraft crashed.

Cause: IP violated regulations and allowed nonrated officer to operate the aircraft.

Result: destroyed aircraft, at a cost of $247,758.

Total Class A aircraft mishaps for FY 83 was 40, with 23 fatalities. This is certainly an improvement over the 59 Class A mishaps and 46 Army fatalities (plus another 40 non-Army persons killed as a result of Army aircraft mishaps) for FY 82, but not a record year. The final Class A mishap rate will not be computed until November 1983; however, based on estimated hours flown during September, the rate is 2.5.

To make FY 84 a better year will require a concerted effort on the part of all Army aviation personnel, particularly pilots. ■

Nonrated officer was on the controls of the UH-1. IP could not recover when control inputs caused aircraft to roll to the right.

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class B mishap □ (H series) About 5 minutes after takeoff, sparks were seen coming from overhead console. Pilot tried to troubleshoot the problem while copilot initiated approach to land. About 100 feet agl, all electrical instruments dropped to zero. Power was partially lost and main rotor rpm dropped below green arc. About 25 feet agl, pilot noticed main rotor rpm at 100. Aircraft landed hard, and main rotor blades flexed and struck tail boom. Aircraft slid about 40 feet, bending skids and cross tubes. 8403

UH-1 Class C mishaps □ (H series) Crew chief from another aircraft walked into tail rotor of aircraft that was being refueled. Crew chief sustained cuts to his head. □ (H series) Aircraft was about 40 meters from touchdown on short final to LZ when it began to spin rapidly to the right. Left pedal was applied with no response. Aircraft spun to right at least one complete revolution and tipped nose low. Cyclic inputs were made to bring nose back up. Aircraft continued to spin, and pilot autorotated to creek bed in steep ravine. Tail boom, tail rotor blades, and main rotor blades were damaged.

UH-1 Class E mishaps □ (V series) Tail rotor chip detector light came on during landing. Caused by failure of 90-degree gearbox. □ (H series) Pilot noticed high consumption of fuel. Fuel was leaking from lower fuel cell sump drain valve. □ (H series) Tail rotor control pedals were binding during flight. Caused by worn magnetic brake. □ (H series) Engine tachometer failed during flight. Caused by defective N_2 tachometer generator. □ (H series) Sprag clutch would not disengage during simulated engine failure at altitude. Caused by failure of main input quill assembly. □ (H series) Transmission oil pressure fluctuated and then went to zero. Caused by broken ground wire. □ (H series) Severe vertical vibration developed during flight. Caused by disintegration of white drive link trunnion bearing liner.

UH-60 Class C mishap □ As aircraft was flying at 45 knots and 1,500 feet agl, small bird hit and broke center windshield section.

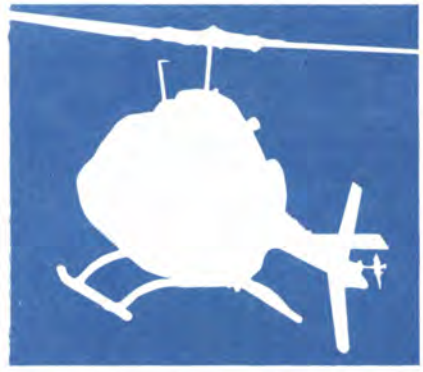
UH-60 Class E mishap □ Vertical vibrations during takeoff were caused by seizure of anti-flap cam bushing.

Attack helicopters

AH-1 Class E mishaps □ (S series) SIP initiated simulated engine failure. Pilot was slow with rotor rpm control. Rotor rpm went to 106 percent. SIP was late with corrective action. □ (S series) Master caution and transmission oil bypass lights came on. Caused by dirt in bypass switch. □ (S series) Pilots heard loud squeal from hydraulic compartment during takeoff. No. 2 hydraulic light came on and SCAS went off line. Pitch SCAS actuator developed leak between solenoid actuator and valve body. □ (S series) Airspeed indicator showed zero during takeoff. Caused by broken pitot line.

Cargo helicopters

CH-47 Class E mishaps □ (B series) No. 1 engine chip detector light came on. Bearing housing retainer pin had sheared off and fallen through gearbox. □ (B series) Beep trim malfunction was noted on No. 1 engine during power change. Caused by failure of electromechanical actuator. □ (C series) Pilot noticed high aft transmission temperature. Caused by failure of temperature bulb.



Observation helicopters

OH-58 Class C mishaps □ (A series) After completing engine wash, pilot attempted engine start, which was aborted because ignition circuit breaker was out. Circuit breaker was pushed in and pilot tried to start engine again, not realizing that throttle was open to flight idle position. As engine start button was depressed, fireguard told pilot there was an engine fire. Fire extinguisher was used, and pilot shut down engine. □ (C series) When engine was started, TOT accelerated at a high rate. Abort start procedures were initiated between 810° C. and 843° C. TOT. Idle stop release was depressed, but copilot's finger slipped from release before throttle was closed, preventing successful completion of hot start procedures. TOT continued to rise to 1,000° C. before throttle was completely closed and hot start procedures completed.

OH-58 Class E mishaps □ (A series) N_2 turbine tachometer needle failed during runup. Caused by loose wire at cannon plug. □ (A series) Loud noise was heard

from engine and vibration was felt during final approach. Caused by failure of aft housing assembly free-wheeling unit. ☐ (C series) IP transferred controls to pilot with 85 percent torque applied. Pilot increased power without checking gauges. IP was checking tactical radio frequency, heard engine wind up, and decreased collective at 113 percent torque.

Fixed wing

C-12 Class C mishap ☐ (A series) No. 2 engine chip detector light came on as power was reduced from takeoff to cruise climb. Failure of gears in nose reduction case caused prop to stop rotating.

OV-1 Class A mishap ☐ (D series) No. 2 engine failed at approximately 200 feet agl during takeoff climb. Both crewmembers ejected successfully, and aircraft crashed in unpopulated area. 8404

OV-1 Class E mishap ☐ (RV-1D) Pilot saw fluid leaking from No. 1 propeller during flight. Caused by failure of No. 3 blade seal.

U-21 Class C mishap ☐ (A series) Loud noise was heard when IP lowered landing gear handle. Left main gear light did not indicate down and locked. Gear was recycled three times, without safe indication. IP completed high g force maneuver and manual gear extension without positive results. He then completed a low approach, with visual inspection by tower operator. IP retracted gear on go-around, but left main gear failed to retract. IP then lowered gear. Tower operator and pilot of another aircraft said gear appeared to be down and in place. Touch-and-go landing was made without incident. On rollout from full-stop landing, left main gear began to slowly retract. Aircraft settled onto left wing and veered off runway.

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	1-26 Oct	**7**	**9**
	November	2	2	November		
	December	0	0	December		
2nd Qtr	January	1	0	January		
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**7**	**9**

U-21 Class E mishaps ☐ (A series) No. 2 engine N_1 went to 70 percent and power lever would not control engine. Oil pressure fluctuated and loud noise was heard from engine. Single-engine landing was made. Caused by engine failure. ☐ (RU-21H) No. 1 engine power lever froze during climb. Movement of power lever was regained when aircraft descended to another flight level. Caused by frozen cable.

Maintenance

UH-1 Class E mishaps ☐ (H series) Unusual vibration during flight was caused by loose lower hub nut in scissors and sleeve assembly. ☐ (H series) Pilot saw hydraulic fluid leaking from aircraft during hot refueling operation. Caused by chafed tube.

CH-47 Class C mishap ☐ (C series) Pilot was told by tower personnel that cowling was open. When aircraft was landed, aft service platform was found to be open. Latches were broken.

CH-47 Class E mishap ☐ (B series) No. 1 hydraulic line developed leak because of hole caused by chafing.

Messages received

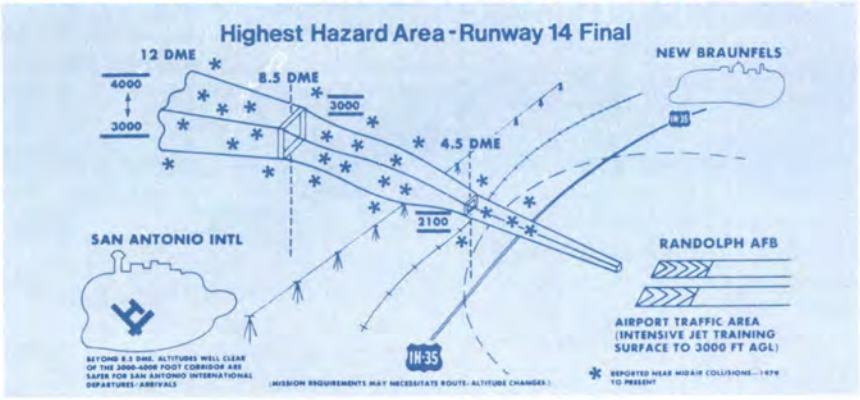
- Maintenance information message concerning UH-60 main tires (landing gear subsystem) (MIM-UH-60A-83-MEA-15, 111535Z Oct 83).
- Maintenance information message concerning replacement of UH-60 anti-flap assembly spring pin (rotary wing head subsystem) (MIM-UH-60A-MEA-83-16, 121930Z Oct 83).
- Maintenance notice concerning conservation of T55, T63, and T53 engines for all UH-1 series, AH-1 series, OV-1 series, OH-58 series, and CH-47 series aircraft (132015Z Oct 83).

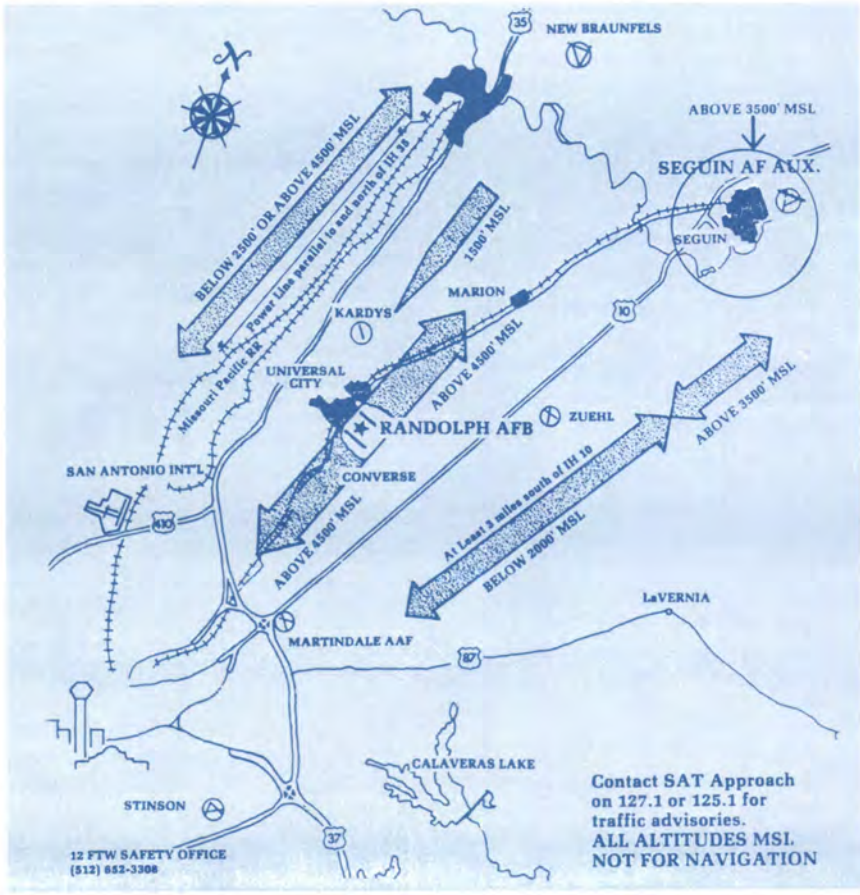
For more information on selected mishap briefs, call AUTOVON 558-4202/4198.

Operation Alert

The problem

The sky is becoming increasingly congested around San Antonio, Texas. Light aircraft, business aircraft, commercial airliners, and military aircraft all share the airspace. Randolph AFB has a monthly traffic count of approximately 20,000 takeoffs and landings. Randolph pilots reported 22 near midair collisions last year, two involving Army aircraft. A third Army aircraft was also seen flying close to the Air Force base. The Army aircraft were not using any radar facilities available in the San Antonio area and were not on IFR flight plans.





Army pilots need to be aware of the hazards involved in flying in the Randolph AFB area. The highest hazard area is located north of the airfield off the approach ends of 14L/R. Aircraft constantly fly ILS and visual approaches to both runways. These approaches extend from 12 DME and 3,000 feet to touchdown. The final approaches to these runways intersect an interstate highway (IH-35), two sets of railroad tracks, high voltage powerlines, and numerous small roads, all of which are extensively used by civilian pilots for navigation. The mix of civilian and military traffic makes the area extremely hazardous.

Randolph AFB uses two military operating areas (MOAs). The first MOA is located east to southeast of Randolph from 30 to 83 miles and 7,000 feet to FL 220. The other MOA is on the western edge of San Antonio, west by southwest from 15 to 60 miles and 9,000 feet to FL 210. Each MOA is constantly filled with high density student jet training during daylight hours.

Actions to take

Extensive radar services are available from San Antonio TRACON. If you fly in the area, use the radar services and keep the area of conflicts in mind. Remain well clear of the Randolph AFB airport traffic area (ATA) (see schematic on highest hazard area). The powerline north of Randolph is clear of the ATA. Both IH-10 and IH-35 are within the ATA.

For more information on flying operations in the Randolph area, call the 12th Flying Training Wing Safety Office, AUTOVON 487-3308, commercial 512-652-3308. ■

Aviation mishap prevention forum

Answers to last week's questions

1. What are ways to prevent static electricity from sparking? Bonding and grounding. **FM 10-68, with Change 3, page 3-4, par. 3-8**

2. What are the three definite hazards to cold weather survival? Frostbite, snow blindness, and hypothermia. **FM 1-202, page 1-37, par. 1-36**

3. What are the duties of the aviation safety NCO?

- Maintain liaison with the command sergeant major, first sergeants, and other enlisted personnel on all aviation safety matters.
- Observe aircraft support activities (such as POL, maintenance, operations, and enlisted crewmember training) to detect and report unsafe practices or procedures.
- Participate as a member on enlisted safety council.
- Maintain liaison between the enlisted safety council and safety council.
- Post reference files of aviation safety literature. Make sure files are current and complete.
- Take part in unit safety surveys and inspections. **AR 385-95, with Change 1, page 1-4, par. 1-7**

4. The aviation safety officer has direct access to the commander on all aviation accident prevention matters. True or false? True. **AR 385-95, with Change 1, page 1-2, par. 1-7**

5. DA Pam 385-95 provides implementing instructions for investigating and reporting Class A, B, and C aircraft accidents and aircraft ground accidents. True or false? True. **DA Pam 385-95, page 1-1, par. 1-2**

Questions for aviation personnel

1. If a Class C fire erupts, a water or soda-acid fire extinguisher may be used to extinguish the blaze. True or false? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

2. Either the pilot or copilot will wear a protective mask when fuzed items filled with toxic chemicals are carried in aircraft. Other crewmembers will have protective masks readily available. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

3. Personnel must be aware that movement of hazardous materials by aircraft requires compliance with special procedures. What AR outlines the operational procedures for aircraft carrying hazardous materials? **Reference: FM 1-300, Flight Operations and Airfield Management**

4. What causes static electricity? **Reference: FM 1-300, Flight Operations and Airfield Management**

5. The Army aviator is the basic element in the command line of aircraft accident prevention. What are his/her aviation duties? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

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Sprag clutch failure...how?

A UH-1H standardization instructor pilot and pilot were on an AAPART/pilot-in-command evaluation flight. They flew to the maintenance test flight area where the IP was to demonstrate and have the pilot practice simulated forced landings, using airspeed and altitude to maneuver to a suitable landing area. The training began with the IP demonstrating the first maneuver at an altitude of 2,000 feet above ground level (agl), with power recovery at 250 feet agl. The pilot then completed the same maneuver, making his power recovery at 300 feet agl.

During a third simulated engine failure, initiated from an altitude of 2,000 feet agl, the pilot recognized that he was going to overshoot the selected forced landing area and told the IP he would have to select another area. The IP took the controls at an altitude of 1,500 feet agl and told the pilot he would show him how to make the area. The IP completed a right 360-degree descending turn, rolling out at 400 feet agl, and lined up with the intended landing area. The IP said he joined the engine and rotor tachometer needles at approximately 6500 rpm, returning the throttle full open, and pulled collective to begin a climb. As he pulled collective, he sensed a loss of rotor rpm. Looking at his instruments, he noticed the rotor tachometer needle at about 250 rpm and the engine rpm at 6700-6900.

Diagnosing a sprag clutch failure, the IP immediately lowered the collective, rolled the throttle to engine idle, and entered autorotation at an altitude of 250 feet agl. Airspeed was 65 knots. About 50 feet above the ground, the IP began decelerating the aircraft and applied collective pitch cushioning for the landing at 10 to 15 feet.

The UH-1 touched down with a forward airspeed of 15 to 20 knots in a muddy, plowed field and slid 47 feet before stopping. The airframe, main rotor blades, and landing gear were damaged extensively. The IP and pilot were not injured.

Teardown and analysis of the clutch assembly revealed that the freewheeling clutch sprags had been driven over center and were not driving the transmission. Sprag drive-through resulted from overloading impact. The most probable cause for the impact overloading was cited as excessive N_2 closing speed during clutch reengagement. How did this happen?

When the IP took control of the aircraft and lined up with the intended landing area, he began his power recovery by rotating the throttle to the full open position. Based on the teardown and analysis report and comments of the pilots, it is suspected that the collective was not fully down during the initial portion of the power recovery maneuver. This could have been the result of the IP's efforts to limit excessive rotor rpm which tends to build during turns, particularly in turns to the right. Subsequently, the position of the collective produced overloading impact during clutch reengagement as the rate of increase in engine rpm was accelerated. The excessive rate of increase was developed as the twist grip throttle was rotated from the flight idle position while the engine governor, in the auto position, sensed an even higher power requirement which is proportional to the raised collective position. The increased kinetic energy associated with an increase in velocity (in this case rapidly increasing engine rpm at reengagement) is exponential rather than additive, which provided overloading impact of a magnitude sufficient to drive the sprags over center.

It is felt the IP did not adequately focus his attention on the dual tachometer during the initial power recovery. Had he done so, he would have been aware of the reverse split in the needles. He would have then identified, as he did later, a drive train failure which would have prompted him to lower the collective. The delay of a few seconds allowed the rotor rpm to decay sufficiently to increase the rate of descent and cause the aircraft to touch down short of the intended landing point. Although monitoring the dual tachometer is a common practice, the ATM does not specifically address this as a required subtask. ■

UH-1 landed hard following sprag clutch failure.

Aircraft radioactive components

The following message, dated 111800Z Oct 83, was received from TSARCOM: "Subject: Aircraft Radioactive Component Impact on Aircraft Accident Investigation

"1. This message constitutes an assessment of the risk involved with radioactive material normally contained within aircraft systems . . . A list of the materials is in TB 43-0116.

"2. Army aircraft contain three areas of potential radiation. They are:

"a. Radium paint on dial of older aircraft instruments.

"b. Thorium as an alloying component of engine magnesium, in engine parts not to exceed 3.3 percent by component weight.

"c. Less than five microcuries of either cesium-137 or krypton-85 in electron tubes within engine ignition exciter.

"3. Radium, as used on the faces of instrument dials, can present a hazard if taken into the body by inhalation or ingestion. In sufficient quantity it can also present an external hazard. As a result of these potential hazards, assets containing radium are being phased out of the Army supply system. Aircraft indicators containing radium have not been procured since the late 1960's. Since that time the quantity of radium assets has been reduced by removal of radium from assets and procurement of nonradium replacements. Comparatively few aircraft indicators still contain radium. Since the extent of the hazard from radium is directly proportional to the amount present within the aircraft, the substantial reduction in radium assets functions to minimize the potential hazard.

"4. Magnesium-thorium alloys containing less than four percent thorium, by weight, are used in about 25 aircraft engine parts. Although thorium is a radioactive material, magnesium-thorium alloys present a potential

hazard only if taken into the body. Inhalation of the alloy is possible only if airborne as a result of fire or processing (such as grinding). Thorium is used in the alloy specifically because of the added strength which it provides at elevated temperatures. In addition, accident evaluation involving fire suggests that conversion of magnesium-thorium alloy (by heat) into material which can be inhaled (ash or dust) is unlikely. Studies have not, however, adequately quantified the actual amount of thorium which could become airborne and subsequently inhaled, as a result of an aircraft fire. It should be noted, however, that conversion of the alloy to a particular dust or ash is necessary prior to the possibility of a potential hazard.

"5. Engine igniter exciters contain up to about five microcuries of krypton-85 or cesium-137. Breakage of exciters containing krypton would result in immediate dispersion of the material within the atmosphere which, because of the small amount present and the fact that krypton is an inert gas, would preclude the presence of a hazard. Cesium exciters could, if broken, cause limited contamination. Based upon their NRC license exempt status and the amount of material present, broken exciters do not constitute a significant hazard to the environment or to personnel. (Disposal of broken exciters must, however, be controlled to maintain the impact 'as low as reasonably achievable.')

"6. Summary: Aircraft accidents can involve radioactive materials. However, the probability of a hazard being presented by such involvement is assessed as remote.

"7. Recommend that radiation protection be integrated into the post preaccident plan (AR 385-95, Army Aviation Accident Prevention) and that responsible personnel, especially firefighters, be instructed in recognition of components and potential problem areas. This recommendation applies to all hazardous material transported, and not just radioactive items. Hazards due to integral radioactive items cannot be viewed as a limiting factor.

"8. Also, recommend that the accident area receive a restricted status and only essential emergency and investigation board personnel be allowed in. This not only reduces exposure to a potentially hazardous environment, i.e., fuel fumes, sharp edges, and potentially radioactive items, but also minimizes the disturbance of important evidence. Even though everyone wants to assist, the site commander must ensure personnel are kept to an essential minimum.

"9. Points of contact are (AV 693-3227): Mr. Dave Scott, Systems Safety; Mr. Dennis Chambers, Radiation Safety; Mr. Dick Beck, Aviation Safety." ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class B mishap □ Landing was made to a hover because of a slope in the landing area. As student pilot was landing aircraft from the hover, right skid touched down. As left skid was being lowered, aircraft began to slide to left. Student pilot abruptly added right cyclic. IP got on the controls to try to correct the situation, but student pilot added collective pitch, causing heel of right skid to be caught by the slope. Aircraft rolled over and came to rest on right side. 8405

UH-1 Class C mishap □ (V series) Pilot was undergoing current evaluation. Standard autorotation was made to the sod. On touchdown, rear of helicopter felt like it was mushing in or spongy. As helicopter leveled, IP increased collective pitch slightly to further cushion the landing. Cross tubes were broken.

UH-1 Class E mishaps □ (H series) Left cargo door strap broke during flight, and cargo door slid back and forth. Technical observer grabbed door and kept it from leaving aircraft. Inspection of other aircraft in the unit revealed two more straps with fatigue cracks. □ (H series) Smoke was seen coming from engine compartment during hover. As aircraft was landed, engine stopped. Caused by failure of No. 3 bearing pack. □ (H series) Fuel control failed during flight, causing compressor stalls. □(H series) Severe vertical vibration was felt during takeoff. Caused by separation of trim tab on top of rotor blade. □ (H series) Crew smelled fuel odor, landed, and found engine fuel control servo spurting fuel. Caused by failure of O-ring. □ (H series) Master caution and transmission oil pressure lights came on. Collective pitch was lowered, flight controls stiffened, and rotor rpm decayed. Aircraft filled with smoke during touchdown. Loss of transmission oil was caused by failure of oil filter gasket.

UH-60 Class A mishap □ Aircraft was No. 2 in a flight of three on a low-level night vision goggle proficiency training flight. As the flight proceeded up a narrow valley, main rotor system of No. 2 aircraft hit 75-foot tree on rising terrain to right of aircraft. Aircraft crashed and burned. Four fatalities. 8406

UH-60 Class C mishap □ Left cargo door began to vibrate open. Passenger, in an attempt to close door, inadvertently dislodged emergency window release handle. Window hit and damaged tip cap on main rotor blade.

UH-60 Class E mishaps □ Master caution and chip accessory module lights came on. Defective bearing in accessory module caused metal contamination of oil. □ No. 2 engine fire light came on. Aircraft was operating in sandy and dusty area, causing buildup of sand and dust deposits. Cannon plug was dirty.

Attack helicopters

AH-1 Class C mishap □ (S series) Postflight inspection revealed damage to main and tail rotor blades. Suspect tree strike.

AH-1 Class E mishaps □ (S series) Aircraft hit tree, damaging main rotor blade, landing light, and cross tube fairing. □ (S series) Copilot felt binding in pedals during flight. Caused by stuck right pedal. □ (S series) Master caution and No. 1 hydraulic lights came on, and pedals were stiff. Caused by malfunction of hydraulic pump.

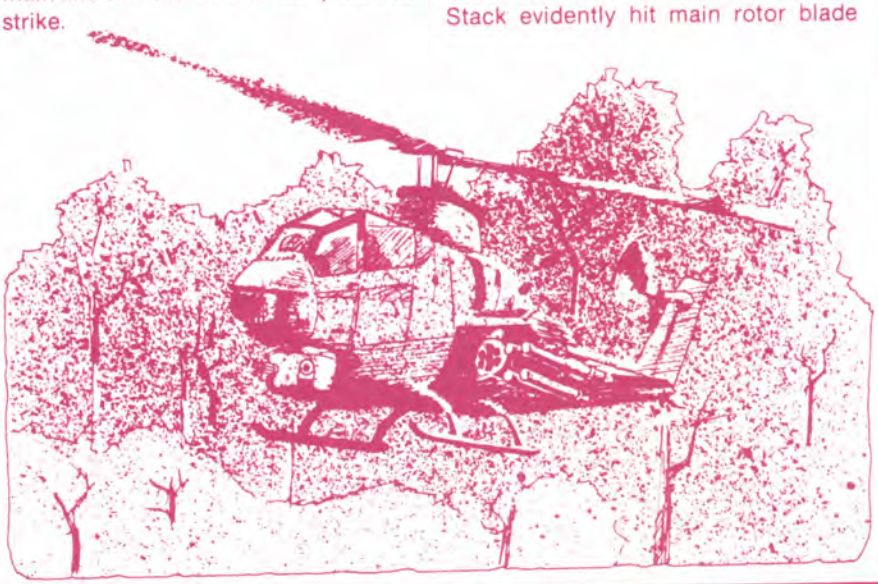
Cargo helicopters

CH-47 Class D mishap □ (D series) As crew was picking up Howitzer for sling-load operation, VOR antenna of aircraft hit gun tube and broke off.

CH-54 Class D mishap □ (A series) Pallet flew up into bottom of fuselage. Caused by incorrect flight procedures for external loads.

Observation helicopters

OH-58 Class E mishaps □ (A series) Fuel pressure light came on. Caused by failure of submerged boost pump. □ (C series) Postflight inspection revealed exhaust stack was missing and main rotor blade was scratched. Clamp that secures exhaust stack was broken. Stack evidently hit main rotor blade



when it came off. ☐ (A series) En route to refueling point, it became apparent that sufficient fuel was not available to reach the point. Aircraft was landed with approximately 65 pounds of fuel. Pilot incorrectly estimated time/fuel required.

Fixed wing

C-12 Class E mishap ☐ (D series) Right bleed air fail light came on during climb. Caused by hole in tubing.

U-8 Class A mishap ☐ (F series) Witnesses saw aircraft in high-speed, descending left spin. Aircraft crashed and burned. Three fatalities. 8407

U-21 Class E mishaps ☐ (F series) Pilot noticed during climbout that right main fuel cap was not secure. Crew did not secure fuel cap correctly after checking fuel quantity during preflight. ☐ (RU-21H) Battery charge light came on and loadmeters indicated abnormally high during runup. On shutdown, smoke was coming from all battery vents. Caused by thermal runaway of battery.

Maintenance

UH-1 Class E mishap ☐ (H series) Master caution and transmission low pressure lights came on during takeoff. Transmission external oil filter was the wrong size.

AH-1 Class E mishap ☐ (S series) N_2 tachometer failed and rpm warning system activated during hover. Caused by loose tachometer generator ground wire.

CH-54 Class E mishap ☐ (B series) Crew chief noticed oil on aft cockpit windows during flight. Threads were stripped from manifold.

U-21 Class E mishap ☐ (RU-21H) Landing gear down position lights remained on after takeoff. Pilot checked circuit breakers and recycled gear handle in an attempt to raise gear, with negative results. Aircraft was landed. Before this flight, crew chief had installed new carpet but failed to reengage landing gear emergency clutch disengage lever. Pilot did not detect this while going through his checklist before takeoff.

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
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	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**9**	**9**

Messages received

• Safety-of-flight maintenance mandatory message concerning inspection and replacement of washer on UH-60 collective bias tube assembly (UH-60A-83-10, 141900Z Oct 83). Summary: The field has reported that there have been incidences of the collective bias tube assembly popping all the way off of the bearing. This will not happen if the washer is replaced with a larger one. Contact: Roger Heidenreich, AUTOVON 693-3300, commercial 314-263-3300.

For more information on selected mishap briefs, call AUTOVON 558-4202/4198.

TM changes

Change 28, dated 5 Oct 83, to TM 55-1520-228-23-1 for OH-58A and C helicopters, has been released.

Unauthorized use of FM transmitters

Some units in the field have obtained and are using for an intercom system commercial FM transmitters/receivers that are **not approved for use in any type aircraft.** In addition, the manufacturers of these headset-type FM radios do not recommend their use aboard aircraft as the frequency may affect the aircraft's navigational and flight reference instruments and possibly cause other problems.

The only radios authorized for use in any Army aircraft/vehicle are those that have been tested and approved. Before you spend unit funds for equipment that may cause you a bad day, make sure the equipment is certified and approved by appropriate authorities. ■

Aviation mishap prevention forum

Lessons learned from a T-42A mishap

We received a copy of the following letter from a T-42A user and would like to share the information with you.

The purpose of this letter is to share information learned from a T-42A Class C mishap. The mishap occurred when the T-42A gear retracted during takeoff. Although propeller strikes occurred, the aircraft became airborne and the pilot continued the takeoff without further incident.

The investigation and analysis of the mishap disclosed the following:

- The pilot failed to physically check the position of the gear selector switch during the preflight check in accordance with the operator's checklist.
- The pilot and the unit instructor pilot were not aware of the latest change to the operator's manual and checklist requiring the position of the gear selector switch be checked.
- The warning horn portion of the landing gear safety switch on the left main landing gear was improperly wired. It was wired in such a way that the switch would do its job of keeping the landing gear from retracting while the aircraft was on the ground, but it would not activate the warning horn if the gear selector switch was in the up position while the aircraft was on the ground.
- Many pilots are not aware that there is a steady warning horn sound that should be activated while the main landing gear strut is compressed and the landing gear selector switch is not in the down position.
- There is no requirement for maintenance personnel to check the operation of the warning horn or the electrical circuitry in the landing gear safety switch.

This headquarters has submitted recommended changes to T-42A operator and maintenance manuals to include adequate information and procedures relating to the gear warning horn system.

Commanders must insure fixed wing pilots use the proper preflight procedure in checking the position of the gear selector switch during the preflight inspection. It is recommended that units with assigned T-42 aircraft complete a one-time inspection of the landing gear safety switch to insure it is wired in accordance with the T-42A Organization, Direct and General Support Maintenance Manual.

Please review the contents of this letter with aviation personnel. Most human error aviation mishaps can be prevented through compliance with established procedures. ■

Answers to last week's questions

1. If a Class C fire erupts, a water or soda-acid fire extinguisher may be used to extinguish the blaze. True or false? False. Use bromotrifluoromethane or a carbon dioxide fire extinguisher. **TM 55-1500-204-25/1, page 7-2, par. 7-11**

2. Either the pilot or copilot will wear a protective mask when fuzed items filled with toxic chemicals are carried in aircraft. Other crewmembers will have protective masks readily available. True or false? True. **AR 95-1, with Change 1, page 2-7, par. 2-18**

3. Personnel must be aware that movement of hazardous materials by aircraft requires compliance with special procedures. What AR outlines the operational procedures for aircraft carrying hazardous materials? AR 95-27. **FM 1-300, page 6-5, par. 6-7**

4. What causes static electricity? Friction causes static electricity. For example, bringing together and separating two unlike substances and almost any motion of persons or materials can produce it. Static electricity is also generated by the flow of flammable liquids. Some other causes are the flow of steam, air, or gas through pipe, hose, or tank openings and the movement of vehicles with nonconductive tires over nonconductive road surfaces. You can't prevent static electricity, but it is not a danger until the static electricity builds into a charge that may form a spark. You can prevent sparks by bonding and grounding. Bonding is an electrical connection (a bonding wire) between metallic containers. This equalizes the electrical potential. Grounding is an electrical connection between one or both of the bonded transfer units and the ground. This dissipates electrical potential. When units are properly bonded and grounded, static electricity generated in transfers is conducted from unit to unit and then into the ground. You must set up bonding and grounding before the transfer begins, and break them only after the transfer is completed. Inspect ground wires monthly. If you find any damage, repair it at once. Inspect the grounding system annually and perform an ohms-resistance test every 2 years or when the system is damaged. To do this, use a multimeter and follow the test procedures in FM 10-68. Static drag chains are not required on military vehicles. Positive bonding and grounding for tank vehicles loading or unloading permit the safe transfer of any static charge that builds up within the tank. **FM 1-300, page 4-5, par. 4-9**

5. The Army aviator is the basic element in the command line of aircraft accident prevention. What are his/her aviation duties?

Aviation mishap prevention forum

- Attain and maintain proficiency in the aircraft he or she is assigned to fly.
- Maintain physical and mental fitness.
- Comply with sound flight principles and safe practices during all flight operations regardless of mission urgency.
- Report hazards and unsafe conditions or acts to the proper authority.
- Make on-the-spot corrections of unsafe conditions when appropriate. **AR 385-95, with Change 1, page 1-3, par. 1-7**

Questions for aviation personnel

1. The aviation safety officer, working with the command safety director and staff aviation officer, advises the commander on all aviation safety matters. What are the duties of the aviation safety officer? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

2. Unit safety meetings offer one of the most productive tools for accident prevention, provided they are timely and interesting. How often should these meetings be held for Active Army units and how often for Reserve components? **Reference: AR 385-95, with Change 1, Army Aviation Accident Prevention**

3. AR 385-40 requires that all Army aircraft accidents be investigated and reported. True or false? **Reference: DA Pam 385-95, Aircraft Accident Investigation and Reporting**

4. The aircraft compass may be checked for deviation and adjusted while flying. True or false? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual** ■

If it won't fit, make it fit. The crew chief of an aircraft noticed on his daily inspection that the trunnion had some play in it. He called the technical inspector, who determined that the trunnion would have to be changed. When the bolts were removed, the damage shown here was discovered. The swashplate assembly on which the trunnion was installed was damaged beyond tolerance when the bolts were installed. Apparently, the mechanic who installed the trunnion did not insure that the slots cut in the trunnion were lined up with the bolt holes when the trunnion was installed. When resistance was met, the bolts were obviously driven in. The swashplate trunnion bolt hole was damaged to such an extent that it was not reparable and the swashplate was condemned.

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Accident review: IMC at night

Synopsis

An OH-58A pilot entered instrument meteorological conditions (IMC) shortly after takeoff from a field site. While trying to return to visual meteorological conditions (VMC), his aircraft crashed.

History of flight

The unit had been on a field training exercise. The exercise was nearing completion, and the aircraft were being repositioned to the airfield. A UH-1 had been flown to the airfield in the afternoon, and three OH-58s were scheduled to leave the field site that night. While waiting for the scheduled takeoff time, the flight crews discussed departure procedures from the dusty area, flight routes, radio frequencies, and vertical helicopter instrument recovery procedures (VHIRP).

About 2 hours before the scheduled takeoff time, the unit commander told the flight crews to prepare for an early departure because of deteriorating weather conditions in the immediate area. The commander, who was not qualified in the aircraft, decided to ride in the lead aircraft.

The lead OH-58 took off to the southwest with an immediate left turn for a direct flight to the airfield. The other two aircraft were to follow at 30-second intervals. Shortly after takeoff, the lead aircraft entered IMC. The unit commander told the pilot to call the pilots of the other two aircraft and tell them to remain on the ground. The second aircraft was already airborne, however. Shortly afterward, the lead aircraft entered VMC again and continued to the airfield. The third aircraft remained on the ground.

Shortly after taking off, the pilot of the second aircraft transmitted that he was NOE and was proceeding to the airfield. The pilot of the third aircraft immediately cautioned him of numerous wires across his flight path and asked him if

(continued on next page)

IMC at night

he was using his landing light. No reply was received, but the landing light was seen to go off. The aircraft entered a fog layer and was then seen emerging from the top of the fog layer in a climbing turn toward the west as required by VHIRP.

Witnesses on the ground then saw the aircraft between cloud formations about 500 to 700 feet agl and climbing. The OH-58 was next seen about 2 kilometers further west at cruise speed and low altitude in a right descending turn from a western to a northern heading. The aircraft crashed at or near cruise speed in a relatively level attitude about 200 meters from the ground witnesses. The aircraft was destroyed, and the pilot was killed.

Crewmember experience

The 20-year-old pilot had more than 250 rotary wing hours, with more than 100 in the OH-58A. He had 19 hours of night flight time, all of which were dual pilot except for .6 of 1 hour which was logged at dusk one evening. He had very little hood or SFTS flight time. This was the pilot's first solo night takeoff.

Commentary

The unit commander was under the impression that all three of the pilots had recently flown at night in the training area. Actually, only one of the pilots had flown in the area at night and that flight had taken place a year before. The unit OH-58 IP, who was the pilot of the No. 3 aircraft, had expressed concern over the conduct of the single-pilot flight at night to the operations officer earlier in the day. Indications were made at that time that there would be two pilots in each aircraft. A lack of communication resulted in the platoon leader sending the personnel who would perform second-pilot functions from the field site during the late afternoon. This eliminated the possibility of placing additional pilots in the three aircraft. These facts were not made known to the commander.

The commander had told the pilots in his unit that he would support them in decisions not to fly due to weather or if they felt that the flight would exceed their capabilities. None of the pilots pointedly expressed their feelings directly to the commander when he advised them of the revised departure time. The only comment made was that perhaps they should wait for the scheduled takeoff time. The commander restated his desire to take off to avoid the apparent likelihood of being forced to remain in the field overnight. At this point, all three pilots packed their equipment and prepared to leave. The general attitude regarding the mission was that it was an easy, straightforward displacement to the airfield about 5 miles away.

Weather conditions at the time of departure were within the guidelines for VFR flight set forth in AR 95-1. The unit was operating tactically within a military training reservation. The weather conformed to that which was predicted during the weather briefing obtained earlier that day. The crews were aware of the existing conditions and could see the low clouds and fog banks in the immediate area. Illumination at the time of the accident was zero percent.

Task saturation in the cockpit is evidenced by the pilot not answering the numerous radio calls made to him. He did, however, respond to some of the calls, such as the query about the landing light and instructions not to fly NOE.

While following the vertical helicopter instrument recovery procedure, the pilot apparently decided to try to return to low-level visual flight conditions. This decision may have been influenced by the sighting of ground lights from convoys and bivouac areas. Apprehension about conducting the VHIRP at night while single pilot into a nonradar facility may also have influenced the pilot to try to return to VMC. Weather conditions, the ambient lighting, and the remoteness of the area in which the accident occurred made it extremely unlikely that the pilot had a visible horizon. The pilot's lack of experience in flying under these conditions most likely led him to make such a decision. ■

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class C mishaps □ (H series) Loud bang was heard and torque increased to 39 pounds. Suspect compressor stall caused by FOD. □ (H series) Main rotor blades hit trees during confined area landing. Both blades were damaged. □ (H series) Crew heard loud grinding noise while on night vision goggle mission. Crew of trailing aircraft saw sparks coming from engine exhaust. Aircraft yawed to left and low rpm audio activated. Aircraft was autorotated to a road about 100 feet away. Main rotor and tail rotor blades hit trees which lined both sides of the road. After touchdown, engine continued to run at just below 3000 rpm for 30 seconds, with egt of 1,000 degrees and maximum engine oil temperature. Loud grinding noise continued while engine was running. After shutdown, it was noticed that engine deck was covered with fuel and oil, throttle linkage rod was broken, oil scupper valve had sheared, and hot end showed signs of burning and melting.

UH-1 Class E mishaps □ (H series) Master caution and transmission oil pressure lights came on. Transmission oil cooler had ruptured internally, allowing oil to be pumped overboard. □ (H series) Aircraft yawed to right, and torque, N_1 and N_2 fluctuated. Caused by failure of fuel control. □ (H series) Hydraulics failed during flight. Hydraulic tube ruptured, causing complete loss of fluid. □ (H series) Hydraulic power came back on unexpectedly during hydraulics-off maneuver. Aircraft yawed right. Solenoid shorted out, causing loss of electrical power to hydraulic switch and return of hydraulic power.

UH-60 Class A mishap □ Shortly after initiation of standard, straight-in autorotation to runway, crew heard loud bang from rear of aircraft and felt severe vibration. IP got on the controls and continued steep power-on approach to a hover. As aircraft slowed to near hover speed, it began rapid turn to right, which quickly progressed into uncontrollable spin. Aircraft hit the ground in a slight right roll attitude. Preliminary investigation indicates that main rotor pylon sliding cover departed the aircraft during the early part of the autorotative approach. It then went up into main rotor system where it was deflected downward onto fuselage and then rearward into tail rotor system. One or two of the tail rotor blades were damaged at that point. As aircraft was slowed and power applied during termination of the approach, out-of-balance condition of tail rotor caused tail rotor blades and gearbox to separate from aircraft. Antitorque control was then lost, resulting in spin and loss of control. 8408

Attack helicopters

AH-1 Class D mishap □ (S series) Forward cross tube hit wire during flight at night. Cross tube and fuselage skin were damaged.

AH-1 Class E mishaps □ (S series) Duck was found hanging on left rocket pod during postflight inspection. Duck hit left front outer pylon fairing and cracked fairing. □ (S series) Master caution and fuel filter lights came on. Caused by short in gunner's master caution panel. □ (S series) POL handler saw tent stake on the ground near running aircraft. He picked up the stake and threw it away from aircraft. Stake was caught in rotorwash and sucked into main rotor. Stake hit tip of one rotor blade and bent tiedown flange of blade tip cap.

A big "attaboy" to all the AH-1 crews for having no Class A or B mishaps during October.

Cargo helicopters

CH-47 Class C mishap □ (C series) Flight engineer noticed loose end on nylon donut when it twisted with the load. Descent was begun. As donut began to untwist, flight engineer told

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**8**	**10**
	November	2	2	1- 9 Nov	**1**	**1**
	December	0	0	December		
2nd Qtr	January	1	0	January		
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**9**	**11**

pilot donut was separating and to get the load on the ground. Rate of descent was increased and deceleration for landing begun. At 150 feet agl, donut failed and load dropped.

CH-47 Class E mishap □ (C series) Master caution and transmission chip detector lights came on. During shutdown, at approximately 60 rpm rotor blades slowed suddenly and lagged appreciably. Postflight inspection revealed that rotor system could not be rotated except for a foot in the direction of rotation.

CH-54 Class E mishap □ (A series) Vibration was felt, and crew chief saw oil running over left side of aircraft. Caused by rupture of hydraulic line.

Observation helicopters

OH-6 Class E mishap □ Rated student pilot decelerated aircraft more abruptly than required during standard autorotation. IP noticed rpm increasing and applied pitch to stop rpm from building, but amount applied was insufficient to prevent overspeed.

OH-58 Class A mishap □ (A series) With copilot on the controls, aircraft was brought to a stable hover 65 to 75 feet above the ground. Aircraft then began uncommanded slow turn to right, which rapidly progressed into a rapid right spin. Copilot closed throttle and initiated autorotation. Aircraft crashed, bounced, and came to rest upright. Preliminary investigation reveals that crew did not compute aircraft performance capabilities nor perform required out-of-ground-effect hover checks before the flight. Aircraft was operated in a flight mode known to be conducive to loss of tail rotor effectiveness. 8409

OH-58 Class C mishap □ (A series) Unusual whining sound was heard. During power-on approach, explosion was heard, aircraft buffeted, and nose yawed to left. Autorotative landing was then made. Engine compartment was on fire. Tail rotor drive shaft was severed.

OH-58 Class E mishaps □ (A series) IP detected unusual buzzing sound, followed by high frequency vibration. Caused by worn aft free-wheeling unit. □ (C series) Low fuel light came on. Pilot miscalculated fuel requirements for mission.

Fixed wing

C-7 Class E mishaps □ Engine did not feather after propeller feather button was pushed during training flight. In-flight engine restart procedures were unsuccessful, as were unfeathering attempts. Single-engine landing was made. Caused by failure of auxiliary feather motor. □ When landing gear was raised, gear remained down and locked for about 30 seconds before responding. Gear came up and locked and remained until extended for landing. Caused by broken electrical wire at right main landing gear weight switch.

C-12 Class C mishap □ (A series) Flock of about 30 large birds took off from left side of approach end of runway and flew into path of landing aircraft. Pilot made a go-around, but aircraft hit three or four birds. Right wing of aircraft was dented.

OV-1 Class E mishap □ (RV-1D) All a.c. powered instrument flags unmasked during flight, and several caution lights came on. No. 1 inverter malfunctioned, causing incorrect voltage output.

U-21 Class E mishap □ (A series) IP gave pilot simulated left engine failure. Power was reduced to idle on left engine and propeller was feathered. Propeller stopped completely while engine continued to run. Unsuccessful attempt was made to take propeller out of feather. Single-engine landing was made. Caused by failure of accessory gearbox input shaft.

Maintenance

UH-1 Class E mishap □ (H series) Master caution light came on during hover. Washer was lost during windshield replacement, fell into caution panel box, and shorted out caution light.

AH-1 Class D mishap □ (S series) Pilot was asked to run up aircraft for completion of engine flush. As engine was started, 3½- to 4-inch flame came out of exhaust area. Flame ignited upper pylon area. Fireguard signaled to pilot that aircraft was on fire. Engine was shut down and fire extinguished. Inspection revealed that drain line coming from dump valve to overboard drain was clogged.

OH-58 Class E mishap □ (A series) Engine-out light and low rpm audio activated. Caused by loose fitting between governor and accumulator tube.

Messages received

• Safety-of-flight message concerning inspection of CH-47A/B/C/D rotor head assemblies (CH-47-83-08, 261900Z Oct 83). Summary: A model 234 CH-47 rotor head pitch varying shaft, P/N 114R2088, was found cracked in service. Cracks have also been found in model 234 hub splines, P/N 114R2050. Investigations of the failures have determined that Army CH-47 pitch varying shafts should be visually inspected for cracks daily on the CH-47A/B/C and every 10 flight hours/7 days, whichever occurs first, on the CH-47D. An additional inspection is required for CH-47C and D aircraft using fiberglass rotor blades (FRB). FRB aircraft must be penetrant inspected within 100 flight hours and every 100 flight hours thereafter. Contact: Mr. Charles Caesar, AUTOVON 693-1607, commercial 314-263-1607.

For more information on selected mishap briefs, call AUTOVON 558-4202/4198.

Aviation mishap prevention forum

Low-flying helicopter reported to Congressman

Following is a synopsis of a letter recently sent to a U.S. Congressman. A copy of the letter was forwarded to the Safety Center with a request that we publish it in **Flightfax.**

"I would like to bring to your attention an episode which occurred Sunday, July 10, involving a military helicopter. I was spending the day at the _____ Beach Club . . . Shortly after 2:30, four military helicopters flew by along the coast traveling north. Shortly thereafter, a single military helicopter with no visible markings, traveling north, veered directly over the club at a very low altitude, turned at a steep angle and made another pass, at an even lower altitude, toward the southwest so as to almost make a figure '8' pattern. The helicopter was at a very sharp angle and flying so low as to narrowly miss a low one-story bathhouse. It appeared that the aircraft was either going to crash or hit its rotor on a building or powerline.

"As I stood up to find my 6-year-old child to get her to safety, a mini-tornado-like wind created by the helicopter rushed west to east, causing damage, and narrowly missed causing injury to people due to flying patio umbrellas and other objects.

"I hope you will investigate the pilot's apparent joy riding and lack of concern for the safety of those on the ground. It seems that a major tragedy was narrowly averted. Perhaps we won't be so lucky the next time . . . ."

Although an investigation was conducted, the identity of the aircraft could not be determined. We have heard of instances where Army helicopters flew low over beaches, lakes, fields, girl friend's houses, etc. Truly professional aviators don't do this. For those who do, and get caught, the penalty promises to be stiff, since commanders are taking strong measures against aviators who have violated regulations and professional flight discipline.

Correction

Thanks to all of you who called about the answer to question 5 in the forum of 5 October 1983. The answer should have been **false**. A combustible liquid is one with a flashpoint at or **above** 100° F. (37.8° C.).

Answers to last week's questions

1. The aviation safety officer, working with the command safety director and staff aviation officer, advises the commander on all aviation safety matters. What are the duties of the aviation safety officer?

- Observe flight and ground operations to detect and correct unsafe practices.
- Conduct hazard analyses, rank hazards in terms of severity and accident probability, and advise responsible officials promptly.
- Educate aircrewmembers on safety-related subjects.
- Review aircraft accident reports and help implement corrections.
- Rehearse and review adequacy of the preaccident plan as outlined in paragraph 2-18 and appendix B.
- Insure that communication equipment, navigation aids, and other electronic aids to aircraft operation are inspected.
- Inspect physical condition of airfields, heliports, and tactical landing sites for hazards; recommend improvements; and insure that all known hazards are publicized.
- Maintain current reference files of aviation safety literature.
- Maintain organizational aircraft accident records.
- Review aviator flight records and the unit training program and make recommendations to correct deficiencies.

Aviation mishap prevention forum

• Advise all aviators on safety and the importance of following standard procedures and techniques.

• Monitor techniques and proficiency of personnel in handling weapons; ammunition; and petroleum, oil, and lubricants (POL).

• Observe aviation maintenance operations and make recommendations to correct unsafe procedures and practices.

• Manage Operational Hazard Report (OHR) function.

• Monitor the FOD prevention function at unit level.

• Advise and assist aircraft accident investigation boards.

• Analyze unit accidents and results of semiannual accident prevention surveys.

• Monitor unit aviation life support equipment and related survival training programs.

• Take part in unit-level mission planning to insure weather, terrain, areas of operation, and crew and aircraft capabilities are considered.

• Perform other duties as outlined in DA Pam 385-95. **AR 385-95, with Change 1, pages 1-2 and 1-3, par. 1-7**

2. Unit safety meetings offer one of the most productive tools for accident prevention, provided they are timely and interesting. How often should these meetings be held for Active Army units and how often for Reserve components? Monthly for Active Army units and at least quarterly for Reserve components. **AR 385-95, with Change 1, page 2-3, par. 2-9**

3. AR 385-40 requires that all Army aircraft accidents be investigated and reported. True or false? True. **DA Pam 385-95, page 1-1, par. 1-1**

4. The aircraft compass may be checked for deviation and adjusted while flying. True or false? False. The compass may be checked for deviation while flying. **Do not** compensate compass while in flight. **TM 55-1500-204-25/1, pages 3-136 and 3-136A, par. 7**

Questions for aviation personnel

1. There should be at least 8 hours between drinking alcohol and flying. True or false? **Reference: FM 1-301, Aeromedical Training for Flight Personnel**

2. When will aircraft flying hours be zeroed? **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures**

3. A magnetic compass will be replaced for what reasons? **Reference: TM 55-1500-204-25/1, General Aircraft Maintenance Manual**

4. All personnel aboard an aircraft will wear a protective mask when incapacitating or toxic chemicals are dispensed and until the chemical safety officer or other crewmember reports the aircraft is clear of the dispensed agent. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

5. When incapacitating or toxic chemicals with no arming or fuzing systems are carried in an aircraft, the pilot and copilot need not wear the mask, but it will be readily available. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations** ▪

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Wind observation

Wind observations have been questioned recently at several Air Force bases and Army airfields throughout the United States. The Air Weather Service (AWS) did a study to pinpoint and solve the problem.

The study revealed that in each case where wind reports were questioned, the Air Force Communications Command (AFCC) maintenance personnel checked the equipment for specifications within the technical order (TO). The equipment was found within the TO specifications. One disparity, however, did surface. Readouts in the tower versus the observation were not always exactly the same. This was due to the tower's observation being a direct readout versus the weather observer's RO-362 recorder (which has a certain degree of sluggishness compared to the direct read dial). However, when checked, these instruments met the applicable TO specifications; i.e., they provide wind direction/speed as advertised. They will not give exactly the same directions/speed because they were not designed to do that.

Another problem was sensors providing inaccurate speeds when the wind was from a specific direction. The sensors appeared to be influenced from terrain or building effects. This is not a problem at Fort Rucker but could be at other installations. Be sure you check the FLIPS when flying into other stations.

Natural wind variability: The fluid atmosphere contains eddies of all sizes from microscale (due to localized efforts) to global macroscale (due to hemispheric weather systems). There are many in between. The spectrum of eddies at the short wavelength end represents an entire field of study in meteorology called atmospheric turbulence. Some of these small-scale eddies are measured with wind sensors. These eddies are important to aircraft operations only when they influence critical aspects of the mission such as landing, departure, bombs on target, and a safe flight (structural integrity) in between. Eddies influencing airfield wind sensors used in aircraft operations can be classified into convective and nonconvective.

Convective

Evaporating showers produce subsiding, localized, cool airmasses. Particularly intense variations in velocity from 10 to 40 knots in about 2 kilometers of horizontal distance can occur on several days in the summer. These are the so-called microbursts reported in recent literature and measured by JAWS experiments. Microbursts are particularly critical to aircraft operations because their scale affects aircraft performance in landing and takeoff patterns and they are very difficult to detect with present sensor systems. A 20-knot tailwind at just the wrong time in a takeoff or landing pattern can result in a critical loss of lift.

Thunderstorms produce downdrafts on larger scales as well. When these pass by they can produce sudden speed and direction changes. They can also maintain themselves for 25 miles or more from their source region and even continue to propagate after the thunderstorm which produced them has dissipated. Mountainous terrain can funnel these small-scale gravity waves, thus enhancing their effects. Be aware of intense thunderstorms occurring over the mountains within even 40 miles of your location.

Nonconvective

In the western U.S., wind differences up to 15 knots in opposite directions over a distance of 3 kilometers are possible from small-scale circulations. Intense heating (local hotspots) leads to vertical currents (thermals). Air is drawn in horizontally to feed these vertical currents. Dust devils formed by this process are fairly common on summer afternoons and they can influence the wind. Currents, generated on mountains, travel upslope and can be focused by irregular terrain. It is not uncommon to experience 35 knots of wind in the late afternoon on the top of a fairly tall mountain. Valleys, on the other hand, experience downslope winds at night due to cooling. These currents can affect the wind as well.

The sea breeze circulation is well known and results from differential surface heating. Lakes can produce circulations much like a sea breeze where the air flows from the water in the afternoon and from the land at night. Even though these small-scale circulations are nonconvective, they often trigger convection at their boundaries and intersections.

Vertical wind shear can be pronounced, especially during nocturnal inversions which essentially isolate surface cool air from wind just above the inversion. The temperature needed to "break" the inversion can be determined by the forecaster. When this temperature is exceeded, the stronger winds above the surface can reach the ground.

In summary, AWS's charter is to provide an observation that is representative of the aerodrome. AWS doesn't possess the capabilities to identify/measure/observe every perturbation on the runway complex. It would grossly misrepresent the situation if they did. Therefore, AWS wants to alert you (their customers) to both the variability of surface winds and to present-day capabilities and limitations in wind observations. ■

—thanks to 2LT William D. Hall, USAF Staff Weather Officer, Det 9, 5WS, Fort Rucker

What you should know about Nomex

Nomex is an uncomplicated material, but it has been the subject of many questions, misconceptions, abuses, and just plain untruths. Hopefully, this article will answer any questions you may have and tell you what you should know about your Nomex uniform.

The material

Nomex is a unique manmade material that is permanently fire retardant. It is a type of nylon that will not melt and stick to the skin as other types of synthetic fibers do. Because other synthetics such as nylon and dacron melt at about 300° F., they should not be worn next to the skin while flying. Female aircrewmembers particularly should remember that heat transfer through Nomex could be high enough to melt synthetic undergarments.

Nomex is resistant to temperatures up to about 700° F. and then begins to char and form a dry, brittle residue that can be brushed away when the heat source is removed. Nomex will not support combustion as other natural and manmade materials will. For example, if a flame is placed directly on cotton, nylon, dacron, etc., the material will burn and continue to burn when the heat source is removed. In contrast, Nomex will char as long as the heat source is applied directly to the fabric but will not char or burn when the heat source is taken away. Nomex will burn if contaminated with flammable substances such as petroleum products or household starch. If your Nomex does become contaminated with any flammable product, simply launder or dryclean it and the material will be restored to its original fire retardant state.

At this time, there is no wear-out criteria established for Nomex in Army TMs or FMs. According to the U.S. Army Natick Research and Development Command, even thin Nomex provides protection.

Uniform fit

The Nomex uniform was designed to be worn rather loosely to provide an airspace between the fabric and the skin. This airspace acts as insulation from heat sources. Do not alter your Nomex uniform because snugly fitted Nomex negates the effectiveness of the airspace.

For those of you who may require special measurement uniforms for a proper fit, refer to AR 32-4 and AR 700-84. These regulations authorize uniforms for individuals who cannot be fitted with readily available sizes.

Static electricity

Tests for static electricity buildup were conducted at Wright-Patterson AFB on a variety of materials, including Nomex. There were no significant differences in the generation of static electricity among the materials tested. One of the most important safety procedures in preventing an accident caused by static electricity during refueling or rearming is proper grounding of the aircraft. Another equally important safety procedure is plugging in the bonding wire from the fuel nozzle to the aircraft before the fuel cap is removed. Replace the fuel cap before unplugging the bonding wire.

If your Nomex becomes saturated with fuel, the saturated area should be thoroughly soaked or deluged in water before removal of the uniform to prevent static electricity from igniting the fumes. One crewmember received first- and second-degree burns when his fuel-soaked clothing was ignited by static electricity as he tried to remove them without first washing the saturated area with water.

Cleaning

Nomex can be drycleaned safely without altering its fire retardant qualities. Any drycleaning solvent remaining in the garment is soon dissipated into the air, thus eliminating any fire hazard. Nomex can also be laundered as many times as necessary and still be fire retardant. Since it is an easily cleaned synthetic fiber, you probably won't need a full wash cycle. Simply set the washing machine on a short cycle; e.g., "delicate" or "wash and wear," and use a good brand of detergent. "Spray and Wash" can be used for removing spots. Close the zippers to prevent damage and fasten the velcro to avoid picking up lint.

The water temperature you use to wash your Nomex and how you dry it is strictly up to you. Home hot water heaters and dryers do not get hot enough to harm the material. Remember, Nomex is high-temperature-resistant and has even been boiled without damage. However, to conserve energy, we suggest a warm wash and cold rinse.

When you remove your uniform from the washer or dryer, hang it up so the wrinkles will fall out. You can even iron your Nomex if you want to.

If Nomex is tumble dried separately from other materials, an antistatic strip probably will not be required to get rid of static electricity. The rubbing together of dissimilar materials causes the buildup of static electricity. If you live in a cold, dry climate and static electricity is a nuisance, you can use a good brand of fabric softener in the wash or a strip in the dryer.

Detergents, fabric softeners, and antistatic strips leave a residue which accumulates on Nomex. This affects the fabric's "wickability"; i.e., the ability to transport water (sweat) to aid in evaporation and cooling. You can test your uniform's "wickability" by placing a drop of water on a clean uniform. If the water soaks in within 10 to 12 seconds,

(continued on back page)

Selected mishap briefs

Information based on preliminary reports of aircraft mishaps

Utility helicopters

UH-1 Class A mishap □ (V series) Aircraft was on medevac mission at night, with one pilot and crew chief on board. Pilot overflew the pickup site and began a right descending turn to land. During the turn, pilot lost spatial orientation because of heavy rainshower and reflection of landing light. Main rotor blades hit tree and aircraft crashed. Pilot and crew chief were injured. 8410

UH-1 Class D mishaps □ (H series) Copilot at the controls became excited when aircraft entered IMC and overreacted with collective input, causing overtorque. □ (H series) During standard autorotation, student pilot applied too much collective pitch about 15 feet above the ground, causing aircraft to balloon. IP took the controls. As aircraft settled toward the runway, IP discovered he only had minimum collective pitch control to cushion the landing. Aircraft landed on rear of skids, bounced, and then landed on toes of skids. Main rotor blades flexed down, damaging tail rotor drive shaft and cover.

UH-1 Class E mishaps □ (V series) Master caution and right fuel boost lights came on. Caused by contaminated fuel. Aircraft had been refueled at small civil airport. □ (H series) Engine oil temperature rose during flight. Caused by seizure of bearing package in oil turbine blower. □ (H series) Aircraft vibrated and loud whistling sound was heard. Main rotor blade had separated at tip. □ (H series) Aircraft took off with vertical fin drive shaft cover open. Cover was bent and three rivets holding hinge were popped. Copilot did not make sure that drive shaft cover was secured during preflight. □ (H series) Loud screeching noise was heard during hover. Caused by broken blade on second-stage compressor. □ (H series) Master caution and transmission oil pressure lights came on. Caused by defective oil pressure relief valve.

UH-60 Class D mishap □ As aircraft took off, crew chief told pilot that load was beginning to oscillate. Pilot slowed aircraft and began shallow right turn. Load could not be stabilized and was released. Load was destroyed.

UH-60 Class E mishaps □ No. 2 reservoir light came on. Caused by leak in pitch trim assembly. □ Pitch bias actuator failed during taxi for takeoff.

Attack helicopters

AH-1 Class E mishaps □ (S series) Yaw SCAS hardover occurred during flight. Caused by failure of tail rotor servo. □ (S series) Airspeed indicator was inoperative during takeoff. Pilot had stored a steel helmet behind his seat. Helmet hit and broke plastic pitot line. □ (S series) Transmission oil pressure dropped during hover. Caused by failure of transmission oil transducer. □ (S series) Master caution and No. 2 hydraulic lights came on and crew heard loud growling noise during hover. Stow lock assembly had failed in turret. □ (S series) Engine oil pressure dropped during hover. Caused by failure of oil pressure transducer.

Observation helicopters

OH-58 Class A mishap □ (A series) Aircraft was flying about 40 feet agl at an airspeed of 60 knots. While crossing some deep ravines, engine and main rotor low rpm lights came on and audio warning systems activated. Pilot started sharp left turn toward level terrain, but aircraft crashed on the slope of a ravine, slid downslope, and came to rest on left side. Pilot sustained minor injuries and observer sustained fatal injuries. Preliminary findings indicate engine failure. 8411

FY 84 Class A Mishap Countdown

		FY 83			FY 84	
	Month	Class A Mishaps	Army Fatalities	Month	Class A Mishaps	Army Fatalities
1st Qtr	October	2	0	October	**8**	**10**
	November	2	2	1-16 Nov	**2**	**3**
	December	0	0	December		
2nd Qtr	January	1	0	January		
	February	0	0	February		
	March	2	5	March		
3rd Qtr	April	6	0	April		
	May	8	1	May		
	June	4	5	June		
4th Qtr	July	5	7	July		
	August	4	3	August		
	September	6	0	September		
	Total for Year	40	23	Total to Date	**10**	**13**

OH-58 Class B mishap □ (C series) Engine lost power during approach. Aircraft hit a road sign and landed on airfield. Aircraft was damaged extensively during landing. 8412

OH-58 Class E mishaps □ (C series) On short final, pilot pulled excessive collective to avoid UH-1 in landing area. Torque reached 105 percent for 1 second. □ (A series) Rear soundproofing detached and flew out of aircraft. □ (C series) Aircraft was being refueled with blades turning. A helmet was thrown from one refueling person to another. Helmet hit and dented main rotor blade.

Fixed wing

OV-1 Class D mishaps □ (D series) Rated student pilot had difficulty maintaining airspeed during approach. IP verbally corrected his mistakes until the point where the landing attitude should have been assumed. Nose was lowered momentarily and then raised in preparation for touchdown. Aircraft touched down hard and bounced. IP was on the controls as aircraft touched down the second time. IP guided the aircraft to a stop about 2,500 feet from second touchdown point. Right main landing gear wheel and axle were broken and nose wheel tire was flat. □ (D series) Pilot applied reverse thrust during landing and aircraft yawed violently to left. As speed decreased, with right rudder and opposite braking applied, control was regained. Postflight inspection revealed left main tire had blown out.

T-42 Class E mishap □ Landing gear did not extend during landing and had to be lowered manually. Caused by failure of landing gear motor.

U-21 Class E mishap □ (F series) Copilot saw fluid and vapor mist coming from nacelle louvers in vicinity of bleed valve on No. 2 engine. Caused by failure of fuel nozzle.

Maintenance

UH-1 Class E mishaps □ (M series) Crew smelled fuel during landing. Caused by loose line on flow divider. □ (H series) Transmission oil pressure indicator fluctuated and then dropped to zero. Caused by loose ground wire on pressure transmitter.

CH-47 Class E mishap □ (A series) Crew detected excessive high frequency vibration in vicinity of No. 1 and No. 2 drive shafts. Drive shaft splines were not lubricated correctly.

CH-54 Class E mishap □ (B series) No. 2 engine oil pressure exceeded normal limits during takeoff. Engine oil supply system was overserviced by 1 quart of oil.

OH-58 Class D mishap □ (A series) Aircraft was being run up for maintenance operational check. Front cowling was removed for 100-hour inspection and placed by passenger door at the foot of the observer monitoring the engine. Main rotor was at flat pitch. Gust of wind blew cowling into tail rotor blades. Blades, gearbox, and cowling were damaged.

U-8 Class E mishap □ (F series) Main landing gear indicators showed partial gear-up during landing. Tower personnel indicated gear appeared to be down. Aircraft was landed without incident. Landing gear sensitive downlock switch was out of adjustment.

U-21 Class E mishap □ (RU-21H) Right main gear indicated unsafe during approach. Gear was extended manually. Actuator spring was out of adjustment and not making contact with downlock switch.

Messages received

• Safety-of-flight technical message concerning repetitive inspection of forward sliding cover assembly as a part of each preflight inspection for all UH-60 aircraft (UH-60A-83-13, 011800Z Nov 83). Summary: A recent accident occurred when the main rotor pylon forward sliding cover separated from the aircraft and hit the tail rotor, resulting in loss of tail rotor control. Any time the sliding cover assembly is moved to the forward position and then returned to the closed position, a visual inspection shall be made while the cover is being moved aft to verify that the forward lower roller assemblies are seated in their tracks. After the cover assembly is locked with the locking latches, lift both right and left sides of the forward position of the cover to assure the alignment/retaining pins are seated. These procedures are essential because it is not possible to otherwise verify that the cover is properly seated. Contact: Lyell Myers, AUTOVON 693-3300, commercial 314-263-3300.

• Safety-of-flight operational message concerning UH-60 cargo hook operations (UH-60A-83-14, 011830Z Nov 83). Summary: Since 24 October 1983, three incidents have occurred involving UH-60 cargo hook load beams opening without apparent electrical or manual release by crewmembers. Common details of all three incidents known at this time are cargo hooks were armed, each hook had the improved cargo hook keeper, and the slingload weights were between 6,000 and 7,000 pounds. Message lists procedures to use to reduce the risk of uncommanded release. Contact: Lyell Myers, AUTOVON 693-3300, commercial 314-263-3300.

For more information on selected mishap briefs, call AUTOVON 558-4202/4198.

TM changes

The following changes to TMs have been received:

• Change 19, dated 12 Oct 83, to TM 55-1520-214-23 for OH-6 helicopters.

• Change 29, dated 11 Oct 83, to TM 55-1520-228-23-1 for OH-58A and C helicopters. ■

Aviation mishap prevention forum

Expedite EIR exhibits

If you have been directed to ship an aircraft EIR exhibit for teardown and analysis, move it smartly! Use the highest shipping priority possible, and ship it by traceable means. The quicker you act, the quicker TSARCOM can recommend a fix and the quicker you'll get a copy of the teardown analysis that tells you what caused the component failure. Your quick action may stop a potential disaster.

Doublecheck to be sure you have good photographs (if required) and that the exhibit is protected and packaged right so it'll reach its destination in good shape.

If you don't get disposition instructions for your exhibit within 10 days (for AIMI equipment) or 25 days (any other equipment) turn it into supply.

DA Message DALO-AV 101951Z Jun 83 has the word.

—from PS Magazine, November 1983

Obesity

Obesity must be guarded against because of its detrimental effects on life and general health. Periods of inactivity and boredom—during standby and long-range flights—can easily lead to overeating. Therefore, it is wise to regularly check your body weight and to adjust the diet to maintain the desired level. This is easier, safer, and more to one's liking than repeated dieting strictly because of signs of overweight.

Diet pills (usually amphetamines) are a hazard to flight and should not be taken. When you are contemplating a diet to lose weight, consult your flight surgeon.

—from FM 1-301

Answers to last week's questions

1. There should be at least 8 hours between drinking alcohol and flying. True or false? False. There should be at least 12 hours between drinking alcohol and flying. This rule holds true only if there are no side effects from the alcohol. Side effects are dangerous, and the nonflying period should be extended when they are present. Cold showers, black coffee, or breathing 100 percent oxygen cannot speed up the metabolism of alcohol by the body. For this reason, the length of time between the last drink and takeoff is most important. **FM 1-301, page 3-15, par. c(5)**

2. When will aircraft flying hours be zeroed? Aircraft flying hours **will never be zeroed** for any reason. This includes depot overhaul rebuild, modification, etc. **TM 55-1500-328-25, page 207, par. e**

3. A magnetic compass will be replaced for what reasons?

- Clouded or discolored liquid.
- Illegible card markings, fading, or loss of luminous paint.
- Failure of card to rotate freely in a horizontal plane when aircraft is in a normal flying position.
- Cracked bowl, broken mounting frame, or broken lugs.
- Erratic action or failure of compass to respond after proper efforts to compensate.
- Lubber line loose or misaligned.
- Air visible in bowl of compass. **TM 55-1500-204-25/1, page 3-132A, par. g**

4. All personnel aboard an aircraft will wear a protective mask when incapacitating or toxic chemicals are dispensed and until the chemical safety officer or other crewmember reports the aircraft is clear of the dispensed agent. True or false? True. **AR 95-1, with Change 1, page 2-7, par. 2-18**

5. When incapacitating or toxic chemicals with no arming or fuzing systems are carried in an aircraft, the pilot and copilot need not wear the mask, but it will be readily available. True or false? True. **AR 95-1, with Change 1, page 2-7, par. 2-18**

Questions for aviation personnel

1. Cigarette smoking causes decreased night vision. True or false? **Reference: FM 1-301, Aeromedical Training for Flight Personnel**

2. What is the definition of a general test flight? **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures**

3. What is the definition of a limited test flight? **Reference: TM 55-1500-328-25, Aeronautical Equipment Maintenance Management Policies and Procedures**

4. Simulated engine failures with power recovery may be made if power recovery is initiated and descent terminated no lower than 50 feet agl. True or false? **Reference: AR 95-1, with Change 1, Army Aviation: General Provisions and Flight Regulations**

5. If you get liquid petroleum on your skin, what do you do? If your clothes are soaked with fuel, what do you do? **Reference: FM 1-300, Flight Operations and Airfield Management** ■

What you should know about Nomex

fine. If it takes 30 seconds or longer for the water to soak in, or it simply beads on the material, your Nomex needs to be drycleaned to remove the residue. If you have ever wondered why it was so difficult to dry yourself with a towel from a hotel or motel, it's because they use strong detergents and softeners which greatly decrease the ability to absorb water.

Potpourri

Whether patches, name tags, insignia, rank, etc., are worn on your Nomex depends on the MACOM commander. If they are worn, the best choices are those made from natural fibers rather than synthetic materials. However, patches, etc., made from synthetics are not necessarily forbidden as most synthetics do not melt before reaching about 300° F. This temperature is considerably higher than the human skin can stand without damage. With heat intense enough to melt a synthetic patch, the victim will already be in very serious condition.

Commanders of certain installations require the Nomex uniform to be tucked or bloused inside the leather boot. This is the commander's prerogative, but it should be remembered that neither the flight suit nor the leather boot was designed to be worn in this manner. During flight, the uniform should be fastened over the boot. Sleeves are to be worn down, zipper zipped to the top, and collar turned up. Of course, Nomex gloves are to be worn. Wear the gloves under the sleeve cuff to prevent accidental snagging of the center console switches. In several instances, the governor switch has been caught by the edge of the glove and switched from the automatic position to the emergency position.

Many of you have complained because the turned-up collar of the present Nomex uniform does not completely cover the neck. There has been a low incidence of thermal injuries to the throat and neck area and a high success rate of the crashworthy fuel system which has virtually eliminated fireball accidents. It is not considered cost-effective to change the collar design on the one-piece Nomex. There has been one thermal injury (first- and second-degree burns) to the neck since FY 73. With the possible exception of a few helicopters, all rotary wing aircraft except the TH-55 and CH-54A are equipped with the crashworthy fuel system.

The unprotected throat area comprises less than 1 percent of the total skin area. In contrast, the skin of the face makes up about 5 percent of the total skin area and is not protected by Nomex. The unprotected face has not received the consideration and publicity the neck has and yet covers five times the skin area of the unprotected neck area. The helmet visor offers the upper portion of the face only limited protection in a flash fire or a full-fledged, raging inferno. Some enterprising individuals have fabricated scarves and dickeys from Direct Exchange Nomex for neck protection at practically no cost.

Nomex is Nomex regardless of the weave, color, or article of clothing. Take care of it and it will take care of you when you need it most.

Point of contact at the Safety Center is Laurel D. Sand, AUTOVON 558-6595/5916, commercial 205-255-6595/5916. ■

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Flightfax
Report of Army Aircraft Mishaps

Aircraft accident review

Power droop diagnosed as engine failure

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Synopsis

The OH-58A pilot, while making a left turn about 50 feet above the ground, heard a loud rpm audio and felt the aircraft lose power. The pilot continued the turn to try to land on level ground to his left front. The OH-58 crashed on an 18-degree slope, bounced rearward, and slid on its left side 72 feet down the slope.

History of flight

An OH-58 was requested for a range sweep mission. The pilot and observer were to check for road barricades.

The pilot arrived at airfield operations to obtain a weather and range briefing and to file a flight plan. He then went to the flight line, did his preflight inspection, and took off to fly to a range site to pick up the observer.

The pilot gave the observer a briefing which included location of first aid kit, fire extinguisher, and emergency exit locations. When the aircraft left the range site, the observer was wearing headphones but no helmet.

The aircraft proceeded south along the eastern boundary of the military reservation. The pilot landed three times to allow the observer to replace road barricades. The OH-58 was then flown northwest for several minutes over some canyons and ravines. As the pilot was making a left turn about 50 feet above the ground and 40 to 60 knots airspeed, he heard the low rpm audio and felt the aircraft "drop out from under him." He interpreted this as an engine failure. Since he was over a deep ravine, he decided to try to reach level ground to his left. Hard left and aft cyclic was applied in an attempt to return to the level area. The pilot does not remember applying collective or cyclic inputs to cushion or decelerate the aircraft before impact.

The OH-58 hit the bank of a ravine 52 feet below its crest in a group of trees. Impact with the trees on the left nose section broke the chin bubble, lower fuselage section, and left overhead structure. The main rotor system hit two trees, severing the mast assembly 6 inches below the rotor hub. The

OH-58 was destroyed when it crashed on the bank of a ravine. Pilot, flying at 50 feet above the ground, thought he had an engine failure and tried to reach a forced landing area to his left.

Accident review

fuselage slid down the ravine slope for 72 feet over rocks, stumps, and tree branches. During the slide, the left roof structure, skid, door, and seat supporting structures were torn free. The aircraft came to rest on its left side.

The pilot, who sustained minor cuts and bruises, released his restraint system, pushed the instrument panel and overhead structure out of the way, and got out of the aircraft. He discovered a small grass fire caused by the engine exhaust and used the fire extinguisher to put out the fire. The pilot could not free the passenger, so he climbed to the top of the ravine and activated his survival radio. About 30 minutes elapsed before his call was heard by the crew of a UH-1. A medevac helicopter flew to the crash site. The passenger was freed from the wreckage and flown to a hospital. He died 2 days later from head injuries.

Crew experience

The 30-year-old pilot had more than 300 rotary wing flight hours, with almost 100 in the OH-58A.

Commentary

The pilot, while flying over a ravine, misinterpreted a momentary engine droop as an engine failure and then did not verify engine failure with his instruments, other than a quick look at engine N1 speed, which was low. His reaction was to try to return to level ground over which he had just flown rather than continue straight ahead into the ravine, verify his engine problem, and make a controlled autorotation. He did not properly coordinate control inputs that would have allowed maximum control and survivability during the impact.

The pilot reacted as he did because he had never been exposed to, or had demonstrated to him, emergency recovery procedures that covered engine power losses at varying altitudes and varying airspeeds which require quick interpretation and establishment of proper autorotative recovery techniques. The OH-58 Aircrew Training Manual does not require or identify the requirement for a pilot to be exposed to or perform simulated engine failures at varying altitudes and airspeeds.

The pilot was operating the aircraft in the caution area of the height velocity diagram and, therefore, placed himself in a flight regime that severely restricted his reaction time and ability to respond to a perceived engine failure. As a result, he was unable to reach a forced landing area directly to his left. The pilot was flying at an altitude of approximately 50 feet because of command guidance that all missions flown downrange in the training area would be flown at terrain flight altitudes regardless of whether they were tactical or administrative missions.

The observer was not wearing a helmet because the command was unaware that Common Table of Allowances 50-900 authorizes the requisition of a helmet for every passenger seat in an observation helicopter. The supported unit was also unaware that they could have requested flight helmets on the aircraft request form.

The operations officer of the supported unit did not notify his higher chain of command that a change had been made in personnel manifested to fly the range sweep mission. As a result, the injured observer was not manifested and his identification was not confirmed until 3 hours after the accident. Failure to correct the flight manifest is attributed to a lack of written procedural guidance from the division aviation office down to the supported unit.

Identification of the observer was further hampered because he was not wearing his ID tags, as required by AR 670-1. When the pilot briefed the observer, he did not physically check for the tags but accepted the observer's word that he had them on.■

FY 84 Class A Mishap Countdown

	Month	FY 83 Class A Mishaps	FY 83 Army Fatalities	Month	FY 84 Class A Mishaps	FY 84 Army Fatalities
1st Qtr	October	2	0	October	7	10
	November	2	2	November	3	3
	December	0	0	December	0	0
2nd Qtr	January	1	0	January	4	0
	February	0	0	February	4	4
	March	2	5	March	3	1
3rd Qtr	April	6	0	April	1	3
	May	8	1	May	4	3
	June	4	5	June	3	5
4th Qtr	July	5	7	July	2	3
	August	4	3	August	2	0
	September	6	0	1-26Sep	4	3
	Total for Year	40	23	Total to Date	37	35*

*Army personnel only. Total number of fatalities in Army aircraft flight accidents is 37.

Selected aircraft mishap briefs

Information based on preliminary reports of aircraft mishaps received 7-13 September

Utility helicopters

UH-1 Class C mishap

H series - Main rotor blades hit tree during landing. Blades were dented and torn.

UH-1 Class D mishaps

H series - Aircraft hit bird during cruise flight at 90 knots. Windshield cracked into small pieces, and some of the pieces caused superficial cuts to the pilot's eyes. Pilot was wearing sunglasses and was not using his visors.

H series - Aircraft was on troop airlift mission. The pickup zone was a road surrounded by rocks and 8- to 10-foot trees. As aircraft was nearing the trees, rpm dropped to 6400 with a torque of 37 to 40 psi. Low rpm audio sounded and aircraft began slow right turn even though IP had full left pedal applied. Seeing an open area to his left, IP applied cyclic while maintaining collective and full left pedal. After the aircraft cleared the trees, it touched down with very little movement. IP had crew chief inspect for damage. Because no fuselage damage was reported by the crew chief, IP took off and continued mission without incident. Postflight inspection revealed multiple dents and tears to both tail rotor blades.

UH-1 Class E mishaps

H series - On short final for landing, pilot saw white gas and fluid coming from upper battery vent. Caused by overheated battery.

H series - Aircraft flew through a single strand of commo wire stretched across a valley. Aircraft was landed with no damage. Communications personnel did not mark the wire or report its location.

H series - Crew heard unusual noise during takeoff. Caused by failure of No. 3 tail rotor hanger bearing.

H series - N_2 dropped to 6000 during right turn at 200 feet and 60 knots. Low rpm light and audio activated. Airspeed was stabilized at 60 knots. Crew was unable to climb. Aircraft was in uncontrolled descent at about 100 feet per minute while crew searched for forced landing area. Terrain was mountainous and heavily wooded. Flight was continued to known dry lake bed, the only available forced landing area. Copilot began shallow approach to sandbar. Running landing was made with 15-knot tailwind. Aircraft slid about 15 feet and remaining rpm bled off with cushioning pitch application. No damage or injuries resulted. Caused by failure of fuel control.

H series - Crew heard whining noise, and master caution and hydraulic lights came on. Running landing was made. Caused by failure of washer on pressure fitting to hydraulic pump.

UH-60 Class D mishaps

Stabilator hit trees during landing to field site.

As aircraft approached landing zone, copilot realized his approach was too fast and initiated nose-high deceleration. Tail wheel hit ground, causing damage to rear tire assembly.

UH-60 Class E mishaps

Master caution and main transmission chip detector lights came on. Caused by failure of main transmission module.

Loud whistling noise was heard from main rotor system during takeoff. Caused by bird strike.

Attack helicopters

AH-1 Class D mishap

S series - Aircraft was landing from a hover to a raised concrete holding pad. As skids touched down, collective was lowered before aircraft was completely on the pad. Aircraft pivoted on skids to the rear with tail-low attitude. Pilot took control and repositioned to center of pad. Right skid tube was bent. Ten-knot crosswind and rotorwash from other aircraft made landing from front seat difficult.

AH-1 Class E mishaps

S series - Stiffness was felt in collective and aircraft vibrated. Caused by seizure of main rotor feather bearing.

S series - Aircraft pitched nose down 15 to 20 degrees. Caused by failure of SCAS compensator unit.

S series - Engine and transmission oil temperature gauges indicated a rise toward the upper limits during approach. Oil cooler was clogged with excessive sand and dust.

S series - Engine oil pressure fluctuated between 50 and 90 psi. Caused by faulty oil pressure transducer.

S series - Engine tachometer dropped to zero during takeoff. Caused by sheared tachometer drive shaft.

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JOSEPH R. KOEHLER
Colonel, Aviation
Commander, Army Safety Center

Mishap briefs

Observation helicopters

OH-58 Class E mishaps

C series - While hovering forward, pilot noticed a tactical antenna 5 to 10 feet in front of aircraft. Airspeed was 5 to 8 knots. Pilot overtorqued engine in attempt to avoid antenna. Antenna was cleared by about 2 feet. Crew was using night vision goggles. Antenna was not marked on map. It had been placed there during the day and was not marked for night operations.

A series - Transmission oil hot warning light came on during flight. Pilot had failed to correctly identify transmission oil level as being low during preflight check.

Maintenance

UH-1 Class E mishaps

H series - Feedback was felt in controls and squealing sound was heard from hydraulic pump. Jam nut on pressure port fitting backed off, allowing loss of hydraulic pressure. Suspect nut was not tightened correctly.

H series - Aircraft had dual inverter failure during approach. Electrical short was caused by foreign object left behind after MWO completion for wire cutter.

AH-1 Class E mishaps

S series - Engine chip detector plug was seen to be seeping during preflight. When plug was installed, the wrong size O-ring was used.

S series - Aircraft pitched nose down during hover. Pitch SCAS card was out of adjustment.

Fixed wing

U-3 Class C mishap

A series - Approximately 200 to 400 feet after touchdown landing rollout, left gear sank slightly, as if a blowout or strut failure had occurred. Right gear then collapsed, and aircraft skidded to stop on left edge of runway. Landing gear were damaged and left prop tips curled.

U-21 Class E mishap

A series - Landing gear did not retract after takeoff. Caused by failure of gear switch.

Cargo helicopters

CH-47 Class D mishap

C series - During engine runup, HIT check was conducted on No. 1 engine. All indications were normal. No. 1 engine was placed in ground position. During No. 2 engine HIT check, emergency power light came on and PTIT on No. 1 engine rose to 1040° C. for about 10 seconds. Caused by malfunction of fuel injector nozzle.

Messages received

• Message from AAH program manager, St. Louis, concerning Apache operating instructions and taskings (131915Z Sep 84). Summary: As a result of a recent Apache mishap, AH-64 operators shall not place the cyclic trim feel switch in the force trim off position on the ground by use of the trim and force feel release switch on the pilot's cyclic. If required by a specific test or training mission, the switch may be placed in the off position in flight provided the flight card or syllabus requires this action and it is fully briefed and understood by both crewmembers. This direction does not alter the operation and use of the momentary trim switch. Contact: W. Brabson, AAH deputy program manager, AUTOVON 693-1911, commercial 314-263-1911.

• Safety-of-flight message concerning one-time inspection of H-6 series helicopters for suspected defective engine power-out warning control units (OH-6A-84-07, 131400Z Sep 84). Summary: A letter was received from the manufacturer of the warning control units stating that certain units manufactured and shipped during 1983 may be defective and provide false engine power-out indications. Suspected defective units have serial numbers from 1226M2 to 1296M2. This message imposes a 500 feet minimum mission flight altitude restriction on all H-6 series aircraft until the requirements of the message have been complied with. Contact: Larry Wieschhaus, AUTOVON 693-1687, commerical 314-263-1687.

For more information on selected mishap briefs, call AUTOVON 558-4198/4202.

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