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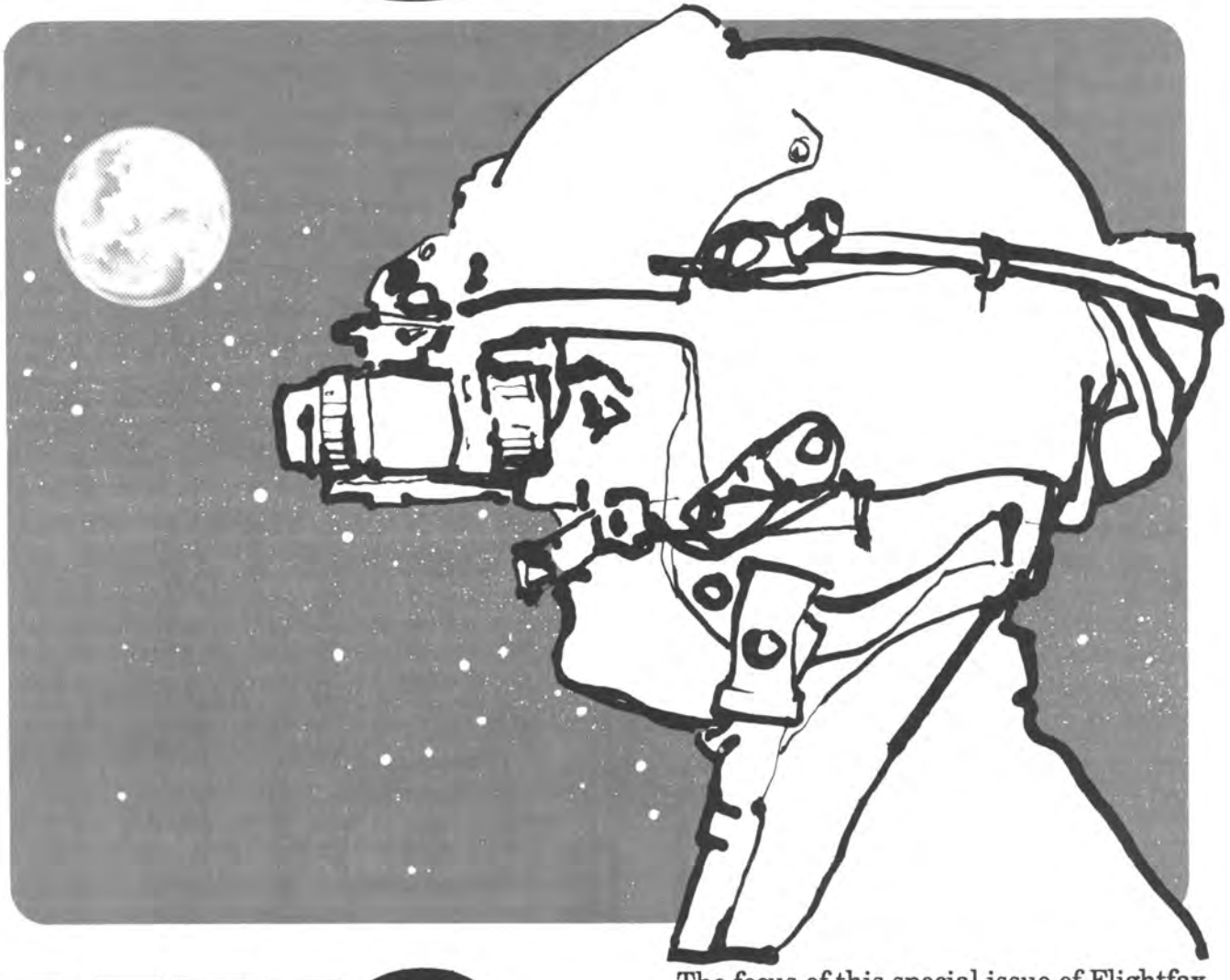


NVGs

Training and operations guidance

The focus of this special issue of Flightfax is consolidated and new training and operations guidance to help aircrews effectively and efficiently use NVGs to their fullest potential. Special features include:

- Night vision goggle training message 91-2
- Night vision goggle focusing procedure
- Night vision goggle batteries update

Night vision goggle training message 91-2

Thumbing through a file of some 50 Department of the Army (DA), U.S. Army Aviation Center (USAAVNC), Aviation Systems Command (AVSCOM), and Communications and Electronics Command (CECOM) messages relating to night vision goggle (NVG) training, operation, and maintenance to find an answer to a particular NVG question is, to say the least, a difficult task. To make unit NVG program management less difficult, Night Vision Goggle Training Message 91-2 dated 281309Z Aug 91 rescinds 21 of these messages and consolidates guidance for NVG training and operations.

If a conflict exists between NVG Training Message 91-2 and the publications listed in the sidebar below, the message will take precedence. The revised Training Circular (TC) 1-210: Aircrew Training Program, Commander's Guide will incorporate the training requirements and procedures contained in the message. However, until the new TC 1-210 is published, the following revised text of NVG Training Message 91-2 will be used as an interim reference for NVG training requirements and procedures:

NVG aircrew training

TC 1-204: Night Flight Techniques and Procedures requires that units have a written NVG standing operating procedure in effect before conducting NVG training.

Annual NVG evaluation

■ The commander designates, in writing, on the commander's task list the crewmember's 3-month NVG evaluation period.

■ A crewmember's NVG semiannual training period may begin either the first day of the month following the end of the designated 3-month NVG evaluation period or the first day of the month following the crewmember's birth month. The training period will continue for 6 months.

■ A crewmember who is designated NVG readiness level (RL) 1 anytime within the 3-month evaluation period must complete all requirements of the annual NVG evaluation.

■ The annual NVG evaluation must be accomplished by all crewmembers who maintain NVG currency, whether or not assigned to a "designated" NVG position. It is conducted in each aircraft group in which the aviator, aerial observer, or aerial forward scout observer (AFSO) performs duties. All tasks identified with an "X" in the NVG column in chapter 5 of the appropriate aircrew training manual (ATM) must be evaluated. In addition, any NVG mission tasks designated by the commander for evaluation must be evaluated. For nonrated crewmembers, an annual standardization flight evaluation of commander-designated tasks will be administered.

Note: **For NVG purposes, all UH-1 aircraft are considered similar and within the same group.**

■ All NVG evaluations will be performed at night, in the aircraft, under NVG. For rated crewmembers, the evaluation is conducted by an NVG instructor pilot (IP) or standardization instructor pilot (SP). An NVG IP, SP, or designated NVG nonrated crewmember trainer (NCT) conducts the evaluation for nonrated crewmembers. An NVG flight engineer must be evaluated by an NVG flight engineer instructor, standardization

Message takes precedence

If a conflict exists between Night Vision Goggle Training Message 91-2 and the following publications, this message will take precedence.

- FC 1-219: Aircrew Training Manual, Night Vision Goggles. (When TC 1-209: Aircrew Training Manual, OH-58D Observation Helicopter, Aviator/Aeroscout Observer, dated 12 May 1987, is revised, FC 1-219 will become obsolete.)
- TC 1-209: Aircrew Training Manual, OH-58D Observation Helicopter, Aviator/Aeroscout Observer.
- TC 1-211: Aircrew Training Manual, Utility Helicopter, UH-1.
- TC 1-212: Aircrew Training Manual, Utility Helicopter, UH-60.
- TC 1-213: Aircrew Training Manual, Attack Helicopter, AH-1.
- TC 1-214: Aircrew Training Manual, Attack Helicopter, AH-64.
- TC 1-215: Aircrew Training Manual, Observation Helicopter, OH-58A/C.
- TC 1-216: Aircrew Training Manual, Cargo Helicopter.

flight engineer instructor, or NCT. If one of these is not available, then an NVG IP or SP may conduct the evaluation.

■ Crewmembers undergoing RL 3 or RL 2 training programs are not subject to the annual NVG evaluation unless they were removed from RL 1 status because of a training deficiency.

■ Crewmembers completing hands-on performance tests during progression to RL 1 may receive credit for those tasks conducted during the commander-designated 3-month NVG evaluation period.

NVG readiness levels

NVG readiness levels are the training status classifications of the individual crewmember *for NVG purposes*. In some cases, crewmembers may have more than one readiness level. For example, an aviator may be RL 1 and RL 3 in the same aircraft—RL 1 for aircraft continuation training and RL 3 for NVG refresher training.

Note 1: **The commander may designate a crewmember's readiness level for NVG purposes through a records check.**

Note 2: **NVG RL and currency training will be performed at night in the aircraft under actual NVG conditions. The synthetic flight training simulator requirement for RL 3 training and simulated night flight in an NVG-compatible visual aircraft simulator for mission or sustainment purposes are permissible exceptions.**

■ **RL 3 initial NVG qualification, aircraft NVG qualification, and NVG refresher training.** A crewmember is designated RL 3 for NVG purposes while undergoing initial NVG qualification, aircraft NVG qualification, or NVG refresher training.

Before undergoing training, an aviator must be qualified and current in the aircraft. Crewmembers must complete the NVG training within 45 consecutive days—the 45-day period is a "sliding window" within the 90-day progression period. The appropriate ATM shows academic and flight training and specific task requirements.

The United States Army Aviation Center (USAAVNC) Night Vision Goggle Exportable Training Package (NVGETP) will be used to conduct training at other than centralized training bases. The USAAVNC NVGETP lesson plans and slides may be obtained from the addresses shown in the sidebar below.

Before the first NVG training flight, the aviator must undergo a 1.0-hour training period in the applicable aircraft flight simulator or at night in a static aircraft. Minimum emergency procedures, NVG emergency procedures, and a blind cockpit drill—switch locations—will be covered. This 1-hour period and the NVG flight evaluation may be applied toward the 10-hour flight minimum required for qualification. During this training, the aviator must occupy a crew position with access to the flight controls. The aviator's proficiency may be determined by a single flight evaluation or by continual evaluation by an IP or SP.

NVG exportable training package lesson plans and slides

The United States Army Aviation Center (USAAVNC) Night Vision Goggle Exportable Training Package (NVGETP) lesson plans and slides may be obtained from the following addresses:

- For NVGETP lesson plans, write to Commander, USAAVNC, ATTN: ATZQ-TDI-D, Fort Rucker, Alabama 36362-5035 or call DSN 558-3283/5990, commercial 205-255-3283/5990.
- For NVGETP slides, units should contact their local training aids support center which will, in turn, request NVGETP slides from Commander, USAAVNC, ATTN: ATZQ-DPT-TA, Fort Rucker, Alabama 36362-5035 or call DSN 558-2620/2116, commercial 205-255-2620/2116.

Note: **Initial NVG qualification, aircraft NVG qualification, and NVG refresher training flight hours must be conducted in the same aircraft group.**

• **Initial NVG qualification training.** The training for initial NVG qualification will be conducted according to this message and the appropriate ATM.

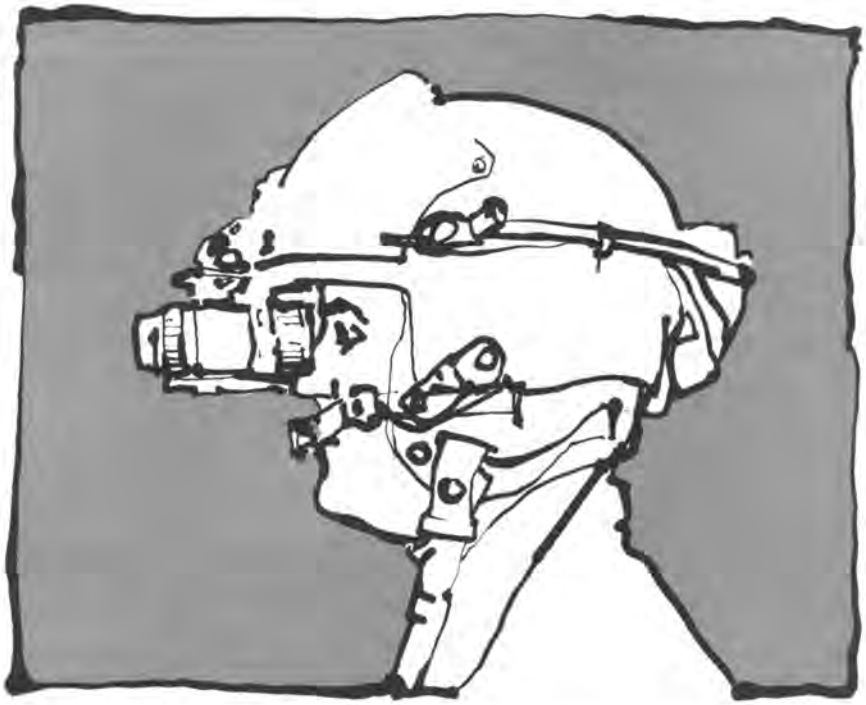
• **Aircraft NVG qualification training.** An aviator who desires to be NVG qualified in an aircraft other than the aircraft in which originally qualified must undergo aircraft NVG qualification training. This training must be completed within 45 consecutive days. In addition, the aviator must—

❑ Occupy a crew position with access to the flight controls.

❑ Complete the training shown in the appropriate ATM.

❑ Complete an NVG flight evaluation given at night in the aircraft by an NVG IP or SP. This may be a continual evaluation. Mandatory evaluation tasks are identified in the appropriate ATM.

Note: **A crewmember qualified in the AN/PVS-5 series NVG must receive additional academic instruction on the AN/AVS-6 to be considered AN/AVS-6 qualified. As a minimum, the training should include instruction on the AN/AVS-6 operators manual and the differences in operating limitations between the AN/PVS-5 series goggles and the AN/AVS-6. The recently fielded guard mount, GM-6, requires knowledge of proper mounting and adjustment of the AN/PVS-5 series goggles in the GM-6 bracket.**



•**NVG refresher training**. An aviator is required to undergo refresher training only in the aircraft in which he has not completed a 1-hour NVG flight during the previous 180 consecutive days. This applies to his primary aircraft and additional aircraft, if applicable. The aviator must have flown from a crew position with access to the flight controls. During this refresher training, the aviator must—

❑ Occupy a crew position with access to the flight controls.

❑ Complete the training shown in the appropriate ATM.

❑ Complete an NVG flight evaluation given at night in the aircraft by an NVG IP or SP. This may be a continual evaluation. Mandatory evaluation tasks are identified in the appropriate ATM.

■**RL 2 NVG mission training**. A crewmember is designated RL 2 for NVG purposes after completing qualification or refresher training. A crewmember who accomplishes initial qualification and who is assigned to a table(s) of organization and equipment (TOE) or tables of distribution and allowances (TDA) position that does not require NVG currency is not necessarily required to immediately enter NVG mission training. Crewmembers must be NVG current to initiate NVG mission training. An aviator may also enter the mission phase of training after a records check. Proficiency in mission-related tasks is the goal of mission training.

Note: **NVG RL progression must meet the same criteria prescribed in aircraft ATMs.**

•Initial NVG mission training for qualified NVG aviators will consist of *a minimum of 10 hours of NVG flight training*. NVG mission training may be conducted by an NVG unit trainer (UT). It is highly recommended that the UT begin this training after an NVG IP or SP has demonstrated each commander-designated task to the aviator undergoing mission training.

Note: **An aviator who has undergone initial NVG mission training may not require additional NVG mission training when transitioning to the same mission-type aircraft; for example, a UH-1 aviator transitioning to a UH-60. However, an aviator initially NVG mission trained in a UH-1 and transitioning to a CH-47 will require 10 hours of NVG mission training.**

•The commander may approve up to 5 hours in a compatible visual flight simulator for aviators, if conditions preclude NVG use in the aircraft.

Note: **During training, the aviator must occupy a crew position with access to the flight controls.**

•For NVG progression to RL 1, a crewmember must complete an NVG evaluation given at night in the aircraft by an appropriate evaluator. This may be a continual evaluation. However, the commander may designate a crewmember RL 1 for NVG purposes if the records indicate the crewmember was previously NVG mission qualified. The records must also show that the crewmember has demonstrated proficiency in those tasks designated by the gaining unit commander.

■**RL 1 NVG continuation training**. A crewmember begins NVG continuation training after completing qualification or refresher training and any required mission training.

•An NVG RL 1 aviator, AO, or AFSO assigned to an NVG-designated position must maintain NVG semiannual flying-hour and sustainment requirements as follows:

❑ Aviator—9 hours NVG flight, which must be flown at night from a crew position with access to the flight controls. This requirement also pertains to an aviator designated as an NVG pilot-in-

command (PC). AH-64 crewmembers are exempt from these requirements.

❑ AO and AFSO—6 hours of NVG flight, all of which must be flown at night as a crewmember in the left seat.

Note: **Aviators who have access to a compatible visual flight simulator may substitute up to 3 hours of simulator time toward the 9-hour semiannual requirement.**

• Minimum annual task and iteration requirements are specified in the appropriate ATM. These requirements consist of one iteration of all NVG tasks indicated by an "X" in the NVG column in chapter 5 of the appropriate ATM task list and any mandatory mission tasks identified by the commander.

Note: **Aviators required to participate in NVG operations but who are not assigned to a designated NVG position or not designated as an NVG PC need only maintain currency as indicated in NVG currency requirements.**

NVG currency requirements

■ To be considered NVG current, the aviator, from a crew position with access to the flight controls, must—

• Participate every 45 days in a 1-hour flight in either a compatible visual flight simulator, if applicable, or at night in the aircraft while wearing NVG.

• Participate every 90 days in a 1-hour flight at night in the aircraft while wearing NVG.

Note 1: **Aircraft flight hours for currency must be conducted in the same aircraft group according to AR 95-1: Aviation: Flight Regulations. For NVG purposes, all UH-1 aircraft are considered similar and within the same group.**
Note 2: **The AH-64 combat mission simulator is not NVG compatible. AH-64 NVG aviators must participate every 45 consecutive days in a 1-hour flight at night in the aircraft while wearing NVG.**

■ An aviator whose currency has elapsed must complete a 1-hour NVG proficiency evaluation given at night in the aircraft by an NVG IP or SP. The aviator must occupy a crew position with access to the flight controls. Minimum tasks to be evaluated are listed in the appropriate ATM. NVG readiness level will be determined upon completion of the evaluation.

Note: **The purpose of this flight evaluation is to reestablish currency with night vision goggles. An IP may evaluate another IP or SP for NVG currency since the examinee's ability to accomplish individual maneuvers is being evaluated. The IP cannot evaluate an SP for annual proficiency and readiness test purposes.**

■ Unit currency requirements are as follows:

• Aviation brigade commanders will establish NVG-designated positions based on the unit's mission essential task list (METL).

• An aviation brigade's NVG-designated position requirement is no less than 25 percent of the brigade's total aviator authorization. Fixed wing or AH-64 aviator positions will not be included in unit totals for NVG-designated positions. The only exception to this requirement is medium-lift helicopter companies. Their requirement is that no less than 20 percent of their authorized aviator positions be designated as NVG. For example, one aviation battalion in a brigade sustains 90 percent of its authorized positions as NVG. Another battalion in the same brigade sustains only 5 percent. Staff elements assigned to a headquarters and headquarters company would not be obligated to sustain currency at all. The resulting brigade aggregate could still meet the DA standard.

• Units not falling under an aviation brigade headquarters—for example, separate battalions and companies—must meet the DA standard percentages specified in the paragraph above. The designation of these separate units must be approved by the appropriate colonel or higher within the organizational chain of command. This authority will not be delegated lower than the colonel level.

NVG nonrated crewmember trainer

An NVG NCT is appointed by the unit commander to assist, implement, and evaluate nonrated crewmember qualification, refresher, mission, and continuation training. The NCT will also assist, implement, and evaluate the academic portion of qualification or refresher training.

■ **Prerequisites**. The NCT must be a qualified and current NVG crewmember in the aircraft in which he will instruct or evaluate.

■ **Qualification requirements**. To be designated as an NCT, the individual must—

• Receive training in the area(s) in which he will instruct or evaluate.

• Complete a standardization evaluation. The NCT flight evaluation will be given at night in the aircraft by an NVG IP, SP, or another NCT. The evaluation will consist of NVG nonrated crewmember qualification tasks and other tasks designated by the commander.

Note: **The trainer or evaluator will not occupy a crew position with access to the flight controls while conducting training or an evaluation.**

•Be designated, in writing, by the commander. The designation will specify the areas of training and evaluation in which NCT duties are to be performed.

NVG pilot-in-command

■ **Prerequisites**. The aviator must meet the requirements stated in AR 95-1.

■ **Qualification requirements**. To be designated as an NVG PC, the aviator must—

•Maintain NVG currency and continuation training requirements.

•Be a current PC for all missions. The intent is for a PC to be a day-qualified PC in a task before conducting the task under NVG.

•Complete an NVG PC evaluation given at night in the aircraft by an NVG IP or SP.

•Be designated, in writing, by the commander.

•The NVG PC who is not a UT, IP, or SP is prohibited from conducting NVG mission, RL 2 progression, training.

NVG unit trainer

An NVG UT is appointed by the unit commander to assist in aviator mission, continuation, and the academic portion of qualification or refresher training. The NVG UT may also conduct nonrated crewmember academic and flight training. The NVG UT is prohibited from conducting emergency procedures training, NVG qualification or refresher flight training, and other training that requires an NVG IP or SP.

■ **Prerequisites**. The aviator must meet the requirements stated in AR 95-1. For NVG UT designation, the aviator must be a qualified and current NVG PC in the aircraft in which he performs UT duties.

Note: **The NVG UT must maintain NVG currency and continuation training requirements.**

■ **Qualification requirements**. To be designated as an NVG UT, the aviator must—

•Receive training in the areas in which he will instruct.

•Complete a UT evaluation given by an IP or SP as outlined in the appropriate ATM. The UT NVG flight evaluation will be given at night in the aircraft by an NVG IP or SP. It will consist of NVG qualification tasks and other tasks designated by the commander.

•Be designated, in writing, by the commander. The designation will specify areas of training in which the UT may instruct or train.

NVG instructor pilot

An NVG IP trains and evaluates aviators, UTs, and NCTs in designated aircraft.

■ **Prerequisites**. The aviator must meet the requirements stated in AR 95-1. In addition, an NVG IP must meet NVG PC requirements before being designated an NVG IP.

■ **Qualification requirements**. To be designated as an NVG IP, the aviator must—

•Be a qualified and current IP in the aircraft in which NVG IP duties are to be performed according to AR 95-1.

•Complete an NVG IP evaluation given at night in the aircraft by an NVG SP.

•Be designated, in writing, by the commander.

NVG standardization instructor pilot

The NVG SP provides technical supervision of the unit's NVG standardization program for the commander. The NVG SP is a highly qualified IP who should be selected on the basis of training, knowledge, experience, judgment, maturity, and proven instructor pilot ability.

■ **Prerequisites**. The aviator must meet the requirements stated in AR 95-1. In addition, an NVG SP must meet NVG IP requirements before being designated an NVG SP.

■ **Qualification requirements**. To be designated as an NVG SP, the aviator must—

•Be a qualified and current SP in the aircraft in which NVG SP duties are to be performed according to AR 95-1.

•Complete an NVG SP evaluation given at night in the aircraft by an NVG SP.

•Be designated, in writing, by the commander.

NVG nonrated crewmember training program

Commanders are required to establish, in writing, a nonrated crewmember NVG training program when flight missions include the use of nonrated crewmembers. (See information under additional crewmember requirements.) Nonrated crewmember training must be documented, in writing.

■ **Training requirements**

•**Academic training**. The current USAAVNC NVGETP will be used by SPs, IPs, UTs, and NCTs to conduct training at other than centralized training bases. Aviator-specific questions will be deleted. The SP, IP, UT, or NCT will add training material and questions pertaining to nonrated crewmember tasks, mission, and local operating procedures. If a test is not included in the NVGETP, a locally produced test is authorized and will

be maintained on file by the unit.

•**Flight training**. Each unit will develop and conduct flight training for qualification, refresher, mission, and continuation training. SPs, IPs, UTs, or NCTs will conduct flight training.

■ **Readiness levels**

•**NVG RL 3**. The nonrated crewmember is designated RL 3 while undergoing NVG qualification training, refresher training, or NVG qualification in a different aircraft.

❑ Progression must be completed within 90 consecutive days (Reserve Components within 1 year) after the nonrated crewmember is assigned to a crew position requiring NVG use.

❑ NVG qualification or refresher training must be completed within 60 consecutive days from the date training starts. The 60-day period is a "sliding window" within the progression period.

❑ Before the first NVG training flight, the nonrated crewmember must undergo a 1.0-hour NVG training period at night in a static aircraft.

❑ As a minimum, the nonrated crewmember must receive training in egress procedures, NVG failure procedures, and blind aircraft switchology. This 1-hour period and the NVG flight evaluation, if applicable, may be applied toward the 5.5-hour flight minimum required for NVG qualification or mission training.

❑ The evaluation may be a continual evaluation or a single evaluation at the completion of training.

Note: **Additional aircraft qualification training—type and amount—is established by the commander.**

•**Refresher training RL 3**. NVG refresher training is required when a nonrated crewmember has not completed a 1-hour NVG flight during the previous 180 consecutive days.

❑ During this training, the nonrated crewmember will complete an NVG evaluation. The training recommended in table 1 should be used as a guide.

❑ The commander will determine the type and amount of training required. Three hours of flight training should be adequate. This training will include academic and flight training or evaluation.

•**Mission training RL 2**. Proficiency in mission-related tasks—for example, external loads—is the goal of mission training. Three flight hours should provide sufficient time to accomplish command-directed tasks.

Note: **A nonrated crewmember who has undergone NVG mission training may not require additional mission training when transitioning to the same mission-type aircraft. For example, a nonrated crewmember who undergoes NVG mission training in a UH-1 may not require additional training when transitioning to a UH-60.**

❑ A nonrated crewmember begins mission training after completing qualification or refresher training. He must be NVG current.

❑ RL progression must be completed within 90 consecutive days (Reserve Components within 1 year) after the nonrated crewmember is assigned to a crew position requiring NVG use.

❑ Mission training hours may be counted concurrently with qualification hours.

❑ The commander will select mission training tasks that reflect the unit's mission requirements.

❑ Upon completion of mission training, an NVG evaluation will be conducted. This may be a continual evaluation.

Table 1. NVG hours and flight subjects for nonrated crewmember

Nonrated Crewmember NVG Qualification or Mission Training	
Hours	**Subjects**
1.0	Static aircraft
5.0	In-flight qualification, including scanning techniques, identification of aircraft structural limitations, distance estimation and depth perception, knowledge of restrictions to visibility, and terrain interpretation.
3.0	In-flight mission training (can be conducted concurrently with in-flight qualification).
1.0	In-flight emergency (can be conducted concurrently with in-flight qualification).
1.0	In-flight evaluation (may be a continual evaluation).
11.0	Total hours*

*Total hours may be reduced to no less than 5.5 hours based on the instructor's recommendation concerning the nonrated crewmember's proficiency. The 5.5 hours must include the 1.0-hour static aircraft training time. Reduction of hours must be documented, in writing, by the commander.

❑ The nonrated crewmember may also enter the mission phase of training after a records check or proficiency flight evaluation.

•**Continuation training RL 1**. All nonrated crewmembers begin continuation training after completing qualification, refresher, and any required mission training.

❑ The commander may designate a nonrated crewmember RL 1 for NVG purposes if the records indicate the individual was previously NVG mission qualified. The records must also show that the nonrated crewmember has demonstrated proficiency in those tasks designated by the gaining unit commander.

❑ Minimum tasks for evaluation should be designated by the commander.

❑ To be considered NVG current, the nonrated crewmember must participate every 60 days in a 1-hour flight at night in the aircraft while wearing NVG. He must perform crew duties.

❑ A nonrated crewmember whose currency has elapsed must complete a 1-hour NVG proficiency evaluation at night in the aircraft. Minimum tasks for evaluation will be determined by the commander.

❑ Commanders will determine who may conduct NVG training and evaluation of nonrated crewmembers. It is strongly recommended that an NVG IP or SP monitor and supervise nonrated crewmember training and evaluations.

Additional crewmember requirements

■ During single-ship operations, UH-1, UH-60, and CH-47 aircraft require at least three NVG-qualified and current crewmembers during flights using NVG except—

•Those operations conducted at USAAVNC according to, or in support of, USAAVNC-approved programs of instructions.

•National Guard Bureau centralized training bases (western and eastern area aviation training sites) according to, or in support of, USAAVNC-approved programs of instruction.

•Air ambulance operational missions that require the use of both nonrated crewmembers for performance of medical duties. The aircrew in such cases is still required to be NVG-qualified and current. They function as required for single-ship operations until an onboard medical emergency requires reassignment of priorities.

•EH-1 or EH-60 operational missions that require the use of the nonrated crewmember(s) to operate mission equipment. The additional crewmembers in these cases are still required to be NVG qualified and current. They will function as nonrated NVG crewmembers until directed by the PC to perform EH-mission tasks.

Note: **Rated aviators, occupying a crew position with access to the flight controls and undergoing RL training conducted by an IP or SP, may be counted toward the three-crewmember requirement.**

■ During aided multihelicopter operations in UH-1, UH-60, and CH-47 series aircraft, the two aviators flying the aircraft will be supplemented as follows:

•UH-1 and UH-60 series aircraft—one additional crewmember wearing NVG, for a minimum total crew of three.

•CH-47 series aircraft—two additional crewmembers wearing NVG, for a minimum total crew of four. The PC will brief all crewmembers on crew duties and assign each crewmember a sector of visual responsibility.

•For additional guidance, see paragraph 7-16, TC 1-204.

Note: **The third and, if applicable, fourth crewmember may use NVGs of a different type from those used by the crewmembers at the controls; for example, AN/PVS-5A/B/C or AN/AVS-6. On UH-1 aircraft, when a fourth crewmember is necessary, that crewmember does not require NVG.**

NVG requirements

■ DA requires that all Active and Reserve Component rotary wing TOE and TDA aviators be NVG qualified. Waiver authority for this requirement will not be delegated below the major Army command level.

■ While conducting NVG operations, all crewmembers with access to the flight controls must be aircraft and NVG qualified and current. In addition, they must wear the same type NVG; for example, AN/PVS-5A/B/C or AN/AVS-6. This allows for the AN/PVS-5A to be used in the same cockpit with the AN/PVS-5B or AN/PVS-5C.

Note: **An aviator not NVG qualified and current may perform pilot duties provided he is aircraft current and undergoing RL training according to his aircrew training program. However, a qualified and current NVG IP or SP wearing the same type of NVG must occupy a crew position with access to the flight controls.**

■ Crewmembers with access to the flight controls in helicopters in the same formation must all wear the same type NVG.

Note: **A formation is a flight in which two or more aircraft are in such proximity to each other that any movement of the lead**

aircraft must be duplicated by the other(s).

■ The same kind of NVG restriction does not apply to scout or attack team operations. However, crewmembers with access to the flight controls in individual aircraft must wear the same type NVG. Aircraft operating with the pilot night vision sensor (PNVS) as the primary sensor (AH-64) or with different types of NVG, AN/PVS-5 versus AN/AVS-6, will maintain a minimum horizontal separation of five rotor diameters. This five-rotor separation does not apply to terminal and tactical landing areas.

■ Single-pilot NVG flight is prohibited unless—

• The pilot in an OH-58 or OH-6 is assisted by a qualified and current AO (93B) or AFSO occupying the copilot's station. The AO or AFSO must have been trained in a DA-approved course specific for that aircraft. In addition, the AO or AFSO must be qualified in NVG operations.

• The pilot in an AH-64 operating with the PNVS is assisted by the copilot/gunner (CPG) operating under the AN/AVS-6.

• The CPG in an AH-1, flips up the GX-5, GM-6, or AN/AVS-6 to make an actual or simulated weapons engagement while the pilot remains goggled. This exception is not authorized with the NVGs in the modified-faceplate configuration.

■ NVG terrain flight is defined as low-level, contour, or nap-of-the-earth (NOE) flight at 200 feet above the highest obstacle (AHO) or less.

■ Airspeed and altitude restrictions are as follows:

• NOE flight—40 knots indicated airspeed (KIAS) maximum, with the skids or wheels above trees and vegetation in the flightpath.

• Contour flight—70 KIAS maximum, with the skids or wheels no lower than 25 feet AHO.

• Low-level flight—aircraft may fly at whatever airspeed operational requirements dictate and aircraft limitations allow, with the skids or wheels no lower than 80 feet AHO.

Note: **The above airspeeds must be decreased if inclement weather or ambient light levels restrict visibility.**

■ An infrared (IR) band-pass filter or pink-light-modified searchlight or landing light must be installed and operational before NVG operations are conducted. If the IR band-pass filter or pink light becomes inoperative during a mission, the PC will evaluate the impact on mission accomplishment. PC actions may vary from a minor mission adjustment to termination of the flight.

NVG operations references

NVG operations will be conducted according to the following references except as amended or directed by appropriate messages:

- AR 95-1: Aviation: Flight Regulations.
- AR 95-2: Aviation: Air Traffic Control, Airspace, Airfields, Flight Activities, and Navigational Aids.
- AR 95-3: Aviation: General Provisions, Training, Standardization, and Resource Management.
- FC 1-219: Aircrew Training Manual, Night Vision Goggles. (When TC 1-209: Aircrew Training Manual, OH-58D Observation Helicopter, Aviator/Aeroscout Observer, dated 12 May 1987, is revised, FC 1-219 will become obsolete.)
- FM 1-202: Environmental Flight.
- TC 1-201: Tactical Flight Procedures.
- TC 1-204: Night Flight Techniques and Procedures.
- TC 1-209: Aircrew Training Manual, OH-58D Observation Helicopter, Aviator/Aeroscout Observer.
- TC 1-211: Aircrew Training Manual, Utility Helicopter, UH-1.
- TC 1-212: Aircrew Training Manual, Utility Helicopter, UH-60.
- TC 1-213: Aircrew Training Manual, Attack Helicopter, AH-1.
- TC 1-214: Aircrew Training Manual, Attack Helicopter, AH-64.
- TC 1-215: Aircrew Training Manual, Observation Helicopter, OH-58A/C.
- TC 1-216: Aircrew Training Manual, Cargo Helicopter.
- Night Vision Goggle Training Message 91-2.

Note: **For the AH-64, the criteria in airspeed and altitude restrictions and requirements for IR band-pass filter or pink-light-modified searchlight and landing light are not applicable. The PNVS is the primary night sensor and the AN/AVS-6 is a supplemental night vision aid.**

■ Daylight filter training with AN/PVS-5 series and AN/AVS-6 is prohibited. Day vision goggle flight no longer satisfies NVG training requirements. Units located in geographic areas with insufficient darkness over extended periods of time and no compatible visual flight simulator available should request a waiver for NVG currency.

■ NVG operations will be conducted according to the references listed in the sidebar on page 9 of this article.

Rescinded messages

Messages rescinded as a result of Night Vision Goggle Training Message 91-2 are listed in the sidebar at right.

Message expiration

Night Vision Goggle Training Message 91-2 expires 28 August 1992, unless rescinded earlier.

Points of contact

POCs for this message are:

■ Headquarters DA, LTC Schettler, DSN 224-4992, commercial 703-697-4992.

■ USAAVNC, MW4 Brooks or CW4 Arnold, DSN 558-5858/5812, commercial 205-255-5858/5812.❑

Rescinded messages

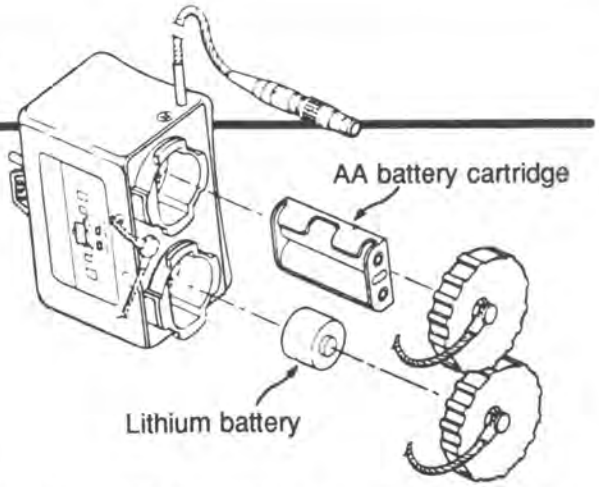
The following messages are rescinded as a result of Night Vision Goggle Training Message 91-2:

- 311935Z Mar 86 Unauthorized Modifications to NVGs
- 281800Z Jan 87 NVG Flight
- 121630Z Feb 87 AN/PVS-5 NVG Modification
- 062200Z Mar 87 NVG Training
- 051900Z Mar 87 Goggle Maintenance
- 081630Z Apr 87 Same Goggle Use
- 261830Z Jul 88 Nonrated Crewmember Training
- 151330Z Sep 88 Nonrated Crewmember Training
- 302335Z Jan 89 Third Crewmember
- 132321Z Jun 89 USAAVNC POCs
- 141433Z Jun 89 Third Crewmember
- 031700Z Nov 89 Third Crewmember
- 152040Z Nov 89 Third Crewmember
- 141810Z Dec 89 Third Crewmember
- 231200Z Jan 90 Message Declassification
- 151852Z Mar 90 NVG Training Message 90-1
- 031512Z Oct 90 ODCSOPS Tasker
- 221645Z Dec 90 Nonrated Crewmember Training
- 092000Z Jan 91 Draft Maintenance Message
- 081430Z Feb 91 NVG Airspeed Limitation
- 081453Z Mar 91 NVG Training and Operations 90-1

NVG batteries update

In recent years, a lot of information has been published concerning the use of lithium BA 5567/U and "AA" alkaline BA 3058/U batteries in the Aviator's Night Vision Imaging System (ANVIS) dual (universal) power pack. In April of this year, the Communications and Electronics Command and the manufacturer of the dual power pack conducted separate tests and concluded that the use of either battery in separate compartments of the power pack should not be prohibited. Use of lithium or "AA" alkaline batteries in separate compartments of the power pack is authorized. Future ANVIS publications will reflect this information.

Lithium BA 5567/U and "AA" alkaline BA 3058/U are the only batteries authorized for use with aviation night vision goggles. Mercury, "AA" carbon, and Nicad rechargeable batteries are not authorized for use with aviation night vision goggles. Units should discontinue use of unauthorized batteries immediately. ❑



POC: SFC Loney, Night Vision Device Branch, Aviation Training Brigade, DSN 558-5858/5812, commercial 205-255-5858/5812

Night vision goggle focusing procedure

Confusion has existed among night vision goggle (NVG) users about preflight adjustment procedures. Lack of an NVG standardized focusing procedure often led to aircrews operating with a less than optimal image. In an attempt to help aircrews optimize the AN/PVS-5 and ANVIS image, the U.S. Army Aeromedical Research Laboratory (USAARL) has developed an effective, standardized NVG focusing procedure for the AN/PVS-5 and ANVIS.

Indoor and outdoor focusing

For indoor focusing of both the AN/PVS-5 and ANVIS, select a target that is 20 feet (6 meters) away. In the event a 20-foot distance is not available, use the maximum distance possible. For outdoor focusing of both the AN/PVS-5 and ANVIS, look at the edge or some detail of a building or other manmade structure about 100 to 200 feet (30 to 60 meters) away. Keep both eyes open throughout the focusing procedure. Closing one eye will result in an out-of-focus adjustment.

AN/PVS-5

Before beginning the focus procedure, adjust both focus knobs to infinity, counterclockwise to the left, and adjust both diopter adjustment rings counterclockwise to the left. It is not important which tube you begin the focus procedure with as long as you complete the following steps for both the right and left tube:

1. Cup your right hand over the right tube to block out all incoming light, being careful not to smudge the lens.

2. With your left hand, turn the left diopter adjustment ring clockwise to the right. When you have obtained the sharpest image, stop. If you have gone too far to the right and the image is badly out of focus, place the diopter adjustment ring all the way to the left again and start over.

Note: **There is a tendency to place the diopter ring too far to the right into the negative diopter setting. For crewmembers under 30 years of age, the elastic eye lens will compensate for the maladjustment and cause the image to focus. However, after about 1 hour of NVG use, the user's eye muscles will grow tired and the image will become out of focus, causing headaches and eyestrain. Be careful not to turn the diopter adjustment rings too far clockwise or "over-minus" the diopters. Strive to "plus-up" the diopters by turning the diopter adjustment ring counterclockwise.**

3. With the diopter ring in what appears to be the best position, check the left objective focus knob for proper focus. Infinity on the AN/PVS-5 is when the focus ring is at the counterclockwise stop. If focusing on a target closer than 100 to 200 feet, move the objective lens clockwise from the stop to achieve a sharp focus.

4. Cup your left hand over the left tube, and repeat steps one through three with the right tube.

Note: **Since each eye has been focused individually (monocular), the tubes must now be focused for both eyes (binocular) viewing unobstructed through the tubes.**

5. Place the left objective focus knob slightly out of focus clockwise to the right. While viewing with the right eye, fine tune the right diopter adjustment ring. When a clear, sharp image is attained, place the left objective focus knob back to its original position.

6. Place the right objective focus knob slightly out of focus clockwise to the right. While viewing with the left eye, fine tune the left diopter adjustment ring. When a clear, sharp image is attained, place the right objective focus knob back to its original position.

ANVIS

Before beginning the focus procedure, adjust both objective focus rings counterclockwise to the left and

adjust the eyepiece focus rings counterclockwise to the left. The rings may also be preset to a known diopter setting by lining up the white dot on the side of each tube with the corresponding known diopter setting. It is not important which tube you begin the focus procedure with as long as you complete the following steps for both the right and left tube:

1. Cup your right hand over the right tube to block out all incoming light, being careful not to smudge the lens.

2. With your left hand, rotate the left eyepiece adjustment ring clockwise to the right from the maximum-positive (full counterclockwise) setting. When you have obtained the sharpest image, stop. If you have gone too far to the right and the image is out of focus, place the adjustment ring all the way to the left again and start over.

Note: **There is a tendency to place the eyepiece adjustment ring too far to the right into the negative diopter setting. For crewmembers under 30 years of age, the elastic eye lens will compensate for the maladjustment and cause the image to focus. However, after about 1 hour of NVG use, the user's eye muscles will grow tired and the image will become out of focus, causing headaches and eyestrain. Be careful not to turn the eyepiece focus rings too far clockwise or "over-minus" the diopters. Strive to "plus-up" the diopters.**

3. Adjust the left objective focus ring to obtain the sharpest image. The ANVIS is not stop-set to infinity as with the AN/PVS-5s.

4. With the eyepiece ring in what appears to be the best position, recheck the left objective focus ring for proper focus.

5. Cup your left hand over the left tube, and repeat steps one through four with the right tube.

Note: **Since each eye has been focused individually (monocular), the tubes must now be focused for both eyes (binocular) viewing unobstructed through the tubes.**

6. Place the left objective focus ring slightly out of focus. While viewing with the right eye, fine tune the right eyepiece adjustment ring. When a clear, sharp image is attained, place the left objective focus ring back to its original position.

7. Place the right objective focus ring slightly out of focus. While viewing with the left eye, fine tune the left eyepiece adjustment ring. When a clear, sharp image is attained, place the right objective focus ring back to its original position.

All NVG academics at the United States Army Aviation Center (USAAVNC) have been changed to reflect the new standardized NVG focusing procedure. This new procedure will be included in the upcoming revision of the AN/PVS-5 and ANVIS operators manuals, which are scheduled for fielding in December 1991. The revision of TC 1-204: Night Flight Techniques and Procedures will also include the new NVG focusing procedure. In addition, a new exportable NVG training package including the new NVG focusing procedure will be fielded in November 1991.

USAAVNC points of contact (POCs) for the NVG focusing procedure are MW4 Brooks or CW4 Arnold, DSN 558-5858/5812, commercial 205-255-5858/5812. USAARL POC is MAJ Kodulak, DSN 558-6812, commercial 205-255-6812. ❑

Class A Accidents through 30 September

	Month	Class A Accidents		Army Military Fatalities	
		FY90	FY91	FY90	FY91
1st Qtr	October	4	3	2	2
	November	2	4	1	3
	December	3	3	4	3
2nd Qtr	January	2	7	4	1
	February	3	14	11	13
	March	4	4	1	8
3rd Qtr	April	1	3	0	2
	May	1	4	0	3
	June	3	1	0	0
4th Qtr	July	2	2	8	0
	August	3	2	2	0
	September	3	3	0	2
	Total	31	50	33	37

U.S. ARMY SAFETY CENTER

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November 1991 Vol 20 No 1 REPORT OF ARMY AIRCRAFT ACCIDENTS

Dynamic rollover

A new look at an old problem

We usually think of dynamic rollover as something to be avoided during slope operations. FM 1-203: Fundamentals of Flight addresses dynamic rollover in the section on slope operations; aircrew training manuals include a note in the maneuver description that the aviator must understand dynamic rollover before conducting slope operations; and dash 10s include a slope-landing limit intended to minimize the chances of dynamic rollover.

Then why do we continue to average two Class A dynamic rollover accidents each year? The answer is that dynamic rollover accidents are happening on *flat* ground. The attention we've given to preventing dynamic rollover during slope operations has paid off; rollover during slope landings and takeoffs is now rare. In fact, during the past decade, 75 percent of dynamic rollover accidents have occurred on flat ground. If we understand dynamic rollover and take the same precautions when operating on flat ground as we do when operating on slopes, we should be able to all but eliminate these accidents.

Definition

Dynamic rollover is the occurrence of a rolling motion, while any part of the landing gear is acting as a pivot, that causes the aircraft to exceed a critical angle and roll over. Dynamic rollover is caused by the main rotor thrust. Untrimmed lateral main rotor thrust causes the roll rates that make the aircraft exceed its critical rollover angle. Other physical factors that contribute to dynamic rollover are center of gravity, tail rotor thrust, crosswinds, ground surface, slopes, and main rotor design.

Main rotor thrust

Main rotor thrust is laterally trimmed when it is acting more or less vertically. When hovering, a helicopter is laterally trimmed when ground movement is zero. If the helicopter has a pivot point in contact with the ground and the main rotor thrust is not laterally trimmed, the sideward component of that thrust will roll the helicopter around the pivot. The roll rate depends on the cyclic input from the trimmed position and on the amount and rate of collective input. If the roll rate is high, the aircraft can rapidly reach its critical rollover angle.

Pilots can do two important things to avoid dynamic rollover. First, ensure that the cyclic is positioned to keep main rotor thrust laterally trimmed when touching down or lifting off to a hover. Second, stay alert to changes in aircraft attitude.

When touching down, adjust the cyclic only as necessary to maintain lateral trim and ensure a vertical descent until the entire aircraft weight is on the landing gear. In most helicopters, once the collective is fully down, place the cyclic in the neutral or central position. In the AH-64 and UH-60, cyclic adjustment is coordinated with collective reduction.

When lifting off, first position the cyclic to ensure that main rotor thrust is vertical. As a guide, the main rotor tip path plane should be parallel to the horizon. As collective is increased and the helicopter becomes light on the gear, adjust the cyclic to compensate for winds, aircraft loading, and translating tendency. To ensure a vertical ascent, make further adjustments as each wheel or skid leaves the ground.

The pilot on the controls must always be alert to the cyclic's position and all control movements must be smooth and coordinated. Maintain lateral trim with the cyclic, and do not apply excess cyclic to pin a wheel or skid to the ground during landing or takeoff. When landing, fly the aircraft until the entire aircraft weight is on the gear. When taking off, start flying the aircraft before raising the collective. To avoid dynamic rollover, these landing and takeoff techniques must be used regardless of whether the aircraft is on flat or sloping ground.

Center of gravity

The critical rollover angle changes as the location of the center of gravity (CG) changes. Helicopters generally have different CGs and, therefore, different critical angles in different configurations. The CG and angle change as fuel and ammunition are used. Asymmetric loading will also change the critical angle and make the aircraft more likely to roll toward the heavier side.

Be conscious of the changes in CG that occur during the mission, and avoid asymmetric loading. When landing or taking off, think about the effect of the aircraft's CG *before* beginning the maneuver.

Tail rotor thrust

In single-main-rotor helicopters, tail rotor thrust can contribute to high roll rates. Because tail rotor thrust acts to the right, the tail rotor tends to roll the aircraft in that direction, especially when the right skid, wheel, or float is acting as a pivot.

In the past 10 years, 90 percent of dynamic rollover accidents have involved rollover to the right. Many of these accidents might have been avoided if the pilot on the controls had adjusted the cyclic to compensate for tail rotor thrust (translating tendency), especially while lifting off to a hover. Care must be taken when applying pedal inputs to ensure they are smooth. Adjust lateral trim with the cyclic whenever tail rotor thrust is changed by pedal inputs. When increasing the collective, apply left pedal. As thrust is increased, adjust the cyclic to the left to compensate for the increasing tail rotor thrust to the right.

Crosswinds

Crosswinds acting on the fuselage can help roll a helicopter over. Avoid lifting off or touching down with crosswinds. If there is a crosswind, make the proper cyclic adjustment into the wind to keep the aircraft laterally trimmed. Crosswinds also necessitate tail rotor pedal inputs to maintain directional control. Again, these tail rotor thrust changes must be trimmed by cyclic inputs as necessary.

Ground surface

Rough ground or obstructions that pin a wheel or skid to the ground can contribute to dynamic rollover. Several rollover accidents have been caused by hitting an obstruction with the landing gear or by attempting a takeoff with an obstruction next to the gear. Accidents have also occurred when the aircraft was allowed to slide laterally across the

ground. This can cause fuselage roll rates to develop, leading to dynamic rollover.

When operating close to the ground, watch for obstructions and carefully select a landing point. If you inadvertently land with the skid or wheel against an obstruction, it would be safer to shut the helicopter down and have it towed away or remove the obstruction than to attempt a takeoff. It shouldn't be necessary to mention the need for a proper preflight inspection. However, in the past 10 years, two aircraft rolled over when the pilots tried to take off with mooring chains still attached.

Slopes

When landing or taking off from a slope, a helicopter will roll over if the maneuver is continued after the cyclic control limits are reached. Once a limit is reached, correct lateral cyclic trim cannot be maintained. Observe caution when operating on any slope, and take particular care to avoid slopes greater than the aircraft's slope limitation.

Main rotor design

If you're an AH-64, UH-60, OH-58D, or CH-47 pilot, you already realize how sensitive these aircraft are to lateral cyclic inputs. These aircraft have good control authority; that is, they respond rapidly to cyclic inputs. Hence, they are quick to develop roll rates, but the cyclic is also very effective in stopping that roll rate once it is detected. Teetering-head helicopters—OH-58A/Cs, UH-1s, and AH-1s—are slow to develop a roll rate, but the control authority is so poor that cyclic inputs alone are unlikely to prevent a rollover once a roll rate has developed. This characteristic is reflected in the accident data for the past decade. More than 80 percent of dynamic rollover accidents have involved teetering-head helicopters, and this percentage does not appear to be changing as the other main rotor designs become more common.

While the aviator has no control over the design of the aircraft's rotor, he does need to be aware of its characteristics. In a teetering-head helicopter, collective reduction is most effective at stopping a high roll rate. In other helicopters, cyclic input also has a rapid effect. Regardless of the design, actions needed to correct a roll rate are the same and should be instinctive: simultaneously reduce the collective, and adjust the cyclic to maintain lateral trim.

Other factors

Physical factors—main rotor thrust, center of gravity, tail rotor thrust, crosswinds, ground surface, slopes, and main rotor design—cause dynamic rollover. However, it is important to understand that the pilot can prevent dynamic rollover by avoiding the physical factors that cause it. Unfortunately, the pilot usually fails to avoid these physical factors because of human factors.

- *Inattention.* If the pilot on the controls is inattentive to the aircraft's position over the ground or its attitude while lifting off or touching down, he risks dynamic rollover. Use extra care when operating close to the ground.
- *Inexperience.* A large proportion of dynamic rollover accidents has occurred with inexperienced student pilots and aerial observers and low-time copilots on the controls. If you are the pilot-in-command, you are *always* responsible for your aircraft. Guard the controls, and monitor the pilot on the controls.
- *Failure to take timely action.* The time to take action is *before* a roll rate develops. Remember that by the time you notice that a roll rate has developed, a rollover may be inevitable, especially in a teetering-head helicopter. When you detect a roll rate developing, simultaneously reduce the collective and adjust the cyclic to maintain lateral trim.
- *Inappropriate control inputs.* Applying inappropriate control inputs is the root cause of almost all dynamic rollovers. If the pilot pays adequate attention to applying control inputs smoothly and carefully, dynamic rollover accidents are avoidable.
- *Loss of visual reference.* If you lose visual reference while operating close to the ground, take off or execute a go-around, using instrument techniques if necessary. A less desirable option is to continue forward to the ground. If the aircraft contacts the ground while drifting sideward, rollover can occur.

Dynamic rollover is avoidable

Dynamic rollover can be avoided by paying attention to the factors, both physical and human, that contribute to it. Trim the aircraft with the cyclic during landing and takeoff, and remain alert to the aircraft's attitude. Above all, *fly the aircraft*: when landing, until the entire aircraft weight is on the landing gear; when taking off, before any collective is applied. And remain alert to the cyclic position and maintain lateral aircraft trim with the cyclic at all times, regardless of whether the aircraft is on flat or sloping ground. ❑

POC: MAJ Trevor Jones, Flight Standards Division, Directorate of Evaluation and Standardization, U.S. Army Aviation Center, DSN 558-2531, commercial 205-255-2531.

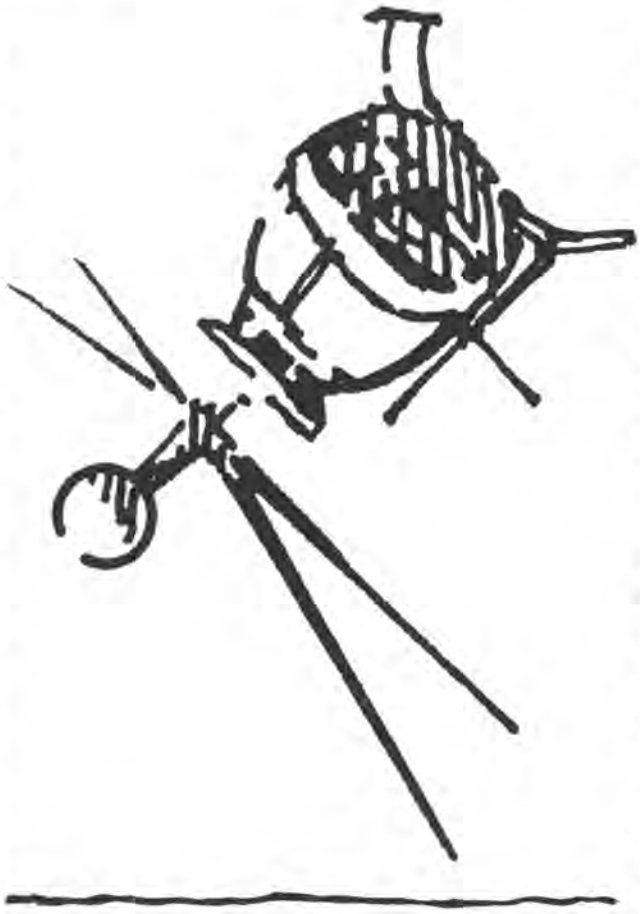
The high cost of unprofessional behavior

After spending 3 weeks at the National Training Center (NTC), the unit was excited about going home. The training had been both demanding and successful, and unit morale was high. The redeployment had been planned so that the unit would arrive at home station the day before Thanksgiving, affording the pilots and crews a leisurely day with family and friends.

Returning home

The flight of five helicopters, three UH-1Hs and 2 OH-58Ds, departed the NTC on the first leg of their return flight. The flight was uneventful, and the crews spent a relaxed evening at their en route stop. On the second day, the flight encountered adverse winds and elected to remain overnight at an en route refuel location.

The third day's flight had gone without a hitch when suddenly at 800 feet above ground level and with approximately 97 percent power applied, Chalk 4, an OH-58D, entered a nose-low, hard-right turn that eventually caused the aircraft to roll inverted. As the aircraft rolled out of the turn, it struck 50-foot trees and continued to the ground. The aircraft hit the ground nose low, rolled, and came to rest inverted.



The aerial observer attempted to crawl from the wreckage; however, he required assistance from a civilian who had reached the crash site within moments. The civilian also pulled the unconscious pilot-in-command (PC) from the wreckage before a postcrash fire engulfed the cockpit space and fuselage. Seconds later, a secondary explosion increased the magnitude of the fire. Impact forces and the postcrash fire destroyed the aircraft.

Searching for the problem

During the investigation, the PC, who was on the controls at the time of the accident, stated that they were climbing slightly and accelerating to catch up with Chalk 3, when he felt several bumps in the cyclic followed by an uncommanded right cyclic hardover. The PC indicated that he used all the strength he had in an effort to pull the cyclic back to the center position but was never able to move it. The aerial observer, who was sitting in the copilot's position, confirmed the PC's statement.

As a result of the crew's statements, the Army Safety Center, Aviation Systems Command engineers, and manufacturer engineers began an intensive inspection of the aircraft, looking for a problem that could have caused this accident. Pieces of the flight controls that survived the postcrash fire were analyzed on site and then sent to Corpus Christi Army Depot for further analysis. No problems with the flight controls could be found that were not impact related.

The investigation shifted to the aircraft manufacturer's location where another OH-58D was rigged to duplicate the loads placed on the accident aircraft's rotor system at the time of the in-flight emergency. After weeks of testing, the right cyclic hardover encountered by the PC was duplicated by inserting a foreign object into the cyclic servo. At this point, it appeared that some kind of foreign object had fallen into the cyclic servo during flight and caused the accident.

Learning what really happened

Prevention options were already being considered when the whole picture unexpectedly changed. Investigators received a call from the aerial observer,

indicating that he had additional information concerning the accident. This time, his story of the in-flight emergency was significantly different. He indicated that the PC intentionally attempted to loop the aircraft and was unable to recover in sufficient time to avoid the trees.

When earlier witnesses were reinterviewed, they confirmed that they were aware, or at least had reason to suspect, that this accident was not caused by a mechanical malfunction. While at the NTC, the unit standardization instructor pilot and platoon leader had counseled the accident pilot for performing an excessively steep turn close to the ground. And just 2 days before the accident, the pilot had been seen making extremely steep turns and performing cyclic climbs with negative-G dives.

Unrestrained, the pilot continued to violate flight procedures until he destroyed an aircraft and caused a fellow crewmember to be seriously injured. He also suffered minor injuries. Other members of the unit knew of this pilot's frequent violations of flight procedures. They had seen him perform other unauthorized maneuvers, and they suspected he had induced the maneuver that resulted in the accident; but they did nothing to alert the chain of command.

Because this aircrew did not tell the truth about what happened, an enormous amount of time and more than $317,000 were wasted in an effort to identify an aircraft problem that did not exist. Combined with the cost of the destroyed aircraft, this lack of professionalism cost the Army more than $4 million. ❑

POC: MAJ Lenear Royer, Aviation Branch, DSN 558-3746/4631, commercial 205-255-3746/4631

ALSE advisory message

Until recently, aviation survival kits contained a controlled substance—diphenoxylate and tropine sulfate tablets (trade name Lomotil, NSN 6505-00-118-1914). According to aviation life support equipment (ALSE) advisory message 91-4, 301030Z Sep 91, the kits now contain loperamin hydrochloride tablets (trade name Imodium, NSN 6505-01-238-5632)—a noncontrolled substance. As a result of this replacement, the survival kits have become noncontrolled.

Survival kits assembled after the following dates contain the noncontrolled sustance Imodium. Therefore, controlled storage will not be required.

Effective date	Survival kit
8 August 1991	Tropical or tactical, NSN 6545-00-782-6412 (hard plastic case)
5 September 1991	Tropical or tactical, NSN 6545-01-120-2632 (zip-lock bag)
2 October 1991	Individual medical packet for OV-1 vest and general medical packet, NSN 6545-00-231-9421

Questions or requests for clarification should be addressed to Nancy Crampton, U.S. Army Medical Materiel Agency, DSN 343-2045. ❑

—Mr. James Angelos, Product Manager, Aviation Life Support Equipment, Aviation Systems Command

Attention Black Hawk crews

The UH-60 with its dual engines brought a safety margin to utility helicopter operations that wasn't possible with single-engine aircraft. However, as mission demands expand and new equipment is added, Black Hawks frequently operate at higher gross weights than in the past.

UH-60 crews should be aware that operating in the height-velocity-avoid regions can be hazardous to them, too, if one engine becomes inoperative. The avoid regions vary based on gross weight and atmospheric conditions encountered.

Pilots should review the information in the operators manual on the height-velocity-avoid regions for single-engine failure and avoid flying in these danger zones as much as possible. ❑

POC: Mr. Michael Lupo or Mr. Dennis Menckowski, Utility Helicopters Project Manager's Office, Aviation Systems Command, DSN 693-3210, commercial 314-263-3210.

VFR to IFR flight

In the past, en route transition from VFR to IFR was a relatively simple task. When the weather was less than VFR at the minimum IFR altitude (MIA) or minimum vectoring altitude (MVA), it was up to the PC to determine whether terrain and obstacle clearance could be maintained. If it was necessary to transition to IFR, after meeting all other regulatory requirements and receiving air traffic control (ATC) clearance, the PC would begin climbing to the cleared altitude. In many cases, the climb was performed in instrument meteorological conditions (IMC) up to the cleared altitude.

A major change to the Airman's Information Manual (AIM), paragraph 4-88, VFR and IFR Flight, dated 14 November 1991, significantly impacts en route VFR and IFR flight operations. The change requires that to receive an IFR clearance an aircraft must be able to climb in VFR conditions to the MIA or MVA. The PC is also responsible for terrain and obstacle clearance until reaching the MIA or MVA. Any aircraft that cannot climb in VFR conditions to the assigned altitude for IFR clearance or accept responsibility for terrain and obstacle clearance should remain VFR or declare an emergency.

Initially, this change to the AIM caused confusion within the aviation community. The most often stated interpretation was that the AIM is nonregulatory in nature and compliance is voluntary. Additionally, some aviators reasoned that they could accept responsibility for the terrain and obstacle clearance and, therefore, climb in IMC conditions to the MIA or MVA.

The Directorate of Evaluation and Standardization (DES) coordinated with the U.S. Army Aeronautical Service Agency to formulate a Department of the Army (DA) position regarding the VFR-to-IFR issue. The Federal Aviation Administration (FAA) intentionally instituted this method of operation to enhance safety and reduce liability on the ATC system. Air traffic control operating principles contained in the AIM are, for the most part, not regulatory; however, most of these principles are companion procedures to the FAA Air Traffic Control Handbook and normally carry the weight of regulations in hearings, evaluations, and courts. The DA position is to adhere to the procedure as it is written in the AIM. The purpose is to place the responsibility of managing terrain and obstacle clearance and maintaining VFR with the aircraft PC.

If additional information is required, DES POC is CW4 Americo, ATTN: ATZQ-RWSP-IE, Fort Rucker, Alabama 36362, AV 558-2442/6309, commercial 205-255-2442/6309. ❑

STACOM 149 **November 1991**

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

Don Cumbie

Donovan R. Cumbie
Colonel, Aviation
Director, DES

Did you know that ...

Many safety issues addressed in *Countermeasure*, the Army Safety Center's report of ground accidents, also pertain to aviation unit ground operations. Sometimes we tend to think of certain issues as ground or aviation, forgetting that some safety problems apply to both. So pick up *Countermeasure* and read it—we think you'll find it useful.

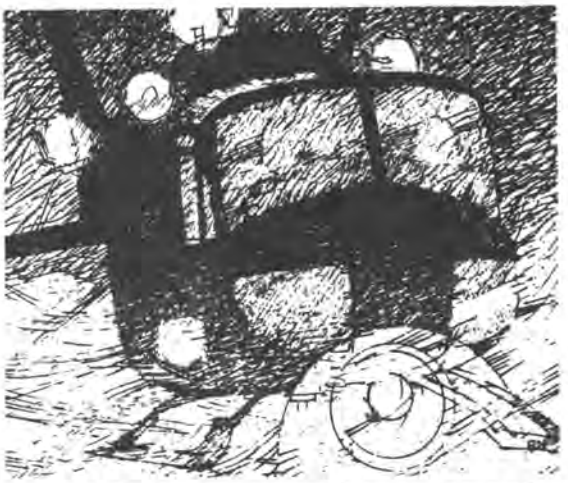
If your unit doesn't receive *Countermeasure* and would like to be placed on the distribution list, write to: Commander, U.S. Army Safety Center, ATTN: CSSC-M, Fort Rucker, AL 36362-5363 or call Sharrel Forehand, Media Management and Production, AV 558-2062/4806, commercial 205-255-2062/4806.

Broken Wing awards

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

■ **CPT Stacy W. Jobe, 151st Military Intelligence Battalion (Aerial Exploitation), Georgia Army National Guard, Dobbins Air Force Base.** After about 20 minutes of flight during the night OV-1D side-looking airborne radar (SLAR) mission, avionics problems forced the crew to cancel the mission and return to base. During the approach to landing over flat terrain with snow and ice, CPT Jobe, the PC, discovered that the landing gear would not lower. The maintenance officer and unit standardization instructor pilot radioed suggestions for troubleshooting the system. Efforts to "blow down" the gear with the emergency pneumatic system were unsuccessful, as were some positive-G maneuvers. CPT Jobe continued to fly in the area for the next 2 hours to burn off fuel. When all prescribed emergency procedures for lowering the landing gear had been tried without success, CPT Jobe completed a gear-up landing on the snow-covered runway with only minimum damage to the SLAR boom, radio antennas, lower anticollision light, and nose gear doors.

■ **WO1 Lance Carlyle Modrell, Company A, 1st Battalion, 227th Aviation Regiment, 1st Cavalry Division, Fort Hood.** While the OH-58C was at an OGE hover above a narrow ridgeline, WO1 Modrell felt a severe vibration throughout the airframe as the retaining bolts sheared and the tail rotor gearbox separated from the drive shaft. He immediately applied forward cyclic to gain airspeed and began maneuvering the aircraft at 60 knots toward a dirt road. During the descent, WO1 Modrell's feet were thrown from the pedals as they jerked violently fore and aft. Upon nearing the road, WO1 Modrell realized it was a rough, uphill grade unsuitable for a running landing. However, he quickly spotted a small suitable landing area near the road and diverted to it. About 25 feet above the intended landing area, the aircraft began an uncommanded right spin. WO1 Modrell entered autorotation, maintained control through two 360-degree turns, and landed the aircraft upright in



an area only slightly larger than the aircraft and bordered by a 3-foot-deep wadi on the left and rough, rising terrain to the rear.

■ **DAC Robert F. Sidonio, Company B, 1st Battalion, 212th Aviation, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker.** During a night training flight, the UH-1H was inbound at 700 feet agl and 90 knots when it yawed left, N2 and rotor rpm began decreasing rapidly, the low rotor rpm audio sounded, and the rpm warning light came on. As the student pilot on the controls began lowering the collective, DAC Sidonio took the controls and established an autorotation, turning 90 degrees left toward a known open field. DAC Sidonio turned on the searchlight, placed the governor switch to the emergency position, and transmitted a mayday call, giving the aircraft's exact location. When the engine failed to respond with the governor in the emergency mode and the throttle full open, DAC Sidonio continued maneuvering toward the field. At 200 feet agl, he saw the field and made a 30-degree right turn to line up with the long axis. At 100 feet agl, DAC Sidonio began to decelerate and noted that the field was freshly plowed, with a significant left-to-right downward slope. Realizing he would have to execute a zero-ground-run landing to prevent damage to the aircraft, DAC Sidonio zeroed his airspeed and landed vertically from 5 feet. Although the aircraft browned out when he applied collective pitch to cushion the landing, DAC Sidonio was still able to land without incident. After touchdown, he applied full left cyclic to prevent the aircraft from sliding downslope, notified a nearby aircraft that they were down and safe, and completed emergency shutdown procedures. ❑

Accident briefs

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - During NVG troop insertion, lead aircraft made sharp left turn into LZ. Chalk 2 pilot failed to anticipate lead's turn and flew aircraft under lead aircraft. Rotorwash caused Chalk 2 to begin settling. Pilot pulled torque to stop rapid descent. Crew landed aircraft without further incident and flew another mission. After returning from second mission, pilots realized they had possibly overtorqued aircraft during first mission while recovering from settling.

H series - About 70 feet agl during first solo flight, student pilot was attempting maximum performance takeoff when low rotor rpm audio sounded and light came on. Aircraft landed hard, bounced once, and came to rest upright. No injuries.

UH-1 Class E

H series - During preflight and before-start check, pilot failed to notice that main rotor tiedown had not been removed. Pilot pressed engine starter and saw tiedown revolve with main rotor. During shutdown, main rotor tiedown was yanked from tip cap. Postflight inspection revealed that FM NR1 antenna had been severed at base and tiedown was coiled around tail rotor.

UH-60 Class C

A series - During low-level flight, crew was about 100 to 200 feet agl when they saw wires to their immediate front. Crew pulled power and decelerated, attempting to clear wires. Wires hit bottom fuselage behind front struts and continued back along tail boom, striking tail strut. Aircraft cleared wires, and crew flew aircraft to destination and landed without further incident.

UH-60 Class D

A series - Aircraft was on short final to confined area when bird flew into rotor system, damaging one tip cap.

A series - While conducting air assault to unimproved LZ, aircraft was Chalk 3 in flight of 5. During landing, blowing dust obscured pilot's vision. Right main landing gear rolled into a depression, and fuselage hit a rock, causing dent in fuselage.

Attack

AH-1 Class B

F series - During OGE hover, aircraft began uncommanded right turn with full left pedal applied. PC decreased power and tried to turn right. Aircraft spun twice, descended into trees, and crashed. No fatalities. 9158

AH-1 Class C

F series - While at stationary hover below ridgeline, wind gust hit aircraft, requiring pilot to make aft cyclic inputs to remain in stationary hover. Crew felt slight vibration in airframe. Crew flew aircraft back to rearming area with no adverse aircraft control problem. Inspection revealed damage to both rotor blades and possibly to tail rotor drive train components.

F series - During engine start, battery voltage was low. Tgt exceeded 1,000°C for about 7 seconds before crew began abort-start procedures. Investigation continues.

AH-1 Class D

F series - Crew noted no abnormal indications during flight. Postflight inspection revealed hole in drive shaft cover where 42-degree gearbox filler cap exited. Crew had failed to replace 42-degree gearbox filler cap during maintenance, service, or preflight.

F series - Pilot was flying aircraft from gunner's station while en route to rearm after range firing. At 80 to 90 knots and 20 feet AHO, pilot entered right turn and allowed main rotor blades to strike tree.

F series - During night mission, crew landed for refueling. After aircraft was serviced, PC and pilot performed inadequate walkaround inspection, leaving right engine cowling unsecured. At 70 knots and 200 feet agl during takeoff, crew heard loud noise. PC returned aircraft to refueling point and made uneventful landing. Inspection revealed right engine cowling missing and damage to tail boom, engine housing upper support strut, and door and mounting bracket.

F series - During APART standardization and annual NVG evaluation, crew was approaching end of surveyed NOE route and searching for marked wires when student pilot in front seat saw wires. Pilot on controls pulled aft cyclic and applied collective. Top guy wire contacted toe of right skid, flexing it upward until front right crosstube hit side of aircraft. Wire slid along bottom of skid without causing further damage. Wires will be resurveyed to verify grid.

S series - Following NOE multiship tactical training mission, postflight inspection revealed damage to both main rotor blades. Suspect crew was hovering too close to trees and allowed aircraft to drift into trees.

AH-1 Class E

E series - Following NOE flight while participating in battle drill, PC found dents in both main rotor blade erosion guards. Suspect crew performed inadequate cross-check of obstacles around aircraft and allowed aircraft to strike tree.

F series - During hot refueling operation, refueler applied too much vertical pressure on nozzle and popped rivets along top portion of closed circuit refueling receptacle retaining ring.

F series - POL handler incorrectly attempted to remove closed circuit refueling nozzle from fuel port and bent outer locking ring.

F series - At 300 feet agl and 110 knots during descending left turn, PC heard single loud bang from engine area, followed by 10-degree left yaw and drop in N2 and rotor rpm. Suspect-

ing compressor stall, PC initiated approach with forward airspeed to open field and made uneventful landing. Inspection revealed engine intake area and compressor blades were covered with grime.

F series - During night-unaided mission, crew felt slight vibration in pedals. During return flight, vibration became worse. On short final, vibration ceased momentarily and then resumed. Crew noted no fluctuations in engine oil temperature and pressure gauges. Crew made uneventful landing. Postflight inspection revealed damage to oil cooler fan and shroud.

S series - During NOE flight, PC on controls in rear seat was watching OH-58 about 7 to 10 rotor discs in front. Pilot in front seat was looking at map. Crew failed to use proper scanning and aircrew coordination techniques, misjudged clearance, and allowed aircraft to strike a cactus. During postflight inspection, maintenance found no aircraft damage.

AH-64 Class C

A series - While descending and decelerating to hover in battle position for JAAT live-fire training, pilot allowed left missile launcher to strike treetop, damaging left side of fuselage. Investigation continues.

AH-64 Class E

A series - Following aborted landing attempt, crew made second attempt and encountered brownout. Tail wheel struck ground, aircraft moved forward about 40 feet, and tail wheel dropped into 2-foot-deep ditch, damaging stabilator, tail wheel strut, and tail wheel lock proximity switch and bracket. Tail wheel came out of ditch, and aircraft traveled forward another 40 feet before stopping.

Cargo

CH-47 Class C

D series - Flight engineer guided forklift driver as he positioned and lowered pallet on aircraft ramp. As driver lowered pallet, he tilted upper portion of forklift onto back of aircraft, damaging lower aft pylon area below APU exhaust.

CH-47 Class E

D series - While aircraft was at ground idle waiting for passengers, crew chief saw transmission fluid leaking from forward main transmission. Crew performed shutdown. Forward transmission temperature bulb housing in forward transmission sump failed, allowing transmission fluid to leak out.

D series - During cruise flight at 8,500 feet msl, passengers complained of being cold. As crew chief attempted to close upper half of main cabin entrance door, emergency escape panel blew out of door frame. Crew found no additional damage during postflight inspection. Suspect rubber seal mounting strip that holds release assembly failed.

Observation

OH-6 Class A

A series - About 225 feet agl during NVG qualification training flight, aircraft struck guy wire on unlit 306-foot radio transmission tower, severing blue main rotor blade. Tail rotor assembly separated from aircraft. Aircraft hit ground in 40-degree nose-down, left-roll attitude, coming to rest on its left side. Two fatalities. 9159

OH-58 Class C

C series - During cruise flight at 100 knots, aircraft yawed left. Crew heard loud bang, followed by low rotor audio and light. Pilot entered autorotation, and aircraft landed hard. Investigation in progress.

D series - As lead mechanic ran up aircraft on parking pad following phase maintenance, engine surged and aircraft spun about three times. Vertical fin hit auxiliary ground power unit, and both tail rotor blades struck tail boom. Maintenance crew was uninjured. Investigation in progress.

D series - While preparing for maintenance test flight, crew noted previous transmission overtorques on caution-warning history page. Crew cancelled flight. Overtorque damage requires replacement of transmission, tail rotor gearbox, and drive shafts.

OH-58 Class D

A series - Crew used right aft seatbelt to secure survival kit in seat. Suspect survival kit shifted from seat to floor with strap catching seatbelt latch and disconnecting seatbelt. During flight, right aft seatbelt came out of door and beat against fuselage below fuel port area, tearing honeycomb panel.

A series - During confined area approaches, crew failed to maintain clearance and allowed aircraft to contact vegetation, damaging lower vertical fin.

D series - During low-level recon mission, pilot's armor side panel opened and detached from aircraft. Suspect possible defective armor side panel latch pin. MWO for latch pin shim buildup had not been applied to aircraft.

OH-58 Class E

A series - After about 3 minutes of ground run at engine idle, engine started to wind down. Engine-out light came on, and engine rpm continued to decrease until engine quit. Suspect pilot inadvertently hit detent and vibration caused throttle to roll off.

A series - While preparing for second flight of the day, pilot attempted to start aircraft with main rotor blades tied down. N1 reached about 40 percent before pilot realized blades were not turning. Preliminary inspection revealed no damage. Release of aircraft for flight is pending inspection of free-wheeling unit.

C series - During confined area approach, pilot noted N2 gauge was below normal operating limits. When engine rpm dropped to 86 percent and rotor rpm dropped to 95 percent, pilot made uneventful landing. Inspection revealed throttle safety was catching on a wire, preventing it from being rolled fully on.

C series - During night-aided, low-level recon mission, crew was flying through gap between two hills in area known to have wire hazards. At 250 feet agl, crew failed to see wire hazard before wires contacted WSPS and broke off free-air temperature gauge.

C series - During OGE hover near hill mass, pilot failed to anticipate effects of wind and sudden downdraft caused aircraft to settle rapidly. Pilot applied 112-percent torque to arrest descent and overtorqued aircraft.

C series - While at OGE hover, pilot and AO were observing OPFOR vehicles, aircraft drifted left, and main rotor blade hit pine tree. Pilot landed aircraft and completed normal shutdown. Maintenance found no damage.

Fixed wing

C-12 Class D

C series - Aircraft was taxiing behind "Follow Me" truck. Second approaching "Follow Me" truck pulled off taxiway, yielding to aircraft. As aircraft approached, vehicle driver attempted to move vehicle farther off taxiway. Vehicle's front wheels were turned left, and driver failed to anticipate initial movement would be toward moving aircraft. Pilot also misjudged clearance, and before he could stop aircraft, wingtip passed over vehicle roof, striking "Follow Me" sign bracket.

C-12 Class E

C series - During M24 chemical mask orientation flight training, each pilot performed normal landing and takeoff, single-engine flight after takeoff, and single-engine landing in both masked and unmasked conditions. During postflight inspection, crew found right outboard main landing gear tire had blown. Suspect that crew used excessive or premature braking during single-engine landing.

C series - While passing through flight level 160, cabin depressurized. Crew made uneventful landing. Inspection revealed door seal had slipped out of its track.

H series - During missed-approach climbout, crew saw smoke and oil coming from right engine. Crew secured right engine and made single-engine landing without further incident. No. 2 engine torque limiter had failed internally.

OV-1 Class C

D series - During cruise flight, hydraulics packing failed, causing loss of hydraulic fluid. While performing no-hydraulics landing, pilot pulled emergency stores jettison handle instead of emergency landing gear release handle. External fuel tanks were jettisoned and ruptured on impact, spilling about 100 gallons of JP-4. Crew landed aircraft without further incident.

OV-1 Class E

D series - During aircraft ground operations, crew failed to secure side hatch and VFR sectional blew out of aircraft and into No. 1 engine inlet. MOC indicated no damage to aircraft.

T-42 Class C

A series - During landing, aircraft experienced slight side load, nose came down, and aircraft porpoised. Pilot had controls in slight aft position and throttle at idle when prop blade hit runway. Pilot taxied aircraft to ramp and completed normal shutdown. Engine must be replaced.

U-21 Class E

A series - During preflight inspection, pilot found centering spring on right side of rudder broken. Inspection of spring eyebolts on bellcrank revealed they were twisted, causing one spring to bend and ultimately fail. Maintenance replaced springs and aligned eyebolts.

Maintenance

AH-64 Class E

A series - After crew started engines and turned on aircraft navigation lights, navigation light circuit breaker popped. Crew reset circuit breaker twice and then aborted mission. Inspection revealed electrician had reversed wires to taillight, causing electrical short in navigation light system.

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

Followups

Information on accidents previously reported

AH-64 Class A

Reported in 6 June 1990 issue as 9026 - Lead and Chalk 2 aircraft departed heliport and flew to forward assembly area where they joined two other AH-64s. After conducting several simulated attacks, lead and aircraft 3 and 4 landed. Chalk 2 remained airborne to maintain contact with the TOC, get the mission, and relay radio calls because there had been some minor trouble with radio reception on the ground. Chalk 2 continued its counterclockwise orbit as lead aircraft took off, followed by aircraft 3 and 4. At 40 knots and 75 feet agl, Chalk 2 was at 3 o'clock position to flight and was moving into a right-echelon position with lead aircraft below and climbing. A report of moving enemy vehicles diverted Chalk 2 pilot's attention, resulting in loss of contact with lead aircraft. Lead aircraft crew did not see Chalk 2 approaching formation because they, too, had diverted their attention to moving enemy vehicles and because Chalk 2 was approaching from right rear and above. Copilot of lead aircraft saw Chalk 2 and ordered lead aircraft pilot to turn left; copilot of Chalk 2 also realized they were on a collision course and told Chalk 2 pilot to break right. However, as lead aircraft rolled left, its main rotors hit left side of Chalk 2. The rear fuel cell of Chalk 2 ruptured and fuel ignited, engulfing both aircraft in flames as they fell to ground. Pilot of lead aircraft sustained major injuries and burns; other crewmembers received minor injuries and burns. Both aircraft were consumed in the fire.

AH-64 Class B

Reported in 25 April 1990 issue as 9020 - Numerous electrical problems involving activation of low rotor rpm audio and light resulted in rotor rpm sensor being replaced. An MOC was performed with no problems being noted. As a precaution, a test flight was performed to check rpm warning system, autorotational rpm, and other aircraft systems. Having completed several uneventful maintenance checks, MP initiated the final maneuver—an autorotational rpm check. MP stabilized aircraft and

retarded No. 1 engine power control lever to flight idle. When pilot verified No. 1 engine rpm had stabilized at 68.1 percent, MP then reduced collective and retarded No. 2 engine power control lever to begin autorotation. As No. 2 power control lever was retarded, low rotor rpm audio warning sounded along with the KY-58 audio, and master caution and low rotor rpm lights came on. Both pilots looked outside the cockpit and noted that the rotor blades were traveling at an extremely low rpm. They were turning so slowly the individual blades could be seen. Aircraft then entered left descending turn, and both engine-out lights came on. Pilot made mayday calls while MP selected a forced landing area. At 150 to 200 feet agl, MP started deceleration, and at 50 feet agl, he applied initial pitch. Tail wheel touched down, 78 feet later main landing gear touched down, and following a ground run of 481 feet, aircraft came to rest upright on a heading of 214 degrees with no apparent damage. However, closer inspection revealed all four main rotor blades sustained irreparable upper surface compression damage because of excessive coning, and main rotor hub was damaged when striker plate ring and pitch housing of all four assemblies made hard contact with rotor hub. Suspect inexperienced MP— with only 8 hours of MP time and on his first maintenance test flight without assistance of another MP— failed to position collective full down, which resulted in bleed-off of rotor rpm and damage to main rotor blades and hub. Most likely, MP performed an engine-powered roll-on landing rather than an autorotative landing.

Class A Accidents through 31 October

	Month	Class A Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4		3	
	December	3		3	
2nd Qtr	January	7		1	
	February	13		13	
	March	4		8	
3rd Qtr	April	3		2	
	May	4		3	
	June	1		0	
4th Qtr	July	2		0	
	August	2		0	
	September	3		2	
	Total	49	1	37	0

CH-47 Class B

Reported in 25 April 1990 issue as 9021 - As aircraft was four-wheel taxiing into parking, ground guide directed crew into a parking position that was extremely close to a utility pole. As pilot initiated left turn into parking, crewmembers better positioned to see areas and obstacles not visible from the cockpit offered no aircraft clearance information until it was too late for pilots to react. Aft rotor blades hit utility pole, damaging aft rotor blades and head and causing visible structural damage to aft pylon and aft transmission area. Additionally, due to sudden stop, suspect damage occurred to aft vertical shaft and transmission, synchronizing shaft, and forward transmission. Crew sustained no injuries.

CH-47 Class B

Reported in 6 June 1990 issue as 9027 - Following several maintenance delays, aircraft departed at 1830 on its training mission. Upon arriving at airfield to conduct VFR readiness level 3 progression training, pilot completed a VMC approach using the searchlight. Two instrument takeoffs followed, one ending in a roll-on landing and the other in a VMC approach. Although it was now almost an hour after sunset and the moon had not yet begun to rise, IP continued night-unaided training. After third instrument takeoff, IP instructed pilot to climb to a downwind altitude of 1,000 feet msl and 190 degrees. To give the pilot a longer distance for tracking the inbound course, IP instructed pilot to extend downwind leg at base. This, in effect, took the aircraft out of the normal traffic pattern and into another training area where the IP was unfamiliar with terrain. After extending the downwind, IP instructed pilot to turn onto base leg, descend to 800 feet msl, and reduce airspeed to 70 knots. Once on this established heading and course, IP then told pilot to track inbound on a 010-degree course and descend to 400 feet msl—100 feet msl below published base altitude of 500 feet msl. Pilot initiated a 200- to 300-foot-per-minute rate of descent. About 500 feet msl, pilot began to retard rate of descent. Shortly thereafter, aircraft descended into trees. IP immediately took control of aircraft and applied power with a climb attitude. Aircraft hit trees, and pilot removed his hood, made mayday calls, and assisted IP on controls. Although front windows were partially obscured by debris and hydraulic fluid was spraying into cockpit, IP maintained sight of airfield and slowly flew damaged aircraft about 2 nautical miles to runway. After confirming that landing gear had sustained no significant damage, IP landed aircraft and performed normal shutdown. Crew was uninjured, but aircraft had broken chin bubbles and extensive sheet

metal, antenna, electrical, and rotor blade damage.

OH-58 Class A

Reported in 11 April 1990 issue as 9016 - During NOE NVG mission providing aeroscout support to two AH-1s conducting mock target engagements, an OH-58 flew into high-voltage power lines about 80 feet agl. PC was on controls and watching distant moving vehicles in anticipation of beginning target handoff sequence with attack helicopters. Copilot thought PC knew location of wire obstacle to their front when, in fact, PC was unsure of exact location of wires. Crew failure to properly communicate location of known obstacles resulted in top-mounted blade of WSPS striking and cutting two upper nonpower support lines. Aircraft control was lost, and during subsequent spin, tail boom and tail rotor contacted one power line, causing tail boom to separate from airframe. Aircraft fell vertically in a right spin through small pine trees on side of steep slope and hit the ground nose low. Although there were no injuries, failure to maintain aircraft control and obstacle clearance and lack of crew coordination resulted in major damage to the aircraft.

OH-58 Class A

Reported in 25 April 1990 issue as 9022 - Before beginning terrain flight training period, crew chief removed and stowed all aircraft covers. He then removed chains used to moor aircraft while pilot completed pre-mission requirements. When removing chain from right front mooring point, crew chief inadvertently dropped chain on top of right skid towing ring where chain and attaching bolt became entangled. Pilot failed to notice entangled chain during preflight inspection of skids. As PC attempted to bring aircraft to a hover, he failed to check for proper control responses as aircraft left ground and began vertical ascent. The entangled right front tiedown chain caused aircraft to begin a nose-low right roll. Roll continued until both main rotor blades contacted parking ramp, tearing main transmission from its attaching points on the roof. As the transmission, with the main rotor blades still attached, departed the airframe, one of the blades struck the cabin area. Aircraft then rocked back on its skids, causing them to break and allowing aircraft to settle on its belly. As aircraft settled, vertical fin struck ground and broke, and both tail rotor blades broke as they hit parking pad. Aircraft fuselage remained upright during crash sequence and came to rest about 40 degrees right of intended hover heading. Crew sustained only one minor injury.

OH-58 Class A

Reported in 6 June 1990 issue as 9028 - Aircraft was at 60 knots and about 200 feet agl while conducting a range sweep checking for personnel and vehicles. Pilot was on controls when engine-out/low rotor rpm audio sounded and aircraft began descending. PC took controls, lowered collective, and entered autorotative descent as pilot made a mayday call. Although PC increased collective as aircraft approached ground, aircraft hit ground at a high rate of descent, rebounded into the air, turned right about 180 degrees, and came to rest upright on a heading of 085 degrees, causing extensive airframe and drive train damage. The engine-out-at-altitude emergency occurred when No. 8 engine bearing failed, causing first-stage turbine wheels to shift aft and contact forward face of the second-stage nozzle and second-stage turbine wheels to shift aft and contact face of power turbine support assembly. Turbine wheels, nozzles, and support assembly started to break up and send metal particles through the engine, causing N1 system to shut down due to binding and restricted air flow. Suspect No. 8 engine bearing failed due to its being installed in a misaligned position against inner mounting shaft. Incorrect screws had been used in rear attachments of seat panel assemblies, restricting seats from buckling the full amount. Restriction of seat buckling subsequently reduced seats' capability to attenuate vertical G loading. Consequently, both crewmembers sustained back injuries. In addition, aircraft was not equipped with an emergency locator transmitter; therefore, it was 1.8 hours before the crew received medical attention.

tion, or competition. Direct communication is authorized by AR 10-29. Address questions about content to AV 558-3746. Address distribution questions to AV 558-2062/4806.

R. Dennis Kerr
Brigadier General, USA
Commanding General
U.S. Army Safety Center

Correction

A UH-60 Class E accident brief in the September 1991 issue of *Flightfax* states that the auxiliary power unit (APU) should not be started in flight when the master caution and No. 1 generator lights come on and cannot be reset. This is incorrect. In accordance with TM 55-1520-237-10, paragraph 9-45, the APU should be started if the caution lights remain on. ❑

POC: MAJ Lenear Royer, Aviation Branch, DSN 558-3746/4631, commercial 205-255-3746/4631

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Flightfax

August 1992 Vol 20 No 10

REPORT OF ARMY AI

Urgency! A POWERFUL ENEMY

As missions become more demanding and resources to accomplish them become fewer, the potential increases for units and crews to perceive more missions as urgent. Sometimes it's only the fine line of perception that separates a routine from an urgent mission. And individual perceptions differ. But regardless of whether it's real or perceived, urgency is a risk to safe operations.

The two accident reviews in this issue reveal how a perceived sense of urgency led to three fatalities in the first accident and the Army's first C-12 Class A accident. Read them, think about how a sense of urgency influenced the decisions the crews made, and review the risk-management skills the crews could have used to help them make more logical decisions.

And then never forget that urgency, even if it's real, can be a powerful enemy.

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Perceived or real...urgency can kill

The medical company was formed on 1 October 1990 by combining three detachments from one state with one detachment from another state. On 23 November, the company received notice that they were to be activated for a duty assignment in the Middle East. On 29 November, unit personnel were ordered to report to their mobilization station on 2 December.

Following an emotional farewell, members of one of the detachments departed for their mobilization station with six aircraft. However, because of weather, they were forced to return their aircraft to home station and report to their mobilization station without the aircraft. Another six aircraft from a second detachment departed their home station only to get weathered in en route. Personnel from this detachment were forced to leave their aircraft at an en route station and also report without their aircraft.

These crews were safety-oriented and made good decisions. They knew it would be unsafe to push on in adverse weather. However, this was not to be the last time that weather would hamper this unit during its mobilization.

Mobilization

During the next 2 weeks, the entire unit processed for mobilization while checkrides were given and crew mix for the deployment to port was established. A couple of days after reporting to the mobilization station, crews were sent to recover the aircraft left at the en route station. They were to relocate all aircraft to another station where a modification work order (MWO) installing erosion tape to the leading edges of main and tail rotor blades was to be completed by a contractor. Port dates and locations as well as the completion date for the MWO installation changed several times during this short period. A requirement received from FORSCOM was for all 12 aircraft to be on the docks at the port at 0800 on 16 December. Based upon the projected 13 December completion of the MWO, the unit elected to deploy to port in one day—14 December.

Crew assignments were made on 12 December. The next afternoon, all flight crews boarded a bus for the trip to the flight facility where the MWO was being performed. As projected, test flights following the MWO were completed on 13 December, and the crews preflighted all 12 aircraft late on the same day. The crews completed route planning and conducted air mission briefs that night. Crewmembers stayed at a local hotel or commuted home if they lived nearby, with orders to report to the flight facility at 0600 hours on 14 December for an 0700 departure.

Deployment

The 12 aircraft were divided into three flights of four aircraft each. The planned 0700 takeoff on 14 December was delayed for over an hour because of en route weather. The lead flight finally departed at about 0845 and arrived at designated refueling points as planned. The first legs of the flight were uneventful. However, due to weather near one refueling point, the flight route was changed. All three flights diverted to a new refueling point without any further weather problem en route. The lead flight arrived at the last scheduled refueling point at about 1900 and encountered some difficulty in refueling. There was only one refuel point, so an extended time was required for refueling. The crews obtained a weather update that stated VFR through arrival time with IFR weather forecast for the following 2 days. So the flight decided to continue even though it was now dark.

At about 2000, the unaided flight (their night vision goggles had already been packed and shipped to port) departed the refueling point. During this last leg of the flight, Chalk 2 was having problems with its radios and on occasion could not receive the lead aircraft's radio transmissions. Chalk 3 would relay what the lead aircraft was saying.

About 2105, Chalk 1 encountered instrument meteorological conditions (IMC) and called for IMC breakup procedures. As briefed, Chalks 1 and 3 conducted inadvertent IMC breakup procedures. Chalk 2 never acknowledged the IMC breakup call and visually went under the cloud layer and turned 180 degrees. Chalk 4 followed Chalk 2, and during the turn, the Chalk 4 crew saw airport lights and called for Chalk 2 to follow them. Chalk 2 never acknowledged this call either. It cannot be determined whether Chalk 2 heard the IMC breakup call or the call from Chalk 4 concerning the lighted airport to the north.

While Chalk 4 continued its turn and approach

to the airport, the crew heard radio transmissions they attributed to Chalk 2. The first call seemed to be the pilot calming the PC. In later calls, the pilot sounded more anxious and seemed to be trying to take control of the aircraft. The last sound was described as three or four beeps from the emergency locator transmitter.

According to ground witnesses, Chalk 2 was at a high hover, appeared stable, and had its lights on. Chalk 2 then flew at low level and slow speed toward a dark wooded area. At 2110, Chalk 2 hit numerous trees, entered an 80- to 90-degree left roll, and disintegrated. All three crewmembers were killed.

Analysis

After descending from altitude to avoid night IMC, the crew lost control of the aircraft and crashed while flying low level over an unlit wooded area with no visible horizon. The cause of control loss could not be determined. However, it is suspected that one of the pilots became spatially disoriented and a struggle developed over the controls. The crew had never flown together before this cross-country flight, and as a result of the breakdown in crew coordination and communications, the aircraft crashed.

Other factors were present in this accident that did not directly contribute to it; however, if left uncorrected, they could adversely affect the safety of future operations.

■ **Urgency**. Members of the unit perceived an excessive sense of urgency toward getting the aircraft to port for overseas deployment. Flight leads and unit standardization personnel were hesitant to stop before arriving at port. It was perceived that the established time for aircraft arrival and loading could not be met if a weather delay was incurred. Consequently, the unit flew longer and later than normal and in worsening weather conditions.

■ **Time and equipment**. Sufficient time and aircraft were not available between the date the unit was activated and the date of the accident to conduct required evaluations of new unit members in accordance with the aircrew training program. The best possible aircrew mix was accomplished by unit safety, standardization, and command personnel, using available data. However, data on the new pilots was limited because they had flown with unit IPs only once or twice. Pilots from the detachments were mixed to attempt unit integration. Most of the crews in the flight had never flown together before this cross-country flight.

Additionally, once the unit was activated, they had no support agency. When they were directed to move their 12 aircraft to port, they did not have sufficient current publications and maps to equip each aircraft as required by AR 95-1 and there was not enough time to acquire them.

The 11 days from the date the crews reported to the unit were not sufficient time to adequately prepare for deployment. With so many tasks to be completed in such a short time, unit personnel quickly went into a hurry-up mode. Therefore, the unit did not perform a complete mission risk assessment and plan for all contingencies. The hurry-up situation created an atmosphere of urgency. Time was not allowed to plan for unexpected weather delays or for adherence to minimum altitudes and visibilities. Had ample time for complete flight planning been available, the mission risks could have been reduced.

■ **SOP directives**. The unit SOP-directed minimum en route altitude was not followed as required by the unit mission briefing sheet. Minimum altitude as stated in the SOP was 500 feet agl. Two of the four aircraft crews in the flight stated that they had descended to 300 or 350 feet agl. It may be that this happened because the unit was new and most of their reading files, regulations, and other nonpersonal documents and equipment had already been shipped to port. This resulted in a portion of the unit having no access to much of the unit safety and standardization data. All unit personnel should have been aware of the contents of the unit SOP pertaining to their area of operation. And once aware, good flight-crew discipline should have ensured compliance with the 500-feet-agl rule.

■ **Weather**. During the weather check for the flight to the port, unit pilots were informed that 15 and 16 December would be the worst weather days to fly. With that thought in mind, the pilots departed on the 14th in three flights of four

aircraft each. But because of the unexpected en route delays, the flights fell behind their planned arrival time. As a result, the lead flight did not leave the last refuel stop until 2000. Well after dark, the unaided flight departed on the final leg of flight.

Once the flight started encountering unforecast clouds at flight level, they decided it was closer to port than to return to the last refuel point. At this time, the flight fully believed their aircraft had to be in port that night and allowed that thought to influence their judgment. Under adverse weather conditions, they decided to push on.

■ **Command pressure**. Not only did the crews feel pressured to get to port that evening because of forecast poor weather conditions for the next 2 days, they also felt pressured by their higher command. Previous instances of canceled passes and prompting to hurry, hurry had already occurred during the mobilization.

Summary

During their activation, the crews used good judgment and didn't push on when they encountered adverse weather. One detachment returned to their departure station, and another stopped at an en route station. However, during the deployment, they allowed a sense of urgency to cloud their judgment.

Whether it's real or perceived, a sense of urgency is a risk to safe operations. Commanders must ensure that unit personnel are informed that common sense and good judgment should never be sacrificed because of a real or perceived sense of urgency. ♦

The Army's first C-12 Class A accident

The January 1992 *Flightfax* contains an account of a crew who flew their C-12 with only one operative engine past airport after airport where they could have landed. This crew was lucky; their lack of good judgment didn't result in an accident. And in his closing remarks, the author stated that we at the Safety Center hoped we would never have to deploy a team to investigate the first Class A accident of an Army C-12 aircraft. But before that issue of *Flightfax* could be published and distributed to the field, the Army had its first C-12 Class A accident. Ironically, poor judgment played a key role in this accident too.

The purpose of the following account of the Army's first C-12 Class A accident is not to condemn the flight crew for blemishing the record but to reinforce the importance of using good judgment; developing, implementing, and following sound training programs; and establishing a command climate conducive to safe operations.

The mission

The unit received the mission through normal channels to transport five VIPs from one country to another. The mission would require an en route fuel stop. After dropping the passengers off at their destination, the crew was to proceed to another destination to remain overnight.

The crew

The crew consisted of an instructor pilot, a CW2 with relatively little fixed wing experience, in the right seat; a pilot, a CW3 receiving C-12 training, in the left seat following the first leg of the flight; and a copilot, an experienced CW4 fixed wing pilot and high-time C-12 pilot, in the left seat during the first leg of the mission and seated in the cabin area with the cockpit doors closed during the remainder of the mission.

The premission planning

The IP and first-leg pilot, the CW4, conducted the premission planning and preflight. Their flight section risk assessment sheet listed the flight as a medium-risk mission requiring company commander or higher approval, but it was never obtained. They checked weather before departing but did not complete a performance planning card.

The flight

Because the passengers were late arriving, the flight departed 2 hours late. They arrived at the en

route refuel point uneventfully. The aircraft was refueled, and again the crew had to wait on the passengers. If the mission had gone as originally planned, the flight would have arrived at the passengers' destination during daylight. However, the delays made it impossible to reach the passengers' destination before dark. And the crew had never landed at this destination at night. But because of the sense of urgency associated with the mission, the IP elected to continue.

With the CW3 receiving C-12 training in the left seat, the flight departed for the passengers' destination. They proceeded to the first VOR and performed an update on their KNS-660 navigational equipment. They then proceeded south toward the next VOR. The crew never updated the KNS-660 again but continued toward where they perceived their passengers' destination to be, several hundred miles to the south.

During the flight, they had to deviate from their planned route a couple of times because of thunderstorms. When they approached what they thought was their passengers' destination, communication with the air route control center was normal. The center reported clear skies and good visibility. However, the crew was unable to tune and identify the NAVAIDS for the approach. Even though they were not receiving the proper NAVAIDS and had even been told there was no radar contact with them, the IP decided to execute a radio navigation approach using only the KNS-660. Essentially, with nothing to confirm their location, the crew descended to circling minimums. They did not see the airport, but they then attempted a nondirectional-beacon approach, backed up by the KNS-660. They reportedly received station passage on the radio magnetic indicator where the KNS-660 said the beacon was, but they were unable to find the airport.

At this point, the crew chose to go to their final destination. That decision was influenced by the then rather concerned CW4 who was seated in the cabin area. He knew the area they were flying over was mostly high mountain-type terrain (16,000 feet agl).

Once again, the IP planned his next leg of flight based on the assumption that they were where the KNS-660 indicated they should be. The crew reestablished communications with the center and requested a lower-than-assigned altitude because they were now also concerned about their fuel state. As they proceeded along their route, the right nacelle low fuel light came on. The IP took the controls and turned navigation over to the pilot, who had been flying up to that point.

At what the crew assumed to be the 45 miles DME (distance measuring equipment) from their intended destination, the pilot asked for and received clearance to descend from 25,000 to 5,000 feet. After the descent, the crew lost radio contact with center control. The weather had been reported to be clear with unrestricted visibility. They broke through a cloud layer at about 8,000 feet and continued under lost-communications procedures. The crew saw a city ahead that they assumed was their destination. By this time, they had flown 2½ hours since their missed approach on a leg that should have taken 1½ hours. When they saw water and boats near the city, the crew realized they were not at their destination. But their fuel state was critical, so they began looking for a landing area.

The landing

They saw a lighted flat area and initiated an approach. When they were closer to the ground, they saw aircraft parked there. They executed a go-around and tried to find a runway. But it was too dark to see, and they did not have sufficient fuel to continue looking. They then decided to return to the ramp area for an attempted landing.

On right base, both fuel gauges began to fluctuate, and it appeared that the No. 2 engine quit. On short final, the No. 1 engine also quit. The aircraft touched down in the middle of the ramp, and the crew applied brakes. However, the aircraft overran the ramp, ran over a concrete ditch, and hit a berm, shearing the nose gear. The aircraft became airborne again and continued into the jungle, where it came to rest in a nose-low attitude. The passengers and crew were fortunate—they escaped the aircraft with only minor cuts and abrasions.

The Class A accident

An initial assessment of aircraft damage was erroneous because the thick jungle growth made it inaccessible. When the growth was cleared sufficiently to assess actual damages, it was readily apparent the cost would put it in a Class A category—the Army's first C-12 Class A accident.

This accident revealed a number of problems, any one of which could cause another accident if not corrected. The most direct causes of the accident were an individual failure on the part of the IP and a training failure on the part of the command. The IP's actions were based on poor judgment: he relied solely on the KNS-660 and neglected other navigational aids. But evidence revealed he was never adequately trained to understand the capabilities and limitations of the KNS-660 navigational equipment. Fatigue also contributed to his poor judgment. His duty day had stretched to 15½ hours, 9½ hours of which were flight time—and 4 hours of that were at night under IMC conditions and, at times, in the vicinity of thunderstorms. The following command failures also contributed to this accident:

- There was a lack of dedicated training time and aircraft within the unit.
- Operation of fixed wing assets was in somewhat of a surge mode most of the time.
- Fixed wing section members perceived that each mission was absolutely essential.
- Most of the section's flight training was conducted in conjunction with actual missions.
- The section's standardization program was not being adequately implemented.

Additionally, fill of aviator personnel by DA was against a U-21 TOE that caused major problems for the unit in that—

- C-12 transition requirements had to be met.
- Most inbound personnel had no C-12 time and very little fixed wing time.
- There was a shortage of IPs and no instrument examiner in the section.

Small fixed wing flight sections are important to a command, but they present some unique problems that require careful consideration if they are to function in a safe and efficient manner. Training programs must be established, and resources and time must be available to implement the training. It is essential that crewmembers know how to make sound decisions in a logical manner. And risk-management training can help crewmembers effectively manage risks encountered even when dealing with urgent, perceived or real, missions.

Yes, the record is now blemished—we have recorded our first Army C-12 Class A accident because damage to the aircraft exceeded $1 million. The truth of the matter is, this accident could easily have resulted in multiple fatalities. But we're fortunate because we still haven't experienced an Army C-12 Class A accident that resulted in a fatality or permanent disability. ♦

—POC: Mr. Bob Wilkins, Investigations and Operations, AV 558-3820, commercial 205-255-3820

Recap of 3d quarter FY92 AVSCOM SOF messages

- **OH-58-92-04 SOF** technical message concerning all OH-58A/C and H-6 series aircraft with T63-A-720 engines with suspect fuel hoses installed.
- **OH-6-92-03 SOF** technical message concerning all OH-58A/C and H-6 series aircraft with T63-A-720 engines with suspect fuel hoses installed.

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

Class A Accidents through July

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	5	4
	December	3	1	3	0
2d Qtr	January	7	3	1	0
	February	13	1	13	0
	March	4	4	8	2
3d Qtr	April	3	1	2	0
	May	4	1	3	1
	June	0	2	0	2
4th Qtr	July	2	2	0	1
	August	3		0	
	September	3		2	
	Total	49	19	39	10

Release of chlorofluorocarbons/Freon

On 1 July 1992, it became illegal to release chlorofluorocarbons (CFC)/Freon during maintenance of refrigeration and air-conditioning systems. In June, AVSCOM issued a message concerning the use of recovery/recycle equipment on all EH-60 aircraft air-conditioning or refrigerant systems that use CFC/Freon (UH-60-92-ASAM-04, 161330Z Jun 92). The purpose of this message is to—

- Inform units on the use of recovery/recycle equipment on all air-conditioning or refrigerant systems that use CFC/Freon.
- Provide points of contact (POCs) for units to obtain needed recovery/recycle equipment or training.
- Inform units that changes to technical manuals are being developed and will be distributed through AVSCOM logistics assistance representatives (LARs).
- Inform units that the MOS to be trained for this equipment will be 67T.

According to the message, CFC/Freon must be recovered and not vented when servicing, maintaining, or disposing of equipment such as air-conditioning and refrigerant systems.

Commanders should ensure that all personnel performing air-conditioning and refrigerant equipment maintenance are trained and certified. Training and certification can be obtained from the Army Troop Support Command (TROSCOM) LARs listed in the box below. If TROSCOM LARs are not located in your area, contact the AVSCOM training POC, Mr. Ken Wilson, DSN 693-3266, commercial 314-263-3266 for assistance.

CFC/ Freon

Recovery/recycle equipment by Robinair (P/N 17500B, NSN 4130-01-338-2707) has been sent to some locations. Check your maintenance storage areas for this new equipment. Only certified personnel should use this equipment on aircraft. As stated in the message, changes to technical manuals are being developed and will be distributed through AVSCOM LARs. Locations collocated with TROSCOM personnel may be able to use TROSCOM equipment until other equipment can be furnished. If recovery/recycle equipment is needed, contact Mr. James Vincent or Mr. Terry Blackmore, DSN 693-9357, commercial 314-263-9357. ♦

—POC: Mr. Brad Meyer, Aviation Systems Command, DSN 693-9089, commercial 314-263-9089

Location	TROSCOM LAR	Telephone
Fort Benning	Reuben Strother	DSN 835-4185
Fort Bliss	Jessie Burns	DSN 978-4176
Fort Bragg	David Aebischer	DSN 236-6023
Fort Campbell	Joseph McClure	DSN 635-9100
Fort Carson	Vowley Vogt	DSN 691-2623
Fort Devens	Kenneth Desautels	DSN 256-3278
Fort Drum	William Hodges	DSN 341-6830
Fort Huachuca	Jimmie Clark	DSN 879-0732
Fort Irwin	Ray Carina	DSN 470-5249
Fort Hood	Lonnie Faglie	DSN 738-3454
Fort Ord	Craig Youngberg	DSN 929-6961
Fort Polk	Wesley Major	DSN 863-7901
Fort Richardson	Bill McKnight	DSN 317-384-2931
Fort Riley	Clyde Green	DSN 856-4241
Fort Sill	Mike Reynolds	DSN 639-3765
Fort Wainwright	Lynn Lamp	DSN 317-353-7735
Schofield Barracks, HI	Edmund Murphy	OVS 655-2342
Baumholder, Germany	Theodore Plumber	OVS 485-7405
Giessen, Germany	James Alpauge	OVS 343-8567
Hanau, Germany	Robert Poe	OVS 322-8005
Heidelberg, Germany	Lloyd Conder	OVS 379-7747
Taegu, Korea	William Teague	OVS 768-6744
Tong-duchon, Korea	Amdimo Turturro	OVS 730-1963
Uijongbu, Korea	Jack Stickradt	OVS 732-6108
Yongsan, Korea	Allen Branon	OVS 741-6673

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - At about 30 feet agl and 25 knots during takeoff, crew heard explosion from rear of aircraft, followed by power loss and moderate to severe vibrations. Low-rpm light and audio came on as aircraft was descending. About 10 feet agl, crew performed hovering autorotation. On touchdown, aircraft slid about 150 feet before coming to rest off departure end of runway. Tower reported seeing flames coming from aircraft. Crew performed emergency shutdown and exited aircraft. Inspection revealed abnormal wear patterns in 90- and 42-degree gearboxes and main transmission. Maintenance also found white powder on engine inlet and exhaust sections, indicative of impeller failure.

H series - At 7,000 feet pressure altitude, crew applied maximum power in attempt to top engine for baseline turbine engine analysis check. When crew reduced power, aircraft experienced two mild compressor stalls. Crew further reduced power and all engine indications were normal. Inspection revealed abnormal wear pattern on 90- and 42-degree gearboxes. Main transmission and drive shaft were also condemned.

UH-60 Class B

A series - Following vibration analysis at 100 percent rotor rpm, crew retarded power control lever and thought they were incurring droop stop pounding. As rotor coasted down, crew chief advised maintenance test pilot to shut down aircraft immediately because pitch change rod was missing. Inspection revealed damage to cowlings around main transmission, engine cowlings, swashplate, and possible internal No. 1 engine damage. Investigation in progress. 9229

UH-60 Class C

A series - While starting No. 1 engine during runup, crew noticed rotor was not turning as Ng reached 25 to 30 percent. PC performed emergency shutdown, which resulted in tgt spike that exceeded limits. Hot-end inspection revealed damage, and engine is being returned to depot for inspection/overhaul.

UH-60 Class D

A series - As pilot taxied aircraft to refuel at civilian airfield, main rotor blade tip cap struck unmarked 2-inch vent pipe.

A series - During NOE training, crew allowed main rotor blade tip to contact treetop. Postflight inspection revealed two cracked main rotor tip caps.

A series - During rappelling operations, rappeller became entangled in rope and was unable to descend. As crew began descent to lower rappeller to ground, main rotor struck tree, damaging one blade tip cap.

A series - During NVG practice landing to unimproved area, crew felt no indication of a problem until they were taxiing to parking. Postflight inspection revealed damage to tail wheel assembly and that tail wheel had blown. Maintenance determined tail wheel shock absorber had failed on landing because of improper servicing.

Attack

AH-1 Class A

F series - During aerial gunnery training, crew saw engine inlet caution segment light and transmitted indication over FM radio. PC made left descending turn, and aircraft struck ground about 15-degrees nose low on left side. Postcrash fire consumed aircraft. Two fatalities. 9230

AH-1 Class C

S series - During standard autorotation, rated student instructor pilot occupying front seat decelerated too high and too much and his initial pitch pull was too high and too much. Pilot then cushioned with collective, and touchdown was smooth and straight. But aircraft experienced abnormal fore and aft rocking during ground run. Main rotor flapped, white main rotor blade contacted tail rotor drive shaft, control rods contacted transmission fairing, and main rotor hub contacted mast. Aircraft came to stop, and crew ground taxied aircraft to clear runway and then performed shutdown.

S series - During flight, crew noted engine oil temperature at 130°C and transmission oil temperature at 90°C and executed immediate landing. On shutdown, transmission oil temperature was 100°C and engine oil temperature was 140°C. Inspection revealed frozen oil cooler.

AH-1 Class E

F series - During landing, 20mm gun hit ground. IP brought aircraft to hover, pushed turret drive circuit breaker in, and used aircraft shadow to verify turret was stowed. Crew completed landing with no damage to turret or 20mm gun. Inspection revealed turret elevation drive motor had failed because of loose retaining nut on brake assembly cover.

F series - During runup, engine oil temperature rose to 93°C. Crew shut down aircraft immediately. Inspection revealed oil cooler turbine fan assembly bearing had seized.

F series - During approach into holding area, skids caught wire. Crew chief told PC of possible wire strike. PC completed landing and shut down aircraft without further incident. Postflight inspection revealed broken skid-mounted landing light.

AH-64 Class D

A series - Aircraft landed near two OH-58Ds and blew left front door off one of them. Aircraft was NOE and did not see OH-58Ds until on short final.

A series - During JAAT operations, crew's attention was diverted to A-10 overhead. PC noticed increase in rate of descent and applied correction. PC did not know aircraft had hit trees and continued flight. Postflight inspection revealed damage to tail rotors.

A series - During normal runup with APU and generators running, smoke filled crew compartment. PC turned generators off and performed normal shutdown. Inspection revealed foreign object had damaged environmental control unit turbine.

AH-64 Class E

A series - During standard autorotation, PC heard pop. After terminating maneuver, shaft-driven compressor (SDC) advisory and master caution lights came on. Crew completed landing and shut down aircraft. Inspection revealed SDC had failed. Popping sound was pressurized air and oil escaping from SDC.

A series - Before takeoff, primary hydraulic gauge began fluctuating from 3,000 to 0 psi, but no caution or warning lights came on. Crew returned to parking and shut down aircraft with no further problem. Inspection revealed hydraulic oil pressure transducer had failed internally.

A series - During flight, crew felt binding in longitudinal axis of cyclic. Crew completed uneventful landing. Inspection revealed cyclic magnetic brake assembly was binding.

A series - During contour flight, copilot/ gunner noticed his helmet display unit (HDU) cord was sparking when it contacted gunners right instrument console. Crew completed uneventful landing, and maintenance replaced HDU and recovered aircraft without further incident.

A series - During ground taxi, vibration gearbox light came on. Crew immediately returned aircraft to parking and completed normal shutdown. Inspection revealed numerous working rivets in tail boom and crack in No. 1 tail rotor drive shaft mount.

Cargo

CH-47 Class B

D series - At about 10-foot hover during helocast mission, aircraft open cargo ramp struck water. Crew increased collective pitch to raise aircraft out of water, and cargo loading ramp broke off. No injuries. 9231

CH-47 Class C

D series - During NVG hover in confined area, IP aborted slope landing after aft gear touched down. Aircraft began undetected left drift. Aft crewmembers announced "sliding left" to IP. IP understood "slide left" and increased rate of left drift. Aft crewmembers announced "hold your left" as aft main rotor blades struck several trees. IP repositioned aircraft and landed on level ground. Investigation continues.

D series - During straight and level flight at 250 feet agl and 90 knots, PC announced "3 kilometers out of LZ." Crew chief answered, and about 1 second later, forward and aft cargo hooks opened and HMMWV was jettisoned. HMMWV and all miscellaneous equipment inside were destroyed.

D series - While at 75-knot cruise flight, aft longitudinal cyclic trim (LCT) indicator accelerated to 130 knots. Pilot attempted to increase airspeed while PC attempted to retract aft LCT in manual mode. External load would not allow aircraft to accelerate beyond 80 knots indicated because of vibration and load oscillation. Because there was nothing abnormal in aircraft attitude and vibration at 75 knots, crew flew aircraft to nearest recovery airfield and completed landing without damage to load or visible damage to aircraft. Maintenance inspection revealed that although aft LCT indicated 130 knots, it was actually fully retracted, resulting in possible damage to aft vertical shaft.

CH-47 Class D

D series - During tandem hookup of two HMMWVs, forward and aft cargo hooks were marked with illuminated chemical wands. Crew stabilized aircraft at 10-foot hover. Ground hookup person loaded aft cargo hook without delay. But forward hookup person failed to recognize forward hook and attempted to attach clevis to VOR antenna, breaking antenna from aircraft.

D series - Crew was performing pinnacle/ ridgeline operations and planned touchdown to aft landing gear only. As aircraft touched down on aft landing gear, aft cargo hook contacted ground, damaging hook and making 12-inch tear in bottom of aircraft.

CH-47 Class E

D series - During multi-ship NVG mission with loaded M998, aircraft landed at LZ. As M998 was being driven off aircraft, both sides contacted aircraft, resulting in sheet metal damage to ramp area on both sides of aircraft at station 575.

Observation

OH-58 Class D

C series - During terrain flight takeoff, pilot pulled in excessive power to avoid brownout. PC noted torque between 110 and 115 percent, and crew landed aircraft immediately without further incident. Maintenance replaced K-flex drive shaft.

C series - Crew performed approach to large open field and landed in 2-foot-tall grass. On landing or takeoff, tail rotor struck brush.

OH-58 Class E

A series - During cruise flight at 200 feet agl about one-quarter mile from shore, rpm light came on, followed by audio. Pilot noted rpm at 96 percent. Crew attempted to adjust governor increase/ decrease switch without success. Pilot executed power-on autorotation to unimproved beach, and aircraft touched down with zero ground run. Maintenance inspection revealed failed linear actuator.

A series - While accelerating after climbout from terrain flight takeoff, low rotor light came on. PC took controls and lowered collective. While maneuvering to evaluate condition and search for forced landing area, PC decided to execute precautionary landing. On approach to forced landing area, aircraft lost lift because of severe power droop. Crew completed landing with zero ground run. Crew felt possible occurrence of tail boom dynamic mode. Maintenance investigation found two fittings on pneumatic line to Pc filter were loose, causing engine to lose power.

C series - Pilot was operating aircraft below effective translational lift when he attempted right turn. Aircraft began right spin. IP took controls and

performed emergency procedure for loss of tail rotor effectiveness. Torque increased to 108 percent. Maintenance inspection revealed no damage.

Fixed wing

C-26 Class D

A series - While attempting to clear thunderstorms and buildups, crew saw flash and heard quick pop. Although radio would not work, crew flew to destination without further incident. Postflight inspection revealed broken antenna, and further inspection revealed burn hole on upper surface of rudder trim tab.

OV-1 Class E

D series - During termination of simulated no-hydraulics approach and landing, pilot used improper asymmetric thrust, allowing aircraft to drift right of runway centerline. IP was late with corrective action and allowed aircraft to veer off runway where right main gear dug into sod about 12 inches.

D series - At 60 knots during landing roll, pilot moved power levers into full reverse from ground idle. Aircraft immediately yawed right, and pilot returned power levers to ground idle, negating undesirable yaw. Crew taxied to ramp and shut down aircraft. Maintenance found failed reversing microswitch on power quadrant that controls reversing for No. 1 engine.

Messages

■ Aviation safety action maintenance mandatory message concerning one-time and recurring inspection of the improved particle separator scavenge tubes on all AH-1 aircraft (AH-1-92-ASAM-12, 011800Z Jul 92). Summary: It was recently reported that some units with improved particle separators (IPS) installed have found the scavenge ejector tubes clogged with dirt and oil. The dirt and oil forms a mud-like substance that causes the ejector system to lose efficiency. The purpose of this message is to require a one-time inspection of the scavenge ejector tubes for blockage and cleaning if warranted, require that this inspection be part of the preventive maintenance daily inspection, and provide the changes for the technical manual and checklist to the user. The message also contains inspection and correction procedures and recording and reporting requirements. Contact: Ms. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning main rotor stretched strap assembly removal on all AH-64A aircraft (AH-64-92-ASAM-05, 291800Z Jun 92). Summary: Aircraft operating with the 2.5-hour main rotor strap inspection restriction (special inspection number 40, paragraph 1-8-3, TM 55-1520-238-23) are currently required to remove the strap pack only after a second laminate failure is detected. A recent field report and subsequent evaluation indicate that the current criteria must be revised and warrants the removal of the strap pack at the next phase maintenance or upon reaching 400 flight hours after detection of the first discrepant laminate, whichever comes first. The purpose of this message is to direct removal of main rotor strap packs that have been operating in accordance with the 2.5-hour special inspection and exceed the criteria contained in this message. This message contains inspection and correction procedures and recording and reporting requirements. Contact: Mr. Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning replacement of Hi-Lok fasteners in left and right butt line 18 beams at fuselage station 83 to 120 on all CH-47D, MH-47D, and MH-47E aircraft (CH-47-92-ASAM-05, 162030Z Jun 92). Summary: During manufacture of the CH-47D helicopter, the subject Hi-Lok fasteners were inadvertently installed in oversized holes. This may reduce the fatigue life of this part of the fuselage structure. Replacement of the Hi-Lok fasteners by OLR team/special technical inspection and repair (STIR) program assures that the proper size fastener for any particular hole is installed. The purpose of this message is to require replacement of all Hi-Lok fasteners at the next phase inspection by OLR teams or during the STIR program. This message also contains inspection and correction procedures and recording and reporting requirements. Contact: Mr. Brad Meyer, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning inspection of fuel systems for all H-6 series aircraft with T63-A-700/720 engines (OH-6-92-ASAM-05, 121830Z Jun 92). Summary: This message is an amendment to the inspection requirements established in AVSCOM OH-6-92-ASAM-04. The purpose of this message is to change 10-hour/25-hour inspection intervals to 150-hour inspection interval requirements for the fuel control filter and engine-driven fuel pump inspection. This message contains recurring inspection requirements for the OH-6 aircraft after compliance with initial inspection requirements of OH-6-92-ASAM-04. Contact: Mr. Lyell Myers, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety maintenance mandatory message concerning one-time and recurring inspection of nose landing gear outer cylinder drag brace attachment lugs, P/N 2578210, for cracking on all OV-1D/RV-1D model aircraft (OV-1-92-ASAM-02, 292000Z Jun 92). Summary: One OV-1D OCONUS and one OV-1D within CONUS have recently experienced failure of the nose landing gear outer cylinder drag brace lugs. Both failures occurred during aircraft parking after completion of a mission. Materiel failure analysis by CCAD has attributed both fractures to tensile overload. This tensile overload probably occurred during prior aircraft towing operations. Heavy takeoff gross weights, abrupt towing motions, aircraft rollback during stop/start towing operations, and occasional application of aircraft brakes during towing are occasions for potential tensile damage. The purpose of this message is to increase inspection frequency and inspection methods to reduce the potential for complete fracture of the drag brace lugs and resultant damage to the aircraft.

Additionally, this message records changes to scheduled inspection requirements before receipt of technical manual changes. This message also contains inspection and correction procedures and recording requirements. Contact: Ms. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

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

Followups

Information on accidents previously reported

UH-1 Class A

Reported in April 1991 issue as 9120 - While climbing to cruise altitude on day VFR service mission at about 90 to 95 knots, Chalk 2 in flight of two incurred tail rotor stoppage. Pilot notified Chalk 1 and flight operations of tail rotor system malfunction and plans to attempt landing on flat area northeast of lake. Aircraft rolled right and entered right, nose-low, spiraling descent. At about 1,550 feet agl, aircraft appeared to resume level flight attitude, lose forward airspeed, and enter flat right spin. At about 500 feet agl, aircraft stopped spinning and fell vertically with reducing rotor rpm until it fell into mountain lake where it sank immediately. Inspection revealed toothed portion of tail rotor drive shaft male spherical coupling (P/N 204-040-603-7) gears sheared, resulting in total loss of antitorque control. Four crewmembers and one passenger received fatal injuries as a result of excessive Gs.

UH-1 Class A

Reported in July 1991 issue as 9128 - Flight of three departed forward operating base (FOB) under night vision devices to return to unit base cluster. About 10 miles south of FOB, lead aircraft crew announced intent to return to FOB because of deteriorating visibility. Flight started left turn, and Chalk 2 lost contact with lead because of dust clouds from vehicles on main supply route, which was located along flight route, and fog that was forming in area. Chalk 2 crew announced intention to land immediately because of poor visibility. At about 20 feet agl during approach, Chalk 2 experienced a series of compressor stalls and crew alerted Chalk 3 of their problems. PC elected to make shallow approach with minimum power to ground. As aircraft was about to touch down, engine failed catastrophically. Aircraft yawed left, right skid contacted ground, and aircraft rolled over and came to rest on its right side. Crewmembers egressed without assistance, and crew of Chalk 3, which had followed Chalk 2 to ground, extinguished postcrash engine fire.

UH-1 Class B

Reported in 2 January 1991 issue as 9110 - Downgraded to Class C. Upon completion of third leg of cross-country flight, pilot was hovering aircraft to parking for refueling. Aircraft began uncommanded right yaw, which pilot could not stop with full left pedal. As aircraft neared its first 360-degree rotation, PC took controls, neutralized pedals and cyclic, and applied full left pedal with no effect. PC reduced collective, and aircraft continued to spin about two and one-quarter additional turns, contacting ground several times and landing hard. Crew exited aircraft unassisted. Inspection revealed continuity of tail rotor drive train system was interrupted at 90-degree gearbox, causing loss of antitorque control. Internal disengagement of 90-degree gearbox occurred between input pinion and male spherical coupling because a dash 9 or 11 part number coupling that has 26 teeth was installed instead of proper dash 7 part number coupling that has 24 teeth. Maintenance records indicate that incorrect coupling was installed by unit during previous phase maintenance. Additionally, a performance error contributed to the severity of the accident. Neither the PC nor pilot correctly identified the emergency. Their attention was focused on high winds they had been encountering all day. Thus, when heading control was initially lost due to gearbox failure, the crew's initial interpretation was loss of tail rotor effectiveness due to high-wind conditions. After taking controls from pilot, PC executed emergency actions for loss of tail rotor effectiveness. Proper emergency procedure was to autorotate.

UH-1 Class B

Reported in July 1991 issue as 9129 - With PC on controls in right seat, aircraft departed on general-officer support mission. As pilot called out torque, "20-25-30-35," crew heard loud bang from engine area. Power turbine section disintegrated, and aircraft yawed left and began descending. Pilot placed emergency governor switch in emergency position and got on controls with PC. As they pulled collective together, rpm bled off, and aircraft fell from about 30 feet with low or no rotor rpm. Aircraft hit tail low with tail skid and aft skids hitting at about 32+ Gs. Aircraft bounced forward, hit on toes of skids, slid sideways for 5 feet, and came to rest upright. When aircraft hit nose low, pilot and copilot seats broke, allowing both crewmembers to rotate forward with seats. Pilot and crew chief exited unassisted but had to assist PC whose face had hit cyclic.

UH-60 Class A

Reported in 30 January 1991 issue as 9114 - During combat support medevac mission, crew was attempting NVG descent and turn to downwind leg for landing at evacuation hospital helipad. PC on controls lost visual reference with ground and failed to transition to instruments and execute go-around or turn control over to pilot who had visual ground reference. Once pilot sighted hospital area, he diverted his attention from his primary duty of providing PC with radar altimeter information to secondary task of storing aircraft coordinates on Doppler navigation radio. When pilot redirected his attention to radar altimeter, aircraft was passing through 60 feet agl. Low altitude light came on as aircraft descended through set 50-foot altitude. Pilot called out altitudes of 40 and 30 feet and began reaching for

controls to arrest descent. As PC heard altitude callouts, he attempted to level aircraft and arrest descent. However, attempts by both pilots to arrest descent were too late to prevent ground contact. Aircraft struck ground in 10-degree left-side-low, 5-degree nose-low attitude at an estimated 100 knots. Aircraft bounced and skidded for about 700 feet before coming to rest. Crew and patients who were restrained received no serious injuries. Attending medic, who possibly was not restrained, received fatal blunt-force injuries.

AH-1 Class A

Reported in 30 January 1991 issue as 9116 - Upon completion of refueling, aircraft climbed to 30 feet agl and air taxied to holding area 300 meters to southwest. Holding area was not lit, and crew was having trouble determining condition of landing area due to lack of contrast and fading light. Crew thought landing area was flat when, in fact, it was slightly sloped and lower than surrounding area. Crew did not use landing light because they were concerned that blowing sand would worsen brownout situation. Pilot was announcing wings level, 100 fpm (feet per minute) descent, and radar altimeter readings. As radar read zero, crew knew they were close to ground, and both verified wings level and 100 fpm descent. However, crew failed to detect unwanted lateral movement during descent and allowed aircraft to touch down with excessive lateral movement. As aircraft touched down, crew felt it slide right and start to roll. PC was unable to stop roll rate, and aircraft entered dynamic rollover. Aircraft came to rest on top right side. Crew exited unassisted.

AH-1 Class B

Reported in May 1991 issue as 9123 - On takeoff from sandy, dusty environment at maximum gross weight of 10,500 pounds, pilot in aft crew station applied forward cyclic and maximum torque available of 100 percent indicated. As aircraft entered rotor-induced dust cloud, pilot applied forward cyclic to accelerate from 15 feet agl and 20 knots. Aircraft descended back into dust cloud with 100-percent torque applied, and pilot transitioned to instruments. Power plant did not produce sufficient power to maintain flight as crew applied maximum torque available. Aircraft struck ground left-side low, rolled left 180 degrees, pivoted about 90 degrees, and came to rest inverted.

OV-1 Class B

Reported in April 1991 issue as 9122 - Downgraded to Class C. At assigned mission altitude, technical observer began side-looking airborne radar (SLAR) mission. No. 3 inverter circuit breaker popped out, PC reset circuit breaker, and breaker popped out again. Because No. 3 inverter is required for operation of surveillance systems, PC decided to abort training mission and return to base. Crew began descent to 2,700 feet msl, and PC contacted tower for landing instructions. During prelanding checks, gear would not extend and PC declared emergency. While maintaining air-ground communications with company standardization instructor pilot, crew attempted gear extension by recycling gear handle numerous times, activating emergency landing gear system, and performing low G-force maneuvers. Crew reviewed emergency landing procedures, safetied their ejection seats, and initiated landing sequence. Crew shut down both engines and feathered propellers immediately before gear-up touchdown on improved runway. Crew egressed unassisted. Inspection revealed that hydraulic landing gear deployment system failed even though all other hydraulic system components operated normally. Hydraulic fluid samples analyzed by CCAD were found to contain unacceptable levels of moisture. Temperature at altitude caused moisture in hydraulic fluid to form ice crystals and changed viscosity of fluid, restricting flow of fluid particularly through landing gear components. Emergency landing gear extension system also failed to extend landing gear. Inspection revealed this was separate failure and not related to hydraulic failure. Testing indicated significant leak in pneumatic system. Pressure safety relief valve spring had weakened and allowed pressure to vent down.

OV-1 Class B

Reported in June 1991 issue as 9127 - Downgraded to Class C. While returning from mission, aircraft encountered unforecast weather caused by smoke from burning oil fields. Crew contacted ground control approach and stated they had less than 30 minutes of flight time remaining. At 10 feet agl on first approach, aircraft hit unused windsock, which was 297 feet right of runway centerline. Crew initiated go-around, and pilot experienced aircraft control problems. Impact with windsock had limited aileron travel. On second approach, aircraft was again right of runway and again made missed approach. On third approach, aircraft was left of runway. Crew saw runway lights and landed about halfway down runway. Aircraft's right wing tip hit ground, bending outer 4 feet of wing up at 20-degree angle and limiting right aileron control to 1 inch of neutral stick. Right tire blew and right auxiliary tank also contacted ground. Pilot initiated reverse thrust, and aircraft slowed and went off right side of runway. Pilot taxied aircraft farther from centerline to avoid interference with second aircraft attempting to land.

U.S. ARMY SAFETY CENTER

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Flightfax

September 1992 Vol 20 No 11

REPORT OF ARMY AIRCRAFT ACCIDENTS

Flightfax 20 years old

When the first *Flightfax* was published in September of 1972, the war in Vietnam was winding down. Army aviators had proven the concept of air mobility over the jungles of Southeast Asia. Their Hueys and Chinooks had hauled the troops and cargo while the Scouts sought out the enemy for the Cobra's fangs. Army aviation had come of age in the mud and dust and spilled its blood with that of its brother soldiers on the ground.

At home, we were mourning our dead and praying for our wounded, POWs, and MIAs. We were also looking at the horrifying numbers killed and injured in accidents and resolving that something would be done to prevent such losses in the future.

Have we kept faith with that resolve? A comparison of accident losses during Desert Shield/Desert Storm to previous major conflicts indicates that we have.

Army Accident Losses in Theater*

WWII 1942-45	Korea 1950-53	Vietnam 1965-72	DS/DS 1990-91
95.57	120.33	154.66	11.14

*Death and injury rates (ground and aviation) per 1,000 soldiers

Flightfax has tracked many of the changes and innovations in Army aviation that have played a part in lowering accident rates over the years. This publication (which replaced the weekly summaries of aviation mishaps published by the U.S. Army Board for Aviation Accident Research) has

provided aviators and aviation units with information on *accident prevention* as well as mishap data. Problems addressed in those early years included such things as mast bumping, dynamic rollover, and loss of tail rotor effectiveness (LTE). While there are still some accidents where pilots induce a dynamic rollover or fail to anticipate wind conditions and experience LTE, intensive training efforts and some aircraft redesign have greatly reduced these kinds of accidents.

Equipment

Significant gains have also been made in reducing accident losses by improvements in crashworthy design of helicopters. Accident reports before retrofit of Army helicopters with crashworthy fuel systems vividly show the horrors of crewmembers killed and injured in postcrash fires after otherwise survivable accidents. A study of 2,382 survivable rotary wing accidents occurring between 1967 and 1969, revealed that postcrash fires were present in 10.5 percent of the accidents and contributed to 39.3 percent of the fatalities. Since 1970, when the first crashworthy fuel system retrofit occurred, deaths from what had been the greatest killer in survivable crash impacts are virtually nonexistent.

Other improvements reported in *Flightfax* over the years include energy-absorbing landing gear and seats designed to stroke, thus reducing spinal injuries. Occupant restraint systems consisting of five-strap restraints: lap belts, two shoulder straps, an inertia reel, negative-G strap, and a single-point-of-attachment buckle are far more effective than the old systems in protecting aircraft occupants during a crash sequence.

Personal protective equipment has also shown great progress. Nomex has been around so long, it is easy to forget that in the first decade of *Flightfax* we were regularly publishing articles reminding aviators about the fire retardant properties of this material and how to properly care for it. Another important improvement was the introduction of the SPH-4 helmet. Probably the best people to tell us just how important would be the crew of a Huey that skidded upside down on a runway for 200 feet. Their helmets not only stayed on, they prevented fatal head injuries. Another important part of helmet protection is the visor. When fire flashed through the cockpit of a CH-47 from the aircraft's cargo compartment, the extreme heat actually caused the pilots' visors to melt. But the visors protected their eyes, and they landed the aircraft safely.

The evolution of NVGs can be readily traced in articles published in *Flightfax*. In 1969, the Army used a goggle-type device on a limited basis as a pilot's aid to night flying in Southeast Asia. In 1973, the AN/PVS-5 was accepted as an interim—quick fix—pilot's night vision system. In 1976, the Night Vision Lab delivered four sets of AN/PVS-5 NVGs to the Aviation Center. The road ahead, however, was far from smooth as doctrine had to be developed on how goggles would be used and procedures established for training pilots. As goggles were received in commands worldwide, the demands of tactical missions increased, and accidents happened. As much as 90 percent of the NVG accidents occurred during tactical terrain flight. Low ambient light and excessive airspeed for conditions were considered contributing factors.

Emphasis at the Aviation Center shifted to the terrain flight environment and tactical tasks. A training manual was developed, and PVS-5s were modified by cutting away the face plates, eliminating the need to focus in/focus out. Aircraft NVG compatibility modifications were improved and their application expedited. Not everything that was tried to improve NVG operations worked, but there were some successes too.

As mission demands increased—for example, NVG NOE multiship, slingload missions, sometimes in marginal weather conditions—so did training risks. Slower airspeeds and modified aircraft with infrared lights helped reduce some of these risks, and improved night vision devices were being developed.[1]

Flightfax continued to report development of better night vision devices as the AN/AVS-6 (ANVIS) NVGs appeared on the scene as well as the Apache helicopter with its PNVS (pilot night vision sensor). Because of NVGs, Army aviators were able to fly at night during Operation Just Cause in Panama. Just how important that was is best expressed by the pilots who said, "What they can't see, they can't shoot."

There was a different set of problems with NVG flight during the early days of Operations Desert Shield/Desert Storm. The lack of visual cues, illusions, and shifting sand dunes made flying with NVGs extremely difficult. But in spite of

[1]"Night vision flying: A special report to the field," Vol 15, No. 18, *Flightfax*, 11 Feb 87

these problems, video footage shot through NVGs clearly shows that flying in desert terrain with NVGs is far safer than flying at night without them.

Crewmembers

In the early years of *Flightfax*, we published numerous accident reviews and articles regarding "hot dogging" or "cowboying" of aircraft. This kind of flying by undisciplined aviators has declined, although it does still sometimes happen. One of the major factors in this decline is self-disciplined, professional aviators who not only take responsibility for themselves but for their fellow aviators. The concept that "you are your brother's keeper" has done much to prevent the undisciplined aviator or an aviator with serious personal problems from continuing to fly until an accident results.

Human error, unfortunately, still accounts for about 80 percent of Army aviation accidents. This area, including crew coordination, is the subject of increasing scrutiny as efforts are focused on ways to prevent such accidents.

Accident investigation

Along with the changes in aviation equipment and training have come changes in the Army's approach to accident investigation. Before 1978, responsibility for investigating Army aviation accidents rested with the unit that had the accident. After a trial period beginning in April of that year, the Safety Center began investigating all Class A and selected Class B aviation accidents Armywide. Centralized accident investigation (CAI) provides many advantages, not only in determining what caused the accident under investigation but also in arriving at recommendations designed to help prevent future accidents.

Because of the success of aviation CAI, the program was expanded in 1983 to include ground accidents. Selected Class A and B ground accidents Armywide are investigated by Safety Center teams.

STACOM

In February of 1976, *Flightfax* began publishing its longest standing department from an agency outside the Army Safety Center. After assuming the expanded mission of worldwide aviation standardization assistance and evaluation, the Directorate of Evaluation and Standardization (DES) at the Army Aviation Center needed a way to maintain direct communication with the field. Because of its frequency of publication and wide distribution, *Flightfax* was the ideal vehicle. Thus began an association that has benefited Army aviators and aviation units for 16 years.

We're here to serve you

The purpose of *Flightfax* is to assist you—the people in the cockpits, on the flight lines, in the maintenance hangars, and in aviation units throughout the Army. We aren't here to point fingers at individuals or units except to tell you about the mistakes of others in the hope that they won't happen to you. We want to let you know about things good leaders and good units are doing so that you can borrow ideas to improve your own safety programs. Let us hear from you; tell us what you think of *Flightfax* and what you think we can do to make it better. You're our customers, and we're here to serve you. ♦

What makes a good aviation safety program?

As the Director of Army Safety, I've done a lot of traveling during the past few months. And whether I'm talking with students at a pre-command course or with brigade and division commanders and sergeants major in the field, I'm asked the same basic question, "What makes a good aviation safety program?"

Leaders want to know how to improve or increase safety awareness in their organizations. Unfortunately, safety cannot be issued like fuel or ammo; it evolves through command leadership, designated safety personnel, proper risk management, training, and a well-defined aviation accident prevention plan. Safety awareness involves many elements and is like morale—it's caught from the environment. Looking into those units that have successful programs, I have found that they all focus on these five important areas.

Command leadership

Of a commander's many policy letters and memos, none is more important than his safety philosophy statement. The objective of safety is to help units protect warfighting capability through accident prevention. And the degree of importance the commander places on

safety will determine the priority it gets throughout the unit. The commander's safety philosophy must represent his style of leadership and must be written in his own words and backed by action.

Command involvement is paramount to a successful safety program, and safety must be integrated into every aspect of a unit's activities. Preventing an aircraft accident only to lose some crewmember in a POV accident just doesn't accomplish the Army's mission. Cheerleading from the sidelines is not enough; leadership at this position demands personal involvement. Mission briefings, after action reviews, and flight line visits are important. Being involved in drivers' training is another vital command action. And commanders should review safety statistics at every command and staff meeting, not just at monthly or quarterly safety meetings.

Quality leadership is a 24-hour-a-day process. Commanders can use a variety of leadership techniques, but the following command actions are key to success:

- Establish performance criteria
- Ensure all personnel are aware of the performance criteria
- Ensure training is conducted to standard
- Ensure operations are by the book
- Take immediate and effective action against deviations from established performance criteria

Designated safety personnel

2 The commander is the safety officer and needs to know what safety inspections, training, and reports are required. But a commander cannot do it alone. He must have a designated full-time aviation safety officer (ASO), who should be a seasoned warrant officer who has the warfighting credentials to serve as a pilot-in-command in the unit. A good safety NCO is also critical. Additionally, every other NCO right on up to the command sergeant major must be involved in safety. They also have a shared responsibility in helping to protect the force, and without their leadership, senseless accidents will continue.

The advice of the ASO and safety NCO can be just as important as that of the flight surgeon or chaplain. Thus, designated safety personnel must fully understand their responsibilities and receive the necessary training to help ensure competency in their positions. Additionally, safety personnel cannot be effective if they are buried under a rock. They need access to and visibility with the commander to reinforce the importance of safety in the unit's missions.

Risk management

3 Risk management should be the cornerstone of any safety program. This five-step cyclic process—identify hazards, assess the hazards, make a risk decision, implement controls, and supervise —can be easily integrated into the decision-making process. Used in a positive command climate, risk management can become a mindset that governs all unit missions and activities.

In addition to setting the example by properly applying risk management principles, commanders must ensure that every unit member has a solid understanding of risk management and can apply the principles effectively. Safety is about preventing accidents, and if practiced by the command and every soldier in the unit, risk management will enhance the mission and help prevent accidents.

But we're missing the boat on risk-management training. Most senior leaders are using risk management properly, but it's the young officers and NCOs who must apply risk-management principles in the cockpits, on the flight lines, and in the maintenance hangars daily. At the Army Safety Center, we're working with TRADOC to integrate risk management into the schoolhouse and our training management doctrine so that we can teach the specifics right down to platoon and squad level.

Training

4 A successful safety program goes back to the basic two-part safety equation: the individual and the leader. Soldiers must be trained to established standards and held responsible for their technical and tactical competence and knowledge of regulations. They must be trained to effectively identify hazards and manage risks, and they must have the self-discipline to consistently perform tasks to standard. And leaders must be ready, willing, and able to enforce standards. For anything less than by-the-book performance, leaders must make on-the-spot corrections and require that soldiers receive remedial training if necessary.

Aviators in units with good safety programs receive individual training to increase capabilities in basic tasks while minimizing limitations in

accomplishing required aircrew training manual tasks. And aviators in these units demonstrate a high degree of professionalism and accept responsibility for policing their own.

Units with good safety programs also carefully plan flight missions and select crews. Crew coordination training is part of every mission. And instructor pilots and instrument flight examiners enforce the safety and standardization program and coordinate for immediate and effective action to be taken against violators of flight discipline. NCOs in these units are trained to perform maintenance operations by the book and require that their mechanics perform to standard, ensuring aircraft are mission ready.

Accident prevention plan

5 Units must have a clearly defined aviation accident prevention plan that formally establishes the safety program within the unit. That plan should outline personnel responsibilities and provide implementation instructions, goals, and methods the command will use to monitor the success of the safety program. The plan should be based on the philosophy that accident prevention is an inherent function of leadership and should be part of the commander's yearly training guidance.

The accident prevention plan should require at least monthly aviation safety meetings where current safety issues and lessons learned can be discussed among unit members. A requirement for a semiannual aircraft accident prevention survey should also be included. The commander can use information obtained from the survey to determine the effectiveness of the accident prevention plan. And it's also a good idea to include rewards for good results—such as a day off for no accidents for 90 days.

Following one of my recent briefings to students at the pre-command course at Fort Leavenworth, a student wrote on his critique sheet: "Sending the Commander or anyone from the Army's Safety Center all the way to Kansas was a complete waste of his time and mine! If we do not know all we need to know about safety by now—we are in trouble!" Let me assure you, that young leader is in trouble if he thinks he knows all he needs to know about safety. Last year we killed 372 soldiers. We had 49 Class A aviation accidents and severely damaged about 1,500 ground vehicles. Total accident costs for FY 91 exceeded $500 million. Since we don't budget for these kinds of losses—who's in trouble?

As a former aviation brigade commander and as the Director of Army Safety, I can tell you I do not know all the safety answers today. But I really believe that protecting the force requires command involvement, leadership by designated safety personnel and every NCO in the unit, proper risk management, training, and a well-defined accident prevention plan. These are the key elements to a good aviation safety program. Safety is awareness; being safety conscious will not impede training or readiness, it will enhance it.

Our units that train to standard and put safety in the mission-essential task list business are defining programs that can result in no memorial services or major accidents. We are fortunate to have many organizations that fall into this elite category. Our challenge is for our brigades and divisions to follow this fine example in protecting the force. ♦

—BG R. Dennis Kerr, Director of Army Safety. Reprinted from the June 1992 issue of *Army Aviation* magazine.

A commander's safety philosophy

A commander's leadership and safety philosophy are decisive factors in ensuring safe operations within a unit. The commander sets the limits within which unit personnel must operate. His safety philosophy statement tells his people how he feels about safety and what he expects of each of them. The following excellent safety philosophy statement was written by LTC John E. Pack, Commander, 3d Battalion, 229th Attack Helicopter Regiment, Fort Hood.

I am not a philosopher—I'm a soldier. So I guess the subject of this correspondence is a little misleading. What I think and feel about safety is the product of 18 years' experience in this business; it's not the philosophy of a great man who has all the answers. It is the gut-wrenching pain I recall feeling as I watched a young soldier crushed between a building and an M60 tank. It is the emptiness and sorrow I felt as I stared down on a patch of scorched

earth in Korea where a very good friend had died in a Cobra. What I think about safety is not an extraordinary revelation. On the contrary, this is just one man's thoughts on how to conduct business safely in an inherently unsafe environment.

Like so many others, I believe accidents don't just happen. Sometimes, they occur because of materiel failure, poor maintenance practices, and inferior or insufficient training. Too often, they occur because of crew complacency or inattention to detail. Sometimes, accidents occur because of willful disregard of standards. If accidents don't just happen, then the reverse must be true. *Safe* acts don't just happen. Those units who take pride in their personnel and equipment, who refuse to take shortcuts no matter how inviting, and who unfailingly execute to standard will avoid most incidents, mishaps, and accidents.

But not all. To err is human; that's a given. However, in our business, we must minimize our errors—even the honest mistakes that are so difficult to foresee. We can do this by identifying potential hazards, correcting unsafe conditions, taking control of our environment and our destiny, avoiding unnecessary risks, and executing every assigned mission to standard. We have to have leader involvement to be successful, but we must also have a commitment from every soldier to do his or her very best according to regulation and standing operating procedures. No free-lancing, no mavericks—only team players who know that our very lives depend on the safe execution of our mission.

I will not ask you to do anything that I will not do myself. I'll be down among the trees with you on the darkest night in the worst weather. I must feel the same challenge that you do. I charge you to perform according to standard, to fight complacency, to report unprofessional as well as unsafe acts, and to think safety in everything you do. I charge our leaders to instill discipline in our training programs, on the ground and in the air. Anybody can learn to fly an Apache, Black Hawk or Scout, but only **professionals** can operate these aircraft in the demanding environment where we train and fight. ♦

Design to reduce human error

Human error is a behavior oddity that is like stumbling over our own feet. We do not intend to do it, we wonder why we did it, and too often we do it again.

Design causes some human error. That is, design got in the way; so, people blundered. With proper awareness of the problem we can reduce human error.

Human error

People make errors for many reasons. Some of those reasons escape control, but the majority can be controlled. The place to begin is proper regard for human error.

Sometimes human error is asserted when the root cause lies deeper. In the following example, the cause appears to be pilot error, but a closer look shows there is more to the story than appears at first glance.

A highly experienced pilot was making an overwater approach to San Francisco International. The sun was bright, visibility was excellent, the bay was super calm. The huge stretch jet moved gradually down its 2.5-degree glidepath and landed softly in San Francisco Bay.

Luck prevailed, the plane rested high and mostly dry on two oyster beds. The passengers first learned of their dilemma when they noticed a small sailboat drift past the huge aircraft.

Investigators concluded that the cause was pilot error when the captain accepted blame. Disturbingly, other stretch jets crashed under similar circumstances at Boston and again at Miami.

Highly experienced pilots landed stretch jets short of runways, in very calm water, when flying conditions were superb. Pilot error was again and again said to be the cause. True, the pilots landed short of the runways, but was their error the basic cause? The coincidence of circumstances aroused doubt.

Further investigation determined the root cause of the pilot errors. The leisurely glide slope of the aircraft combined with approaches over calm water—which reduced visual cues—deprived the pilots of an appreciation for their rate of descent. The pilots landed in the water because they probably did not realize the danger until it was too late to do anything. Knowing this, the investigators told stretch jet pilots to use the glidepath instrument, not their judgment.

To recap: Operator error was an accepted explanation for these incidents. Then, the

investigators realized they should dig deeper. Deeper investigation found the root cause to be training error rather than operator error. Thus, the error was not solely the pilots'.

Assertions of operator error suggest nothing could have been done to prevent the error; therefore, nothing may be done. That can lead to recurrence of the incident.

Pronouncements of human error follow most well-publicized tragedies. There seems to be a relationship between the magnitude of the disaster and the persistence of the human error declaration.

We need to be more circumspect about assigning accident cause. Did the user commit the root error, or did those who designed the software and hardware fail to recognize something important?

Sometimes operator error is an inescapable conclusion. Humans get into trouble due to irrational moments or lapses of attention. In other words, humans act human. Design must recognize that plain fact and move beyond it. The real issue is: What can be done to keep our imperfections from wrecking systems?

People can be set up to mess up. Design is a controllable determinant of human-machine reliability.

What can be done?

Human error should be a red flag that prods investigation of cause. Human error does not deserve the status of an explanation unless that conclusion emerges as the root cause. Otherwise, human error is only part of the truth. And partial truths can lead to recurrence, as happened with the stretch jets.

We must become skeptical of accepting general terms as sole explanations. Human error only says that a human made an error. Human error does not address why the human made the error; thus, the path to correction is vague.

There are many elemental causes of human error. While not all-inclusive, the following list includes some of the more general causes: carelessness, failure to follow procedures, design-induced error, design that requires over-dependence on recall, design which can but does not evoke proper behavior, human capability is exceeded.

Carelessness as well as failure to follow procedures are improper behaviors. Such behavior is a management problem handled by training or personal control. Managers can stress awareness of procedures, hazards, and risks, but little more can be done about improper behavior.

Design is preferable to admonishment. Training is a poor second to design. Design endures, training may not. Inadequate system design and situational factors can cause human reliability to decline. People can be set up to mess up. Design is a controllable determinant of human-machine reliability. So, what should we look for in design?

Reduction of complexity is a good start. Many designs include nice-to-have gauges, knobs, and switches located near the most-used controls. Those designs provide users more choice than they need. More controls placed at the primary control location provide flexibility of operation. On the other hand, the more we make readily accessible, the greater the chance of error.

Each design decision must optimize system performance. Nice-to-have items can usually be located away from the primary operating controls or deleted with small sacrifice of typical system performance. Designers should ask: Why have that? Why have it there?

An unwritten rule is—Whether or not adjustment is appropriate, if users can adjust it, they will. The unwritten corollary is—If it should not be adjusted by users, move it to where they cannot find it.

Complicated designs cause problems that lead to user rejection. Simple designs, such as the paper clip, enjoy wide use for decades. Few designs can be paper clip elegant, but many designs can be simplified.

There is nothing new about designing to control user behavior. Cars will not start unless the lever is in park or neutral. Microwave ovens turn off when the door is opened. Gas is not supplied to furnace burners unless the ignition source is on. Those are good ideas; we need more like them.

Good design is the investment that heads off trouble at the drawing board. Training is done many times, use happens every time. If design forces correct behavior and frees up the operator's attention, errors are less likely and less training is required.

Users can be set up for error by designs that do not evoke correct behavior. People deal with typical objects or actions in typical ways. We bring a map-like set of anticipations to most

tasks. We acquire the map because objects are usually arranged in a typical manner and most interactions occur in a typical manner.

Power boats with steering wheels like cars were introduced several years ago. Those steering wheels turned the boat like a tiller. Turn left to make the boat go right. Several accidents proved that design decision to be wrong.

Designs must fit user capabilities. If users can't learn to use a design, then redesign is imperative.

Conclusion

If design is done with the human in mind, then humans would have less error on their minds.

The message is: Preclude undesirable behaviors and force needed behaviors via design to reduce human error. We have the standardization documents and the subject matter experts to convey human factors knowledge to designers. We can design to match human psychological, physiological, and physical capabilities. Humans must co-exist with technology; so, we must practice human-oriented design. ♦

—Adapted from an article written by Dr. Paul J. School, chief of the Human Engineering Lab Detachment at Fort Belvoir, and published in the Jan-Feb 1992 issue of Army Research, Development & Acquisition Bulletin.

Design failures result in human-error accidents

Statistics show that about 80 percent of our accidents are a result of human error. As the chart shows, one of the sources of support failures is improperly designed equipment or materiel.

Following are three examples of designs the Army has recognized as having the potential to cause human-error accidents.

CH-47D lighting control panels

The design of the NVG-compatible Nightfix Phase II lighting systems for CH-47D aircraft has caused problems for pilots who were accustomed to the interim NVG lighting system. The location of the bottom anticollision light switch and the interior dome light switch were reversed on the two lighting systems. Pilots who were accustomed to blindly reaching up with their left hand to identify and actuate the bottom anticollision light switch have inadvertently actuated the bright white interior dome light in the newer NVG configuration. This caused shutdown of the pilots' night vision goggles, resulting in loss of practically all visual cues and near-panic while the crew tried to locate and deactivate the switch. Not all CH-47s have been upgraded to the full Phase II NVG lighting system due to lack of availability of the lighting kits and the downtime required while the new lighting systems are being installed. Aviators should be aware that aircraft with both systems are still in the fleet. They should also be aware of the negative habit transfer potential until the new systems have been installed in all CH-47s and flight crews

Sources of Human Error in Aviation Accidents
Readiness Shortcomings
Individual — Soldier knows and is trained to standard but elects not to follow standard (self-discipline). • *Attitude* • *Overconfidence* • *Haste* • *Fatigue (self-induced)* • *Alcohol, drugs*
Leader — Leader does not enforce known standard. • *Direct supervision* • *Unit command supervision* • *Higher command supervision*
Training — Soldier not trained to known standard (insufficient, incorrect or no training on task). • *School* • *Unit* • *Experience, OJT*
Standards — Standards/procedures not clear or practical, or do not exist. • *Task* • *Condition* • *Standard* • *Operating procedures (AR,TM, FM, SOP, etc.)*
Support — Equipment/materiel improperly designed/not provided; inadequate maintenance/facilities/services.

have relearned these blind cockpit procedures.

Cargo hook release switch

Numerous instances of jettisoned fuel blivets, cargo containers, and pieces of equipment have resulted when flight engineers attempted to press the intercommunication system button on the hoist operator's grip and hit the cargo hook release switch instead. Modification of the CH-47 fleet for this problem is underway. The majority of these aircraft should have been modified by now with a hoist operator's grip that has a raised guard around the cargo hook release switch. Until all CH-47s have been modified, however, crewmembers must remain alert to the existence of this problem.

AH-64 wing stores

The collective control salvo jettison switch is a recessed, push-button that has no guard or cover. The lack of a guard or cover and the switch location on the side of the collective most used by crewmembers makes it vulnerable to inadvertent jettisoning. For example, during a maintenance test flight, the MTP removed his left hand from the collective control in order to write notes and make sensor adjustments. Keeping his attention on the PNVS screen and video display unit, he attempted to adjust polarity of the PNVS picture. When he reached for the collective with his left hand, he inadvertently depressed the salvo jettison switch, jettisoning the wing stores. The number of incidents that have been caused by crewmembers inadvertently depressing the salvo jettison switch has led to issuance of MWO 1-1520-238-50-23. This MWO, which calls for installation of a molded plastic cover for the salvo jettison switch, should prevent future accidental activation and jettisoning of the wing stores.

Research psychologists and other specialists in human engineering and design problems are constantly on the lookout for potential problems in the relationship between man and machine. One of the best sources, probably the best source of all, for identifying problems with Army equipment are the users—those of you who fly and maintain the aircraft. We ask that you be alert for design traps that can be just as deadly as booby traps to your safety and that of your fellow crewmembers. If you spot something, report it through your normal equipment improvement report/quality deficiency report (EIR/QDR) channels. ♦

It's coming . . .

Whether you're prepared or not, the snow and ice of winter are just a few short weeks away.

Operating aircraft in cold weather conditions or an arctic environment presents no unusual problems *if you're prepared*. If crews are aware of the changes that take place and conditions that may exist because of lower temperatures and freezing moisture, risk can be minimized and missions safely accomplished.

Preflight

Pilots must be more thorough in the preflight check when temperatures have been at or below 0°C (32°F). Water and snow may have entered many parts of the aircraft during operations or in periods when the aircraft was parked unsheltered. This moisture often remains to form ice that will immobilize moving parts, damage structure by expansion, or occasionally foul electric circuitry.

Covers afford protection against freezing rain, sleet, and snow when installed on a dry aircraft before precipitation begins. Since it is not practical to completely cover an unsheltered aircraft, parts not protected by covers, parts adjacent to cover overlap, and joints require closer attention, especially after periods of blowing snow or freezing rain.

Crews should remove accumulations of snow and ice before flight. Failure to do so can result in hazardous flight because of aerodynamic and center of gravity disturbances, as well as the introduction of snow, water, and ice into internal moving parts and electrical systems. Particular attention is required for the main and tail rotor systems and their exposed control linkages.

Flight

Hovering helicopters produce the greatest amount of rotorwash, creating the potential for rotor-induced whiteout when operating over

snow-covered terrain. The hazard is not as serious for aircraft with wheels as it is for skid-mounted aircraft. Aircraft with wheels can be ground taxied safely to the takeoff point with only minimum blade pitch, thus reducing rotorwash. Takeoffs pose a hazard in snow-covered terrain because of the lack of visual cues for peripheral vision. And landing can present a significant hazard unless aircrews follow proper landing procedures. Selecting an improper landing technique can also result in whiteout. FM 1-202: Environmental Flight recommends specific techniques pilots should use when taking off from and landing on snow-covered areas.

Maintenance

The increased requirement for aircraft maintenance stems directly from low temperatures. Operation at temperatures below -50°F should not be attempted except in emergencies, unless the aircraft with the appropriate winterization kit and auxiliary systems has proven reliable at lower temperatures. The following special precautions and equipment are necessary to ensure efficient operation of the aircraft:

■ Reciprocating engines should not be started at temperatures of 10°F and below without the use of an electrical power unit for assistance in starting. A source of external heat for application against the engine accessory case, carburetor induction system, oil pump, and battery will ensure easier starting.

■ The standard portable combustion type heater that includes a blower and flexible hoses for application of heat to localized areas may be used for preheating aircraft components and systems before starting. In addition to preheating engines for starting, these units may also be employed to heat specific portions of the aircraft so that maintenance personnel can work without gloves. (Don't forget that touching cold metal with bare hands in below-freezing temperatures can tear the skin right off your hands.)

■ For aircraft with internal combustion heaters, the heaters should be turned on to warm the aircraft for at least 20 minutes before operating hydraulic systems. Otherwise, damage to the system is more likely.

■ Some system gauges/indicators are unreliable until the system reaches operating temperature.

■ When temperatures remain below freezing, aircraft batteries not in use should be removed and stored in a warm place.

■ When transferred from a warm to a cold environment, some aircraft engines, transmissions, and hydraulic and landing gear systems may require a different kind of lubricating oil or hydraulic fluid.

■ Thickening of oils at low temperatures presents problems in operation and starting. Installing standard winterization equipment that includes baffles on oil coolers and engine cowl baffles can aid in maintaining proper temperatures. Oil dilution units may also be installed, although it is normally satisfactory to drain the oil from engines at the end of the day's operations and to heat it before replacing it in the engine.

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

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

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

You can't control or eliminate all risks associated with cold-weather operations, but you can learn to manage them. Prepare now by brushing up on techniques and procedures you'll be using in the months ahead. Even in those areas where summer lingers, watch out: it's coming—old man winter will soon be here. Don't let him catch you unprepared. ♦

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class B

H series - While performing hover work, student overcontrolled cyclic, causing rearward drift. IP got on controls and announced "I have the controls," but he was unable to overpower student control inputs and prevent aircraft nose and main rotor from striking ground. Aircraft impacted ground in right-nose-low attitude, coming to rest upright on its undercarriage. Crewmembers exited unassisted. 9232

UH-1 Class C

H series - Following NVG training flight, crew found damage to tail rotor blades. Observer suspected aircraft may have hit tree during approach, but did not tell crew. Crew noticed no unusual vibrations or feedback in controls.

V series - Upon hovering backward, crew heard whining noise. About 2 seconds later, noise increased and crew heard grinding sound and felt vibration in pedals. Crew made immediate landing. Postflight revealed a ½-inch hole in right side of 42-degree gearbox. Part of gear was lying on left side.

UH-1 Class D

H series - During training, OH-58 pilot informed UH-1 crew that tail rotor drive shaft cover was loose. UH-1 landed and crew found cover was damaged. Suspect dzus fasteners were not properly secured.

UH-60 Class D

A series - Aircraft was trail in night formation flight during deployment. Avionics door flew open and flipped back, shattering center windshield. PC, who was on controls, reduced collective and decelerated. Systems check revealed master caution and FPS warning light, which PC cleared by power-on reset. Aircraft landed without further incident. CE failed to secure avionics door after performing work inside compartment.

Attack

AH-1 Class E

S series - On return to firing line, PC, in rear seat, elected to change radio frequency without transferring controls. Aircraft contacted treetop. Gunner was looking through TSU and did not see tree.

S series - Aircraft experienced slight compressor stall at 50 feet agl. Crew reduced collective, tgt rose to 750°, and torque rose to about 50. Maintenance replaced fuel control, overspeed governor, and bleed band actuator.

AH-64 Class E

A series - Crew had completed first half of training mission when backup control system light illuminated. Crew shut down aircraft, and maintenance replaced pilot directional control shear pin. Pedal mismatch exceeded limits of directional system.

Cargo

CH-47 Class D

D series - Crew allowed aircraft to drift over construction site about 15 feet below ground level. Cement forms blew over, injuring worker. FE failed to notify PC they were drifting over construction site. PC failed to tell CP to correct for drift.

CH-47 Class E

D series - As FE raised ramp for taxi and takeoff, she failed to see seatbelt had slipped between ramp and fuselage. Seatbelt buckle was forced into aircraft skin at station 495, puncturing sheet metal.

D series - Camouflage netting was blown down by hovering aircraft. Soldier on ground was slightly injured when hit on head by crossbeam.

Observation

OH-6 Class E

A series - While hovering OGE for AO to adjust 4.2-inch mortar firing, pilot failed to conduct fuel consumption check. After mission was completed, AO noted low fuel light was on and fuel gauge indicated 60 pounds. Pilot made uneventful landing.

A series - Aircraft, with doors removed, was trail in flight of two. At 200 feet agl following takeoff, fire extinguisher clamp came loose and extinguisher fell to ground. No damage or injuries resulted.

OH-58 Class C

C series - Crew was flying right circle at 400 feet agl, about 60 knots,

Class A Accidents through August

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	5	4
	December	3	1	3	0
2d Qtr	January	7	3	1	0
	February	13	1	13	0
	March	4	4	8	2
3d Qtr	April	3	1	2	0
	May	4	1	3	1
	June	0	2	0	2
4th Qtr	July	2	2	0	1
	August	3	1	0	0
	September	3		2	
	Total	49	20	39	10

when passenger requested they fly lower and slower for better recon. PC leveled aircraft at 50 feet above trees, 40 knots, and entered approach to area. As PC turned to downwind heading at 10-15 knots, still 50 feet above trees, aircraft suddenly dropped and began rapid descent. PC applied 100-percent torque and attempted to increase forward airspeed. Aircraft settled into trees, and PC applied 120-percent torque to stop descent and recover out of trees. After landing in open field, crew found tree strike damage to all rotor blades and vertical fin. Investigation continues.

OH-58 Class D

C series - Left armor side panel came open during cruise flight. Crew heard loud bang, and aircraft yawed left 15 to 25 degrees. Pilot in right seat mistook condition as engine failure. As examiner in left seat was trying to stow armor panel, pilot reduced collective and pulled aft cyclic, causing main rotor to overspeed to 112 percent for 2 or 3 seconds before examiner could take controls and add collective to put aircraft back into normal limits. Aircraft made uneventful landing. Rotor head and blades were sent to depot for inspection.

OH-58 Class E

A series - During NOE flight, master caution and transmission chip detector lights came on. PC landed and notified maintenance. Inspection revealed mast bearing race failed, causing metal particles to be ingested by transmission.

Fixed wing

C-12 Class C

D series - Aircraft was in straight and level flight at 24,000 feet when crew saw electrical flash in front of aircraft. There was no indication of lightning strike or damage. After normal landing, crew found evidence of strike.

C-12 Class D

C series - During flight in IMC at FL160, crew saw bright flash and heard loud bang. Crew suspected lightning strike but continued flight and made normal landing. Postflight inspection revealed damage to right propeller, inboard flap, and elevator.

JC-23 Class A

A series - Aircraft was in cruise flight, 5,500 feet agl, performing an airworthiness evaluation. During cruise configuration with gear and flaps up, crew was performing single-engine stalls with the critical engine (right side) shut down and prop feathered. As aircraft approached stall speed, aircraft snap-rolled right about 115 degrees. The aircraft continued to roll about the right wing in a nose-low attitude. At about 4,000 feet agl, aircraft stabilized in a fully inverted position but continued slowly rotating counterclockwise. Aircraft impacted ground inverted, nose low, with little forward airspeed. Postcrash fire ensued. Three fatalities, aircraft destroyed. 9233

U-21 Class D

A series - During through-flight inspection, crew noticed right oil cooler fairing was missing. Oil cooler fairing separated from aircraft sometime between takeoff and landing, causing two dzus fastener attachment holes to be enlarged. Maintenance repaired damage and replaced oil cooler fairing.

F series - Crew was deviating about 20 nm north of weather depicted on weather radar. At about 15,000 msl, minus 4°C, in IMC, crew saw flash of light on right side of cockpit and heard sound of lightning strike. Cockpit indications were normal, and aircraft landed about 30 minutes later. Postflight inspection revealed damage to one blade of No. 2 prop, underside of aft fuselage, tail fin, tail cone, and left aft wing tip. Right wheel well had 1½- by 3-inch hole.

Messages

■ Aviation safety action maintenance mandatory message concerning one-time inspection of Kaman 747 blades (TB 1-1520-244-20-36) on all AH-1 aircraft (AH-1-92 ASAM-13, 051800Z Aug 92). Summary: Two Kaman 747 blades have been found with cracks in the main spar area. Cracks are attributed to severe winds. Purpose of this message is to direct a one-time inspection of all Kaman 747 blades and to provide advance manual change for TM 55-1520-234-23 and TM 55-1520-236-23 requiring inspection of blades when nonrotating blades are unrestrained and/or have torn loose from their mooring when subjected to winds of 60 mph or higher. Contact: Ms. Terese McGrew or Mr. Dong Nguyen, DSN 693-2085, commercial 314-263-2085.

■ Aviation safety action informational message concerning airframe fuel filter installation on all OH-58A/C helicopters (OH-58-92-ASAM-16, 061800Z Aug 92). Summary: A unit reported the throttle linkage was binding after installation of MWO 1-1520-228-50-48. The fuel elbow had been positioned improperly and the fuel line was contacting the throttle linkage in the engine compartment. Another unit reported an accumulation of water in the airframe fuel filter. The purpose of this message is to provide information about the airframe fuel filter. Contact: Mr. Lyell Myers, DSN 693-2285, commercial 314-263-2285.

For more information on selected accident briefs, call AV 558-3262/3410, commercial 205-255-

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REPORT OF ARMY AIRCRAFT ACCIDENTS

Risk management vs. risk assessment

What's the difference?

The terms "risk management" and "risk assessment" are often used synonymously when, in fact, they are different. And safety personnel often use these terms as though they are safety specific, when, in fact, they are not. It's time to set the record straight.

Risk management is a tool that helps leaders make sound decisions in a logical manner. Used in a positive command climate, risk management can become a mindset that governs all unit missions and activities.

Risk management enables leaders at all levels to do exactly what the term implies: manage risks. The term is best applied generically, as leaders are confronted by a variety of risks: training risks, fiscal risks, and safety risks. Safety risk management, however, is a specific type of risk management. This article is directed toward safety risk management and how it fits into the leader's tool bag.

Risk management in theory

Risk management is a five-step cyclic process that is easily integrated into the decision-making

process outlined in FM 101-5: Staff Organization and Operations. The decision-making process is ingrained in military leaders and readily lends itself to safety risk management, so rather than advocate safety risk management as a separate consideration, let's put it into a process that leaders understand.

A risk assessment is a part of risk management. It can range from simple to complex. A risk assessment causes leaders to identify hazards and threats and place them in perspective relative to the mission or task at hand. Logically, one cannot identify the risk without first determining what the hazards are.

Risk assessment

- ✓ Identify hazards
- ✓ Assess the hazards

Risk management applied

1 The first step in risk management is to ***identify hazards***. The hazards are the potential sources of danger that could be encountered while performing a task or mission. For example, a unit is given a mission to transport passengers and documents over open seas. Factors that determine hazards are weather, time of flight, terrain, equipment, and training of personnel. There could be other less obvious hazards that would become apparent during planning. Leaders should seek to identify all these hazards before the operation.

2 The second step is to ***assess the hazards*** to determine their cumulative effect on the mission or objective. Each of the hazards is analyzed to determine the probability of its causing a problem and the severity of the consequences should such a problem occur. Exercising judgment on how to eliminate or reduce hazards to lessen the overall risk is inherent in the risk assessment process. This step concludes with a risk assessment that describes the impact of the combined hazards. The result is a statement that quantifies the risk associated with the operation: high, medium, or low.

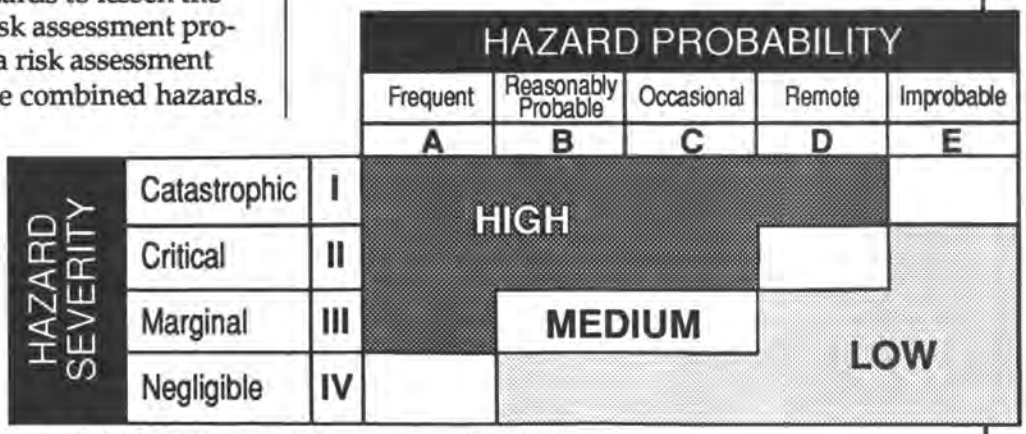
3 The third step is to ***make a risk decision***. Leaders are expected to weigh the risk against the benefits of performing an operation; however, the mentality is more often mission-first. Keep in mind that unnecessary risk can be just as great a hindrance to mission accomplishment as enemy action.

Risk decisions are made at a level of command that corresponds to the degree of risk. As such, guidance should be established as to who makes which risk decisions. For example, high-risk platoon actions may be elevated to the company commander for acceptance or denial. A brigade commander may direct that company-level risk decisions be made by the company commander if the risk is low, battalion commander if the risk is medium, and brigade commander if the risk is high. In the case of battalion-level decisions, the chain may go from battalion to brigade to division.

4 Step four is to ***implement the controls*** established as a result of steps one through three. Included in this step is leader action to reduce or eliminate hazards. Controls may be as substantial as writing an SOP or as simple as conducting a short safety briefing. In the overwater mission scenario, the leader would provide the crew a mission briefing on the specifics of what he has decided. He would then require a briefback from the crew to ensure that all is understood.

5 Step five is to ***supervise.*** However, supervision in this sense goes beyond ensuring that people do what is expected of them. It includes following up during and after an action to ensure that all went according to plan, reevaluating the plan or making adjustments as required to accommodate unforeseen issues, and incorporating lessons learned for future use. ♦

POC: LTC Kurt Pierce, Prevention Programs Division, DSN 558-2119, commercial 205-255-2119



Hazard Risk Assessment Code	Risk Level
IA-ID, IIA-IIC, IIIA	HIGH
IE, IID, IIIB-IIIC, IVA	MEDIUM
IIE, IIID-IIIE, IVB-IVE	LOW

Risk management in practice

B Company receives a mission to transport four passengers and documents over open seas. First, the commander identifies the potential hazards as weather, time of flight, terrain, equipment, and training of personnel.

Now the commander must look at each hazard and assess its impact on the mission. Weather for this mission is forecast to be marginal VFR with light rainshowers. The commander plans for an NVG mission so that some "low-time" NVG pilots can get NVG training. The aircraft scheduled for the mission does not have a radar altimeter, which is required for overwater flight. The commander also knows that some unit members are not current in overwater survival training.

The commander determines there are several things he can do to reduce or eliminate the hazards identified. Because this will be an overwater NVG mission, he selects another aircraft, one with an operational radar altimeter. He decides to replace one of the low-time NVG pilots with an experienced NVG pilot. Knowing that weather in the area can quickly deteriorate below VFR minimums, he makes sure that the pilots are proficient in instrument flight. Since the flight will be over water, the commander ensures that everyone on board has been trained in aircraft underwater egress and is trained and current in use of overwater survival equipment. The commander also specifies that detailed flight planning and a passenger briefing will be accomplished for all aspects of the mission, including crew and passenger actions and responsibilities in the event of ditching. In addition, he requires that a rescue plan be coordinated with flight-following activities. He has now significantly lowered the level of risk by reducing the hazards.

The commander assesses the hazards involved and determines their cumulative effect to be medium risk. After carefully weighing the risk against the need to accomplish the mission, he decides to go ahead.

The commander's work isn't finished. He must ensure his directives are followed and make adjustments to accommodate unforeseen issues that might surface. After the mission has been completed, the commander will require a postflight debrief to obtain lessons learned for future use. ♦

Risk assessment in field situations

Performing risk assessment in the field is limited by the amount of time available for planning and requires flexibility and judgment by leaders. Such risk assessments can be divided into three major categories:

■ *Hasty risk assessment* is required when planning time is minimal. For example, while in flight an aviator encounters an unexpected thunderstorm. Planning time and reaction time are minimal. The pilot must quickly assess the risk and determine whether to land, attempt to fly over or around the weather cell, or abort the mission and return to home base.

■ *Deliberate risk assessment* is used when planning time permits. It involves systematic risk identification, evaluation, consideration of control options and risk decision making, implementation of controls, and supervision. For example, when a commander receives notice of a support mission 3 days in advance, there is ample time to identify and evaluate the hazards, develop and implement controls, and supervise preparations for the mission.

■ *Indepth risk assessment* should be used when risks appear high and time and resources allow thorough risk assessment. Risk assessment at this level requires more sophisticated techniques and professional reviews. An indepth risk assessment is necessary when a unit is to receive a new type of aircraft. For example, a unit in Korea might have their UH-1s replaced with UH-60s, requiring significant changes in its mission and operational parameters. In this case, commanders would also need to review the unit's risk-management program and revise subelements such as the SOP. ♦

Gambler or prudent risk taker?

Commanders have a special responsibility to create a positive climate in which risk-assessment principles will be applied and "gambling" eliminated. FM 100-5: Operations demands leaders who are willing to take risks. It specifically calls for "audacity" and "demands subordinates who are willing and able to take risks and superiors who nurture that willingness and ability in their subordinates." However, the manual advocates prudent risk taking, not gambling.

A risk is prudent when a leader systematically applies the risk assessment process and reaches a decision that the identified risk is warranted. Gambling is taking a risk without assessing the potential costs.

The following scenarios illustrate how command climate can influence risk taking.

The gambler

The pilot-in-command (PC) is preflighting an aircraft for a reconnaissance mission in support of an Army Training and Evaluation Program (ARTEP). Because of a communications breakdown, the mission was not relayed to the aircrew until the last minute. The PC knows that his commander is "sweating bullets" in his efforts to get the mission going and thinks if they hurry they might not be noticeably late. If the PC follows the steps required by the preflight checklist, it will be a few minutes longer before the crew can take off for the mission. To get ready for takeoff as quickly as possible and without performing a risk assessment to determine the possible consequences of his actions, the gambler decides to omit several items on the preflight checklist. The omissions are observed but not corrected. In fact, the commander praises the gambler for timely mission accomplishment.

On the day before his next scheduled mission, the gambler is feeling a little "under the weather." Since he got away with gambling before, he decides to try it again. He doesn't want to tell his commander he can't perform the mission because he likes being known as a mission achiever. Besides, this training is supposed to be as realistic as possible, and the gambler knows that in a real "shooting war" he will have to take chances. So the gambler self-medicates, and during the otherwise routine mission, he becomes incapacitated and is involved in an accident.

Because he had gambled before and had been rewarded for it, he was hooked—like a gambler—and tried it again. He was gambling that his luck would hold out.

When gambling goes unpunished and sometimes rewarded, the unit will experience a steady deterioration of both standards and risk-control measures. Sooner or later, this will result in losses. The commander, by his tacit approval of unapproved practices, may be setting a new, lower standard for the unit.

The prudent risk taker

Given the same scenario, the reconnaissance mission is assigned to a PC who intends to perform the task boldly and aggressively, but this aviator is a prudent risk taker. The PC realizes that performing all required steps in the preflight checklist will take a few minutes longer. However, he mentally reviews the risk-assessment process and determines that the potential cost of omitting preflight steps outweighs the benefits of the few minutes to be gained from taking the risk. The prudent risk taker elects to follow by-the-book preflight procedures rather than take any shortcuts as the gambler did.

The commander notices that the prudent risk taker is still preflighting the aircraft. Eager to get the mission started, the commander complains about the time delay. The prudent risk taker tells the commander, "Sir, I'm preflighting the aircraft as fast as possible." In an attempt to clarify the situation, the prudent risk taker asks the commander, "Sir, should I skip the preflight?" Frustrated, but not stupid, the commander realizes that the prudent risk taker is right—the benefits to be gained from compromising preflight standards do not outweigh the risks. The commander would much rather have to explain the delay than to have to explain that he lost an aircraft because he told the pilot to take a shortcut.

In addition to setting a positive example, it is the unit commander's responsibility to ensure that aviators have a solid understanding of the unit's risk-management program and to ensure that every crewmember can apply risk-assessment principles effectively. Commanders must then reward prudent risk takers and punish gamblers, because in the long run, gamblers will lose. The result will be the bold, smart risk takers demanded by FM 100-5 and a more combat-capable command. ♦

POC: Mr. Paul Dierberger, Training Division, DSN 558-4479/6410, commercial 205-255-4479/6410

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - During NVG navigation and formation training flight, four UH-1 aircraft landed at en route airfield for refueling and weather update. Because of deteriorating weather conditions along planned route, AMC elected to cancel remaining training and return to home station by direct route at 500 feet agl. Flight departed, and about 6 miles east, trail aircraft hit ground in level attitude. No fatalities. 9201

V series - On final approach, pilot ran out of left pedal. As PC took controls, aircraft began slow right spin. PC lowered collective, added forward cyclic to gain airspeed, and maintained full left pedal, attempting to arrest right spin. Low rotor audio sounded and rpm light came on. Aircraft continued slow spin, struck ground, and rolled left 90 degrees, coming to rest on left side. Two minor injuries. 9160

UH-1 Class C

H series - Following maintenance for compressor stall, MP conducted turbine engine analysis check. As aircraft passed through 10,000 feet, MP began slow descent to 8,000 feet. As MP applied power to level off, aircraft began having severe compressor stalls. MP reduced power and ensured de-ice and bleed air switches were off. MP continued reducing collective until it was at near zero pitch. Compressor stalls continued until collective was in near full-down position. Aircraft experienced 8 to 10 compressor stalls but no major yawing and egt remained at 510 to 540°C, torque at 25 to 50 psi, and N1 at 84 to 86 percent. MP completed minimum-power approach landing. Investigation in progress.

H series - On takeoff, pilot noted engine oil temperature at 112°C and notified PC. PC evaluated other instruments, thought that it was an indicator problem, and continued flight. Because aircraft was operated for 1.5 hours at 112°C, engine must be replaced.

V series - While flying NOE along river bed during SAR mission, medic saw wire and announced "wires." PC decelerated, aircraft settled, and tail rotor struck and cut wire. PC landed aircraft without further damage and performed normal shutdown.

UH-1 Class D

H series - While PC was completing walkaround inspection, he allowed pilot to start engine even though three earlier starts had been marginally within egt limits. Pilot started engine, and egt rose to maximum of 660°C and exceeded 625° for 13 seconds. Pilot failed to follow procedures for engine fire during start when it became apparent that egt limits would be exceeded.

UH-60 Class B

A series - At 175 to 200 feet agl and 120 knots while returning for second look at previously reconned communications and signal equipment site for upcoming FTX, aircraft struck three-strand power line. Lower left WSPS cut one wire, and other two wires broke. Master caution and No. 2 primary servo advisory lights came on. PC placed aircraft in landing attitude. During descent, PC executed 90-degree left turn and attempted to land in rice paddy. As aircraft touched down, PC realized aircraft was going too fast to stop before hitting berm and applied collective and aft cyclic. Aircraft struck 16-inch berm and came to rest upright at 22-degree angle. Aircraft sustained extensive damage. No injuries. 9202

L series - After aircraft departed rearm pad, crew heard loud whining noise and turned to land. Crew then heard loud bang, and aircraft lost power. Aircraft landed hard, damaging FLIR. Suspect shaft failure between engine and transmission. 9203

UH-60 Class C

A series - During NVG mission, pilot was attempting to pick up M102 howitzer and allowed aircraft to drift toward another aircraft that was also picking up external load. Power requirements increased because of rotor-wash turbulence, and tgt limits were reached. Aircraft started to oscillate, and IP took controls and jettisoned howitzer to regain aircraft control. Investigation in progress.

A series - During annual NVG evaluation checkride, pilot began approach to confined area. About 10 feet agl, aircraft

Class A Accidents through 30 Nov

	Month	Class A Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	3	4
	December	3		3	
2nd Qtr	January	7		1	
	February	13		13	
	March	4		8	
3rd Qtr	April	3		2	
	May	4		3	
	June	1		0	
4th Qtr	July	2		0	
	August	2		0	
	September	3		2	
	Total	49	4	37	4

began undetected drift and struck trees, damaging four main rotor blades and one tail rotor paddle. Crew landed aircraft without further damage.

Attack

AH-1 Class A

F series - Following overwatch for air assault mission, aircraft departed battle positions, made right-pedal turns, and flew down ridgeline to join up in free-cruise formation. At 150 feet agl and 50 to 60 knots, Chalk 5's main rotor blade struck right skid of Chalk 6 as Chalk 5 passed under Chalk 6. Chalk 5 descended, hit ground, and burst into flames. Chalk 6 continued forward about 300 meters and crashed into another ridgeline. Two fatalities. 9204

AH-1 Class E

E series - During NOE attack mission, PC failed to properly clear aircraft and allowed blades to strike tree. Crew was unaware of tree strike until postflight inspection revealed damage to both main rotor blades.

E series - During hover engagement, pilot failed to clear aircraft and allowed main rotor blades to hit tree branches. PC took controls and landed aircraft without further damage.

F series - While holding over airfield at 8,000 feet msl and 90 knots during instrument training flight, crew heard single loud bang. Aircraft yawed left 5 degrees, and crew noted tgt descending through 800°C. Crew made uneventful landing.

F series - Crew terminated aircraft at 25-foot hover in firing position. Torque and tgt stabilized for 30 to 45 seconds. As pilot began searching for targets, aircraft began to settle rapidly. Pilot failed to anticipate effects of gusty winds and light turbulence. Power required to hover under adverse conditions was greater than indicated in the dash 10. As pilot gradually increased torque, tgt fluctuated to 880°C and torque increased to 102 percent for 1 second. Pilot stopped descent at 15 feet above treetops and landed aircraft without further damage.

S series - After refueling aircraft at forward arming and refueling point, pilot in back seat taxied aircraft about 300 meters and landed about 2 feet left of bush in confined area. Tail rotor blades struck bush.

AH-64 Class A

A series - At 3,500 feet pressure altitude (PA) and 80 knots during postphase maintenance test flight, MP initiated autorotative rpm check. While descending through 2,000 feet PA, MP noted rotor rpm at 94 percent and fuel remaining at 1,800 pounds. When MP attempted to recover from autorotation, rotor rpm did not increase and continued to decay below 89 percent, bringing generators off line. Aircraft continued descent into trees. Minor injuries. 9205

AH-64 Class C

A series - During NOE flight, crew misjudged clearance and allowed main rotor blades to strike tree. Crew heard slight thud but felt no abnormal feedback in controls. Crew returned to airfield and made uneventful landing. Postflight inspection revealed damage to main rotor blades.

AH-64 Class D

A series - Following 0.8 hours of flight, aircraft was at 50-foot hover when aircraft vibrations caused right outboard pylon to unlatch and drop rocket pod, destroying M261 rocket pod with 12 2.75-inch practice rockets.

AH-64 Class E

A series - While hovering OGE, transmission chip light came on. Crew landed aircraft without further incident. Main transmission had failed internally.

A series - Following takeoff from forward arming and refueling point, aircraft was at 40 knots and 200 feet agl when master caution light came on along with the nose gearbox No. 6 oil psi segment light. Crew achieved single-engine airspeed and climb and then pulled No. 1 engine back to idle. Crew continued flight back to airfield and made uneventful run-on landing. Postflight inspection revealed nose gearbox No. 1 fill plug had come off.

A series - Following NVG flight, crew found No. 5 drive shaft cover open and damaged. Crew chief had opened cover and failed to secure it during walkaround inspection before takeoff.

A series - Flight of two aircraft landed for refueling just ahead of severe thunderstorm. After shutdown, crew did not have adequate time to secure aircraft before rain, lightning, and high winds hit. Winds of about 50 knots caused rotor blades to lift, contacting static stops on rotor hub. Suspect damage to main rotor hub and blades.

A series - At 1,000 feet agl during climbout, crew heard loud popping noise. Crew returned to airfield and landed without further incident. Inspection revealed separation on rotor blade.

Cargo

CH-47 Class C

D series - During slingload operation, FE was positioned over center cargo hook with cargo pistol grip in left hand. FE began to slide, grabbed center cargo hook to stabilize himself, and released load simultaneously. Hook opened, and FE's right hand was crushed between hook and actuating cylinder.

D series - Hookup person and person holding grounding rod received electrical shock and fell off HMMWV during slingload operation.

CH-47 Class D

D series - While attempting to hook up two 500-gallon water blivets and two JP4 blivets, hookup person was standing near blivets, requiring aircraft to descend dangerously close to load and ground support personnel. As aircraft descended, aft cargo hook struck and punctured one water blivet. Pilot landed aircraft without further incident. Inspection revealed no damage to aircraft.

CH-47 Class E

D series - During NVG cruise flight with tandem load, PC smelled fuel. Crew chief checked ramp area and found steady stream of fuel coming from No. 2 engine manifold vent. PC returned aircraft to airfield and completed landing without further incident. Maintenance found damage to N2 section and accessory gearbox on No. 2 engine.

D series - During cruise flight, master caution and utility hydraulic system caution lights came on.

Simultaneously, FE found that utility hydraulic pressure was decreasing rapidly and fluid level was low. FE began servicing utility system, and crew chief began searching for leak. Crew chief located leak at bulkhead just aft of forward transmission. Forward fitting on hydraulic pressure line to cargo winch had vibrated loose, causing loss of fluid. Crew landed aircraft at nearest available site, checked for more leaks, serviced system, and returned aircraft to home station.

Observation

OH-6 Class D

A series - During touchdown autorotation, crew failed to level aircraft before touchdown and tail skid hit runway. Crew found no damage and continued mission. Damage to tail skid and vertical fin was found during next daily.

G series - At 100 feet agl and 40 knots during aerial gunnery mission, loose vent cap flew out of aircraft and hit tail rotor blades, damaging one blade.

OH-58 Class A

C series - During NVG training mission, aircraft hit ground in near-level attitude. Main rotor system made initial ground contact. Aircraft then struck ground with left skid, followed by left front of cockpit and second main rotor blade strike. Aircraft spun on nose, came down on left side, and made third main rotor blade strike. Main rotor system, transmission, and fuel cell separated from aircraft. Two fatalities. 9206

OH-58 Class C

C series - At NOE altitude while hovering laterally to right, right skid contacted tree. Aircraft rolled over and came to rest inverted. Crew egressed unassisted.

C series - During climbout, pilot noticed torque fluctuation, followed by left yaw, low rotor rpm audio, and engine-out light. Aircraft hit ground with tail skid, bounced forward, and hit ground level with forward rocking motion, severing tail boom with main rotor system. Aircraft spun and came to rest on right side. Investigation continues.

D series - During simulated engine failure at altitude, IP reset both KY-58s during descent and recycled AC generator. About 75 to 85 feet agl, pilot began to decelerate. IP realized throttle was not fully open and attempted to roll throttle up. Aircraft touched down in slight left yaw and skidded to stop, damaging skids, clipping tail rotor drive shaft cover, and tearing honeycomb at aft left crosstube attaching point.

OH-58 Class D

A series - During aircraft qualification training, IP was demonstrating masking and unmasking. Between maneuvers, aircraft was caught in downdraft and began descending at about 100- to 200-feet per minute. To arrest rate of descent, IP pulled 110-percent torque, overtorquing aircraft. During recovery, tail rotor struck tree. Damage requires replacement of tail rotor blades, yoke, and gearbox and main drive shaft.

A series - During confined area landing, PC failed to properly clear aircraft and allowed tail rotor to strike dead bush. Crew completed shutdown and inspected aircraft, finding no damage. A thunderstorm with forecast hail and 45-knot winds was approaching, and PC elected to fly aircraft back to home station. Postflight inspection revealed damage to tail rotor blades.

OH-58 Class E

A series - During low-level flight, pilot failed to maintain terrain clearance and aircraft struck dead tree, causing small hole in right chin bubble.

D series - At 20-foot OGE hover, crew heard loud grinding noise from rear of aircraft and felt vibrations. IP took controls and landed aircraft without further incident. Inspection revealed that tail rotor servo mounting bracket was loose.

D series - During NOE flight, hand-held GPS fell from instrument console and cracked copilot's chin bubble.

Fixed wing

C-12 Class B

H series - Aircraft landed with landing gear retracted. Investigation in progress. 9207

C-12 Class C

H series - While climbing through flight level 170 to flight level 220, crew observed bright flash out left side of aircraft and heard dull bang. While receiving ATC clearance to return to home base, crew observed another bright flash and heard loud bang. Lightning had struck left propeller and exited through trailing edge of left wing.

C-12 Class E

C series - Crew had completed landing and taxiing when seal failed and left main strut collapsed. Crew completed shutdown without further incident.

L series - About 20 minutes after takeoff, No. 2 engine cowling front latch popped open. Crew returned aircraft to home base without further incident. Suspect latch pin did not fully seat in its guide even though the latch and cowling appeared to be secure.

U-8 Class E

F series - During after-takeoff check, IP noted left main landing gear indicated down with gear handle in up position. Crew made uneventful landing. Inspection revealed up limit switch had failed.

F series - On takeoff, small birds flew off runway and into aircraft flightpath. Crew completed climbout, flew traffic pattern, and made uneventful landing. Propellers showed signs of bird strike, but no damage.

Maintenance

AH-1 Class E

F series - After conducting hovering autorotations, crew noticed transmission oil pressure was 38 psi at 100 percent rpm with collective full down. Inspection revealed that crew chief had installed wrong type transducer.

AH-64 Class E

A series - During flight, No. 1 engine oil pressure began to drop. Crew made successful single-engine landing. Loss of oil pressure was caused by improperly installed O-ring. Postflight inspection also revealed that crew had failed to secure No. 1 engine door before takeoff.

CH-54 Class C

B series - While ground

taxiing from parking, crew completed wheel brake check and began right turn. Right turn was followed by strong shudder, unusual vibrations, and uncommanded right yaw. Crew chief reported that tail rotor was not operating properly. PC shut down aircraft. Tail rotor pitch change beam assembly retaining nut came off, allowing pitch change beam assembly to slide on pitch change servo rod. Suspect retaining nut was not properly saftied.

OH-58 Class E

A series - During NOE hover, pilot noted engine oil temperature at 118 to 120°C. Crew landed aircraft and engine oil temperature went to 110 to 112°C for 1 minute and then dropped to 107°C. During return flight to airfield, engine oil temperature again climbed to 110°C for 25 to 30 seconds and then dropped to 107°C. Crew completed normal landing and shutdown. Maintenance personnel removed engine oil tank shroud and found three brushes and torn pieces of paper shop towel in area.

D series - After refueling, pilot brought aircraft to stationary 3-foot hover, turned 180 degrees, and had just begun moving forward when engine failed. Maintenance found fuel boost pump cartridge, which had been replaced before flight, installed incorrectly.

U-8 Class E

F series - When crew extended landing gear, left main landing gear indicator showed "in transit." Crew made uneventful landing. Inspection revealed incorrect wire stud had been installed.

U-21 Class E

A series - During preflight inspection, pilot found drag link on right main landing gear installed upside down, causing drag link to hit against actuator.

Messages

■ Safety-of-flight technical message concerning one-time inspection of the tail rotor yoke assembly for specific serial numbers on all UH-1H/M/V and EH-1H/X aircraft (UH-1-91-02, 091630Z Sep 91). Summary: Safety-of-flight (SOF) message UH-1-89-12 was issued to recall about 1,600 tail rotor yokes that were manufactured with possible forging defects that impact the fatigue (retirement) life of the yoke. About 900 of the 1,600 yokes have been inspected and returned to supply with either minor or no rework performed. These yokes are identifiable by the prefix "TT" and the suffix "A" on the serial number. Several deficiency reports have been received on these reissued yokes for the same defects that generated SOF message UH-1-89-12. About 300 yoke assemblies were not returned under SOF message UH-1-89-12 and will not have the suffix "A." These yoke assemblies are also included in this SOF message. Due to the lack of proper inspection, rework, and recordkeeping, all reissued yokes are suspect. As a result, a reinspection of these yokes is necessary, which requires that they be removed from service and disposed of according to instructions in this message. This message also contains inspection and correction procedures and recording and reporting requirements. Contact: Roger H. Heidenreich, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of interference between the engine cross shaft and the right-hand fairing access cover on all CH-47D, MH-47D, and MH-47E aircraft (CH-47-92-ASAM-01, 161900Z Oct 91). Summary: There have been several reported occurrences of interferences between the one-piece engine cross shaft and the alignment pin or rivets installed in the right-hand drive shaft fairing access doors. This interference causes wear on the edges of the cross-shaft lugs. The purpose of this message is to require a one-time inspection of the engine cross shaft for scratches and/or scoring and the configuration of the right-hand cover. This message also outlines inspection and correction procedures, parts and requisitioning and disposition instructions, and recording and reporting requirements. Contact: Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning one-time and recurring inspection of T53-L-701 engine fuel heater and filter assembly for evidence of main fuel cell sealant contamination on all OV-1D and RV-1D aircraft (OV-1-91-ASAM-06, 251630Z Sep 91). Summary: An OV-1D had been operating under normal flight conditions when the No. 2 engine began to surge and flamed out (shut down). The aircraft landed single engine without further difficulty. Postflight inspection of the aircraft determined that the cause of the in-flight emergency was fuel starvation of the engine caused by a blocked fuel heater filter assembly. The fuel contaminant was main fuel cell liner sealant from the self-sealing main fuel cell inner wall. Daily and preflight fuel samples did not uncover the problem before this incident. Purpose of this message is to require an inspection of all OV-1D and RV-1D aircraft installed T53-L-701 series engine fuel heater filter assemblies, P/N 045468 and 123998, for fuel cell sealant contamination and to document the requirement for subsequent scheduled 180-day recurring inspections. This message also contains inspection and correction procedures for the engine fuel heater filter assemblies and specifies recording and reporting requirements. Contact: Terese McGrew, DSN 693-9089, commercial 314-263-9089.

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R. Dennis Kerr
Brigadier General, USA
Commanding General
U.S. Army Safety Center

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January 1992 Vol 20 No 3
REPORT OF ARMY AIRCRAFT ACCIDENTS

A matter of judgment

Two aviators were talking on their way to the flight line. One was a seasoned aviator with thousands of flying hours to his credit, the other was young and inexperienced. The young aviator asked the old-timer where he got all his good judgment. The old pro replied that he got his good judgment from his experience. "Then where did you get all your experience?" the young aviator asked. "Well, to tell you honestly," the old aviator replied "I got all my experience from my bad judgment."

Unfortunately, there is a lot of truth in what the old aviator said; too often experience is bought at the price of bad judgment. That is the primary reason we publish accident reviews —so that instead of learning from their own mistakes, aviators can learn from what others did wrong. Although the crew in the following account did not have an accident, the bad judgment they displayed could easily have cost the Army an aircraft and the lives of everyone on board.

The C-12 crew, each with more than 1,000 hours of fixed wing flight time, had completed the first leg of a round-trip mission to pick up two passengers. After refueling at a civilian airport and obtaining a weather report, they talked about the upcoming flight while they waited for the passengers to arrive. The weather was just about perfect. A front had passed through the area a few days before, leaving the east coast almost clear of cloud cover. If their passengers arrived on time, they estimated they should be able to complete the return leg of the flight before 1700.

The passengers arrived at 1500, and after a short briefing, the aircraft was in the air by 1520.

Climbout was normal until the aircraft passed through 15,000 feet, then a chip detector light for the right engine flashed on.

The pilots began checklist procedures and contacted air traffic control, requesting the upcoming altitude of 19,000 feet as their final altitude. The request was granted, and with flight level 190 established, they shut down the engine. The passengers, who were apprehensive about the inoperative engine, were assured that the aircraft was completely capable of sustained flight with the remaining engine. The next decision facing the crew was where they should land.

With only one operative engine, they flew on, passing airport after airport where they could have landed

Up to this point, the crew had followed all of the required procedures. The aircraft operators manual clearly advises that the engine be shut down if safe single-engine flight can be maintained. There are, however, no further instructions that the crew should "land as soon as possible." Pilots are expected to use good judgment when confronted with this kind of situation, but this crew did not live up to expectations.

The C-12 was now 40 miles from its point of departure, and the crew was in contact with Washington Center. Aware that the aircraft was flying single-engine, center advised the crew they would be granted priority handling to the field of their choice. Davison Army Airfield was 40 miles away, Dulles 35, Fredericksburg 65, and Manassas 28. Any of these fields could handle the situation and had facilities to accommodate the crew and passengers. The crew, however, replied that they would continue to their destination, some 200 miles away. Washington Center personnel were surprised by the crew's decision—but their surprise could hardly equal that of the passengers when they learned of the crew's intentions.

A few minutes later, the aircraft was handed off to New York Center, where again an inquiry was made of the crew's intentions. The crew affirmed that they intended to proceed to destination. They flew on, passing Lakehurst, Morristown, Newark, and Teterboro, all suitable places to land the C-12.

They were lucky. They reached their destination and made an uneventful single-engine landing, no doubt patting each other on the back for such a smooth operation. The passengers, however, weren't nearly so impressed by the crew gambling that the remaining engine would continue to operate and bring them to a safe landing. As for the people in the Washington and New York Centers, they have since begun using this story in their training programs—but you may be sure they don't use it to illustrate bravery and good judgment.

Although the lack of good judgment displayed by this crew should have brought into question their capability to pilot an aircraft that operates in an executive flight profile, no corrective actions were taken. Other instances of being overly aggressive, sloppy flying, running over taxiway lights, and lopping off antennas after hitting a tug were known but apparently disregarded.

These two pilots are still flying, and by not taking any corrective action, their leaders apparently continue to condone less than optimal performance. We at the Safety Center can only hope that we never have to deploy a team to investigate the first Class A accident of an Army C-12 aircraft. ♦

—LTC David Regan, Directorate of Investigations and Operations, AV 558-2660, commercial 205-255-2660 and CW4 Robert Rendzio, Military Intelligence Battalion (LI), APO AA

C-12 has outstanding record

Since 1975, when the Army first began keeping accident statistics on the C-12, these aircraft have flown nearly 900,000 hours without a single Class A accident.

This means there has never been a fatality or permanent total disability to a crewmember or passenger aboard these aircraft.

Much of this outstanding record can be attributed to the civilian flight training centers that provide initial and refresher training for C-12 crewmembers. Credit is also due the civilian contractors who maintain the Army's fixed wing aircraft. But above all, this admirable safety record has been achieved by the men and women who fly these aircraft.

Reminder for maintenance test pilots

Two recent accidents occurred while conducting power-off autorotative rpm checks. Both aircraft were in an approved test flight area; however, both maintenance test pilots terminated their approach to an unimproved area, destroying one aircraft and causing substantial damage to the other.

Whenever possible, test pilots should conduct maintenance autorotative rpm checks over a prepared surface at an airport or airfield. Conducting autorotative rpm checks over a prepared surface could prevent further damage to the aircraft in the event a power recovery is not possible. Remember, recent maintenance may have changed the performance of the aircraft, so plan that extra margin of safety for autorotative rpm checks.

And by the way, it should b comforting to know that the f department and crash rescue are nearby in the event of the unexpected. ♦

POC: MAJ(P) George Giffin, Aviation Branch, AV 558-3746/4631, commercial 205-255-3746/4631

BROKEN WING AWARDS

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

■ CW3 Warren A. Aylworth and WO1 Derik J. Willis, N Troop, 4th Squadron, 2d Armored Cavalry Regiment, VII Corps, APO AE 09759. Following about 5.5 hours of flight at 10 to 30 feet agl during an air cavalry troop screening mission well forward of VII Corps forces, the AH-1F was Chalk 2 in a flight of seven returning to refuel and rearm, when the engine failed. At 90 knots and 25 feet agl, a sudden change in engine noise occurred. Immediately, a puff of smoke entered the cockpit from the environmental control unit vents, the master caution light came on, and the crew heard a loud bang from the rear of the aircraft. WO1 Willis, who was flying the aircraft from the pilot's station, lowered the collective about 1 inch to reduce power in the event of a compressor stall. Realizing the aircraft was settling rapidly, he began a coordinated deceleration to hold altitude and compensate for a left yaw. WO1 Willis verified that rotor rpm was in the green and left the collective setting stable. He then visually cleared the flightpath to the front. When he heard the change in engine noise, CW3 Aylworth discarded his map and got on the controls with WO1 Willis. He attempted to make a mayday call on both the FM and UHF radios as together the pilots flew the aircraft to the ground while countering a 15-knot left crosswind. The crew completed a 50-meter ground run along the rough desert floor and noted that turbine gas temperature was at 1,000°C when the aircraft stopped. CW3 Aylworth and WO1 Willis completed emergency shutdown and exited the aircraft. The skill and cockpit coordination between CW3 Aylworth and WO1 Willis allowed them to land the aircraft without injury to themselves or further damage to the aircraft.

■ SGT James R. Frush, U.S. Army Aviation Logistics School, Fort Eustis. During a day cross-country training mission, the AH-1F entered inadvertent instrument meteorological conditions (IMC). The pilot continued looking outside the aircraft in an apparent attempt to fly the aircraft back into visual flight rules conditions. SGT Frush immediately focused his attention on the instruments. According to the attitude indicator, the pilot had placed the aircraft in a nose-down, left-bank attitude. The aircraft was descending at 2,500 feet per minute, and the pilot appeared to

be in a state of fixation. At 500 feet agl, SGT Frush informed the pilot they were in a dive. The pilot reacted by immediately jerking back the cyclic but was unable to control the aircraft with the use of instruments. SGT Frush began speaking calmly to the pilot, talking the pilot through the necessary procedures to regain positive control of the aircraft. He continued talking to the pilot, pointing out deviations in attitude, altitude, and airspeed as they continued to fly IMC until they were able to land at a nearby airfield. By becoming actively involved in the in-flight emergency, SGT Frush helped the pilot regain aircraft control during an extremely stressful situation.

■ **WO1 Richard J. Gregg, Company B, 2d Battalion (Assault), 2d Aviation Regiment, 2d Infantry Division, APO AP 96524-0460.** While the UH-60 was in a slow climb over mountains during a troop transport mission, the crew heard a loud bang and the aircraft yawed right, followed by the low rotor rpm and engine-out audio. No. 1 engine Ng, Np, and oil pressure decreased, No. 2 engine tgt increased, and rotor rpm decreased. Although the No. 1 engine failed, it did not decouple from the main transmission and subsequently dragged down the rotor speed below flight-sustaining rpm. WO1 Gregg, the pilot-in-command, recognized the engine failure and immediately reduced the collective full down, attempting to maintain rotor rpm. The pilot initiated a left turn away from obstacles, inadvertently decreasing airspeed. WO1 Gregg realized that rotor rpm was not recovering and took the controls. He applied right forward cyclic and full right pedal, attempting to regain airspeed, rotor rpm, and terrain clearance. WO1 Gregg was able to recover airspeed, but he was unable to regain rotor rpm due to the failure of the No. 1 engine to de-couple from the main transmission. He recognized the aircraft would be unable to reach a safe landing area under these conditions. In an attempt to regain rotor rpm, WO1 Gregg instructed the pilot to perform an ECU lockout on the No. 2 engine. Combining the regained rotor rpm with judicious use of collective enabled WO1 Gregg to safely clear obstacles in the flightpath. WO1 Gregg's quick actions in using right pedal and initiating a right turn to regain airspeed and having the pilot perform an ECU lockout to regain rotor rpm were directly responsible for saving 15 lives and the aircraft.

Recap of 4th quarter FY 91 AVSCOM SOF messages

■ **UH-1-91-02 SOF** technical message concerning one-time inspection of the tail rotor yoke assembly for specific serial numbers. TB 1-1520-242-30-02 supersedes TB 55-1520-242-30-01 and is effective until 3 Sep 93 unless sooner rescinded.

■ **AH-64-91-04 SOF** technical message concerning one-time and recurring inspection of main rotor strap assemblies and lead-lag links on all AH-64 aircraft that participated in Operations Desert Shield and Desert Storm.

■ **AH-64-91-05 SOF** technical message concerning inspection of vertical stabilizer barrel nuts and bolts (TB 55-1520-238-20-29).

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

STACOM

CY 91 STACOM INDEX

STACOM 146, 16 Jan

■ Return of 1991 answer sheets for Army Aviation Written Evaluation

■ Third copy of DA Form 759 series documents for IPs, SIPs, and IFEs

STACOM 147, August

■ Certified true copies of DA Form 2408-12

STACOM 148, September

■ Holding Mode 4

STACOM 149, November

■ VFR to IFR flight

STACOM 150 **January 1992**

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

Don Cumbie

Donovan R. Cumbie
Colonel, Aviation
Director, DES

AH-1 fuel control assembly (clarification on 5 December 1990 article regarding adjustment of fuel control assemblies)—***May***

A false sense of security (accident review). Low altitude audio either failed to sound or crew failed to hear it and failed to see visual radar altimeter signal—***2 January***

Airborne use of cellular phones verboten—***May***

Aircrew coordination (correction to 5 December 1990 article) —***30 January***

ALSE advisory message (survival kits now contain noncontrolled substance Imodium rather than controlled substance Lomotil)—***November***

A matter of trust (quality maintenance means giving your best effort to the job all the time)—***2 January***

A proud tradition of Army aviation (history of Broken Wing award)—***August***

Attention Black Hawk crews (reminder that operating in height-velocity-avoid regions can be hazardous)—***November***

Attention flight surgeons (slide presentation on effects of smokeless tobacco use available)—***May***

Attention UH-60 pilots (male aviators needed to participate in research projects)—***30 January***

Aviation NVG maintenance requirements and documentation (message consolidating current aviation NVG maintenance requirements and updating requirements for maintenance documentation, including sample forms)—***June***

Aviation safety action messages

■ AH-64 removal of tail rotor swashplate de-ice brush block on aircraft operating in adverse desert environments only—***2 January***

■ AH-64 recurring erosion inspection of main rotor blade tip caps on all aircraft involved in Operation Desert Shield—***2 January***

■ Informational message concerning installation and use of cryptographic computer Kit-1C on all Army aircraft except EH-60A, EH-1H, and OH-58D —***13 February***

■ AH-1E/F required TOW missile simulator functional check of aircraft that have had MWO 55-1520-236-50-19 applied—***13 February***

■ AH-64 change of operational procedures of power-up/power-down for the TADS/PNVS systems with optical improvement installed on aircraft S/N 89-0192 and subsequent —***13 February***

■ CH-47 revision of checklist for aircraft involved in Operation Desert Storm—***13 February***

■ OH-58D revised inspection/replacement criteria to increase service life of main rotor pitch link bearing—***13 February***

■ T-42A inspection of cabin door latching mechanism—***13 February***

■ OH-58A/C reduction of field inspection requirements on main rotor heads—***April***

■ AH-1S/P deletion from portions of previous AVSCOM message AH-1-91-ASAM-01—***April***

■ General message concerning CCAD hot line and Engine Service Center support for all UH-1, AH-1, OV-1, OH-58, H-6, CH-47, UH-60, and AH-64 aircraft with T53, T55, T63, and T700 engines—***June***

■ UH-1H/V and EH-1 increase in retirement life of the stabilizer center frame assembly—***June***

■ CH-47D calculation of fatigue life for aircraft operation at gross weights above 50,000 pounds—***June***

■ UH-1, AH-1, and OV-1 records inspection of T53 engine fuel controls for undersized pins—***July***

■ OV-1D/RV-1D inspection of installed main recovery parachutes, P/N 11-1-1861, NSN 1670-00-200-4429, for the MK-J5D ejection seats—***July***

■ CH-47D and MH-47D installation of new forward transmission oil cooler air inlet duct on aircraft operating in Southwest Asia—***August***

■ UH-1 alternate method of tracking tail rotor blades using fixed length tail rotor pitch change links—***August***

■ UH-1H/V elevator assemblies with misaligned attachment holes —***August***

■ CH-47 maintenance information on T55-L-712 engines—***September***

■ UH-60 changes to inspection procedures for main rotor elastomeric bearings—***September***

■ CH-47D, MH-47D, and MH-47E inspection of interference between the engine cross shaft and the right-hand fairing access cover—***December***

■ OV-1D and RV-1D inspection of T53-L-701 engine fuel heater and filter assembly for evidence of main fuel cell sealant contamination—***December***

Avoiding attitude problems and postwar mishaps (hazardous or unproductive attitudes can lead to postwar accidents)—***July***

Basic ditching procedures and techniques—***July***

Be prepared—good advice for aircrews too (review of skills needed for cold weather taxi, takeoff, en route, and terrain flight)—***September***

Broken Wings—a proud tradition of Army aviation—***August***

Broken Wing awards (recipients and synopses of emergencies for which awarded)—***2 January, 30 January, May, August, November***

Cellular phone use verboten while in flight—***May***

Change in frequency of publication—***April***

Checklist for cold-weather operations (reduce hazards of flying in cold weather by following checklist)—***September***

Clarification on AH-1 fuel control assembly (followup on 5 December 1990 article)—***May***

Cold-weather flying techniques (review of skills needed for taxi, takeoff, en route, and terrain flight)—***September***

Cold-weather injuries (most common ones and prevention measures)—***September***

Cold-weather protection: C-O-L-D—***September***

Correction to 5 December 1990 article on aircrew coordination —***30 January***

Correction to September UH-60 Class E accident brief—***November***

Crashfax videos available (announcement of latest Crashfax videos)—***May, September***

Crew Error in Night Rotary Wing Accidents (Crashfax video available)—***May***

CY 90 Flightfax index—***16 January***

CY 90 STACOM index—***16 January***

Did you know that... (reminder for *Flightfax* readers to read *Countermeasure* too)—***November***

Ditching procedures and techniques—***July***

Do you believe in caution lights? (accident review) UH-60 crew ignored engine chip light—***30 January***

Dynamic rollover...a new look at an old problem—***November***

Fatigue...an insidious enemy—***13 February***

First quarter FY 91 accident losses (poster showing number and types of aircraft destroyed and number of fatalities)—***30 January***

First student aviator to receive Broken Wing award—***August***

Flightfax needs your help (share your aviation experiences and ideas)—***July***

Followups (information on accidents previously reported)—***30 January, June, November***

Gambler or prudent risk taker? (Scenarios illustrating how command climate can influence risk taking)—***December***

Good maintenance can make the difference (when authorized procedures are not followed, the stage is set for accidents)—***2 January***

Helicopter emergency egress device (underwater breathing apparatus for aircrews)—***July***

Help arrives for NVG maintainers—***June***

How to Survive in Water—Prepare to Ditch (water survival video available)—***July***

Kather named Army aviation trainer of the year—***30 January***

Mechanic's code—***2 January***

Message takes precedence (NVG training message takes precedence over publications)—***October***

Minor congestion—major hazard—***September***

More aircrewmembers receive Broken Wings (22 aviators and crewmembers receive awards)—***August***

New DA Form 285 means better ground accident tracking—***July***

Night vision goggle focusing procedure—***October***

Night vision goggle training message 91-2—***October***

Nomination requirements for Broken Wing award—***August***

Not one more life (General Schwarzkopf message)—***April***

NVG batteries update—***October***

NVG desert operations (airspeed and altitude guidelines for flying over Southwest Asian terrain)—***April***

NVG exportable training package lesson plans and slides—***October***

NVG hours and flight subjects for nonrated crewmembers—***October***

NVG maintainers (help arrives)—***June***

NVG maintenance requirements and documentation (message consolidating current aviation NVG maintenance requirements and updating requirements for maintenance documentation, including sample forms)—***June***

NVG operations references—***October***

NVG—recap of maintenance references—***June***

NVGs: training and operations guidance—***October***

OH-58 crew misjudged altitude above water, failed to hear or see altitude warning signal, and allowed aircraft to descend until it hit the water (accident review)—***2 January***

OH-58 fireguard burned during hot refueling operation

(accident review)—***30 January***

OH-58 pilot's unprofessional behavior cost over $4 million (accident review)—***November***

Overconfidence + lack of training = one life lost (accident review). UH-1 crashed into lake during NVG training mission—***July***

Performance Planning: What the Aircraft Can and Can't Do (Crashfax video available)—***September***

Preventing cold-weather injuries (most common ones and prevention measures)—***September***

Quality maintenance (it's a matter of trust)—***2 January***

Recap of 2d quarter FY 91 AVSCOM SOF messages—***July***

Recap of NVG maintenance references—***June***

Refueling accident injured fireguard (accident review)—***30 January***

Requests for accident statistics (most of the information requested from Safety Center is available at installation or MACOM safety offices)—***July***

Requests for desert operations NVG training video and draft Appendix E, Desert Planning Guide, to TC 1-204—***April***

Rescinded messages (NVG messages rescinded as a result of NVG Training Message 91-2)—***October***

Risk assessment in field situations (types of risk assessments)—***December***

Risk management in practice (scenario illustrating 5-step risk management process)—***December***

Risk management vs. risk assessment (What's the difference?)—***December***

Routine details + training program = seven lives saved (accident review). UH-1 ditched in open sea and all seven on board survived—***July***

Runway friction testing devices update—***13 February***

Safety-of-flight messages

■ AH-64 inspection of all servo cylinders for nonconforming hardware—***30 January***

■ AH-64 addendum to previous message requiring inspection of servo cylinders for nonconforming hardware—***13 February***

■ OH-58A/C and H-6 recall of T63 engine compressor assemblies—***May***

■ CH-47D, MH-47D, and MH-47E inspection and removal of combiner transmissions and engine transmissions containing suspect input pinions and gears—***June***

■ UH-1 and EH-1 operational restriction for aircraft with T53-L-13B, P/N 1-000-060-22, installed engines—***July***

■ CH-47D, MH-47D, and MH-47E update to identify serviceable combiner transmissions and engine transmissions—***August***

■ UH-1H/M/V and EH-1H/X inspection of tail rotor yoke assembly for specific serial numbers—***December***

Safety-of-use messages

■ AN/AVS-6(V1) and AN/AVS-6(V2) manufacturing defect could cause monocular housing to separate from pivot and adjustment shelf assembly—***August***

■ AN/AVS-6(V1) and AN/AVS-6(V2) update on monocular housing assembly bonding problem—***September***

Smokeless can be hazardous (smokeless tobacco can have adverse effects on health and flying duties)—***May***

Smokeless tobacco slide presentation available—***May***

STACOMs for CY 91—***16 January, August, September, November***

The cost of flying in the desert (number of Class A aviation accidents and fatalities during Desert Shield and Desert Storm) —***April***

The high cost of unprofessional behavior (accident review). Pilot's unprofessional behavior cost over $4 million—***November***

UH-1 crashes into lake during NVG training mission (accident review)—***July***

UH-1 ditched in open sea and all seven on board survived (accident review)—***July***

UH-60 male aviators needed to participate in research projects —***30 January***

UH-60 correction to September Class E accident brief—***November***

UH-60 crew ignored engine chip light and aircraft crashed (accident review)—***30 January***

UH-60 crews hit wires during NVG mission—***16 January***

UH-60 crews and the height-velocity-avoid regions—***November***

Update on runway friction testing devices—***13 February***

Visual illusions (ones most frequently encountered by aircrews in Southwest Asia)—***April***

Water survival training program (sample training program of unit that routinely flies overwater missions)—***July***

Water survival video available—***July***

What's the difference? (risk management vs. risk assessment)—***December***

Wires claim two Black Hawks (accident review)—***16 January***

Wire strikes can be a shocking experience (potential exists for injuries or fatalities among ground rescue personnel)—***16 January***

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class B

H series - Following completion of instrument evaluation flight, instrument flight examiner was on controls while landing to parking pad. Tail rotor meshed with parked aircraft and separated. No injuries. 9208

UH-1 Class C

H series - While demonstrating NOE deceleration, IP allowed tail rotor blades to hit pavement and lost aircraft control. Aircraft spun 460 degrees before hitting ground during autorotation.

H series - At 900 feet agl, IP initiated simulated engine failure to forced landing area. Pilot established autorotative descent profile, verifying normal engine idle indications. About 500 feet agl, pilot initiated power recovery. As pilot advanced throttle from idle, engine did not respond. When throttle reached full open position, crew noted very low N2 rpm. Engine oil pressure segment and master caution lights came on. IP took controls at about 400 feet agl. At 200 feet agl, IP initiated deceleration and established near vertical rate of descent. IP applied full collective before touchdown. On touchdown, aircraft rocked as it settled on 5-degree upslope and 4-degree left cross slope. Investigation continues.

H series - During cruise flight on return leg of service mission, engine turbine fan assembly bearing failed, resulting in engine oil temperature exceeding limits. Pilot made uneventful landing at airfield.

UH-60 Class C

A series - Aircraft was parked downwind, and tail wheel would not unlock. Crew repositioned aircraft to parallel taxiway facing 210 degrees. During HIT with No. 1 power control lever in fly position, No. 2 power control lever retarded, and collective increased to 60 percent Ng, crew heard loud bang, followed by loss of rotor rpm and failure of both main generators. Crew performed emergency APU start. When aircraft AC power was restored, No. 1 engine tgt was above 1,000°C for about 10 seconds. Crew completed emergency engine shutdown.

A series - With airspeed less than 40 knots during takeoff, PC made left-pedal turn. PC saw tree, passed it on his left side, and made left cyclic input. Main rotor hit tree, damaging four tip caps.

A series - As Chalk 2 in flight of three, aircraft was carrying slingloaded HMMWV. Pilot unsuccessfully attempted to release load in LZ. Aircraft encountered brownout and began drifting left. As pilot initiated go-around and aircraft began climbing, load began oscillating. Aircraft was pulled left, and crew chief manually released load. HMMWV landed upright on wheels, and aircraft landed without further incident.

A series - Damage to all four blade tips found during postflight inspection. Suspect contact with tree during troop insertions.

UH-60 Class D

A series - While performing night terrain flight takeoff from field site, IP asked pilot to dim instrument lights. Pilot was making radio call and was unable to respond. When IP diverted his attention inside cockpit to dim lights, he felt aircraft settle. He applied collective, but aircraft aft section hit trees, damaging forward antenna set and right side of stabilator.

A series - During preflight, crew discovered damage to left main landing gear. As Chalk 2 in flight of 3 during previous air assault mission, aircraft encountered large dust cloud while on short final. Pilot lost ground reference after touchdown, and left landing gear had landed in hole.

A series - While attempting to locate suitable touchdown point in PZ during NVG mission, crew stabilized aircraft at high hover and began vertical descent. Crewmembers called clear of obstacles and continued descent until tail rotor struck top of small 12-foot tree on right side. Right-side door gunner was not wearing NVGs and failed to see tree.

A series - During VFR climbout, crew heard loud thump. Crew chief found that both left emergency windows had come off and gone through rotor system. Crew aborted mission and made uneventful landing. Inspection revealed damage to one main rotor blade. Suspect worn jettison handle had backed off and vibrated loose, releasing windows.

UH-60 Class E

A series - As aircraft was being ground taxied for takeoff, crew chief reported oil dripping from behind No. 1 engine cowling. Crew shut down No. 1 engine and returned aircraft to parking. Crew chief had failed to replace No. 1 engine oil cap after servicing engine.

Attack

AH-1 Class C

F series - During live-fire JAAT operation, pilot maneuvered aircraft into firing position and immediately began to unmask for firing. Torque reached 102 percent for 1 to 2 seconds. Crew made uneventful landing. Inspection revealed metal chips on transmission oil filter. Suspect that 102-percent torque for 1 to 2 seconds did not cause chips in transmission. Transmission removed and sent to depot for teardown analysis.

S series - During start attempt, aircraft experienced hung start at 90 percent N1 and tgt was no more than 300°C after 35 seconds. For next start attempt, fireguard opened cowling to determine if igniters were operational and saw smoke coming from exhaust. PC then saw tgt passing through 950°C and reaching 1,000°C for 3 seconds. PC motored engine to bring tgt within limits. Engine requires replacement.

AH-64 Class C

A series - During hover taxi, crew saw small amount of smoke coming from right engine nacelle. Postflight inspection revealed damage to No. 2 engine nacelle. V-band clamp holding primary nozzle to engine had failed, and engine exhaust had ducted directly into nacelle.

A series - During NOE flight into battle position, aircraft struck several trees in rising terrain before crew applied power and exited NOE. Crew landed, inspected aircraft while it was still running, determined damage was minimal, and continued with mission. Extent of damage was unknown until aircraft was shut down and postflight inspection performed.

AH-64 Class E

A series - During postflight inspection, crew found catwalk access panel unsecured and damaged. PC had failed to perform walkaround inspection before runup.

Cargo

CH-47 Class C

C series - During cruise flight, crew detected smoke in aft transmission area. MP began descent to land in open field. After landing and before aircraft could be shut down, an explosion occurred in aft transmission auxiliary gearbox area. Hydraulic fluid sprayed onto utility pump, igniting into flames. Crew extinguished flames six times before pump cooled below flash temperature. Crew then shut down aircraft without further damage.

D series - During NVG approach with slingloaded HMMWV, flight engineer inadvertently released load by pressing cargo hook release button on winch hoist control grip instead of intercommunication system button.

CH-47 Class D

D series - Aircraft landed on frozen lakebed, and left front ski broke through ice. On takeoff, left front ski caught under ice, breaking strut support from ski and causing aft portion of ski to hit bottom of fuselage. Crew flew aircraft to field site and landed without further incident.

D series - During training with new aerial firefighting equipment, crew picked up load of water to make practice delivery run. As aircraft approached target point, pilots failed to adequately judge altitude of bucket and adjust flightpath to avoid letting bucket hit ground. As crew chief released water, bucket struck unseen berm, damaging rubber and canvas shell.

Observation

OH-58 Class A

A series - Aircraft was Chalk 4 on ferry flight when flight encountered inclement weather. On return to heliport, aircraft was at 175 feet agl and 30 to 35 knots and turning from downwind to base leg when rotor rpm warning light came on and low rotor rpm audio sounded, followed by left yaw. Attempting to gain airspeed, pilot lowered aircraft nose and simultaneously entered autorotation. High sink rate caused aircraft to land hard on rear portion of skids. Because of the soggy condition of landing area, aircraft did not slide, but rolled over on its nose, coming to rest on its side. One injury. 9209

OH-58 Class C

C series - During local area orientation flight, aircraft was descending from 1,300 feet msl to 50 feet AHO when engine failed at 250 feet AHO. SP took controls and entered autorotation. After all forward movement stopped, aircraft descended vertically about 5 feet through 4-foot-high dense vegetation and landed hard, damaging tail boom, swashplate, transmission cowling, and skid tubes.

D series - During NVG continuation training flight, crew landed on pinnacle and IP decided to reposition aircraft. IP brought aircraft to hover and began moving left. Crew heard noise and aircraft began vibrating. IP landed aircraft and vibrations worsened. IP had allowed aircraft to drift backward into small tree, destroying tail rotor blades and damaging tail boom and horizontal fin stabilizer.

OH-58 Class D

C series - After landing in saddle to conduct visual recon, both tail rotor blades struck a rock as aircraft settled when pilot reduced power for shutdown.

OH-58 Class E

C series - Following painting at another station, aircraft was on return flight to home station when engine began to run rough. During descent for precautionary landing, engine overspeed occurred but was controlled within limits. Engine surged again, and on short final, engine again ran rough. Inspection revealed fuel was contaminated with sand,

Class A Accidents through December

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	3	4
	December	3	1	3	0
2nd Qtr	January	7		1	
	February	13		13	
	March	4		8	
3rd Qtr	April	3		2	
	May	4		3	
	June	1		0	
4th Qtr	July	2		0	
	August	2		0	
	September	3		2	
	Total	49	5	37	4

paint chips, iron, aluminum, and fibers.

Fixed wing

C-12 Class E

D series - During touchdown, pilot applied right rudder to align aircraft with runway. Because his feet were too high on pedals, he inadvertently applied right toe brake, resulting in blown right main outboard tire.

OV-1 Class D

D series - During cruise flight, crew noticed slight yaw and change in engine noise. No. 2 engine surged several times and then failed. Crew performed emergency procedures for engine failure at cruise altitude, declared emergency, and landed aircraft without further damage. Inspection revealed main fuel filters were totally clogged with fuel cell compound due to deterioration of main fuel cell.

SD-3 Class C

30 series - During retraction of landing gear, crew heard loud report and aircraft shuddered. Crew cycled gear down, and nose gear did not lock. ATC confirmed recycling gear did not work. PC declared emergency and landed aircraft, holding nose off ground while decelerating. Nose gear collapsed on touchdown. Suspect nose landing gear retract actuator bolt sheared.

Maintenance

UH-1 Class E

H series - On takeoff, crew noticed that airspeed indicator read zero. PC landed aircraft without further incident. Inspection revealed that lines had not been properly installed when airspeed indicator gauge was changed.

CH-47 Class E

D series - During cruise flight, cabin escape hatch blew out. Phase maintenance team had used unauthorized lubricant to seat seal. Lubricant had not evaporated before flight and allowed seal to slip loose, causing hatch to be sucked out of aircraft.

OH-58 Class E

A series - During training flight, crew encountered light turbulence and engine oil bypass light flickered and went out. PC made precautionary landing. Postflight inspection revealed oil leaking from threads on torque line where it entered engine. Torque line had been installed into the engine incorrectly and seal on engine helicoil had not been properly seated.

Messages

■ Safety-of-use mandatory operational message concerning AN/ALQ-144A (V)1 (NSN 5865-01-229-5859, LIN J01849) and AN/ALQ-144A (V)3 (NSN 5865-01-299-5860, LIN J01917) countermeasures set (CECOM 91-12-01, 181800Z Dec 91). Summary: We have been informed of a potential safety hazard with the ALQ-144A countermeasures set. The ALQ-144A (V)1/3 is presently installed on various utility and attack helicopters. The low-speed modulator is assembled using threaded rods. These rods pass through the two reflectors and are fastened with mechanical nuts on the top of the modulator. These nuts are secured using Loctite. We have learned that some systems may have been fielded without the Loctite. If the nuts loosen and come off the rods, they can bounce around within the modulator, which revolves at 1400 rpm, thereby causing extensive damage to the ALQ-144A. This has already happened to at least one system, damaging the source, low-speed modulator, and outer window assembly. There is no visual inspection procedure currently available to determine whether the Loctite is present on the rods. This presents a safety hazard if the system is turned on. The purpose of this message is to direct all personnel, aviators and/or maintenance, to not turn the system on. This problem does not pose a hazard unless the system is activated. An inspection procedure and corrective actions are being developed with Lockheed Sanders, Incorporated and will be provided within about 10 days. Note: Should any aviation unit currently be involved in an immediate threat or hostile environment where turning this jammer off would be of serious operational concern, contact the Army ASE technical manager, Bill Nicholson, at DSN 693-1477 or commercial 314-263-1477. Mr. Nicholson will be prepared to discuss the relative risk of your threat environment against the relative risk of flying with this jammer turned on before the corrective action being made available to your unit. For technical information, contact Larry Decosimo, DSN 995-4261 or Don Roth, DSN 693-1465. For safety information, contact Tom Brennan, DSN 992-0084.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of generator wire harness at the fire extinguisher discharge tube on all CH-47D, MH-47D, and MH-47E aircraft (CH-47-92-ASAM-02, 201500Z Nov 91). Summary: During flight, the No. 1 generator on a CH-47D aircraft failed and would not reset. The problem was found to be chafed wiring at the discharge tube for the No. 1 engine fire extinguisher from the aft bottle. The purpose of this message is to require a one-time inspection of the generator wire harness and to remove any existing chafing problem. This message also describes inspection procedures and recording and reporting requirements. Contact: Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning rescission of airworthiness releases on tank assembly, 85SDSCC-D-0007-4, and related information on all CH-47C, CH-47D, MH-47D, and MH-47E aircraft (CH-47-92-ASAM-03, 201945Z Nov 91). Summary: Many airworthiness releases have been issued to use the 600-gallon metal tanks, P/N 85SDSCC-D-0007-4, for forward refueling and extended-range missions. An improved version of this tank and related hardware has been developed that standardizes the configuration. This improved extended-range fuel system (ERFS), P/N 85SDSCC-D-0007-2, and its installation and operation are defined in TM 55-1560-307-13&P. This ERFS has a full materiel release and does not require an airworthiness release. The purpose of this message is to:

• Rescind all airworthiness releases for tank as-

semblies, P/N 85SDSCC-D-0007-4.

• Inform the field that the ERFS, P/N 85SDSCC-D-0007-2, is the only authorized configuration other than the Robertson system used on special operations aircraft.

• Provide the field with disposition instructions for tank assemblies, P/N 85SDSCC-D-0007-4, and related hardware.

Contact: Brad Meyer, DSN 693-9089, commercial 314-263-9089.

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

Followups

Information on accidents previously reported

UH-1 Class A

Reported in 26 September 1990 issue as 9037 - While en route during night-aided MAST mission, PC encountered unforecast IMC. Attempting to regain VFR conditions, PC started 180-degree left turn and lost contact with ground. Realizing he was in 30-degree bank and might be losing altitude, PC rolled aircraft level and applied power to initiate a climb. Almost immediately, aircraft struck vegetation, continued forward 290 feet, and crashed upright on ridgeline, causing severe damage to several major aircraft components. All crewmembers exited aircraft unassisted.

UH-1 Class B

Reported in 25 April 1990 issue as 9018 - Downgraded to Class C. During simulated engine failure at altitude terminating with power, IP on controls decelerated until tail rotor hit ground. Tail rotor drive shaft severed at No. 4 hanger bearing assembly when tail rotor drove into mud. Aircraft continued forward about 20 feet before beginning uncommanded right spin. IP simultaneously decreased throttle and lowered collective. Aircraft descended vertically, turned right, hit ground hard, and bounced several times before coming to rest upright in open field. Although crewmembers were uninjured and exited aircraft unassisted, a communications breakdown within flight following caused more than 3-hour delay in crew receiving assistance.

UH-60 Class A

Reported in July 1991 issue as 9130 - During cruise flight on night medical transport mission, crew allowed aircraft to descend and hit ground in wings-level, nose-low attitude. At about 70 knots, aircraft struck ground in powered flight. Impact forces destroyed aircraft and fatally injured all occupants. Adverse weather and poor communications resulted in 38-hour delay in locating crash site. Suspect crew allowed aircraft to descend because of spatial disorientation.

UH-60 Class A

Reported in July 1991 issue as 9131 - With zero illumination and reduced visibility during night-aided, low-level, combat support mission, pilot was unable to control airspeed and altitude. Aircraft ascended above an altitude that allowed visual reference with ground. PC took controls and tried to descend to 50 feet agl. He failed to detect nose-high pitch attitude, which resulted in deterioration of airspeed and an excessive rate of descent. Aircraft hit ground in near-level descent with an estimated force of 10 Gs, causing major structural damage. Crew and passengers received no injuries requiring attention beyond first aid.

UH-60 Class A

Reported in 20 June 1990 issue as 9031 - At 125 feet agl and 25 knots during takeoff from confined-area PZ, crew heard several loud reports from left side of aircraft. No. 1 engine lost power, and aircraft started to descend. PC, flying from right seat, reduced collective, turned aircraft toward an area with least number of trees, alerted crew and passengers of in-flight emergency, and made mayday call. Due to low airspeed and aircraft gross weight, aircraft could not sustain single-engine flight and settled into trees. Aircraft came to rest upright, sustaining major damage to fuselage, main and tail rotor systems, and tail boom. Although crew chief seats were installed and occupied by crew chiefs, 11 passengers not sitting in seats and not secured by restraint systems were thrown around, striking crew chiefs and each other during accident sequence. Debonding and loss of portions of shroud segment honeycomb and filler material in turbine case created an uneven surface on the stator honeycomb. This disrupted airflow around gas generator rotor blade tips and created a resonance frequency and stress (high-cycle fatigue) that caused cracking in the blade root and subsequent fracturing of blades. As turbine blades fractured and departed gas generator turbine rotor, blades became lodged in gas generator, causing engine to fail.

AH-1 Class A

Reported in 25 April 1990 issue as 9019 - During aerial gunnery proficiency training mission, IP was repositioning aircraft to another firing position. At about 15 feet agl and 15 knots, IP heard three loud reports (bangs) from engine compartment, followed by low rpm audio. Aircraft started to descend and yawed right about 180 degrees. IP reduced throttle and increased collective, landing from a high hover onto sandy, rocky surface. Aircraft hit ground in nose-low attitude and rocked aft. During initial contact with ground, main rotor system flexed down and struck cockpit, fatally injuring pilot/gunner. Aircraft came to rest upright on a heading of 300 degrees. Aircraft received minimal undercarriage damage but major cockpit and drive train damage. Aircraft engine experienced compressor stall as a result of long-term erosion of engine components due to sandy environment in which aircraft constantly operated. Engine compressor stall, in turn, caused tail rotor drive shaft to fail.

AH-64 Class B

Reported in 10 October 1990 issue as 9041 - During filming mission, aircraft was at terrain flight altitude and airspeed over small hill. At 30 feet agl and about 70 knots, IP attempted left banking maneuver at bottom of hill. IP failed to apply aft cyclic before applying left lateral cyclic. Aircraft lost altitude during turn and descended until main rotor blades struck two small trees.

CH-47 Class A

Reported in 1 August 1990 issue as 9033 - At 10 feet agl with near-zero airspeed and near-zero ambient light during night-aided approach to a beach, aircraft became engulfed in blowing sand and dust. To assist in maintaining visual reference, pilot initiated left yaw. Pilot lost visual reference and attempted a go-around. Left yaw continued, and right front and rear landing gears hit ground in 90-degree left yaw. Aircraft continued moving along the approach heading of 145 degrees, rolled onto its right side, and came to rest on heading of 050 degrees. Crew chief had failed to use restraint system and was thrown from aircraft during accident sequence and was trapped underneath as aircraft rolled over. Crew chief suffered a fracture of his lower right leg. Other crewmembers were uninjured and egressed unassisted.

OH-58 Class A

Reported in June 1991 issue as 9126 - Before beginning blowing-snow approach with intention of terminating with run-on landing, PC, at the controls in the left pilot's seat, conducted high and low recon of intended landing. However, during recon, PC failed to see rut created by ski-equipped CH-47. Aircraft touched down level and slid forward until right ski-equipped skid dropped into 10-inch-deep rut. Aircraft encountered dynamic rollover condition and rolled right, causing main rotor blades to hit ground. Aircraft continued rolling right and came to rest on its right side. Crew exited through left pilot's door, and using their AN/PRC-90 survival radio, contacted another aircraft that was in the area.

OH-58 Class A

Reported in 21 November 1990 issue as 9106 - Downgraded to Class C. At 200 feet agl and 100 knots during cruise flight over thick, wooded terrain, aircraft experienced total loss of power. Pilot entered autorotation and made 60-degree right turn toward clearing—a small area of 8- to 12-foot spruce trees. Aircraft came to rest, partially cushioned by broken and bent trees, in slight nose-down, left-bank attitude. Aircraft sustained major damage to rotor systems and aft fuselage. Both crewmembers egressed uninjured. Suspect engine failure caused power loss; however, no specific cause could be determined by teardown analysis.

OH-58 Class A

Reported in 10 October 1990 issue as 9042 - At 30 to 60 feet agl during NVG training mission, crew misjudged altitude over varying desert terrain in flightpath. Pilot identified large sand dune and perceived that his altitude would allow aircraft to clear sand dune by 10 feet. However, aircraft struck upslope face of sand dune about 10 feet below its crest. Skids and lower wire strike protection system hit first, causing aircraft to slide about 50 feet before pitching over nose first while decelerating. Aircraft came to rest on its left side. PC exited unassisted but had to assist aerial observer from aircraft.

OH-58 Class A

Reported in 24 October 1990 issue as 9044 - During NVG zone recon, aircrew was conducting screening mission. At 60 knots in near-level attitude, aircraft nose and front portion of skids struck crest of 75-foot-high sand dune about 30 feet from top. Aircraft rotated 90 degrees right, where left skid hit sand dune a second time. Tail boom and main rotor system departed aircraft during crash sequence. Aircraft came to rest on its left side about 50 feet from initial impact point. One crewmember sustained minor injury to left thumb.

OH-58 Class A

Reported in July 1991 issue as 9142 - During night-aided combat mission, commander told crew to land aircraft because weather was deteriorating. At 140 feet agl, pilot in right seat initiated left turn and immediately flew into fog. Pilot failed to commit to instruments and attempted to maintain visual contact with ground, which he could glimpse out aerial observer's door, and reference instruments inside cockpit. Aerial observer announced they were rapidly descending through 60 feet. Pilot pulled enough torque that alert audio sounded twice before aircraft hit ground. Main rotor blades hit ground first, followed by aircraft rolling and breaking off mast-mounted sight. Aft 4 feet of tail boom were cut by main rotor blades. Aircraft came to rest on its left side about 120 feet from first blade impacts and burst into flame. Aerial observer's survival gear caught on object and held him inside aircraft until he was able to cut away gear with his knife. Aerial observer then freed pilot from his shoulder straps and helped him egress.

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R. Dennis Kerr
Brigadier General, USA
Commanding General
U.S. Army Safety Center

Attention NCOs

The next Aviation Accident Prevention Course for NCOs will be 2 through 13 March 1992 at Fort Hood, TX.

POC: Gerri Shelp, Fort Hood, AV 737-6413 or MSG B. Vick, U.S. Army Safety Center, AV 558-4479, commercial 205-255-4479

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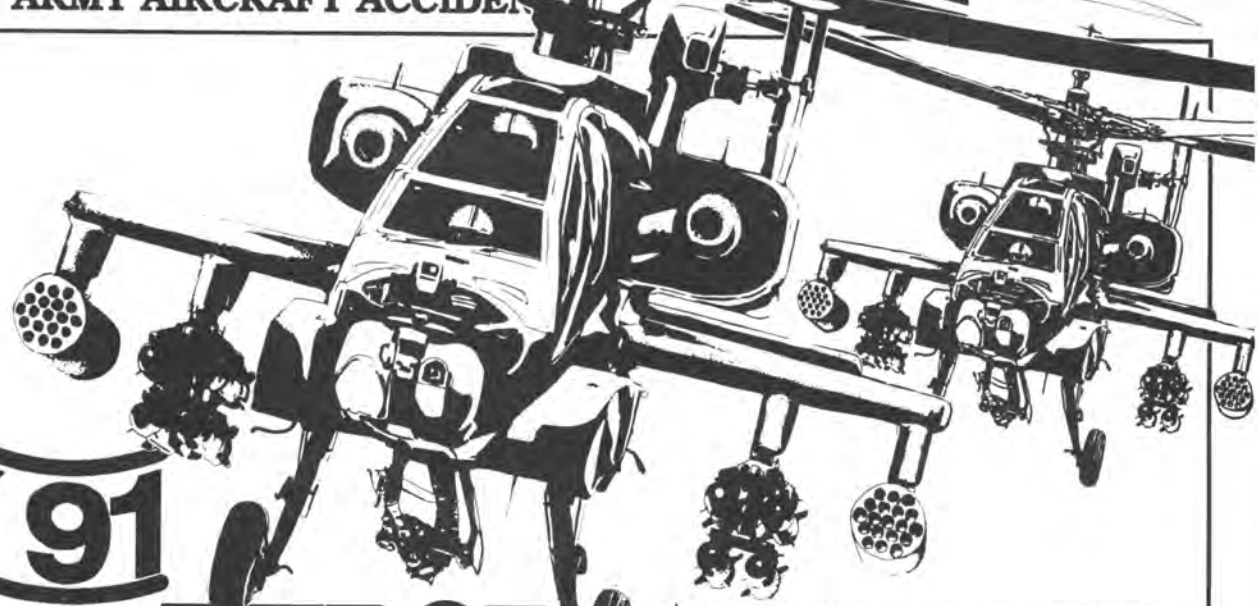
REPORT OF ARMY AIRCRAFT ACCIDENTS



FY 91 Safety REPORT

The beginning of FY 91 found Army units well into Operation Desert Shield. While awaiting word to begin combat, Army aviators were training hard in an environment unlike any they had ever before encountered. The deserts of Southwest Asia, with their shifting sand dunes, featureless terrain, visual illusions, and temperature extremes, created some of the toughest flying conditions Army aviators had ever faced. When the word came, the long days and nights of preparation paid off. Army aviation proved once again that it is an integral part of the combined arms team. These aviators and their aircraft racked up an outstanding battle performance.

Not only did our soldiers on the ground and in the air inflict heavy losses on the enemy, in the harshest of environments, they did it with the lowest wartime accidental death and injury rate (per 1,000 soldiers) since World War II. This outstanding safety record during Operations Desert Shield and Desert Storm (DS/DS) can be attributed to the increase in safety emphasis and awareness since the Vietnam War. A comparison of death and injury rates during DS/DS and Vietnam shows the dramatic effects of this increased attention on safety operations.

Death and Injury Rates*

	DS/DS	Vietnam
Enemy action	2.90	131.02
Friendly fire accidents	0.68	2.67
Other accidents	11.14	154.66

*Per 1,000 soldiers

Aviation accident statistics*

During FY 91, Army aviation experienced 176 Class A through C accidents. In these 176 accidents, 39 lives

were lost, 73 soldiers received nonfatal injuries, and 175 aircraft were damaged (43 were totally destroyed). In all, aviation accidents cost the Army almost $183 million.

What would our safety performance have been if DS/DS had not occurred? We at the Safety Center believe that the 5-year downward trend in Class A rotary wing accidents would have continued, and a rate of 1.79 per 100,000 flight hours would have been achieved for FY 91 if DS/DS had not occurred. At this rate, we would have experienced only 20 Class A accidents in FY 91. With DS/DS, the 47 Class A accidents, at a rate of 4.13 per 100,000 flight hours, more than doubles the peacetime estimates.

** Statistics as of 16 Nov 91*

Problem areas

We know that many of the problem areas we experienced in peacetime were also experienced during DS/DS. For example, 90 percent of the night rotary wing accidents involved crew error. However, as shown in figure 1, the difference in DS/DS was a significant increase in four problem areas: ability to maintain or recover orientation, estimate distance or closure, detect hazards or obstacles, and diagnose and respond to emergencies. Each of these was related to the harsh, dusty, low-contrast flight environment and was compounded initially by aviators flying too low and too fast for the conditions. We just did not fully appreciate the limited capability of NVGs for this environment. The Apache, however, handled this environment very well. And it did so because its forward-looking infrared system provided the pilot with visibility that could not be attained with NVGs in this environment.

Why did we have the same accident problem areas in DS/DS that we had in peacetime? Human error is the largest cause factor, and the central problem is soldiers and leaders not performing to standard. Individuals who know and are trained to standard but elect not to follow the standard account for more than 40 percent of the night aviation crew error accident problem. Examples of this lack of self-discipline are a false sense of mission urgency and overconfidence.

Performing to standard is a requirement that must not stop when we deploy from a training or operational environment to a combat theater. It's up to leaders to ensure individuals comply with the standards set for each task. If we do not correct these systemic/standards failures, they will continue to cause accident problem areas in peacetime and will accelerate accidents in the next war just as they did in DS/DS.

The aviation model in figure 2 illustrates how uncorrected systemic/standards failures, combined with an unfamiliar and demanding mission environment, can drive up accident rates. Mission and environmental difficulty generally increase when we go from day to night missions. At the same time, operational structure and supervisory enforcement of standards are greatest in the school house (TRADOC), less in TOE operational units (FORSCOM and USAREUR), and least in units deployed for combat (DS/DS). In some cases, junior leaders—those people making risk assessments in the cockpit and in combat—did not integrate risk management into their decision-making process. The result was our accident rates increased dramatically when we deployed to Southwest Asia.

Countermeasures

In response to standards failures and our DS/DS experience, some countermeasures are being developed. Our avia-

Crew Error in Night Rotary Wing Accidents

Problem Area	*Peacetime*	*DS/DS*
Scan	27%	3%
Coordinate	21%	13%
Maintain/recover orientation	14%	36%
Plan - during flight	12%	3%
Plan - preflight	8%	0%
Estimate distance/closure	6%	13%
Detect hazards/obstacles	6%	19%
Diagnose/respond to emergency	6%	13%
	100%	100% (31)

Figure 1. Crew error in night rotary wing accidents

tion accident countermeasures focus on night operations.

■AR 95-1: Flight Regulations. We currently do not specify in one document the equipment an aircraft must have for night vision device (NVD) operations. This is needed for standardization and to facilitate NVD effectiveness. Therefore, we are specifying all the equipment requirements in a revision of AR 95-1.

■TC 1-210: Aircrew Training Program, Commander's Guide. The commander's guide is undergoing a major revision, and we expect it to be fielded in the third quarter of this fiscal year. Chapter 5 of this guide is devoted to risk management with special emphasis on night and NVD missions. Chapter 4 is devoted to NVGs and covers training, criteria, and procedures. In addition, TC 1-210 will address requirements for battle rostering of crews to develop critical skills and enhance crew coordination.

■ Aircrew training manuals (ATMs) and programs of instruction (POIs). All ATMs and the school POIs are being revised to integrate crew coordination at the task-condition-standard level. The revised ATMs for all rotary and fixed wing aircraft will be fielded in the third quarter of this year. Coordinating draft flight training guides for all rotary wing aircraft have been sent to the flight line in preparation for inclusion of crew coordination in the POIs.

■NVG training actions. There have been a number of NVG training actions, four of which are noteworthy.

- An exportable NVG unit training package has been fielded.
- Two training videos related to night operations and night desert operations (including crew coordination) have been fielded.
- A desert operations planning guide, draft Appendix E to TC 1-204: Night Flight Techniques and Procedures, has been developed.
- A prototype computerized moon illumination program is being developed and tested.

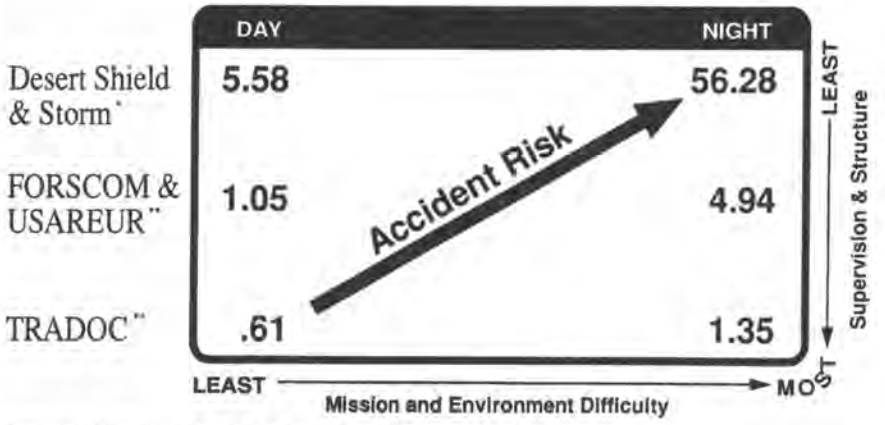
■Materiel developments. To assist in night operations, the following three actions are in process:

- *Aviator night vision imaging system (ANVIS) heads up display (HUD).* The ANVIS HUD will be fielded in December 1992. The UH-60s will receive the equipment first, followed by the CH-47Ds.
- *Altitude voice warning for radar altimeters.* During DS/DS, 500 altitude voice warning devices for radar altimeters were purchased for UH-60s. There is a requirement to install voice warning devices for radar altimeters in all rotary wing aircraft, with those used in night operations receiving first priority. When funding is received, we will complete the UH-60s and expand into the CH-47s and AH-1s. Funding for further procurement is anticipated in FY 94.
- *Obstacle avoidance system.* The obstacle avoidance system is designed to provide a visual and auditory warning of hazards in the flightpath. The Northrop laser system has been selected for prototype testing. The Communications and Electronics Command Center for Night Vision and Electro-Optics will conduct field tests in FY 93.

Although accidents increased in FY 91 due to our wartime deployment, credit for the tremendous Army aviation successes in DS/DS goes to all of those who enthusiastically accepted the unique challenges presented in the Southwest Asian desert. The lesson we must learn from DS/DS is to train as we will fight. Thus, our challenge is to make peacetime training wartime realistic without increasing accidents.

—Mr. Darwin S. Ricketson, Chief, Research, Analysis, and Studies Branch, AV 558-3842, commercial 205-255-3842

FY91 Class A Rotary Wing Flight Accident Rates

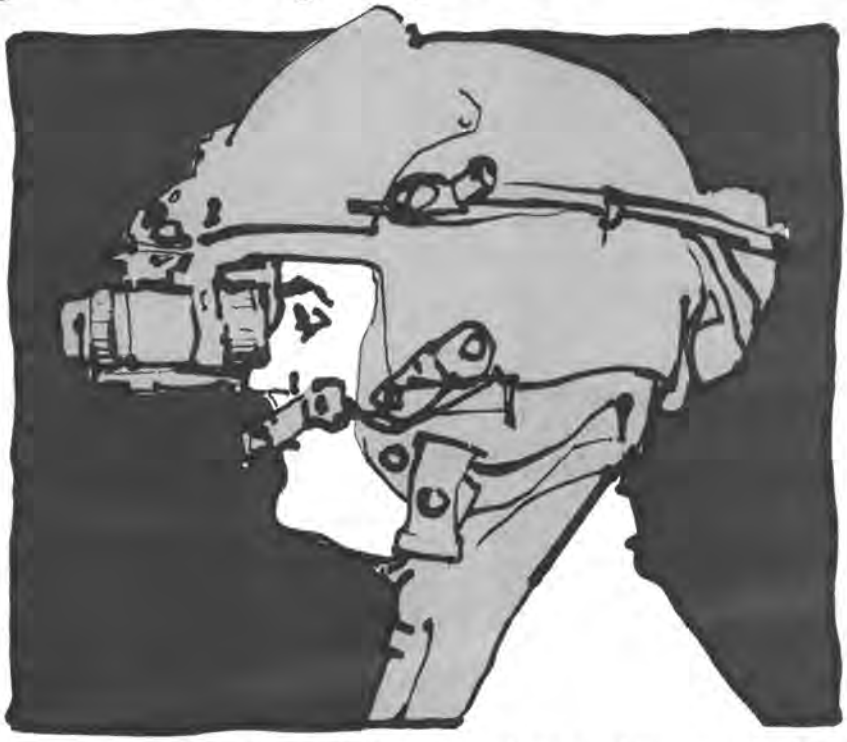


Data as of 16 Nov 91 * Aug 90 - Sep 91 ** FY90 less SWA

Figure 2. FY 91 Class A rotary wing flight accident rates

Night vision goggle message update

Following is aviation safety action maintenance mandatory message (GEN-92-ASAM-02, 192230Z Dec 91) adapted for publication in *Flightfax*. This message provides an update of information published in previous night vision goggle (NVG) messages and applies to all Army aircraft. (TB 1-1500-342-20-1 takes precedence over this message and is effective until 1 December 1992 unless sooner rescinded or superseded.)



Purpose

The purpose of this message is to consolidate information and provide the field with the most current update on aviation NVG messages. It is not intended to replace any publication. This message does not address NVGs used for ground operations.

Status of messages

This message and the messages listed in a sidebar on page 6 are current and shall be complied with until expired as noted. Messages rescinded as a result of this message are also listed in a sidebar on page 7.

AN/AVS-6

HQDA has approved the AN/AVS-6 basis of issue plan (BOIP) dated July 1990 that authorizes 68R and 68N MOS to repair and perform maintenance on AN/AVS-6 at AVUM and AVIM levels based on the technical manual maintenance allocation chart.

AN/PVS-5 NVGs

■ *AN/PVS-5 image intensifier tube (IIT) MX-9916 repair.* Rebuilt/overhauled AN/PVS-5 image intensifier tubes (MX-9916) are not authorized for aviation use. Rebuilt/overhauled assemblies are identified by a label stating "Overhauled by Sacramento Army Depot."

■ *GX-5 flip-up mounts.* CDRAVSCOM message, 072100Z Apr 87, subject: Airworthiness Release for Use of GX-5 Flip-Up Night Vision Goggle System in Rotary Wing Aircraft is rescinded. GX-5 aviator's helmet mounts are no longer authorized for use with NVGs in Army aircraft. The GX-5 mount is replaced by GM-6 mounts.

Commercial NVGs

Commercial NVGs are not authorized for aviation use. These nonstandard NVGs have not been adequately tested for military use (for example, electromagnetic interference).

Battery information

■ *Authorized batteries.* Batteries authorized for NVG aviation use are BA-5567/U LISO2 battery and BA-3058/U AA alkaline battery. No other batteries (nicad, mercury, carbon, etc.) are authorized for NVG aviation use.

■ *Deadlined batteries.* The following production lots of BA-5567/U LIS02 batteries produced by Saft America, Inc., have had leaking/venting problems and are deadlined:

Contract	Manufacturing Date Code
DAAB07-85-C-H332	0187A, 0587E, 0886D
DAAB07-86-C-C029	0887E, 0987A, 0987B, 0987C, 0987D, 1087A, 1087B, 1087C, 1087D, 1187A

If you find any of these batteries, remove them from service and place them into condition code "J." Credit is authorized only for unused stock. Leaking or used batteries should be disposed of through your local servicing defense reutilization and marketing office. For credit on unused stock, ship to Commander, Defense Distribution Region West, ATTN: Transportation Officer, Lathrop, CA 95331. Mark boxes M/F:C/C J.

Test sets

AN/AVS-6 are required to be tested using the TS-3895A/UV, TS-3895/UV, or TS-4348/UV. When the TS-3895A/UV, TS-3895/UV, or TS-4348/UV is not available, alternative test procedures for checking resolution are not authorized for AN/AVS-6 goggles. PMNVEO message, 041500Z Feb 88 does authorize use of the alternative test method for aviation-modified AN/PVS-5 goggles.

The TS-3895A/UV test set requires calibration every 12 months. To identify the calibration due dates, locate the warranty date on the lower left corner of the TS-3895A/UV main plate. Subtract 6 months. This is the date that the first calibration is due. Notify your local calibration shop.

For maintenance guidance on TS-3895A/UV, TS-3895/UV, or TS-4348/UV, contact Mr. Tom Stonich, U.S. Army TMDE Activity, DSN 746-3054, commercial 205-876-3054 or Mr. Glen Nowak, PM-NVEO, DSN 345-7485/7486, commercial 703-355-7485/7486.

Modification work orders (MWOs)

The following MWOs must be applied to aircraft before NVG operations. (For aircraft with NVG-compatible components that have been replaced since initial application of NVG MWO, see the *Note* in the paragraph on red or white lighting.)

- *UH-1H*—Concurrent installation of MWO 55-1520-210-50-7 and MWO 55-1520-210-50-11 or installation of MWO 55-1520-210-50-10 is required for NVG use.
- *UH-1V*—MWO 55-1520-210-50-12 must be installed for NVG use.
- *UH-60*—Aircraft S/N 85-24462 and subsequent are authorized for NVG use when delivered. Aircraft S/N 85-24461 and prior must have MWO 55-1520-237-50-20 installed for NVG use.
- *AH-1E, F, and P*—MWO 55-1520-236-50-4 or MWO 55-1520-236-50-5 must be installed for NVG use.
- *AH-1S*—MWO 55-1520-234-50-1 or MWO 55-1520-234-50-4 must be installed for NVG use.
- *CH-47C*—MWO 55-1520-227-50-27 and MWO 55-1520-227-50-33 must be installed for NVG use.
- *CH-47D*—All CH-47D aircraft are authorized for NVG use when delivered, with the exception of aircraft S/N 84-24187 and prior, which are required to have MWO 55-1520-240-50-3 installed.

Note: **NVG use is not authorized in aircraft S/N 81-23381 through 81-23384.**

- *OH-6*—MWO 55-1520-214-50-16 must be installed for NVG use.
- *OH-58A*—MWO 55-1520-228-50-31 or MWO 55-1520-228-50-22 must be installed for NVG use.
- *OH-58C*—MWO 55-1520-228-50-32 must be installed for NVG use.
- *OH-58D*—All aircraft are acceptable and safe for NVG use from production. No MWO is required.

Lighting

- *Red or white lighting*. Red or white lighting of any radio control panel, switch panel, instrument, master caution light, etc., must be taped, filtered, or turned off to eliminate effects of red or white lighting before conducting NVG operations. Flashlights with red or white light may not be used, except for ground operations or in the cargo compartment of UH-1, UH-60, or CH-47 aircraft. Even then, use is at the discretion of the pilot-in-command.

Note: **Aircraft with components that have been replaced since initial application of the NVG MWO and do not meet interior lighting requirements are prohibited from NVG operations. In this case, a circle red X entry will be required, restricting the aircraft from NVG operations. An example of this entry is, "UHF radio control panel is red lighted; aircraft restricted from NVG operations unless panel is taped, filtered, or turned off." Variation in wording is acceptable. This circle red X entry may be cleared by taping, filtering, turning off, or replacing the component with an NVG-compatible component.**

- *Supplemental lighting*. Supplemental lighting is defined as additional blue-green interior lighting which may consist of lip lights, finger lights, flashlights, chemical light sticks, and other similar devices. NVG supplemental lighting does not fulfill the flashlight requirement of AR 95-1. The use of supplemental lighting is authorized. The specific lighting configurations authorized by unit commanders must be defined in unit SOPs.

Additionally, unit commanders must ensure crewmembers receive instruction in the use of authorized supplemental lighting, including flashlight filters. As a minimum, the training must include—

- Operation and use of lighting.
- Cautions/warnings associated with the lighting.
- Demonstration of degradation of NVG performance caused by supplementary lighting.
- A means to verify knowledge of use.

■ *Acceptable supplemental lighting.* Representatives from Natick Research and Development Center have evaluated existing supplemental lighting. Following are two sources of supplemental lighting that may be used until an Army standard light aid is fielded (expected in FY 93):

- Lip and finger lights—Night Devices, Inc., Route 3 Box 77, Daleville, AL 36322.
- Lip lights—Seitz Scientific Industry, 201 Hickory Bend Road, Enterprise, AL 36330.

■ *Flashlight filters.* Blue-green flashlight filters may be used on flashlights during NVG flight until an Army standard filter is fielded. However, use of lip and finger lights is preferred.

■ *Current evaluations.* Evaluations are being

Current NVG messages

Aviation safety action maintenance mandatory message concerning updated information on night vision goggle messages for all U.S. Army aircraft (GEN-92-ASAM-02, 192230Z Dec 91) and the following messages are current and shall be complied with until expired as noted:

- PMNVEO message, 041500Z Feb 88, safety-of-use operational message, subject: Alternative Test Method for AN/PVS-5 Night Vision Goggles. This message expires on 1 Dec 92 for aviation use.
- CDRAVSCOM message, 092100Z Dec 88, maintenance information message, subject: Night Vision Goggle Operation on all UH-1/EH-1 Series Aircraft (UH-1-88-MIM-08). This message expires on 1 Dec 92.
- CDRAVSCOM message, 172225Z Mar 89, subject: Aviation Night Vision Goggle, Operational Evaluation, One-Time Evaluation of All AN/PVS-5A, 5B, and 5C Night Vision Goggles, AN/AVS-6 Aviator Night Vision Imaging System (ANVIS). This message expires when the information is included in the next revision of TM 11-5855-238-20, dated Oct 88 and TM 11-5855-263-23, dated Jun 86.
- CDRAVSCOM message, 172359Z Mar 89, subject: Maintenance Advisory for AN/PVS-5A, 5B, and 5C Series Night Vision Goggles (NVG), AN/AVS-6 Aviator Night Vision Imaging System (ANVIS) Return for Unacceptable Distortion. This message expires when the information is included in the next revision of TM 11-5855-238-20, dated Oct 88 and TM 11-5855-263-23, dated Jun 86.
- HQDA message, 042006Z Aug 89, subject: Airspace Management in Containment Areas, Training Areas, and Ranges. This message expires when the information is included in the next revision of TC 95-93, dated Mar 89.
- CDRAVSCOM message, 312000Z Jul 90, subject: One-Time Wiring Modification of All PVS-5 Series NVGs Utilizing the Aviation GM-6 Mount (NVG 90-01). This message expires upon the publication of TM 11-5855-238-23 and P.
- CDRAVSCOM message, 292000Z Aug 90, subject: Clarification of One-Time Wiring Modification of All AN/PVS-5A, 5B, and 5C Series Night Vision Goggles Utilizing the Aviation GM-6 Modification (NVG 90-02). This message expires upon the publication of TM 11-5855-238-23 and P.
- CDRUSAAVNC message, 032330Z Jan 91, subject: Night Vision Goggle Scanning and Crew Coordination Errors. This message expires when the information is included in the next revision of TC 1-204, dated Dec 88.
- PMNVEO message, 221530Z Mar 91, subject: Aviation Night Vision Goggle (NVG) Maintenance. This message expires when the information is included in the next revision of TM 11-5855-238-20, dated Oct 88 and TM 11-5855-263-23, dated Jun 86.
- CDRUSAAVNC message, 161345Z Jul 91, subject: Change to Training Requirements for AO/AFSO. This message expires when the information is included in the next revision of TC 1-215, dated Mar 90.
- HQDA message, 261942Z Aug 91, subject: ANVIS Visor Mount Incompatibility With the Dual Visor Used on the New SPH-4B Aviator's Helmet. This message has been extended until 1 Apr 92.
- HQDA message, 281309Z Aug 91, subject: Night Vision Goggle Training Message 91-2. This message expires when the information is included in the next revision of TC 1-210, dated Oct 86.

made of various types of lights and filters to meet and/or comply with the Department of Defense military specification for lighting aircraft: Interior, aviator night vision imaging system (ANVIS)-compatible, MIL-L-85762 dated 26 Aug 88. This military specification is tailored for the AN/AVS-6 with the minus-blue filter. The AN/PVS-5 series NVGs do not have a minus-blue filter, so they are slightly degraded by all cockpit and supplemental lighting, including ANVIS-compatible filtered light.

Infrared (IR) bandpass filters

The IR filter (pink light), P/N EGO-0931-3, may be installed on either the searchlight or landing light based on operational requirements as

Rescinded NVG messages

As a result of aviation safety action maintenance mandatory message concerning updated information on night vision goggle messages for all U.S. Army aircraft (GEN-92-ASAM-02, 192230Z Dec 91), the following messages are rescinded:

• CDRAMC message, 161650Z Jan 86, safety-of-use message, subject: Commercial Night Vision Goggles.

• CDRAVSCOM message, 072100Z Apr 87, subject: Airworthiness Release for Use of GX-5 Flip-Up Night Vision Goggle System in Rotary Wing Army Aircraft.

• CDRAVSCOM message, 291300Z Jul 87, safety-of-flight technical message, subject: Inspection of Night Vision Goggle AN/AVS-6(V1) (GEN-87-03).

• CDRAVSCOM message, 211400Z Aug 87, subject: Night Vision Goggles (NVG).

• CDRAVSCOM message, 061200Z Oct 87, subject: Night Vision Goggle Operation.

• CDRAVSCOM message, 111500Z Feb 88, safety-of-flight operational message, RCS CSLD-1860 (R1), subject: Temporary Suspension of Flight Operations Using the Night Vision Goggles (NVG) AN/PVS-5B and AN/PVS-5C (GEN-88-01).

• CDRCECOM message, 191600Z Feb 88, safety-of-use mandatory operational message, subject: AN/PVS-5 Night Vision Goggles.

• CDRCECOM message, 191900Z Feb 88, safety-of-use advisory operational message, subject: AN/PVS-5 Night Vision Goggles.

• CDRAVSCOM message, 231815Z Mar 88, subject: Night Vision Goggle Operations With IR Bandpass Filter for Helicopter Landing Lights and Searchlights.

• CDRCECOM message, 271800Z Apr 88, subject: AN/PVS-5 Night Vision Goggle Image Intensifier Tube (IIT) MX-9916 Repair.

• CDRAVSCOM message, 242100Z Oct 88, safety-of-flight maintenance mandatory message, subject: One-Time Distortion Inspection of all AN/PVS-5B and 5C Series Night Vision Goggles (NVG) (GEN-88-04).

• CDRAVSCOM message, 281630Z Nov 88, subject: Aircraft MWOs for Night Vision Goggles (NVG).

• CDRCECOM message, 131800Z Dec 88, safety-of-use advisory operational message, subject: BA-5567/U Lithium-Sulfur Dioxide (LIS02) Batteries (CECOM 88-12-02).

• CDRCECOM message, 031800Z Mar 89, safety-of-use advisory operational message, subject: BA-5567/U Lithium-Sulfur Dioxide (LIS02) Batteries (CECOM 89-09-01).

• PM-ALSE message, 081600Z Mar 89, subject: Night Vision Goggles Modified Waiver.

• CDRAVSCOM message, 051615Z May 89, safety-of-flight followup, subject: Aviation Night Vision Goggle Operational Evaluation (NVG-89-02).

• CDRCECOM message, 061700Z Jun 89, subject: Safety-of-Use Message Identifies Problems With Missing Retaining Rings From the Objective Lens (CECOM 89-06-1).

• CDRUSAAVNC message, 222300Z Sep 89, subject: Night Vision Device (NVD) Central Point of Contact.

• CDRAVSCOM message, 142030Z Aug 90, aviation safety message, subject: Night Vision Operation in UH-60 Series Aircraft (UH-60-90-ASM-03).

• CDRAVSCOM message, 052000Z Sep 90, subject: One-Time and Recurring Inspection of the Plunger Contacts on the AN/AVS-6 Visor Mount and the Power Cable Assembly (NVG-90-03).

• HQDA message, 091910Z Jul 91, subject: GM-6 Aviation Night Vision Goggle (NVG) Mount Distribution.

• CDRAVSCOM message, 151900Z Aug 91, aviation safety action informational message, subject: Rescission of Safety-of-Flight Message GEN-87-01 Concerning Night Vision Goggles (GEN-91-ASAM-07).

• CDRCECOM message, 301800Z Jul 91, safety-of-use operational message, subject: AN/AVS-6(V1) (NSN 5855-01-138-4749) and AV/AVS-6(V2) (NSN 5855-01-138-4748) ANVIS Night Vision Goggles (NVG) (CECOM 91-07-04).

determined by the user. Units are authorized to use the bulb from the following list that best suits their operational environment and mission:

P/N	NSN	Voltage	Wattage	Candlepower
4571	6240-00-690-1094	28.0	150	7,000
4551	6240-00-583-3334	28.0	250	75,000
4553	6240-00-816-4808	28.0	250	300,000

Note: **The maximum permissible wattage is 250 watts.**

The beam spread should be as follows:

P/N	Horizontal	Vertical
4571	80 degrees	25 degrees
4551	50 degrees	10 degrees
4553	11 degrees	12 degrees

Miscellaneous information

- AN/PVS-7s are not authorized for aviation use.
- Safety-of-flight message GEN 87-01 is rescinded and is no longer valid.
- NVG operations in the AH-64 aircraft will be conducted in accordance with the interim statement of airworthiness qualification (ISAQ).

Points of contact (POCs)

POCs for this message are:

- PEO aviation, Mr. Tom Benbrook, DSN 693-1407, commercial 314-263-1407.
- PM-NVEO, Mr. Glen Nowak or MAJ Randall Burdette, DSN 345-7485/7486, commercial 703-355-7485/7486.
- Aviation Training Brigade, MW4 Robert Brooks, DSN 558-5858/5812, commercial 205-255-5858/5812.
- CECOM, Mr. Jay Hanrahan, DSN 992-0084, commercial 908-532-0084.
- AVSCOM, Mr. Brad Meyer, DSN 693-9089, commercial 314-263-9089.
- After hours, AVSCOM Command Operations Center, DSN 693-2066/2067, commercial 314-263-2066/2067. ♦

New NVG video available

A new NVG video has been distributed to visual information libraries throughout the Army. You may obtain a copy by asking your local audiovisual library for—

Aviation Night Vision Goggle Operations—Desert Environment (TVT-46-62, PIN 708404). This video demonstrates low-level and NOE flight operations in a variety of desert conditions. It also illustrates essential mission planning, to include risk assessment and the identification of specific hazards. Included in the video are flight demonstrations over three different types of desert terrain. The video also emphasizes the need to follow all safety precautions when flying low level as well as NOE. ♦

Class A Accidents through January

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	3	4
	December	3	1	3	0
2nd Qtr	January	7	2	1	0
	February	13		13	
	March	4		8	
3rd Qtr	April	3		2	
	May	4		3	
	June	1		0	
4th Qtr	July	2		0	
	August	2		0	
	September	3		2	
	Total	49	7	37	4

Aviation safety training

We get a lot of calls asking about dates, locations, and points of contact (POCs) for aviation safety training presented by the Army Safety Center. The following course recaps should answer most of these questions.

Aviation Accident Prevention Course (AAPC)

The AAPC is designed to award the A2 additional skill identifier (ASI) to primarily CMF 67 and 93P NCOs. AR 611-201: Military Occupational Classification and Structure lists the specific aviation maintenance MOSs and pay grades authorized to receive the A2 ASI. Quotas for the resident classes at Fort Rucker are controlled through the Army Training Resource Requirement System (ATRRS). Quotas for the nonresident (NR) classes are controlled by the POC and are to be filled IAW AR 611-201 with soldiers of the proper MOS and pay grade.

The FY 93 AAPC schedule is being developed. Units or installations desiring on-site training must coordinate their request with the installation safety office. Requests must be submitted to the Army Safety Center (ATTN: CSSC-PS) not later than 1 July 1992. The request must include a primary and two alternate dates (for scheduling purposes); commit to a fund cite for travel, rental car, and per diem for three NCOs; and agree to schedule soldiers to attend the course who meet the prerequisites outlined in AR 611-201. Class size for resident and on-site courses is limited to 40 students.

Aviation Safety Officer (ASO) Course

All ASO courses are resident at Fort Rucker, AL, and are 6 weeks in length. Students must be rated aviators assigned to or projected to be assigned to ASO positions. Attendance must be requested and approved through the aviator's career manager. The 40 seats per class are allocated through the ATRRS system. The next ASO course is scheduled for 13 April-22 May. POCs are MAJ Allen Turner or Ms. Fran Souders, AV 558-4479/3164, commercial 205-255-4479/3164.

Personnel enrolled in the ASO correspondence course must have successfully completed Phase I of the correspondence course and received a certificate of completion before attending the resident phase. The resident phase of the ASO correspondence course is scheduled for 16-27 March, 8-19 June, and 13-24 July.

Human Error Accident Reduction Training (HEART)

This is a stand-alone course for battalion- and higher-level ASOs who were trained before 1987. It is not designed for those who are not ASOs, for example, instructor pilots and maintenance officers. HEART teaches the ASO how to be a small group facilitator and highlights instructional techniques the ASO can use to conduct monthly safety training sessions. The course requires students to prepare for and conduct one session and participate in several others. This training also includes 1 day of briefing updates on current happenings affecting Army aviation safety. The class is designed for 30 students. Units sending attendees will be expected to fund TDY and pay an additional fee of about $312 for each student by a military interdepartmental purchase request for the contractor who provides the training.

In addition to the courses described, there are numerous other aviation-related safety courses available from civilian contractors and educational organizations. For further information and POCs for these courses, contact MAJ Glenn Camp or Ms. Fran Souders. ♦

—POC: MAJ Glenn Camp, Training Branch, AV 558-4479/3164, commercial 205-255-4479/3164

Class No.	Date	Location	POC
92-5 NR	6-17 Apr	Fort Bragg, NC	Mr. Bill Ivey, AV 236-7501
92-6 NR	4-15 May	Fort Wainwright, AK	CW4 Wright, AV 317-7098/7096
92-7 NR	15-26 Jun	Fort Stewart (Hunter AAF), GA	MW4 Williams/SFC Hecht, AV 971-5940
92-8 NR	13-24 Jul	Atlanta, GA	Mr. Tom Davis, 2d Army, AV 797-7382
92-3	3-14 Aug	Fort Rucker, AL	MSG Vick, AV 558-4479

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

V series - While attempting hoist rescue of victim caught in kayak in turbulent backwash of low-water dam, crew positioned aircraft at 20-foot hover over victim and lowered medic, who was secured to jungle penetrator. After several unsuccessful attempts, victim grabbed medic, climbed "sidesaddle" onto medic's lap, and clamped his arms around medic and penetrator. Due to victim's size, strength, and position, medic was unable to secure victim with safety strap. As crew chief began hoist, pilot repositioned aircraft clear of obstacles to west bank of river. When victim reached skid height, he released his grip and lunged for skid, even though he had been instructed not to. Victim's weight shifted, and he fell about 40 feet to the ground, resulting in fatal injuries. 9210

UH-1 Class C

H series - While in cruise flight, crew felt slight vibration and checked all instruments and flight controls. Crew believed vibration to be turbulence. Postflight inspection revealed damage to one tail rotor blade, three elongated rivet holes with two small tears in tail rotor cover, and missing access cover. Investigation continues.

H series - After completing night instrument evaluation, instrument examiner (IE) positioned aircraft over parking pad. Due to calm wind conditions, IE pedal turned aircraft right to southerly heading. After confirming that aircraft was aligned with parking mark, IE initiated descent from 5-foot hover and allowed aircraft to strike another aircraft's tail rotor. Aircraft began to spin, and IE rolled throttle off and executed hovering autorotation.

V series - During cruise flight at 1,000 msl and 90 knots, N2 tachometer and torque indications went to zero while rotor rpm went to 350 plus. IP increased collective and reduced throttle to flight idle, but rotor rpm remained unchanged, creating severe vibration. IP then called for governor switch to be placed into emergency position and rotor rpm decreased. IP could then control rotor rpm manually. Suspect materiel failure of R-22 engine N2 spur gear.

UH-60 Class D

A series - While sitting in tactical FARP, crew released parking brakes for takeoff and aircraft rolled backward, breaking off unstowed searchlight when it contacted uneven terrain.

A series - While hovering to parking, main rotor tip cap hit main rotor tip cap of parked aircraft. Pilot did not feel any feedback in flight controls; he discovered damage on postflight inspection.

Attack

AH-1 Class C

S series - Crew preflighted aircraft during daylight hours. After dark, front tiedown was untied from skid toes but not removed from blade due to rear tiedown still being engaged. Rear tiedown was disengaged from tail boom, blades rotated 90 degrees, and rear tiedown removed. Crew failed to post fireguard; therefore, neither pilot saw front tiedown, which was on blade at 9 o'clock position. Crew started engine and heard noises as main rotor tiedown struck tail rotor components, requiring complete replacement of tail rotor and tail rotor controls.

AH-64 Class A

A series - Aircraft had made precautionary landing for smoke and electrical fumes in cockpit. Maintenance replaced No. 2 generator and aircraft was MOC'd. On takeoff, aircraft entered IMC due to fog. Pilot initiated right climbing turn, and aircraft descended into trees and crashed about 500 meters east of stagefield. Front-seat pilot sustained fatal injuries during crash sequence. 9211

AH-64 Class C

A series - After refueling operation, pilot initiated No. 2 engine start. Engine hot started, tgt reached 950°C, and pilot immediately shut down No. 2 engine. After engine cooled down, pilot attempted to restart No. 2 engine with same results. Crew shut down and secured aircraft. Engine requires replacement because tgt exceeded limits.

AH-64 Class D

A series - As aircraft departed on low-level flight route, PC felt tail rotor control pedals stiffen. PC had cruise power applied, and anticipating loss of tail rotor control, he increased airspeed. Almost immediately, pedals became unmovable. PC notified tower of situation and completed roll-on landing at 80 knots. Postflight inspection revealed that transmission access panel had come loose and lodged against tail rotor controls. Crew chief had failed to properly secure access panel during daily, and PC had failed to notice improperly secured access panel during preflight.

Cargo

CH-47 Class D

D series - As crew hovered aircraft from parking, rotorwash lifted and separated tunnel covers from parked aircraft, causing sheet metal damage to covers. Crew chief had failed to secured tunnel covers on parked aircraft.

D series - During night landing to confined area, tree branch was ingested into aft rotor system, damaging three aft rotor blades.

D series - While in cruise flight carrying two external fuel blivets, No. 1 engine chip detector caution light came on. PC shut down engine without landing load and continued flight for about 10 minutes. PC then decided to jettison external load since single-engine hover was not possible. At about 50 feet agl and 30 knots, crew released load in open area. One blivet burst on impact and other blivet rolled down slope 200 feet

before bursting. Crew completed single-engine landing without further incident.

D series - About 1 minute after takeoff, flight engineer (FE) found hydraulic leak in flight control closet. While FE searched for source of leak, pilot turned aircraft around and headed back to PZ to drop off external loads of fuel and land. Upon reaching PZ, pilot positioned aircraft to set external load down. As forward load was placed on ground, crewmember calling loads inadvertently released aft load about 10 feet agl. The 500-gallon fuel blivet burst on impact. As pilot repositioned aircraft to land, FE found source of hydraulic leak. Forward fitting on utility hydraulic pressure line located just aft of forward transmission at bulkhead station 120 had vibrated loose.

Observation

OH-58 Class C

C series - While at OGE hover in masked observation position during training exercise, IP attempted sliding right-pedal turn to reposition aircraft. Right landing gear hit tree, and aircraft rolled right and crashed inverted. IP received minor injuries.

D series - During NVG continuation training, crew landed on pinnacle and IP decided to reposition aircraft. IP brought aircraft to hover and began moving left. Crew heard noise, and aircraft began vibrating. IP landed aircraft and vibrations became severe. IP had allowed aircraft to drift backward into small tree, destroying tail rotor blades and damaging tail boom and horizontal fin stabilizer.

OH-58 Class E

A series - Crew heard grinding noise from engine cooler area as rotors coasted down. Postflight inspection revealed metallic particles in No. 1 hanger bearing grease, as well as ball bearings on engine deck. Engine drive shaft also had superficial scratches.

A series - PC flew up valley into sun and did not see single strand of 5/8-inch wire strung between two trees. On return trip back down valley, wire hit right chin bubble, shattering it and bending tail rotor pedal control tube before wire cutter under nose cut wire. Crew completed landing without further incident.

C series - Pilot found large amount of fluid on transmission deck during through-flight inspection. Crew shut down aircraft. Further inspection revealed transmission line from freewheeling unit to transmission was loose.

D series - During cruise flight in heavy rain, crew heard flapping sound that they suspected was main rotor blade debonding. Crew completed uneventful landing. Maintenance confirmed blade had delaminated on its underside at blade tip.

Fixed wing

C-12 Class B

C series - On short final during instrument approach, aircraft encountered abrupt wind shifts and touched down on left side of runway. Left main landing gear went off runway and collapsed. Left wing tip hit ground and nose gear severed at mounting points. Aircraft slid on its belly along left edge of runway into snowbank. No injuries. 9212

F series - Crew was experiencing severe navigational equipment problems with low-fuel conditions. Crew executed approach to partially lit service apron. Aircraft received extensive damage. Three minor injuries. 9213

C-12 Class E

C series - Pilot was climbing through FL 180 when passenger noticed fluid streaming out of rear cowling latch and rear of engine compartment. PC landed at nearest airfield and found that oil cap latch was unsecured, allowing oil to escape. Suspect mechanic did not properly secure oil cap during daily inspection. PC also failed to physically check cap latch for security during engine check.

F series - In cruise flight at FL 250, crew heard cracking noise and found 3-inch hairline crack in pilot's windshield. Crew completed checklist procedures and landed at home station.

H series - On final approach, landing gear nose indicator light would not come on. Crew cycled landing gear several times and checked bulb for proper seating. Crew declared an emergency and made low pass for ATC personnel to visually check landing gear position. Crew completed uneventful landing.

K series - Crew lowered gear and flaps during descent, but nose gear safe indication light did not come on. After about 1 to 2 minutes, nose gear safe indication light did come on. Pilot left gear in down and safe position, returned to base, and completed landing without further incident.

U-21 Class E

A series - At about 555 feet agl during climbout, crew noticed both nacelle fuel caps were open and siphoning fuel. Crew returned to airfield and completed uneventful landing. Postflight inspection revealed left cap was loose and right cap was missing. Crew had failed to properly secure caps during preflight inspection.

UV-20 Class D

A series - As parachutist exited aircraft at 12,500 feet agl, left foot became entangled in fastened seatbelt, causing deep cut and broken leg. Parachutist hung upside down with left foot still inside aircraft for about 20 seconds. Seeing that parachutist was conscious, safety observer unfastened seatbelt, and parachutist landed safely on drop zone.

Messages

■ Aviation safety action maintenance mandatory message concerning inspection for three unserviceable spindle assemblies on all H-60 series aircraft (UH-60-92-ASAM-01, 061900Z Jan 92). Summary: The rotor system of an H-60 aircraft experienced sudden stoppage due to a main rotor blade strike to the tail cone. A previous message was issued to locate the spindle assemblies that may have found their way back into the inventory. As of this date, three of the suspect assemblies have not been located and may still be in the supply system. The previous message was issued during Desert Shield, and the subject spindle as-

semblies may have been in a transient status and therefore not located. The purpose of this message is to direct a DA Form 2408-16 records check for three suspected unserviceable spindle assemblies with serial numbers A204-04468, A204-04922, and A204-05066. If none of these spindle assembly serial numbers are found, no further action is required. If one of the spindle assembly serial numbers is found to be installed on an aircraft, remove and replace the spindle. This message also contains recording and reporting requirements. Contact: Mr. Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of vertical hinge pins on all CH-54A aircraft (CH-54-ASAM-92-01, 092145Z Jan 92). Summary: During an inspection of CH-54A helicopters, corrosion was found in the vertical hinge pins of hinge assembly, P/N S1510-23021-2. Failure of this part would cause loss of a main rotor blade and subsequent loss of the aircraft. A letter, along with inspection and rework procedures, was sent to the National Guard Bureau to advise all affected units of this problem. The Georgia National Guard contracted with Erickson Air-Crane Company to have their aircraft inspected. This ASAM incorporates techniques used by Erickson Air-Crane Company into the instructions previously provided. The purpose of this message is to require a one-time inspection of the bore in the vertical hinge portion of hinge assembly, P/N S1510-23021-2. (Aircraft inspected IAW previously issued instructions or by representatives of Erickson Air-Crane Company do not need to be reinspected.) This message outlines inspection and correction procedures and recording and reporting requirements. Contact: Mr. Brad Meyer, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning inspection of the fuel controls and governors on all OH-58A/C and OH-6 series aircraft with T63-A-700/720 engines (OH-58-92-ASAM-09 and OH-6-92-ASAM-03, 282200Z Jan 92). Summary: A one-time inspection of the T63-A-700/720 engines for correct fuel controls and governor is required. Maintenance work order 55-1520-228-50-26, which is expired, has raised questions in the field concerning compatibility of engines and fuel controls and governors. Both new and old fuel controls are completely interchangeable only within the same engine designation. The purpose of this message is to require a one-time inspection of T63-A-700/720 engines to assure they have the correct fuel controls and governors. This message also contains inspection and correction procedures and recording and reporting requirements. Contact: Mr. Lyell Myers, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning OV-1D AN/AYA-10 signal data converter connector (MS3122E20-16P, NSN 5935-00-989-2537) maintenance improvement (OV-1-92-ASAM-01, 192100Z Dec 91). Summary: The J1 connector is mounted on the shelf within the right-side aft equipment compartment with the back of the connector in an upright position, making it vulnerable to dirt and moisture. The pins and internal parts corrode, causing pins to short which results in AN/AYA-10 signal data converter, P/N CV-2647/AYA-10, circuit card malfunctions. The purpose of this message is to require a visual inspection of the J1 connector for dirt, moisture, and corrosion. This message also contains correction procedures and recording and reporting requirements. Contact: Mrs. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning one-time and recurring inspection of nose wheel steering link assembly internal self-locking nut and one-time visual inspection of the main landing gear assemblies for improperly installed drag links on all U-8F, BE-65 series, B80 aircraft and U-21A/D/G/H, RU-21A/B/C/D/H, and Beech A90 aircraft (U-8-92-ASAM-01, 072100Z Jan 92 and U-21-92-ASAM-01, 072200Z Jan 92). Summary: A U.S. Army Reserve unit experienced a landing/rollout mishap caused by the nose wheel centering spring coming loose on a U-8F aircraft. The internal self-locking nut in the link assembly had backed off, causing the spring to come loose. This link assembly is also common on the U-21/RU-21 aircraft. Also, during a preflight inspection on a U-21A aircraft, it was determined that the right main landing gear drag link was installed upside down. Further inspection revealed damage to the landing gear actuator, requiring replacement of both parts. Investigation failed to determine when the drag link was installed incorrectly. Several inspections, including an inspection resulting from the landing gear failing to extend properly, did not reveal the upside down part. This same part is on the U-8F, BE-65 series, and B80 aircraft. The purpose of these messages is to require inspection of these aircraft nose gear steering linkages for excessive end play and retainer nut tightness and main landing gear assemblies for improperly installed drag links. This message also outlines inspection and correction procedures and recording and reporting requirements. Contact: Mrs. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

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

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R. Dennis Kerr
Brigadier General, USA
Commanding General
U.S. Army Safety Center

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Alcohol and flying

The 48-hour rule

When asked about flying after drinking alcohol, pilots frequently quote the 12-hour "bottle to throttle" rule. However, in addition to the prohibition against flying within 12 hours after consuming alcohol, AR 40-8: Temporary Flying Restrictions Due to Exogenous Factors also requires that "no residual effects remain." Residual effects from alcohol consumption pose a significant and continuing hazard to flight safety. But just what are these residual effects and how long do they last?

To answer these questions, one must first understand how alcohol affects the human body. A standard drink—defined as 1.5 ounces of 80-proof liquor, 12 ounces of beer, or 3 ounces of wine—contains about 15 grams of alcohol. Ingestion of one drink by a 150-pound person will result in peak blood alcohol concentrations of 0.02 to 0.04 percent. Alcohol is eliminated from the body at an average rate of 8 grams per hour; therefore, about 2 hours are needed to reduce the blood alcohol concentrations from one drink to zero. Contrary to popular belief, drinking coffee, taking a cold shower, or other activities will not increase the rate of elimination and allow one to "sober up" faster.

Alcohol acts as a central nervous system depressant or inhibitor. Impairment of judgment and recently learned complex and finely tuned skills begins to occur after one drink (0.02 percent). At this level, the ability to track moving objects and to

do tasks requiring divided attention may suffer. After two to three drinks, thought, judgment, and motor skills will be impaired. Under both simulated and actual flight conditions, planning and performance errors, procedural errors, failure to maintain vigilance, and communication errors have been identified in pilots even with low levels (0.02 percent) of alcohol.

The stimulation commonly ascribed to alcohol is actually due to the depressant effects on inhibitory controls. A pilot under the influence of even a moderate dose of alcohol is less able to appreciate the potential dangers or costs of a particular action. Alcohol consumption can therefore promote action on impulse, without concern about the potential negative consequences of such action. For example, a pilot may attempt a maneuver that he would not undertake when his judgment is unaffected by alcohol.

Alcohol can adversely affect a pilot's visual control by its effect on the inner ear. Head movements may produce nystagmic eye movements (similar to the Coriolis phenomenon), resulting in the sensation of turning or angular acceleration. This disruption during flight would impair the pilot's perception of the aircraft's attitude and visual fixation and tracking ability. It would also adversely affect a pilot's ability to control the aircraft, read instruments, and see and avoid other aircraft or obstacles. These effects are most pronounced at low ambient light levels, such as those encountered during night flight. These changes may be particularly hazardous since they occur at blood alcohol concentrations that have little or no effect on preflight tasks and may therefore go unnoticed. In addition, this response has been identified for up to 36 hours after alcohol consumption, which is long after measured levels have returned to zero. Alcohol-induced nystagmus may be an unidentified factor in aircraft accidents currently attributed to spatial disorientation.

A final concern is the "hangover effects" of alcohol. Pilot performance has been shown to be impaired 14 hours after consuming four to six standard drinks (0.1 percent) in a 2-hour period. Simulator studies have shown a decrease in precision and accuracy on all areas tested, including takeoff and landing heading, instrument landing system localizer and glide-slope deviation, and yaw on takeoff and landing. Most important, pilots were unable to determine their own degree of impairment.

Pilot performance can be impaired sufficiently to jeopardize safe flight after consumption of a single alcoholic drink a few hours before flight. This impairment can persist for more than 24 hours after consuming five or more standard drinks, and for each drink consumed, 2 or more hours may be required to reduce blood alcohol levels to zero. Further impairment due to hangover effects and adverse visual effects (nystagmus) have been identified up to 36 hours after alcohol consumption. When an individual is under the influence of alcohol whether just after drinking or several hours later, judgment of his own ability to pilot an aircraft may be seriously impaired.

Although individual response to alcohol may vary, using a 48-hour interval between drinking and flying should eliminate the residual adverse effects. This 48-hour rule will reduce risk and enhance safety in the flight environment. ♦

—POC: MAJ Daniel T. Fitzpatrick, Flight Surgeon, USASC, AV 558-2763, commercial 205-255-2763

Class A Accidents through February

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	3	4
	December	3	1	3	0
2nd Qtr	January	7	3	1	0
	February	13	1	13	0
	March	4		8	
3rd Qtr	April	3		2	
	May	4		3	
	June	1		0	
4th Qtr	July	2		0	
	August	2		0	
	September	3		2	
	Total	**49**	**9**	**37**	**4**

Lessons on wartime safety

Good aviators die when...

The call to transition from a peacetime environment to a combat environment can come quickly, as many learned during Operations Desert Shield and Desert Storm. And death can come equally as quick when good aviators arrive in the combat environment and stop using or forget to use the basic aviation and risk-management skills they've been taught from the schoolhouse to their TOE units.

From the first day of flight training, an air of confidence and self-assuredness is necessary in the aviation profession. In a building-block sequence, students are taught the skills needed to become fully competent aviators. In conjunction with those skills, they're taught basic decision-making and risk-management procedures needed to keep them from becoming accident statistics.

As aviators leave the school and transition to the operational environment, their proficiency increases and so does their confidence. In fact, it's often overconfidence that leads aviators to do unsafe things that sometimes result in fatal accidents. And unfortunately, when the requirement came to transition from an operational environment to a combat environment, some aviators left those basic aviation skills and decision-making and risk-management procedures at home. They forgot that many of the skills and procedures that kept them alive while they earned their first few hours of flight time were some of the same ones that could keep them from becoming accident victims during combat.

The thorough briefings and debriefings established by General Tunner revealed incorrect crew procedures and the necessity for better training and crew discipline.

General William H. Tunner, who was responsible for the India-China airlift in the last year of World War II, found that ignoring safety in combat costs lives and aircraft. More than 45 years later, Operations Desert Shield and Desert Storm again proved that good aviators die when they let their overconfidence persuade them that they can afford the luxury of leaving safety out of combat missions. Safety does have a "go-to-war" mission. General Tunner learned that lesson way back in 1944, and yet to some extent we had to relearn it in Desert Shield and Desert Storm.

India-China airlift

In the April 1986 issue of *Flying Safety*, Dr. Richard W. Huling, an Air Force historian, tells about General Tunner's experiences during one of the first attempts to supply an army by air.

The airlift had been in existence for about 2 years when General Tunner took command in 1944. It had been reluctantly called into existence by a ground-oriented command because a deadly combination of Japanese and geography made moving supplies over the Burma Road all but impossible. Those supplies were crucial because they meant the Chinese forces in Western China could continue to keep 2 million Japanese troops tied down and out of action against U.S. forces in the Pacific.

The same treacherous geography that plagued ground troops was also a problem for pilots who were trying to keep the Chinese supplied. The high peaks and jungles of the Himalayas weren't the only problems however. In his book, *Over the Hump*, General Tunner describes what he found when he arrived in India in the summer of 1944.

"Here, in a strange land far from home on the fringes of a mysterious backward civilization, were all the conditions that bring hazardous flight: fog, heavy rains, thunderstorms, dust storms, high mountains, a necessity for oxygen, heavy loads, sluggish planes, faulty or no radio aids, hostile natives, jungles, and one-way airfields set in mountainous terrain at high altitude."

In January of 1944, the accident rate for the airlift was 1.97 per 1,000 flying hours (which is approximately 22.5 times greater than our present

Class A through C rate of 8.76 per 100,000 flight hours). Every 200 trips over the Hump cost one airplane; for every 100 tons of supplies flown into China, three Americans died. Most of the accidents were total losses. Aircraft either hit mountain peaks or were lost in the jungle, and the few crewmembers who were able to parachute simply vanished and were never seen again.

General Tunner soon found that all efforts had been directed toward increasing tonnage the airlift could transport, but as tonnage gradually increased, so did the mishap rate. *Safety had been ignored*. Night flying had been introduced, although radio communication and navigational facilities were nonexistent except at the terminals. Weather was virtually ignored, and many planes flew in violation of standard Air Corps specifications.

General Tunner issued a challenge: Increase tonnage and lower the accident rate. Some people will tell you that you have to choose between the mission and safety, yet General Tunner's command managed to meet both of those seemingly contradictory actions in a wartime environment.

What did they do? The safety program they instituted consisted of the basics (still being used in risk management today) distilled into four main points:

- Analysis of existing flight and maintenance procedures and practices.
- Statistical investigation and analysis of accidents.
- Recommendations for the correction of faults revealed in the foregoing analyses.
- Prompt action and followup on that action.

General Tunner and his staff also investigated pilot training and made up for any gaps before sending them over the Hump. They began to take weather and communications seriously, attacking conditions such as icing and turbulence, and becoming more familiar with navigational equipment and how to best deal with its absence.

Another major area was pilot discipline. General Tunner was very specific about the importance of using the checklist. Exact procedures, from starting the engines to cutting them off at destination, were emphasized.

Briefing and debriefing, according to General Tunner, lay at the heart of the program. In his own words—

"Briefing and debriefing proved to be of the greatest importance. Briefing involved not only a thorough preparation of the pilot for the route he was to take, but a check to make certain that the crew was competent to make the proposed flight safely. Debriefing would show up incompetent flight procedures, indicating the necessity for corrective action and additional training. Debriefing also provided our best weather reports."

Did it all work? In August of 1944 (just before General Tunner's arrival), 23,000 tons were airlifted over the Hump to China. The accident rate hovered around 2.0 per 1,000 flying hours. In January 1945 with close to 40,000 tons airlifted, the accident rate dropped to .301. By July 1945, total tonnage jumped to 71,042 with an accident rate of .239. During August 1945, the last big month of the airlift, 20 planes were lost during 135,000 flying hours, bringing the accident rate down to .154 per 1,000 flying hours. General Tunner makes the statistics come to life by looking at them another way:

"If the high accident rate of 1943 and early 1944 had continued, along with the great increase in tonnage delivered and hours flown, America would have lost not 20 planes that month, but 292 with a loss of life that would have shocked the world."

Operations Desert Shield and Desert Storm

General Tunner's aircrews faced the hazards of the mountainous terrain. Desert Shield and Desert Storm aircrews faced the hazards of a desert terrain unlike any previously encountered. No previous training, not even at the National Training Center, had prepared aircrews for operations in an environment where there was constant sand and dust up to 2,000 feet. The combination of featureless terrain and visual illusions created hazardous conditions for flight, especially for night flight. And without contrast, night vision goggles were less effective than we perceived they would be. Our aircrews found that they had to get lower at night. But in some instances, they did not slow down as they got lower. Aircrews were hitting the ground or sides of the dunes at airspeeds of 25 to 70 knots. Crews were often flying in marginal weather with zero illumination and limited visibility. The desert hazards waiting to reach out and grab aircrews were numerous. As a result, four Class A aviation accidents occurred during the first two weeks of Operation Desert Shield.

Sure, the hazards and challenges of desert flight were unique, but could the fact that, in some cases, safety was left at home have contributed to

those accidents? It's difficult to excuse an aircrew taking off at or over maximum gross weight downwind and getting into a brownout situation—that's stuff that following basic aviation rules will prevent.

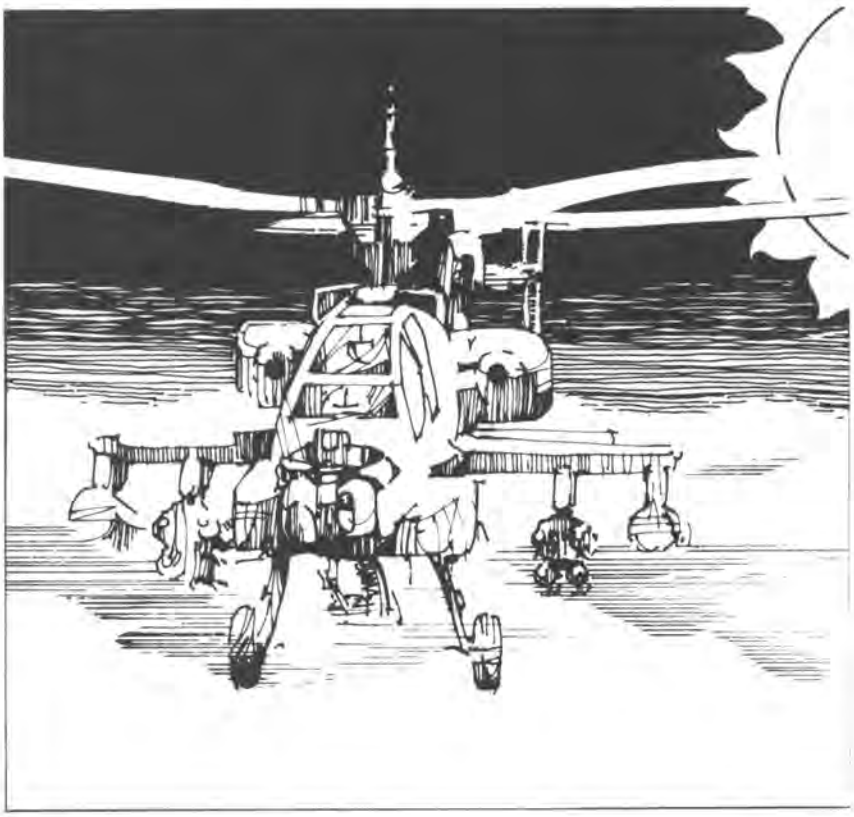
What did we do? General Tunner didn't choose between mission and safety. He met both challenges in a wartime environment. So did we. The actions we took consisted of the same basics that General Tunner used: analysis of flight and maintenance procedures and practices, statistical investigation and analysis of accidents, recommendations for corrections of faults revealed in the analyses, prompt action and followup on that action, improved training, emphasis on pilot discipline, and thorough mission briefings. Today, we call it risk management.

In response to the early Desert Shield accidents, the U.S. Army Safety Center sponsored an analysis of NVG operations in Southwest Asia by a team of representatives from the Army Safety Center, Army Research Institute, Aviation Training Brigade, and Center for Night Vision Electro-Optics. From actual flights, analysis of audio and video tapes, and interviews with other pilots, the team determined and recommended maximum airspeeds and altitudes for different types of desert terrain and levels of illumination.

Mission planning charts were developed and published in the Aviation NVG Desert Training and Operations Planning Guide. This information was quickly distributed to aviation units for use in operational planning. With the help of this information, commanders made smarter risk decisions and implemented operational parameters for night flight. And not only did commanders implement the controls, they followed up during and after each mission to ensure that all went according to plan, reevaluated the plan and made adjustments as required to accommodate unforeseen issues, and incorporated lessons learned for future use.

General Tunner recognized the need for additional training before sending crews over the Hump. Likewise, we quickly recognized our aircrews were not prepared to handle the unique challenges of the Southwest Asian desert. Nowhere in the U.S. could we have duplicated the environment they would encounter there. Therefore, our aircrews needed train-up time in that environment. Fortunately, on the training side, we had time to "crawl before we walked." The almost 6 months from the beginning of Operation Desert Shield to the beginning of Operation Desert Storm provided time for crews to train as they awaited the start of combat.

The fact that in the early stages of Operation Desert Shield many units deployed without their safety and standardization personnel was perceived by some crews as an indication that safety was less important in combat than it had been in the peacetime environment. However, units quickly realized that active involvement of safety and standardization personnel increases battlefield survivability, thereby retaining combat power. This problem was corrected promptly, and safety and standardization personnel deployed with their units.



The Army has established reasonable, attainable, valid standards that include safety elements and provides realistic training for crews to reach these standards of proficiency. Anything less than by-the-book performance can't be tolerated in peacetime, and it certainly could not be tolerated during combat. It was up to

leaders to enforce standards—including safety elements—and they did. Perhaps the lesson learned here is that we should continue to train as we will fight but that we need to redefine realistic training.

Just as briefings and debriefings proved to be of great importance to General Tunner's aircrews, they also proved their worth during Operations Desert Shield and Desert Storm. Briefings provided detailed analysis of missions and outlined specific crew duties. Not only did debriefings provide an opportunity to pass along lessons learned, they were a valuable source for current weather updates, an area where information was sometimes inadequate.

How well did it work in Southwest Asia? There were 39 Class A Army aviation accidents during Desert Shield and Desert Storm, which is almost double the peacetime estimate of 20. However, if we had not implemented these safety stratagems in Desert Shield and Desert Storm—many of them the same as those used by General Tunner in the India-China airlift in 1944—we might also have had to report "a loss of life that would have shocked the world."

General Tunner knew that for his aircrews to accomplish their mission and survive they had to make safety part of everything they did. So do we. Probably the most important lesson learned from Desert Shield and Desert Storm is that risk management must be an integral part of every mission, regardless of whether it is training, operational, or combat. To ensure that good aviators do not die needlessly and that future conflicts end in success, we must learn from history and our own experiences and avoid repeating our past mistakes. ♦

—Portions of this article on the India-China airlift were adapted from the article by Richard W. Huling, Ph.D., AFISC Historian.

S T A C O M

Integration of newly graduated IERW aviators into unit ATPs

During a recent Department of the Army training assessment, it was noted that some units were integrating newly graduated initial entry rotary wing (IERW) aviators into their Aircrew Training Programs (ATPs) at readiness level (RL) 2. This integration was based solely on a records review of the aviator's DA Form 759: Individual Flight Record and Certificaton—Army, without any aircrew training manual (ATM) records. Units were citing as authority TC 1-210: Commander's Guide, paragraph 4-3a; TC 1-210, figure 4-1; and NOTE 2 under the paragraph title "Readiness Levels" in the appropriate ATM.

Units are advised that these references do not apply to new flight school graduates for two reasons:

- IERW student pilots are trained in all base tasks required by the appropriate ATMs; however, not all of the tasks are evaluated.
- The aviator arrives at the unit with a DA Form 759 and no flight training records. Therefore, a records review cannot be accomplished.

Additionally, integrating IERW aviators into ATPs at RL 2 is contrary to the Directorate of Evaluation and Standardization (DES) position established on 28 April 1987, which requires newly graduated flight school aviators to be integrated at RL 3. Since 1987, however, IERW training has changed considerably and a modification of this policy may be warranted.

Units are advised to administer a proficiency flight evaluation as part of the commander's evaluation before integrating a newly graduated aviator into the ATP. Based on the outcome of this proficiency flight evaluation, the proper RL status can be determined.

If additional information is required, DES POC is CPT Evetts, ATTN: ATZQ-ESF, Fort Rucker, AL 36362, AV 558-6309/3504, commercial 205-255-6309/3504. ♦

STACOM 151 **March 1992**

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

Don Cumbie

Donovan R. Cumbie
Colonel, Aviation
Director, DES

OH-58 sand ingestion

Certain OH-58A/C aircraft used in Desert Shield/Desert Storm have experienced excessive fuel system contamination with sand. The sand had forced the engine fuel pump to enter the bypass mode. Due to an anomaly in the engine fuel pump, this bypass is not continually indicated by the cockpit warning system.

Aviation Systems Command (AVSCOM) has transmitted the following four aviation safety action messages (ASAMs) concerning sand- or fuel-related problems on the OH-58A/C.

■ 212030Z Nov 91, OH-58-92-ASAM-02, subject: One-time inspection of fuel system for contamination.

■ 261930Z Nov 91, OH-58-92-ASAM-04, subject: Addition of flight restriction and reduction of task inspection suspense date to one-time inspection of fuel system for contamination on all OH-58 A/C helicopters.

■ 132100Z Dec 91, OH-58-92-ASAM-07, subject: Revision to one-time inspection of fuel system for contamination on all OH-58A/C helicopters that were deployed to Southwest Asia.

■ 152145Z Jan 92, OH-58-92-ASAM-08, subject: Inspection of the engine fuel pump filter bypass valve for proper operation on all OH-58A/C and OH-6 series aircraft with T63-A-700/720 engines.

AVSCOM Directorate for Engineering designed an airframe fuel filter for the OH-58, and the kit was prototyped at Fort Rucker, AL. The retrofit of the fleet will be by modification work order (MWO) kit, MWO 1-1520-228-50-48. ♦

—POC: MAJ(P) George Giffin, Aviation Section, AV 558-3746/4631, commercial 205-255-3746/4631

Airworthiness release needed for GPS

Information in this article has been extracted from the 15 January 1992 Issue of *Aviation Logistics*.

During Operations Desert Shield, Desert Storm, and Provide Comfort, many lightweight commercial global positioning systems (GPS) and Loran receivers were temporarily installed on Army aircraft. Some examples of these are the Trimble and Magellan GPS units and Voyager Loran. These receivers were installed on a temporary basis to aid units while conducting operations in the Southwest Asian theater.

Some receivers were issued with installation kits and mounting instructions, others were not because of the urgent need to get the units into the hands of the operators. Over the past several months, the Army Safety Center has received several preliminary reports of incidents where unsecured or improperly secured receivers had vibrated off the glareshields of OH-58 aircraft, falling into and damaging chin bubbles. Damage to Army aircraft caused by inadequate installation of these receivers is expensive and unnecessary.

Units returning home from Southwest Asia need to apply for an airworthiness release to cover the installation of these receivers if continued use is desired. Airworthiness releases are being handled on a case-by-case basis, dependent upon the technical merit of each installation. Units should submit requests for airworthiness releases through their respective MACOM to the Commander, U.S. Army Aviation Systems Command, ATTN: AMSAV-E, 4300 Goodfellow Blvd, St. Louis, MO 63120-1798.

Technical data necessary to establish the adequacy of the installation from an airworthiness standpoint should be included in the request. The data should include drawings of the installation and specification sheets for the receiver and antenna, including weight and power consumption. For existing Trimpack GPS units that were installed using an approved AVSCOM technical bulletin and installation kit, the request need only reference the technical bulletin number. AVSCOM engineers will review the data and contact the unit if further information is required. For further technical information, contact Mr. Roger Alons, DSN 693-1291, commercial 314-263-1291. ♦

—MAJ Brent McMahan, Aviation Section, AV 558-3746/4631, commercial 205-255-3746/4631

Aviation logistics corner

The following messages are adapted from the *Aviation Logistics* newsletter and contain solutions or the latest information on areas of interest for people involved in Army aviation.

■ UH/EH-60 external fuel tanks. Questions have arisen about the use of external fuel for training missions. Change 13 to the operators manual presents descriptions and performance data for mission profiles using external fuel tanks, including 230- and 450-gallon configurations. Units should note that 450-gallon tanks are approved for self-deployment missions only. Also, an airworthiness release is required for flight with the self-deployment kit installed. Special considerations will apply due to the high gross weight of 24,500 pounds, which is outside the normal maximum gross weight envelope. Logistics considerations also apply, since the logistic concept dictates only limited use of the self-deployment kit.

Configuration of the aircraft with four 230-gallon tanks is a fully qualified configuration that offers extended range while remaining within the 22,000-pound gross weight flight envelope. Operation with four 230-gallon tanks installed for training purposes approximates operation with the self-deployment kit installed but eliminates the following characteristics of operation that apply at the self-deployment gross weight of 24,500 pounds:

- The UH-60A cannot hover; the UH-60L hovers at 2 feet in-ground-effect.
- A rolling takeoff at 60 knots required.
- There is high pilot workload during taxi and a nose-down pitchover tendency during takeoff.
- Extensive operations would require reductions in component retirement times.
- The 450-gallon tanks are not crashworthy or ballistically tolerant. Contact: Mr. Ray Oliver, DSN 693-3210.

■ AH-1 improved particle separator (IPS) icing procedures. Two Cobra units reported significant engine damage on several of their aircraft outfitted with the IPS. AVSCOM conducted investigations at both locations. In addition to FOD caused by objects passing through all stages of the compressor, seal deterioration and seal damage were found. A third Cobra unit reported bypass door actuator malfunctions. Two ASAMs (aviation safety action messages) have been issued to correct erroneous procedures, clarify proper procedures, and check other aircraft for potential engine FOD. The actuator malfunctions were caused by corrosion in the actuator mechanism. The vendor is preparing a bulletin that will detail corrective actions to prevent further corrosion caused by actuator malfunctions. Meanwhile, units with IPS-equipped Cobras should be careful to protect actuators from spray during washing. Contact: Mr. Jack Hepler, DSN 693-1575.

■ AH-64 flameouts. Fort Hood reported one incident of No. 1 engine flameout in flight. This occurred about 15 minutes after internal fuel transfer. Postflight aircraft analysis could not replicate occurrence and no faulty components were detected.

Due to the incident occurring following fuel transfer, removal of the fuel transfer pump was recommended and Category I Deficiency Report (CAT I DR) was requested to investigate internal pump air seal leakage. Internal seal failure (on either transfer or boost pump) can occur on air-driven devices, yet they can still perform their intended function. Aeration of the fuel is the net result.

A Category I DR for information purposes is requested on any incidents where a flameout or low fuel psi light is encountered. Data detailing the preceding 15 to 20 minutes of activity leading up to the incident can be beneficial in focusing investigative actions to correct or prevent further incidents. Contact: Mr. Carl Duffner or Mr. Fred Banks, DSN 693-1679.

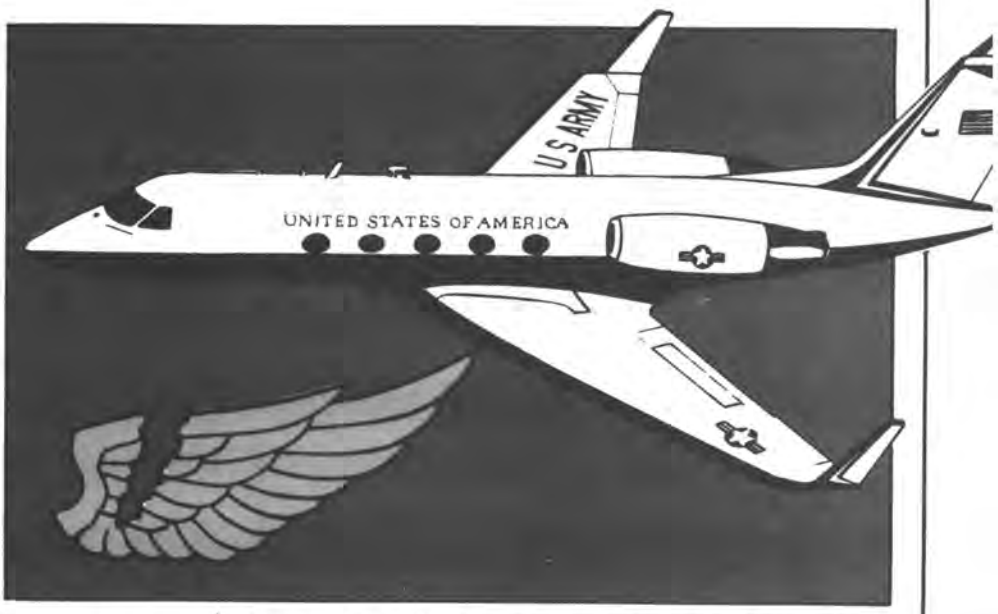
■ CH-47 engine start procedures. The CH-47D T55-L-712 engine may not always reach 15-percent N1 speed during start. The dash 10 manual was originally changed from 12 percent to 15 percent minimum due to high power turbine inlet temperature (PTIT), hung starts, and engine surges. However, because of the wording in the technical manual "minimum of 15 percent," numerous missions have been aborted. As long as the pilot motors the engine to its maximum speed and it exceeds 10-percent N1 (minimum) a start should be initiated.

A publication change is being initiated to add a note stating "If the engine does not reach 15-percent but exceeds 10-percent N1 (minimum) and has reached its maximum speed, initiate start but monitor engine and PTIT for a possible hung start and/or excessive PTIT."

You are authorized to use this procedure until receipt of the publication change. Contact: Mr. Ronald Heitert, DSN 693-1415. ♦

Broken Wing award

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



CW3 Michael B. Rahm, Davison Aviation Command, Fort Belvoir. With nine passengers and five crewmembers on board, the C20-E departed Andrews Air Force Base (AFB) for a more than 5-hour combination service and training flight to Howard AFB, Panama. At flight level 370 about 2½ hours into the flight and almost 120 miles out into the Gulf of Mexico, CW3 Rahm, the pilot-in-command, was on the controls when the pilot and copilot electronic flight instrumentation system flashed three times and then went blank. Simultaneously, the autopilot disengaged and all communication and navigation systems failed. The crew smelled a strong odor of burning electrical wires in the cockpit. Twenty-three circuit breakers popped on the pilot and copilot circuit breaker panel, including hydraulic systems circuit breakers. And eleven circuit breakers popped in the power distribution box, which houses 50 amp circuit breakers. The auxiliary power unit (APU) fire light came on.

The only source of electrical power available was through the emergency "E" inverter, which powers the engine instruments. CW3 Rahm maintained basic flight by using the standby (emergency) airspeed indicator, artificial horizon, and altimeter. Without communications and navigational capability and with the prospect of an APU fire, CW3 Rahm reversed course just short of Cigar intersection on R875. The crew maintained pressurization with the outflow valve seated in the closed position. Not knowing how long pressurization would be maintained, CW3 Rahm started a maximum rate descent to 10,000 feet. With no communications or navigation radios and no VFR charts or maps, he flew the crippled aircraft on a magnetic heading of 060 back to the Florida coast and successfully located MacDill AFB. He prudently selected MacDill as the emergency landing site because of its 11,420-foot runway.

The crew made contact with MacDill Base Operations using a passenger's cellular telephone. However, subsequent attempts to contact MacDill with the cellular telephone were unsuccessful; therefore, the crew did not know if the tower was aware of their ➤

Wear of Broken Wing award

A question has been raised about wearing the Broken Wing award on the uniform. AR 670-1: Wear and Appearance of Army Uniforms and Insignia does not authorize wearing the Broken Wing award on the uniform. However, paragraph 27-20c(3) does state that "use of a conservative military-oriented tie tack or tie clasp is authorized." Therefore, the Broken Wing award can be worn as a tie tack on the Class A uniform or as a lapel pin on a civilian suit or sport coat. A DA Form 2028: Recommended Changes to Publications and Blank Forms requesting authorization for the Broken Wing award to be worn on the uniform is being submitted.

—POC: Mr. Don Mynard, Policy, Training, and Evaluation, AV 558-3759/3913, commercial 205-255-3759/3913

situation. Upon arriving at MacDill, CW3 Rahm circled the field looking for a light-gun signal while maneuvering to stay clear of recovering F16 aircraft.

Without the necessary hydraulic systems available, CW3 Rahm knew he would not have at his disposal brake anti-skid, thrust reverser, ground spoilers, and nosewheel steering for landing. There had been no known reports of the aircraft experiencing a complete loss of essential electrical power because of the aircraft's sophisticated redundant system design. Therefore, CW3 Rahm had no documented emergency procedure addressing what should be done in the event of a complete electrical failure.

Using his own superior flying skills and knowledge of the aircraft's handling characteristics, CW3 Rahm knew he had to keep the aircraft on the runway by judicious use of toe braking. He also knew that without the use of flaps, the landing speed would be increased by about 30 knots. CW3 Rahm cautiously landed the aircraft, applying brakes to prevent any tire blowout during the high-speed run. He skillfully used the entire length of the runway to bring the aircraft to a stop with no injury to the passengers or crew and no further damage to the aircraft. ♦

Accident briefs

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - At 15-foot hover during flight evaluation, pilot misunderstood IP and rolled throttle to flight idle. IP thought engine had failed, checked instruments, and told pilot engine was still producing power. Pilot realized mistake and rapidly increased throttle. Crew observed torquemeter coming down through 55 psi. Aircraft yawed and shuddered, and IP took controls and completed landing. Overtorque requires removal of transmission, main rotor hub, main rotor blades, mast, and drive shaft.

UH-1 Class D

H series - During night cruise flight at 2,500 feet agl and 100 knots, aircraft experienced severe vibration, accompanied by nose-high attitude and left yaw. RPM warning light came on, and pilot noted N1 and N2 gauges were indicating maximum rpm. PC increased collective while simultaneously reducing throttle. RPM was still above limits, so pilot placed governor switch in emergency position. During descent, engine chip detector and master caution lights came on. Crew landed in open field and shut down aircraft without further incident. Suspect overspeed governor or fuel control malfunction.

UH-1 Class E

H series - About 30 minutes into emergency medical evacuation mission, aeromedical personnel in charge of patient experienced difficulty with oxygen system. Attending flight surgeon requested aircraft be landed at closest base to resolve problem with oxygen system. PC started approach from about 5,500 feet agl while pilot made necessary arrangements with ATC. About 20 seconds after PC initiated descent for approach, master caution and hydraulic caution segment lights came on, followed by control stiffness. As crew performed emergency procedures, crew chief smelled hydraulic fluid. Flight control stiffness continued, and about 1 minute before landing, crew smelled another odor that they thought was coming from hydraulic pump. Crew made running landing, touching down at about 35 knots. With pilot helping PC push collective down, crew did not experience any difficulty in ground track or heading control as aircraft skidded about 1,500 feet before coming to stop. Postflight inspection revealed that tail rotor hydraulic return line inside right transmission area access panel had failed, allowing fluid to drain out. Hydraulic pump had run hot for about 5 minutes during approach and requires replacement.

UH-60 Class B

L series - During night-aided terrain flight training mission, aircraft struck high-tension wires, damaging all four main rotor blades. One wire hit No. 2 engine cowling on right side and another wire struck gunner's window and lodged on console. Crew landed aircraft in open field. No injuries. 9214

UH-60 Class C

A series - Pilot engaged target with 2.75-inch high-explosive rockets and went into break. Crew heard object strike aircraft and completed landing without further incident. Postflight inspection revealed dents in two main rotor blades and hole in right cargo door window. No injuries.

UH-60 Class D

A series - With forward-looking infrared radar (FLIR) stowed, crew landed aircraft to unimproved area. After touchdown, sister ship reported that FLIR was in dirt. Crew repositioned, shut down, and inspected aircraft. FLIR outer case had been dented.

Attack

AH-1 Class D

S series - As aircraft hovered past OH-58, rotorwash blew left pas-

senger door off OH-58. Crew had failed to properly secure OH-58 door.

AH-1 Class E

F series - During approach to snow-covered small soccer field on island, high recon indicated area was suitable for landing. During low recon, crew failed to see white soccer goal, which blended with snow-covered ground, and continued approach. At about 4 feet agl, aircraft struck crossbar of soccer goal. Cannon plug on de-clutching solenoid and tip of lower WSPS sheared off.

AH-64 Class D

A series - During night vision system mission, crew heard rattling noise and descended to landing site. While on final, noise disappeared, and crew continued mission. Upon arrival at tactical FARP, pilot did walkaround inspection and found tail rotor drive shaft cover open. Pilot shut down aircraft, and both crewmembers agreed that damage was slight and that mission could be continued. Crew flew for 1.5 hours and returned to home base. Technical inspection revealed tail rotor drive shaft was scored, requiring replacement.

AH-64 Class E

A series - During approach to rearm line, PC misjudged speed and clearance, resulting in hard landing. Tail wheel struck ground and tail wheel strut compressed and struck stabilator against tail wheel switch bracket.

A series - During preflight, crew failed to properly secure No. 1 engine cowling. Cowling came open during flight, bending several support ribs and cracking one.

A series - Following preflight inspection, crew chief took oil sample and did not latch cowling. Pilot failed to notice unlatched cowling during walkaround inspection. Engine cowling opened in flight, damaging cowling strut and jack assembly.

A series - During training mission, pilot performed roll-on landing with parking brake on, resulting in left tire going flat.

Cargo

CH-47 Class C

D series - Aircraft was lead in flight of six performing NVG external load operations. While hovering with M966 HMMWV at 100 feet agl to remain clear of other aircraft and high trees, aircraft entered ground fog and IMC. PC executed vertical helicopter instrument recovery procedures (VHIRP). About 1 to 2 minutes into VHIRP in IMC, load began severe oscillations. As aircraft became uncontrollable, PC ordered flight engineer to jettison load. PC completed VHIRP and returned to home base.

D series - During air-to-air refueling operation, aircraft failed to connect with refueling probe. Probe moved up and hit main rotor blades. Crew landed without further incident.

CH-47 Class D

D series - While on vectors for visual approach to airfield, crew heard thump under aircraft. Flight engineer opened utility hatch door and discovered lower rescue hatch had separated from aircraft. Search for hatch was unsuccessful, and crew landed aircraft without further incident. Rod-end clevis on one of the two links that holds lower rescue hatch forward edge had broken, allowing hatch to swing down into windstream. Other forward link then broke and pulled two aft link attaching points out of lower rescue hatch as it was torn off aircraft, leaving four holes in aircraft sheet metal aft of hatch.

D series - During night cruise flight, crew noticed slight left yaw. Postflight inspection revealed that left aft pylon work platform latch pin retaining hole had failed. Door had come open and then slammed shut several times, damaging sheet metal aft of door.

CH-47 Class E

D series - During night-aided cruise flight, master caution light came on with corresponding utility hydraulic segment light on caution panel. Flight engineer checked panel and verified utility pressure had dropped to zero. Crew completed uneventful landing to civilian airfield. Inspection revealed hydraulic pressure fitting at station 117 had backed off, allowing all hydraulic fluid to drain.

D series - During hookup phase of night air assault mission with externally rigged TOW HMMWVs, forward hookup person was crouched on HMMWV hood, reducing hover clearance between aircraft and HMMWV to 4 feet. Air turbulence from other CH-47s caused aircraft to settle momentarily and strike HMMWV cab with center hook, slightly damaging roof. Forward and aft hookup personnel were forced off top of HMMWV but were uninjured.

Observation

OH-58 Class A

C series - Crew was searching for suitable landing area when low rpm warning light came on and audio sounded. Pilot turned right off crest of mountain to trade altitude for airspeed as he lowered collective. RPM increased enough to deactivate low rpm indicators. Crew elected to find precautionary landing site. As they descended mountain, rotor rpm began to decrease at constant, moderate rate. Pilot entered autorotation after clearing last set of wires between aircraft and landing site. Aircraft impacted ground at very low rpm and high rate of descent. Tail stinger hit ground first, and skids hit level on a 4-foot bank. Aircraft slid for about 10 feet on level ground until left skid dropped into 3-foot gully. Left skid, lower wire cutter, and nose dug into bank at edge of gully. Aircraft's tail pitched up, pivoted about 45 degrees, and hit ground almost vertically. White main rotor blade severed tail boom twice, and entire rotor system separated and came to rest about 10 feet away. Pilot completed emergency shut down, and crew egressed unassisted. 9214

OH-58 Class C

A series - At 20 to 30 feet agl, crew was repositioning aircraft from field

landing site to FARP when they heard loud bang and aircraft yawed left. Refuel personnel saw flames coming from engine exhausts. N2 and rotor deteriorated below normal range, and pilot executed cushioning autorotation. Aircraft skidded 6 to 8 feet, and left skid tube apparently failed and broke between crosstubes, allowing aft portion to buckle and break off aft crosstube. Aircraft settled upright but left side low. Inspection revealed no indication of hard landing in drive train or tail boom attaching bolts. Investigation continues.

D series - During approach for landing, crew heard bang and conducted internal and external checks to determine cause but found none. Aircraft had slight vibration but no other indication of problem. Crew performed flyby at tower for visual check; tower could not see problem. While aircraft was hovering to termination point, ground crew signaled for pilot to land immediately. Crew landed and completed emergency shutdown. Inspection revealed upper shroud of mast-mounted sight subsystem was missing and three main rotor blades were damaged.

OH-58 Class E

A series - Aircraft was en route to field training exercise area and made unauthorized stop at civilian airport. After takeoff, crew encountered unforecast IMC. Pilot was able to return to civilian airport where crew remained overnight.

Fixed wing

C-12 Class D

H series - Light mixed icing was forecast from 3,000 to 15,000 feet with ceiling at 800 feet agl. With temperature at 0°C, crew turned on windshield heat during before-takeoff check. At 200 feet agl and 130 knots during climb-out, crew heard loud boom as pilot's windshield cracked. Crew completed landing without further incident.

U-8 Class C

F series - After takeoff, both main gears indicated unsafe but appeared down. Crew unsuccessfully attempted to recycle gears. Flyby to tower indicated gears down. Aircraft touched down and rolled to stop. About 1 to 2 seconds later, main gear collapsed. Crew completed shutdown and exited aircraft without further incident.

U-21 Class D

A series - At 4,500 feet agl, parachutist exited aircraft and struck horizontal stabilizer with his head. Crew felt no abnormal control reactions.

C series - After practice instrument landing system approach, landing gear failed to retract when crew placed gear handle in up position. During flyby, tower verified gear was down. Crew completed uneventful landing. Maintenance found left main gear squat switch was worn and out of adjustment.

Maintenance

UH-1 Class E

H series - During hot refueling, fuel was seen leaking from belly of aircraft. Crew completed shutdown. Inspection revealed right rear fuel cell access cover plate packing was pinched during installation, causing cover cell to leak when fuel reached it.

AH-1 Class D

F series - During runup for MOC, fire guard noticed oil leak and informed pilot to shut down aircraft. Crew chief had failed to follow procedures and incorrectly connected engine oil return line, damaging engine oil bypass valve and engine oil cooler.

CH-47 Class E

D series - During daily inspection, mechanic discovered that forward transmission air induction cowling lower segment had been sucked into drive shaft and flex pack. Ground chips coated all forward pylon interior components. Investigation revealed that lower segment assembly was apparently reinstalled incorrectly before previous flight. Aft edge of lower segment was inserted above drive shaft pass-through bracket at station 120, allowing air pressure to force lower segment assembly up against synchronized drive shaft. As lower segment assembly wore, it eventually contacted flex pack, which chewed up the remainder of lower segment assembly.

Messages

- Aviation safety action maintenance mandatory message concerning inspection of the engine main fuel filter for fuel leaks on all OH-58D aircraft with T703-AD-700/700A engines (OH-58-92-ASAM-10, 262000Z Feb 92). Summary: Fuel has been found leaking from the fuel filter assembly, P/N 23003143. Leaking fuel was caused by a loose fitting packing (MS29513-232, NSN 5330-00-251-9364) from batch number 61554. The purpose of this message is to require a visual one-time inspection of the entire fuel filter assembly for fuel leaks during runup. This message also contains inspection and correction procedures and recording and reporting requirements. Contact: Mr. Lyell Myers, DSN 693-9089, commercial 314-263-9089.

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

U.S. ARMY SAFETY CENTER

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R. Dennis Kerr
Brigadier General, USA
Commanding General

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ACM

While modern technology has produced many useful materials, these same materials can become a modern-day Pandora's box unless precautions are taken to protect people who may be exposed to them during manufacture, repair, or following an aircraft accident.

Advanced composite materials

An Apache is down and burning. For reasons not yet determined, the AH-64 hit trees during NOE maneuvers in an installation training area. Emergency rescue and firefighters arrive on the scene and begin rescue and fire control operations. Two of the firefighters, neither of whom is wearing respiratory protection gear, have inhaled smoke from the active fire. Within minutes, one firefighter experiences headache, burning eyes, and vomiting. He has to be medevaced to a local emergency room for treatment. His problem is diagnosed as "reactive airway dysfunction syndrome." The second unprotected firefighter will experience a "bad" headache for 2 to 3 days but does not seek medical attention. An investigation team from the Army Safety Center arrives to investigate the accident. When the investigation has been completed, a work detail from the supporting installation begins the cleanup job. Two members of the

cleanup crew also experience severe headaches and trouble breathing for 2 to 3 days after taking part in the operations.

Although the situation just described didn't happen just that way, it is a collage of several real events that have happened in Army aviation units over the past several years. People who are exposed to aircraft crash sites often report similar health effects. These effects are caused by a common culprit—advanced composite materials (ACMs).

Increasing amounts of ACMs are being used in aircraft

Production

Manufacturing ACMs involves many complex steps, which include producing a resin (bonding) system and reinforcing fibers and fillers or additives. The system components are then joined and "cured" to form a cross-linked matrix. Two of the fibers produced are more commonly known by their trade names—Kevlar® and Nomex®.

Resins provide the "glue" for ACMs. The most commonly used resin is epoxy. It is produced from the burning resins, products of pyrolysis, that are believed to cause irritant effects when the resultant smoke is inhaled.

Carbon-based and graphite ACMs are being used more frequently and in greater quantities in structures ranging from aircraft to tennis rackets. ACMs have several advantages over conventional metal. The primary advantage of ACMs is their favorable strength to weight ratio. In addition to their strength to weight ratio, ACMs have high tensile strength and stiffness, corrosion resistance, and a low coefficient of thermal expansion; that is, they do not expand greatly when heated. Disadvantages include high costs and low damage tolerance.

Content in aircraft

Increasing amounts of ACMs are being used in aircraft. The F-14, F-15, F-16, and F-18 aircraft contain about 3 to 5 percent composites by structural weight; the ATF (Advanced Tactical Fighter) and B-2 contain 30 to 50 percent composites; and the V-22 Osprey may contain as much as 70 percent ACMs. More important to Army aviators, some Army aircraft in the current inventory contain ACMs (table 1). The UH-1 and AH-1 have composite main rotor blades, and the new RAH-66 Comanche may contain as much as 80 percent ACMs. In addition, several of the older aircraft, such as the UH-1s, are being retrofitted with components containing ACMs.

Health hazards

While the health hazards involved in manufacturing these materials are relatively well known, the aviation community has recently become concerned about the potential health risk to personnel exposed to fragmented composites. Health concerns about ACMs—particularly following an aircraft accident involving a crash, fire, or an explosion—center around resin pyrolysis products and liberated composite fibers.

The Navy Environmental Health Center (NEHC) has collected extensive data on ACMs and in particular ACMs in fires (NEHC-TM 91-6, September 1991). The main concern during a fire is the possibility that the fibers, liberated as the resin burns off, will splinter into particles small enough to be inhaled and retained in the lungs. In addition, experimental studies done to assess and define composite combustion products revealed that burning graphite and epoxy composites produce carbon monoxide and, to a much lesser extent, hydrogen cyanide. Also found as combustion products were ethane, propane, isopropyl alcohol, benzene, and trace amounts of propylene.

Carbon fiber dust and fibrous particles also present a potential skin hazard. When handled

Table 1. Approximate percent composite content of Army aircraft*

Type Aircraft	Basic Weight in Pounds	Graphite Epoxy	Kevlar Epoxy	Fiberglass	Boron
UH-60	10,500	0.54	1.6	1.6	0.06
AH-64	10,505	<0.1	2.2	1.7	0
CH-47D	22,499	0.08	0.15	7.5	0
OH-58D	3,100	**	**	**	**

* Source: U.S Army Aviation Systems Command, 1989

** Information not available

vigorously in a manner that causes filament breakage or abrasion, composite fibers create splinters that can penetrate the skin's surface, similar to the way a wood splinter would do. Because of the nature of composite fibers, these splinters break into smaller pieces when attempts are made to remove them with tweezers. Additionally, composite splinters may cause skin irritation in susceptible individuals.

Protection

The NEHC and the Air Force Advanced Composites Program Office of the Air Logistics Command have simultaneously published ACM aircraft mishap safety and health procedures. These procedures should serve as initial guidance for people who respond to an ACM aircraft mishap. Further guidance and assistance are available locally from the installation safety manager and/or the industrial hygienist.

In an aircraft accident where fire or an explosion occurs, the following work practices should be observed:

- Limit crash site access to essential personnel.
- Conduct all work upwind of the crash site whenever possible.
- Spray the debris with a fixative, such as polyacrylic acid (for example, Carboset XL-11 manufactured by B. F. Goodrich) as soon as the fire is extinguished and the wreckage has cooled. A light oil mist or acrylic floor wax (or an equivalent sticky substance) are acceptable substitutes.
- Prohibit eating, drinking, or smoking in or around the crash site.
- Exercise caution when handling debris. Skin punctures from reinforcing fiber splinters are possible.
- Ensure that personnel shower as soon as possible after leaving the crash site.

The following specific protective clothing and equipment are recommended:

- Firefighters should use their self-contained breathing apparatus and protective gear while aircraft wreckage is burning or smoldering.
- Personnel at the crash site during the early stages should wear a full-face respirator with high-efficiency particulate air organic vapor cartridges. Until a fixative is applied, there may be unknown concentrations of airborne fibers and/or combustion by-products.
- After a fixative has been applied to the debris and vapor or mist generation is no longer a concern, crews may use a dust, fume, or mist cartridge respirator unless sampling warrants greater protection.
- Investigation and cleanup crews should wear Tyvek® or comparable coveralls, and the coveralls should be taped at the openings. Crews should also wear steel-toed boots, and puncture-resistant leather gloves are necessary when handling fibrous debris. Safety goggles or safety glasses with side shields will provide eye protection if a full-face respirator is not used.

ACMs have only been used for the last 10 to 15 years. Insufficient studies and scientific data exist to determine whether exposure to composite fibers of the respirable size constitute health risks similar to other industrial fibers such as asbestos. However, when risks are not well defined, it's prudent to take appropriate precautions. ACMs are present in many of our aircraft or in components that have been added to the aircraft systems and will appear in increasing quantities in the next generation of military aircraft. Knowing the hazards associated with ACMs and the appropriate handling precautions will help dispel unnecessary anxiety and protect the health of those who must work in and around crash sites. ♦

POC: LTC Kenneth Tannen, Industrial Hygienist, AV 558-2450, commercial 205-255-2450

Class A Accidents through March

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	3	4
	December	3	1	3	0
2d Qtr	January	7	3	1	0
	February	13	1	13	0
	March	4	4	8	2
3d Qtr	April	3		2	
	May	4		3	
	June	0		0	
4th Qtr	July	2		0	
	August	2		0	
	September	3		2	
	Total	48	13	37	6

CPO cyclic lockout

Investigation of a recent OH-58D accident revealed that a contributing factor was that the copilot/observer's (CPO) cyclic was locked out. When an attempt was made to transfer the flight controls from the right-seat pilot to the left-seat pilot (the PC), the left cyclic was not functional and subsequently led to loss of aircraft control. Not realizing his cyclic was locked out and ineffective, the PC misdiagnosed the cyclic lockout as a flight control or hydraulics malfunction. Lockout of the CPO cyclic has been identified as a possible factor in other OH-58D accidents and incidents.

The Army Aviation Center has initiated a vigorous risk management program to expeditiously deal with the cyclic lockout issue. Armywide changes in training, standardization, and operational procedures are being aggressively pursued and formulated. As an interim measure, the Aviation Branch Chief has directed that OH-58D aircraft will not be flown with the CPO cyclic in the lockout position when the crew consists of two rated aviators, with the following exceptions:

■**Maintenance test flights.** Unit OH-58D maintenance test flight processes will be reviewed to ensure cyclic lockout procedures are properly followed. On a case-by-case basis, the unit commander may waive the CPO lockout prohibition for those maintenance test flights requiring cyclic lockout. The mission briefing and back-brief documents will include the waiver authority.

■**TRADOC training courses.** The pilot training bases at Fort Rucker and Fort Eustis will review their curriculums to confirm flight periods in which the program of instruction requires cyclic lockout. Those periods will receive special emphasis during the mission briefing and the back-brief sessions.

For those flights authorized by the unit commander to be flown with the CPO cyclic in the lockout position, the PC will conduct a detailed review of proper in-flight cyclic reengagement procedures. He will also discuss the circumstances that might require in-flight cyclic reengagement.

A review of the OH-58D operators manual is in progress. Part of the review will focus on accidents where lockout of the CPO cyclic was or is suspected to have been a contributing factor. The objective of the review will be to determine what changes to the operators manual are needed to eliminate the CPO cyclic lockout as a potential accident-causing factor. The Aviation Center and the OH-58D TRADOC systems manager will determine if materiel or training changes are required in addition to the publication changes.

The Aviation Branch Chief expects procedures designed to eliminate the CPO lockout problem to be finalized and the CPO cyclic lockout prohibition to be lifted within 60 days. ♦

POCs: MAJ Brent W. McMahan, Army Safety Center, AV 558-3746, commercial 205-255-3746; CW4 Donald Price, Assistant TRADOC System Manager OH-58D, AV 558-3808, commercial 205-255-3808

Attention medevac commanders and standardization officers

The Medical Service Corps advisor for the Directorate of Evaluation and Standardization (DES) is 1LT Leonard W. Bowley. Any questions concerning aircrew training programs, standing operating procedures, aircrew training manuals, field manuals, training circulars, regulations, night vision goggles, environmental programs, or enlisted standardization programs should be addressed to 1LT Bowley. Questions concerning DES visits for aviation resource management surveys, assistance visits, or equivalency evaluations should also be addressed to 1LT Bowley at AV 558-5411/2770/3325, commercial 205-255-5411/2770/3325, FAX 205-558-3113. ♦

SPH-4 flight helmet retention assemblies

The U.S. Army Aeromedical Research Laboratory (USAARL) recently received an inquiry concerning a faulty SPH-4 series flight helmet retention assembly. A problem exists with size regular earcup retainer assemblies, NSN 8415-01-056-0700, from lot number DLA100-80-C-2420 manufactured by Kings Point Manufacturing.

Figure 1.

Figure 2.

A review by the U.S. Army Natick Research Development and Engineering Center, the Defense Procurement Support Center (DPSC), and USAARL of this retention assembly determined that the front left tab grommet placement (figure 1) is one-fourth inch closer to the earcup ring than the front right tab grommet (figure 2), causing uneven placement of the earcups in the helmet. The Natick and DPSC reviews uncovered other reported problems in this lot number, including installation of the chin strap grommet and a nape strap that is too long.

According to DPSC, these are old retention assemblies and should be purged from the supply system. The current retention assembly is the universal retention assembly, NSN 8415-01-330-6609. The universal retention assembly also eliminates the need for ordering regular and extra-large assemblies separately.

DPSC will exchange the old retention assemblies for the new universal retention assemblies on a one-for-one basis. The old retention assemblies along with an SF 364: A Report of Discrepancy or SF 368: Quality Deficiency Report, as appropriate, and the original requisition number should be addressed to Commander, Defense Procurement Support Center, ATTN: DPSC-FQPC, 2800 South 20th Street, Philadelphia, PA 19101. ♦

POC: Mr. Joseph R. Licina, USAARL, DSN 558-6892/6893, commercial 205-255-6892/6893

NVGs and lasers

Several questions have been posed to the Army Safety Center recently about what happens to aircrews when laser energy is focused on them while they are wearing night vision goggles (NVGs). The answer is reassuring, but there is still reason to be cautious. Because NVGs are not a direct-view piece of optical equipment, the laser energy cannot directly reach the NVG wearer's eyes through the tubes and cannot cause eye damage. Refracted energy from the laser could possibly pass by the NVG tubes if viewed off center and cause eye damage, so users should exercise caution in areas where laser energy might be encountered.

Laser energy can cause damage to the image intensifier tubes of unprotected NVGs; therefore, users should exercise caution when wearing unprotected NVGs in areas where laser energy might be encountered. The AN/PVS-5 NVGs have no protective features and none are anticipated. However, the aviator night vision imaging system (ANVIS) that is currently being procured has built-in laser

filters that protect the tubes from damage.

Unit goggle maintenance personnel can inspect the ANVIS to determine if laser filters have been installed. If the ANVIS does not have laser filters installed and units have not received the filters through the supply system for unit installation, contact Mary Ackerson, Program Manager (PM) Night Vision and Electro-optics, AV 656-4277/3277, commercial 703-806-4277/3277 for assistance in obtaining the filters.

Points of contact are:

■ MAJ Brent McMahan, Army Safety Center, AV 558-3746/4631, commercial 205-255-3746/4631.

■ MW4 Robert Brooks, U.S. Army Aviation Center, AV 558-5858/5812, commercial 205-255-5858/5812.

■ Mr. Glen Nowak, PM Night Vision and Electro-optics, AV 656-4276, commercial 703-806-4276 for ANVIS maintenance issues. ♦

Broken Wing awards

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

■ CW4 James A. Mooney, 4th Squadron, 3d Armored Cavalry Regiment, APO AE 09209. While climbing through 20 feet agl during takeoff in an AH-1F, CW4 Mooney felt a severe high-frequency vibration in the pedals. He immediately reduced power for an approach to the ground. At about 5 feet agl, he lost tail rotor directional control and the aircraft began a right spin. CW4 Mooney entered autorotation and was able to land the aircraft to a flat desert sand area with no further damage to the aircraft. Postflight inspection revealed that the red tail rotor blade had lost all of the L-100 erosion paint, which caused a severe out-of-balance condition. The resulting high-frequency vibration caused the 90-degree tail rotor gearbox mounting bolts to fail, allowing the tail rotor crosshead to separate from the tail rotor assembly.

■ CW2 Carl L. Solida, Company A, 1st Battalion, 25th Aviation Regiment (Attack), 25th Infantry Division (Light), Schofield Barracks, Hawaii. At 500 feet agl and 100 knots, the AH-1P crew heard a cavitating sound from the hydraulic compartment, followed by master caution and No. 1 hydraulic segment lights. Aircraft yawed right and froze in position. Quickly analyzing the situation, CW2 Solida, the pilot-in-command, realized that neither the No. 2 nor emergency hydraulic system would assist in alleviating the stuck pitch condition. He then attempted to streamline the aircraft and was partially successful. CW2 Solida diverted to the only suitable landing area, a Marine Corps air station. The crew made radio calls, confirmed emergency procedures, and prepared for touchdown. To avoid endangering the civilian population in the residential areas on the coast, CW2 Solida remained over water as he initiated his descent for approach. On short final, ATC notified CW2 Solida that the arresting gear at the threshold was still raised. Modifying his approach angle to overfly the cable, CW2 Solida continued using available power, airspeed, and manual control of the throttle to maintain aircraft alignment. He completed a smooth touchdown at 70 knots. As the aircraft raced down the runway, the pilot notified CW2 Solida that a second set of arresting cables had not been retracted. With only a moment to react, CW2 Solida realized the aircraft would be destroyed if contact was made at the speed they were travelling. To avoid impact, he needed to gain altitude; but to do so with airspeed well below 50 knots would create a control problem. The increase in collective would cause the aircraft to yaw right, and additional engine and rotor rpm would be lost. With determination, CW2 Solida smoothly applied collective, adjusted the throttle, and cleared the arresting cable by inches. With equal skill, he eased the aircraft back onto the runway, once again using cyclic and throttle to maintain alignment. If not for CW2 Solida's sound professionalism throughout the in-flight emergency and his ability to make split-second decisions, it is readily apparent that the aircraft and possibly the crew would have been lost. ♦

Failures lead to accidents

While participating in a medical readiness training exercise, two UH-60s were independently transporting medical personnel by multiple sorties to remote villages where they provided medical care. At the end of the day, the aircrews returned the medical personnel to a base camp for rest and resupply before the next day's mission. For 5 days, the mission had been completed without event.

On the sixth day, one of the UH-60 crews performed insertion of the medical personnel at the remote villages and then extracted them at the end of the day and returned to the medical base camp. At the base camp, the crew shut down the aircraft and conducted a debrief with the medical team commander, discussing the mission and ensuring that everyone would be ready for the mission the following day. With 700 indicated pounds of remaining fuel, the crew restarted the aircraft and departed for the approximately 15-minute flight to a local airport, where they were to refuel and remain overnight.

As the crew crossed the last ridgeline some 5 minutes away from the airport, the No. 1 low fuel quantity caution light came on. The fuel quantity caution light was quickly followed by the No. 1 low fuel pressure light, the No. 1 engine low oil pressure light, and then the No. 1 engine-out light and audio. Fearing the possibility of losing the second engine or inability to sustain single-engine flight, the PC, who was on the controls, chose to fly directly toward the airport to a point at midfield rather than continue in a normal traffic pattern. The aircraft continued in relatively level flight but soon began rapidly losing rotor rpm and altitude. As it became apparent that flight could not be sustained to the airport runway, the PC selected the only available open area—a soccer field located between some warehouses—and attempted to maneuver the aircraft to this spot. Approaching the soccer field, the aircraft struck a 20-foot-tall tennis court backstop, hit the ground, bounced up

against one of the warehouses, fell back to the ground, and slid to a stop, coming to rest on its left side. Through his broken overhead window, the pilot in the left seat observed the bladeless rotorhead still turning. He then placed the No. 2 power control and fuel levers to the off position and watched as all motion ceased.

The crew then egressed the aircraft with little assistance. One injury occurred when the pilot, standing on top of the aircraft, helped a passenger egress by pulling him by one arm up through the open right crew door, dislocating the passenger's shoulder. The aircraft was a total loss.

In reviewing the circumstances that led to this accident, the following individual failures were identified:

■ The unit maintenance officer and maintenance technician failed to properly diagnose the cause of an engine flameout that this aircraft had experienced about a month before the accident. Following the loss of the No. 1 engine, the crew reduced airspeed, continued normal flight for about 15 minutes back to home base, and completed a successful roll-on landing. Following rollout, the crew, presuming that they had experienced a No. 1 engine problem, elected to crossfeed the operating No. 2 engine from the No. 1 fuel system, which indicated significantly more fuel remaining than did the No. 2 fuel system. The No. 2 engine immediately quit, and the aircraft coasted to a stop at the unit's refuel point. The maintenance crew then wrongly presumed that the fuel gauge was out of calibration and made the following entry in the logbook. "No. 1 fuel gauge indicated 200 lbs more than actual. Flight below 400 lbs indicated is restricted." The intent of the writeup was to prohibit flight below an indication of 400 pounds on the No. 1 fuel system indicator, *not* a combined indication of 400 pounds. That was the extent of the troubleshooting efforts by unit maintenance personnel, and no preliminary report of aircraft mishap was submitted on this incident.

■ The accident PC failed to adjust airspeed and power requirements when he experienced failure of the No. 1 engine. Remembering the incident that the other two unit pilots had experienced a month prior, the PC was admittedly concerned with the possibility of a No. 2 engine failure. Fortunately, this aircraft was equipped with a flight data recorder (FDR) that recorded all actions by the aircrew during the mishap sequence. The data showed that not only did the PC not reduce to single-engine airspeed, but he also increased both airspeed and power demanded of the No. 2 engine. Although he was an experienced pilot with a total of 1,314 flight hours (879 of which were

in the UH-60), his control inputs demanded performance the No. 2 engine was not capable of providing, and rotor rpm began progressively decaying until further flight was impossible.

■ The pilot—a relatively new aviator with only 359 total flight hours, 205 of which were in the UH-60—also failed to accomplish his primary task of providing the PC with critical information on flight, rotor, and engine instrument indications during the in-flight emergency. The pilot was initially monitoring the No. 2 Ng but diverted his attention when a stabilator-off caution light came on. He reset the stabilator and soon saw what he thought was the No. 2 engine-out light coming on. The FDR established that the No. 2 engine never failed, and in fact, power never decreased to the point that the engine-out light would have illuminated. At the time the stabilator failed, the rotor rpm had decreased to below 93 percent, thus it was understandable that the stabilator failure was due to the loss of electrical power.

The ifs

■ *If* the maintenance personnel had conducted by-the-book troubleshooting procedures, they would have detected that the No. 1 fuel system boost pump output line had been disconnected and was loose in the cell, allowing the system to cavitate at about the 200 pounds fuel-remaining point. No records existed to show when, why, or by whom the line was disconnected but evidence did exist to show it had once been connected and torqued.

■ *If* the PC had followed by-the-book procedures for single-engine operations, the aircraft could have successfully sustained single-engine flight to the civilian airport, where the fault could have been investigated and possibly corrected.

■ *If* the pilot had completed his by-the-book crewmember responsibilities, he would have informed the PC of the deteriorating rotor rpm and helped talk the PC through performance of the proper single-engine procedure. *If* he had been more observant, he would have noted that the No. 2 engine was running at maximum available power throughout the entire sequence.

If any one of these individual failures had been eliminated, this accident could have been prevented. And accidents can only be prevented by individuals following by-the-book procedures. Anything less will ensure that accidents like this one will continue to happen. ♦

—MAJ Brent McMahan, Aviation Section, Prevention Programs Branch, AV 558-3746/4631, commercial 205-255-3746/4631

CCAD hot line and ESC support

According to aviation safety action informational message, 102130Z Mar 92, Corpus Christi Army Depot (CCAD) provides a hot line and engine service center (ESC) support for T53, T55, T63, and T700 engines on all UH-1, AH-1, OV-1, OH-58, H-6, CH-47, UH-60, and AH-64 aircraft. The CCAD hot line is manned from 0645 to 1715 Monday through Thursday. The line is operational 24 hours a day, and calls after duty hours will be recorded and returned the next day.

The CCAD hot line is provided to assist field units with problems concerning engines and dynamic components. The ESC supports front-line engines except contractor-supported engines, such as the PT6, T74, and other totally contractor-supported engines.

Requirements and procedures have not changed. Units should continue to use existing troubleshooting procedures. When a problem arises, units should use assistance representatives and request assistance from logistics assistance representatives when required. They should also use the local enhanced engine repair activity if available. If problems persist, units can contact the CCAD hot line at DSN 861-2651/2652, commercial 512-939-2651/2652. CCAD personnel may, at AVSCOM's discretion, advise how to repair an engine in the field. If CCAD personnel cannot solve the problem by telephone, they are authorized to send a quick-reaction team to make on-the-spot repairs. Problems that are not related to engines, such as airframe or aircraft component problems, should be addressed to logistics assistance representatives.

Personnel must have the engine model, engine serial number, engine time since new, engine time since depot repair, airframe type and serial number available when requesting assistance on the CCAD hot line.

Aviation units and support maintenance elements are encouraged to review procedures for prevention of foreign object damage, oil contamination, and operational factors that contribute toward premature engine removal and to take appropriate action to reduce unnecessary damage.

Compliance with these procedures should help minimize unnecessary return of engines to depot. ♦

POC: Mr. Roger H. Heidenreich, DSN 693-9089, commercial 314-263-9089

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - Following service mission, crew shut down aircraft because of 30-minute delay in refueling. Crew restarted aircraft, completed refueling, and was repositioning from POL to parking. As aircraft hovered into parking under blowing snow conditions, main rotor blades hit main rotor blades of aircraft waiting in parking area to reposition to POL. Both aircraft sustained major damage. No injuries. 9216

UH-1 Class C

H series - During daily inspection, crew chief found damage to swashplate assembly, scissors and sleeve assembly, mast assembly, and two connecting links. Further inspections and investigation in progress.

UH-60 Class B

A series - During NVG slingload training mission, aircraft was at 25 feet agl in FARP LZ with slingloaded fuel blivet. Aircraft drifted back and contacted trees with tail rotor. Pilot dropped load and landed to right front of load, striking tree with main rotor blade. No injuries. 9217

UH-60 Class D

A series - Crew performed ground day recon of proposed landing site and set up two inverted Ys for use during NVG training flight. After flying short traffic pattern, IP began approach to landing site. As he neared intended touchdown point, IP noticed rate of closure was excessive and increased rate of deceleration to slow aircraft, resulting in nose-high attitude. Trailing edge of stabilator hit ground, damaging stabilator trailing edge and tearing 2-inch and 3-inch holes about 6 inches inboard from trailing edge.

Attack

AH-1 Class C

F series - At about 4 to 5 feet agl with airspeed below 10 knots during simulated engine failure at hover, IP announced hovering autorotation and reduced engine throttle to idle. Pilot applied aft cyclic, resulting in nose-high attitude. Aircraft tail skid hit runway. Main rotor flexed down into No. 4 drive shaft cover, severing tail rotor drive shaft.

F series - PC was conducting orientation flight for newly assigned weather forecaster. Flight was briefed for low level up to 500 feet agl to keep it below fixed wing traffic in zone. Because of limited flight following facilities in area, PC was briefed to stay in control zone. While crossing ridgeline, PC failed to notice set of high-power electrical wires in time to avoid them. Aircraft was in right bank when top guy wire struck top of TOW sighting unit, breaking off azimuth indicator. Wire continued about halfway up left side of forward canopy where it cut into left wire strike guide plate. Wire then broke, striking left side of aircraft on alternator fairing and left forward fuel cell panel. Wire also struck one main rotor blade.

AH-64 Class B

A series - During air combat maneuver training, aircraft struck trees, damaging four tail rotor blades, stabilator, and two main rotor blades with possibility of other two main rotor blades having to be replaced. No injuries. 9218

AH-64 Class D

A series - During night vision system proficiency checkride, IP told pilot to perform NOE deceleration. Aircraft pitched up abruptly, decelerating and descending. IP twice warned pilot about altitude loss and trees. IP noticed power increase and torque at 120 percent. IP took controls, reduced power, and applied forward cyclic. Overtorque lasted about 2 seconds, and inspection revealed no damage.

Cargo

CH-47 Class D

D series - While carrying four 500-gallon fuel blivets during cruise flight, aft-most blivet separated from sling system. Blivet impacted, ruptured, and sprayed 500 gallons of JP-4 over field. Aircraft landed with no further mishap and no injuries to personnel or aircraft. Inspection of external air transport system revealed that grab hook keeper assembly for left chain leg had separated from assembly. Right chain leg keeper was bent out of position when left chain leg failed. Chain slipped through grab hook, allowing blivet to fall.

Observation

OH-58 Class C

A series - Crew was repositioning aircraft from field landing site to FARP when they heard loud bang and aircraft yawed left. Refuel personnel saw flames coming from engine exhaust. N2 and rotor rpm deteriorated below normal range, and pilot executed cushioning autorotation. Aircraft skidded 6 to 8 feet, and left skid tube apparently failed and broke between crosstubes, allowing aft portion to buckle and break off aft crosstube. Aircraft came to rest upright but left side low. Inspection of drive train and tail boom attaching bolts revealed no indications of hard landing.

A series - One to two seconds after normal start, turbine outlet temperature (TOT) rose rapidly to over 1,000°C. IP completed emergency shutdown procedures. TOT decreased to below 200°C and remained. Investigation continues.

OH-58 Class E

A series - During cruise flight, master caution and fuel filter segment lights came on. PC made precautionary landing without further incident. Aircraft had recently been washed and water entered fuel cells when water was inadvertently squirted up fuel cell vent line. Aircraft had recently been painted and contractor reversed stencils for fuel cell vent and engine deck drain line connectors. Fuel cells were

drained, opened, and manually cleaned. It is suspected that aircraft was not tilted back when fuel cells were cleaned and some trapped water was left in fuel cells. Fuel filters replaced for one-time flight back to home station. Fuel cells again drained and cleaned.

A series - During daily inspection, crew chief discovered exhaust cover lodged between rotating and nonrotating halves of main rotor swashplate. Damage to exhaust cover indicates aircraft was flown with cover in swashplate.

C series - While washing aircraft, crew chief mistakenly placed water hose on fuel tank vent instead of engine deck drain. Settling time was allowed, and fuel was drained until clear samples were obtained. Fuel filter caution light came on during takeoff on next flight. Crew landed and shut down aircraft. Maintenance found water in fuel filter and replaced it.

Fixed wing

C-12 Class C

H series - During climbout on crosswind leg, aircraft was struck by at least four large birds, causing extensive damage to leading edge of right wing.

U-21 Class E

H series - At 9,000 feet msl on IFR flight plan in VMC conditions, aircraft experienced immediate and complete avionics failure. PC maintained VMC and descended to 3,500 feet msl, flew to airfield, and completed landing without further incident. Inspection revealed that avionics No. 14 gauge main power supply wire going to master relay became frayed and shorted against oxygen pressure gauge elbow in copilot wall panel, causing total avionics failure. Further investigation revealed that avionics wire bundle was improperly secured when King package was installed.

Maintenance

UH-60 Class E

A series - During takeoff, PC noted that stabilator was not programming and airspeed indicators were not working. Crew aborted takeoff. Inspection revealed that pitot static drain ports had not been reinstalled following scheduled maintenance.

AH-1 Class E

F series - While hovering IGE, pilot heard two sharp reports but did not notice any rapid rise in tgt or other instruments. Crew landed and shut down aircraft. Inspection revealed variable inlet guide vane was improperly rigged.

Messages

■ Safety-of-flight technical message concerning engine support bracket on all AH-64 aircraft (AH-64-92-02, 102300Z Mar 92). Summary: A unit has reported the engine control supports bending, twisting, buckling, or breaking. This item supports the bell crank connecting the collective input to the load demand spindle on each engine. The purpose of this message is to provide inspection procedures to ensure that the support is serviceable. This message also outlines recording and reporting requirements. Contact: Mr. Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

■ Safety-of-flight operational message concerning flight limitations because of overstress conditions experienced during flight for certain specified OV-1D and RV-1D aircraft (OV-1-92-01, 102200Z Mar 92). Summary: Field reports have identified five OV-1D and RV-1D aircraft that have been subjected to flight load extremes. Visual inspections of these aircraft in accordance with TM 55-1510-213-23-1, pages 1-175 and 1-176, have not identified any visual fatigue cracks, structure deformation, or damaged fasteners. Flight loads that exceed 4.5 positive "Gs," as recorded on the counting accelerometer counter/recorder, detract from the service life enhancement program (SLEP) fatigue life predictions. Recurring projections are calculated from G-loads recorded on the DA Form 2408-13. Grumman aircraft computer processes the information recorded on the DA Form 2408-13 into a fatigue-life math model. Extreme wing and fuselage loads have a negative effect on the SLEP improvements incorporated into conversion OV-1D and RV-1D airframes. Eight SLEP improvements are fatigue enhancements of the existing aluminum wing and fuselage structure accomplished through cold working of wing attachment structure holes and addition of interference fit fasteners into the critical wing and fuselage fastener holes. These techniques result in reduced stress concentration in the enhanced holes, which allows a significantly higher fatigue life for normal flight load conditions. It should be noted that the ultimate strength of the wing and fuselage structure was *not* changed as a result of the SLEP improvements because the existing aluminum construction was used. The purpose of this message is to restrict airspeed and wing loading—that is, G-forces—on the five conversion OV-1D and RV-1D airframes listed in box below.

These specific airframes have been subjected to extreme wing loading during flight. The purpose of this message is also to alert OV-1D and RV-1D pilots of the negative effect that excessive G-loads have on the fatigue life of the conversion OV-1D and RV-1D wing and fuselage structure. This message also outlines correction procedures and recording and reporting requirements. Contact: Ms. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

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

Model	National Stock Number	Serial Number
OV-1D	1510-00-869-3654	67-18908
OV-1D	1510-00-869-3654	68-15943
OV-1D	1510-00-869-3654	68-15952
RV-1D	1510-00-368-8440	64-14252
RV-1D	1510-00-368-8440	64-14258

Followups

Information on accidents previously reported

UH-1 Class A

Reported in 21 November 1990 issue as 9103 - Aircraft departed on overwater ferry flight. Review of crew's flight plan and weather briefings indicated that they planned an en route time of 5 hours and 15 minutes. Flight appeared uneventful until crew approached island where they told tower that they were making precautionary landing to investigate engine chip detector light. An hour later, crew reported to tower that they were departing island for refueling point. While at refueling point, tower transcripts indicate that PC discussed with authorities nature of precautionary landing and his intentions to continue to destination. He was reminded that official sunset was 1751 local time, and he responded that he would try to expedite his arrival at destination "before VFR time is over." Crew established communications with destination point at 1747. Crew was advised that "[it] is dark now and VFR is over. Please expedite." Pilot responded that they were expediting and estimated reaching destination in 20 minutes. At 1816, crew reported their conditions as light rain and 2 kilometers visibility. Last tower communication with crew was at 1819. At 1825, witness on northern coast reported low-flying helicopter over her house, followed by silence. Aircraft had descended while in left-banked attitude and impacted water at high speed, sinking to depth of 220 meters. All three crewmembers received fatal injuries. A records review indicated a lack of required rotary wing instrument mission tasks in the unit's training program. Suspect that crew, knowing their lack of instrument proficiency, attempted to maintain visual flight rules. Most likely scenario is that crew failed to arrest rate of descent because of inadequate attention and/or spatial disorientation.

UH-60 Class A

Reported in 29 August 1990 issue as 9034 - At 50 feet agl and 40 knots while on short final during night tactical insertion to unimproved landing zone, aircraft experienced uncommanded right yaw, which progressed into right spin. Crew made two or three attempts to regain control by diving aircraft to gain airspeed. As crew entered autorotation, master warning panel lights came on, causing NVGs to white out. Aircraft landed hard, and unrestrained passengers sitting on floor were tossed about passenger compartment. Aircraft came to rest in relatively level attitude with left side of aircraft crushed, resulting in five fatalities and seven severe injuries. Inspection revealed that tail rotor control retaining washer, P/N 70103-11015-101, had cracked and allowed tail rotor pitch beam to rotate, resulting in loss of tail rotor control.

UH-60 Class A

Reported in 12 September 1990 issue as 9036 - Downgraded to Class B. During VFR night-aided 10-ship tactical insertion into multiple LZs, aircraft was Chalk 2 in flight of three on final lift. Before touching down in LZ, flight lead experienced brownout and called for a go-around. Chalk 2 did not hear call and continued approach. While on short final, crew failed to recognize aircraft had descended into large depression. Crew chief, seated on right side of aircraft, saw depression before contact and told PC to pull up. PC was slow to react to warning, and nose of aircraft hit top of berm, followed by main landing gear. Because rear of aircraft was over depression, it began to settle into depression. PC sensed aircraft was descending and abruptly increased collective, causing aircraft to rise to about 40 to 50 feet agl. Because rear of aircraft was low, aircraft moved backward when PC applied thrust. Perceiving right yaw, he incorrectly diagnosed tail rotor malfunction and lowered collective full down, causing aircraft to descend vertically at high sink rate. Pilot attempted to place power control levers in off position but had difficulty doing so. Aircraft landed hard in near-level attitude on heading of 097 degrees, sustaining major damage. All 12 occupants received minor injuries but exited aircraft without difficulty.

AH-1 Class B

Reported in 2 January 1991 issue as 9111 - Upgraded to Class A. Unit had been deployed to tactical field location for 6 days and was preparing to return to base. Mission was NVG training flight to be conducted in conjunction with redeployment. As Chalk 4 in second flight, AH-1 crew waited while three OH-58s made successful departures. Aircraft was parked on heading of 346 degrees, and crew attempted to depart on same heading, which resulted in right quartering tailwind of 5 to 10 knots. During downwind takeoff in loose sand environment, pilot in back seat was on controls and lost visual contact with ground. Upon experiencing brownout, he immediately transferred aircraft controls to front seat pilot who still had visual contact with ground. During control transfer, torque decreased from 98 to 90 percent and aircraft nose came up slightly. After taking controls, front seat pilot almost immediately lost ground reference. Aircraft began to settle and drift right before striking ground with right skid and entering dynamic rollover. Aircraft came to rest on top right side with no injuries to crew. Unit personnel were onsite almost immediately and were able to extinguish small postcrash fire in engine exhaust area. Instead of initially executing an altitude-over-airspeed takeoff, specifically an instrument takeoff as recommended in TC 1-204: Night Flight Techniques and Procedures, crew attempted takeoff with intention of transferring control of aircraft from back-seat pilot to front-seat pilot and from front-seat pilot to back-seat pilot in event visual conditions could not be maintained.

AH-64 Class A

Reported in 16 January 1991 issue as 9112 - While preparing for deployment to unit's tactical field location and desert operations, erosion tape had been applied to aircraft's main rotor blades, requiring limited test flight for main rotor tracking and smoothing. Crew started engines with auxiliary power unit (APU) without

incident. After crew completed runup procedures and aircraft was operating at rpm, crew took readings from Strobex, which indicated adjustments were required to pitch change links. Crew completed normal shutdown procedures and necessary adjustments were made. Using APU, crew started aircraft again. Strobex readings indicated rotor blades were within parameters for hover flight. Crew requested and received taxi clearance. While taxiing to hover pad, pilot told technical observer (TO) in front seat to help with clearing aircraft because of heavy traffic congestion between parking ramp and hover pad. At hover pad, pilot hovered aircraft for about 1 minute while TO recorded Strobex readings. Rotor track was unsatisfactory. Pilot landed aircraft and began taxiing back to parking where final adjustments to pitch change links were to be made. Again, during taxi back to parking, both pilot's and TO's attention was directed outside aircraft due to traffic congestion. About halfway back to parking, pilot started APU, and about 30 seconds later, pilot smelled smoke in cockpit. TO confirmed smell and stated that APU fire light had come on. Pilot cross-checked instruments and noted that APU fire handle light had also come on. He immediately pulled fire handle and activated fire extinguisher select switch for both primary and reserve bottles. Fire extinguisher bottles failed to dispense because fire suppression system wiring in catwalk area had already burned, disabling system. Pilot then pulled power levers to off position, set toe brakes, and neutralized cyclic. Crewmembers received no injuries and exited aircraft unassisted. Fire burned 3 to 4 minutes before first fire extinguishing agent was applied. Aircraft was extensively burned in transmission deck catwalk area when fuel ignited. Fire was caused by malfunction of APU fuel shutoff solenoid, P/N 6925456. Suspect that solenoid O-ring, P/N S101AC-111, failed for unknown reasons. As a result, pressurized fuel sprayed between solenoid coil and solenoid housing halves, entering cover assembly. Simultaneously, fuel sprayed aft between valve body and housing halves, contacting APU combustion can and igniting.

CH-47 Class A

Reported in 29 August 1990 issue as 9035 - While on final NVG approach of third traffic pattern to field site during training mission with slingloaded 15,760-pound concrete block, IP allowed pilot to fly aircraft below safe approach angle. For unknown reasons, crew chief stopped calling out altitude after reporting 75 feet agl and IP did not take corrective action until slingload hit ground at about 50 knots and 1 kilometer short of open field. IP came on the controls with pilot as aircraft rapidly descended nose down. When rotor blades and fuselage hit ground, aircraft began to spin and roll until it came to rest on its left side. When all motion stopped, aircraft had turned about 180 degrees to flightpath. Both pilots were ejected from aircraft when cockpit disintegrated. One crewmember was able to egress through an opening. Seeing small fire on left side of aircraft, crewmember attempted to assist two crewmembers who were trapped inside aircraft. However, fire grew until it engulfed aircraft. IP, crew chief, and flight engineer instructor received fatal injuries. Pilot and flight engineer received minor injuries.

OH-58 Class A

Reported in 7 November 1990 issue as 9101 - Purpose of training portion of mission was to begin OH-58A qualification for newly assigned pilot. Preflight phase was comprehensive since IP was explaining related aircrew training manual tasks and local procedures to pilot. With pilot on controls, aircraft departed and proceeded to area about 5 nautical miles northwest of airfield. IP then informed pilot he was going to receive a simulated engine failure at altitude. Pilot stated he was ready, and a few seconds later, IP announced "simulated engine failure" and reduced throttle to engine idle. Pilot performed maneuver with right turn, and IP assisted on controls as necessary. Pilot completed termination with power and requested maneuver be repeated. This time, IP decided to demonstrate maneuver. After climbing to 1,300 feet msl, IP initiated maneuver by reducing throttle. IP went through standards of maneuver, calling out rotor rpm, gas producer, and trim. At 350 feet agl, IP initiated termination with power by applying throttle to full open. Before reaching 100 feet agl, IP glanced inside aircraft to see if needles joined and saw at least one needle in green area. At 50 feet agl, he began deceleration, and at 30 feet agl, he began to slowly pull in collective to avoid excessive power application at end of maneuver. Shortly thereafter, low rotor rpm audio came on. IP confirmed he had throttle full open. At 15 feet agl, he saw berm in intended landing area and attempted to maneuver right. Left skid landed on berm with slope of 37 degrees and no forward airspeed. As rotor rpm bled off, right skid rolled down slope. Each main rotor blade struck ground once. Aircraft came to rest on its right side, partially propped up by main rotor blade. IP performed emergency shutdown procedures, and both uninjured crewmembers crawled out through right crew door. Cause of engine power loss is unknown. Suspect that power loss occurred because of improper throttle rigging, contaminated fuel, or failure of IP to roll throttle back on during maneuver.

U.S. ARMY SAFETY CENTER

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U.S. Army Safety Center

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'There I was...'

An Army aviator tells his story of an in-flight emergency, ditching at sea, and how the crew survived.

All too often, stories about accidents have to be told by someone who only saw what happened. But I particularly like to read about the ones where the person involved lived to tell others about it. *Flying Safety*, the Air Force monthly aircraft mishap prevention publication, features a "There I Was" section where aviators tell about accidents or near misses in which they were involved. Those are the ones that give you an insight into what someone is thinking and feeling as well as doing during the emergency. I've read and heard a lot of these stories, and now I've got one of my own to tell. It's my turn to give you an Army aviator's "There I Was" account of an OH-58D ditching at sea.

It was a beautiful night to fly—at least 90 percent illumination and not a cloud to be seen. I was flying from the left seat in the flight-lead position. We were about an hour and a half into the mission and on our way back to the ship. I was using the sight to locate the ship when I felt the helicopter yaw right. I looked over at my right seater's display and saw the engine-out warning light. No big deal—except when you're flying at 30 feet and 80 knots over nothing but water. I knew that without a doubt on this night we were going to get wet. I remember thinking "this is going to hurt" as I reached for the floor mike switch. I made the radio call, but I don't think it got out.

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

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

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

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

I knew I was bleeding and that there were "things" in the water that would find us soon if we didn't get out.

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

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

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

—CW2 David B. Whalen, 4th Squadron, 17th Cavalry (Air) (Recon), Fort Bragg, DSN 236-2493, commercial 919-396-8008

Editor's Note: Do you have your own "There I Was" story to tell? If so, we would like to hear from you. Don't worry about the grammar, style, punctuation, and so forth. We'll help you. Just send us your story, along with your name, address, and a telephone number where we can reach you if we have any questions about your story.

Underwater egress training for Army helicopter crews

Control of quotas for underwater egress training was centralized in October 1988 and is now handled exclusively by the major Army commands (MACOMs) and Headquarters, Department of the Army (HQDA). The Navy no longer permits direct unit coordination with the various Navy training sites to obtain training quotas.

During the third fiscal quarter of each year, HQDA will request MACOM input for training requirements for the following year. The MACOMs request training, and HQDA then allocates quotas received from the Navy to the MACOMs.

Units wishing to participate in underwater egress training should ensure their training requests reach their MACOM in time to be incorporated into the MACOM message to HQDA. Requests are due to HQDA not later than 15 July each year.

Unit commanders should review attendance prerequisites for the training in HQDA message 121940Z Jun 91, subject: FY 91 Navy UWE training quotas for Army helicopter crews (UWE-91-5). This review by commanders is necessary to ensure that students meet attendance prerequisites.

Units should direct questions to their respective MACOM aviation officers. MACOM POCs may contact HQDA, ATTN: DAMO-TRO, DSN 224-4992.

Make a decision

Why do some helicopter crewmembers choose not to use their HEED bottle?

Proper training in the use of the HEED is essential for safe operation. However, once crewmembers are properly trained, they are sometimes still reluctant to use the HEED during ditchings. We believe that the facts and thought-provoking issues addressed in the following article could alleviate some of the fears associated with using the HEED. The article is reprinted from the December 1991 issue of Approach, the Naval Safety Center's monthly publication.

It was to have been a routine surface search and contact mission in the Persian Gulf. As the SH-60B lifted from the frigate and the pilot applied power to transition to forward flight, a blade in the first stage of the gas generator vibrated loose. The crew heard a loud bang as the engine destroyed itself. Ten seconds later, the helicopter hit the water, rolled over on its right side, and sank.

The pilot took a breath and escaped through his emergency window. The sensor operator waited until all motion ceased. As water filled the cabin, he put his HEED bottle in his mouth and drew a breath of air. When the pressure equalized, he opened his emergency window and got out.

The copilot took a good breath before going under, but he couldn't open his emergency window. He got his door partially open and was on his way out when it slammed shut, pinning his helmet and right hand. He inhaled a little water and started to panic. Then he saw light coming through the pilot's window. He braced his feet on the center console and pushed against the door, freeing his right hand. After unstrapping his helmet, he shot through the pilot's window. Finally clear of the aircraft, he was disoriented but remembered to blow out some air to figure out which way was up. The pilot and sensor operator saw him clawing his way to the surface in what could have been the last seconds of his life.

All three of these crewmen were trained in the use of the HEED, yet only one chose to use it. You could say that since all three survived, they all made the right decisions. You can't argue with success. However, the copilot was within seconds of drowning.

In another HEED-related incident, an SH-2F on a surveillance mission entered a descending, decelerating turn to identify an object in the water when the aircraft began to yaw uncontrollably to the right. It spun four or five times before it hit the water and sank. The cabin filled with water, and the helicopter rolled over on its right side. Although the first crewman was not able to take a breath of air before going under, he had no trouble getting out. The second crewman was able to take a breath but became disoriented as the aircraft rolled over. He pulled his HEED bottle out, took a breath, and then released his lap belt. As he was getting out, he dropped his HEED bottle, but since it was tied to his SV2, he recovered it. Although the mouthpiece was full of water, he purged it and got another breath of air. He said later that the HEED saved his life. The helicopter aircraft commander first tried to get out through the cargo door, but it was jammed. Then he looked for his HEED bottle but could not find it (it was not properly tied to his SV2).

He noticed the copilot's door was blocked, so he crawled to the aft cabin, getting stuck in the process. Just before passing out, he managed to clear the aircraft, although he can't remember how. The two crewmen revived him on the surface. Searchers were only able to find the copilot's helmet and seat cushion. The investigators believe he lost his helmet, hit his head, and drowned.

It is unlikely in this case that the HEED could have saved the copilot. Evidence suggests that he was incapacitated on impact. Since his seat cushion floated to the surface, he may have released his lap belt (or it may have failed). The second crewman was about 30 feet under water when he finally escaped. Why do some helicopter crewmembers choose not to use their HEED bottle? Part of the answer is in training; another part is in attitude. As with automatic actuating devices in survival equipment, such as the FLU-8P for TACAIR crews, using the HEED bottle is not the primary method of escape. The first

option is to quickly get out of the aircraft. If the crewmembers encounter any delay or difficulty, then they use their HEED bottle. When do you consider yourself delayed? How long will you try to escape before pulling out your HEED bottle? If you wait too long, you may not have the presence of mind to remember to purge the regulator, if you even remember you have a HEED bottle at all. The HEED bottle lasts at least 2 minutes at 20 feet and 50°F. During tests, it averaged 3.1 minutes.

When HEED training was just getting started, two incidents that were treated as arterial gas embolisms—but were probably hyperventilation—occurred. Neither aviator suffered long-term injury or disability. Yet the stories that arose from these incidents, and the fears of helicopter crews today about embolism, may be an underlying factor in deciding whether to use the HEED.

Since May 1987, 26 aviators have used the HEED during egress. Not one experienced embolism. Conversely, in the same mishaps eight people drowned, seven of whom could have used the HEED. Why didn't they? What's your game plan? Are you worried that your HEED will give you an embolism? You can be treated for embolism; drowning is permanent! ♦

—LCdr. D. J. Thorn was a mishap investigator at the Naval Safety Center. He is currently assigned to the Naval Postgraduate School.

HEED Saves Since 1987

Aircraft	People on board	Survivors who used HEED	Fatalities
UH-1	10	2	4
SH-2	17	7	2
SH-3	12	4	1
H-46	12	4	1
H-53	5	2	0
H-60	12	7	0

HEED update

The July 1991 issue of *Flightfax* brought home the realities of increased risk associated with overwater flight. However, some think that overwater flight is an increased risk only for single-engine aircraft and that the possibility of a multi-engine aircraft having to ditch is so remote that the risk is almost nonexistent. To the contrary, research shows that the majority of aircraft ditchings, both military and civilian, are by multi-engine aircraft. So don't be misled! Aircraft that have more than one engine have them because both engines are needed. One engine will not provide the required power to sustain flight during all normal flight or mission requirements.

The helicopter emergency egress device (HEED) is a self-contained underwater breathing apparatus (SCUBA) that has been miniaturized and simplified into a single lightweight, yet rugged assembly. It is also known as the "spare air" by the scuba community. The HEED consists of an aluminum alloy cylinder and stainless steel regulator assembly with polycarbonate mouthpiece. Physical dimensions are 2 inches in diameter by 13 and 3/8 inches long and weighs 1 1/2 pounds fully charged. It will provide an average underwater breathing time of about 2 minutes, which should be more than sufficient time to egress a submerged helicopter and rise to the surface. The HEED, SRU-36/P, is a proven lifesaving device for both single- and multiple-engine aircraft crewmembers.

Those units that presently have HEEDs must ensure users are properly trained to use the device. As any scuba diver will tell you, proper training means the difference between life and death in the use of underwater breathing equipment. It's like flight training—you can learn only so much out of the book, then you must have hands-on training to develop the required level of skill necessary to safely operate the equipment. Anything less than the training now required by the Navy may result in an air embolism or lung damage (reference Boyle's Law). Untrained or improperly trained use of the HEED is flirting with disaster.

The Director of Combat Developments at the U.S. Army Aviation Center is currently drafting a requirements document, including training requirements, for the HEED. ♦

POC: Mr. James C. Dittmer, Product Manager, Aviation Life Support Equipment, Aviation Systems Command, DSN 693-3573, commercial 314-263-3573

HEED inspections

While you're submerged in water and darkness and disoriented as your helicopter is sinking is not the time to discover your HEED doesn't work properly. It's part of your survival equipment—but it can't help you survive if it doesn't work.

To ensure that it works correctly all the time, NAVAIR 13-1-6.5 lists preflight and postflight inspections that Navy aircrewmembers must perform on their HEED before and after each flight. If your unit has HEEDs and doesn't already have a required set of inspection procedures, the following preflight and postflight procedures adapted from NAVAIR 13-1-6.5 could be helpful.

Preflight inspections

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

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

- Return the HEED for replacement or repair if discrepancies are noted.

Postflight inspection

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

Remember that any missing part following flight can be an FOD hazard. Even a small part from your HEED could lead to disastrous results if it's adrift and finds it way into critical aircraft components or flight controls. Neglecting your preflight and postflight inspections could lead to this lifesaving device failing you at a most critical time or to its becoming a potential FOD hazard. ♦

Air/Sea Rescue Award

CW3 Julian Council and CW3 Scott Berrier, A Troop, 4th Squadron, 17th Cavalry (Air) (Recon) recently received the Lucas Aerospace-sponsored Army Aviation Association of America (AAAA) Air/Sea Rescue Award for rescuing two downed aviators in the Persian Gulf. On 20 September 1991 at 2315 local, the lead aircraft of a flight of two OH-58D Kiowa Warriors experienced an engine failure, crashed, and sank in the Gulf.

CW3 Council and CW3 Berrier, in the trail aircraft, circled over the two downed aviators. After more than 20 minutes, it became apparent that the nearest surface vessel could not reach the location before the OH-58 crew would have to break station for fuel. If they left the scene, it was unlikely that the crashed pilots could be relocated, so they jettisoned their rocket pod and lowered the caving ladders. With CW3 Council directing, CW3 Berrier maneuvered the aircraft over the pilots, allowing them to hook onto the ladders. CW3 Council and CW3 Berrier then made an NVG approach to a high hover over the USS Stark and lowered the pilots to the flight deck. The entire rescue was performed under NVG conditions.

The Air/Sea Rescue Award is presented "to the crew or crewmember who has performed a rescue using a personnel rescue hoist that saved the life or eased the suffering of an individual or individuals during the awards period encompassing September 1 through October 31." Although a personal rescue hoist was not specifically used, this rescue was considered so exceptional that this crew was deemed fully deserving of the Air/Sea Rescue Award. ♦

—Adapted from the January 31, 1992 and March-April 1992 issues of ARMY AVIATION magazine

Thunderstorm do's and don'ts review

Thunderstorms occur throughout the year, but nature seems to pull out all stops in the summer, and thunderstorms occur somewhere in the world on a daily basis. A thunderstorm packs just about every weather hazard known to aviators: tornados, turbulence, icing, hail, lightning, and low ceiling and visibility. FM 1-230: Meteorology for Army Aviators describes these in detail. And now is the perfect time to brush up on these atmospheric hazards.

Above all, never regard any thunderstorm lightly even when radar returns show the echoes are of light intensity. While avoiding severe weather is the best prevention method of all, knowing what to do and what not to do may make the difference if you find yourself inadvertently embroiled in a thunderstorm.

Thunderstorm avoidance

The following is a review of some do's and don'ts of thunderstorm avoidance:

- Don't land or take off in the face of an approaching thunderstorm. A sudden wind shift or low-level turbulence could cause loss of control.
- Don't try to fly under a thunderstorm even if you can see through to the other side. Turbulence under the storm could be disastrous.
- Don't try to circumnavigate thunderstorms covering six-tenths of an area or more either visually or by airborne radar.
- Don't fly without airborne radar into a cloud mass containing scattered, embedded thunderstorms. Scattered thunderstorms, not embedded, usually can be visually circumnavigated.
- Do *avoid* by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
- Do clear the top of a known or suspected severe thunderstorm by at least 1,000 feet of altitude for each 10 knots of windspeed at the cloud top. (This would exceed the altitude capability of most Army aircraft.)
- Do remember that vivid and frequent lightning indicates a severe thunderstorm.
- Do regard as severe any thunderstorm with tops 35,000 feet or higher, regardless of whether the top is visually sighted or determined by radar.

Thunderstorm penetration

If you *cannot avoid* penetrating a thunderstorm, the following is a review of some things you should do *before* your aircraft enters the storm.

- Tighten your safety belt, put on your shoulder harness if you have one, and secure all loose objects.
- Plan your course to take you through the storm in a minimum time and stick with it.
- Establish a penetration altitude below the freezing level or above the level of -15°C to *avoid* the most critical icing.
- Turn on pitot heat and carburetor or jet inlet heat. Icing can be rapid at any altitude, and it can cause almost instantaneous power failure or loss of airspeed indication.
- Establish power settings for reduced turbulence penetration airspeed recommended in your aircraft manual. Reduced airspeed lessens the structural stresses on the aircraft.
- Turn up cockpit lights to highest intensity to lessen danger of temporary blindness from lightning.
- Disengage altitude hold and speed hold modes if using automatic pilot. The automatic altitude and speed controls will increase maneuvers of the aircraft, thus increasing structural stresses.
- If using airborne radar, tilt your antenna up and down occasionally. Tilting it up may detect a hail shaft that will reach a point on your course by the time you do. Tilting it down may detect a growing thunderstorm cell that may reach your altitude.

What to do during thunderstorm penetration

The following is a review of some do's and don'ts *during* thunderstorm penetration:

- Do keep your eyes on your instruments. Looking outside the cockpit can increase the danger of temporary blindness from lightning.
- Don't change power settings; maintain settings for reduced airspeed.
- Do maintain a constant attitude; let the aircraft "ride the waves." Maneuvers in trying to maintain constant altitude increase stresses on the aircraft.
- Don't turn back once you are in the thunderstorm. A straight course through the storm most likely will get you out of the hazard the quickest. In addition, turning maneuvers increase stresses on the aircraft. ♦

AAAA national individual award winners

On Friday, 10 April 1992, the following Army Aviation Association of America (AAAA) awards were presented to the 1991 winners at the annual AAAA convention awards luncheon:

- **Army Aviator of the Year Award**. Presented to CW3 James C. Kalahan, 4th Squadron, 17th Cavalry Regiment, XVIII Airborne Corps, Fort Bragg, NC.
- **Aviation Soldier of the Year Award**. Presented to SSG Everett F. Smith, 1st Battalion, 24th Aviation Regiment, Hunter Army Airfield, GA.
- **DAC of the Year Award**. Presented to Mr. James R. Ray, Chief, Logistics Assistance Branch, U.S. Army Aviation Systems Command, Europe.
- **McClellan Aviation Safety Award**. Presented to CW4 Stephen V. Rauch, Combat Aviation Brigade, 3d Infantry Division, APO AE.

The co-winners of the 1991 **Army Aviation Trainer of the Year Award** were CW3 John S. Moltenberry, Track Chief, OH-58D Maintenance Test Pilot Course, U.S. Army Aviation Logistics School, Fort Eustis, VA, and SGT Christopher M. Pakutka, Aeroscout Observer, Palehorse 4/2 Armored Cavalry Regiment, Feucht, Germany. ♦

Attention aviation safety officers

At the time CW3 Craig R. Witt submitted this tip for aviation safety officers (ASOs) he was ASO for a general support aviation company comprising six UH-1 command and control, six OH-58D reconnaissance, and three EH-60 electronic warfare aircraft. CW3 Witt is presently the safety officer for A Company, 2d Battalion, 2d Aviation Regiment, at Camp Stanley, Korea.

We would like to hear from more of you. If you've found a way to solve a problem or do something better, send it to us and we'll help you tell others about it. The address is: Commander, U.S. Army Safety Center, ATTN: CSSC-SPP (Flightfax), Fort Rucker, AL 36362-5363.

FORSCOM Regulation 385-1: Forces Command Safety Program, paragraph 12-3c requires that all aircrewmembers and aviation maintenance personnel attend monthly safety meetings. The regulation also says that a makeup session will be held for people who were not able to attend the regular meeting. The problem is that the same things that prevented people from attending the regular meeting often make it hard for them to get to the makeup session. For example, in addition to their regular duties, soldiers have to participate in common tasks training, pull their share of extra duties, keep medical and dental appointments, and so on.

As an ASO, I had to find some way out of this dilemma. What I did was set up a reading file for enlisted people in each of the flight platoons and the maintenance platoon for which I am responsible. Included in this file are general aviation and aircraft-specific information, messages, and articles from *Flightfax* and *PS* magazine. At the end of each month, a synopsis of the monthly enlisted safety meeting is added to the new information section of the book. Once a month all soldiers read the information in this section and initial the attendance roster they find there.

I have found this to be the most productive way to keep enlisted soldiers informed about safety. It doesn't take the place of the unit reading file, but by using this method, you can tailor your safety program to meet the specific needs of each platoon. ♦

Class A Accidents through April

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	3	4
	December	3	1	3	0
2d Qtr	January	7	3	1	0
	February	13	1	13	0
	March	4	4	8	2
3d Qtr	April	3	1	2	0
	May	4		3	
	June	0		0	
4th Qtr	July	2		0	
	August	2		0	
	September	3		2	
	Total	48	14	37	6

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - As crew was back taxiing aircraft out of hot refueling and making right-pedal turn, crew chief saw smoke and told pilots to land. Engine noise decreased, aircraft yawed left, and low rotor audio sounded. Pilot initiated hovering autorotation. Aircraft hit ground in tail-low attitude and then rocked forward, coming to rest upright on gravel road between two 2-foot-deep ditches. Aircraft sustained damage to skid tubes, crosstubes, tail rotor, and tail stinger. Crew chief sustained minor back injuries.

H series - During cruise flight at 2,000 feet agl, crew heard loud bang from rear of aircraft. Aircraft pitched nose low and yawed right. PC took controls, lowered collective, and turned right toward landing area. At 30 feet agl, right yaw increased. PC reduced throttle while increasing collective. Aircraft landed with no forward movement. After shutdown, crew discovered that tail rotor assembly and 90-degree gearbox had separated from aircraft.

UH-1 Class D

H series - During student familiarization flight at the Naval test pilot school, crew executed VMC approach. At about 10 feet agl, pilot unexpectedly and rapidly reduced collective, inducing rapid sink rate. IP applied power and forward cyclic to arrest descent and level aircraft. Aircraft landed hard in tail-low attitude and became airborne again. IP stabilized aircraft and completed landing. Aircraft sustained damage to tail stinger, fore and aft crosstubes, left and right skid tubes, greenhouse, lower anticollision light, and sheet metal.

UH-1 Class E

H series - Following NVG insertion mission, crew was returning to assembly area. At 10 to 30 feet agl and 70 knots, aircraft hit top of leafless tree on ridgeline, breaking both chin bubbles and right position light. PC maintained aircraft control and landed in assembly area.

UH-60 Class B

A series - Engine control unit on No. 1 engine failed. During precautionary landing, aircraft hit tree, damaging main rotor blades, stabilator, one tail rotor paddle, and tail rotor fairing. No injuries. 9219

UH-60 Class D

A series - While hovering aircraft above landing site and attempting to estimate groundslope, crew failed to detect power lines crossing area. As aircraft descended vertically, rotor blades struck top strand of wire, damaging all four blades. Crew felt and heard wire impact, backed aircraft away from wires, and completed landing without further incident.

UH-60 Class E

A series - As pilot banked right 45 degrees on long final, passenger allowed unsecured nylon rope to fall from aircraft. Rope hit tail rotor paddle, and force from tail rotor drove rope downward into stabilator. Postflight inspection revealed that rope was wrapped around tail wheel landing strut.

A series - During troop loading, soldier carrying PRC-77 radio with long whip antenna walked under rotor system. Rotor blade hit antenna, damaging rotor blade tip cap.

A series - Crew leveled off aircraft at flight level 060 and began acceleration. While passing through 120 knots at 70- to 75-percent power, crew heard loud explosion from No. 2 engine. Engine-out and low-rotor lights came on, audio sounded, and all No. 2 engine indications deteriorated. No. 2 fuel pressure and engine oil pressure caution lights came on as airspeed decreased to 80 knots. Crew attempted in-flight restart of No. 2 engine but aborted attempt because of loud rumbling sound from No. 2 engine after starter began turning. Crew completed single-engine landing at civilian airport. Inspection revealed first-stage gas producer rotor had failed.

Attack

AH-1 Class E

F series - Aircraft was Chalk 4 in flight of six. Chalk 3 made quick deceleration to avoid going IMC. Chalk 4 pilot pulled collective and banked hard right to avoid Chalk 3. Crew saw overtorque light come on and observed torque at 104 to 105 percent. Chalk 4 went IMC and was recovered to base.

F series - During NVG mission, crew was returning to FARP to rearm MILES when aircraft struck treetops. Crew completed landing in FARP, and inspection revealed minor scratches and dents in fuselage.

AH-64 Class B

A series - During night gunnery operations, crew allowed aircraft to descend vertically into trees. After blade contact, pilot brought aircraft out of trees and landed 200 meters away in cleared area. All four main rotor blades were damaged beyond repair, three tail rotor blades were damaged, and aircraft sustained possible FOD to No. 1 engine. No injuries. 9220

AH-64 Class C

A series - Start and runup of No. 1 engine were nor[illegible] No. 2 [illegible] indications were n[illegible]al. After advancing No. 2 power lever to idle and starting clock, pilot monitored tgt, Ng, Nr, and oil psi. Pilot saw that No. 2 Np was advancing higher than No. 1 Np and Nr. No. 2 engine torque read 0 percent, and No. 2 Np idled at 80 percent. All other indications were normal. Pilot believed No. 2 input drive clutch had failed, and IP concurred. Pilot performed emergency shutdown. As No. 2 Np passed through No. 1 Np and Nr, crew felt sudden violent jerking motion. IP pulled No. 1 power lever off. As Nr went below 50 percent, rotor brake engaged. After main rotors stopped, tail rotors

continued turning. Initial inspection indicates collateral damage to drive shaft, 90-degree gearbox, shaft-driven compressor, and possible damage to tail rotor.

AH-64 Class D

A series - During postflight inspection, crew found that 30mm gun barrel was missing. Preflight inspection had included check of weapon system, and PC believed barrel was locked in place.

AH-64 Class E

A series - After landing, crew smelled smoke. All indications were normal, and no circuit breakers were popped. Smell intensified, and crew performed emergency shutdown and secured aircraft. Maintenance discovered generator had seized and parts were scattered on deck.

A series - During taxi back from refueling, pilot heard loud bang, followed by shaft-driven compressor [illegible] caution warn- [illegible] Other [illegible] were normal, and pilot taxied back to parking. Initial postflight inspection showed massive amount of oil pouring from turtleback area. SDC had nickel-size hole in back casing.

Cargo

CH-47 Class C

D series - At about 20 feet agl, aircraft browned out. Crew released slingloaded M198 howitzer, damaging right tire and wheel assembly and other components. Crew completed landing without further incident.

D series - As aircraft hovered to hot refueling point following maintenance test flight, crew heard unusual noise from rotors. Crew chief saw that half of right work platform was missing. Postflight inspection revealed hole in aft main rotor blade.

CH-47 Class E

D series - In level flight at 130 knots, aircraft was Chalk 3 in flight of four. Chalk 4 advised that left aft work platform on Chalk 3 had come open. Chalk 3 IP initiated graduated descent and deceleration for landing in open field. Crew completed landing without further incident. Maintenance determined that forward latch assembly failed as result of metal fatigue at its mounting bracket. Aerodynamic forces forced locking pin from detent.

D series - During approach to confined area with training slingload, crew heard unusual noise. As noise grew louder, pilot unintentionally pushed cargo release button on cyclic. Load fell about 30 feet into soft dirt of open field. Crew landed and found that noise was caused by small plastic trash bag that had blown up into drive shaft. Crew completed shutdown, and maintenance found no damage.

Observation

OH-58 Class A

C series - At about 600 feet agl, engine failed. Pilot performed autorotation to ground. Aircraft landed hard on slight slope and rolled over onto its right side. Tail boom separated from aircraft, and landing gear and main rotor blades were destroyed. No injuries. 9221

D series - Crew had completed hover work, and during NVG takeoff, crew transferred controls. Aircraft pitched nose up, turned right 180 degrees, and crashed on right side at edge of woodline. Postcrash fire began about 2 minutes after impact and destroyed aircraft. IP sustained minor facial injuries but was able to assist pilot from aircraft. Pilot suffered burns, broken right foot, and minor facial injuries. 9222

D series - During day VFR range familiarization mission, aircraft crashed. Wreckage was discovered when another OH-58D overflew it. Crashed aircraft was lying on its right side with fuselage intact and mast-mounted sight system detached. Two fatalities. 9223

OH-58 Class C

A series - Pilot was on controls and aerial observer was navigating as crew hovered aircraft down road at about 5 feet agl. Aircraft drifted into tree on right side, damaging main rotor blade tips. Crew heard tree strike and immediately landed aircraft.

OH-58 Class D

A series - During helicopter gunnery operations, OH-58 was returning to overwatch position to observe attack helicopter firing. As pilot approached overwatch position, AH-1 was approaching firing position. OH-58 pilot made right turn at treetop level into overwatch position, and AH-1 pilot made left turn into firing position about 500 meters north and abeam OH-58 position. When OH-58 pilot saw AH-1 turn toward him, he overreacted by initiating 25- to 30-degree nose-high decelerating right turn, which placed aircraft in downwind conditions at low altitude. Aircraft experienced loss of tail rotor effectiveness and began right spin. Pilot made no control response, and evaluator immediately got on controls and applied left aft cyclic, left pedal, and torque to stop turn and arrest rate of descent. Narrowly missing large tree, crew completed landing on road. During incident, crew saw torque at 120 percent and saw and heard low rotor warnings.

C series - On takeoff during aerial observer continuation training, tail rotor chip detector caution light came on. IP made precautionary landing. Postflight inspection revealed that tail rotor gearbox chip detector had fallen out and was hanging by detector wire. Safety valve functioned properly; therefore, no significant loss of oil occurred. Crew chief had taken oil sample before flight, and it is suspected he failed to properly seat chip detector.

OH-58 Class E

A series - Rotorwash from landing aircraft blew door off parked OH-58. Pilot had just landed and was tying down main rotor blades. When he exited aircraft, he failed to ensure that right door was properly latched.

A series - While in flight, master caution and engine oil bypass lights flickered three times and remained off. Pilot made precautionary landing. Crew chief arrived at site and added three-fourths quart of engine oil. On previous day, AVUM had done inspection of engine oil flow. After MOC, technical inspector had failed to ensure that oil tank was serviced to proper level.

And PC failed to do proper preflight inspection of engine oil tank.

C series - During routine 14-day runup, pilot failed to remove exhaust stack cover after removing tiedowns and inlet pillows on preflight. Pilot continued with before-start and engine startup procedures. During startup, pilot released trigger and heard loud popping sound. Pilot then saw exhaust cover land 15 to 20 feet from aircraft and immediately shut down aircraft. Inspection revealed dent on underside of red main rotor blade.

Fixed wing

C-12 Class E

C series - While climbing to flight level 250, crew noticed cabin getting hot. Crew unsuccessfully attempted to control heat by adjusting automatic control mode and then manual control mode. Crew also unsuccessfully tried turning cabin temperature mode selector to off and pulling temperature control circuit breaker. Upon reaching flight level 250, crew determined they had no control over cabin heat and requested clearance back to base. Postflight inspection revealed small piece of aluminum tape lodged in linkage of No. 2 engine air-to-air heat exchanger bypass valve, thus preventing its movement.

OV-1 Class A

D series - About 1.8 hours into RL 3 progression training flight, IP initiated simulated left engine failure. Pilot took corrective action for left engine failure and continued approach to runway. Aircraft landed with landing gear up, damaging skin, bulkhead, drop tanks, and both props and engines. No injuries. 9224

OV-1 Class E

D series - About 2 hours after takeoff, technical observer (TO) began complaining of burning sensation in his legs. Pilot told him to go to 100 percent oxygen and to ensure that all oxygen indicators were normal. TO confirmed normal operation. Pilot asked if TO wanted to return to base, but TO said he was OK. About half hour later, pilot noticed that TO had passed out. Pilot removed TO's oxygen mask, replaced it with his own mask, applied 100 percent oxygen, and revived TO. Crew descended to 10,000 feet and completed mission without further incident. Postflight inspection revealed that TO's flexible oxygen hose had disconnected from solid hose during flight.

Messages

■ Safety-of-flight technical message concerning one-time inspection of all OH-58A/C and H-6 series aircraft for compressor cases to be returned to manufacturer for correction (OH-58-92-03 and OH-6-92-02, 302000Z Mar 92). Summary: AVSCOM messages OH-58-92-01 dated 3 Dec 91 and OH-58-91-04 dated 15 Mar 91 recalled T63 engine compressor case assemblies suspected of a manufacturing defect. This message recalls approximately 132 additional T63-A-720 compressor case assemblies, P/N 6877410, which may have been manufactured incorrectly. Some of the cases in the suspect group may have crack(s) present in the vane air foil(s) in a direction along the vane chord and just outside of the case's plastic coating. This could result in a fatigue failure of the vane and subsequent engine power loss. The purpose of this message is to ensure that suspect compressor case assemblies installed in engines are removed. This message also provides inspection and corrections procedures; specific disposition instructions, including instructions for depots and holders of stock; and recording and reporting requirements. Contact: Mr. Lyell Myers, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning night vision goggle information on the dual visor on aviator helmets (GEN-92-ASAM-06, 301400Z Mar 92). This message expires on 1 Apr 93. Summary: AVSCOM message 031500Z Jan 92 extended the expiration date of HQDA message 261942Z Aug 91 until 1 Apr 92. HQDA message 261942Z Aug 91 dealt with the dual visor used on the new SPH-4B aviator helmet. In a recent Army study, pilots using the new dual visor assembly with the SPH-4B and SPH-4 helmets stated a need for more upward tilt range. As a result of this study, additional testing on the aviator night vision imaging system (ANVIS) tilt requirements with the dual visor is now required. Until further notice, the dual visor will not be used with the ANVIS or the GM-6 mounted AN/PVS-5 series goggles. This restriction will be lifted upon completion of additional testing and final approval. The SPH-4B helmet may be flown using a single visor with the ANVIS or the GM-6 mounted AN/PVS-5 series goggles. Single visors, NSN 5855-01-151-4229, are available in the supply system. Exercise care when replacing to prevent damage to the thermal plastic liner. The purpose of this message is to inform units that the dual visor will not be used with the ANVIS or the GM-6 mounted AN/PVS-5 series goggles until units are notified by message. Contact: Mr. Brad Meyer, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning use of discrepant lots of Syn-Tech grease, P/N 3913-G1, on all Army aircraft (GEN-92-ASAM-07, 022030Z Apr 92). Summary: The Air Force has reported that certain lots of grease, P/N 3913-G1, FSCM 53592, NSN 9150-00-506-8497, manufactured by Syn-Tech Ltd during June 1990 and February 1991 have failed to meet the required lubrication specification. AVSCOM concurs with these findings and is directing units not to use these grease lots for lubrication of Army aircraft. Grease manufactured during April 1991 and June 1991 marginally failed the specification requirements; however, use of these lots is considered acceptable and will continue to be authorized. This grease has a shelf life of 4 years. An informal survey of several field units has revealed quantities of grease that have exceeded the 4-year life. The purpose of this message is to advise field units

to dispose of grease lots, P/N3913-G1, with a manufacturing date of June 1990 and February 1991; authorize use of grease, P/N3913-G1, with a manufacturing date of April 1991 and June 1991; and emphasize compliance with the 4-year shelf life for the grease. Contact: Mr. Brad Meyer, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning report of serial numbers of all UH-1H/V aircraft sent to Operation Desert Storm (UH-1-92-ASAM-07, 022300Z Apr 92). Summary: It is necessary that the serial numbers of the subject aircraft that were sent to Operation Desert Storm be identified by locations. This information is needed for scheduling in the upcoming special technical inspection and repair (STIR) program. The purpose of this message is to assist project STIR. This message outlines inspection and recording and reporting requirements. Contact: Mr. Roger H. Heidenreich, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning improper installation of global positioning system (GPS) on all OH-58A/C/D aircraft (OH-58-92-ASAM-11, 311900Z Mar 92). Summary: Several reports have been received citing damage to the chin bubble when the GPS receiver fell off the top of the instrument panel. These units were not installed in accordance with approved instructions. Unsecured equipment is a potential hazard. There is a risk that flight controls could be jammed. The purpose of this message is to advise all OH-58A/C/D aircraft users or operators that the GPS or any other portable navigation equipment must be properly installed and must have its installation approved. This message outlines inspection and correction procedures. Contact: Mr. Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

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

Followups

Information on accidents previously reported

UH-60 Class A

Reported in 24 October 1990 issue as 9043 - While in cruise flight on night-aided local area orientation training flight, IP noted he was 40 feet above his planned altitude of 100 feet agl. Without informing other crewmembers or requesting their assistance, IP began descent to return to 100 feet agl, which was in violation of relatively new corps policy to fly no lower than 150 feet agl. IP failed to arrest descent and hit 22-foot-high sand dune about 5 feet from crest. Aircraft struck ground at 69 knots and at 200-foot-per-minute rate of descent in near-level attitude. All five people on board sustained injuries. Aircraft sustained major damage, particularly forward of cargo door where nearly all occupiable space was severely damaged or destroyed.

AH-64 Class A

Reported in 21 November 1990 issue as 9105 - Flight departed on day movement-to-contact training mission and arrived in holding area (HA). After waiting 20 minutes in HA for departure time, flight crossed to phase line at 50 feet agl and 50 knots. Flight then proceeded to battle position (BP) 32 and on to BP 34 for about 3 to 5 minutes. Unit commander directed crew to BP 36 and then to target reference point 2007. Aircraft moved out at 50 feet agl and 20 knots in coordinated right turn. As aircraft straightened out on heading of 075 degrees, PC heard loud noise behind his head and felt aircraft begin immediate descent. PC applied collective pitch and turned toward open area about 40 meters to his right. Collective control moved easily and freely but did not stop descent. Aircraft descended into wooded area on heading of 075 degrees at 5 knots and in 40-degree left yaw, cutting down several small trees with main and tail rotor blades. Aircraft hit ground in nose-high, left-side-low attitude and rolled over onto its right side, coming to rest on heading of 115 degrees. Crew pulled engine power levers off and jettisoned canopies to egress aircraft. PC sustained back muscle strain, and pilot assisted him from aircraft. Specific source of failure or malfunction could not be positively identified; however linear variable differential transducer (LVDT) probe used in collective servo actuator failed at some point just before or during accident sequence. LVDT probe failed through overstress at substandard single-point weld. Suspect that LVDT probe failed in flight, which caused uncontrolled descent.

CH-47 Class A

Reported in 30 January 1991 issue as 9118 - Crew completed several detailed mission briefings during 3 days of preparation to tactically move internal and external unit assets to forward operating base (FOB). Flight departed rear assembly area for FOB and landed at predetermined refueling point. First leg of flight was uneventful. Weather was clear and dry and did not present any difficulties for crews. After refueling, flight departed on last leg. Trail aircraft experienced some maintenance difficulty and remained at refuel point to correct deficiency. Thus, accident aircraft became trail aircraft. After about 40 minutes of flight, pilot on controls noted and announced that No. 2 engine transmission hot caution light had come on. As he began approach to land, he asked flight engineer (FE) to check for fire. PC discontinued navigational duties and monitored pilot's approach. At about 15 to 20 feet agl, FE told crew that smoke was coming from engine nose area, flowing back across engine; however, no fire was visible. Just after aft and forward wheels touched down, an explosion occurred in rear of aircraft. At time of explosion, FE, located at ramp, noted what he thought was part of engine enter cabin area and exit through rear. He also saw No. 2 engine exhaust cone and other debris falling into rear of aircraft. After aircraft came to stop, crew chief in right cabin door area saw smoke and fire in No. 2 engine area. Precisely as planned during premission briefings, crew chiefs

immediately began evacuating passengers from aircraft. PC remained in aircraft, made emergency radio calls, and shut down remaining aircraft systems. Both pilots exited by jettisoning their emergency egress doors. Crew chief located in left front of cabin exited through left front window after passengers egressed. Supported unit first sergeant and driver of internally loaded HMMWV exited through right emergency egress window of aircraft, exactly as they had been briefed to do in case of emergency. All 5 crewmembers and 13 passengers exited in timely manner and joined up at 3 o'clock position according to premission brief. They then moved farther away from aircraft because of exploding ammunition aboard burning aircraft. Aircraft and all cargo were totally consumed by fire within 14 minutes after aircraft came to full stop. Aircraft experienced catastrophic failure of No. 2 engine. Engine failure was direct result of failure of nosebox pinion drive gear (P/N 145D6301-2, S/N P-260). Pinion gear failure led to sudden engine disconnect. Additionally, nosebox housing cracked following gear failure, which allowed hot oil and debris to be ingested into engine. Engine subsequently suffered overspeed and failed. Examination of failed pinion gear disclosed machining cracks in snap ring dampening groove area.

OH-58 Class A

Reported in 7 November 1990 issue as 9102 - Flight of one OH-58C and two AH-64As departed company's field location for both day and night local area orientation training. Crews completed day portion of planned training with no problems and returned for hot refueling. While at refueling point, OH-58 crew donned AN/AVS-6 for night-aided portion of training. Flight of three departed refueling point en route to company's battle position (BP). Upon reaching BP, flight broke up to conduct individual training in and around BP. AH-64s remained in BP while OH-58 moved about 3 kilometers away to avoid traffic and dust conditions created by AH-64s. OH-58 crew completed about 40 minutes of NVG training. Moon illumination was 91 percent and well above horizon. Therefore, IP decided to conduct remainder of training unaided. Due to light obscuration caused by dust, neither landing nor anti-collision lights were used below 150 feet agl. Pilot began making terrain flight approaches using natural illumination and position lights on bright. He made two approaches to rocky area with high contrast and numerous visual cues. As IP told him what to look for, pilot made two approaches to sandy area with scattered scrub brush and few visual cues. IP then decided to take controls and make some unaided approaches for his own proficiency. He took off and made terrain flight approach to area similar to last two approaches made by pilot. His second approach was to unlit, dry, flat, sandy lake bed that was devoid of all visual cues. IP initiated approach at 150 feet agl. At 50 feet agl and 30 knots, vertical speed indicator was 250-feet-per-minute down. As aircraft continued to decelerate, pilot was calling out airspeed and radar altimeter, with last reading being 0 knots and 2 feet altitude. Both crewmembers were scanning forward and to their respective sides. However, due to lack of visual cues, IP misjudged rate of closure and descent and allowed aircraft to hit ground with right skid. Aircraft bounced, became airborne, moved right about 20 feet, caught right skid on ground, and rolled onto its right side, coming to rest on heading of 013 degrees. Tail boom was partially severed forward of tail rotor gearbox, and main rotor blades separated at mast. One crewmember received minor injury while egressing.

U-21 Class A

Reported in 13 February 1991 issue as 9119 - During combination service and training mission, aircraft took off on instrument flight plan. Crew completed uneventful passenger dropoff portion of mission and began evaluation phase. Upon successful completion of upper air work at about 5,500 feet msl, crew proceeded to airport to conduct traffic pattern work. Pilot completed touch-and-go maneuver without incident. Next pattern had to be extended due to outbound traffic. After being integrated into final approach and completing another touch-and-go maneuver, IP notified tower that he was going to conduct single-engine-out emergency procedure. Crew took off, and pilot was slow to recognize onset of emergency primarily because she was completing after-takeoff checks. By the time she reacted to emergency, aircraft was at about 225 feet agl and had begun left yaw and roll with nose-high attitude. Pilot alerted IP she was uncomfortable with situation; however due to his confidence in her abilities, IP was slow to assist. Pilot was unable to arrest yaw and roll rate, and IP took controls and nosed over aircraft in attempt to fly out of yaw and roll condition. Aircraft continued left yaw and roll in about 70-degree angle of bank while descending. At about 90 knots on heading of 160 degrees, aircraft struck ground in 15-degree left-wing-low and 10-degree nose-low attitude. Aircraft slid about 160 feet on its belly and came to rest on heading of 200 degrees. Both crewmembers sustained ankle injuries, and IP received major lacerations when he was slung forward and his head hit instrument panel.

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REPORT OF ARMY AIRCRAFT ACCIDENTS

Apaches STRIKE WIRES

Wires and other obstacles that pose a threat to terrain flight should be accurately depicted on hazard maps. However, in some areas where the proliferation of wires would unduly clutter the map, only major wire hazards and wires that are located in unlikely areas are plotted. This makes it extremely important that aircrews are made aware of other unplotted wire locations. Before every terrain flight mission, crews must be thoroughly briefed on wire strike hazards. This is particularly important for night-aided missions. Night vision devices cannot "see" wires because of the frequencies involved.

Even with all the precautions associated with night flight in the wire environment, we still had three Class A and one Class B wire strike accidents during FY 91. Two of these accidents, one Class A and the Class B, involved AH-64 aircraft. In both cases, overconfidence and failure to comply with established procedures led to the accidents. ➤

Class A accident

An AH-64 departed home station and arrived at the field training exercise (FTX) site to participate in a multiship night-aided, low-level, company deep-attack training mission. The crew had completed pre-mission briefings before departing for the FTX site, and they completed a final briefing before taking off from the FTX site. A maintenance problem with the scout aircraft had delayed the wire recon. As a result, it was dusk by the time the OH-58 crew conducted the wire recon and reported to the flight lead that there were no unposted hazards along the proposed route.

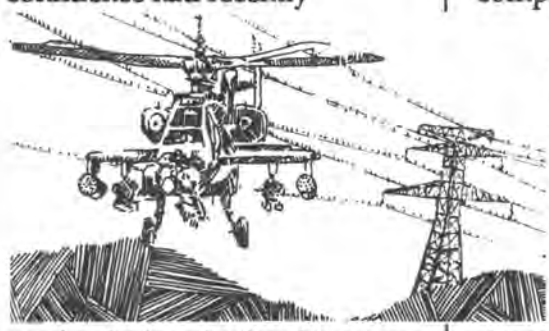
There was no undue sense of urgency when the flight took off at about 1900. After reaching the release point, the flight split into two fire teams. Everything went like clockwork. Crew coordination and target handoffs were the best they had been in a long time. According to the unit commander, they were "really clicking."

After about 10 minutes, the aircraft left the battle position (BP) and flew toward the rally point. The crews linked up visually with no problems and departed on schedule for the return flight.

The flight successfully crossed a river valley with three big sets of wires. On the other side of the valley, however, there was another set of wires. The first three aircraft completed this wire crossing near the passage point. But while in cruise flight at 100 knots and about 180 feet agl, Chalk 4, one of the Apaches, struck the wire. Indications are that the aircraft free fell from about 150 feet with little or no rotor rpm. The aircraft struck the ground on top of a berm in a 36-degree nose-low, right-roll attitude. Both crewmembers sustained multiple fatal blunt-force injuries.

Overconfidence

The PC had been slow in becoming comfortable in the Apache. It was reported that he had at times even questioned his ability to pilot an AH-64. However, his confidence had recently received a boost when his team placed third in a "Top Gun" exercise or contest. With his newfound confidence, he had begun to fly lower. Overconfidence, following this highly successful mission, could well have contributed to his inattention, resulting in failure to see wires.



The copilot/gunner (CPG) was an older pilot who "wore the aircraft like a glove" and did not need a lot of stick time. It would not have been unusual for the younger PC to have flown the entire mission. And evidence suggests that he was on the controls at the time of the crash. In accordance with the unit battle roster, the two crewmembers had been operating together for about 4 months and were doing great as a team. Most likely, they had become too comfortable with each other and their aircraft and as a result had become less attentive.

It is suspected that the crew became overconfident because the tactical portion of the mission had been successfully completed, the flight was on its way home, and all they had to do was follow the leader home. However, this accident shows only too clearly that crews must remain vigilant until the return flight is completed and the aircraft is safely back on the ground.

Failure to comply with established procedures

The Chalk 4 crew failed to comply with the minimum obstacle clearance of 100 feet above the highest obstacle (AHO) that was established by the company commander before the flight. Additionally, they failed to comply with TC 1-214 guidance when they flew below 100 feet AHO at a speed of 100 knots or more. This speed reduced the time available to see, identify, and avoid obstacles. Their overconfidence led them to disregard established procedures.

Airspace conflict

Although it did not contribute to the accident, a potential airspace conflict existed in the vicinity of the accident site within minutes of the accident. Three separate flights were using the same sub-unit helicopter training area (SUHTA), and none of them was aware that other flights were there. Because of the distance and terrain, aircraft in terrain flight mode in this SUHTA could not establish radio contact with the tower or flight operations. Use of the SUHTA is controlled by block times. And because the flights were not aware of each other, there was a potential for a midair collision.

All unit aviators must be aware of the importance of obtaining positive verification of airspace clearance in

SUHTAs. To ensure that traffic conflicts in SUHTAs are minimized, flight operations must monitor and post all Notices to Airmen (NOTAM) referring to SUHTA airspace usage on local flying area maps.

Class B accident

The mission called for a flight of five AH-64s to conduct a night simulated deep attack in preparation for the unit's Army Readiness Training Evaluation Program. Aerial observers performed a day recon and briefed the crews. The air mission commander (AMC), who was the copilot of the accident aircraft, briefed the mission at 1500 and rebriefed at 1730. One of the AH-64s was scrubbed for maintenance.

The flight of four departed at 1834. Entering the western training area from the north, the flight continued in a southerly direction to the designated release point. After reaching their release point, the flight flew NOE into their BP, where they practiced target acquisition and engagement techniques.

After about 15 minutes, the unit commander received permission to move from the BP to a designated holding area about 4.5 kilometers south of the BP. The flight followed the route at about 75 to 100 feet agl at an airspeed varying between 0 to 50 knots. The flight stopped at a high hover about 1 kilometer short of the holding area to pinpoint their location. As the flight again began moving, the Chalk 2 PC spotted a small pole. Scanning to the side, he saw a large pole just beyond the first one. As the PC scanned back to the front, he saw the wires, "just white strands right across the FLIR." The aircraft was at 90 feet agl and 25 knots when it struck the wires. The PC was able to maintain control of the aircraft as it descended through the wires and came to rest upright. The crew executed emergency shutdown procedures and determined that there was no postcrash fire. Although the PC received facial lacerations from a flailing wire, the crew egressed the aircraft without difficulty after the blades stopped.

Overconfidence

The PC failed to brief the CPG, who was the company commander and AMC. Because the CPG had flown with him before, he was sure the CPG knew exactly what was required of him. However, the CPG did not clearly understand what his specific responsibilities were during the flight. As a result of the PC's overconfidence in the CPG, crew coordination broke down.

The CPG was also overconfident in his own ability to identify hazards. The battalion SOP required the CPG to be navigating on the map, but he was not doing this and became somewhat misoriented. The CPG did not know, as required by aircrew training manual standards, the exact location of the aircraft plus or minus 100 meters. And he did not inform the PC of this fact, which contributed to the crew's lack of awareness of wires in the area.

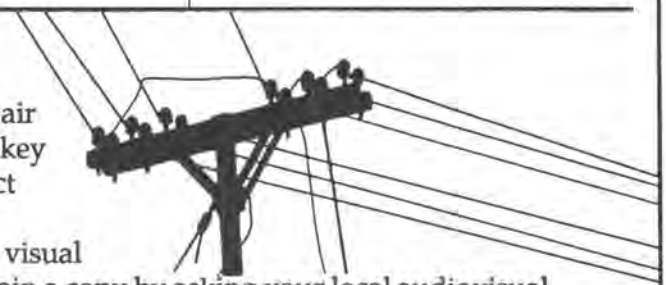
Failure to comply with established procedures

The crew failed to properly scan and maintain their position in relation to the lead aircraft, terrain, and existing obstacles in the area. They allowed the aircraft to descend below the minimum altitude required by the unit tactical SOP, which would have kept them clear of the wires.

If they had maintained the same altitude as the lead aircraft, no doubt they also would have cleared the wire. The low altitude hazard was compounded by the PC failing to properly clear his intended flightpath before moving forward. Overconfidence in his own abilities may have caused the PC to fail to follow the lead.

Confidence in self and the aircraft is a must for aviators, but overconfidence can lead to failure to comply with established procedures. Thorough crew briefings, including crew coordination duties, and following by-the-book procedures are essential to conducting safe night tactical missions. Without proper crew coordination, the optimum efficiency needed for safe flight in the night wire environment is lost. ♦

Reminder: Crashfax video available



Surviving in the Wire Environment video is targeted at air mission leaders and operational pilots. It focuses on five key wire strike prevention actions and the importance of strict adherence to standards.

The video is a valuable training aid and is available in visual information libraries throughout the Army. You may obtain a copy by asking your local audiovisual library for **Surviving in the Wire Environment (CFV 46-3, PIN 708002).**

See the supports and avoid wires—the French solution

All helicopter crews know the importance of avoiding wires. That can be a difficult task, however, especially when operating in areas with unmarked wires. The French Army aviation approach is to teach aircrews where they can expect to find wire obstacles.

The French solution to avoiding wires evolved from the fact that the Army Advanced Aviation Center is located near hilly terrain (the foothills of the Alps). This area is surrounded by many high-tension lines. Therefore, instructor pilots (IPs) developed a special wire course that every student must negotiate. This special course forces the student to cope with several different wire traps found in the region.

In the night vision goggle course, students shoot an approach to a large field near a hill. Once the helicopter is on the ground, the IP takes the controls and tells the student to look up. What the student sees is a set of high-tension lines coming down from the hill and into a tree line on the other side of the field. The helicopter is directly underneath the wires, which were invisible. Also invisible are the wire supports, which are hidden in the trees on the hill. This technique reinforces the importance of the French solution to the students.

Safe flight trajectory

French Army pilots call their cardinal rule for tactical flight *trajectoire de sècuritè* (safe flight trajectory). This technique simply calls for a flightpath which ensures that if there are wires, the helicopter will travel where the supports are. This requires an understanding of how wires are strung.

In rugged terrain, supports are always found on high ground (figure 1). Otherwise, the wire would touch the ground. If crews fly between the two high points, they may expect to find wires, but not supports. A safe flight trajectory would place the helicopter along the military crest of one or the other high point. This technique helps ensure that the flight crews will avoid wires even if they do not see them. In fact, wires usually are invisible until it's too late to avoid them. Thus, crews must fly where they can see the supports. This will virtually ensure that crews will not fly into a wire trap, whether they're flying in a familiar or unfamiliar area.

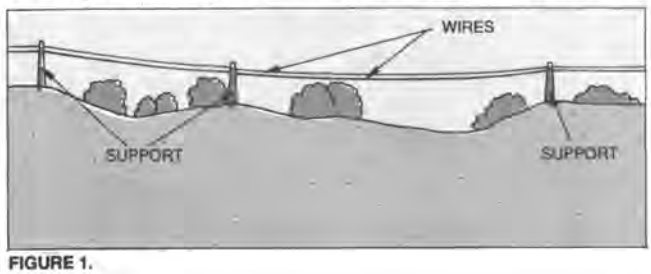


FIGURE 1.

In a valley, support poles for high-tension wires are always found on the crests (figure 2). So a helicopter traveling faster than a brisk walk, should fly on one side of the valley near the military crest. This will result in the crews being able to see the supports—day or night. Then they can cross under or over the wires, based on the situation. Crews should cross valleys perpendicularly or at angles. But having crossed a ridgeline, they should not immediately fly down its slope. There may be wires running parallel to the others.

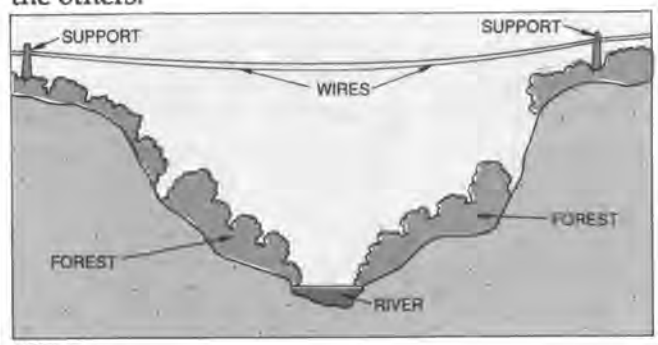


FIGURE 2.

Speed and altitude

Two key elements of this concept are speed and altitude. The lower the altitude, the more crews must slow the helicopter's airspeed to have enough reaction time to stop the aircraft in front of the obstacle or to avoid it. So, unless crews reduce their airspeed sufficiently to provide reaction time, they should not fly down the middle of the valley. However, when flying tactically near the enemy, crews must descend into the bottom of the valley. In this case, they must fly slow enough to do a quick stop, because they'll only have seconds to react after seeing the almost invisible wires.

Where we speak of low-level, contour, and nap-of-the-earth flight, the French speak of three speeds:

- First speed is 0 to 50 kilometers per hour (kph) with a maximum altitude of 1.5 meters. (At this altitude, the helicopter is maneuvering amid the obstacles.) This speed is frequently used when near the enemy.
- Second speed is 50 to 150 kph with an altitude up to 5 meters. This is the most frequently used

airspeed when not near the enemy. This speed provides a power reserve for evasive maneuvers plus airspeed that can be transformed into altitude.

■ Third speed is above 150 kph. This speed is not used for tactical flight.

As a rule of thumb, when flying faster than a brisk walk and low enough to see terrain out one or both side windows, crews should feel uncomfortable because they are in the flight domain where they can expect to hit wires.

Safe flight trajectory allows the aviator to avoid wires and still reduce exposure to enemy fire. Because if the enemy is on the other side of the ridgeline, it does not matter how high the helicopter is as long as the terrain masks it.

This technique also works on flat terrain. If flying at cruise airspeed, crews should not dip into clearings surrounded by forests for fear of finding wires suspended by supports hidden in the woods. They also should not fly down the middle of a river or across a lake surrounded by trees. The trees can mask the supports that suspend a wire. Crews should fly along the tree line where they can see the supports and avoid the wires. ♦

—POC: LTC John S. Wilson, TRADOC Aviation Liaison Officer, APO AE 09777

Inspection of OH-58/OH-6 fuel systems

Contamination in the OH-58 aircraft engine fuel system has been found after compliance with previous aviation safety action messages (ASAMs) concerning the same subject. An airframe-mounted fuel filter (AMFF) has been developed and is being installed on the OH-58 to resolve this hazard.

AVSCOM has issued a maintenance mandatory ASAM on all OH-58A/C and H-6 series aircraft with T63-A-700/720 engines for inspection of fuel systems (OH-58-92-ASAM-13/ OH-6-92-ASAM-04, 201730Z May 92). Until the AMFF is installed on the OH-58, the following recurring inspection requirements will be implemented. Continuous recurring inspections will be implemented for the H-6 aircraft. These inspections *do not* replace inspections required by OH-58-92-ASAM-02 on all aircraft returning from Southwest Asia.

■ At each 10 flight hours until 50 flight hours after installation of the OH-58 airframe fuel filter and until all contaminants have been flushed from the system, (for H-6 aircraft, continue recurring inspection each 10 flight hours) —

• Inspect fuel control filter in accordance with (IAW) TM 55-2840-241-23, paragraph 5-12j, or TM 55-2840-231-23, paragraph 6-10. ASAM OH-58-92-13/ OH-6-92-04 outlines corrective action if foreign material is found.

• Bleed (purge) air from the system by bleeding at the engine nozzle IAW TM 55-2840-241-23, paragraph 5-7, or TM 55-2840-231-23, paragraph 6-2.

■ At each 25 flight hours until 50 flight hours after installation of the OH-58 airframe fuel filter and until all contaminants have been flushed from the system, (for H-6 aircraft, continue at each 25-hour interval)—

• Inspect the engine fuel pump filter IAW TM 55-2840-241-23, paragraph 5-10, or TM 55-2840-231-23, paragraph 6-27.

• Test engine fuel pump bypass valve IAW OH-58-92-ASAM-02 or OH-58-92-ASAM-08. ASAM OH-58-92-13/OH-6-92-04 outlines corrective action if the bypass valve fails the test.

• Bleed (purge) air from entire fuel system in the following sequence:

▫ At the airframe fuel filter (if installed).

▫ At the engine fuel pump filter.

▫ At the engine nozzle.

■ At each 300 flight hours or 12 months (whichever comes first)—

• Test engine fuel pump bypass valve.

• Test OH-58 fuel filter switch IAW OH-58-92-ASAM-02.

• Replace airframe fuel filter (if installed).

• Bleed (purge) air from entire fuel system using sequence described above.

■ At each 24 months, inspect entire fuel system (OH-58 sump removed/ H-6 access covers removed) for contamination, fuel cell interior damage, deterioration, or activation.

TM 55-1520-228-23 has a requirement to inspect the fuel system anytime the fuel filter light comes on. This and other requirements for maintenance remain in effect and are not changed by this or previous ASAMs. These messages supplement and add to existing requirements and instruction. The general procedure for inspection of the fuel system is contained in OH-58-92-ASAM-02.

TMs 55-1520-214-23, 55-2840-231-23, 55-2840-241-23, and 55-1520-228-23 will be changed to reflect this message. Until the printed change is received, a copy of ASAM OH-58-92-13/ OH-6-92-04 should be inserted in the appropriate TM. ♦

—POC: Mr. Lyell Myers, Aviation Systems Command, DSN 693-9089, commercial 314-263-9089

AH-1 performance planning and directional control margin (tail rotor authority)

Prudent thinking and safety consciousness, as well as AR 95-1: Flight Regulations, requires aviators to do adequate performance planning. TC 1-213: Aircrew Training Manual (ATM), Attack Helicopter, AH-1 Task No. 1004 gives a block-by-block description of how an aviator should prepare a DA Form 4887-R: RW Performance Planning Card (PPC). Task No. 1004 is designed so that pilots as well as commanders will be aware of the design limitations of the aircraft. But sometimes aviators get confused in computing specific departure and arrival data items. The following is intended only to inform users of the requirements of the ATM and to provide additional guidance to pilots.

Departure data

Using the hover charts on pages 7-17 and 7.1-17 in TM 55-1520-236-10, pilots compute maximum allowable gross weight at out-of-ground-effect (OGE) and in-ground-effect (IGE) hovers, Items 11 and 12 respectively on the PPC.

Using sheet one of the directional control margin (DCM) chart on page 7-18.1 in the dash 10, pilots determine safe pedal margin, Item 20 on the PPC, for calm wind conditions. Then using the proper weight zone derived from sheet one, pilots determine incoming wind azimuths-to-avoid from sheet two if steady or gusting wind conditions are prevalent.

Pilots sometimes become confused when considering the note printed below paragraph 2a(16)(b) on page 6-11 in TC 1-213. The note states, "Marking *no* in the safe pedal margin block will not preclude flight." This refers to the intersection point of the gross-weight line and the environmental-condition line in the yellow area of sheet one of the DCM chart (less than 10-percent directional control). This implies that tail rotor control cannot be ensured even at an IGE hover under no-wind conditions.

The note below paragraph 2a(16)(b) on page 6-11 in TC 1-213 also states, "This information is valid at any altitude when the aircraft is at a stabilized hover at 100-percent rpm/6600 rpm." While it is true that the tail rotor will produce its maximum amount of thrust at 100-percent rpm/6600 rpm, tail rotor function is a combination of rpm and angle of attack or the amount of left pedal applied. During IGE hover at an appropriate hover (engine) torque, in a no-wind condition with left pedal applied approaching the 10-percent DCM, the amount of engine power (torque) required for an OGE hover, when compared with IGE power, increases to about 10 to 11 percent. Performing an OGE hover also further increases the amount of left pedal required to maintain directional control. Trying to maintain directional control at an OGE hover with the aircraft at the same gross weight and under the same conditions as the IGE hover above would prove risky because of the additional requirement for left pedal at OGE altitudes.

Takeoff conditions with gross weights and environmental conditions intersecting in the yellow area do not preclude flight, but pilots should understand that the amount of left-pedal travel is greatly reduced. If the tail rotor pedals are properly rigged and in the neutral position, the full amount of left pedal that normally can be applied is 5.98 inches. Therefore a 10-percent pedal margin in a no-wind condition means less than 0.6 of an inch (10 percent of 5.98 equals .598) of left-pedal travel remains for tail rotor control.

While it is true that "marking *no* in the safe peda margin block will not preclude flight," this

statement implies that flight will be restricted to limited maneuvers only. In this instance, limited IGE maneuvers should be considered due to unpredictable amounts of tail rotor control. These limited flight environment maneuvers should be conducted with adequate maneuver room and/or forward speed, resulting in a reduced power requirement and, therefore, a reduction in left-pedal requirements.

Using sheet two of the DCM chart, pilots apply the gross-weight zone from sheet one in determining wind azimuths-to-avoid when winds, steady or gusts, are a factor. These wind azimuths become most critical when winds are incoming from the 3 o'clock position (90 degrees in azimuth relative to the nose of the aircraft). The line that designates the beginning of the gross-weight zone, determined from sheet one, indicates when the aircraft is approaching the 10-percent safe pedal margin. More left pedal is required to maintain aircraft direction with winds coming from the right because of the normal weather-vaning effect. Placing the aircraft in positions where wind is incoming from a direction other than the right side contributes to the need for more right pedal (reduction of left pedal) and more directional control. In effect, placing the incoming wind from the nose or left side increases the amount of left pedal remaining, moving away from the 10-percent safe pedal margin zone.

However, we're still left with an ambiguous idea of where the 10-percent safe pedal margin may be. As already discussed, the worst condition is with the incoming wind from the right side. With the current DCM charts, we cannot accurately determine the amount of left pedal remaining, either IGE or OGE, with incoming wind from the aircraft's nose or the left side. With numerous efforts in computing azimuths-to-avoid from sheet two of the DCM chart, it can be shown that when wind velocities increase in magnitude with winds from the right, the azimuths-to-avoid range generally decreases. Additional lift generated from wind effects on the main rotor causes a reduction of power requirements of both main and tail rotors. We also know that we do not have directional control problems when operating at speeds above effective translational lift. But try to perform an approach to an OGE hover—for example, to a firing position above the trees—heavily loaded (gross weight in the yellow area of sheet one of the DCM chart) with the wind at a disadvantage and you had better look out!

Arrival data

Arrival data for AH-1 performance planning is also sometimes misunderstood. Some aviators believe it is required only upon returning to the base. The term "operational area data" might be a better way of thinking about arrival data. Operational area is the area in which the mission must be performed, whether it is landing to an IGE hover, conducting NOE, or firing position operations at an OGE hover.

The method of determining maximum allowable gross weight for both IGE and OGE arrival data performance planning is essentially the same as for the departure data performance planning. The greatest difference comes when considering TC 1-213 paragraph 2b(4)(c). The maximum allowable gross weight is a comparison of the OGE maximum allowable gross weight, the IGE maximum allowable gross weight, and the weight of the aircraft at the beginning of the yellow area of the 10-percent DCM chart. The least of the three will become the maximum allowable gross weight. This derived maximum allowable gross weight is then compared with the actual (estimated) weight of the aircraft. If the weight of the aircraft is greater than the derived maximum allowable gross weight, then the pilot may be putting himself and his aircraft in a more-than-acceptable risk, especially if the mission is to be performed OGE.

A note below paragraph 2f on page 6-13 in TC 1-213 reads, "The same PPC data will suffice... when aircraft gross weight or environmental conditions have not increased significantly...." When computing performance planning data, most pilots use this statement to rationalize why they do not have to compute arrival data. And most of the time, they can get away with it. However, those pilots operating in areas of extreme increases in PA and FAT at the arrival area should be aware that they are taking a chance, especially when departure and arrival data are drastically different (increased). Units in areas such as Fort Carson, Korea in the summertime, and even Fort Lewis, can improve their safety rates by making it mandatory for pilots to compute PPC arrival data as prescribed in TC 1-213.

In no way is this information intended to restrict operations of the AH-1 in a combat environment. Pilots-in-command have a responsibility to do adequate performance planning and to inform the commander if operation of the aircraft is to be

conducted in the yellow area of the DCM chart. Commanders must then weigh the importance of the mission, determine and weigh the risks to aircrew and aircraft, and make necessary risk decisions during combat operations. However, during ATM or unit tactical training, pilots and commanders must ensure that adequate controls are in place to prevent OGE maneuvers in operational areas or mission profiles where aircraft gross weight is greater than that determined for safe pedal margin.

Until further testing of the AH-1 tail rotor has been completed and directional control margins have been conclusively determined, pilots and commanders will be well-advised to follow arrival data guidelines in TC 1-213. ♦

—POC: CW4 Stephen T. Knowles was assigned to the Army Aviation Center, Directorate of Evaluation and Standardization (DES) when this article was written. Current DES POC is CW3 Timothy L. Lee, AV 558-2531/2532, commercial 205-255-2531/2532.

S T A C O M

AH-1 performance planning and directional control margin

Confusion exists concerning the use of AH-1 performance data correction information charts in TM 55-1520-236-10, pages 7-10.1 and 7.1-10.1. Confusion also exists about whether paragraph 2b(4)(c), TC 1-213, Task No. 1004 should be used to determine maximum allowable gross weight.

To clarify use of the performance data correction information charts, AVSCOM message 182100Z Nov 91 was issued. The message states "remove these pages [7-10.1 and 7.1-10.1] from the operators manual and use the remaining current performance charts for performance planning."

Testing of the AH-1 tail rotor is currently being conducted under the direction of the AH-1 Product Management Office and AVSCOM. This testing will provide data to refine tail rotor rigging procedures and to update directional control margin charts if appropriate.

Until the dissemination of the new information and procedures, the Directorate of Evaluation and Standardization recommends users comply with paragraph 2b(4)(c), TC 1-213, Task No. 1004 to determine the maximum allowable gross weight.

STACOM 152 **June 1992**

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

Immanuel C. Sieving III
LTC, Aviation
Director, DES

Updated Guide now available

The twelfth edition of the Guide to Aviation Resources Management for Aircraft Mishap Prevention is now available, and there have been several changes made. The content has been updated, and the format is improved. Floppy disk copies of the Guide are also available, which will make it easier for units to adapt and upgrade the Guide with local requirements and regulations and requirements from higher headquarters. But the foremost change is in proponency. The Army Aviation Center, Aviation Branch Safety Office is now the lead agency for the publication.

As in the past, changes and publication of additional sections will be announced in *Flightfax*. The changes will also be available on floppy disk copies for quick, convenient updating in the field.

Requests for the Guide should be directed to the Aviation Branch Safety Office, ATTN: ATZQ-S, Fort Rucker, AL 36362-5000. If a floppy disk copy is requested, users are asked to furnish two disks with the request. ♦

—POC: Mr. Ronald Cox, Aviation Branch Safety Office, AV 558-2388, commercial 205-255-2388

Use of portable computers on Army aircraft

Because of requests for guidance on the use of portable computers on board Army aircraft, AVSCOM has issued an aviation safety action operational message (GEN-92-ASAM-08, 291810Z Apr 92) to provide important information on the safe use of these devices. The purpose of the message is to provide procedures to be followed before and during operation of portable computers on board Army aircraft.

Portable computers will not be operated on board Army aircraft in flight while OMEGA/VLF receivers are being used as the primary source of navigation. In addition, portable computers will be suitably stowed and not operated during takeoff, landing, and approach procedures.

Except as stated in the previous paragraph, portable computers may be operated on board Army aircraft provided that the following restrictions are met:

- The portable computer must be certified as a Class B computing device under subpart B or J, part 15 of the Federal Communications Commission regulations. All computers meeting these regulations carry a sticker certifying their compliance.
- Portable computers will not use electrical cabling to interconnect with the aircraft for any reason. This includes use of aircraft power as the computer's electrical source.
- Before the first flight for each aircraft and each type and model of portable computer, a qualitative electromagnetic compatibility (EMC) check will be conducted in order to demonstrate that the computer does not serve as a source of interference to aircraft electrical/electronic systems. This will be accomplished by monitoring the performance of aircraft controls and instruments while the computer is started and initialized using its bootstrap (bootup) procedure. All aircraft systems will be in their in-flight configuration for these checks. Special attention will be given to aircraft communication and navigation equipment, particularly Loran, Decca, and direction-finding systems. If EMC anomalies are observed, the computer will not be used during flight. Any EMC anomalies will be reported by telephone to Mr. Dennis Sparks, DSN 693-1634, commercial 314-263-1634. The caller should provide the aircraft mission, design, series, avionics configuration, and type and model of computer involved. In addition, a written report stating the details of the anomalies observed will be submitted to Commander, AVSCOM, ATTN: AMSAV-ESE (Mr. Dennis Sparks), 4300 Goodfellow Blvd., St. Louis, MO 63120-1798.

If at any time during flight the portable computer is suspected of causing interference in aircraft systems, the pilot-in-command will order that the computer be turned off. The computer will then not be used in flight until an investigation has been conducted to determine the exact cause of the interference. The incident will be reported to AVSCOM in accordance with the above instructions.

The operational guidelines and restrictions detailed in this message do not supersede those established separately under any airworthiness release issued by AVSCOM.

Units should place a copy of this message in the pilot information file. It is recommended that this information be part of the passenger preflight briefing, and units should consider placing a placard with this information in the passenger cabin area. ♦

—POCs: Mr. Dennis Sparks, technical POC, DSN 693-1634, commercial 314-263-1634, or Mr. Brad Meyer, safety POC, DSN 693-9089, commercial 314-263-9089

Class A Accidents through May

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	3	4
	December	3	1	3	0
2d Qtr	January	7	3	1	0
	February	13	1	13	0
	March	4	4	8	2
3d Qtr	April	3	1	2	0
	May	4	1	3	1
	June	0		0	
4th Qtr	July	2		0	
	August	2		0	
	September	3		2	
	Total	48	15	37	7

Broken Wing awards

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

■ **CW4 Edmond A. LaFantasie and CW4 Geza Zoller, Connecticut Aviation Classification Repair Activity Depot, Groton, CT.** During IMC cruise flight at 10,000 feet msl, the C-23B encountered mountain wave wind shear, causing airspeed to vary between 130 and 180 knots. Then the aircraft started picking up unforecast severe clear ice. The mountain wave wind shear combined with a simultaneous severe icing buildup and the aircraft's high gross ferry weight created a critical situation. The crew elected to turn 180 degrees, and ATC assigned them a lower altitude. Following about 5 minutes of cruise flight at 8,500 feet msl and 135 to 140 knots, the airspeed dropped from 130 to 110 knots. Because of the severe icing, the crew disengaged the autopilot to take manual control of the aircraft. The nose of the aircraft pitched up, stalling the aircraft. The left wing dropped, and the aircraft entered a descending spiral. CW4 LaFantasie, the pilot-in command, communicated critical flight information to CW4 Zoller, the pilot on the controls, and then got on the controls with CW4 Zoller to assist the moment the aircraft started to become flyable at about 3,000 feet. The crew recovered the aircraft from the stall at about 1,900 feet. Still in IMC with inoperative gyros, the attitude indicators showed the aircraft was inverted, and the magnetic compass was inoperative because the windshield heat was on. At 1,900 feet and still in IMC, the crew had managed to regain full control of the aircraft although it had descended 6,500 feet in 40 seconds. Spotting the faint outline of a mountain ahead through the clouds, CW4 LaFantasie alerted CW4 Zoller. Simultaneously, the proximity warning device came on, and CW4 Zoller immediately initiated a climb to 5,000 feet. Still in IMC but now in radar contact with ATC, the crew requested a no-gyro handling for an instrument approach. CW4 LaFantasie and CW4 Zoller completed the landing with a 90-degree, 30-knot crosswind. Their keen flying skills and combined efforts directly resulted in saving the lives of the ferry crew and prevented the loss of the aircraft.

■ **WO1 Richard K. Chenault and WO1 Christopher J. Uppman, 4th Squadron, 6th Cavalry, 6th Cavalry Brigade (Air Combat), Fort Hood.** During a night vision system right-echelon formation flight, the AH-64 was Chalk 4 in a flight of four. WO1 Chenault, the pilot-in- command, felt resistance in the cyclic and asked WO1 Uppman if he was on the controls. Just as WO1 Uppman replied that he was not on the controls, the cyclic froze. Unable to manipulate the cyclic by himself, WO1 Chenault asked WO1 Uppman to assist with cyclic control movements. WO1 Chenault advised the flight lead of the situation and his intentions. At 320 feet agl and 118 knots, he began an approach to a small open field to the left. WO1 Chenault told WO1 Uppman to remove his helmet display unit and turn on the searchlight. As the flight progressed, the cyclic became extremely difficult to manipulate, even with both pilots on the controls. WO1 Chenault cross-checked the hydraulic pressure indicator and the caution/warning panel and found that all indications were normal. With both pilots on the controls, they were able to turn the aircraft left. When WO1 Chenault attempted to reduce the collective, he found that it could only be reduced and not increased. During the final phase of the approach, the crew felt uncommanded left lateral cyclic inputs. Struggling to keep the aircraft upright and in a controlled descent, they noticed a fence running from left to right down the middle of the field. The pilots were able to hold the aircraft at about 20 feet agl until the fence was cleared. The aircraft then touched down at 12 knots, bounced once, and landed upright. Inspection revealed that the probable cause of the emergency was a combination of the primary and utility hydraulic pumps cavitating, which resulted in erratic hydraulic pressure going to the flight control system. The heading and altitude reference system (HARS) was also found to be mounted improperly, which resulted in excessive vibration. The excessive vibrations caused the HARS to send erroneous signals to the digital automatic stabilization equipment computer. The combination of these malfunctions could have directly resulted in a Class A accident had it not been for the crew's quick interpretation of the situation, subsequent actions by both crewmembers, and the excellent crew coordination exhibited. ♦

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class B

H series - Aircraft was Chalk 3 in flight of three when it encountered fog and broke formation. At 8,700 msl, aircraft broke out of fog and attempted to rejoin formation but had insufficient power to maintain altitude. Aircraft descended to about 100 feet agl and 25 knots, lost power, made right turn, and impacted slope, coming to rest upright. One minor injury. 9225

UH-1 Class C

H series - During maintenance autorotational rpm check, pilot reduced collective and retarded throttle to engine idle. Dual tachometer indicated needle split, engine rpm low and rotor rpm high. During descent, rotor rpm continued to build, exceeding 356 rpm. Pilot increased collective and returned throttle to full-open position. Investigation of rotor overspeed and damage continues.

UH-60 Class C

A series - During NVG formation approach, aircraft browned out in dusty conditions. PC continued approach, and aircraft landed hard with some right movement. Damage discovered during preflight for next mission.

UH-60 Class D

A series - At 1,800 feet msl on heading of 360 degrees, aircraft was inbound with interior lights on. Tower advised PC of traffic taking off. PC acknowledged and reached down to turn on landing light. While attempting to turn on landing light, PC's thumb came off landing light switch and struck cargo hook emergency release button, activating cargo hook squib. Aircraft shuddered and crew heard bang as blivet with 400 gallons of water was released over wooded area. Because of ceiling and darkness, PC decided they could not find blivet and continued flight to airfield without further incident.

Attack

AH-1 Class E

F series - At about 30 feet agl during hovering fire, pilot was firing stadiametric rockets, then switched to fixed gun and continued engagement. Aircraft had descended slightly and was moving aft as result of 20mm gun thrust. Pilot lowered aircraft nose to arrest rearward movement, and aircraft began to descend. Pilot leveled aircraft and increased power. With 100-percent torque applied, descent continued. Pilot elected to overtorque aircraft rather than risk hard landing on uneven terrain. Torque peaked at 105-percent indicated (102-percent calibrated) as aircraft came into ground effect. Crew completed landing on even terrain. Pilot had allowed rate of descent to build too rapidly for amount of tailwind. Direct tailwind of about 12 knots and aircraft's forward movement simulated downwind approach.

Cargo

CH-47 Class C

D series - In IMC at 6,000 feet msl, aircraft was struck by lightning. Crew saw bright flash and heard loud bang. Aircraft shuddered, and control response was momentarily interrupted. Enlisted crew identified what they thought was fire in No. 2 engine. Shortly thereafter, No. 2 engine failed. Crew declared emergency and requested lower altitude. After aircraft descended to VMC, crew determined that there had been no fire. Crew restarted No. 2 engine and completed flight without further incident. Postflight inspection revealed damage to two blades on forward head.

Observation

OH-58 Class C

A series - During maintenance compressor bleed valve check, aircraft rolled up on toes of skids. Ground-handling wheel on right side locked in up position. Pilot lowered collective, but locked wheel would not allow aircraft to settle level. Suspect hard landing.

C series - During maintenance test flight, crew performed pylon isolation mount check. On second attempt, pilot heard loud bang. Aircraft rolled left, followed by more bangs. Pilot reduced throttle and attempted hovering autorotation. Aircraft landed hard.

Fixed wing

OV-1 Class A

D series - During rollout, pilot reversed engine thrust. Only one prop reversed. Crew lost aircraft directional control, resulting in aircraft exiting runway. Landing gear collapsed, causing major damage to airframe before aircraft came to rest. Postcrash fire erupted and could not be extinguished by airfield firefighters. Wreckage was destroyed. No injuries. 9226

Maintenance

OH-58 Class E

C series - During cruise flight, approach control could not receive transponder. Observer saw IFE circuit breaker had popped out. When he attempted to reset circuit breaker, he saw a spark in overhead console. Crew completed landing without further incident. During inspection, crew found socket wrench in overhead console.

Messages

■ Aviation safety action maintenance mandatory message concerning one-time inspection of the centrisep particle separator assembly inner gasket for proper sealing and inactivation of the bypass door on all AH-1E and F series aircraft modified per maintenance work order (MWO) 55-1520-236-50-12 (AH-1-92-ASAM-10, 060600Z May 92). Summary: Engine foreign object damage (FOD) is increasing due to a number of firewall gas-

kets, P/N CB-00158-1D1322A, not sealing to the engine reduction housing, P/N 1-030-390-05. Gaskets have been reported as torn, deteriorated, and with sections missing. This allows unfiltered air into the engine and increases potential FOD. Foreign objects can also enter through bypass door operation. The purpose of this message is to reduce FOD, require a one-time inspection of the gaskets for proper sealing, provide a means of sealing the openings of the gaskets, and to seal the bypass door so that it is inoperative. This message also contains inspection and correction procedures and recording and reporting requirements. Contact: Ms. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning one-time and recurring inspection of cross-shaft adapters on all CH-47D, MH-47D, and MH-47E aircraft (CH-47-92-ASAM-04, 222222Z Apr 92). Summary: During a daily inspection, the No. 2 (right side) engine-combiner cross-shaft steel adapter lug on the combiner end was found cracked. Investigation revealed that the crack initiated from fretting in the bore of a bolt hole. The fretting is attributed to a loose bolt between the Thomas couplings and the adapter. The purpose of this message is to require a one-time inspection of all inboard/outboard cross-shaft adapters for cracks and a check of nut torque, require a recurring 25-hour inspection to visually inspect the outboard drive shaft and adapter lugs, and emphasize to inspection and flight crews that the daily inspection will include a visual inspection of the inboard drive shaft and adapter lugs for cracks. This message also contains inspection and correction procedures and recording and reporting requirements. A copy of this message will be inserted in the appropriate TM as authority to implement the change until the printed change is received. Contact: Mr. Brad Meyer, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning procedure to inspect/ replace 45-degree bulkhead elbow fitting for auxiliary power unit (APU) fuel and nitrogen inerting unit (NIU) system on all AH-64 aircraft (AH-64-92-ASAM-04, 131800Z May 92). Summary: Several instances of cracked 45-degree bulkhead elbow fittings that occurred during installation have been reported. The affected elbow fitting is installed in two locations on the aircraft: the APU fuel supply line and the NIU air supply line. The purpose of this message is to direct a one-time inspection for leakage in the 45-degree elbow fittings, MS21907D6, used on the APU fuel supply line. This message also requires a replacement of the elbow fittings at the next scheduled phase inspection. This message also contains inspection and correction procedures and recording and reporting requirements. Contact: Mr. Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action informational message concerning nonconforming swashplate bearing pivot bolts, P/N 206-010-464-1, on all OH-58A/C aircraft (OH-58-92-ASAM-12, 211800Z, Apr 92). Summary: Nonconforming swashplate bearing pivot bolts, P/N 206-010-464-1, have been received from supply. The nonconforming bolts did not have the head machined to 0.125-inch height as required by the drawing. Therefore, we presume none of these nonconforming bolts have been installed on aircraft because of the unusual force required to install the swashplate bearing. The Defense Logistics Agency has traced the nonconforming bolts to contract number DLA500-87-M-HB96. The purpose of this message is to advise units not to use the nonconforming bolts. Contact: Mr. Lyell Myers, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action operational message concerning flight limitations when operating all C-12 and RC-12 aircraft in icing conditions (C-12-02-ASAM-01, 121900Z May 92). Summary: The first Army icing test of an RC-12/C-12 airframe has just been completed by the Airworthiness Qualification Test Directorate of the Aviation Technical Test Center. These tests identified several previously unidentified icing-related problem areas. The most significant observations were:

- Accumulation of ice on the pitot tube assemblies and unprotected airplane surfaces caused variations from the indicated airspeed (worst case—complete loss of pilot and copilot indicated airspeed) and significant increases in parasitic drag.
- Ice formation on wing surfaces immobilized the stall warning vane.
- Accumulation of ice obstructed the heated primary fuel vent and appeared to obstruct the unheated primary fuel vent during some icing encounters.

The purpose of this message is to place flight restrictions on C-12 and RC-12 aircraft in icing conditions, alert aircrews of possible hazards due to ice accumulation, require that this message be placed in the pilot reading file and included as part of the unit aviation safety meeting, and add a warning to the operators manual. A copy of this message will be inserted in the appropriate operators manual as authority to implement the change until the printed change is received. Contact: Ms. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

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

U.S. ARMY SAFETY CENTER

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R. Dennis Kerr
Brigadier General, USA
Commanding General
U.S. Army Safety Center

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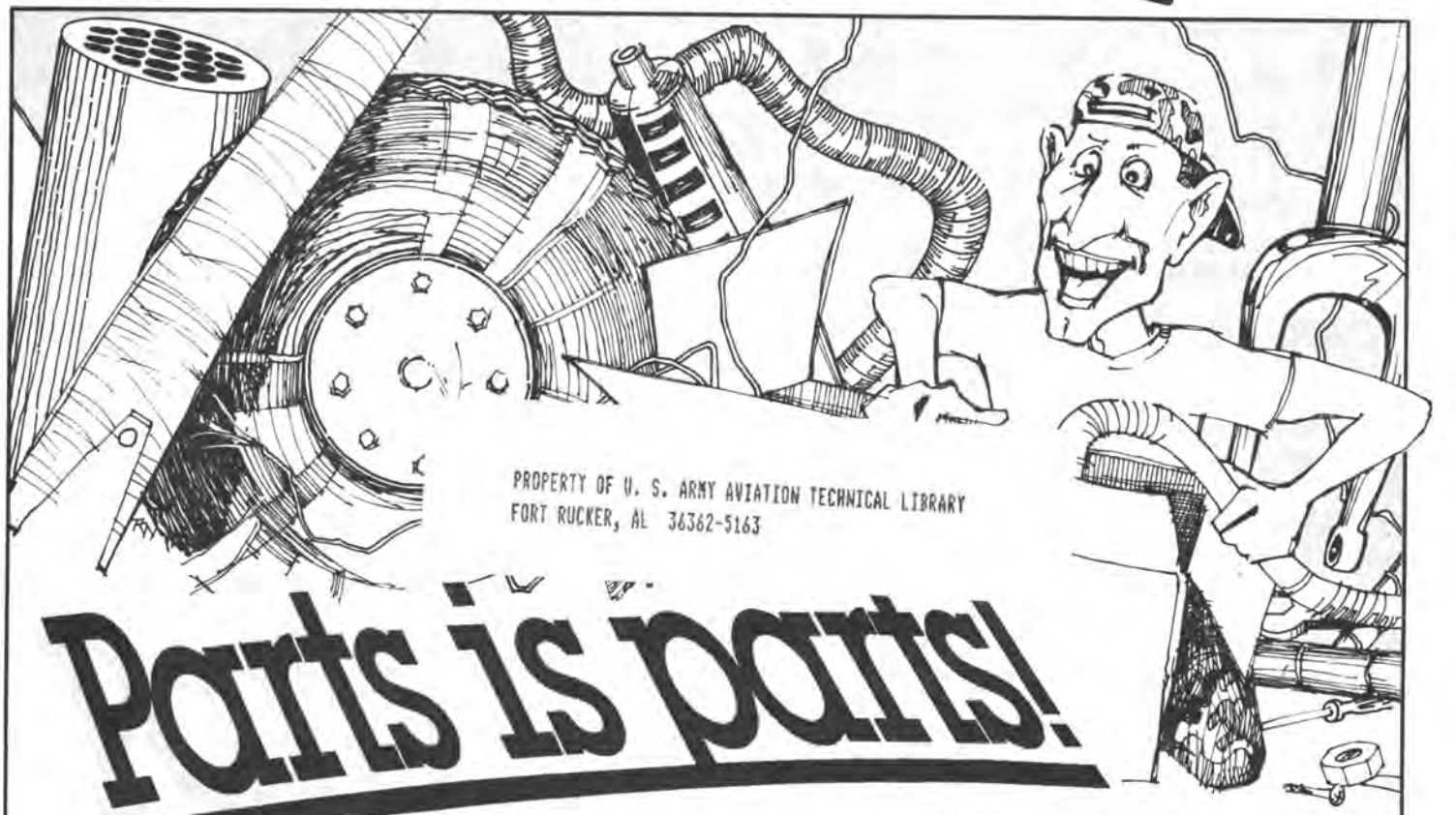
July 1992 Vol 20 No 9

REPORT OF ARMY AIRCRAFT ACCIDENTS



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Parts is parts!

That disparaging reply is heard frequently around the halls of the Aviation Systems Command (AVSCOM) when someone feels that a particular part is not getting the attention it deserves. But aircraft parts are special; they require lots of TLC and increased engineering and quality assurance efforts. They're made to the most exacting standards of quality (we hope), and they're very expensive (we know). So with all of this cost and quality control, why do some parts perform well while others—and it always seems to be the most expensive and most difficult to replace—require continuous premature replacement? To find the answers, we need to understand some terms associated with parts service life, how initial service life is established, and what affects how parts perform in service.

Service life terms defined

Three terms are associated with parts replacements: retirement life, time between overhaul (TBO), and on-condition.

■ **Retirement life.** Retirement life means that the part has seen sufficient service so that it must be removed from any further use. When we think of retirement life, we tend to think in terms of aircraft structural components. However, retirement life can also apply to such components as cartridge-activated devices that deteriorate with age and restraint harnesses that deteriorate from exposure to sunlight and other atmospheric elements. For the purposes of this article, however, we'll limit our discussion to structural components.

Unlike cartridge-activated devices and restraint harnesses, the retirement life of structural components depends on usage rather than calendar time. Remember the old saying, "It's not the age; it's the mileage." Well, that's a good way to look at structural parts. Each time a load is applied to a structural part, that part experiences a certain level of stress. As long as the level of stress remains →

below a certain threshold, the part suffers no permanent damage. If we could prevent stresses on the part from ever exceeding the threshold, the part could have an unlimited life and virtually never need replacement. However, each time the stress exceeds that threshold, the part suffers an infinitesimal amount of permanent damage, thus reducing its service life. This reduction in service life is in direct proportion to how often and by how much the threshold is exceeded.

Why don't we just design parts strong enough that the stress level never exceeds the threshold? Strength equates to weight, and as we all know, weight is the natural enemy of aircraft performance. Thus, like many things in life, aircraft design is a series of compromises. Later we'll look at how initial service life is established and why it may change.

■ **Time between overhaul.** Retirement life components must be removed from service and cannot be refurbished; however, TBO items can be restored to serviceable condition. A component is assigned a TBO cycle when one or more parts of the component requires replacement at a finite usage interval. The overhaul generally consists of disassembly, inspection, replacement of mandatory-replacement parts and other parts as necessary, reassembly, and test. When this cycle has been completed, the component is ready to be returned to service for yet another TBO cycle. The fact that a component is assigned a TBO cycle is no guaranty that the part will perform satisfactorily for a full TBO cycle. TBO really means that when a component has successfully completed a TBO cycle, it must be removed from service because of known service-life limitations on one or more parts. Later in this article, we'll discuss reasons why some components, including TBO components, sometimes fail to reach their anticipated service life.

■ **On-condition.** On-condition parts can remain in service indefinitely as long as they continue to meet a set of serviceability criteria. There are two basic forms of serviceability criteria: inspectable and detectable. By inspectable, we mean criteria that can be found in the dash 23 manual and can be visually inspected and/or measured. Detectable criteria are those items that can be monitored by sensors installed on the components. These sensors detect such parameters as temperature, pressure, vibration levels, and metal particles. The threshold of each of these parameters is established at a level that should alert flight and maintenance crews of an impending failure sufficiently in advance to avoid catastrophic failure.

The current trend in aircraft design is to go from dynamic components in TBO items to dynamic components that are on-condition. The on-condition approach eliminates the removal of components at a fixed-service time if the component is still functioning satisfactorily.

Initial service life established

Now, let's look at how parts come into being and how initial service life is established. Any new Army aircraft design starts with a mission requirement defined by the user. Basically, the user specifies how the aircraft is to be used and how long it is expected to last. How the aircraft will be used is defined by a set of typical mission scenarios. These scenarios establish such parameters as speed, range, endurance, payload, and so forth. Using these parameters, the aircraft designer develops an aircraft design that can perform the intended missions.

One of the functions of the design process is to calculate the loads that the aircraft will experience during each of the mission scenarios. These calculated loads together with the desired service life of the aircraft help to define the aircraft's structural design. A similar process is used for dynamic components.

There are two key points to remember. First, at this stage the aircraft is still a paper aircraft and loads are *calculated*. Second, the aircraft is being designed to a set of *anticipated* mission scenarios. The next step in the development process is to convert the paper aircraft into hardware and to test the hardware. During this testing, the calculated loads are applied to structural and dynamic components to produce the stress levels these

components are expected to experience in service. It is this testing that establishes the initial service life for the structural and dynamic components.

Performance in service

Next, let's look at how parts perform in service. There are many reasons why the service life of parts change, but we will look at a couple of the more important ones. Remember, we said that aircraft are designed to *calculated* loads based on *anticipated* mission scenarios. The time from requirement identification to aircraft fielding can stretch out a decade or more. During that time, threats and tactics change and the aircraft ends up flying to different scenarios and frequently at greater weights than originally envisioned. All of this can work to reduce service life. Also, once the aircraft is flying, we can measure the actual loads the aircraft experiences and compare them with the calculated loads. This comparison can result in either an increase or decrease in the service life of a component.

And let's face it, engineering is not an exact science. Sometimes a design that looks perfect on the drawing board can't cope with the real world. When that happens, it is literally "back to the drawing board" for redesign and requalification—an expensive and time-consuming exercise. In the meantime, the service life of the part may be reduced to maintain safety and guard against premature failure.

Premature removals

What about parts that just don't seem to be able to pass muster? These are the parts that require frequent premature removal. Let's talk about some of the reasons for these early removals and what can be done about them. We've already touched briefly on the case where the design is inadequate. In that case, the only solution is a component improvement. And all of the component improvements must compete for limited funds. Of necessity, those components that have a direct impact on safe flight are given top priority. Other components requiring design improvement must wait their turn even though they continue to be a time-consuming and expensive maintenance problem for the field.

Quality can also be a cause of premature removal. Despite all of the quality controls that are imposed on parts manufacturers and overhaulers, substandard parts still occasionally get out to the field. Frequently, this is because a requirement was overlooked or misinterpreted. If you're experiencing premature removals that you suspect are due to either design or quality, be sure each removal is documented on a Quality Deficiency Report so that AVSCOM can investigate the failure. In the case of design or quality problems, the ball is in AVSCOM's court.

Operation Desert Storm exposed us to another reason for premature removal—*environmental extremes*. In the harsh conditions of Southwest Asia, intensive maintenance was imperative to remove sand from components and protect components from high heat loads and sand intrusion. While components can be designed to operate in these environmental extremes, a better solution is the development of protective kits that will be installed only while the aircraft is exposed to such extremes.

Abusive aircraft operation can also have a negative effect on the service life of components. Combat flying by its very nature is aggressive flying. And the aerial demonstrations performed at the Paris Air Show by Army aircraft like the AH-64 Apache are spectacular. However, engineering analyses show how the loads from such demanding flying use up a disproportionate amount of the life of certain structural parts in just a few flight hours. Any time you venture outside the dash 10 flight envelope while trying to perfect your own Paris Air Show routine, you're entering the twilight zone as far as the strength and life of certain components are concerned.

Remember when as a teenager you "popped the clutch" on your fire-breathing chariot only to be greeted by the heart-stopping sound of your U-joint and drive shaft dropping onto the pavement? Well, if your current fire-breathing chariot is an AH-64, every time you use the 95-percent start switch for the auxiliary power unit (APU) when the outside temperature is moderate, you're literally "popping the clutch" on the APU input clutch and the main transmission. A little TLC can go a long way toward prolonging component life.

Last but definitely not least, let's talk about *maintaining the aircraft* properly; that means keeping the aircraft serviced in accordance with the dash 23 manual. This includes such things as lubricating, cleaning, inspecting, power torquing of parts on installation, and so forth. Inspection includes spotting cases of chafing before the damage requires component replacement.

If you feel that you're →

removing components unnecessarily because the removal criteria in the dash 23 manual are too stringent, ask AVSCOM to take another look at the criteria. Many of these criteria are initially established very conservatively. After all, we can replace parts but not human lives. However, with increased experience on the aircraft, we may be able to relax some of the initial criteria. If you have a question on these criteria or any other aspect of the dash 23 manuals, just drop AVSCOM a line on the DA Form 2028-2 found in the back of your manuals. If we don't hear from you, we tend to just roll along thinking life is good.

If you're removing components and sending them to a higher echelon to have work done that you feel you could do at your own level if you were authorized to do it and the parts were available to you, let AVSCOM know about this too.

Bottom line

If we're going to operate in this time of shrinking budgets, we're going to have to make an all-out effort to reduce premature component replacement. For the folks in the field, this means maintenance by the book and lots of TLC for the aircraft. For AVSCOM, it means increased engineering and quality assurance efforts. The late comedian Jimmy Durante had a favorite line, "Everybody wants to get into the act!" In this case, everybody *has* to get into the act. ♦

—Originally written by Mr. Gene Doerr, AVSCOM Directorate for Engineering, this article was adapted from the April 1992 Aviation Logistics newsletter supplement. AVSCOM POCs are Mr. Jack Walkenhorst, DSN 693-1059 and Mr. John Niemann, DSN 693-1629.

CH-47 cargo hook accidents

Failure to follow procedures and lack of communication hurts both physically and financially.

In the past few months, there have been several incidents in which people were injured during operation of the aircraft cargo hooks. The CH-47D has three external cargo hooks: a forward, center, and aft hook. All hooks have normal, emergency, and manual release modes. In the normal release mode, hooks can be controlled by either pilot or by the hoist operator. Emergency release of all hooks can be performed electrically by either pilot or manually by the hoist operator.

Because more than one person can actuate the mechanism, costly accidents, such as the following two examples, occur when crewmembers fail to follow established procedures or fail to communicate intentions to other crewmembers when working around cargo hooks.

Failure to follow established procedures

The crew had conducted multiple hookups and releases with the flight engineer training an enlisted crewmember who was in the hole and calling the loads. At an undetermined point, the flight engineer took the place of the enlisted crewmember in the hole and told him to observe from the seat directly beside the hole. After a few hookups and releases, the flight engineer indicated that he wanted the enlisted crewmember to release the load on command. On the final hookup, the flight engineer was in the hole calling the load. The hookup was accomplished with no problem. But in preparing to release the load, the flight engineer began to move up and aft, out of the hole. As he placed his hand on the cargo hook support beam, he told the enlisted crewmember to release the load. But the flight engineer lost his balance and began to slip down and out of the aircraft. Reaching out with his right hand to arrest his fall, he placed his hand on the cargo hook frame support. The opening cargo hook pinned his fingers against the bar.

This accident was a result of human error—an individual failure to conform to standards on the part of the flight engineer. While conducting external load operations, the flight engineer ignored the battalion SOP; TC 1-216: Aircrew Training Manual, Cargo Helicopter; and common unit operating procedures when he directed an RL (readiness level) 3 enlisted crewmember who was not calling the load to release the external load. Failure to follow established procedures combined with the flight engineer's command to release the load and his simultaneous slip led to his receiving extensive injuries to his right hand.

Another human error also contributed to this accident. This human error was leader failure. Because of a shortage of CH-47 enlisted crewmember trainers, the unit commander, after

consulting with the IP and the unit's only remaining enlisted unit trainer, elected to allow RL 3 enlisted crewmembers to accompany standard flight crews on missions. The purpose was to begin orienting new personnel toward crew duties and responsibilities during varying unit missions. However, the company commander, IP, and unit trainer failed to establish any boundaries, limitations, or guidelines or provide verbal briefings for conducting training during these flights. This decision to violate known guidelines and subsequent failure to identify or establish any kind of limitations allowed the flight engineer to perpetuate the violation and set the scene for the mishap to occur.

The commander failed to enforce or elected to bypass the known standard and provided no new standard for training. If the commander, IP, or unit trainer had given the flight engineer specific guidance on training RL 3 enlisted crewmembers, this injury (costing more than $16,000) may have been prevented.

Lack of communication

In another case, lack of communication was a critical factor in a crewmember's injury. During runup procedures, all steps were accomplished normally up to the cargo hook checks. During the cargo hook checks, an enlisted crewmember was crouching behind the center hook using an aft intercommunication system (ICS) microphone for communication. Another enlisted crewmember was stationed outside on the right side of the aircraft in line with the center cargo hook. He was using the right-door ICS microphone for communication. Still another enlisted crewmember was stationed inside the aircraft forward of the center hook, using an aft ICS microphone for communication. A sergeant, who was on the aircraft to conduct evaluations on two of the enlisted crewmembers, was seated on the three-man seat adjacent to the center hook on the right side of the aircraft. He was using the hoist operator's microphone, allowi[illegible]m to hear but not speak on the ICS. The hoi[illegible]perator's pistol grip was on the cabin floor to the right of the center hook.

The pilot checked the forward hook, and the enlisted crewmember crouching behind the center hook informed the pilots that the forward hook was operational. The other pilot activated the center hook, and the same enlisted crewmember informed the pilots that the center hook had opened. However, the master caution and center-hook-open caution lights did not come on. The pilots informed the crew of this and made another check of the hook. Again, no cockpit indications. At this time, the enlisted crewmember who was stationed in the cabin forward of the center hook and the sergeant doing the evaluations joined the enlisted crewmember in the center hook area. Using flashlights, they visually checked for obvious faults.

One of the pilots informed the crew that external load operations would not be conducted, but that the entire cargo hook system operational check would be completed. The enlisted crewmember returned to his position in the cabin forward of the center hook, positioning himself so that he could see both the center hook and the cockpit caution panel. The sergeant was outside the aircraft, lying on the ground to the right front of the center hook.

The enlisted crewmember stationed behind the center hook activated the aft hook using the hoist operator's grip and informed the pilots that the hook was operational. The pilot then selected tandem hooks and activated them with his hook release button. Again the crewmember stationed at the center hook informed the pilots that both the forward and aft hooks were operational.

During this time, the sergeant was still checking the center cargo hook for faults. He was using his left hand to feel around the area of the caution light microswitch. At no time, however, did he or any other crewmember tell the pilots what he was doing.

One of the pilots selected the ALL position, and the other pilot activated the hooks, using his hook release button. Although the sergeant heard the pilot announce "going to all" indicating that all three hooks would be checked, he was unable to move his left hand clear of the center hook before it opened. When the hook opened, it caught the sergeant's left hand between the top of the actuator piston and the mount structure above it. He immediately began screaming, and the crewmember stationed in the cabin forward of the center hook told the pilots to open the center hook.

During the process of resetting the cargo hook with the emergency open system, which causes the center hook to close and open again, the sergeant was able to remove his hand from the hook. He rolled out from under the aircraft to its right side and ran to the rear, about 20 feet behind

the aircraft. Two of the crewmembers followed him and began first aid.

The cause of this accident was human error—individual failure by the sergeant and other enlisted crewmembers to communicate to the pilots the sergeant's intention to continue to troubleshoot the center cargo hook. If the pilots had been aware the sergeant was continuing to troubleshoot the center cargo hook, they would not have continued the cargo hook system operational check.

The pilots had already informed the crew that external load operations would not be performed; however, the sergeant was a professional, dedicated NCO who felt the need to attempt an on-the-spot fix. But he and the other three enlisted crewmembers all failed to inform the pilots what the sergeant was doing.

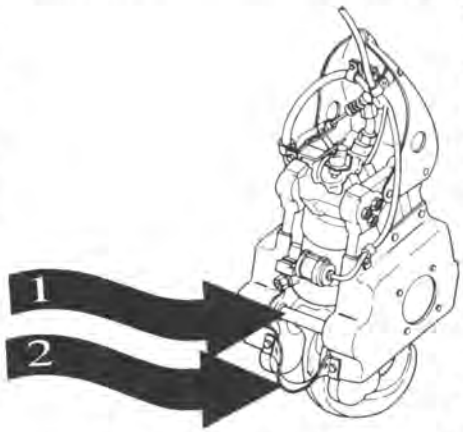

Figure 1. Grasping the synchronizing assembly shaft (arrow 1) can cause injury if the hook opens. Use the nylon web strap handle (arrow 2) when positioning or stowing the hook.

Unaware that anyone was still in the area of the center cargo hook actuating mechanism, the pilots continued the cargo hook system operational checks. Any of the crewmembers could have informed the pilots that troubleshooting was still in progress. But no one did. And the sergeant sustained a serious injury costing about $115,000.

Reminders

The solution to preventing these kinds of accidents is to follow established procedures in the appropriate maintenance and operators manuals. The following are some specific areas that should be reemphasized to flight crews:

- When maintenance is being performed on the cargo hook, ensure that proper procedures are followed in accordance with the maintenance manual and be sure crewmembers read all warnings, cautions, and notes.
- Anytime the cargo hook is being operated, extreme caution must be taken to keep hands clear of the cargo hook and especially away from any moving parts.
- Do not grasp the hook assembly by the synchronizing assembly shaft (figure 1). Serious injury can result if the hook is operated while your hand is in this area. A nylon web strap handle, designed for use when positioning or stowing the hook, is attached to the rear of the cargo hook assembly.
- Communication among the aircrewmembers is critical because the cargo hook can be operated from either pilot's station or from the cargo area and the pilots and the cargo area crew are physically separated.

All aircraft crewmembers know that working around powered systems can be dangerous. However, sometimes a perceived or real need to complete the mission leads crewmembers to disregard established procedures. When this happens and crewmembers also fail to coordinate their actions and communicate effectively, accidents like the ones described can happen.

Aircrewmembers must know the locations and be aware of the intended actions of other crewmembers. If one member of the crew fails to keep other crewmembers informed, another crewmember will have to do it. This is truly being your brother's keeper. Protecting the force requires everyone's active participation, otherwise accidents like these will continue to cause injuries and further drain already shrinking resources. ♦

—POC: SFC John Mark Morthole, Aviation Section, AV 558-3746, commercial 205-255-3746

Class A Accidents through June

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY91	FY92	FY91	FY92
1st Qtr	October	3	1	2	0
	November	4	3	5	4
	December	3	1	3	0
2d Qtr	January	7	3	1	0
	February	13	1	13	0
	March	4	4	8	2
3d Qtr	April	3	1	2	0
	May	4	1	3	1
	June	0	2	0	2
4th Qtr	July	2		0	
	August	3		0	
	September	3		2	
	Total	49	17	39	9

Update on avoiding droop stop pounding in the Black Hawk

The H-60 main rotor is equipped with droop stops and flap restrainers to prevent extremely high or low blade flapping at low rpm. As rotor speed is increased to approximately 70 to 75 percent rpm, the droop stops rotate from their static to their dynamic position. The audible knocking of droop stops during engagement or shutdown, as they are rotating between the static and dynamic position, is one form of droop stop pounding (DSP).

To avoid DSP during rotor runup or shutdown, the cyclic must be centered or displaced very slightly into the prevailing wind. The collective should be raised not more than 1 inch in accordance with the operators manual. If possible, shutdown should be avoided until adjacent helicopters are at flat pitch.

DSP can also occur with the droop stops in their dynamic position, usually with excessive aft cyclic, low collective, and with all wheels on the ground. Although DSP can occur during rearward taxi (prohibited by the operators manual) and downslope landings, the maneuver that is most likely to produce DSP is the roll-on landing.

To avoid droop stop pounding during a roll-on landing—

- Keep speed in accordance with TC 1-212 (60 knots or below) before touchdown.
- Be aware of the tip path plane—excessive aft cyclic will place the tip path unusually high in your field of view.
- Reposition the cyclic forward before lowering the collective.

Excessive forward cyclic during taxi can also lead to DSP. If a pilot habitually places his tip path too low during ground taxi, he may encounter DSP during right turns because of the Black Hawk's longitudinal-to-yaw control mixing. When ground taxiing on level ground, keep the helicopter level by referring to the horizontal situation indicator/altitude indicator.

Severe DSP will stress main rotor dynamic components beyond design limits and can lead to failure of one or more components of the main rotor system.

Each H-60 pilot should—

- Become familiar with the conditions in which DSP may be encountered and avoid these conditions.
- Ensure that the rotor system is thoroughly inspected if DSP and/or unusual vibrations are detected during the last flight. ♦

—POCs: Mr. Raymond Oliver or Mr. Michael Lupo, Utility Helicopters Project Manager's Office, Aviation Systems Command, DSN 693-3210, commercial 314-263-3210

STACOM

Entering the date of the Army Aviation Annual Written Examination (AAAWE) on DA Form 759, Part IV, Block 2

A question has arisen regarding the requirement to enter the date of the most recent written examination for the annual proficiency and readiness test in an aviator's records. In accordance with DA message dated 251300Z Jul 91, the requirement for the AAAWE was terminated on 30 September 1991. Effective immediately, when the flight records of an aviator are closed, DA Form 759, Part IV, Block 2 will be left blank.

USAAVNC point of contact is SSG Patrick R. Menzies, AV 558-2415, commercial 205-255-2415. ♦

Logging of flight time in the OH-58D Kiowa Warrior

Some confusion exists in the field regarding the logging of flight time in the OH-58D Kiowa Warrior. Effective immediately, all flight time logged in the OH-58D Kiowa Warrior will be logged as OH-58DI.

USAAVNC point of contact is MAJ Stephen F. Koach, AV 558-2415, commercial 205-255-2415.

STACOM 153 July 1992

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

Chris Sieving

Immanuel C. Sieving III
LTC, Aviation
Director, DES

Airworthiness release

In a memorandum dated 19 May 1992, Aviation Systems Command (AVSCOM) issued an airworthiness release (AWR) in accordance with (IAW) AR 70-62 for all U-21J, C-12C, C-12D, and C-12F aircraft to increase the wing spar life to 25,000 hours. This AWR is applicable for the aircraft listed in the box below, except as noted.

Aircraft operations will be IAW the Operator's Manual for Beechcraft U-21J Aircraft, 92-36978B4, 15 March 1991, including all current changes or Technical Manual 55-1510-218-10: Operator's Manual, Army Models C-12A, C-12C, C-12D, and C-12F Aircraft, 22 April 1988, except as noted below. If any conflict arises between this AWR and a referenced operators manual, this release will govern.

■ The maximum gross takeoff weight (MGTOW) will not exceed 13,500 pounds. Operations above 12,500 pounds will be IAW information in the following paragraph.

■ No more than 25 percent of all missions flown at or below 12,500 pounds MGTOW are to be low-level missions (less than 5,000 feet agl).

Model/Design/ Series	Serial Number
U-21J (C-12L)	*71-21058 through 71-21060
C-12C	*73-22250
	*73-22252 through 73-22264
	*73-22267 through 73-22269
	76-22545 through 76-22557
	76-22559 through 76-22562
	76-22564
	77-22931 through 77-22942
	77-22944 through 77-22950
	78-23126 through 78-23139
C-12D	78-23140
	81-23541
	81-23543 through 81-23546
	82-23780 through 82-23785
C-12D (C-12D+)	83-24145 through 83-24150
	84-24375 through 84-24380
C-12F	85-51261 through 85-51272
	86-60084 through 86-60089

*Note: AWR applies only after the original wing spars have been replaced following 10,000 hours of service.

The following limitations apply for an aircraft operating over 12,500 pounds:

■ Flight must be approved by the unit commander as essential to perform the mission.

■ All missions will be planned and flown at or above 10,000 feet agl and be a minimum of 60 minutes in duration, unless restricted by air traffic control, turbulence, other weather conditions, or emergencies.

■ Takeoffs and landings will only be performed on a smooth paved runway.

■ Takeoffs will not be performed with a tailwind.

■ Maximum landing weight will not exceed 12,500 pounds.

■ Landing sink rate will not exceed 500 feet per minute.

■ Center of gravity limits are as follows:

• The aft limit above 12,500 pounds is 196.4 arm inches.

• The forward limit at 13,500 pounds is 188.3 arm inches. Intermediate values to 12,500 pounds vary linearly to 185.0 arm inches.

■ The following limitations apply only to U-21J (C-12L), C-12C, and C-12D aircraft when operating above 12,500 pounds:

• The autopilot system will not be used.

• Maximum zero fuel weight will not exceed 10,400 pounds.

• Performance planning will be accomplished using the previously supplied performance charts at enclosure 1 to HQ AVSCOM memorandum dated 26 April 1990, subject: Interim Airworthiness Release for C-12C and C-12D Aircraft to Operate at 13,500 Pounds Maximum Gross Takeoff Weight. These charts will be used in conjunction with the torque conversion chart at enclosure 2 to the same memorandum.

■ The following limitations apply only to C-12D (C-12D+) and C-12F aircraft when operating above 12,500 pounds.

• Maximum zero fuel weight will not exceed 11,000 pounds.

• Performance planning will be accomplished using the previously supplied performance charts at enclosure 1 to HQ AVSCOM memorandum, revision 5, dated 27 April 1989, subject: Interim Airworthiness Release, C-12D+ and C-12F Operation at Maximum Gross Takeoff Weights Not to Exceed 13,500 Pounds and Zero Fuel Weight Not to Exceed 11,000 Pounds. These charts will be used in conjunction with the previously referred to torque conversion chart at enclosure 2 to above referenced HQ AVSCOM memorandum dated 26 April 1990.

• Cargo loading will not exceed limits outlined in enclosure 3 to above referenced HQ AVSCOM

memorandum, revision 5, dated 27 April 1989.

The aircraft will be inspected and maintained IAW all applicable maintenance manuals and associated maintenance advisory and safety-of-flight messages. Any discrepancies will be evaluated/repaired before the next flight to ensure airworthiness of the aircraft.

In accordance with the provisions of DA Pam 738-751: Functional Users Manual for the Army Maintenance Management System—Aviation (TAMMS-A), the following logbook entries will be made:

■ DA Form 2408-13, Block 10c: Maintain a running total of all takeoffs over 12,500 pounds.

■ DA Form 2408-14, Block 17: Enter the following, "Operate the aircraft IAW the enclosed AWR dated 19 May 1992."

■ DA Form 2408-16: Enter new 25,000-hour wing spar life.

■ In addition to the above entries, the following entry will be made for any U-21J (C-12L), C-12C, or C-12D aircraft performing a mission over 12,500 pounds MGTOW.

• DA Form 2408-13, Block 16: Enter a circled red X, and adjust Block 7 as appropriate.

• The circled red X will be cleared whenever a mission is performed at or below 12,500 pounds MGTOW.

A copy of the AWR should be inserted in the aircraft logbook and another copy inserted in the aircraft historical record file.

This AWR will remain in effect until it is superseded by direction from AVSCOM. This AWR will be transferable to any future user. ♦

—POC: Mr. Ken Hutchingson, Aviation Systems Command, DSN 693-1069, commercial 314-263-1069

Accident briefs

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - Aircraft was operating at about 6,000 feet density altitude during high-altitude training when rotor blade struck tree branch. Crew flew aircraft short distance to suitable landing area and completed landing without further incident.

UH-1 Class D

H series - As aircraft moved forward, pilot in left seat maneuvered left to avoid small trees on right. When aircraft cleared trees on right, PC told pilot to come right. As aircraft began moving right, main rotor blades struck small tree at left front of aircraft. Inspection revealed both main rotor blades have several depressions on lower side.

H series - During approach to confined area with six combat-equipped troops, aircraft experienced excessive sink rate. PC failed to anticipate power required to arrest sink rate under existing conditions. PC corrected by applying collective pitch. As he pulled up on collective, he heard unusual engine noise. Checking torquemeter, he saw that torque had peaked at 60 pounds. PC should have reduced airspeed sooner to allow earlier power application. And pilot had failed to monitor developing situation and potential for settling with power. Because of overtorque, main drive shaft and 90-degree gearbox require replacement.

UH-1 Class E

H series - During hover taxi checks, all instruments functioned normally. However, during climbout on instrument training flight, instrument examiner noted left-side airspeed "wobbling" between 0 and 10 knots. Pilot noted right-side airspeed indicator "pegged" at 0 knots. Crew returned and completed uneventful landing. Inspection revealed insects obstructing pitot tube.

UH-60 Class C

L series - Crew had just completed 2.2-hour training flight and was returning to parking at civilian airfield. Pilot was ground taxiing aircraft from left seat, following taxi lane that proceeded across parking ramp and then paralleled hangar about 45 feet right of taxi lane. Just short of hangar, pilot performed teardrop-shaped ground taxi turn, as he had done several times before at this location, to park aircraft facing opposite direction. While ground taxiing at about 1 knot, pilot turned aircraft 45 degrees right and then started to make left turn. PC in right seat asked, "You got the building to the right?" Pilot responded that he had it and continued left turn. Crew then heard noise and saw particles falling. Pilot stopped aircraft for crew to assess situation. Crew taxied through turn and then parked and shut down aircraft. Inspection revealed damage to all four main rotor tip caps and a 4- by 4-inch tear in metal outer hangar wall.

Attack

AH-1 Class E

F series - While returning to FARP in gun trail formation, antitorque/tail rotor pedals became stiff and sluggish. Pilot notified flight lead of problem and departed formation. PC in front seat told pilot in back seat to disengage SCAS yaw channel, but problem persisted. Crew flew aircraft to small airfield and made running landing without any damage to aircraft. Inspection revealed that tail rotor hydraulic servo was binding.

AH-64 Class C

A series - While taxiing, copilot actioned 30mm gun. Gun barrel dropped and hit taxiway, causing turret and structural damage. Oil low utility →

hydraulic caution light came on. Once gun was stowed, crew parked and shut down aircraft. Investigation continues.

AH-64 Class E

A series - During runup after APU shutdown, crew heard bang from transmission deck area, followed by master caution and shaft-driven compressor (SDC) segment lights. Crew immediately shut down aircraft. Inspection revealed SDC had failed and drive shaft had sheared.

A series - After placing power lever to idle during No. 2 engine start procedure, fuel psi caution light came on for about 2 seconds, went out, flashed again, and then came on. No. 2 engine failed at about 38 percent Ng, and tgt reached 496°C. While motoring starter, crew noticed environmental control unit pressurized air system cutting on and off. Crew shut down aircraft for inspection. When fuel sample was taken later, small amount of sand settled to bottom. Maintenance checked fuel system and inspected and replaced fuel filter.

Cargo

CH-47 Class D

D series - During postflight inspection, crew found white plastic particles around forward transmission. During flight, segment air duct around drive shaft and forward transmission had broken and was ingested into forward transmission oil cover.

CH-47 Class E

D series - While starting No. 1 engine during second flight of day, linear actuator failed to advance engine from ground to flight. Crew chief manually advanced actuator, but once in flight, actuator would not bring engine to ground.

D series - While in flight, crew smelled JP-4. During shutdown, flight engineer saw fuel coming from right aft intertank bay area. When crew turned boost pumps off, fuel leakage stopped. Inspection revealed preformed packing on fuel transfer tube had failed.

Observation

OH-58 Class A

C series - At about 30 feet agl while conducting zone reconnaissance training mission, aircraft struck ¼-inch electrical wire. Wire wrapped around skids, and aircraft traveled about 200 meters before crashing. Initial ground contact was nose first with right rolling motion. Fuselage bounced forward about 20 feet and came to rest on its right side. One fatality and one injury. 9227

OH-58 Class C

D series - Aircraft had just taken off from field site as Chalk 3 in NVG flight of three. After crossing ridge, PC lowered collective to descend and engine failed. Engine-out warning light came on, and engine-out and low rotor audio sounded. PC executed emergency procedures and performed autorotation to desert floor. Aircraft landed hard, touching down on 10-degree slope surrounded by large rocks, ditches, and wadies. Initial inspection revealed minor damage to skid crosstubes and WSPS. Followup inspection identified structural damage, and because of hard landing, some power train components require further inspection.

D series - While performing IGE hover check at 3 feet agl, pilot detected abnormal cyclic feedback in lateral directions. IP got on controls with pilot and confirmed abnormal feedback. Before pilots could take further action, aircraft began uncommanded left and then aft drift, followed by violent pitchup of nose until vertical fin and tail rotor blades hit concrete ramp. Aircraft pitched nose low, continued to drift left and aft, and did not respond to forward cyclic inputs. Pitch oscillations and drift continued until pilot reduced throttle to engine idle. Aircraft settled to ground, skids level, with 5-foot forward slide and slight left turn. Crew completed shutdown without further damage. Investigation in progress.

OH-58 Class D

A series - After refueling, crew repositioned aircraft to hover taxi lane. In downwind condition, pilot made right turn and lost directional control. Aircraft began rapid right spin. PC in right seat took controls as aircraft passed through 90 degrees of turn. PC applied full left pedal; however, aircraft continued right turn and landed hard while moving right and rearward. PC lowered collective to prevent rollover and performed emergency shutdown procedures. Inspection revealed damage to both crosstubes and one skid tube and broken left rear saddle mount bracket.

OH-58 Class E

A series - During engine start, all systems were normal. As N1 reached 56 percent, engine quit operating. Crew took fuel sample and discovered large amount of sand. Maintenance drained fuel cell and replaced fuel and N1 filters.

A series - After preflight, pilot tied blade down and went to recheck weather. Upon returning, pilot attempted to start aircraft with blade tied down. At 30 to 35 percent N1 and 693° turbine outlet temperature, pilot realized blade was not turning, aborted start, and turned throttle off. Maintenance inspection revealed no damage.

C series - During cruise flight, low rpm audio sounded and rpm warning light came on. Engine tachometer indicated engine underspeed. When crew lowered collective, rotor rpm recovered. Crew completed landing without further incident. Inspection revealed that full throttle application was limited by improperly installed copilot collective.

C series - After crossing wire set, crew turned right 180 degrees at 15 knots into sun. Crew saw wire as it slid up windscreen into upper wire cutter. WSPS cut wire, and PC landed aircraft immediately. Inspection revealed pilot's front windscreen was scratched and outside air temperature gauge and probe were broken off.

Fixed wing

OV-1 Class C

D series - During turn while taxiing into parking, nose gear partially collapsed forward, damaging nose gear strut assembly and sheet metal of adjacent frame. Inspection revealed failure of drag brace attaching points on nose gear barrel.

U-8 Class A

F series - On final approach to runway, aircraft veered to right of approach end, hit tree head-on, and spun 180 degrees during crash sequence. Postcrash fire occurred. Both crewmembers and five personnel on ground were injured. 9228

U-21 Class E

A series - At 10,500 feet agl, jumper exited aircraft and struck left inboard flap with his foot. Jumper sustained no injuries, and crew felt no abnormal aircraft control reactions.

Messages

■ Aviation safety action maintenance mandatory message concerning T700-GE-700 gas generator (GG) rotor turbine blade failures/engine cleaning, engine life-limited components tracking, and single-engine flight planning procedures on all UH-60A and EH-60A aircraft (UH-60-92-ASAM-03, 021900Z Jun 92). Summary: Aviation Systems Command safety-of-flight messages UH-60-89-01 and UH-60-89-10 identified 555 suspect GG rotors in the T700-GE-700 engine requiring removal and inspection for loss of shroud honeycomb material. New evidence now shows this problem is applicable to all T700-GE-700 GG rotors. Inspection of depot and field hardware shows that loss of shroud segment material can occur on any engine. The investigation of the Stage 1 and Stage 2 GG rotor blade failures determined high-cycle fatigue (HCF) resulting from excitation of the blades to be the cause. The excitation source is predominately the voids of the shroud segment material due to distress caused by exposure to elevated temperatures. Dirt has a profound effect on acceleration of this phenomenon because it clogs shroud cooling holes as well as other hot section cooling passages, causing the shroud segments to operate above design temperatures. Failure of the blades is usually characterized by an audible "bang" sound, followed by rapidly decreasing torque, Ng and Np, and increasing tgt. Turbine blade dampers are the solution to the HCF problem. The dampers reduce the blade stress when the blade is excited, thereby significantly reducing HCF failures. Dampers are currently being installed on all new T700-GE-700 GG rotors, as well as those rotors and engines repaired at overhaul facilities. Blade failures are not a problem in the T700-GE-701C-equipped aircraft (UH-60L) as all -701C engines are equipped with blade dampers at the factory. An accelerated retrofit program for the T700-GE-700 engine damper installation is in process. The purpose of this message is to—

- Institute new engine cleaning procedures to prevent buildup of dirt, which accelerates hot section degradation because of increased internal operating temperatures.
- Reiterate the need for tracking engine life-limited components in accordance with TB 55-2840-248-20-18: Life Limits for Stage 1 and 2 Gas Generator Turbine Rotor, dated 30 November 1990, with change 1.
- Reiterate flight-planning procedures with regard to single-engine operations.

This message also contains correction procedures. A copy of the message should be inserted in the appropriate TM as authority to implement the change until the printed change is received. Contact: Mr. Lyell Myers, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning revision to one-time inspection of the centrisep particle separator assembly inner gasket for proper sealing and inactivation of the bypass door on all AH-1E and F series aircraft modified per maintenance work order (MWO) 55-1520-236-50-12 (AH-1-92-ASAM-11, 282000Z May 92). Summary: There is no change from summary of problem paragraphs a and b in AH-1-92-ASAM-10, 060600Z May 92. The purpose of this message is to provide a project code for the requisitioning of parts needed to complete AH-1-92-ASAM-10 and to require that DA Form 2408-5: Equipment Modification Record on all AH-1E and F series aircraft be inspected to determine if the MWO 55-1520-236-50-12 has been applied. If the MWO has not been applied, the inspection is complete. If the MWO has been applied, complete the inspection procedures as outlined in AH-1-92-ASAM-10. Contact: Ms. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action operational message concerning windshield anti-ice operating instructions for all C-12 and RC-12 aircraft (C-12-92-ASAM-02, 181800Z May 92). Summary: During the past year, there have been four incidents of cracked windshields in the RC-12H aircraft when the windshield anti-ice has been activated. It has been determined that this is not a systemic design problem, but it is an operational problem. The current aircraft manuals give no real guidance on operating the windshield anti-ice. Detailed instructions are being added to the aircraft manuals. The purpose of this message is to provide the field with advance instructions on operation of the windshield anti-ice. A copy of this message should be inserted in the pilot information file and in the appropriate dash 10 operators manual and checklist as authority to implement the change until the printed change is received. Contact: Mr. Dong K. Nguyen, DSN 693-9089, commercial 314-263-9089.

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

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R. Dennis Kerr
Brigadier General, USA
Commanding General
U.S. Army Safety Center

Broken Wing awards

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

CW2 Thomas Ray Byrne and WO1 Eric Allan Smith, 56th Aviation Company, 70th Transportation Battalion (AVIM), APO AE 09028

During cruise flight at 2,500 feet agl and 100 knots, the UH-1H cyclic very abruptly moved to the front left quadrant, followed by an abrupt move to the right rear quadrant. The cyclic then began a series of similar movements forward, aft, left, and right in rapid succession in an area measuring about 6 inches in diameter. During these cyclic movements, the master caution and hydraulic segment caution lights came on. CW2 Byrne, the pilot-in-command (PC), and WO1 Smith, the pilot, felt severe vibrations and heard loud grinding noises from the transmission area. While attempting to maintain control of the aircraft, CW2 Byrne told WO1 Smith to perform the hydraulic power failure emergency procedure. WO1 Smith performed the emergency procedure, but it did not restore hydraulic power. About 4 minutes into the in-flight emergency, the aircraft assumed an excessively nose-high attitude because of the extreme rearward position of the cyclic. Realizing that he could not control the cyclic position by himself, CW2 Byrne then told WO1 Smith to assist him in applying forward pressure on the cyclic to restore cruise attitude. With both pilots on the controls, enough pressure was applied to retain stable flight. CW2 Byrne then decided to execute an emergency landing at the nearest suitable landing area. In order for WO1 Smith to make the emergency radio call to the airfield, CW2 Byrne had to use both hands and his knees to keep the aircraft stable. After the tower acknowledged the call with permission to land, WO1 Smith again had to assist CW2 Byrne on the controls in order to sustain cruise attitude.

During the shallow approach to a run-on landing, CW2 Byrne found that the collective could not be placed below the 20 psi position. With the aid of WO1 Smith, CW2 Byrne was able to lose altitude by applying forward cyclic pressure. The aircraft touched down at about 35 to 40 knots, and immediately after touchdown, the aircraft nose assumed a right yaw. In order to offset the right yaw and prevent the aircraft from rolling over on its side, both pilots had to apply left pedal pressure with both feet. The aircraft skidded for about 165 feet and came to a stop right of the center line. Inspection revealed a severed hydraulic input line, which caused the left hydraulic servo to fail. Failure of this servo resulted in the pilots having to fly the aircraft by direct linkage only.

CW2 Randall D. Zehnder, 1267th Medical Company (-Det 1) (Air Ambulance) Missouri Army National Guard, Jefferson City, MO 65109.

During UH-1H NBC training flight, pilot was in full MOPP (mission-oriented protection posture) gear and on the controls. Aircraft had just leveled out at 1,400 feet agl when the pilot felt a shudder. She announced to CW2 Zehnder, the PC, that something did not feel right. CW2 Zehnder took the controls and started a turn to return to the airport. Almost immediately, the engine failed. CW2 Zehnder entered autorotation and chose a landing area. The pilot placed the governor switch to emergency and called the airport tower to report the engine failure and their location. During the descent, CW2 Zehnder realized that his intended landing area had too much slope. He turned to an area that looked better and increased collective, just managing to clear some 20- to 30-foot-tall trees. The aircraft touched down with low rotor rpm and slid about 50 feet on a terraced 5- to 10-degree slope. Inspection revealed metal contamination in the fuel control filter. ♦

*U.S. Government Printing Office: 1992 — 631-026/60011