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REPORT OF ARMY AIRCRAFT ACCIDENTS

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Most frequently Violated AVIATION PROCEDURES

Statistics show that since 1980 human error has been a causal factor in about 80 percent of Army aviation accidents. And many human-error accidents involve noncompliance with safe operating procedures. Reviews of accident reports indicate that some of these procedures are frequently violated.

The Army Safety Center initiated a study to determine the specific procedures that are frequently violated. The objective of the study was threefold: to identify the most frequently violated procedures, to identify the precise steps or parts of the procedure that were violated, and to determine the reasons for noncompliance with the procedure. Armed with the study's indepth analysis packages showing the specific steps or parts of each violated procedure and the causes of the violations, proponent agencies could then develop recommended actions to correct the underlying causes of these violations.

Procedures

All FY 84 through FY 89 Class A through C accidents attributed to human error were reviewed to verify that human error was a cause factor in each accident. The accidents were further analyzed to identify the specific task being performed by the crewmember committing the error and to identify the category of human–performance error. For each task and associated error, the researchers—two former Army aviators formally trained and highly experienced

Table 1. Accidental losses accounted for by the most frequently violated procedures

Procedure	*Accidents*	*Fatalities*	*Injuries*	*Cost*
Rotary Wing				
15 ATM procedures	188	49	193	$138,714,212
5 Non-ATM procedures	80	44	89	72,672,840
Fixed Wing				
4 ATM procedures	14	1	6	1,938,602
7 Non-ATM procedures	9	8	5	5,769,374
Totals	**291 (72%)**	**102 (69%)**	**293 (76%)**	**219,095,028 (75%)**

in conducting Army aircraft accident investigations—identified the aircrew training manual (ATM), the specific task number, and the standard governing correct performance of the task. In those cases where an ATM did not adequately govern performance, the researchers identified a non-ATM procedure.

Findings

The study identified 15 frequently violated ATM procedures and 5 frequently violated non-ATM procedures in rotary wing aircraft accidents. Four frequently violated ATM procedures and seven frequently violated non-ATM procedures in fixed wing aircraft accidents were also identified. These most frequently violated rotary wing and fixed wing procedures accounted for 72 percent (291) of the accidents, 69 percent (102) of the fatalities, 76 percent (293) of the injuries, and 75 percent ($219,095,028) of the costs for FY 84 through FY 89 Class A through C human-error accidents (table 1).

Initially, the most frequently violated procedures were identified solely on the basis of frequency of occurrence. The most frequently violated procedures were then further internally prioritized by evaluating each procedure in terms of frequency of violation occurrence, number of fatalities, number of injuries and total accident cost. A percentage was calculated for each of these parameters, and the most frequently violated procedures were ranked using an average percentage value of all four parameters. In this way, violated procedures with a low relative frequency of occurrence within the top violated procedures but with more significant impact on combat effectiveness in terms of lost personnel, equipment, and dollars were ranked above those more frequently occurring procedures having less severe consequences. The results of the prioritized rankings are shown in tables 2 and 3. Based on this information, users would then be able to concentrate their efforts on correcting the underlying causes of the procedural violations with the biggest payoff to the Army. Overall, the five most frequently occurring errors involved improper monitoring, poor decisions, improper control actions, inadequate inspections, and inadequate communications. Together, these accounted for 79 percent of the total number of identified errors. Improper monitoring and poor decision making accounted for 50 percent of the total errors.

Frequently identified causes of these errors included inadequate attention, overconfidence, inexperience, inadequate unit training, and improper motivation. Inadequate attention was

Table 2. Prioritized ranking of violated rotary and fixed wing ATM procedures

ATM Task Number	*Task/Job/Activity*
Rotary Wing	
1035/2081	Terrain flight
1071	Crew coordination
1083	Vertical helicopter instrument recovery procedure (VHIRP)
1017	Hovering flight
1001	Plan visual flight rules (VFR) flight
1028	Visual meteorological conditions (VMC) approach
2004	Pinnacle operations
1005	Preflight inspection
1032	Slope operations
1015	Ground taxi
2016	External load operations
1053	Simulated engine failure
2084	Terrain flight approach
1031	Confined area operations
Fixed Wing	
1027	Engine failure takeoff
1020	Normal landing
1007	Taxiing
1021	Power approach/precision landing

Table 3. Prioritized ranking of violated rotary and fixed wing non-ATM procedures

Rotary Wing Reference	*Fixed Wing Reference*
AR 95-1	C-7A Operator's Manual
TC 1-204	U-21 Operator's Manual
TC 1-201	

Table 4. Scanning errors by the top 15 rotary wing ATM tasks

	Aircrew Training Manual Tasks											
Error Type	1035	1017	1031	1028	1053	1071	1015	1083	2084	1032	2016	Total
Fixated	15	7	2	3	1	2	1	2				33
Limited	14	3	7	3		1	2	1				31
Technique	8	1	2		3				2	1	1	18
Totals	**37**	**11**	**11**	**6**	**4**	**3**	**3**	**3**	**2**	**1**	**1**	**82**

Table 5. Aircrew coordination failures by top 15 rotary wing ATM tasks

	Aircrew Training Manual Tasks								
Failure Types	1071	1035/ 2081	1015	1028	2004	2016	1017	1001	Total
Direct assistance	3		1						4
Announce decision	2			1			1		4
Positive communication	4	1							5
Assign crew duties	2		1		1			1	5
Offer assistance/information	12	7				1			20
Totals	**23**	**8**	**2**	**1**	**1**	**1**	**1**	**1**	**38**

found to be the most frequent cause for monitoring errors; overconfidence for decision errors; and inexperience for improper control action errors. No systemic cause could be identified for a large percentage of these errors.

In developing indepth analysis packages for the top 15 rotary wing violated procedures, the following two problem areas accounted for 46 percent of the total number of errors:

■ Monitoring errors, primarily caused by inadequate attention, were further pinpointed as scanning errors. Table 4 shows three scanning errors—fixated, limited, and improper technique—distributed across the top 15 rotary wing ATM tasks.

- Fixated scans describe a crewmember who discontinues head and eye movement when searching his field of view.
- Limited scans describe a crewmember who searches only a portion of his field of view.
- Improper technique describes a crewmember who scans too close in, too far out, too fast, or too slow.

■ Planning, decision, and communications errors were further pinpointed as five crew coordination failures: failure to direct assistance, announce decisions, use positive communications, assign crew duties, and offer assistance (table 5).

The leading type of crew coordination failure was failure of the crewmembers not on the controls to offer assistance or information that was needed or had been previously requested by the crewmember on the controls. This and other types of crew coordination failures occurred more often in utility helicopters than in other types, while cargo helicopters had a much lower incidence. Like scanning errors, almost 74 percent of the crew coordination failures occurred during the day.

The study's findings indicate that the ATM tasks associated with flight close to the earth's surface adequately address the requirement to remain clear of obstacles and the supporting references provide sufficient guidance about scanning and obstacle-avoidance techniques. However, the methods of imparting this information during institutional training and the degree of emphasis placed on the technique and teamwork required to optimize crewmember scanning effectiveness did not appear to be standardized or completely effective.

Recommendations

Both the scanning and crew coordination problem areas have been previously identified by the Army Aviation Center. Within the past year, a new appendix to TC 1-204: Night Flight Techniques, dealing with crew coordination and scanning during NVG operations in the desert has been distributed to the field. In addition, the revised TC 1-210: Aircrew Training Program, Commander's Guide to Individual and Crew Training and TC 1-214: Aircrew Training Manual, Attack Helicopter, AH-64 have both incorporated crew coordination requirements into the training plan and individual ATM tasks. These same requirements will be incorporated into future revisions of all the ATMs.

Information from the study should be used by training developers, institutional and unit trainers, and evaluators in formulating and executing training programs to integrate crew coordination into initial entry rotary wing and other training courses.

The study also recommends that the number of unexplained causes of errors in the accident reports be reduced and attempts made to

improve the overall quality of accident reports, especially Class C reports. Within the top 15 rotary wing ATM violated procedures, the unknown or insufficient information category was mostly cited in the Class C accidents. Because most of the Class C investigations are conducted by unit personnel, this high percentage of unknown cause factors may reflect an inadequate level of training provided to unit aviation personnel who are responsible for investigating accidents or inadequate investigative experience on the part of the field unit investigators.

According to the study, inadequate attention was cited as the cause for almost 71 percent of the monitoring errors. But inadequate attention as a systemic cause category does little to explain the nature of monitoring errors. It does not provide any information as to where the aviator's attention was focused and why it was focused there. Accident investigators should explore monitoring errors in greater depth to determine why an aviator's attention was not concentrated at the proper place at the proper time.

The study also revealed a large number of decision errors in the data sample, including a variety of judgmental errors associated with assessing relative risk. These findings indicate the need for crewmembers to become more proficient in using the risk-management process. Fully understanding the risk-management process will give crewmembers a tool to help them make smart risk decisions. And the ability to make smarter risk decisions should help crewmembers decrease the probability of procedural violations, thereby resulting in fewer accidents and a savings in personnel and equipment and an increase in overall warfighting capability. ♦

—POC: Ms. Mary Ann Thompson, Research and Analysis Section, AV 558-3842, commercial 205-255-3842

Share those good ideas and safety tips

The May 1992 *Flightfax* article "Attention Aviation Safety Officers" brought the following two responses from the field. Surely there must be more good ideas and tips on how aviation safety officers and managers can increase safety awareness in units.

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-PMA (Flightfax), Fort Rucker, AL 36362-5363.

■ **Mr. Richard L. Miller, U.S. Army Reserve, 120th ARCOM ASF (123)-A, West Columbia, SC 29169.** By regulation, all aircrewmembers and aviation maintenance personnel must attend monthly safety meetings. For those who cannot attend the scheduled meeting, a makeup session must be held. I have found that the easiest solution is to use a video camera to record the original meeting. People who miss the scheduled meeting can simply check out the tape from me, pop it into a VCR, and see and hear the original safety briefing. One person or several can be accommodated in these video makeup sessions. Equipment support isn't normally a problem. Video camera equipment can be checked out from the training aids service center, and most units or facilities have a VCR and television available.

■ **CW3 Michael F. Shane, Assistant Division Safety Officer, 101st Airborne Division, Fort Campbell, KY 42223.** I would like to pass on a tip ASOs can use to energize their unit FOD program. We all know that periodic FOD walks are required on flight lines. But it seemed to me when I was a unit ASO that most FOD walks did not really produce FOD awareness. I decided that in order to get soldiers motivated to pick up FOD I had to find a way to generate some enthusiasm. The way I did it was to place an orange bolt or washer somewhere on the flight line. Then I would announce to the soldiers that whoever found the item I was looking for would get a 3-day pass. The result was astonishing; the amount of FOD that was picked up broke records. It worked so well, in fact, that I decided to put unannounced orange FOD on the flight line every week and reward the soldier who found it. The same outstanding results happened every time. Of course, I had my commander's support. I had to have his backing before I could promise those 3-day passes. I also

had to make sure I knew where I placed each piece of orange FOD so I could recover it if no one found it.

After each FOD walk, I dumped all the stuff that was picked up onto my desk. After discarding the dirt and trash, I organized what was left: piles of safety wire, washers, bolts, cotter pins, writing pens, and pin-on rank. This "FOD analysis" tipped me off to any trends that were developing on our flight line. Once I had "analyzed" the FOD, I prominently displayed it on an FOD tree, which I made from a sheet of plywood laced with safety wire, nails, and hooks for hanging the FOD on its branches.

The FOD was no longer "just trash" when it was hung on the tree. Soldiers were amazed at the amount and variety of FOD that was displayed. That FOD tree sure went a long way in promoting FOD awareness and prevention in my unit—maybe it could work for you too. ♦

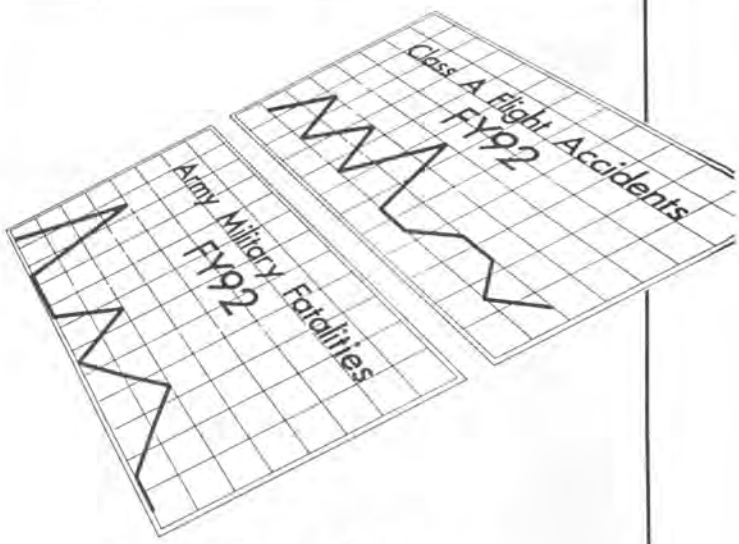
CH-47D and MH-47D extended-range fuel system tank assembly

Four extended-range fuel system (ERFS) tank assemblies, P/N 85SDCC-D-0007-115, have been returned to Corpus Christi Army Depot as unserviceable because of seepage in the vicinity of a weld in the tank skin. This seepage was found on tanks with the lower skin doubler extending only to the inboard side of the skids. Tanks with the doubler extending outboard of the skids have the preferred configuration and have not seeped fuel.

Units with leaking tanks or tanks with the doubler on the inboard side of the skids should immediately report them to the Project Manager, CH-47 Modernization Program, ATTN: SFAE-AV-CH-L (Mr. Bob Thompson), St Louis, MO 63120-1798, DSN 693-1485, commercial 314-263-1485. Reports should cite CH-47-92-ASAM-06, 101600Z Sep 92; quantity of tanks assigned; quantity of tanks with doubler only to inboard side of skids; and quantity of tanks that seep fuel. Units with tanks that seep fuel or tanks with the doubler on the inboard side of the skids will be provided with the preferred configuration tanks.

The replacement schedule and disposition instructions will be made by a logistical point of contact after all the reports have been received. Until replacements are provided, tanks with doublers extending only to the inboard side of the skids may continue in service provided there is no fuel seepage. Units should perform the fuel leak inspection required before operation IAW TM 55-1560-307-13 & P, table 2-6, item 15. ♦

—POC: Mr. Brad Meyer, Aviation and Troop Command, DSN 693-2085, commercial 314-263-2085



Class A Accidents through September

	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	2	0
	Total	**49**	**22**	**39**	**10**

FY 93 AAPC schedule

We get lots of calls asking about dates, locations, and points of contact (POCs) for the Aviation Accident Prevention Course (AAPC) presented by the Army Safety Center. The following information should help answer some of these questions.

The AAPC is designed to award the A2 additional skill identifier (ASI) to primarily CMF 67 and selected CMF 68 and 93P NCOs. AR 611-201: Military Occupational Classification and Structure and DA Pam 351-4: Formal Schools Catalog outline 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 and are secured by submitting a DA Form 4187: Personnel Actions Request. Quotas for the nonresident (NR) classes are controlled by the hosting POCs and are to be filled IAW AR 611-201 and DA Pam 351-4 with soldiers of the proper MOS and pay grade (SSG through CSM/SGM).

The FY 93 AAPC schedule has been approved (below), and the hosting installation POCs have been notified. A total of four resident and six nonresident classes are scheduled for FY 93. No additional requests for FY 93 nonresident classes are being accepted. ♦

—POC: MSG William Anderson, Training Branch, AV 558-6510/3367, commercial 205-255-6510/3367

Class	Date	Location	POC
93-1NR	3-16 Oct 92	Fort Hood, TX	Ms. Shelp, DSN 737-6413
93-1R	26 Oct-6 Nov 92	Fort Rucker, AL	MSG Anderson, AV 558-3367
93-2NR	30 Nov-11 Dec 92	Fort Campbell, KY	SFC Reese, DSN 635-5222
93-2R	4-15 Jan 93	Fort Rucker, AL	MSG Anderson, AV 558-3367
93-3NR	1-12 Feb 93	Fort Bragg, NC	Mr. Ivey, DSN 236-2309
93-3R	5-16 Apr 93	Fort Rucker, AL	MSG Anderson, AV 558-3367
93-4NR	3-14 May 93	Korea	Mr. Lopez, DSN 723-6616
93-5NR	14-25 Jun 93	HQ 2d Army	Mr. Davis, DSN 797-7382
93-4R	12-25 Jul 93	Fort Rucker, AL	MSG Anderson, AV 558-3367
93-6NR	2-13 Aug 93	Hawaii	CW4 Mohr, DSN 456-1153

Congratulations Marne Eagles!

On 15 September 1992, the soldiers of the 3d Infantry Division's Combat Aviation Brigade attained a significant milestone in aviation safety: 10 years without a Class A aviation accident.

The Combat Aviation Brigade located in Ansbach, Germany, is a descendant of the 4th (Iron Eagle) Brigade, 1st Armored Division, and the 501st Aviation Battalion (Combat), 1st Armored Division.

The size of the Combat Aviation Brigade (over 100 aircraft) and the complexity of its mission add to the importance of this accomplishment. The brigade currently comprises two AH-64 battalions, a general support battalion, and a headquarters company. A cavalry squadron and an AVIM battalion have also been part of the brigade for most of this period.

Since 1982, the aviators of this brigade have flown more than 190,000 hours in Germany in such places as Grafenwohr and Hohenfels, during many REFORGER exercises, and during Operations Desert Shield and Desert Storm in Saudi Arabia, Kuwait, and Iraq.

Ten years without a Class A aviation accident is testament to the pride, professionalism, and caring of those Marne and Iron Eagles. It also serves as a challenge for every Army aviator and aviation unit, a legacy of excellence. ♦

—POC: CW4 Stephen V. Rauch, Training Branch, AV 558-2947/3367

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 Scott A. Belknap and 1LT Barry L. Jones, 2d Battalion (Assault), 82d Aviation Brigade, 82d Airborne Division, Fort Bragg.** With 12 passengers on board, aircraft was Chalk 4 in a flight of five UH-60s conducting night air assault. While at terrain flight altitude, CW2 Belknap noticed a slight stiffening in the tail rotor controls and uncommanded left-pedal movements. CW2 Belknap passed the controls to 1LT Jones to verify the symptoms. At that time, the aircraft began an uncommanded left yaw. In coordination with 1LT Jones, CW2 Belknap executed appropriate procedures while alerting other aircraft in the flight of the emergency and simultaneously providing 1LT Jones with terrain and obstacle clearance data. While simultaneously coordinating with CW2 Belknap on emergency procedures, 1LT Jones, under NVGs, kept the aircraft from striking trees and other aircraft in the formation as the aircraft made three accelerating 360-degree uncommanded rotations. Even under NVGs and despite the centrifugal force, which was making concentration difficult and severely increasing the effort required to reach the center console to move the tail rotor servo switch to the backup position, CW2 Belknap managed to identify and reach the switch. He placed it in the backup position, which restored full control of the aircraft to 1LT Jones. During the in-flight emergency, the crew maintained altitude within 30 feet and their position in the formation. But fearing a recurrence of the emergency, the crew returned to the airfield and executed an uneventful roll-on landing.

■ **CW2 Gary L. Carrola, Company B, 1st Battalion, 14th Aviation Regiment, Aviation Training Brigade, Fort Rucker.** CW2 Carrola was IP of an OH-58A conducting IERW NVG training with AN/PVS-5 goggles. It was the first NVG flight for the nonrated student. At 200 feet AHO and 70 knots, the aircraft had just turned crosswind to downwind toward a wooded area to the southeast of the stagefield when the student pilot noticed the N2 and rotor rpm were above normal. He told CW2 Carrola, and CW2 Carrola quickly glanced under his goggles to verify this condition. He responded to the overspeed by increasing the collective, which stopped the overspeed condition. CW2 Carrola looked back to his outside reference to ensure proper aircraft attitude and search for a forced landing area. He called the tower and alerted them of the emergency and his intent to turn back toward the lanes. CW2 Carrola quickly glanced underneath the NVGs again to check the instruments and noted that the N1, N2, and rotor rpm began decreasing rapidly, accompanied by the low rotor rpm light and the low rotor audio. CW2 Carrola immediately lowered the collective to regain rotor rpm and continued with his 270-degree turn to 030 degrees back to the stagefield to try to make it away from the trees and a swampy area. Because he was still quite a distance from the stagefield, CW2 Carrola did not close the throttle. In an attempt to gain rpm, he applied some collective to clear the barriers and told the student pilot to increase the governor increase-decrease switch to full increase. Given indications of some partial power, CW2 Carrola applied power to clear the tree line and swampy area. Once he had cleared the barriers, CW2 Carrola lowered the collective to the full-down position and entered autorotation. CW2 Carrola's flight path brought the aircraft perpendicular to the lane, but his low altitude would not permit him to land parallel to the lanes. Realizing that the sod between the lanes had 5-degree slopes, CW2 Carrola executed his precision autorotation on about 20 feet of lane. CW2 Carrola completed the autorotation with an actual ground slide of about 10 feet. After touchdown, he saw that the engine-out light had come on. CW2 Carrola checked to ensure the student pilot was okay and performed emergency shutdown procedures. Maintenance inspection revealed the engine had completely failed. ♦

TC 1-210: Aircrew Training Program, Commander's Guide to Individual and Crew Training

Units will implement the provisions of TC 1-210 dated 20 May 1992 upon its receipt, except for those areas that require the use of the new Aircrew Training Manuals (ATMs)— for example, crew drills, crew readiness levels (RLs), and crew evaluations. However, it is recommended that units initiate these programs to the fullest extent possible while waiting for the new ATMs. The Directorate of Evaluation and Standardization (DES) will be available to assist units in developing training programs. On 1 October 1993, DES will begin assessing total compliance with TC 1-210.

Several units have contacted DES requesting approval for computer reproduction of reproducible forms (for example, DA Form 4889-7-R: Individual Training Record) in TC 1-210. This would have a negative impact on standardization worldwide, and units should reproduce the forms using standard methods IAW AR 25-30: The Army Integrated Printing and Publishing Program.

Units will make the following changes to TC 1-210:

■ *Page 3-10, DA Form 7120-R: Commander's Task List, paragraph 5.* Change this paragraph to read "If designated an ME, you are required to perform annually, from each flight crew station, two iterations of each MTF task listed on the Commander's Task List."

■ *Page 3-18, paragraph 3-7e, Environmental Training.* In subparagraph (1), delete "According to FM 1-202."

■ *Page 3-25, paragraph 3-9d, Flying-Hour Proration.* Delete subparagraph (1)(i). Add to the end of subparagraph (2): "However, an RL 1 crewmember designated RL 3 because of training deficiencies must still meet his RL 1 flying-hour task and iteration requirements. Hours, tasks, and iterations accomplished to bring the new crewmember back to RL 1 status can be applied toward his minimums."

■ *Pages 3-10, 3-31, 3-40, 3-41, and 3-42.* Delete all references to DA Form 5051-R: Maintenance Test Flight Personnel Training Record. This form is no longer used. The commander decides what form will be used to track crewmembers.

Distribution of DA Form 759: Individual Flight Record and Flight Certificate—Army

Effective immediately, the only categories of personnel requiring distribution of the second copy of the Individual Flight Record and Flight Certificate—Army are Army Reserve aviators, flight surgeons, or medical officers in aviation service but not on extended active duty who successfully accomplish required annual minimums or fail to accomplish required minimums. For these personnel, distribution of the second copy of the form will be made per AR 95-3: Aviation: General Provisions, Training, Standardization, and Resource Management, table 2-1, page 6. Because the second copy of the Individual Flight Record and Flight Certificate—Army will no longer be distributed for personnel other than those listed above, it is imperative that individuals retain the first copy for their personal records. In the event their flight record is lost or destroyed, the first copy will be needed for flight record reconstruction purposes.

Distribution of the third copy of the Individual Flight Record and Flight Certificate—Army is no longer required for any personnel.

U.S. Army Aviation Center point of contact is SFC Judith Sewell, AV 558-2415, commercial 205-255-2415. ♦

STACOM 154 **October 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.

Edward H. Littlejohn
COL, Aviation
Director, DES

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - PC decided to make precautionary landing on island to investigate after rpm warning light flickered twice and then came on. During approach, engine failed (engine N2 dropped to zero and N1 decreased to below 70 percent). Crew reduced throttle and placed governor switch to emergency position. Aircraft yawed left severely (not to the right as would be expected), and rotor rpm overspeed occurred. PC tried to control rotor rpm with collective, then announced he was entering autorotation and told pilot to make mayday call. Aircraft landed hard. Crew turned off main fuel and battery switch and exited aircraft.

H series - During landing to confined area, main rotor struck tree. Blades not repairable.

UH-1 Class D

H series - At 40 feet agl while departing confined area, rpm began decreasing. Pilot accelerated forward to increase airspeed, and main rotor blades hit tree. Crew had failed to recognize higher-than-normal egt during HIT. Deice bleed air switch failed, causing activation of engine deice which resulted in less than full torque available.

V series - While on approach to confined area, below etl at 20 to 40 feet agl and with about 40 pounds of torque, aircraft experienced severe right yaw. Crew heard grinding noise from rear of aircraft. Aircraft then spun 180 degrees. PC rolled throttle to idle and increased collective. Aircraft landed vertically. Suspect loss of tail rotor effectiveness due to failure of tail rotor quill assembly.

UH-1 Class E

H series - Following service mission, aircraft had been hot refueled. PC had begun rearward hover from POL to parking when crew noticed large puddle of hydraulic fluid on hot refuel pad. Aircraft was in sliding left-pedal turn. Crew chief asked PC if he still had control authority. Simultaneously, crew heard loud pop and aircraft's cyclic and pedals froze. There were no other cockpit indications. PC lowered collective, landed aircraft with no further damage, and executed emergency engine shutdown. Inspection revealed failure of hydraulic filter input line. Inspection also revealed that master caution and hydraulic segment lights did not come on because hydraulic segment light switch was inoperative.

H series - At low-level altitude, aircraft approached mouth of canyon. Crew was uncomfortable with number of wires around river and began ascent to next area. Crew observed power pole on hillside to their right but did not see wires stretching across canyon. Pilot saw wires just before contact and pulled pitch and aft cyclic. Aircraft upper wire cutters cut uppermost cable. Crew completed precautionary landing without further incident.

V series - During climb and cruise following refueling, aircraft started one-to-one vertical vibration that progressively worsened. Crew returned to airport and completed uneventful landing. Suspect individual who tied down main rotor bent trim tab.

UH-60 Class B

A series - While at high hover, aircraft experienced No. 1 engine malfunction. Aircraft lost rotor rpm and landed hard, sustaining extensive structural damage. Crew completed emergency shutdown. 9234

UH-60 Class C

A series - Crew made normal dusty-terrain landing at PZ. On rollout, area appeared to be rough but not anything out of the ordinary. Aircraft needed to be repositioned so crew hovered about 150 meters forward. On landing, another crew informed UH-60 crew that stabilator was very close to ground. On inspection, crew chief discovered tail strut had collapsed. Crew completed shutdown without further incident. Investigation continues.

L series - Pilot was performing takeoff while PC was operating radio. On climbout, pilot banked aircraft 20 degrees right and heard popping noise. Crew realized aircraft had struck tree. Pilot landed aircraft in field about 75 yards away, and crew completed shutdown. Inspection revealed damage to two tip caps and possible damage to another.

UH-60 Class D

A series - Aircraft rotor dropped to 94 percent before load could be checked for go/no-go. At 10 feet agl during descent, brownout occurred and visibility decreased. When crew chief said M119 was on ground, crew released load. Due to aircraft drift, M119 rolled over and damaged sight mechanism.

UH-60 Class E

A series - During HIT on No. 2 engine, crew turned on anti-ice switch. Tgt went from 722 to 850°C, and crew heard loud bang. No. 2 engine failed, and all aircraft power was lost. Crew started APU, confirmed No. 2 engine failure, and aborted mission. Inspection revealed first-stage turbine rotor assembly blade separated at the root, causing extensive secondary damage to power turbine module.

Attack

AH-1 Class B

F series - At some point during 2-hour training mission, aircraft struck tree. One main rotor blade sustained extensive damage, and second blade sustained minor damage. Sudden stoppage involved. 9235

AH-1 Class C

F series - As aircraft was hovering out of hot refueling to conduct training mission, pilot in back seat started left-pedal turn. Both crewmembers heard loud increase in engine noise. Aircraft started uncommanded ascent to about 10 feet agl. PC quickly glanced at instru-

ments, noticed dual tachometer was above 100 percent, and called for control of aircraft. Pilot and PC simultaneously reduced throttle and collective. Aircraft settled to ground as throttle was further reduced to engine idle. Crew shut down aircraft without further incident. Suspect high-side governor materiel failure. May require replacement of engine, main rotor system, and drive train.

F series - On approach to airfield, gun elevation stow light did not come on after crew performed before-landing checks. Pilot in rear seat recycled circuit breaker five times without restoring light. IP radioed second aircraft in flight for visual confirmation of gun position. Second aircraft visually confirmed gun was in the up and stowed position. IP completed landing and taxied to refueling point with no problems. Aircraft departed refuel for some traffic pattern work. IP was demonstrating standard traffic pattern with normal approach. Advisory light still had not come on. Crew believed gun was still in stowed position. At about 5 feet agl and zero airspeed, crew felt sharp shudder and determined that gun had depressed and hit ground. Crew completed landing with no further damage. Investigation continues.

AH-1 Class E

F series - In cruise flight, rectifier light came on. Crew reset alternator/rectifier switch but light would not go out. Crew turned alternator/rectifier switch off and completed landing with no further problems. Maintenance found string in transfer rectifier unit cooler fan. Suspect string came from aircraft battery tag.

F series - During approach to arming pad, aircraft overflew parked OH-58A. Rotorwash caused rear door on copilot side of OH-58 to be blown off, breaking top hinge pin. Suspect door was only partially secured.

F series - During closed circuit hot refueling, refueler pulled down on refuel handle to shut off flow. Refueler did not support nozzle assembly and sheared CCR breakaway plate from aircraft.

AH-64 Class A

A series - While attempting approach to mountain landing site, crew heard low rpm audio. PC took controls and tried to maneuver left, downslope from intended landing site. Aircraft struck ground about 150 feet below summit and rolled down side of mountain for another 650 feet. Pilot assisted PC from aircraft. Aircraft was consumed by postcrash fire. 9236

AH-64 Class D

A series - Aircraft was fitted with new tail rotor blade. Maintenance officer then ran up aircraft for tail rotor balancing with rotor analysis diagnostic system equipment attached. During initial runup, readings were not recorded and aircraft was shut down. Inspection revealed that accelerometer was loose. Accelerometer was tightened, and aircraft was run up again. During second runup, IPS (inches per second) readings were recorded and aircraft shut down. Inspection revealed damage to stabilator, sheared bolts to gearbox brace, and damage to T545 cover.

A series - Upon landing, pilot was notified by tower that engine cowling was open. Pilot repositioned aircraft to parking and performed normal shutdown. After shutdown, crew found both engine cowling covers were open. Both covers had bent ribs, and cowlings were warped and would not close. Crew had failed to ensure that engine cowling latches were properly secured.

A series - Crew failed to ensure No. 1 engine nacelle door was secure during preflight inspection. During flight, door came open and sustained damage.

AH-64 Class E

A series - During engine runup with No. 1 engine running, No. 2 engine failed to start. Engine start and boost pump lights came on with no indication of tgt, Np, Ng, or oil pressure. Crew shut down aircraft without further incident. Inspection revealed sheared air turbine starter shaft.

A series - Pilot saw smoke from target acquisition designation sight and pilot night vision sensor. Pilot smelled electrical smoke and completed shutdown without further incident. Inspection revealed environmental control system internal fan had failed.

Cargo

CH-47 Class D

D series - During hovering flight, PC executed left turn cleared by crew chief. Halfway through turn, crew chief advised PC that aircraft was too close to trees. PC stopped turn immediately, slid aircraft right, and landed it. Inspection revealed 1-inch crack in main rotor blade.

CH-47 Class E

D series - After APU came on line, crew started No. 1 engine. Crew chief discovered that hydraulic oil was leaking from overhead near flight control closet and around forward transmission area. Crew performed normal shutdown. Inspection revealed hydraulic leak was from lower fitting on No. 1 power transmission unit.

D series - During NVG external load hookup, crew chief in cargo hole advised pilot of excessive forward speed. Unit trainer applied aft cyclic, causing aft landing gear to strike HMMWV windshield.

Observation

OH-6 Class D

A series - During flight, main transmission chip light came on. Crew completed precautionary landing and normal shutdown. Inspection revealed big slivers of metal on magnetic chip plug. Oil samples subsequently proved transmission was faulty.

OH-6 Class E

A series - Crew smelled strong odor of burning plastic and began 90-degree clearing turn, attempting to identify source of odor. Upon returning to original heading, crew heard loud continuous noise and felt abnormal vibrations in airframe and controls. Crew landed aircraft from

3-foot hover and completed normal shutdown. Inspection revealed damage to oil cooler impeller blower and scroll.

OH-58 Class A

A series - IP attempted to take off to hover from level field site. Aircraft entered dynamic rollover and came to rest on its right side. 9237

OH-58 Class D

C series - During cruise flight, left armor side panel came open, causing loud bang and 15- to 20-degree left yaw. Pilot mistook conditions as engine failure. As examiner in left seat was trying to stow armor panel, pilot reduced collective and pulled aft cyclic. Main rotor reached 112 percent for 2 to 3 seconds before examiner could take controls and add collective to put aircraft back into normal limits. Crew completed landing and normal shutdown. Main rotor assembly was removed and sent to depot for inspection.

OH-58 Class E

A series - During taxi to takeoff pad, smoke was observed coming from engine compartment. Crew completed landing and emergency shutdown. Inspection revealed engine oil had leaked from No. 6 and 7 engine bearing T-fitting.

A series - On approach to field site, low rotor rpm light and audio came on when crew applied power to slow descent. PC completed landing without further incident. Inspection revealed fifth-stage bleed valve was faulty and fuel nozzle was partially clogged.

A series - About 30 minutes into flight during 30-degree left bank, aircraft experienced DC generator failure. Crew executed emergency procedures that restored generator and continued flight. About 15 minutes later while in 15-degree left bank, generator failed again and could not be brought back on line. Crew completed emergency procedures and landed with no further incident.

A series - During straight and level flight, low rotor audio and light came on and rotor rpm went to zero. Hydraulic pressure caution light came on, and hydraulics failed. PC completed emergency procedures and made uneventful running landing. Maintenance replaced rotor tachometer generator.

C series - During straight and level flight, master caution light flickered and then came on along with fuel filter segment light. Crew completed landing. Inspection revealed engine fuel filter was clogged. Maintenance replaced engine-driven fuel filter and fuel control filter and reset bypass valve.

C series - While in traffic pattern, both crewmembers saw flash of light behind instrument panel, followed by smell of smoke. Crew declared emergency and completed uneventful landing. Inspection revealed electrical wire leading to low-rotor-rpm caution light had shorted out.

C series - Aircraft was in level flight at 1,500 feet msl when PC noticed N2 needle fluctuating rapidly from 100 percent to 50 percent and back to 100 percent. PC scanned instruments but found no other abnormalities. Gauge did not show any other fluctuations. PC continued short flight to airfield, completed landing, and shut down aircraft without any further incident. Inspection revealed rough area on N2 tachometer generator drive spline when it was rotated.

Fixed wing

C-12 Class C

A series - During before-landing check on final visual approach to airport, crew was attempting to extend nose landing gear when they heard loud snap. Cockpit light indicated nose wheel was not in down and locked position, and crew confirmed problem with mirror check. Tower personnel also confirmed unsafe gear. For about 2 hours while burning off fuel, crew attempted to extend nose gear IAW with dash 10. Following unsuccessful attempts to lower nose gear, crew made emergency landing at airfield with main gear extended. Crew completed emergency shutdown and exited aircraft uninjured.

OV-1 Class D

D series - While conducting normal landing, pilot felt clunk in landing gear. When crew applied brakes, right brake pedal bumped up and down. Postflight inspection revealed bolt from right main landing gear wheel had lodged in brake assembly, causing damage to dual disk brake and landing gear wheel.

U-21 Class C

A series - While leveling off at 8,000 feet on IFR flight, aircraft suddenly developed severe fore and aft vibration in control wheel. Vibration was so severe throughout aircraft that instrument panel was hard to read. Crew immediately disengaged autopilot and slowed aircraft to 160 knots. Vibration continued, and crew slowed aircraft to 140 knots where vibration frequency decreased but magnitude became more severe. Crew increased airspeed back to 160 knots and declared an emergency. Crew received clearance for ILS approach to airfield about 36 nautical miles southwest. Aircraft remained in IMC until final approach to airport. During 15-minute flight to airfield, left horizontal stabilizer was vibrating about 10 to 12 inches at end while right horizontal stabilizer was vibrating 6 to 8 inches. Crew completed no-flap landing with no further problems. Postflight inspection revealed left elevator trim control rod had disconnected at trim tab. Underside of left elevator trim tab rod to forward edge of elevator was damaged, and three of the four bolts connecting left elevator to elevator horn were sheared.

Maintenance

UH-1 Class E

H series - During test flight for cyclic servo installation, pilot felt feedback in cyclic control while descending to land. At about 100 feet agl, feedback became more frequent and forceful. Pilot completed landing without further incident. Inspection revealed left cyclic servo was nearly separated from servo support mount. Four retaining nuts from mounting

studs had not been reinstalled during maintenance procedure.

Messages

■ Safety-of-flight technical message concerning ungrounding of all OH-58D aircraft (OH-58-92-06, 101500Z Sep 92). Summary: Safety-of-flight emergency message OH-58-92-05, 222000Z Jul 92, grounded all OH-58D helicopters because of a malfunction of the electronic supervisory control (ESC) while in the digital (NORM) mode. Analysis of all preliminary reports of aircraft mishaps and quality deficiency reports identified 31 ESC-related incidents. Based on this analysis, all ESCs will be updated to the latest production configuration to resolve all known malfunctions. The purpose of this message is to provide ungrounding instructions with installation of a modified ESC on all OH-58D helicopters. Contact: Mr. Lyell Myers, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning revision to UH-1-92-ASAM-11, one-time and repeat inspections of 90-degree gearbox attachment fitting on all UH-1 series aircraft (UH-1-92-ASAM-12, 272200Z Aug 92). Summary: Fifty UH-1 90-degree gearbox attachment fittings manufactured by Corpus Christi Army Depot may exhibit the same skewed leg condition as the ones manufactured under contract number DAAJ09-91-C-0638. These 50 fittings should be subjected to the same inspection and correction criteria as set forth in UH-1-92-ASAM-11. In addition to the special tool identified in UH-1-92-ASAM-11, a driver (bayonet type) is required when using the spotfacing tool. The purpose of this message is to revise UH-1-92-ASAM-11 to require inspection/correction of the additional fittings, provide the driver part number and purchasing information, clarify identification of the fittings P/N 204-030-828-9 and -103, and provide a correction to the back spotfacing tool part number. Points of contact are the same as those listed in UH-1-92-ASAM-11.

■ Aviation safety action maintenance mandatory message concerning inspection and replacement of main rotor blade expandable pin on all H-60 series aircraft (UH-60-92-ASAM-05, 182015 Aug 92). Summary: A recurring 10-hour/14-day inspection of the main rotor blade expandable pin has been required since 9 April 1990 after a cracked pin was found on a UH-60. A new expandable pin has been developed that will preclude the failure mode found during the cracked-pin investigation. Two new manufacturers have now been qualified to deliver these new-style pins to the government. These two new sources, along with the original manufacturer, have delivered over 7,000 new-style pins to both the government and Sikorsky Aircraft. After installation on aircraft at Sikorsky, three manufacturing defects and a significant weight difference with one of the new parts were detected during routine inspections. The purpose of this message is to eliminate the 10-hour/14-day inspection of pins per UH-60-90-01 by replacing pins, request information from the user so that pins can be shipped directly to each MACOM or installation for distribution at no cost to the user or government, require replacement of old-configuration pins within 90 days, require inspection of certain new-configuration pins within 90 days, and change appropriate maintenance manuals. Contact: Mr. Brad Meyer, DSN 693-2085, commercial 314-263-2085.

■ Aviation safety action operational message concerning emergency procedures for engine inlet air master caution segment light on all AH-1 aircraft (AH-1-92-ASAM-14, 132000Z Aug 92). Summary: With implementation of AH-1-92-ASAM-10, the TM 55-1520-236-10 and TM 55-1520-236-CL emergency procedures require updating for engine inlet air caution panel segment light. The purpose of this message is to update TM 55-1520-236-10 and TM 55-1520-236-CL. Contact: Mr. Lyell Myers, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of tail rotor drive shaft bearings for lubrication holes (OH-58-92-ASAM-17, 242200Z Aug 92). Summary: During acceptance inspection of an OH-58D helicopter at Fort Rucker, Alabama, a tail rotor drive shaft bearing would not accept grease. Further inspection showed the bearing did not have grease holes. If uncorrected, this condition will result in bearings binding and damage to the antitorque system. The purpose of this message is to require units to remove and replace bearings installed and in stock that do not have lubrication holes. Contact: Ms. Terese McGrew, DSN 693-9089, commercial 314-263-9089.

■ Aviation safety action maintenance mandatory message concerning correction to OH-58-92-ASAM-17, one-time inspection of tail rotor drive shaft bearings for lubrication holes on all OH-58D helicopters (OH-58-92-ASAM-18, 281800Z Aug 92). Summary: Incorrect aircraft serial numbers were listed in OH-58-92-ASAM-17, paragraph 5. The purpose of this message is to provide the correct serial numbers. Points of contact are the same as those listed in OH-58-92-ASAM-17.

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

U.S. ARMY SAFETY CENTER

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Brigadier General, USA
Commanding General
U.S. Army Safety Center

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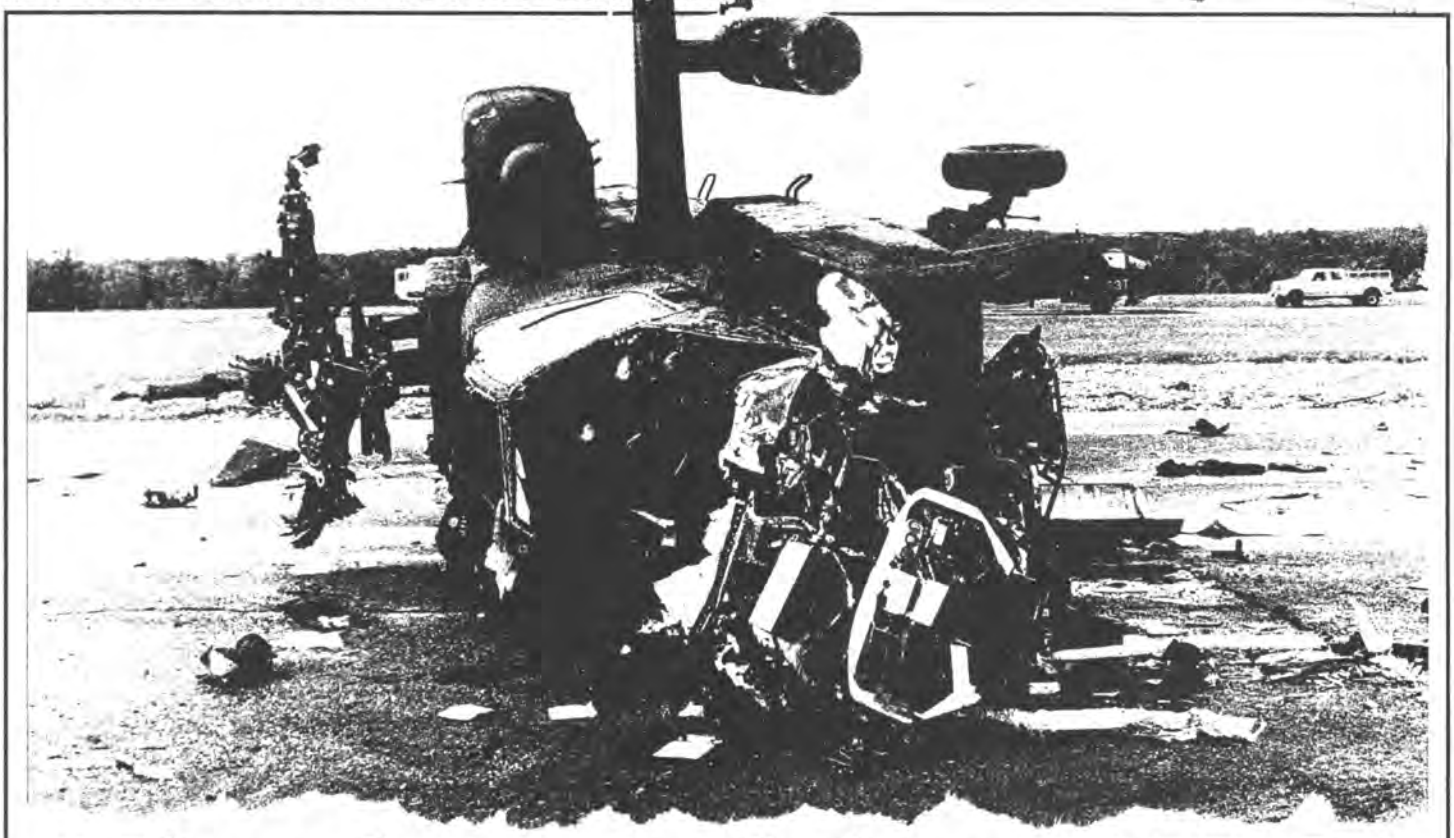


Microburst claims AH-64

During a day VFR training flight, the AH-64 was on lane No. 1 when rain intensified to the point that the rated student pilot could not maintain visual reference using his pilot night vision system. The pilot transferred the controls to the instructor pilot (IP), who elected to return to parking. Cleared by the tower to return to parking, the IP was ground taxiing the aircraft across lane No. 3 when the tail was lifted by strong winds from the northwest. The aircraft became airborne in an extreme nose-low condition and subsequently began a rapid right spin about the nose of the aircraft. As the aircraft completed approximately 180 degrees, the main rotor blades flexed down and struck the right side of the front cockpit canopy structure, instrument panel, nose of the aircraft, and the asphalt surface of the taxiway. The aircraft continued to spin to the right and came to rest on its right side.

Although the isolated rainshower had appeared virtually harmless, the onset of the microburst was so sudden and so violent (as high as 89 knots) the IP was unable to maintain control of the aircraft. An environmental phenomenon known as a "microburst" claimed his life and destroyed an almost $11 million aircraft.

Microbursts

Due to their small size, short lifespan, and the fact that they can occur over areas without surface precipitation, microbursts are not easily detectable using conventional weather radar or wind-shear alert systems. At best, present systems can only detect microbursts as they are occurring. Reliable forecast techniques have yet to be developed.

Microbursts are probably one of the most alarming meteorological phenomena known to aviation. The danger from a microburst stems from the combination of its unpredictability and its violent power. A severe microburst can be produced by any moderate convective activity, even the most innocuous-looking rainshower.

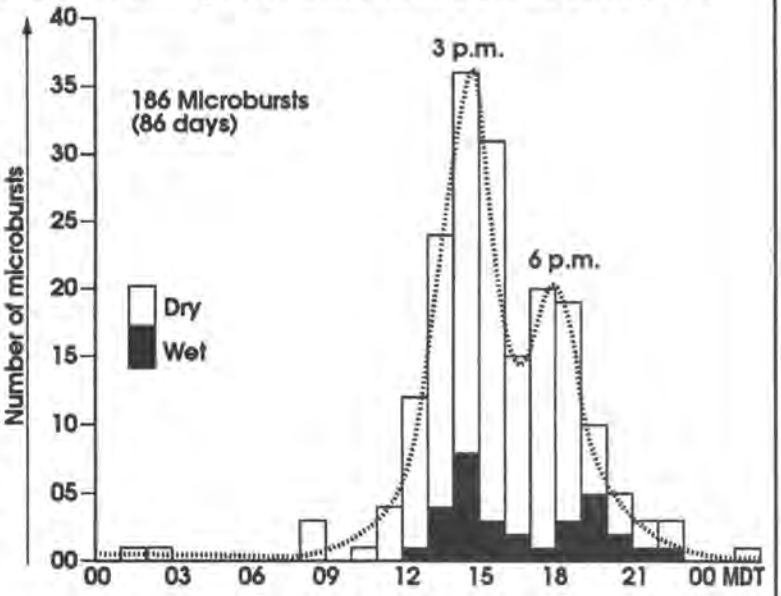


Figure 1. Diurnal variation of microbursts

Definitions

A microburst is a subtype of the meteorological phenomenon known as a downburst, which is a classification of a downdraft. A downdraft results when the upper-level winds associated with convective activity reach the ground. Every thunderstorm produces a downdraft.

A downburst is a strong downdraft that induces a strong outburst of damaging winds on or near the ground. This downburst is stronger than the main downdraft and affects a smaller area. A downburst is classified as either a microburst or macroburst, depending on the spatial and temporal scale involved. A typical downburst affects a 5-kilometer (3-nautical-mile) area.

■ **Macroburst.** A macroburst affects an area ranging from 4 kilometers (2.4 nautical miles) to 40 kilometers (24 nautical miles) with damaging winds lasting from 5 to 20 minutes. The strongest downburst ever recorded was 67 meters per second (150 miles per hour) at Andrews Air Force Base on 1 August 1983. This event occurred 6 minutes after Air Force One had landed.

■ **Microburst.** A microburst ranges in size from 0.4 kilometer (.24 nautical mile) to 4 kilometers (2.4 nautical miles), and peak winds generally last from 2 to 5 minutes. These peak winds create an average differential velocity of 12 meters per second (27 miles per hour) to 24 meters per second (54 miles per hour) but can achieve much higher speeds.

Depending on the amount of precipitation reaching the ground, downbursts are further classified as either wet or dry. There is no correlation between the intensity of the downburst and whether the downburst is wet or dry. Further, the ratio of wet to dry downbursts seems to be geographically dependent. An extensive study of downbursts near Chicago found that 64 percent were wet compared to a study of downbursts near Denver in which only 17 percent were wet.

Physical causes

The physical forces that create a downburst are not completely understood. Several theories exist that attempt to explain the energy required to produce the magnitude of wind speeds witnessed; however, none are definitive yet. One thing is certain, there is a strong correlation between solar heating and the occurrence of downbursts. As shown in figure 1, downbursts rarely occur before 1100 or after 2300 local time.

Effects on aircraft

The first indication of a typical aircraft encounter with a microburst would be an increased headwind (normally a 20- to 30-knot increase). This will cause the aircraft's nose to pitch up and

the indicated airspeed (IAS) to increase. Normal pilot response would be to decrease power and reestablish correct pitch attitude. As the aircraft enters the core of the downburst, the pilot will probably perceive a sinking sensation, along with a descent indication on the vertical speed indicator (VSI). Once the aircraft exits the core of the downburst, a strong tailwind will exist, causing a loss of IAS and increasing the descent of the aircraft. Due to the speed of these changing conditions, recovery at low altitude can be extremely difficult (see figure 2).

It is very important that the pilot recognize the microburst quickly, apply maximum power, and achieve the best rate-of-climb attitude in order to safely transit the microburst. Remember that an average microburst has a differential velocity of between 12 meters per second (27 miles per hour) and 24 meters per second (54 miles per hour). This means that within a 5-kilometer (3-nautical-mile) area, a pilot could encounter a headwind of 60 knots, followed quickly by a tailwind of 20 knots.

As illustrated in a recent AH-64 accident, the potential for microburst damage to aircraft at NOE altitude or during ground operations is high even if only apparently harmless-looking clouds or isolated showers are present. And because of the wind speeds involved, microbursts can easily cause damage to parked aircraft too. Dash 10 procedures should be followed at all times even when the aircraft is on the ground and cannot avoid the microburst.

At this time, there is no adequate way to forecast downbursts. The latest Doppler radars can perceive the wind shear in a microburst as it is occurring. But no technique currently exists for recognizing signatures in advance of their actual occurrence.

Microbursts are unpredictable, and they can be deadly. Staying alert and abreast of the weather situation—even if it's only harmless-looking clouds or an isolated rainshower—will enable you to respond quickly if a microburst is encountered.◆

POC: 1Lt Ryan W. Myers, USAF, Assistant Staff Weather Officer, Detachment 9, 1st Weather Group, DSN 558-3902

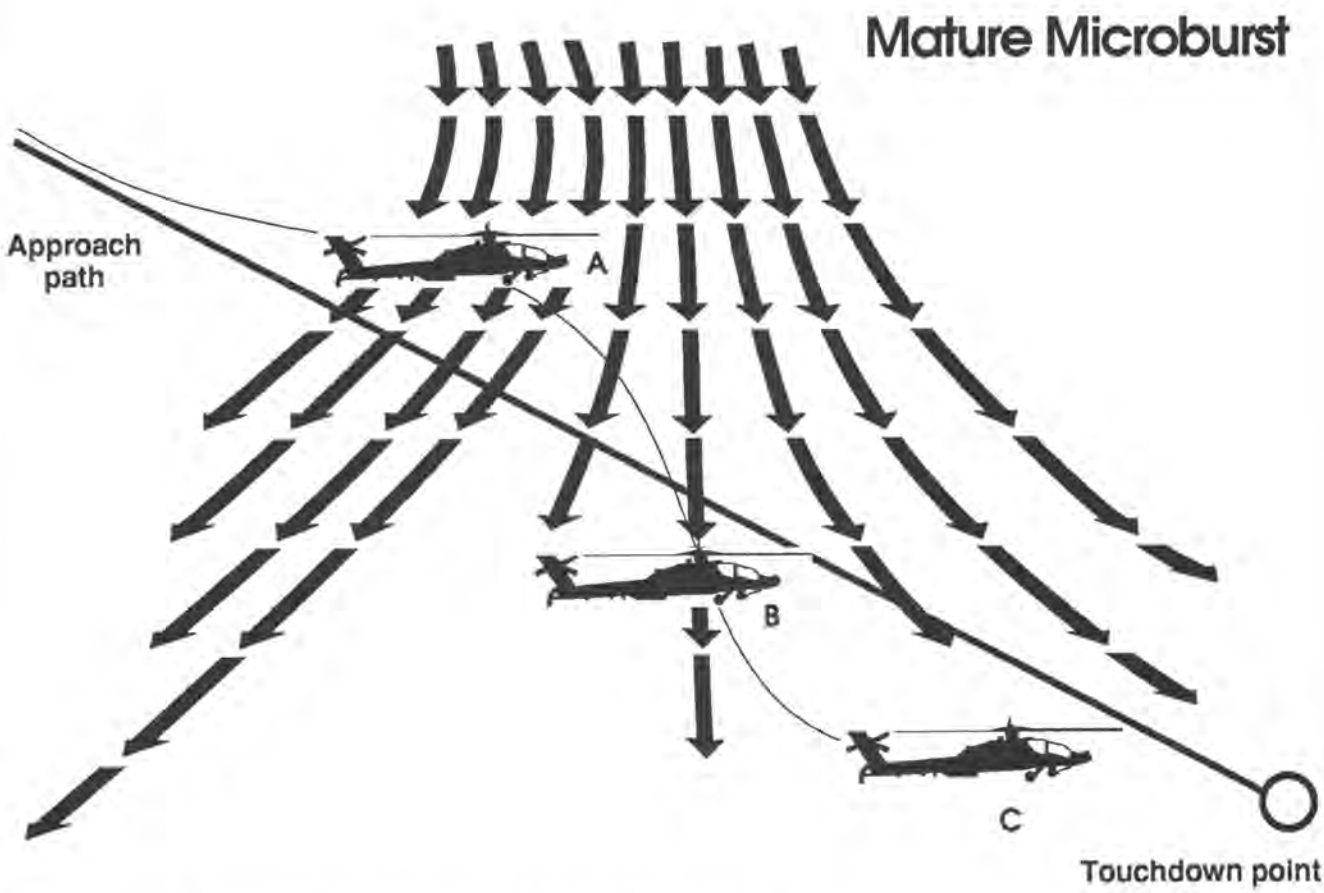


Figure 2. Microburst encounter by helicopter during final approach

(Editor's Note: Although the following article specifically addresses the H-60 ESSS/ERFS mission kits, the Apache community may find the information of interest since the AH-64 also has the long-range deployment system. If any of the AH-64 units are having problems with their long-range deployment system, we ask that you forward the information to the Safety Center through the Preliminary Report of Army Mishap (PRAM) system. Please submit a PRAM even if the problem does not meet the established criteria for submitting a PRAM.)

H-60 ESSS/ERFS mission kits

Use of the H-60 external stores support system (ESSS) and extended-range fuel system (ERFS) mission kits as daily mission equipment carries some increased flight risk for aircrews. The ESSS auxiliary management system was originally developed to satisfy an operational requirement for the H-60 to have a self-deployment capability. The system was designed for ferry missions and to be removed from the aircraft before conducting "normal" operations.

It was not until the ESSS auxiliary fuel management system development and qualification program was well underway that its potential for use in a greater variety of missions became widely recognized. Due to the increased flexibility offered by this system, employment of the ESSS/ERFS has evolved from the original operational concept to a point where apparently the ESSS/ERFS is sometimes permanently installed on helicopters for everyday use whether truly needed or not.

Limitations of ESSS/ERFS

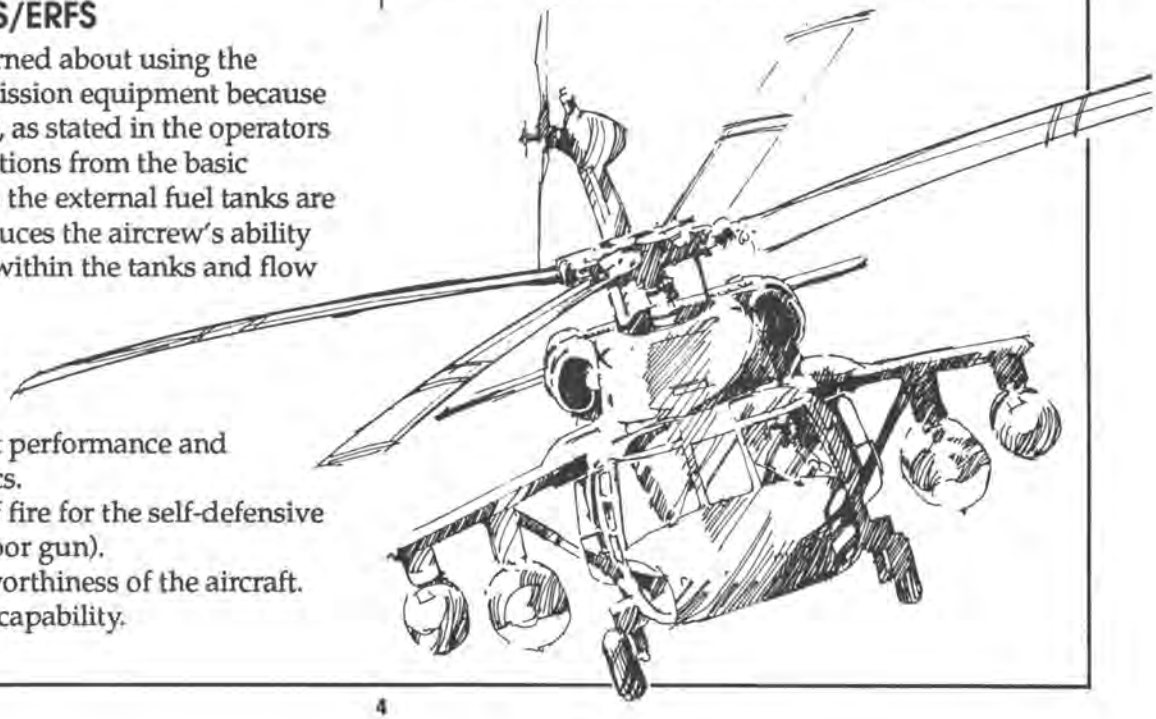
Units should be concerned about using the ESSS/ERFS as daily mission equipment because it has some limitations, as stated in the operators manual, that are reductions from the basic helicopter. In addition, the external fuel tanks are not gauged, which reduces the aircrew's ability to monitor fuel levels within the tanks and flow rates from the tanks to the internal main tanks. Other limitations include—

- Degraded aircraft performance and handling characteristics.
- Degraded field of fire for the self-defensive armament weapon (door gun).
- Degraded crashworthiness of the aircraft.
- Degraded egress capability.
- The external 230-gallon tank itself. The tank was not designed to be as ballistically tolerant or crashworthy as the helicopter's internal main fuel tank system, which increases the potential for postcrash fires.

To illustrate the increased risk that may be associated with the use of the ESSS and ERFS mission kits, a recent UH-60 accident involved the crew's inability to recognize and properly react to a lateral center of gravity (CG) shift caused by asymmetric fuel transfer from the outboard external fuel tanks. The helicopter impacted on the right outboard 230-gallon tank, which was full. The tank ruptured, resulting in an immediate flash fire that destroyed the aircraft. Recent flight testing has shown that lateral cyclic controllability may be significantly diminished in extreme out-of-balance conditions.

Other ESSS/ERFS problems

Following this UH-60 accident involving the ESSS/ERFS, the Safety Center has received several calls concerning problems with the ESSS.



For example, in extremely cold environments, the bleed air pressurized lines have apparently frozen, causing a nontransfer of fuel, which in turn can result in asymmetrical fuel loading.

When aircraft with the ESSS installed are not flown for a prolonged period, the ejector mechanisms corrode and may cause the tanks to seize and not jettison properly. In an emergency, asymmetrical jettison of the wing stores could cause a lateral CG imbalance, further complicating existing emergency conditions.

The Army is researching and validating these reports of problem areas and will follow up with additional information to the field.

Additional data needed

The Safety Center's data base has limited information concerning problems associated with the ESSS. In an effort to obtain more information, we ask users in the field to forward information about any problems they encounter or have encountered with the ESSS. This information should be forwarded using the PRAM system even if the problem does not meet the established criteria for submitting a PRAM. This request for information does not alleviate the requirement or need to prepare and submit a Quality Deficiency Report (QDR) and other deficiency reports or recommended technical manual (TM) changes to the Aviation and Troop Command (ATCOM).

Corrective actions

As a result of the recent UH-60 accident and separate deficiency reports received from field units, the Army has taken the following actions to improve the ESSS/ERFS for everyday mission use:

- Released UH-60-93-ASAM-10 dated 012000Z Apr 93 to establish and clarify cleaning procedures and requirements for the ESSS pneumatic lines, check valves, and bleed air regulator valves within the TMs.
- Released UH-60-93-ASAM-13 dated 011432Z Jun 93 to provide supplemental operational and emergency ESSS/ERFS procedures for the operators manual.
- Released UH-60-93-ASAM-14 dated 161534Z Jun 93 to require a one-time inspection of ERFS ejector racks, clarify that the 120-days clean BRU-22A/A ejector rack and firing lead cable requirement must be accomplished regardless of squib firing, and provide notification of changes required to the TMs.
- Initiated development of training films to provide enhanced maintenance and operating information for the external auxiliary fuel system.

In addition, the Army is considering the following materiel changes:

- Incorporation of an auxiliary fuel-gauge system to provide additional visual information regarding fuel quantities in external fuel tanks and asymmetric fuel transfer from the external tanks, which could lead to a shift in lateral CG.
- Incorporation of a manual override and bypass system to provide the capability to manually override an electrically failed fuel transfer valve or to manually bypass a failed bleed air regulator valve.
- Enhancements to flight simulators to incorporate scenarios for asymmetric fuel transfer and extreme lateral CG offset; for example, one full tank on the right outboard station and one empty tank on the left outboard station.

Risk assessment

Without question, there are situations in which the everyday use of the ESSS/ERFS has proved invaluable; for example, Desert Shield/Storm and Somalia, where the mission probably could not have been accomplished without it. However, commanders need to be aware that the ESSS/ERFS was not designed to be used as daily mission equipment. When considering its use, commanders should ask the following questions and build the answers into their mission risk assessment:

- Is the ERFS necessary for mission success or simply a convenience? If its use is a convenience, then consider alternative fuel sources. Elimination of the ERFS eliminates any associated flight risk.
- Will the mission profile require tight or rapid maneuvering or large roll angles? If yes or possibly yes, then be aware that aircraft performance requirements may be greater than the performance available. And if there is a significant lateral imbalance, lateral (roll) control could become a problem.
- What is the crew experience level with ERFS? If the experience level is low, consider pairing up lesser-experienced pilots with higher-experienced pilots or keeping a light mission profile. Good crew coordination concerning fuel management can reduce many of the risks associated with the ERFS.
- Have crewmembers been trained in

accordance with ATCOM message UH-60-93-ASAM-13 to recognize problems with fuel transfer? If not, then the risk is obvious. All crewmembers contemplating ESSS/ERFS operations must read and understand the contents of the ASAM. A copy should be placed in the operators manual until its contents are incorporated into a future change to the manual.

■ What is the maintenance history on the particular ERFS? Any indication that the system is not working properly raises the risk level.

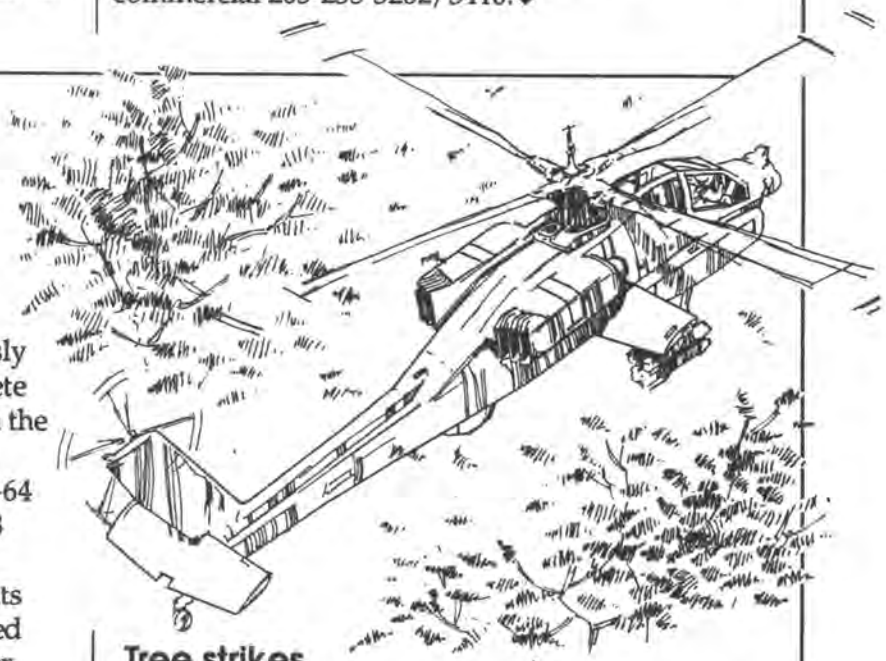
Points of contact

Anyone with questions or comments about the ESSS/ERFS should contact the following people:

■ MAJ Ken Gwynne, Army Aviation Center, DES, DSN 558-2442/6309, commercial 205-255-2442/6309.

■ MSG Robert E. Price or MAJ James Dunn, Army Safety Center, DSN 558-3262/3410, commercial 205-255-3262/3410.◆

AH-64 update



Since 1988, 6 soldiers have died and another 21 have sustained disabling injuries in 25 Class A AH-64 flight accidents. And we have destroyed and seriously damaged the equivalent of almost two complete attack battalions in Class A and B accidents. In the last 24 months alone, we have destroyed 11 Apaches. Total costs of Class A through C AH-64 flight accidents for FY 88 through 31 May 1993 exceeds $240 million.

Disturbed by this alarming jump in accidents within the AH-64 community, a team composed of representatives from the Army Safety Center, Directorate of Evaluation and Standardization, Aviation Training Brigade, Aviation Branch Safety Office, and TSM-Apache at Fort Rucker, AL, was formed to identify problem areas. The team's analysis of Class A through C accident data from FY 88 through 1 March 1993 identified the most frequently occurring accident types as tree strikes, wire strikes, object strikes, flying into the ground, and multiaircraft accidents.

With the information obtained from the analysis, along with recommended prevention measures, the team developed a briefing to assist individual crewmembers, crews, and commanders in attempting to reverse these accident trends. Although 22 percent of the accidents analyzed were the result of materiel failures, this article, which has been adapted from the AH-64 briefing, addresses only the accidents that were the result of human errors. Hopefully, the article will serve as a refresher to those who have heard the briefing and will provide useful information for those who have not yet received the briefing.

Tree strikes

Tree strikes accounted for about 36 percent of the Class A through C AH-64 accidents. By far, the most frequently occurring accident scenario involved the main or tail rotor blades striking trees. Of the 24 accidents involving tree strikes, 4 were Class As, 5 were Class Bs, and 15 were Class Cs. Total cost of these accidents was more than $46 million. Note that the number of Class Cs is relatively high compared to the number of Class Bs and As. There is a very good chance that these Class Cs could just as easily have been Class Bs or As had the aircraft struck a larger limb or the main trunk of the tree.

■ **Scenarios.** The following Class A and C accident scenarios describe typical tree-strike accidents:

• *Class A.* The accident aircraft was Chalk 3 in a night, multiship, deep-attack, battalion training mission. The back-seater was using the pilot's night vision system (PNVS), and the front-seater was using the target acquisition designation sight (TADS) during battle-position operations. While in an out-of-ground-effect

(OGE) hover, the aircraft entered a left, rearward, descending drift and struck trees with the main and tail rotor systems. The aircraft then began an uncontrolled right spin and impacted the ground on its right side in a nose-low attitude.

• *Class C.* After completing a situational training exercise, the crew arrived at the battalion forward arming and refueling point (FARP) and established an OGE hover. While waiting for the ground guides, the crew allowed the aircraft to descend into a tree. Neither the PC nor pilot detected the descent or the contact with the tree. The pilot initiated a go-around when he noticed that the radar altimeter was indicating zero altitude. On the next approach, the crew landed at the FARP and received hot refueling. After completing the refueling operations, the crew departed for their home station. During the postflight inspection, the PC found damage to the stabilator and the four tail rotor blades.

■ **Prevention measures.** Although you are probably already familiar with the following prevention techniques and procedures, a thorough review of the training and standardization ideas should be helpful. Crews should—

• Follow procedures in the aircrew training manual. Conform to established standards.

• Be very thorough and careful in maintaining—

- Takeoff obstacle clearance
- Planned terrain flight speeds and altitudes
- Approach obstacle clearance
- Hover position **and altitude**

• Be particularly cautious in areas of low contrast and definition. Be aware of motion perception deficit (undetected motion).

• Practice emergency procedures in the combat mission simulator while occupying a firing position/battle position (FP/BP).

• Be cautious when making the transition from en route to a hover mode.

• Refer to appropriate system symbology to assist in stabilizing the aircraft in the FP/BP. Don't rely on the human proprioceptive system for aircraft motion cues.

• **Not wait until you are overtasked to ask for assistance.**

Commanders and leaders should—

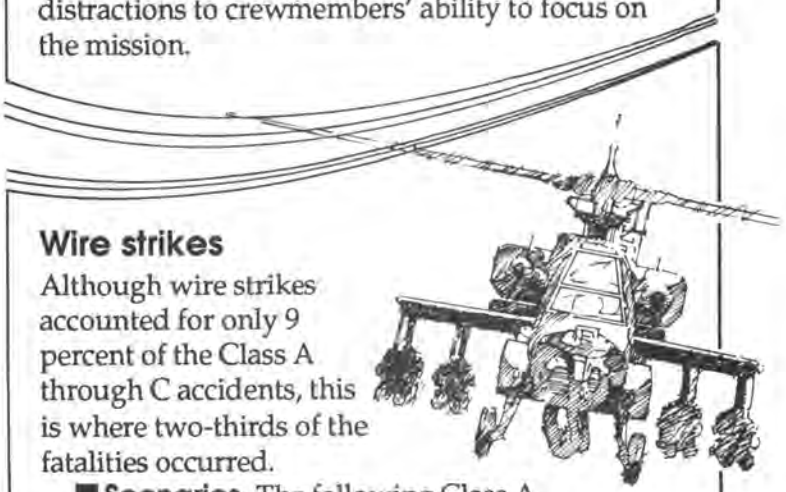
• Adhere to the crawl-walk-run approach to training. Train air mission commanders in their duties and responsibilities. Start with simpler missions and progress slowly to the more difficult. In several of the accident cases studied, individual aviators were trying to do too much to run a mission and not enough to help maintain aircraft control. Remember, first things first—control the aircraft.

• Accomplish missions in the daytime the same way you expect to do the mission at night. Each daytime iteration then becomes a rehearsal for the more complex night mission.

• Be willing to increase aviator and crew annual iteration requirements.

• Start with the higher ambient light levels when in the "crawl stage" of night operations. An AH-64 accident profile developed by the Safety Center shows more night accidents occur during darker nights. While FLIR is not illumination-dependent, additional illumination may assist crews when using their unaided vision.

• Start training again slowly as crewmembers turn over due to movements, retirements, and the effects of downsizing. You may need to temporarily return to the crawl mode and build from there. Additionally, consider any prolonged absences, family difficulties, or other distractions to crewmembers' ability to focus on the mission.



Wire strikes

Although wire strikes accounted for only 9 percent of the Class A through C accidents, this is where two-thirds of the fatalities occurred.

■ **Scenarios.** The following Class A scenarios are typical of wire-strike accidents:

• During a night vision systems mission, the lead aircraft descended into wires during an attempted under-wire crossing. The aircraft crashed and was consumed in a postcrash fire. Both pilots were killed on impact.

• Following a night low-level, deep-attack training mission using night vision systems, Chalk 4 in a flight of four struck a ¾-inch multistrand cable on the return route from the battle position. The aircraft crashed in a 36-degree nose-low, 34-degree right-roll attitude onto the top of a berm. Both

crewmembers were killed.

■ **Prevention measures.** Although the following wire strike avoidance techniques and procedures aren't new, they are still as valid as they were when they were originally developed and published in Flightfax:

• Post hazard maps and keep them up-to-date.

• Do a hazards reconnaissance to identify wire hazards if you're operating in a new area.

• Mark wires when possible. While wire markers may not be visible under all flight regimes, placing markers on wires is a cost-effective way to avoid the next wire strike.

• Minimize contour flight. Contour flight keeps the aircraft in striking range of many of the "monster wires" or multistrand wires that are most dangerous. If contour flight is necessary, careful and thorough mission planning can mitigate the risk of a wire strike.

• Go slower at lower altitudes.

• Remain oriented on the map. Most wire strikes occur when the aircrew isn't where they think they are. Ask for help if you become misoriented. Everyone has been lost at some time.

• Do not assume the other aviator sees the wires. If a sister ship is getting close to wires, don't assume the crew sees the wires. Say something—even if operating under radio silence.

Flying into the ground

The next most frequently occurring kind of accident is described as flying into the ground, which usually results in the total loss of the aircraft. Fortunately, accidents of this kind make up only a small percentage of the total.

■ **Scenarios.** The following scenarios may not seem related, but the causal factors are very similar:

• While attempting a night visual flight rules (VFR) departure and climbout from an unattended airfield, the aircraft entered into instrument meteorological conditions (IMC). The maintenance test pilot (MP) on the controls in the back seat experienced spatial disorientation while in a climbing right turn. The aircraft descended while in the right turn and crashed through large pine trees approximately 0.6 miles east of the point of departure. The pilot in the front seat was killed.

• While on a day VFR tactical training flight, the pilot-in-command (PC) of Chalk 3 in a flight of three AH-64s in free cruise formation initiated a descending right turn to reposition behind Chalk 2. The aircraft descended into trees, traveling 334 feet before coming to rest on its right side. The aircraft was destroyed, and the pilot, flying in the front seat, sustained head and chest injuries.

■ **Prevention measures.**

• In these as in other incidents where an aircraft was flown into the ground, the crew had a breakdown in their scanning. Cross-checking flight instruments as well as avoiding fixation on any one point of reference can allow the crew to detect an unwanted rate of descent before it is too late to recover.

• Crew coordination is also important, especially when one crewmember becomes spatially disoriented. In the first scenario, the back-seat pilot announced that he was experiencing vertigo, but the front-seat pilot did not take control of the aircraft or give assistance in transitioning to instrument flight. The front-seat pilot had the cyclic in the stowed position, which limited his ability to assist in recovering once the aircraft entered IMC.

• Maintain situational awareness.

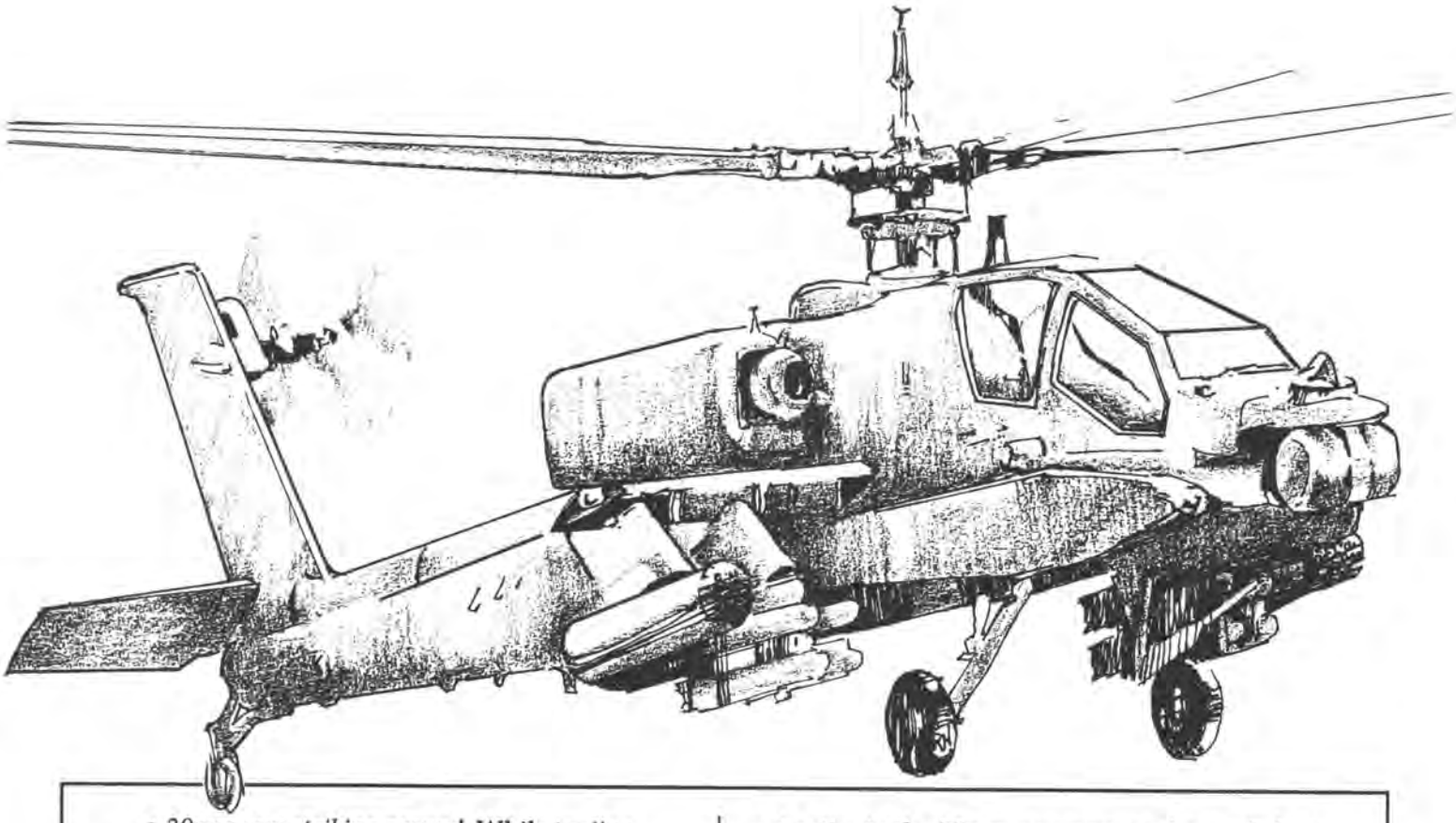
• Never stop flying the aircraft.

Object strikes

Object strikes accounted for 9 of the 69 Class A through C accidents from FY 88 to 1 March 1993. The three major categories are main rotor blade strikes to the PNVS, which caused two Class B and two Class C accidents; the 30mm gun flexing downward and digging into the ground, which caused three Class C accidents; and FOD, which caused one Class A and one Class C accident.

■ **Scenarios.** Although we haven't had a huge number of accidents involving PNVS strikes, crews sticking the 30mm gun into the ground, and FOD, the following are typical examples:

• *PNVS strike.* The crew was preparing for a running takeoff when the rated student pilot (RSP) noted a flickering master caution light accompanied by a flickering accessory oil PSI segment light. The IP took the controls, returned to the parking area, and instructed the RSP to start the APU. When the APU was engaged, smoke billowed from the aircraft. During the emergency egress, the RSP kicked the cyclic from the IP's hand, resulting in the main rotor striking the PNVS turret. The smoke emanated from a shaft-driven compressor that dumped oil onto the catwalk area. The damage was caused by the RSP knocking the cyclic out of the IP's hand.



• *30mm gun striking ground.* While taxiing, the CPG actioned the 30mm gun. The barrel dropped and struck the taxiway. The oil-low utility hydraulic caution light came on. Once the gun was stowed, the aircraft was parked and shut down. Inspection revealed that the squat switch was not adjusted properly, which allowed the 30mm gun to flex past the limiting feature.

• *FOD.* During a training flight, the aircraft experienced a loss of directional control due to the loss of the tail rotor assembly. The IP, flying from the back seat, autorotated into a grove of pine trees. The front-seat pilot was killed, and the IP was seriously injured. Inspection revealed that the door-locking device was not secured and subsequently departed the aircraft. It struck a tail rotor blade, causing an imbalance and complete loss of the tail rotor assembly.

■ **Prevention measures.**

• The Apache community has already taken some actions to remedy the PNVS-strike problem, such as instituting egress training as part of the aircraft qualification course at the Army Aviation Center at Fort Rucker, AL, and changing the dash 10 to require the battery power and force trim remain on in the case of emergency egress.

• For the 30mm gun problem, a squat switch gap clearance check is being added to the -238-PM. A message was sent to the field and a caution is being added in the dash 10 stating "Do not activate the 30mm weapons action switch at altitudes below 10 feet AGL (radar altimeter reading) or during ground taxi operations because a system malfunction may allow the gun to depress past the limiting feature and strike the ground."

• To correct the door-locking device FOD problem, "Remove Before Flight" streamers are now required to be attached to door-locking devices. This should be viewed as a bandage fix to the root problem of fixing the lock already on the aircraft. Until a systemic fix is emplaced, be very cautious of these local door-locking devices and make sure they are properly stowed before flight.

Multiaircraft accidents

Accidents involving multiaircraft accounted for only 3 percent of the Class A through C accidents. However, there were no Class C multiaircraft accidents, which clearly reminds us that when multiaircraft accidents do occur, the results are costly.

Normally, we think of multiaircraft accidents as midairs—a frightening thought to all aviators. But we must remember that not all multiaircraft accidents occur at altitude; some happen even after the aircraft are back on the ground. Crews sometimes forget that the mission isn't over until the aircraft stops moving and the engines are shut down.

■ **Scenarios.** The following examples illustrate a typical midair multiaircraft accident and a multiaircraft accident that occurred on the ground.

• A group of four AH-64s had been conducting simulated attacks and had returned to a holding area. The flight lead and Chalks 3 and 4 landed while Chalk 2 orbited the three aircraft in order to provide radio contact with the controller. After a short time, the three aircraft on the ground took off from the field location. Chalk 2 was at the flight's 3 o'clock position and began to maneuver into the normal No. 2 position of an echelon right formation. At an altitude of approximately 75 feet and 40 knots, Chalk 2 started to approach the lead aircraft from lead's right rear and above. Chalk 2 continued to close with Chalk 1 until the CPG of Chalk 1 saw Chalk 2 and ordered the pilot to turn left. In the attempt to avoid contacting Chalk 2, the pilot of Chalk 1 rolled the aircraft left and the main rotor system of Chalk 1 contacted the left side of Chalk 2. Chalk 2's rear fuel cell ruptured and the fuel ignited, engulfing both aircraft in flames as they fell to the ground. Both aircraft were destroyed, but surprisingly, no one was killed.

• In another accident, an aircraft was making a night vision system approach to the rear assembly area. On short final, the crew extended their approach due to a foxhole to their front, then became distracted while looking for armament grounding stakes sticking out of the ground. The aircraft became enveloped in dust and began drifting left where it impacted with another aircraft on the ground. Both aircraft sustained major damage; however, there were no injuries to any of the crewmembers.

■ **Prevention measures.** In the first scenario, the obvious lesson learned is that crews shouldn't try to make in-flight joinups during the takeoff phase. Further, any in-flight joinup requires a thorough understanding by all participating aircrews of how the maneuver is to be done. If at any time during the joinup, visual contact is lost with the formation aircraft or things just don't feel right, back out and start over.

In the second scenario, the result was the collision of two helicopters, but the cause was brownout.

• Don't begin an approach to an area conducive to brownout or whiteout until the crew has discussed go-around procedures. Be willing to go around.

• Don't rely solely on symbology during any phase of flight, particularly an approach.

• Use FLIR-compatible landing area markings whenever possible.

Class D and E accidents

In addition to reviewing the Class A through C accidents, the team also looked at D and E reports to see if any trends could be identified.

■ By far, the most frequent cause of Class D mishaps was unsecured engine cowlings.

■ Unplanned jettison of external stores was next and seemed to happen most when a crewmember punched a button without confirming that it was the correct switch.

■ And finally, our old nemesis the tree strike. There were lots of Class D tree strikes—cases where small twigs or branches were hit.

Human error

Human error remains the principal cause of aircraft accidents. The problem areas identified aren't new; they are the same ones identified in previous studies:

■ Scanning and crew coordination failures account for more than 50 percent of the problem areas encountered. Scanning and crew coordination are closely related. For example, crewmembers often fail to announce that they are leaving a sector of scanning responsibility to perform other crew duties rather than monitoring aircraft clearance. This is especially true during firing position operations.

■ Failure to detect hazards and properly estimate distance or closure rates are responsible for 24 percent of the Apache crew-error accidents. Crewmembers typically fail to detect inadvertent drifting or loss of altitude during hovering operations or fail to estimate aircraft clearance with obstacles in the area of operation.

■ Pre-mission and mission planning failures account for another 18 percent of our AH-64 crew-error accidents. These failures are closely linked with insufficient or poor risk management. Risk management cannot stop with risk assessment.

■ Maintaining or recovering orientation specifically refers to problems with brownout. And crews often try to fly their symbology to the ground without any outside references rather than executing a go-around.

■ Diagnosing or responding to emergencies refers to in-flight engine failures and executing emergency descents to the ground.

ATM tasks

Crews most often encountered the problem areas identified when performing the following ATM tasks:

- *Task 1119. Perform firing position operations.*
- *Task 1035. Perform terrain flight.*
- *Task 1037. Perform NOE deceleration.*
- *Task 1017. Perform hovering flight.*
- *Task 1031. Perform confined area operations.*
- *TC 1-210. Perform mission risk management.*

Scanning and crew coordination are critical during most tasks. They are especially important during firing position operations, terrain flight, NOE deceleration, hovering flight, and confined area operations. Inadvertent drift and loss of altitude are common problems in firing position operations, hovering flight, and confined area operations. Difficulty estimating distance or closure rates is also a common problem during terrain flight tasks.

Currency versus proficiency

An issue that has been examined and reexamined for some time is currency versus proficiency. How do you quantify proficiency? It's a tough question that we in aviation have been wrestling with for some time. We have been able to quantify currency, but currency does not always equal proficiency. An experienced aviator with a lot of time in the AH-64 *may be* able to remain proficient in all tasks by flying 1 hour every 60 days. Then again, maybe not. And as our resources continue to be reduced, the definition of "experienced aviator" may change.

Although Army guidance requires that aviators fly once every 60 days to retain aircraft currency, commanders should consider reducing the time between flights based on aviator experience and capability. For example, new aviators could be required to fly once every 45 days while more experienced aviators may be able to wait the full 60 days. IPs and PCs are good sources of information regarding an aviator's proficiency; ask for their advice. But ultimately, commanders must make the call on an aviator's proficiency. And just because the aviator is a high-time rotary-wing pilot with low AH-64 hours doesn't mean his currency should be stretched to its limits.

Risk management

Present doctrine requires risk management at all levels and during all phases of a mission. Risk management involves more than just risk assessment. The process begins with the requirement to identify the hazards associated with a particular mission. And the five major AH-64 hazards addressed in this article aren't by any means the only ones.

Risks are usually identified as high, medium, or low with the higher risks requiring a higher-level commander or supervisor to approve the mission. Each individual has a responsibility to always reduce the risks as much as possible at his or her level of authority. For example, if you are authorized to approve only low-risk missions and a crewmember brings to you an assessment indicating a low-risk mission that you know is very close to being a medium-risk mission, try to reduce the risks to a medium-low or low-low. However, if the risks cannot be further reduced, then it is also your responsibility to elevate the risk decision to the next higher approving level.

While in flight, crewmembers make many risk decisions. Don't take shortcuts. Make sure decisions are made based on accomplishing the task to standard. Try to reduce the task to the simplest level.

During mission debriefs, try to capture the "what went wrongs" of each mission. No mission is perfect. Be honest, and if necessary, be blunt to ensure the lessons learned are captured and shared with others in the unit.

The goal of every crewmember should be to learn, understand, and be able to apply the risk management process and principles to every task. Smart risk decisions coupled with performance to standard every time is the best way to avoid becoming an accident statistic. Even one fatality, injury, or damaged aircraft is unacceptable. We simply can't afford to lose a single crew or aircraft.

Points of contact

- CW5 Robert A. Brooks, Army Safety Center, DSN 558-3262, commercial 205-255-3262.
- CW4 Dave Adams, Aviation Training Brigade, DSN 558-4630, commercial 205-255-4630.
- Mr. Jerry Smith, Aviation Branch Safety Office, DSN 558-2301, commercial 205-255-2301.
- MW4 Gary Kilker, Directorate of Evaluation and Standardization, DSN 558-2532, commercial 205-255-2532.
- CPT Greg Lund, TSM-Apache, DSN 558-4072, commercial 205-255-4072. ◆

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

V series - During counterdrug operations, aircraft struck tree, damaging both main rotor blades. Crew felt no unusual vibrations but found damage during postflight inspection.

UH-60 Class B

A series - During maintenance test flight, crew noted vibrations while hovering. Pilot attempted hovering turn, realized he had no directional control, and executed hovering autorotation. Aircraft came to rest partially on pad with damage to tail boom and drive train. 9334

A series - During air taxi, crew experienced uncommanded right cyclic input. Aircraft contacted ground on right main gear. 9335

UH-60 Class C

A series - IP applied power to start forward rolling motion. As he glanced inside cockpit to determine status of tail wheel, aircraft continued to roll 15 to 20 feet and main rotor struck tail rotor of parked UH-1. IP initiated 45-degree turn and allowed aircraft to roll about 200 feet to a complete stop.

A series - During contour flight, crew placed aircraft in left bank over dirt road and rotor blades struck trees on left side of road. Aircraft began to vibrate, and PC took controls and landed aircraft in open field.

Attack

AH-1 Class C

F series - IP executed evasive maneuver by placing aircraft in right bank. Pilot observed torque reaching 122 percent, and IP immediately placed aircraft in left bank.

F series - While on final unaided approach to level terrain with no obstructions, pilot misjudged speed and distance to ground and failed to recognize excessive rate of descent. Aircraft struck ground and came to rest upright on right pylon stores.

AH-64 Class B

A series - While executing 60-degree banking turn during low-level training, pilot allowed aircraft to descend. PC (who was looking inside cockpit) noted descent, looked up, and verified descent but elected not to take controls. Realizing that pilot was not correcting descent, PC took controls but was unable to recover before aircraft struck ground. 9336

Cargo

CH-47 Class C

D series - As aircraft was taxiing into parking at civilian airfield, rotor blades struck hangar.

Observation

OH-58 Class C

A series - During daily inspection following cross-country flight, crew discovered ½-inch puncture in leading edge of red tail rotor blade. Crew inspected tail rotor driveshaft area for evidence of FOD and found driveshaft coupling bolt. Further investigation revealed that this bolt and L-4 nut had been left in driveshaft area after tail rotor driveshaft maintenance. During flight, nut worked its way out of driveshaft cover and struck tail rotor.

C series - While hovering out-of-ground-effect in masked observation position, both crewmembers heard loud thump as rotors struck tree. Pilot increased collective and applied forward cyclic to clear tree line. Aircraft accelerated to about 5 knots and began to vibrate but remained controllable. Maintaining airspeed, pilot entered shallow descending right turn and landed in large open area.

Fixed wing

C-12 Class C

C series - While at 18,000 feet AGL in light rain, aircraft was struck by lightning. Crew landed aircraft without further incident. Inspection revealed that left engine must be replaced.

For more information on selected accident briefs, call DSN 558-3262, commercial 205-255-3262.

Class A Accidents through June

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	6
	December	1	1	0	0
2d Qtr	January	3	1	0	0
	February	1	5	0	8
	March	4	1	2	5
3d Qtr	April	1	5	0	0
	May	1	2	1	1
	June	2	0	2	0
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	22	23	10	22

U.S. ARMY SAFETY CENTER

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REPORT OF ARMY AIRCRAFT ACCIDENTS

Your flight helmet
wear it properly or lose it

The head can tolerate a focused impact of about 30 Gs for the nose or 100 to 200 Gs for 1 square inch of frontal bone without fracture. However, the skull can sustain up to a 300-G impact force without fracture if the force is spread over a larger surface area.

Flight helmets are designed to distribute and attenuate crash forces to the head. However, a flight helmet can provide protection only if it remains on the crewmember's head throughout the crash sequence. If the helmet rotates excessively or comes off, the head can be exposed to initial impact and subsequent head injuries, which is the most common cause of death in helicopter accidents.

Prior accident studies show that typically one in five crewmembers lose their helmets during a severe crash. These losses were most frequently traced to chinstrap snap failures (63 percent), which resulted in the addition of a second snap on the chinstrap of the SPH-4 and finally the elimination of snaps on the SPH-4B helmet. In addition, the initial chinstrap strength of 300 pounds has been increased to 440 pounds in the new SPH-4B and HGU-56/P flight helmets.

Recent accidents

The front-seat occupant of an AH-64 suffered severe head injuries when he struck the optical relay tube. He sustained two severe blows to the front and rear of his integrated helmet and display sight subsystem (IHADSS) helmet. One of the blows caused the snaps to pull out of the chinstrap assembly, and the helmet came off the pilot's head. The U.S. Army Aeromedical Research Laboratory (USAARL) evaluated the helmet and found that there were 8 Velcro fitting pads in the front, 11 fitting pads in the rear, and 2 fitting pads at each earcup of this extra-large helmet. Obviously, an extra-large helmet is required when an aviator has a large head; but this aviator had more than 4.3 centimeters of thickness in fitting pads in his helmet. He should have been issued a smaller helmet.

To determine what it took to tear the snaps from the chinstrap, another IHADSS chinstrap was stretched to failure in a standard test device. More than 400 pounds were required to bend and tear the snaps from the chinstrap.

In another accident, an MH-60 struck water at a velocity in excess of 120 knots. All of the helmets—including flight helmets and troop helmets—came off the wearers' heads. USAARL evaluated the helmets and found that all of the chinstraps were fastened. Although it could not be conclusively determined, it is suspected that improper fit resulted in the helmets coming off.

Four of the helmets involved in the MH-60 accident were the Army's newest SPH-4B helmets. Of these four, only one had damage to the retention system—a grommet was torn from the shell as the shell tore.

The sole survivor of the mishap was wearing an SPH-4B helmet. Fortunately, this crewmember survived even though his helmet came off. Like the IHADSS wearer, this aviator, who had an average-size head, was wearing an extra-large shell with the retention system placed at the largest setting. In addition, the tiedown strap for the yoke assembly at the rear of the helmet was tucked up into the helmet rather than holding onto the nape strap as designed.

Lessons learned

Your flight helmet is your best bet in preventing a severe head injury in an aircraft accident. However, for the helmet to do its job, it must be properly fitted, properly maintained, and properly worn.

Does your flight helmet require a large number of fitting pads, is it loose on your head, or does it rotate when you pull on the edge? Many of the yoke assemblies can be adjusted in the helmet to accommodate unique head shapes. You don't need to wear a helmet that doesn't fit because it was the only one available. Go to your ALSE shop and have them check the shell size and fit.

The chinstrap and yoke assembly are very strong, but they can fail. Make sure the nylon straps are clean since oil or grease can weaken the nylon. If the retention system has snaps, be sure they aren't damaged (this includes bending of any part of the snap) or torn from the nylon webbing. Our newest helmets have stronger chinstraps with Kevlar tape to minimize stretch of the nylon and no snaps to fail.

Finally, the nape strap and chinstrap should form a ring at the base of the skull. The tighter the ring, the more likely the helmet won't rotate forward and come off the head. Wear your helmet with the nape strap pulled tight and the chinstrap snugged up against your neck. This is your best bet that your helmet will be there when you need it most! ❑

POC: Mr. Joseph R. Licina or MAJ James E. Bruckart, USAARL Biodynamics Research Division, DSN 558-6893/6897, commercial 205-255-6893/6897

Operational safety: a personal perspective

This article was written by COL William G. Stolarcek, former Director of Operations and Investigations and Deputy Commander of the Army Safety Center. COL Stolarcek is retiring after 32 years of military service. He has been a valuable asset to Army safety. Although we wish him well in his new life, his guidance within the safety community will be missed.

It's hard to believe; but retirement is right around the corner. It seems such a short time ago that I chose soldiering as my life's work. As I look back over the years, I'm reminded of the many missions undertaken and lessons learned during each assignment—from boot camp to my last assignment as Deputy Commander of the Army Safety Center.

The safety mission

Agencies throughout the Army are tasked with many diverse and important missions, but I can think of none more important than the mission of the Army Safety Center as portrayed in this illustration. Protecting the force is a heavy responsibility—a responsibility so great that no one part of the Army can do it alone. It's a responsibility that must be borne by every individual within the Army.

The cost of accidents

Even a quick glance at the numbers shown in figure 1 tells us that the costs of accidents in terms of fatalities, injuries, and destroyed equipment are staggering. But numbers cannot begin to measure the grief of the families of those killed or the pain experienced by soldiers injured in accidents.

Category	3-yr avg*	FY91	FY92
Soldiers killed	360	353	236
Soldiers injured	6,801	6,578	4,697
Training man days	93,702	90,908	64,648
Aircraft damaged	102	115	93
Aircraft destroyed	35	45	22
Tracked vehicle damaged	88	88	37
Wheeled vehicle damaged	549	608	339
Dollars (million)	$397.21	$417.97	$252.70

*FY89, 90, 91 (updated 10 April 93)

Figure 1. FY92 loss in warfighting capability

These losses all represent severe drains on our warfighting capability—losses that we cannot afford for many reasons, one of which is that we don't budget for accidents within the Army. The task of reducing these disturbing numbers cannot be taken lightly. Protecting the force requires a full commitment from **everyone.**

The "best" have accidents too

The Safety Center's centralized accident investigation teams investigate all Class A and selected Class B aviation accidents and selected ground accidents. These accident reports along with those sent in from units in the field are then analyzed to identify common causes of accidents and determine profiles of similar accidents.

Analysis often reveals some vexing themes and trends. For example, a common theme in many of the reports has to do with the type of person who had or caused the accident: the "best" in the Army. The best driver, the best soldier in the unit, the most professional sergeant in the company, the best aviator or instructor pilot, the best tank crew, and on several occasions even the best commander in the squadron, battalion, regiment, brigade, and so forth.

Analysis also reveals that many of our accidents are caused by hasty decision making (not having all the facts), poor planning, and taking unnecessary risks—causes that *are not* characteristic of the "best." Very seldom do our

investigators find any extenuating circumstances—such as financial, marital, social, drug or alcohol, or psychological problems—surrounding the person or persons who incurred the accident. Typically, a human factors profile describes the individual who incurred the accident as "highly respected by subordinates, peers, and seniors; no known marital or financial difficulties; and the model soldier or officer."

So, why do so many of the accidents involve some of the "best" in the Army? Why do so many of our officers, noncommissioned officers, and soldiers become involved in poor decision making, poor planning, and so on? Why do they take shortcuts to proven practices and procedures or skip steps in the maintenance or preflight checks? Is pressure, real or imagined, a cause factor? Or could pride, professional arrogance, or overconfidence in their abilities be the reason they choose to disregard by-the-book procedures?

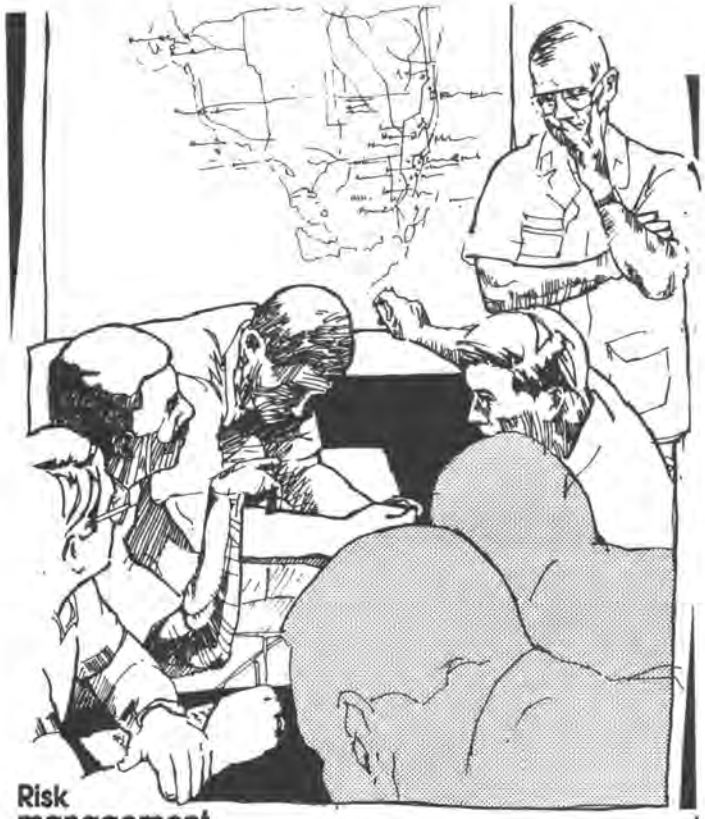
In many of the accidents, some of these basic questions can never be adequately answered. For whatever reason these "best" soldiers chose to ignore the known standard, it cost them their lives. And we're left to speculate on the "why."

The consequences

After the Gulf War ended, a highly experienced explosives expert attempted to move volatile ammunition without properly packing or handling it. A box ruptured, the ammunition fell through, and the explosives expert and two other soldiers were killed.

When the supervisor was shown photos and learned how the soldiers had packed and moved the ammunition, he was shocked, along with the rest of the EOD community in the area. The investigators heard comments of disbelief and dismay from all who knew the explosives expert. After all, he was one of their best!

Unfortunately, we will never know why this highly qualified professional did what he did. We can speculate about fatigue, heat, pressure, and a sense of urgency contributing to a highly trained expert letting his guard down, but all we know for sure is that he did it. Just once, he took unnecessary risks and it cost him his life and the lives of two other soldiers. Similar examples can be found in all branches within the Army.



Risk management

Our warfighting doctrine, albeit changing with the times, *is* compatible with operational safety and force protection. We must have leaders who are "audacious" and who are risk takers, but that doesn't mean leaders who take unnecessary risks or gambles. It means leaders who can make *smart risk decisions*. It means leaders who are aware of and sensitive to personal and unit weaknesses when operating on the edge of capability. And it means leaders who know when their units should drop back into the crawl mode if they are not proficient enough to be in the walk or run mode. It also means leaders who are willing to allow this to happen.

Risk management training is not for wimps. It isn't an excuse for not accomplishing a mission. It is a means to ensure the mission is accomplished as safely as possible. Many commanders who have experienced tragic accidents within their commands wish they had taken more time to understand and practice risk management and teach it to their soldiers.

When I briefed operational safety at the pre-command course, I told those future commanders about a Desert Storm commander who decided not to conduct a massive night air assault because the threat didn't warrant such an operation. After considering the operational precision that would be required, the desert environment, the poor visibility, and so on, this commander decided the risk was much greater than the benefits from doing the mission. That

fits squarely into the moral courage block on the Officer Evaluation Report. It takes courage to make that kind of decision, and we need more of this kind of courage.

One of the students commented that risk management works well at the level I had described, but attempting to apply the risk management process becomes more difficult at battalion, company, platoon, or squad level. But does it?

Assessing risks in a given situation and making a decision applies to individuals at all levels—even if the risk decision requires elevation to the next level of command. Consciously assessing the hazards associated with doing or not doing something—whether it be as simple as wearing a seatbelt or as difficult as conducting a night attack—is the basis for prudent decision making.

I'm not trying to teach risk management in this short article; I'm only trying to point out how you, regardless of where you are in the chain of command, can use risk management to enhance your own safety and the safety of others. If you're confused about risk management or if the subject hasn't been addressed in your unit, take the time to seek out the information, study it, and assess the philosophy and principles. You'll find it a real help in meeting your responsibility for protecting the force.

Command involvement

Although people at the Safety Center work hard to develop and design accident prevention policies, procedures, and programs, they can't make it happen by themselves. Preventing avoidable accidents is a team effort, and it takes every member of the team to make it happen. Accident prevention works when commanders at every level are personally involved. And commanders need direct contact with their safety managers—not information and recommendations that have been filtered through the staffing process.

I recall one incident when the Director of Army Safety was visiting a major command (MACOM) to discuss accident-reduction initiatives. With some embarrassment, he found himself introducing the MACOM safety manager to the MACOM commander. Although the safety manager had been on the staff for a number of years, the commander didn't know him or even recognize his name.

Getting involved starts at the top. Personal involvement in your unit's safety initiatives and risk management will yield results. Try it; your accident rate will drop! You'll be able to avoid many of the preventable accidents that are injuring and killing your soldiers and destroying your equipment. Our Army will be safer, and our warfighting capability will be preserved.

To all whom I've known and worked with in the safety community over the past several years, thank you for your support and dedication to our force protection efforts. In spite of all the changes our great Army is facing, the challenge is for you to keep the operational safety momentum going in the right direction. You can do it; you must do it—soldiers' lives depend on your ability to meet this challenge. ❑

Systems managers

Like the rest of the Army, the Safety Center's Aviation Branch has felt the effects of downsizing and restructuring, which has made some internal moves and reorganization necessary. Currently, the Aviation Branch is organized by aircraft system.

Systems managers and their phone numbers are listed below. DSN is 558-XXXX; commercial is 205-255-XXXX. The FAX number for all members of the Aviation Branch is 5318.

- **Branch Chief**—LTC William A. Tucker, 2119
- **Utility Aircraft**—MAJ Richard C. Young or MSG Robert E. Price, 3262
- **Attack and Observation Aircraft**—CW5 Robert A. Brooks or SFC Alcides Santana-Cruz, 3262
- **Cargo and Fixed Wing Aircraft**—CW4 Daniel O. Baxter or SFC John M. Morthole, 3262
- **Night Vision Devices**—CW5 Robert A. Brooks, 3262
- ***Flightfax***—Ms. Jane D. Wise, 2119

The address for members of the Aviation Branch is Commander, U.S. Army Safety Center, ATTN: CSSC-PMA (individual's name), Building 4905 5th Avenue, Fort Rucker, AL 36362-5363. ❑

(Editor's Note: The Army has two separate programs that qualify selected Army aviators as aviation safety officers: a 6-week resident course and a correspondence course with a 2-week resident phase. The program of instruction (POI) for these two courses has always been closely related but not identical. Information in the following article pertains to the 6-week resident course.)

Aviation Safety Officer Course update

Recent changes to the Aviation Safety Officer Course (ASOC) place increased emphasis on the daily duties and responsibilities of company and battalion aviation safety officers (ASOs). The shift in focus in the POI was generated by ASOC student critiques, ARMS team inspections, and input received from company-through MACOM-level field safety officers.

From these wide-ranging sources, the response was virtually unanimous: we were spending too much time teaching things new ASOs don't do and we weren't teaching those things they should be doing.

Course modifications

Emphasis on the detailed technical aspects of an aircraft accident investigation has been reduced. The course still includes nearly 40 hours of accident investigation subjects, but the focus is now on unit-level actions rather than centralized accident investigation (CAI) techniques and procedures. This was done because company and battalion safety officers generally do not investigate Class A or B accidents where CAI skills are needed.

Safety officers do, however, find themselves involved with the day-to-day activities of running a unit's accident prevention program; for example, holding safety meetings, participating in safety councils, writing an SOP, managing a safety awards program, and maintaining the safety office files. To assist safety officers in learning to perform these duties, many new classes, hands-on demonstrations, practical exercises, and briefings have been added to the course.

New classes

■ *Risk management*. Training in risk management—the Army's process to ensure force protection while supporting mission accomplishment—has been increased significantly. ASOC students are now given indepth training on the risk management process and are expected to return to their unit and serve as the commander's advisor, subject matter expert, and unit trainer on risk management.

■ *Speaking and writing*. Field ASOs also strongly emphasized the need for new safety officers to be able to speak and write effectively. In response, each student is now required to prepare and present a 25-minute safety class. Preparing and presenting a safety class gives the student an opportunity to talk about a safety topic before a "friendly audience," as well as providing fresh ideas and experiences for the whole class.

Classes added to Aviation Safety Officer Course

Class	*Hours*
Risk management	**14.0**
Total quality management	**2.0**
Introduction to duties and responsibilities	**1.0**
Commander's aviation accident prevention plan	**1.0**
Unit aviation safety program	**1.0**
Unit ground safety program	**1.0**
Safety SOP	**1.0**
Safety office administration/awards program	**1.0**
Safety meetings	**1.0**
Student safety classes	**10.0**
Aviation safety council	**1.0**
Foreign object damage	**1.0**
Aviation accident prevention survey	**1.0**
Pre-accident plan	**2.0**
Hazard communications program	**4.0**
Field duties of the aviation safety officer	**1.0**
Aviation Branch Safety Office	**4.0**
Aircrew coordination	
Crew endurance	
ARMS briefing	
Accident reporting procedures	**2.0**
Effective writing, Flightfax/Countermeasure	**3.0**
Fire prevention and protection	**2.0 (2.0)**
HEMTT tanker/FARP demonstration	**(2.0)**
Altitude physiology/altitude chamber exercise	**1.0 (2.5)**
USAARL briefing/tour	**(2.0)**
Air Force safety program briefing	**(2.0)**
Navy safety program briefing	**(2.0)**
9D5 helicopter underwater egress trainer	**(5.0)**

Note: Time in parentheses is for practical exercises or field trips.

A class that stresses the importance of effective written communications as a means of sharing safety information has also been added. And each student is required to write a draft article for either *Flightfax* or *Countermeasure*, the Safety Center's ground accident prevention publication. The writing requirement and subsequent editorial assistance from the Safety Center writing staff are designed to show the students how easily safety ideas and experiences can be shared so that others in the field can also benefit from the ideas, information, or lessons learned. (The article on FOD in this issue of *Flightfax* was written by a student in the ASOC 93-3).

■ *Other.* A list of other topics recently added to the course are shown in the sidebar. In addition, several other subject areas are being modified to orient on the ASO's role in a given subject area; for example, providing an opportunity for the students to learn techniques for monitoring their unit's hearing conservation program.

Demonstrations

One of the interesting and productive additions to the course is due to the invaluable assistance and cooperation of the 2d Battalion, 229th Aviation Regiment (Flying Tigers), their commander LTC Ken Travis, and their safety officer CW3 Will Chance. SGT Paul Madrid and members of the 3/5 Platoon, conduct an excellent demonstration of a forward area refueling point (FARP) using a heavy expanded mobility tactical truck (HEMTT) tanker.

Practical exercises

■ *Survey.* The 2-229th also hosts the ASO class on two modified safety surveys of their hangar and flight line. The initial survey is conducted during the first week before the technical portion of the course begins. The second survey is conducted during the last week of the course and is used to see how much the student has learned during the course. Any safety discrepancies noted during these surveys are provided as a courtesy to the 2-229th's safety officer. This program has been well received by the students, and the 2-229th is benefiting as well.

■ *Hazard Communications Program.* Hazard communications training has changed from a 1-hour lecture to a 4-hour exercise in which students use an actual hazard inventory log to develop a Hazard Communications Program. Students access the hazardous material information system on CD-ROM, print out the necessary material safety data sheets and warning labels, and complete the project by briefing the class on hazardous chemicals in the workplace. This exercise gives the ASOC student the hands-on training to effectively operate a Hazard Communications Program.

■ *Briefings.* The most recent major change in the ASOC is the addition of briefings on the safety programs of the Air Force and Navy and helicopter underwater egress training in the 9D5 dunker at the Pensacola NAS. Not only do the ASOC students get an onsite briefing about water egress procedures, they actually participate in dunker training. ASO Class 93-3 was the first group to go through this training. And from their responses and the responses from the ASO class instructors (see article on page 8), it was time well spent.

Note: Students attending future 6-week ASOCs will be required to participate in all scheduled training, including dunker training. Students weak on swimming skills are encouraged to seek training and practice before arriving at Fort Rucker for the course. All students must bring their individual medical records, a current upslip, a swimsuit, and a towel.

Each of the last several courses has been modified and has, in turn, been a major learning event for both the ASOC students and the instructors. To continue to provide field commanders with the best-trained aviation safety officer, the instructors and staff at the Safety Center will continue to modify the ASOC POI as we receive input from you, our customers. ❑

POC: CW4 Stephen V. Rauch, Training Division, DSN 558-6510/3367, commercial 205-255-6510/3367

Want to attend the Aviation Safety Officer Course?

The Army Safety Center conducts the Aviation Safety Officer Course. However, all assignments, including shortfalls, are made by the soldier's personnel assignment organization.

■ Active-duty soldiers should contact their assignment officer at The Army Personnel Command. Active-duty commissioned officers should call DSN 221-5974 or commercial 703-325-5974. Active-duty warrant officers should

call DSN 221-5223/5228/5284 or commercial 703-325-5223/5228/5284.

■ Army Reserve troop program unit personnel should go through their chain of command to the appropriate Army Reserve Command.

■ Individual Ready Reserve (IRR) and Individual Mobilization Augmentee (IMA) personnel are assigned to the ASO Course by the Army Reserve Personnel Center. Both IRR and IMA personnel should call DSN 892-3565 or commercial 800-325-4382.

■ National Guard officers must coordinate with the National Guard Bureau when requesting the ASO Course. National Guard officers, both commissioned and warrant, should call DSN 327-7349/7342 or commercial 703-607-7349/7342.

When an individual is selected to attend the ASO Course, the reservation is entered into the Army Training Requirements Retrieval System (ATRRS). Remember that selection of an individual for attendance in the ASO Course and updating the ATRRS is the responsibility of each individual's personnel assignment organization.

Although we at the Safety Center are here to help you and can assist you in many ways, the only way to be selected for the ASO Course is through the normal assignment process. ❑

POC: CW4 Stephen V. Rauch, Training Division, DSN 558-6510/3367, commercial 205-255-6510/3367

That sinking feeling

We were over the water, it was pitch black, and I was strapped in a troop seat. There was a moment of silence, a sinking feeling, and then the impact as we hit the water. There were no lights, little sound, and barely enough time to gulp in air before the sudden inrush of water. I held on to my seat with one hand and reached for my seatbelt with the other as we started settling. Without warning, everything went crazy and we rolled inverted, completely submerged and still sinking.

Disoriented and with what felt like a gallon of water up my nose, I held on to the seat as I felt others rush past me. I waited a moment longer and then released my seatbelt. Floating weightlessly, I groped hand-over-hand in the blackness toward the door and pulled myself through. Free, I shot to the surface, gasped for breath, and looked to see if everyone else had gotten out.

Five bobbing and splashing figures were there. We had made it —made it through the fourth and final drop in the Navy's 9D5 helicopter underwater egress training device at the Pensacola NAS. Through it all, we had been in the very competent hands of Petty Officer Davy Jones (that's what I thought he said anyway) as we participated in one of the newest additions to the Army's Aviation Safety Officer Course.

Before participating in the "dunker" training, we received detailed briefings on water survival, water egress situations, and all aspects of the training we were about to become involved in. Everyone participating in the training then went through a swimming test that involved floating/treading water and both surface and underwater swimming while in full flight gear, including helmet, vest, and boots.

Those who made it went on to the 9D5 "dunker," a giant green metal barrel suspended by wires and winches over a 20-foot-deep pool. To complete the training, we had to successfully egress four times, two of which were conducted blindfolded.

It was everything I was told to expect and more. It was mentally demanding and physically exhausting, it was disorienting, and there was no way to keep the water out of your nose once you were inverted. It was well organized, well supervised, and safe. And, yes, it was even fun!

My hat's off to the professionals at training tank No. 1 at the Pensacola NAS who teach underwater egress training. The water-survival briefings and egress training they provide could help aircrews successfully egress a sinking aircraft should they ever be forced to ditch over water. ❑

POC: CW4 Stephen V. Rauch, Training Division, DSN 558-6510/3367, commercial 205-255-6510/3367

Streamlined submission requirements and procedures for PRAMs

Draft AR 385-40: Accident Reporting and Records and DA Pam 385-40 (now DA Pam 385-95) are currently being staffed with major Army commands and staff elements. Both are scheduled for publication during the October-November 93 timeframe and contain the following streamlined accident or incident notification requirements and procedures that will become mandatory upon publication.

■ **Class A through C aviation accidents.** Immediately report the accident telephonically to the U.S. Army Safety Center (USASC) Operations (DSN 558-2660/3410, commercial 205-255-2660/3410) in accordance with the current AR 385-40. No hard copy followup notification is required; the completed accident report is considered the followup. The accident investigation board president will notify USASC Operations of any Army safety-of-flight issues discovered during the investigation.

■ **Class D accidents and Class E and FOD incidents.** Mail or fax (FAX DSN 558-5318, commercial 205-255-5318) a legible handprinted or typed preliminary report of aircraft mishap (PRAM) worksheet with the data elements specified in the current AR 385-40 to Commander, USASC, ATTN: CSSC-ITD, Fort Rucker, AL 36362-5363. Special attention must be placed on legibility when faxing the worksheets.

Units or installations providing aviation accident or incident notification either telephonically (Class A through C) or by mail or fax (Class D, E, and FOD) to the Safety Center should continue to notify their chain of command in accordance with existing procedures and policies.

The Safety Center is presently set up to accept accidents and incidents reported using the above notification procedures. In addition, the Safety Center will electronically notify the appropriate addressees with information provided in both the telephonic notification (Class A through C) and PRAM worksheets (Class D, E, and FOD). Organizations may begin using these procedures now as an alternate method to the requirements outlined in the current AR 385-40. ❑

POC: Mr. Lee McCown, Policy, Installation, & Evaluation Division, DSN 558-3759/3913, commercial 205-255-3759/3913

The two meanings of FOD

FOD is a recurring problem for aviation units Armywide. It can cause something as serious as a Class A accident or as minor as a Class E, but the good news is it's preventable. The best place to start is to define what we mean by FOD. Then we need to identify the sources of FOD and understand why it exists so that we can develop ways to prevent it.

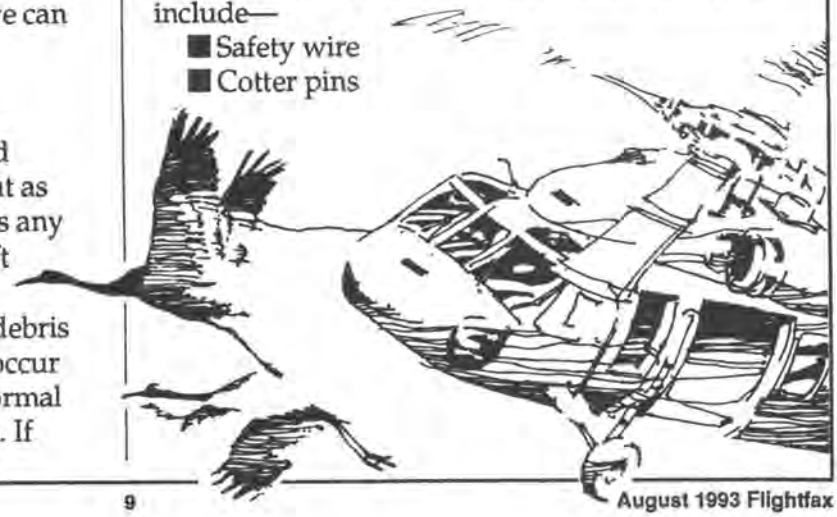
FOD defined

FOD can mean both foreign object *debris* and foreign object *damage*, but it always starts out as foreign object debris. Foreign object debris is any loose object not part of the aircraft or aircraft system that can interfere with the normal functioning of the aircraft. If foreign object debris is not removed, foreign object damage can occur when the loose debris interferes with the normal functioning of the aircraft or aircraft system. If foreign object debris is found and removed, foreign object damage won't happen and FOD accidents can be prevented.

Sources of FOD

The sources of foreign object debris are just about unlimited. A few of the more common examples include—

- Safety wire
- Cotter pins



- Nuts and bolts
- Tools
- Small pebbles, rocks, and twigs
- Pin-on insignia
- Watches and rings
- Bird and insect nests
- Shop towels

Anything that isn't part of the aircraft and can interfere with its normal operation can be considered as foreign object debris.

Since every crew chief and pilot should be able to easily recognize foreign object debris, why does it end up on aircraft where it can cause foreign object damage? The answers are just about as varied as are the sources of foreign object debris. The following are just a few reasons why foreign object debris is not policed up before it has a chance to cause foreign object damage.

- No SOP directly dictating proper procedures to use around aircraft
- Leaders not enforcing procedures and guidelines in SOPs
- Individuals willfully neglecting to follow known procedures
- Lack of proper tool accountability

Even small rocks and debris lodged in the grooves of boot soles can become foreign object debris when dislodged during maintenance or preflight checks on the aircraft. Objects dropped or blown onto the flight line can be picked up by the rotor system or sucked into engine inlets.

FOD prevention is everybody's job

Individuals and supervisors can alleviate or control foreign object debris by—

- Ensuring the unit has an SOP dictating proper procedures and that the SOP is followed and enforced.
- Ensuring that a tool inventory is completed *before* and *after* every maintenance procedure performed on the aircraft. Tool accountability is both an individual and a supervisory task.
- Ensuring individuals check the bottoms of their boots before climbing on the aircraft, especially when in the field.
- Ensuring that an FOD sweep of the flight line is conducted on a regular basis (at least three times weekly, preferably daily).

To win the war against FOD, both debris and damage, requires enthusiasm and action. But the payoffs are worth it: the life you save may be your own! Remember foreign object debris doesn't have to become foreign object damage. **You** can prevent it. ❑

—Written by CW2 Christopher Lake Gardner while attending the Aviation Safety Officer Course 93-3

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 Kent A. Knapp, Flight Standardization Division, Directorate of Evaluation and Standardization, Army Aviation Center, Fort Rucker.** During an AH-1 NVD qualification evaluation, the master caution and engine chip detector lights came on. CW4 Knapp took the controls and completed a safe landing. A maintenance crew dispatched to the area completed corrective actions and an MOC, and released the aircraft for flight. CW4 Knapp decided to discontinue the evaluation and make an unaided flight back to the heliport. At 110 knots and 250 feet AGL about 3 minutes after takeoff, the master caution and chip detector lights again came on. CW4 Knapp told the student to reset the master caution and confirm which chip light had come on. The student verified that it was another engine chip light. CW4 Knapp was attempting to make contact with the maintenance crew again when the aircraft shuddered, followed by the master caution and engine oil pressure lights. He made an immediate left turn toward a landing site to avoid wires to the right and trees to the front. During the turn, he entered autorotation and confirmed that the N2 had split, N1 was zero, and the engine had failed. After executing a 180-degree left turn, CW4 Knapp achieved a maximum deceleration attitude to minimize aircraft ground run because of uncertain field conditions. CW4 Knapp applied initial pitch at about 15 feet AGL. Aircraft touched down and slid about one helicopter length before coming to a stop. Early inspection revealed N2 gearbox had failed.

■ **CW2 Evan Edward McManus, A Company, 5th Battalion (Attack), 501st Aviation Regiment, APO Area Pacific 96297-0626.** At about 450 feet AGL while crossing a series of ridges that were perpendicular to the OH-58A's flightpath, both

pilots heard the low RPM audio sound. CW2 McManus, who was on the controls, lowered the collective to conserve rotor RPM while he checked the instruments to see if he had an actual engine failure. He noted that the N2 and rotor RPM needles were dropping through 90 percent and the N1 was spooling down rapidly. While the pilot made a mayday call and monitored the instruments, CW2 McManus searched for a landing site. After spotting a suitable landing area, he initiated a left turn to build rotor RPM and began an approach to a series of stair-stepped rice paddies in a small valley. After beginning the deceleration, he realized that he would not have room to stop the aircraft in the rice paddy before it slid into a 5-foot-high berm. He checked rotor RPM and saw that it had returned to the high green. Since he had rotor RPM to use, he increased collective slightly to extend his glide over the berm to reach the next rice paddy. He bled off all remaining airspeed and pulled remaining collective to cushion the landing. CW2 McManus completed the landing with an aircraft ground run of about 5 feet.

■ **LTC (Ret) Daniel C. Dugan (LTC Dugan was attending the Command and General Staff College at Fort Leavenworth when this in-flight emergency occurred on 8 January 1970).** At about 5,000 feet AGL in clear but extremely cold weather, a connecting rod failed in the T-41's engine. The aircraft started smoking and losing power. As LTC Dugan began descending and looking for a suitable place to land, he established contact with the tower by relay through another Army aircraft in the area. LTC Dugan selected a small dirt road that was reasonably aligned with the prevailing wind. Telephone wires paralleled the right side of the dirt road and crossed it at intervals. LTC Dugan landed over one set of wires, under another, and kept the right wing away from the telephone poles. The cause of the emergency was attributed to a ball of ice that had formed on the crankcase breather pipe. Once the breather was completely closed off, the crankcase pressurized and the engine oil was rapidly pumped overboard through the filler cap. This led to the loss of the rod bearing from the immediate oil starvation. Because of a maintenance oversight, the breather had not been winterized as required. ❑

Accident briefs

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - Aircraft had departed from static display area on climbout to cruise when crew heard loud bangs and aircraft began to yaw. Pilot decreased collective, checked instruments, and looked for forced-landing area. Pilot began descending toward wires and congested highway that was unsuitable for landing. As PC applied collective, crew heard bangs and aircraft began yawing again. PC then determined he could land in clearing near cemetery and was able to maneuver aircraft to that area. Crew completed shutdown without further incident.

H series - While on approach to tactical landing zone, rotor blades struck top of tree, causing damage to underside of each blade. Right skid tube was also damaged while repositioning for takeoff.

H series - Aircraft failed repeated HIT checks and topping check. Mechanic found air leak in bleed air elbow and blocked P3 air so that it would not leak. As a result, P3 air was blocked from oil cooler fan. At 1,000 feet and 90 knots during test flight, engine oil pressure decreased to 55 PSI and engine oil temperature rose to 138 to 140° C.

V series - Engine oil temperature exceeded limits during cruise flight. Crew landed aircraft without further incident. Maintenance personnel replaced thermostat flow control, and aircraft was cleared for one-time flight to home station for engine replacement.

UH-60 Class B

A series - While flying at about 100 feet AGL and 100 knots, crew sighted bridge that was not marked on map. Pilot increased altitude slightly. After passing bridge, pilot sighted wires and attempted cyclic climb. Aircraft struck high-power lines at about 140 feet AGL and lost instrumentation. Pilot was momentarily blinded when his NVGs shut down. PC came on controls, and crew executed controlled emergency landing to open field. Aircraft sustained extensive damage. 9337

A series - During IFR flight at 6,000 feet AGL, aircraft was struck by lightning. Flight computer went off line, and crew executed emergency landing. 9338

L series - Following recon/service mission, crew found damage to all four main rotor blades during postflight inspection. 9339

Cargo

CH-47 Class C

D series - While at 15-foot AGL hover, No. 2 engine ingested FOD material and failed. Crew completed landing without further incident.

Observation

OH-6 Class C

A series - At 20 feet AGL while on final approach over sod, aircraft experienced engine flameout and landed hard.

C series - During running landing to sod area, left skid broke off. IP took controls and hovered aircraft until ground personnel could place jacks and matting under aircraft. Crew completed landing without further damage.

Fixed wing

C-12 Class B

C series - While preflighting aircraft, crew discovered lightning damage. Engine will require replacement. 9340

Messages

■ Safety-of-flight technical message concerning modified procedures for boresighting when using TOW 2 and TOW 2A missiles on all AH-1F aircraft (AH-1-93-01, 251934Z Jun 93).

■ Safety-of-flight technical message concerning inspection of vertical stabilizer barrel nuts and bolts (AH-64-93-05, 091441Z Jun 93).

■ Safety-of-flight technical message concerning one-time records check of engine transmissions to identify unserviceable transmissions on all CH-47D, MH-47D, and MH-47E (CH-47-93-03, 161400Z Jul 93).

■ Aviation safety action informational message concerning maintenance checklist procedures to be included in DA Pamphlet 738-751: Functional Users Manual for the Army Maintenance Management System—Aviation (TAMMS-A) dated 15 June 1992 (GEN-93-ASAM-09, 241606Z May 93).

■ Aviation safety action informational message concerning inappropriate use of nonfire-resistant jackets with the aviation battle dress uniform (ABDU) (GEN-93-ASAM-10, 091950 Jun 93).

■ Aviation safety action maintenance mandatory message concerning oil debris detection system modification to caution panel on all UH-1H/V series aircraft (UH-1-93-ASAM-03, 241700Z May 93).

■ Aviation safety action maintenance mandatory message concerning one-time inspection of tail rotor drive shaft heat shield for debonded liner on all UH-1 series aircraft (UH-1-93-ASAM-04, 071234Z Jul 93).

■ Aviation safety action maintenance mandatory message concerning special oil sampling and repair of T53 engines with high iron content in all UH-1, AH-1, and OV-1 series aircraft (UH-1-93-ASAM-05, AH-1-93-ASAM-03, OV-1-93-ASAM-03, 191200Z Jul 93).

■ Aviation safety action operational message concerning all H-60 aircraft with external stores support system (ESSS) and extended-range fuel system (ERFS) mission kits installed (UH-60-93-ASAM-13, 011432Z Jun 93).

■ Aviation safety action maintenance mandatory message concerning inspection of extended-range fuel system (ERFS) ejector racks on all H-60 aircraft with external stores support and ERFS mission kits installed (UH-60-93-ASAM-14, 161534Z Jun 93).

■ Aviation safety action informational message concerning correction to phased maintenance checklist on all OH-58A/C aircraft (OH-58-93-ASAM-08, 071137Z Jul 93).

■ Aviation safety action maintenance mandatory message concerning one-time and recurring inspection of all T703-AD-700 engine fuel controls for broken bypass cover screws on all OH-58D series aircraft (OH-58-93-ASAM-09, 071741Z Jul 93).

■ Aviation safety action maintenance mandatory message concerning rescission of OV-1-93-ASAM-01 concerning emergency manual canopy jettison system on all OV-1D/RV-1D aircraft (OV-1-93-ASAM-02, 252200Z May 93).

For more information on selected accident briefs, call DSN 558-3262, commercial 205-255-3262.

Class A Accidents through July

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	6
	December	1	1	0	0
2d Qtr	January	3	1	0	0
	February	1	5	0	8
	March	4	1	2	5
3d Qtr	April	1	4*	0	0
	May	1	2	1	1
	June	2	0	2	0
4th Qtr	July	2	0	1	0
	August	1		0	
	September	2		0	
	Total	22	22	10	22

*An accident previously reported as Class A has been downgraded

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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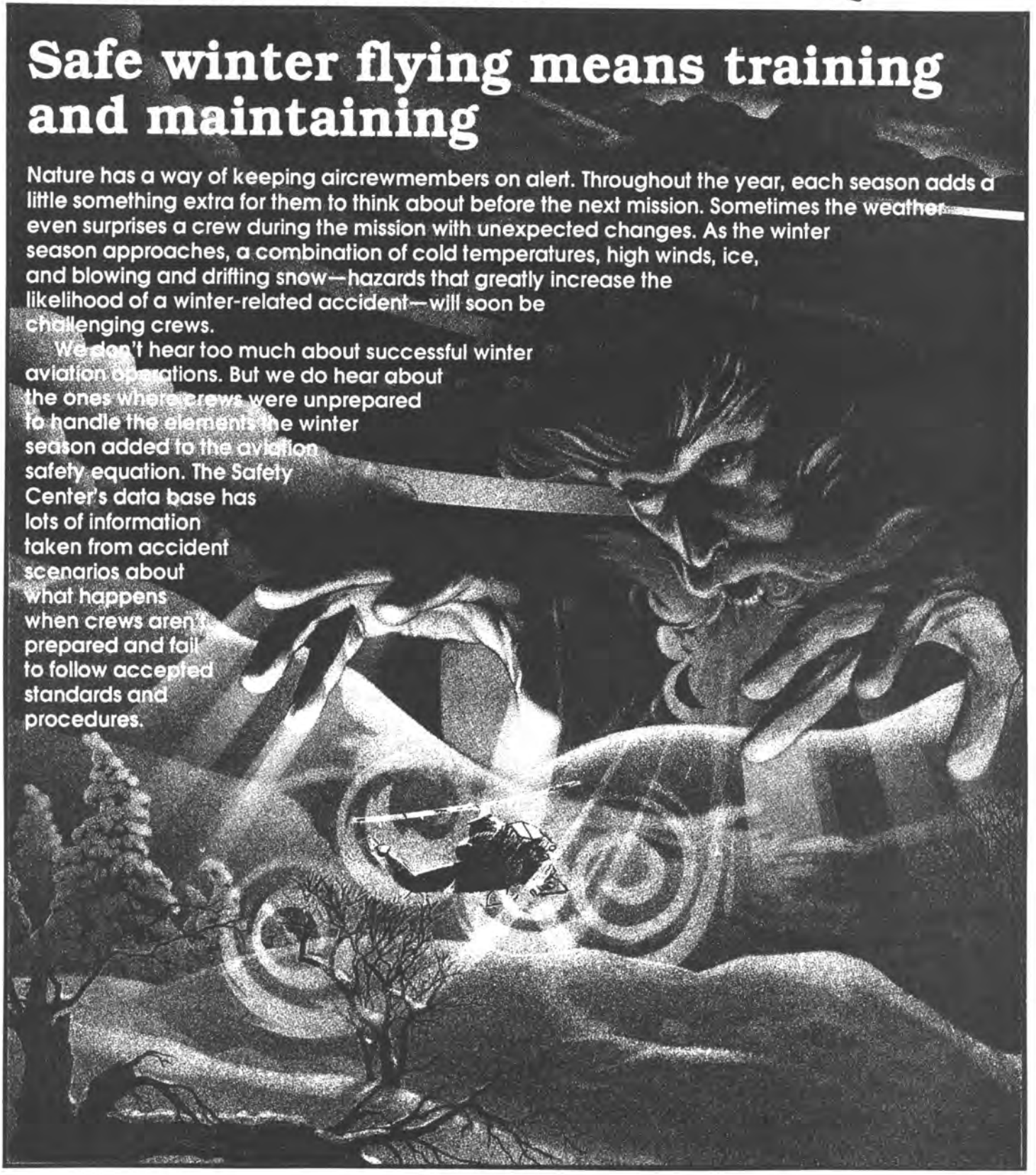
Flightfax
September 1993 Vol 21 No 12
REPORT OF ARMY AIRCRAFT ACCIDENTS

Safe winter flying means training and maintaining

Nature has a way of keeping aircrewmembers on alert. Throughout the year, each season adds a little something extra for them to think about before the next mission. Sometimes the weather even surprises a crew during the mission with unexpected changes. As the winter season approaches, a combination of cold temperatures, high winds, ice, and blowing and drifting snow—hazards that greatly increase the likelihood of a winter-related accident—will soon be challenging crews.

We don't hear too much about successful winter aviation operations. But we do hear about the ones where crews were unprepared to handle the elements the winter season added to the aviation safety equation. The Safety Center's data base has lots of information taken from accident scenarios about what happens when crews aren't prepared and fail to follow accepted standards and procedures.



The present rightsizing of the Army and corresponding reduction in available resources makes it readily apparent that losses due to costly accidents cannot continue. The Army simply cannot maintain its warfighting capability when trained crewmembers and hard-to-replace aircraft and equipment are lost in preventable cold-weather accidents.

Improper cold-weather operational and preventive maintenance procedures and inadequate training and mission planning are often cause factors in winter-related accidents. Overcoming cold-weather environmental problems is not impossible. To ensure safe mission accomplishment during the harshest season of the year, now is the time to start preparing.

Preventive maintenance procedures

Crew chiefs and maintenance personnel should consult applicable operators and technical maintenance manuals to determine those extra procedures required to safely operate and keep aircraft running in cold weather. Some specific tips on cold-weather preventive maintenance for your aircraft are shown in the accompanying article.

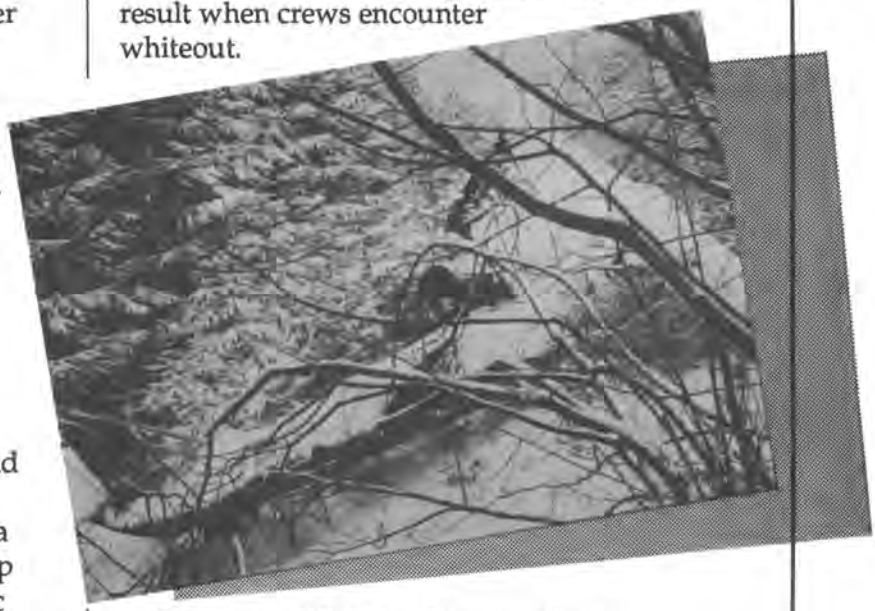
Training

Units should develop a cold-weather training plan that ensures aviators are familiar with flight techniques to use during winter flying before it becomes necessary to use them. Most units require that aviators not trained or current in winter operations demonstrate proficiency to an instructor pilot before being released for regular missions. Special consideration should be given for night checkouts when night vision systems are to be used.

■ *Scenario.* While attempting to avoid whiteout during an NVG blowing-snow approach to a frozen lake surface, the UH-1 pilot maintained excessive airspeed to touchdown. After touchdown, he attempted to aerodynamically brake the forward motion of the aircraft. The aircraft slid 309 feet before coming to a stop slightly right of another aircraft that had already landed in the LZ. As the pilot leveled the rotor system, it struck the rotor system of the other aircraft, causing major damage to both aircraft and minor injuries to one crewmember.

The pilot failed to anticipate the effects of excessive closure speed because of his inadequate experience and lack of formal NVG unit training in the harsh conditions of cold-weather environment.

Additional training is needed for unaided snow takeoffs and landings too. Many accidents result when crews encounter whiteout.



■ *Scenario.* While landing to a sloping, snow-covered field, the pilot encountered whiteout and lost all visual reference. The aircraft rolled left and entered the trees, coming to rest on its left side. Although the pilot was familiar with various snow-landing techniques, he selected an approach-to-the-ground technique that was not suitable for the landing site selected. After touching down, he felt uncomfortable with the slope and attempted to abort the landing while engulfed in whiteout.

Another problem occurs when crews attempt to land with a tail wind, which increases the difficulty in keeping ahead of the snow cloud during approach. Make landings to areas that provide vertical relief and contrast to use as reference points and to aid in depth perception.

Aviators should always leave themselves an out—never commit to a course of action or a maneuver that cannot be aborted or fail to leave room to accomplish a go-around. Follow procedures outlined in Army regulations, local policies and procedures, and FM 1-202: Environmental Flight.

Ensuring winter survival kits are on board the aircraft is not enough; crewmembers must be thoroughly trained in cold-weather survival and the use of cold-weather survival kit components.

Don't wait until you need to use an item in your winter survival kit to see if it works or even how it works.

Unit trainup should follow the crawl-walk-run principle to ensure that adequate individual, crew, and small unit proficiency in required skills is achieved before participation in a major field exercise. This is not restricted just to aviator training; maintainers need to fine-tune their cold-weather procedures to be able to provide around-the-clock support for air operations.

Mission planning

Effective risk management is the best method to ensure safe operations. Managing the additional risks that result from winter conditions demands increased attention to detail from the mission planning phase through preflight checks and postflight shutdown and inspection.

Unit operations personnel and aircrews must identify and assess hazards associated with adverse weather conditions expected to be encountered during winter flying. Integrate force protection (safety) into the mission planning by eliminating unnecessary risks and implementing controls to ensure that those risks that cannot be eliminated are reduced to the lowest level possible.

Remember that cold weather makes everything, especially maintenance, more difficult and time consuming to accomplish. Even moving aircraft around on the ramp requires more caution during the winter season. Speeds at which aircraft are towed must be slower because control is harder to maintain while turning or stopping. Plan for the extra time that will be needed.

Don't forget to carefully select aircraft landing and parking areas in field sites. If you choose the wrong area, a sudden thaw can cause aircraft to sink to their belly panels in mud, or the landing gear can freeze to the ground during the night.

■ *Scenarios.*

• The UH-60 was landing in a snow-covered LZ. The LZ was marked by an inverted Y, and each landing spot was marked by a separate light. Upon landing, the UH-60 settled in the snow and sank into the mud.

• The UH-1 crew performed a blowing-snow approach to semi-frozen muskeg. When the pilot attempted to take off, the crew realized the left ski had frozen in the ice and snow. The PC applied pressure/counterpressure to the tail rotor in an attempt to free the ski. When the ski broke free of the frozen slush, the aft mount strap failed and the aft portion of the ski broke off.

Preflight

Ensuring that the aircraft is ready to perform is as much the responsibility of the pilot as it is the crew chief and the maintenance personnel. This is particularly important during adverse weather conditions. During preflight checks, crews should look for "hurried" maintenance caused by mechanics rushing to get in out of the cold and "forgotten" steps caused by numerous trips to the warming tent.

To ensure aircraft airworthiness, unprotected and even some protected parts require close scrutiny. Icing on aircraft control linkages and surfaces can reduce aircraft performance, alter flight characteristics, and/or restrict control movement. Before flight, check to see that blade and propeller surfaces are free of ice, frost, and snow. Remove ice with heat or deicing fluids. Check the technical manual for your aircraft for correct procedures.

■ *Scenario.* During a UH-60 engine start, the pilot advanced the power control levers to the idle position and a lateral vibration began that increased to a moderate intensity. The crew aborted the start and shut down the aircraft. Inspection revealed some ice buildup near the main rotor blade tips. The crew had failed to anticipate and check for ice buildup during the preflight.

Leaks may appear more frequently due to contraction and expansion of metals as a result of temperature extremes. Suspected leaks should be checked before takeoff but after the systems are at operating temperatures and pressures.

Aircraft runups take a little longer during cold weather. Oil and lubricant pressure readings tend to indicate higher than normal. And engine instruments driven by tachometers may indicate lower than normal indications on initial engine start. Additional running at engine-idle settings is required until normal readings are attained. Hurried aircraft runups can cause water vapor to condense inside components and freeze, which could result in split oil coolers or blocked oil lines.

Postflight

Don't give in to the desire to hurry up and get in out of the cold; follow the checklist.

■ *Scenario.* While air-taxiing into a tactical parking area, the pilot-in-command (PC) made an improper decision to execute a blowing-snow approach (without a visual, fixed reference point) to a location close to another UH-1 operating at engine idle in its assigned parking point. The main rotor blades of the two aircraft meshed.

Other more prudent options were available to the PC that would have assisted him in maintaining proper ground track and clearance from the other aircraft. But he was overconfident in his abilities to execute the blowing-snow approach. And he was anxious to secure the aircraft and move in out of the cold. The crew had just completed cold refueling in subzero temperatures and were extremely uncomfortable.

Even if you are cold and in a hurry to get in, remember to top off fuel tanks at the end of the flight. Don't forget to put blade bags on the blades to assist in preventing ice buildup. And remember that the best time to check oil levels is during the postflight inspection while they are at operating temperatures.

The harsh environment sometimes encountered during the winter season requires that even the most routine aviation missions be well planned and meticulously executed. Winter flying is a difficult task even for the most experienced aviators. But thorough preparation, effective preventive maintenance procedures, proper training, and adequate mission planning will allow units to safely deal with the hazards associated with winter operations. ◆

—CW4 Adrian Booth, Investigations Division, DSN 558-3262, commercial 205-255-3262

COLD WEATHER tips

■ Allow time to become acclimated to colder temperatures. If you're non-acclimated, you will encounter difficulties at even warmer temperatures above -10°F.

■ Wear arctic mittens with the leather shell's wool finger insert or the trigger finger mitten wool insert inside the arctic mitten to keep hands warmer in temperatures of -20°F and colder. This serves two purposes: hands stay warmer and the wool inserts protect the skin from exposure to cold temperatures, thus preventing cold-weather injuries and direct contact with metal items.

■ Don't blow warm breath into mittens or gloves. Air from the lungs contains moisture that will condense on the hands and wet the inside of the gloves, contributing to further hand cooling.

■ Think twice before removing mittens or gloves. It doesn't take long to suffer the effects of frostbite.

■ Use the buddy system when you're out in the cold. Keep an eye on each other for signs of cold-weather injuries. Remember, not everyone has the same threshold for the cold and its elements.

■ Don't forget to do frequent self-checks even though you're using the buddy system.

■ Make sure you eat and drink fluids more often than normal to replace what your body is using. Your body burns more energy (calories) in cold weather trying to keep warm. Remember, you can dehydrate in cold temperatures too.

■ Expect to take twice as long to complete the job when working outside in extreme cold weather (-25°F and below). Allow plenty of extra time in your planning.

■ Keep small batteries warm until needed—for example, in your pocket—so you'll have power when needed.

■ Concentrate on the mission at hand. Your mind starts to drift when your body gets cold. Stay focused.

■ Carry an individual cold-weather survival kit at all times.

■ Be prepared for sudden weather changes. Wear clothing appropriate for the *coldest* weather you expect to encounter.

■ Cold-weather clothing protection is based on the principles of insulation, layering, and ventilation. When using cold-weather clothing, remember to keep it clean, avoid overheating, wear it loose in layers, and keep it dry.

■ See your flight surgeon if you feel a seasonal "cold" coming on. Don't wait until your "cold" gets too serious and causes prolonged medical downtime from flying. ◆

Leadership challenges during cold-weather operations

The principles of leadership are unaffected by the weather, but challenges for leaders can be profound during cold weather. To accomplish the mission, leaders must also contend with the stress of the environment. When addressing cold-weather operations, we most often address the threat of frostbite, chilblain, trenchfoot, dehydration, hypothermia, and so forth. However, the stress of cold can also adversely affect attitudes and morale, and leaders must recognize and cope with these effects if they are to maintain their unit's effectiveness.

Many soldiers come from regions where winters are not severe, and few have experience in working or living outdoors during cold weather. Initially, these soldiers may lack confidence in their ability to cope with and survive in cold weather.

The cold can seem inescapable. Even when soldiers are able to stay warm, the effects of the cold are felt in the need to wear awkward cold-weather clothing, confinement to small shelters, and problems with equipment. These effects can lead to anger, frustration, and depression, which can be intensified by fatigue, periods of isolation, and shortened daylight hours.

When conditions are extremely cold and soldiers have been out for a long time, the need to stay warm tends to become the individual's most important concern. Hurrying to finish the mission and get into a warmer environment can lead crews to take shortcuts, which often leads to accidents.

Leaders are responsible for prevention of cold injuries among their crews. Susceptibility to cold injury varies considerably. The sidebar shows some of the risk factors that can make individuals more susceptible to cold-weather injuries.

Although it's usually the newly-assigned individuals with little or no cold-weather training or experience who sustain cold injuries, leaders cannot fail to monitor the individuals with considerable cold-weather experience. They can become too desensitized to the threat of cold injuries. Leaders must be alert to this kind of carelessness too.

Crews need to be taught that when it is cold, tasks may be more difficult but not impossible. Leaders can build this confidence in their crews by having them practice tasks and survival skills in the cold and by conducting cold-weather training exercises. Viewing the cold as a challenge to be overcome is the key to the positive attitude required to successfully complete the mission. ◆

—Adapted from *Sustaining Health & Performance in the Cold: A Pocket Guide to Environmental Medicine Aspects of Cold-Weather Operations*, U.S. Army Research Institute of Environmental Medicine

Individual cold-injury risk factors

- ***Inadequate training***
- ***Prior cold injury***
- ***Inadequate clothing and equipment***
- ***Illness, injury, wounds***
- ***Fatigue***
- ***Dehydration (poor intake of fluids or excessive caffeine intake)***
- ***Alcohol***
- ***Poor nutrition***
- ***Low body fat***

Aircraft PM in the cold

It's a time-consuming, patience-tasking job to keep aircraft flying when the temperatures plummet and snow, wind, and ice attack. But top-notch preventive maintenance (PM) on your aircraft is critical in cold weather.

Start maintenance procedures by moving the aircraft inside if possible. If you can't and you're faced with some extended maintenance, use a maintenance shelter or rig a temporary shelter out of tentage, other canvas, or a salvaged cargo parachute canopy. Use a ground heater to warm your shelter. A warm, ventilated area will let you work without bulky clothing and heavy gloves. But don't forget to identify and assess any fire hazards associated with operating a ground heater.

The following are some areas you shouldn't forget while doing your cold-weather PM:

❄ **FUEL.** Water in fuel can turn to ice that will block fuel lines. Keep fuel tanks topped off. The gap between the top of the tank and the fuel is full of cold moist air, which causes condensation that drips into your fuel. When taking fuel samples, drain enough fuel to get rid of all the water. Drain the sumps daily.

■ When refueling an aircraft in subzero temperatures, always check the fuel level outside. When a full aircraft is moved into the hangar, the fuel level rises with the higher temperature. Opening the filler cap inside the hangar could result in a fuel spill to clean up.

■ The colder it is, the drier the air. And the drier the air, the more static electricity becomes a hazard. Be extra careful during refueling.

• Static can result from the aircraft moving through the air or by brushing frost or snow off the aircraft. Fuel flowing through the filler neck can also generate a spark that ignites fuel.

• Aircraft must be grounded. Make sure the aircraft and tanker are bonded together and the nozzle is bonded to the aircraft before removing the cap. When you're freezing while refueling, you might be tempted to neglect a ground. **Don't!** Follow all grounding procedures; do not take shortcuts.

• If you're not using a closed circuit

fueling nozzle, put the regular nozzle in all the way. That will keep static down and lessen the chance for a fuel spill.

■ Use extra care if you have to refuel or take fuel out of an aircraft. Spilled fuel can cause instant frostbite.

❄ **OIL and GREASE.** Fuel is not the only fluid affected by the cold. Most fluids get stiffer as temperatures fall; oil thickens, fuel's harder to ignite, and grease gels. You must use the right fuel and lube for cold weather. The lube chart in your technical manual lists the fuel, oil, and grease to use.

■ When servicing an oil tank on a cold-soaked aircraft, never fill it to the brim. If you do fill it to the brim, the tank will overflow when the oil heats up.

■ Oil leaks are a chronic problem in cold weather. Check connections, joints, and seals regularly.

❄ **SEALS.** Cold weather is hard on gaskets and seals. They contract, and that leads to leaks. Moisture can seep in around seals, freeze, and form ice that will cut the seals. Make a list of your aircraft's seal and gasket potential trouble spots. Post that list next to these preventive maintenance tips on your bulletin board.

❄ **BATTERIES.** Unless you're in subfreezing temperatures for a long string of days, nickel-cadmium batteries will do their job well in cold weather without too much effort on your part. However, every cold start shortens the life of batteries. So, if possible, bring batteries indoors when several days of subfreezing temperatures are expected. If that's not possible, turn on the landing lights, searchlight, or other equipment for 30 seconds before an engine start. That "load" will warm up the battery a bit. Always use an auxiliary power unit on the first start of the day. It saves a lot of drain on cold batteries.

■ Lead-acid batteries should also be kept warm. Cold weather saps their charge much faster than it does nickel-cadmium batteries.

■ If you bring batteries in, place them on a shelf or on dunnage, not on a bare floor. Never store nickel-cadmium and lead-acid batteries in the same area. Fumes from a lead-acid battery can cause a discharge of a nickel-cadmium battery.

❄ **TIRES.** Air pressure drops with the temperature, so check your aircraft's tire pressure often. Tires frozen to the ground can be freed with liquid deicer. Move the aircraft immediately to keep tires from freezing again as the slush formed by the deicer refreezes. Use boards, dunnage, or something similar under tires and skids to keep them off snow or ice.

❄ **ALUMINUM AIRFRAME.** A bolt that is overtorqued on a warm day could shear off as the bolt shank contracts.

❄ **LANDING GEAR.** Use a clean rag dampened with hydraulic fluid to remove ice, dirt, and grit from struts and pistons.

❄ **PRESSURE SYSTEMS.** Service them according to the instructions in each aircraft maintenance manual. Remember that any moisture present will freeze into ice crystals and damage seals.

❄ **RUBBER HOSES OR RUBBER-COVERED WIRES.** Never bend them when they're cold soaked. Rubber gets brittle and stiff and could crack. ◆

—Adapted from the October 1992 issue of *PS Magazine*

Notification of Army ground accidents caused by acts of nature

Request that units notify the U.S. Army Safety Center (USASC) as soon as possible (by telephone, electronic mail, or fax) whenever Army equipment or property incurs Class A through D damage caused by an act of nature—lightning, high wind, hail, and so forth. This notification procedure will enable the Director of Army Safety to respond to questions from Army leaders about these kinds of accidents.

Normal accident reporting procedures contained in AR 385-40: Accident Reporting and Records, dated 1 April 1987, apply after the USASC has been notified. ◆

POC: Mr. Lee McCown, Policy, Installation, & Evaluation Division, DSN 558-3759/3913, commercial 205-255-3759/3913

Broken Wing awards

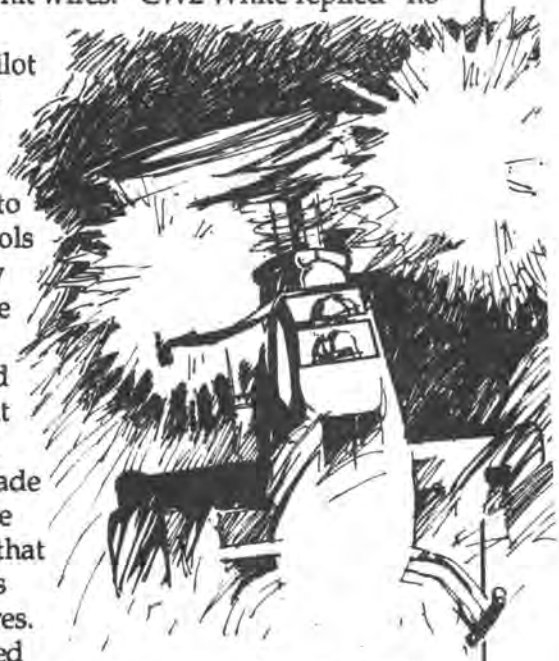
The Broken Wing award is given in recognition of aircrewmembers who demonstrate a high degree of professional skill while actually recovering an aircraft from an in-flight failure or malfunction necessitating an emergency landing. Requirements for the award are spelled out in AR 672-74.

■ **CW4 Sandra L. Beebe and CW4 William J. Clark, B Company, Military Intelligence Battalion (Low Intensity), APO AA 34042.** During an RC-12D continuation training mission, the crew executed four takeoffs and landings without incident or unusual indications. With CW4 Clark on the controls, the crew prepared to make another normal landing. As the crew placed the gear handle down, they heard a loud grinding noise. CW4 Beebe thought it indicated a broken chain. CW4 Clark verified this assessment when gear-indicator lights did not show green (indicating an unsafe condition) and the nose gear was not visible through either side mirror. The crew placed the gear handle up and made another unsuccessful attempt to lower the gear. CW4 Beebe continued to operate the radios and initiated external coordination while CW4 Clark continued to fly the aircraft. CW4 Beebe declared an emergency, requesting and receiving clearance from ground control approach (GCA) to climb in the downwind portion of the traffic pattern. CW4 Clark immediately initiated a climb to 7,000 feet. As CW4 Clark executed a VFR holding pattern above the airfield, CW4 Beebe requested a discrete frequency handling so they could discuss the situation with their command element. Once the situation stabilized, the crew assessed their condition. The crew decided that CW4 Clark would continue to fly the aircraft and execute an emergency landing if necessary and CW4 Beebe would handle all radio traffic except for high-density periods when division of communication workload was required. GCA set up a large box pattern at minimum obstruction-clearance altitude. The crew reviewed the operators manual but found that dual flight failure (nose gear up and unsafe main gear) was not addressed in the dash 10. As a result of conflicts in the operators manual, the crew requested assistance from unit instructor pilots (IPs) who were present in the tower. The IPs contacted the Directorate of Evaluation and Standardization and the Army Safety Center at Fort Rucker, AL, and Beechcraft Aerospace Services, Incorporated. Based on all acquired information and their own experience, the crew assessed the situation and established a plan. After orbiting for about 1 hour, the crew executed a flyby of the tower at about 200 feet AGL to try to determine if the gear was possibly down and locked, which would reduce the complexity of the emergency. The visual review was inconclusive, and the crew re-entered a safe orbit while they burned off fuel and depressurized the aircraft. After further assessment, the crew decided to land gear up because of the unsafe right main gear. However, based on a recommendation from Beechcraft representatives, the crew once again cycled the gear. Subsequently, they received two safe main gear indications. Now with the situation less complex, the crew could land in accordance with the operators manual. Although the crew wanted to burn off another 500 pounds of fuel to minimize the potential danger, the weather started to deteriorate rapidly. Recognizing the potential high-wind conditions that can accompany storm activity, the crew told the tower they were ready to land. CW4 Beebe took the controls while CW4 Clark secured all equipment in the cabin and removed and secured the escape hatch. The crew established a shallow (full flap) approach. Because CW4 Clark was in the best position for aircraft control (left seat), he executed the approach and landing. The aircraft touched down in a slight nose-high attitude. CW4 Clark held the nose off while trimming the elevator to the full-up position. Concurrently, CW4 Beebe guarded the controls to ensure no forward yoke was applied, feathered the props, placed the condition levers in the cutoff position, pulled the fire pull handles, and turned the master switch off. After a landing run on the main gear of about 900 feet, the nose settled down on the centerline of the runway, sliding an additional 1,500 feet before stopping.

■ **CW2 Timothy Wade Whited, B Troop, 6th Squadron, 6th U.S. Cavalry, APO AE 09140.** On 14 August 1991, CW2 Whited was pilot-in-command of a fully armed AH-64 providing escort security for a medical resupply mission. The flight consisted of one CH-47, one UH-60, and two AH-64s. The landing zone consisted of a dusty, loosely graveled parking lot about 100 meters wide by 200 meters long. The aircraft were parked in each corner of the parking lot with CW2 Whited's aircraft in the right rear.

At 1155, the flight was ready for takeoff. The AH-64s departed first. The departure area was surrounded by about 300 to 400 Kurdish spectators, various vehicles, and large construction equipment. To avoid overflight of the other aircraft, CW2 Whited elected to take off to the right and then make a left turn to avoid power lines. Due to the high density altitude and gross weight of the aircraft, maximum torque available was required for takeoff. Upon takeoff, the aircraft was enveloped in a cloud of dust. The aircraft reached 20 knots and 30 feet AGL while maneuvering over the large crowd of onlookers. At that moment, the low rotor RPM audio sounded, the engine-out light came on, and the No. 1 engine failed. CW2 Whited disregarded the emergency procedure to jettison the fully loaded stores and auxiliary tank to attain single-engine flight because of the danger to the Kurdish civilians. The only possible safe landing area was a small dirt field about 50 meters to his front. En route to the landing area, the rotor RPM dropped well below 80 percent and both generators dropped off line, resulting in loss of force trim and stabilization systems. Although the brownout created an IMC situation, CW2 Whited safely landed the aircraft with little remaining rotor RPM on a 10-degree nose-up, 8-degree left-to-right slope with 12-inch-deep ditches running parallel to the aircraft at 3-meter intervals. Immediately after touching down, the aircraft began to roll backwards and to the right. CW2 Whited, still IMC, applied proper brakes and cyclic to prevent dynamic rollover.

■ **CW2 Paul A. White, Nightrider Troop, 4th Squadron, 11th Armored Cavalry Regiment, APO AE 09146.** After a normal departure from home airfield during a routine NVG training flight, CW2 White took the AH-1F controls to allow his copilot to begin his navigation training drill. As the copilot identified the initial holding area, CW2 White descended to 300 feet AGL and slowed to 60 knots. After the copilot identified the holding area, CW2 White entered right traffic for a downwind leg. As CW2 White turned to base, he identified the 150-foot-high tension wires that ran northeast to southwest and paralleled his final approach course. CW2 White verbally confirmed sighting the two support pylons immediately to the north and south of the east/west autobahn that would parallel their final approach. He descended on base leg to about 200 feet AGL and slowed to 40 knots. CW2 White initiated a right turn to the final approach course and verbally confirmed adequate clearance over the wires. At about 200 feet AGL and 40 knots with cruise power applied and in a slight right turn, the crew heard a series of loud, sharp reports from the rear of the aircraft. Simultaneously, they saw bright flashes to the rear of the aircraft. The copilot yelled over the intercom "you hit wires." CW2 White replied "no we didn't."



Again, the copilot yelled "you hit wires." CW2 White felt no external input to the flight controls or adverse yaw but checked the engine/rotor tachometer and saw the RPM at 95 percent and holding. He made sure the throttle was open and that the aircraft was clear of the wires. He then lowered the collective to initiate an approach. CW2 White directed the copilot to make a mayday call over the flight following frequency. At this point, the copilot kept his attention outside the aircraft. CW2 White now saw the engine/rotor RPM was at 100 percent. He continued to hear loud reports and see bright flashes to his rear as he maneuvered the aircraft toward an open area to his immediate front. At about 40 feet and 20 knots, CW2 White felt the aircraft enter a rapid descent, heard the low RPM warning audio alert and saw the engine/rotor RPM rapidly decreasing. Even though the copilot was yelling at CW2 White to pull collective, CW2 White realized he was still too high and waited momentarily before applying full-up collective and aft cyclic to cushion the impact. The aircraft hit the ground in a slightly nose-high attitude at a near vertical angle and high rate of descent. The aircraft remained upright with only its skids spread. In spite of misleading input from his copilot, CW2 White's ability to remain calm and think clearly helped him successfully perform his first low-level, low-airspeed autorotation under NVGs on a totally moonless night. ◆

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class D

V series - During approach to desert field site, aircraft encountered brownout and landed hard. Both cross tubes, two saddle mounts, and the right skid tube were damaged.

UH-60 Class C

A series - While turning to position aircraft at refuel point, crew was clearing sign next to refuel pad. As pilot continued turn, he saw another sign but was unable to stop before main rotor blades struck sign. Flying debris hit parked civilian aircraft.

Attack

AH-1 Class C

S series - While at OGE hover in battle position, crew swung tail right and tail rotor blade struck overhanging tree branch. Crew flew aircraft at 10 to 15 knots for 1,500 meters to open field and landed without further incident.

Cargo

CH-47 Class D

D series - After landing, crew chief opened cabin door and threw wheel chocks out. One chock did not clear step. Crew chief stepped out on chock, tripped, and fell, fracturing his right ankle.

Observation

OH-58 Class C

D series - Following flight, crew discovered damage to tail rotor but was unable to determine when tail rotor strike occurred.

Fixed wing

C-12 Class C

C series - Lightning struck aircraft at 20,000 feet AGL, damaging both engines and control surface.

C-12 Class D

C series - Maintenance discovered several indications of lightning strike. Lightning appeared to have struck the radome and exited via the rudder and vertical strake below the rudder. Pilots did not recall aircraft being struck by lightning during flight.

OV-1 Class B

D series - Aircraft experienced uneven reverse of props during high-speed maintenance operational check following adjustment of thrust reversers. Aircraft skidded sideways and bounced, right landing gear collapsed, aircraft flapped down, and right prop dug into taxiway. 9341

U-21 Class E

F series - During climbout, pilot noticed torque fluctuation and gradual loss of oil pressure. Crew returned to airfield. During descent at reduced power, oil pressure continued to decrease to 35 PSI. Crew completed uneventful landing and rollout. During inspection, crew found that oil cap had come loose and 6 quarts of oil had pumped overboard.

Messages

■ Aviation safety action maintenance mandatory message concerning one-time inspection of the hydraulic pump module (70652-02300-050) knurled bleed/relief knob securing pin (UH-60-93-ASAM-16, 271723Z Jul 93). Summary: An uninstalled bleed/relief valve adjustment knob retention pin could allow the knobs to fall off and become a hazard within the flight control system. A recent acceptance testing of the hydraulic pump modules has revealed that the pin securing the knurled bleed/relief knob on some valves were not swaged or otherwise secured. Also, the roll pin used on one manufacturer's valve was found to be loose. The discrepant knobs are currently being held in place by friction force developed by a spring that holds the bleed valve in the normal position. The purpose of this message is to require a one-time inspection of all fielded and spare supplies of the subject pump modules bleed/relief valve for knob retention pin security. Contact: Mr. Lyell Myers, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of the engine to transmission drive shaft installation bolts on all OH-58D aircraft (OH-58-93-ASAM-10, 041541Z Aug 93). Summary: During a scheduled inspection, it was found that several engine drive shaft bolts were not protruding through the nuts. Further investigation revealed that in some instances, bolts that were too short had been installed. Bolts that are too short may not fully engage with the locking portion of the locknut. To ensure the locking portion of the locknuts is fully engaged, the bolt should protrude through the nut one and one-half threads when installed. The purpose of this message is to require a one-time inspection of all OH-58D aircraft and to require installation of correct engine drive shaft bolts. Contact: Mr. Lyell Myers, DSN 693-2258, commercial 314-263-2258.

For more information on selected accident briefs, call DSN 558-3262, commercial 205-255-3262.

U.S. ARMY SAFETY CENTER

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

Safety alert message for H-60 units

On 12 August 1993, the Army Safety Center issued an aviation safety alert message regarding all H-60 series aircraft. The purpose of this message is to correct an inadvertent deletion to the UH-60A and EH-60A operator's manual.

Change 18 dated 15 February 1993 to TM 55-1520-237-10: Operator's Manual, UH-60A and EH-60A inadvertently deleted paragraph 2-193 on page 2-79. This paragraph required taping of the master warning panel before NVG flight. The safety alert message states that "Only upon application of NVG-compatible cockpit lighting will the requirement to tape the master warning panel be negated."

The safety alert message requires that all—

■ H-60 crewmembers be briefed that taping of the master warning panel is still mandatory before NVG flight. See TM 55-1520-237-23, Appendix H. Upon conclusion of NVG flight operations, the tape should be removed, the panel lights switch should be activated, and the lighting rheostats should be adjusted for normal use.

■ Units insert a copy of the 122050Z August 1993 safety alert message in the pilots information file. ◆

POC: LTC William A. Tucker, Chief, Aviation Branch, DSN 558-2119, commercial 205-255-2119

Class A Accidents through August

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	6
	December	1	1	0	0
2d Qtr	January	3	1	0	0
	February	1	5	0	8
	March	4	1	2	5
3d Qtr	April	1	4	0	0
	May	1	1*	1	1
	June	2	0	2	0
4th Qtr	July	2	0	1	0
	August	1	1	0	0
	September	2		0	
	Total	**22**	**22**	**10**	**22**

*An accident previously reported as Class A has been downgraded

S T A C O M

Interim change to TC 1-212

Task 2099, Perform Extended Range Fuel System Operations, has been added to TC 1-212: Aircrew Training Manual, Utility Helicopter, UH-60 to provide aircrew training guidance for users. The next formal change to TC 1-212 will include this task.

Units should insert the interim change in TC 1-212 after page 6-186 and retain a copy of this STACOM in the front of the manual for reference purposes.

The Department of the Army point of contact (POC) is CW3 James Goddard, ATZQ-TDI-A, DSN 558-3801, commercial 205-255-3801. The Directorate of Evaluation and Standardization POC is MAJ Ken Gwynne, ATZQ-ESF, DSN 558-2442, commercial 205-255-2442.

STACOM 159 **September 1993**

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208, DSN 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.

Russell E. Adams

Russell E. Adams
COL, Aviation
Director, DES

TASK: Perform extended range fuel system operations.

CONDITIONS: In a UH-60 or UH-60FS with an ERFS consisting of two 230-gallon fuel tanks or four 230-gallon fuel tanks.

STANDARDS:

1. **RATED.**

a. Correctly perform a preflight inspection of the ERFS components.

b. Determine if aircraft takeoff CG, landing CG, or aircraft gross weight imposes limitations on the proposed flight.

c. Without error, operate the auxiliary fuel management panel system.

d. Without error, recognize ERFS malfunctions that require emergency procedures be conducted.

e. Without error, perform or describe appropriate immediate action emergency procedures according to TM 55-1520-237-10.

f. Correctly perform a postflight inspection of the ERFS components.

g. Correctly perform crew coordination actions.

2. **NONRATED.**

a. Correctly complete all before-flight and preflight duties according to TM 55-1520-237-10 and, if applicable, the unit SOP.

b. Correctly perform crew coordination actions.

DESCRIPTION: All operational procedures will be conducted according to TM 55-1520-237-10 or TM 55-1520-237-CL. The PC will perform or have the P perform the preflight inspection of the ESSS/ERFS according to the CL. The P will monitor the main fuel quantity indicators and the auxiliary fuel management panel to ensure that the system is operating normally. He will also operate the fuel management panel in both the AUTO and MANUAL modes.

REFERENCES:

AR 95-1
TM 55-1520-237-10
TM 55-1520-237-CL
Unit SOP

*U.S. Government

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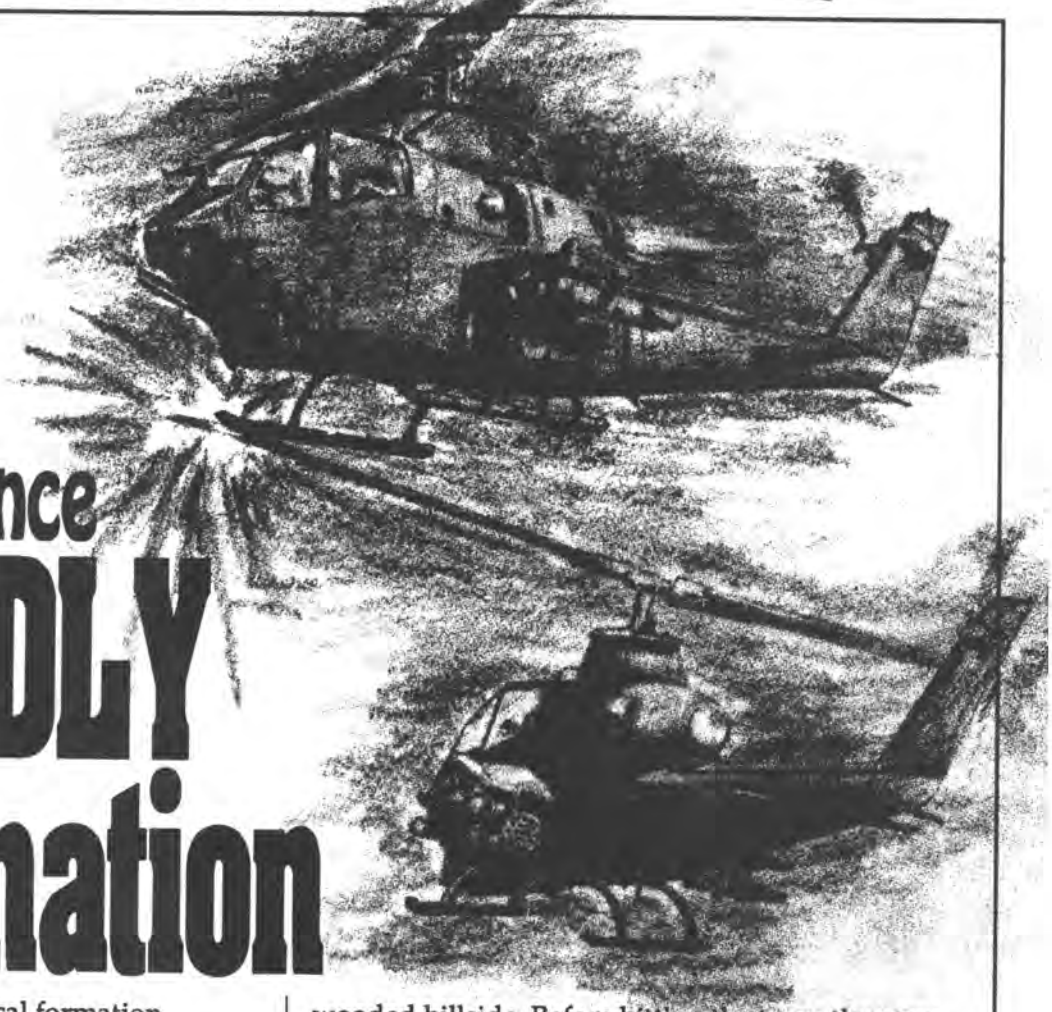
REPORT OF ARMY AIRCRAFT ACCIDENTS



Frustration, Pride, and Overconfidence A DEADLY Combination

During an NVG tactical formation training flight at 150 feet agl, the crew of Chalk 7 observed Chalk 5 descending in a nose-low attitude with flames and sparks coming from the transmission area. As the Chalk 7 crew watched, Chalk 5 with its rotors barely turning struck the ground tail first on the downslope of a ridge. Both pilots were killed. The wreckage was engulfed in a postcrash fire.

As the Chalk 7 crew were witnessing the Chalk 5 in-flight emergency, the Chalk 6 pilot looked out his right window and also saw the falling aircraft with sparks coming from the mast area. At the same time, the cyclic of Chalk 6 began to oscillate and the aircraft became uncontrollable. The pilot felt the IP get on the controls with him. Their aircraft was losing altitude and was headed for a wooded hillside. Before hitting the trees, the crew managed to decelerate and pull collective to cushion impact. The aircraft settled softly on top of some small trees and rolled onto its left side. The pilot got out of the aircraft and went around to assist the IP. As the pilots moved up the hill, they saw the fire from the burning wreckage of Chalk 5. They ran toward the crash site where they were met by other members of the flight.

Two Cobras were down on a hillside only 500 meters apart. It wasn't some new kind of accident; it was the nightmare of every aviator—a midair. The only major malfunction in this dual aircraft accident was once again the human one. Frustration, pride, and overconfidence resulted in a series of human errors that quickly led the flight toward disaster.

The mission

The battalion had been assigned the mission of supporting a task force for air assault training into two landing zones. This called for providing cover from battle positions. Team C consisted of six AH-1Fs and one OH-58. A complete, thorough mission brief using a sand table was conducted, including mission risk assessments.

The aircraft departed their home station en route to the FARP. At 1840, Team C departed the FARP for their first battle position, relieving Team B. Team C occupied their battle position from 1850 to 1945, which because of lift delays was 15 minutes longer than planned. After relief from the battle position, Team C returned to the FARP for refueling. They then flew to the second battle position and conducted a relief on station at about 2030. At 2130, Team C received permission to leave the battle position. Again, they had remained on station longer than planned because of lift delays.

The main rotor blade of Chalk 5 struck the right front skid of Chalk 6.

The midair collision

Before exiting the battle position, the OH-58 crew flew to the rear of the line and ensured that all the aircraft had their infrared lights on. The OH-58 then came up on the right side of the battle position to lead the team out. As they made a right-pedal turn to exit the battle position, someone suggested they spotlight a local national who had been shining a flashlight on the eastern-most aircraft in the battle position. The air mission commander made no objection to the suggestion.

In trail formation at about 25 feet agl, the crews flew east for a short distance. Each crew, in turn, diverted their attention to spotlighting the local national, then turned right and began a climb. Chalks 6 and 7 unknowingly lost sight of Chalk 5, which was to their left and flying lower than the rest of the flight. The crew of Chalk 6, observing an aircraft to their front, thought it was Chalk 5 and continued flying formation on that aircraft.

About 1 kilometer south of the battle position and at about 150 feet agl, the Chalk 6 pilot saw an aircraft climbing toward them from his 7 to 8 o'clock position. Unable to believe what he was seeing, the Chalk 6 pilot rechecked, hesitated for a second, and then placed his aircraft in a 25-degree nose-high deceleration, attempting to avoid the approaching aircraft. However, due to the short time span, cockpit communication was not made. The pilot did not tell the IP that he had sighted the approaching aircraft. As a result, the IP was startled by the evasive maneuver and immediately got on the controls and returned the aircraft to level flight, admonishing the pilot not to do that again under NVGs.

The nose-high attitude of Chalk 6 allowed Chalk 5 to partially pass under Chalk 6 without contact. However, when the IP lowered the nose of Chalk 6, Chalk 5 was in a position for its main rotor blade to strike the right front skid of Chalk 6 and then its tail rotor to strike the right rear skid. The main rotor blade tips of both aircraft meshed. As a result, the 10-pound weight on one of the blade tips of Chalk 6 came off.

In all probability, the Chalk 6 pilot's evasive action lessened the severity of the midair collision and probably saved their lives. It can only be speculated, but if the Chalk 6 pilot had communicated with his IP and the IP had allowed the deceleration to continue, the midair may have been avoided.

The causes

Although it was initially reported that an engine failure was the reason one aircraft turned into the other, physical evidence does not support this. Investigation revealed no indication of an engine failure before the midair collision.

The crew of Chalk 5 failed to follow written procedures in TC 1-204: Night Flight Techniques and Procedures, paragraph 7-9 and 7-10b and common practices when they attempted to regain their position in the flight rather than joining the rear of the flight. The Chalk 5 pilot also failed to

notify the flight of his intentions. A lack of self-discipline to follow the known standard—individual failure—and failure to enforce the known standard—leader failure—were the primary causes of this accident.

Individual failure. The Chalk 5 pilot, who was on the controls and also the air mission commander, allowed himself to get out of formation. And it is likely that he tried to regain his position in the formation rather than embarrass himself by doing what is common practice among aviators: radio the flight about being out of formation, fly away from the flight a short distance, turn around and count all the aircraft, and then take up the rear position. Most likely, the Chalk 5 pilot's perception of his authority as air mission commander would not allow him to take up the rear position. Instead, he attempted to get back into his assigned position to resume control of the flight.

Following the midair collision, the Chalk 5 pilot also failed to follow proper emergency procedures. If the Chalk 5 pilot had followed the immediate-action emergency procedures (autorotate with throttle off) outlined in TM 55-1520-236-10, paragraph 9-22 (page 9-7), he possibly could have landed the aircraft with less severe results. Physical evidence indicates that the primary in-flight damage to Chalk 5 was failure of the main drive shaft as the aircraft's rotor blades struck the skid area of Chalk 6. The aircraft crashed with very little or no turning movement of the main rotor and tail rotor blades. The minimum rotor rpm indicates the collective was not reduced in autorotation.

The air mission commander allowed his flight to deviate from the planned and briefed mission.

Records revealed that just 3 months before the accident, the Chalk 5 pilot had failed the simulated engine failure portion of a standardization checkride by freezing at the controls and taking no corrective action. Only after 8.4 hours of additional training was he able to pass the checkride.

Did the Chalk 5 pilot again freeze at the controls during the real in-flight emergency? Or did he simply fail to recognize the true emergency in time to autorotate? Perhaps by the time the crew realized the nature of the emergency, there was insufficient time to complete an effective autorotation.

Leader failure. As the air mission commander, the Chalk 5 pilot failed to ensure flight discipline by allowing his team to spotlight the local national. After someone suggested they spotlight the individual, he did not object. He allowed his flight to deviate from the planned and briefed mission. His actions probably resulted from his irritation and frustration with the individual who had been distracting one of his crews. Thus, with the air mission commander's implied consent, all crews diverted their attention to spotlighting the individual during their departure from the battle position.

The Chalk 5 PC had made a habit of flying low after he was criticized for flying too high on a mission several weeks previously. Consequently, it was not out of character for his aircraft to have been lower than the rest of the flight. Unfortunately, the pilot chose the wrong course of action to get back in formation.

The crew's decision-making process may have been impaired by having to hover in the battle position for a longer-than-normal period of time and being frustrated and angry at the local national. Regardless, the PC failed to perform his duties as commander of the aircraft and he jeopardized the safety of his aircraft by allowing the pilot to attempt to regain their position in the flight. The PC knew the established procedure for rejoining the formation. But he failed to enforce the known standard, and a midair collision resulted.

The pilot of Chalk 5 allowed his frustration, pride, and overconfidence to keep him from following established procedures in TC 1-204 and the battalion SOP. Rather than be embarrassed by having to take up the trail position in the formation, the pilot was confident he could rejoin the formation and regain his previous position—and the PC allowed him to do it. Avoiding a little embarrassment just doesn't seem worth two lives and $8 million in destroyed and damaged aircraft. It was a terrible price to pay. ♦

The pilot's role in collision avoidance

The Federal Aviation Administration (FAA) and Department of the Army safety agencies have introduced several significant programs designed to reduce the potential for midair and near-midair collisions. FAA Advisory Circular (AC) 90-48C is one of those programs directed to all pilots operating in the National Airspace System. The purpose of the AC is to alert pilots to the potential hazards of midair and near-midair collisions. The circular also discusses basic problem areas—visual scanning; clearing procedures; airspace, flight rules, and operational environmental concerns; use of communications equipment and air traffic advisory services; airport traffic patterns; and flying in formation—where improvements in pilot training are needed to reduce the potential of midair collisions.

The following areas warrant special attention and continuing action by all pilots to avoid the possibility of becoming involved in a midair collision.

See and avoid concept

The flight rules prescribed in Part 91 of the Federal Aviation Regulations (FAR) set forth the concept of "see and avoid." This concept requires that each person operating an aircraft (regardless of the kind of aircraft being flown) maintain vigilance at all times whether it's an instrument flight rules (IFR) or visual flight rules (VFR) operation. Remember that most midair and reported near-midair collisions occur during good VFR weather conditions and during daylight hours.

Visual scanning

Pilots should remain consistently alert to all traffic movements within their field of vision. In addition, they should periodically scan the *entire* visual field outside their aircraft to ensure detection of conflicting traffic. Performance capabilities of most aircraft in both speed and rates of climb and descent result in high closure rates, thereby limiting the time available for detection, decision, and evasive action.

The probability of spotting a potential collision threat increases with the amount of time spent looking outside, and certain techniques may be used to increase the effectiveness of the scan time. The human eyes tend to focus on something, even in a featureless sky. To be most effective, pilots should shift their glances and refocus at intervals. Most pilots do this in the process of scanning the instrument panel, but it's also important to focus outside to set up the visual system for effective target acquisition.

When switching views between inside the cockpit and distant objects outside, the eyes may require several seconds to refocus. Proper scanning requires constant sharing of attention with other piloting tasks.

Effective scanning is accomplished with a series of short, regularly-spaced eye movements that bring successive areas of the sky into the central visual field. Each movement should not exceed 10 degrees, and each area should be observed for at least 1 second to enable detection. Although horizontal back-and-forth eye movements seem preferred by most pilots, each pilot should develop a scanning pattern that is most comfortable and then adhere to it to assure optimum scanning. Pilots should remember, however, that scanning effectiveness is easily degraded by such psychophysiological conditions as fatigue, boredom, illness, anxiety, or preoccupation.

Peripheral vision can be most useful in spotting collision threats from other aircraft. Each time a scan is stopped and the eyes are refocused, the peripheral vision takes on more importance because it is through this element that movement is detected. Although a lack of brightness and color contrast in daytime and conflicting ground lights at night increase the difficulty of detecting other aircraft, apparent movement is almost always the first perception of a collision threat. Also, it's probably the most important because it is the discovery of a threat that triggers the events leading to proper evasive action.

It's essential to remember, however, that if another aircraft appears to have no relative motion, it is likely to be on a collision course with you. If the other aircraft shows no lateral or vertical motion but is increasing in size, take immediate evasive action.

Visual search at night depends almost entirely on peripheral vision. To perceive a very dimly lighted object in a certain direction, pilots should not look directly at the object. The correct procedure is to scan the area adjacent to it. Short stops of a few seconds in each scan will help detect the

light and its movement.

Pilots must also remember to move their heads to search around physical obstructions, such as doorposts or windowposts. A doorpost can cover a considerable amount of sky, but a small head movement may uncover an area that might be concealing a threat.

Clearing procedures

Before taxiing onto the runway or landing area for takeoff, pilots should maneuver their aircraft to provide a clear view as they scan the approach areas for possible landing traffic. During climbs and descents in flight conditions that permit visual detection of other traffic, pilots should execute gentle banks left and right at a frequency that permits continuous visual scanning of the airspace about them. Before all turns, abnormal maneuvers, or acrobatics, appropriate clearing procedures must be executed.

Most midair and reported near-midair collisions occur during good VFR weather conditions and during daylight hours.

Airspace, flight rules, and operational environment

To comply with applicable flight rules, pilots should be aware of the kind of airspace in which they intend to operate. Aeronautical information concerning the National Airspace System is disseminated in three methods: aeronautical charts (primary), the Airman's Information Manual (AIM), and Notice to Airmen (NOTAM) system. The general operating and flight rules governing the operation of aircraft within the U.S. are contained in Part 91 of the FAR. Pilots should—

- Use currently effective aeronautical charts for the route or area in which they intend to operate.
- Note and understand the aeronautical legend and chart symbols related to airspace information depicted on aeronautical charts.
- Develop a working knowledge of the various airspace segments, including the vertical and horizontal boundaries.
- Develop a working knowledge of the specific flight rules (FAR 91) governing operation of aircraft within the various airspace segments.
- Use the AIM. The basic flight information and air traffic control (ATC) procedures describe the airspace segments and basic pilot responsibilities for operating in such airspace.
- Contact the nearest FAA Flight Service Station for any pertinent NOTAMs pertaining to their area of operation.

Pilots should also be familiar with and exercise caution in those operational environments where they may expect to find a high volume of traffic or special types of aircraft operation. These areas include terminal radar service areas; airport traffic patterns, particularly at airports without a control tower; airport traffic areas (below 3,000 feet above the surface within 5 statute miles of an airport with an operating control tower); terminal control areas; control zones, including extensions; federal airways; vicinity of VORs; restricted areas; warning areas; alert areas; military operating areas; intensive student jet training areas; military low-level, high-speed training routes; instrument approach areas; and areas of high density jet arrival or departure routings, especially in the vicinity of major terminals and military bases.

Use of communications equipment and air traffic advisory services

In terminal areas that have an operating ATC system, one of the major factors contributing to the likelihood of near-midair collisions has been the mix of *known* arriving and departing aircraft within *unknown* traffic. The known aircraft are generally in radio contact with the controlling facility (local, approach, or departure control), and the other aircraft are neither in two-way radio contact nor identified by ATC at the time of the near-midair collision. This precludes ATC from issuing traffic advisory information to either aircraft.

Although pilots should adhere to the necessary communications requirements when operating VFR, they are also urged to take advantage of the air traffic advisory services available to VFR aircraft. Pilots should—

- Use the AIM.
  - The basic AIM contains a section dealing with services available to pilots, including information on VFR advisory services, radar traffic information services for VFR pilots, and recommended traffic advisory practices at nontower airports.

• The airport or facility directory contains a list of all major airports showing the services available to pilots and the applicable communication frequencies.

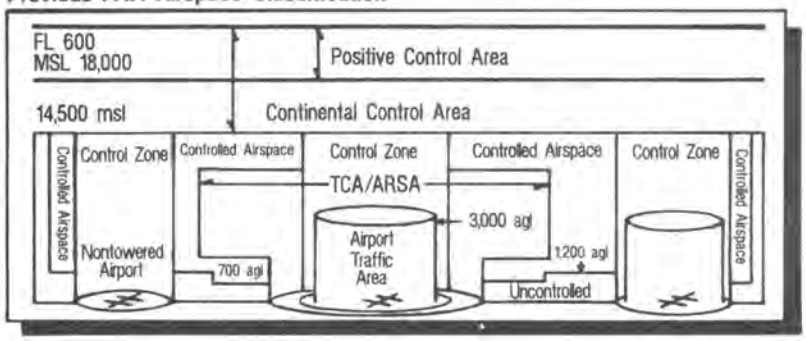
■ Develop a working knowledge of those facilities providing traffic advisory services and the area in which they give these services.

■ Initiate radio contact with the appropriate terminal radar or nonradar facility when operating within the perimeters of the advertised service areas or within 15 miles of the facility when no service area is specified.

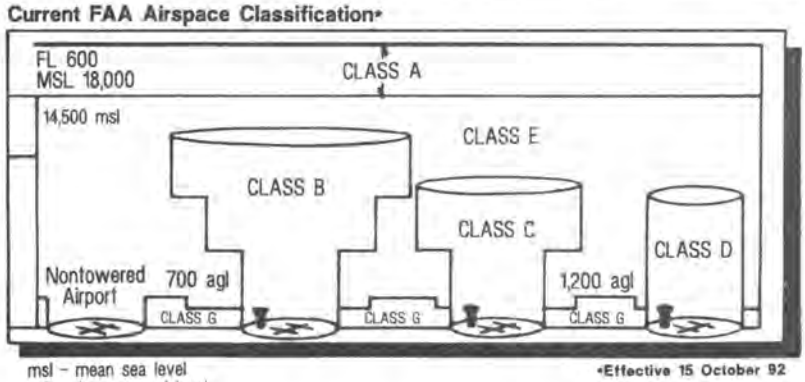
■ At least monitor the appropriate facility communication frequency when it is not practical to initiate radio contact for traffic information. This is particularly important when operating in or through arrival or departure routes and instrument approach areas.

■ Remember that controller observation of aircraft in the terminal area is often limited by distance, depth perception, aircraft conspicuity, and other normal visual acuity problems. Limitations of radar (when available), traffic volume, controller workload, unknown traffic, and so forth may prevent the controller from providing timely traffic advisory information. Traffic advisories are secondary to the controller's primary duties (which are separating aircraft under his control and issuing safety advisories when aware of safety conflicts). Therefore, the pilot is responsible for seeing and avoiding other traffic. Pilots should request and use traffic advisories, when available, to *assist* in seeing and avoiding other traffic. Traffic advisories are not a substitute in any way for the pilot's own visual scanning. It is important to remember that advisories provided by air traffic controllers are not intended to lessen in any manner the pilot's obligation to properly scan to see and avoid traffic.

Previous FAA Airspace Classification



Current FAA Airspace Classification*



msl - mean sea level
agl - above ground level
FL - flight level

*Effective 15 October 92

Airport traffic patterns

A significant number of midair collisions as well as near-midair collisions have occurred within the traffic pattern environment.

Pilots should—

■ Maintain two-way radio contact with the tower while within the airport traffic area when operating at tower-controlled airports. Make every effort to see and properly avoid any traffic pointed out by the tower or any other aircraft that may be in the area and unknown to the tower.

■ Keep a sharp lookout for other aircraft in the pattern when entering a known traffic pattern at a nontower airport. Enter the pattern in level flight, and allow plenty of spacing to avoid overtaking or cutting any aircraft out of the pattern.

■ Fly over or circle the airport at least 500 feet above traffic pattern altitude (usually at 2,000 feet or more above the surface) to observe the airport layout, any local traffic in the area, and the wind and traffic direction indicators when approaching an unfamiliar airport. Never descend into the traffic pattern from directly above the airport.

■ Be particularly alert before turning to the base leg or on the final approach course and during the final approach to landing. At nontower airports, avoid entering the traffic pattern on the base leg or from a straight-in approach to the landing runway.

■ Compensate for blind spots due to aircraft design and flight attitude by moving their heads or maneuvering the aircraft.

Flying in formation

Several midair collisions have occurred that involved aircraft on the same mission, with each pilot aware of the other's presence. Pilots who are required by the nature of their

operations to fly in pairs or in formation are cautioned to:

■ Recognize the high statistical probability of their involvement in a midair collision.

■ Make sure that adequate preflight preparations are made and the procedures to be followed are understood by all pilots participating in the mission.

■ Always keep the other aircraft in sight despite possible distraction and preoccupation with other mission requirements.

■ Avoid attempting formation flight without having obtained instruction and attained the skill necessary for conducting such operations.

Flight instructors and pilot examiners

The importance of flight instructors training student pilots to devote maximum attention to collision avoidance during flight operations in today's increasing air traffic environment cannot be overemphasized. Because students consciously and unconsciously imitate the flying habits of their flight instructors, instructors should set the example by carefully observing all regulations and recognized safety practices. Flight instructors and persons acting as safety pilots should—

■ Guard against preoccupation during flight instruction. Maintain a constant vigilance for other traffic.

■ Be particularly alert during simulated instrument flight where there is a tendency to "look inside."

■ Place special training emphasis on those basic problem areas addressed in AC 90-48C and this article where improvements in pilot education, operating practices and procedures, and techniques are needed to reduce the potential for midair collisions.

■ Notify the control tower operator at airports where a tower is manned when a student is making his first solo flight.

■ Explain the availability and encourage the use of *expanded radar services* for arriving and departing aircraft at terminal airports where this service is available. Also explain to students the use of radar traffic advisory services for transiting terminal areas when flying between en route points and encourage them to use the services available.

■ Understand and explain the limitations of radar that may frequently limit or prevent air traffic controllers from issuing radar advisories (refer to AIM).

Pilot examiners should observe the student's vigilance of other air traffic and ensure the student has adequately cleared the area before performing any flight maneuver during any flight test. The examiner should also determine the student's knowledge of the airspace; available FAA air traffic services and facilities; essential rules; and good operating practices, procedures, and techniques that are necessary to achieve high standards of air safety. ♦

—Adapted from *Army Aviation Flight Information Bulletin*, August 1992

Attention Black Hawk crews

In August 1992, a UH-60A entered one-engine-inoperative flight that could not be sustained because of the gross weight, altitude, and airspeed. The aircraft was within the avoid area of the height-velocity diagram (dead man's curve), figure 9-2, in TM 55-1520-237-10 at the time of sudden single-engine failure. The aircraft could not sustain flight, and a hard landing followed. There were no injuries to personnel but major damage to the airframe resulted.

Prompted by this accident that occurred after an in-flight engine failure, Aviation and Troop Command recently issued an aviation safety action informational message concerning T700-GE-700 gas generator rotor turbine blade failures/engine cleaning and single-engine flight planning procedures for all UH-60 and EH-60 aircraft (UH-60-93-ASAM-02, 151830Z Oct 92).

Aviation safety action message UH-60-92-03 discussed T700-GE-700 engine gas generator rotor turbine blade failure caused by shroud segment distress and outlined maintenance and operational procedures to be followed. The maintenance procedures emphasized cleaning of the engine on a periodic basis, depending on operating environmental conditions. And the operational procedures emphasized to pilots the importance of flight planning procedures in the area of single-engine operation.

Following this recent accident, the need for single-engine operation flight planning procedures and proper engine cleaning procedures should be reiterated. All affected units should re-read UH-60-92-ASAM-03 and adhere to its guidance. Preparedness is the key to avoiding the danger of a sudden single-engine failure.

—POC: Mr. Lyell Myers, Aviation and Troop Command, DSN 693-2285/2085, commercial 314-263-2285/2085

Engine flushes required

Several recent accident investigations have revealed that engine flushes are not being performed as required by maintenance manuals for operations in desert or other sandy, dusty environments. For example, a UH-60 was in a left turn at 75 feet agl and 25 knots during hover taxi when the crew heard loud popping noises that sounded like the No. 1 engine was experiencing a compressor stall. The PC was at the controls. He reduced power, at which point he received a radio call that flames were coming out of the No. 1 engine exhaust. As the PC applied collective power to slow the rate of closure, the pilot announced "low rpm." The PC reduced power until the aircraft reached an estimated 25 feet agl. The PC then applied collective power to cushion the landing. The aircraft struck the ground right side low and drifted right, sustaining extensive damage. The PC then applied brakes as the aircraft came to rest 95 feet from initial ground contact.

While preparing for the closeout phase of a National Training Center (NTC) training cycle, the battalion maintenance officer had shipped to home station essential maintenance equipment without making provisions for the required support of the aircraft involved in the closeout. Subsequently, the unit did not have the equipment available to perform the engine-flush requirements nor were facilities available at the NTC to rotating units. As a result, the aircraft overflew the engine-flush requirement by about 10 hours and experienced the in-flight engine failure. Investigation revealed that the engine had extensive accumulations of ingested sand/dirt that disrupted airflow.

In another accident, a small amount of residue was discovered in the power turbine section of a UH-1 during the postaccident examination. Although an engine flush had been completed on the aircraft when it returned to home station, the aircraft had flown 53 hours during a recent NTC rotation without an engine flush.

Increased requirements

One of the early lessons learned during Desert Shield was the requirement for more frequent engine flushes than indicated in the maintenance manuals. As a result, TB 55-2840-248-20-17: Desert and Combat Operations for T700 Series Engines (Operation Desert Shield) was published 5 December 1990 giving further guidance while operating Army engines in a desert or extremely sandy environment.

Water washes. Aviation and Troop Command (ATCOM) recommends that when operating in sandy/dusty conditions, engine water flushes should be done daily (or more frequently if possible) on a warm engine. Frequent engine flushes sustain engine performance. However, the problem is in acquiring an adequate supply of water to perform flushes following each flight. For more information, contact Mr. Mark Taylor, ATCOM, Maintenance Engineering, DSN 693-3261, commercial 314-263-3261.

Chemical washes. For chemical washes, units must comply with Environmental Protection Agency (EPA) standards. The National Training Center and Fort Irwin Aviators' Procedures Guide (forwarded to units before their deployment to NTC) dated 24 August 1992 provides instructions for handling hazardous waste during chemical flushes while at the NTC. The NTC currently does not have available wash facilities and equipment for units to use during their rotation.

Class A Accidents through October

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
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2d Qtr	January	3		0	
	February	1		0	
	March	4		2	
3d Qtr	April	1		0	
	May	1		1	
	June	2		2	
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	**22**	**6**	**10**	**2**

Recommendations

Currently there is a proposal for the NTC to provide an area suitable for rotational units to conduct required routine engine flushes while complying with EPA standards. Additionally, an alternate engine flush compound has been identified and is currently being evaluated for use at the NTC.

Until these efforts are finalized, however, unit maintenance officers must deploy with the necessary equipment to perform the required flushes. And the equipment must remain with the unit to support the aircraft during closeout.

In addition to TB 55-2840-248-20-17 and the NTC publication, UH-60-ASAM-92-03 also contains specific guidance on increased engine flushing requirements when operating in desert or dusty/sandy environments. ♦

—POC: LTC George Giffin, Investigations Branch, AV 558-2119, commercial 205-255-2119.

Kiowa information needed

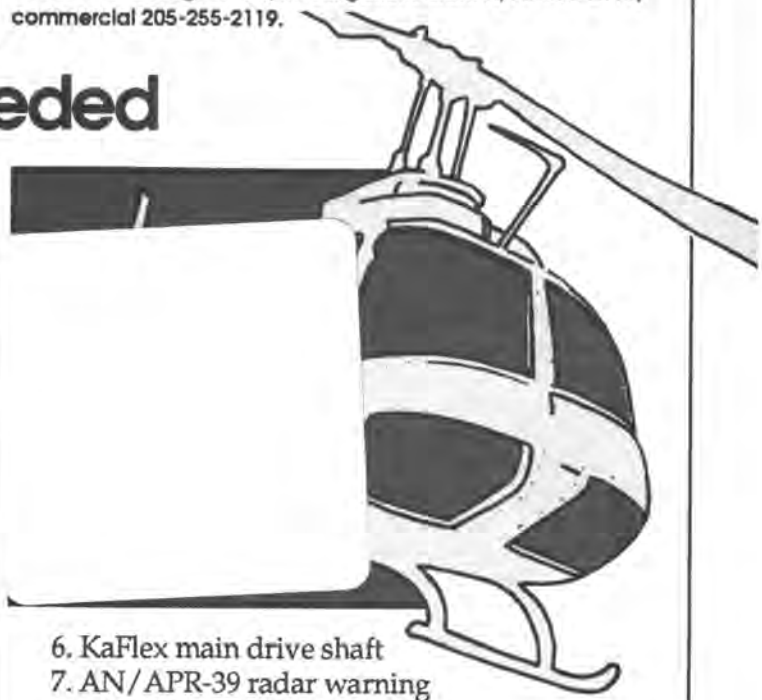
The Light Observation Helicopter Product Management Office has been redesignated Weapon Systems Manager for Light Observation Helicopter. Our name may have changed, but our mission remains the same: to support the logistics and maintenance requirements of the OH-58A/C fleet.

Everyone realizes the military is downsizing, and Army aviation is not exempt from this process. Consider the increased emphasis on "force modernization" aircraft, and you can appreciate that those of us flying, maintaining, or modifying the Kiowa must truly do more with less.

One of the ways we can stretch limited program dollars is to restrict acquisitions to the minimum number of components and systems required to complete the fleet. To do this, we need an accurate picture of the components and systems that are currently on the aircraft. We don't have a complete data base for the Kiowa fleet's installed equipment even though we've been actively working toward that goal for nearly 15 months. Our thanks to those units that responded to the *Aviation Logistics* newsletter request for this important information.

For those units that have not responded to our request or may be reading about it for the first time, we'd like to hear from you. It's never too late to make a difference. For each OH-58A/C aircraft in your unit, please send us the full tail number with suffixes from the following list, showing which components and systems are on that particular aircraft (for example, 72-21345-1,3,4,5,6,10):

1. Air-to-air Stinger
2. Flat plate canopy
3. M43 blower mount
4. AN/APN-209 radar altimeter
5. IR exhaust suppressor



6. KaFlex main drive shaft
7. AN/APR-39 radar warning
8. AN/APN-201 SINCGARS
9. Casey heater
10. Improved tail rotor
11. Airframe in-line fuel filter
12. External oil scavenge oil filter

Units operating aircraft with special systems not included in this list can add suffixes and state which systems they are. Write, call, or FAX, we don't care how you do it—just do it! We really need your help. The address is Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-W-AL (MAJ Johnson), 4300 Goodfellow Blvd, St. Louis, MO 63120-1798, DSN 693-2781/1350, commercial 314-263-2781/1350, FAX 693-2588/1508 or commercial 314-263-2588/1508.

Requests for assistance or suggestions are welcome. We are committed to supporting the OH-58A/C Kiowa and solicit your assistance in keeping the Army's aeroscout fleet out front and "Above the Best." Thanks for being part of the team. ♦

—POC: MAJ Wayne P. Johnson, ATCOM, Weapon Systems Manager for Light Observation Helicopter

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - During terrain flight training mission, aircraft collided with small earthen dam and impacted inverted on side of small gully. Fuel from crushed fuel cells spilled onto hot engine and started postcrash fire that consumed aircraft wreckage. Two fatalities. 9301

UH-1 Class C

H series - During second leg of counternarcotics operation flight, PC conducted unauthorized low-level flight with unauthorized passengers on board. While in 180-degree left turn, aircraft descended into trees. Crew continued flight after incident and returned passengers to pickup zone but did not inspect aircraft for damage after landing. Crew then flew additional 30 minutes back to base. Postflight inspection revealed damage to aircraft.

UH-60 Class C

A series - During extraction of infantry platoon, aircraft was lead in flight of two. In cruise flight at 100 feet agl and 130 knots, pilot noticed master caution and No. 1 and 2 engine oil temperature lights. PC noticed several high indications on pilot and central display units. PC also noticed No. 2 egt was significantly higher than No. 1 egt. PC analyzed situation as increasing percent rpm emergency and initiated emergency procedures by reducing No. 2 engine power control lever (PCL). Aircraft began losing rotor rpm and altitude. PC immediately returned No. 2 PCL to fly position, but aircraft continued to lose rpm and altitude until it was landed. Main rotor blades contacted tree on touchdown, incurring damage to main rotor blades and associated FOD to several aircraft components.

L series - At 3 to 5 feet agl during approach to landing, aircraft browned out. Pilot completed landing with slight forward movement. Sand built up in front of tires, and aircraft came to abrupt halt, damaging FLIR turret.

UH-60 Class E

A series - At about 100 knots during NOE flight, pilot placed aircraft in 45-degree right turn. While in turn, aircraft began to settle. Turn was completed, and pilot applied aft cyclic and increased collective in an effort to stop descent. Aircraft continued to descend and settled in trees at about 80 knots. Crew regained aircraft control and climbed clear of trees. Postflight inspection revealed cracked ADF loop antenna, broken cargo hook light, and small dent in leading edge of stabilator on right side.

Attack

AH-1 Class B

F series - While on final approach to level terrain with no obstructions, pilot allowed excessive rate of closure to develop. Aircraft struck ground and came to rest upright and on right pylon stores. Crew completed emergency shutdown. No injuries. 9238

S series - PC misjudged height above trees. Damage not noticed until postflight inspection after shutdown in FARP. 9239

AH-1 Class C

F series - During screening mission, pilot noticed change in noise. Crew landed and checked for problems. After finding none, flight continued to forward assembly area. After refueling, crew landed and shut down aircraft. During postflight inspection, crew found damage to both main rotor blades.

S series - On short final, master caution and transmission oil hot lights came on. Crew continued approach to touchdown and immediately shut down aircraft. Engine oil temperature reached 150°+ and transmission oil temperature peaked at 120°. Inspection revealed lubricating cooler fan and turbine assembly had seized.

AH-1 Class E

F series - While flying at 50 feet agl and 50 knots along highway, aircraft struck two wires. TSU guide bar cut upper wire, and lower WSPS cut lower wire. Aircraft sustained no damage.

AH-64 Class A

A series - While on downwind, pilot placed crossfeed switch in aft position for fuel management and both engines flamed out. Crew entered autorotation and landed on dirt road. Landing gear stroked and damage occurred to M230 gun and underside of aircraft. Wings also sustained damage. No injuries. 9240

A series - During hovering flight, aircraft experienced uncommanded right roll. As aircraft reached 90 degrees in roll, it fell to ground. Aircraft completed roll and stopped inverted on left side. All main rotor blades were severed, and tail boom was broken off. Both crewmembers received minor injuries. 9241

AH-64 Class C

A series - While in terrain flight, aircraft descended below tree line and tail rotors, stabilator, and missile launcher made contact with tree. IP increased power, brought aircraft to hover above tree line, and initiated approach and landing back to airfield.

Cargo

CH-47 Class A

D series - At 80 knots and just above treetops while making descending right turn to NOE flight, PC reduced power, applied right pedal, and felt binding. As pedal reached 1½ to 2 inches, pedals froze. PC verified that pilot did not have his feet on pedals. PC then asked pilot to help apply pressure on pedals, but pedals still could not be moved. When pedals locked, aircraft nose began to tuck and aircraft began to roll right. PC applied aft left cyclic and initiated cyclic climb to gain altitude and get out of right roll. Aircraft was leveled at 500 feet agl, and airspeed was near zero. Aircraft then began uncommanded left flat spin. Attempting to stop spin, PC applied right cyclic to try to fly out of spin, and aircraft began

right roll. PC neutralized controls and right roll stopped, but aircraft continued left spin. PC then tried to follow spin with left cyclic. Nose tucked left, and aircraft attempted to roll left. PC neutralized controls, and roll and tuck stopped. Left spin had increased rpms, and Class 1 cargo was being thrown from aircraft through rear ramp (tongue had been lowered for NOE flight). Pilot attempted adjusting power and engine rpm with no effect on spin. With power at 53 percent, aircraft began uncommanded 3,000-foot-per-minute descent. Just before impact with trees, PC applied thrust to arrest descent. As aircraft decended into trees, it made one additional turn, and PC pulled all remaining thrust. When aircraft came to rest, both engines were on fire. PC applied both pull handles to No. 2 (right) engine (side being used to evacuate 17 onboard personnel). PC extinguished No. 1 engine fire with portable fire extinguishers, then radioed for assistance with his PRC-90 survival radio. Minor injuries; no fatalities. 9302

CH-47 Class C

D series - Aircraft had just departed hot refuel after completion of IFR flight. While picking up to 10-foot hover, aircraft had reached about 6 feet when rotor rpm started climbing rapidly. Crew saw both torque needles climbing together. PC moved No. 2 engine condition lever (ECL) to ground position, which had no effect on torque or rotor. Rpm reached 115 to 120 percent. PC then moved No. 1 ECL to ground position, and rotor rpm decayed as pilot landed aircraft. Crew started APU and completed normal shutdown.

CH-47 Class D

D series - While in cruise flight at 500 feet agl during slingload mission, forward sling broke and F-4 free fell into 8 feet of water. Slings used by suported unit had been rigged with spacer bar, causing forward sling to be cut.

Observation

OH-6 Class C

J series - During cruise flight, air filter caution light came on and MP initiated normal approach to field site. While passing through etl, MP realized he was making downwind approach and applied power to begin climbout. Aircraft continued to descend, hit ground on right skid, and spun clockwise 340 degrees, damaging skids, tail boom, tail rotor, and right side of fuselage.

OH-58 Class A

C series - While attempting slope landing on an approximately 8-degree slope, crew placed right skid against upper slope and main rotor blades contacted ground on upper slope. Aircraft came to rest upright with damage to all major components. No injuries. 9303

Fixed wing

OV-1 Class E

D series - During cruise flight, master caution light came on with no accompanying segment light. Crew aborted mission and returned to base. On short final, master caution and fuel pump segment lights came on. Maintenance found inoperative aft fuel boost pump.

D series - During level flight at 8,500 feet, No. 2 engine experienced severe compressor stall. Compressor stall occurred in high angle of attack, above 54 percent torque. Cause of stall is under investigation.

D series - During cruise flight, No. 1 engine oil pressure dropped to zero. Visual inspection of engine revealed oil leakage at bottom of cowling. Crew performed emergency engine shutdown and completed single-engine landing without further incident. Inspection revealed engine fire extinguisher hose had pushed against engine oil drain valve, causing it to open.

Maintenance

UH-60 Class E

A series - As aircraft was brought to hover, crew lost tail rotor control but was able to complete uneventful landing. Inspection revealed hydraulic lines had been improperly installed.

A series - During runup for transmission oil samples, aircraft was at engine idle when crew heard loud bang and pilot's overhead window shattered. Crew completed emergency shut-down. FOD check had not been completed after maintenance, and spool of safety wire had been left on top of head. Wire slipped off and was struck by two rotor blades and thrown into window.

A series - During hot refueling, main module chip caution light came on. Crew completed shut down. When maintenance crew attempted to remove chip detector, they discovered sleeve assembly gearbox had been damaged. Someone had previously removed chip detector without using correct tool.

OH-58 Class E

A series - Improperly installed left crew door opened during flight, destroying door. Lower latch pin was not installed, allowing slipstream air to force lower leading edge of door away from fuselage. Upper pin was installed, and door remained attached but fluttered and banged against fuselage, shattering plexiglass and deforming door structure assembly. Mechanic had failed to install door properly, and technical inspector had failed to adequately inspect work.

Messages

■ Safety-of-flight operational message concerning operation of the fuel crossfeed system in all AH-64A aircraft (AH-64-93-01, 051600Z Oct 92). Summary: The current AH-64 operator's manual does not reflect the proper procedures for operation of the fuel crossfeed system. The purpose of this message is to provide proper procedures for operation of the fuel crossfeed system. A copy of this message should be inserted in TM 55-1520-238-10 as authority to implement the change until the printed change is received. Contact: Mr. Dong K. Nguyen, DSN 693-2085/2885, commercial 314-263-2085/2885.

■ Safety-of-flight emergency message concerning immediate grounding of CH-47 and MH-47 series aircraft (CH-47-93-01, 232230Z Oct 93). Summary: During the investigation of a CH-47 accident in Alaska, the probable cause was isolated to the suspected materiel failure of a screw in the upper boost actuator control valve. This failure would

restrict the travel of the pilot valve in the upper boost actuator, resulting in reduced controllability of the aircraft. PEO-Aviation and ATCOM are working to get a full understanding of the problem and will provide continuous updates until the problem is fully understood and a final fix is identified. Contact: MAJ Victor P. Malmgren, DSN 693-2258, commercial 314-263-2258.

■ Safety-of-flight technical message concerning ungrounding of U.S. Army CH-47D, MH-47D, and MH-47E aircraft (CH-47-93-02, 302100Z Oct 92). Summary: CH-47-93-01, 232230 Oct 92, grounded all U.S. Army CH-47D, MH-47D, and MH-47E aircraft because of the materiel failure of a screw in the upper boost actuator control valve. The screw failed because of hydrogen embrittlement. *Note:* CH-47C aircraft were not affected by CH-47-93-01. Replacement screws are made of a different material, have been silver-plated, have a nylon locking feature bonded to them, and are identified by six dimples on the head. Boeing teams are being sent to centralized locations to train unit maintenance personnel (AVUM) and available CH-47D logistics assistance representatives (LARs) on the proper installation and inspection of the new screws. Units will be telephonically notified of the training schedule. Any questions should be directed to the logistical POC, Mr. Stephen F. Kouchnerkavich, DSN 693-1415, commercial 314-263-1415. The new screws and written instructions will be provided by Boeing teams. (Additional copies of Boeing letter/message 8-1420-3-4440, dated 29 Oct 92, may be obtained from the local LAR). Units are required to provide qualified maintenance personnel to attend training, which may be conducted after normal working hours. The purpose of this message is to provide ungrounding instructions for CH-47D, MH-47D, and MH-47E aircraft. Contact: Mr. Brad Meyer, DSN 693-2085, commercial 314-263-2085.

■ Aviation safety action maintenance mandatory message concerning one-time and recurring inspection of the UH-1 droop compensator jackshaft assembly on all UH-1H/V aircraft (UH-1-92-ASAM-13,301700Z Sep 92). Summary: A corrosion problem has been identified with the droop compensator jackshaft assembly, P/N 205-060-710-1. Two failures have occurred on UH-1H aircraft sold to foreign governments through foreign military sales. The failures indicate corrosion of the clevis arm riveted to the tube. The clevis arm can be manufactured using either aluminum or magnesium. The failures have only involved the magnesium clevis arm. The corrosion was severe enough to totally fail the clevis arm at the first rivet. Due to the design of the jackshaft and its installation, it is impossible to visually detect the corrosion on the clevis arm. For this reason, an inspection has been developed to check for a severely corroded magnesium clevis arm with the jackshaft partially installed on the aircraft. Since corrosion is time dependent, this inspection will be required on a recurring basis. The purpose of this message is to require a one-time and recurring inspection of magnesium clevis arms for corrosion. Aluminum clevis arms will be identified and do not require a recurring inspection. Contact: Mr. Roger Heidenreich, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning one-time inspection for proper hardware on the pedal adjuster assembly, P/N 70400-01613, on all H-60 Army aircraft (UH-60-92-ASAM-06, 211830Z Sep 92). Summary: The pedal adjuster assembly, P/N 70400-01613, on some aircraft has recently been found with the input arm, P/N 70400-01610-042, partially slid off the pedal adjuster mechanism because of deformation of the securing washer. The washer deforms because the nut used to secure the components together is not large enough. With sufficient force, the washer could deform around the nut and allow the input arm to slide off the mechanism. The purpose of this message is to ensure the pedal adjuster assembly input arm has the proper hardware installed. Contact: Mr. Lyell Myers, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning one-time operational check of the transmission and gearbox chip detector system on all H-60 Black Hawk aircraft (UH-60-93-ASAM-01, 072000Z Oct 92). Summary: There have been reports from the field of instances where chip detectors have failed to operate properly. The purpose of this message is to require a one-time operational check of all transmission and gearbox chip detectors to ensure they are functioning properly and to gather information to determine if the current maintenance requirements are adequate. Contact: Mrs. Terese McGrew, DSN 693-2285/2085, commercial 314-263-2285/2085.

■ Aviation safety action maintenance mandatory message concerning inspection of the mast support base for corrosion and shear bolts for torque check on all AH-64A aircraft (AH-64-93-ASAM-01, 051800Z Oct 92). Summary: During STIR/phase inspections, excessive corrosion pitting on the mast support bases and one broken shear bolt were found. Most pronounced areas of pitting were inside the four recesses that are covered and sealed. The purpose of this message is to direct a one-time and recurring inspection of the mast support base and shear bolts and to provide maintenance procedures to prevent corrosion. Contact: Mr. Dong K. Nguyen, DSN 693-2085, commercial 314-263-2085.

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

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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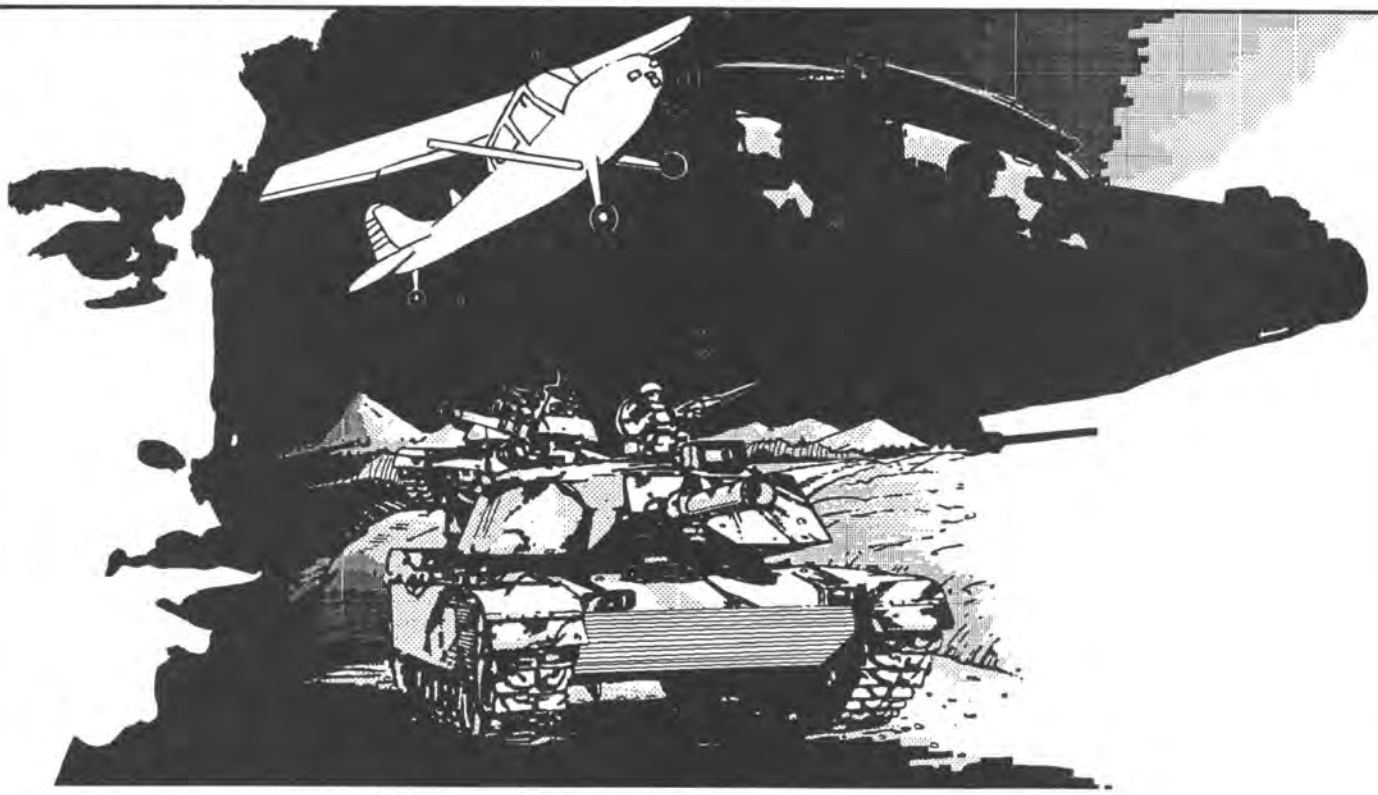
REPORT OF ARMY AIRCRAFT ACCIDENTS



Aviation safety

Over time, great leaders have conducted training and combat operations without an unnecessary loss of people and equipment.

During FY 92—while the Army was down-sizing, moving units, and releasing thousands of service members—we established the best aviation safety record in our history: a Class A accident rate of 1.58* accidents per 100,000 flying hours. This was the lowest rate, by far, ever achieved by Army aviation.

However, in the first 45 days of FY 93, we destroyed 8 aircraft with the loss of 10 lives. Only one of the accidents was the result of materiel failure; human error is the dominating factor. We must not allow this to become a trend.

Our Army is in the midst of considerable change. There is potential to compromise our proven aviation standardization and safety process. Constrained training programs call for uncommon leadership at all levels.

Leadership makes the difference. We don't need new standardization or safety programs. I'm not going to stand down the fleet. Apply our current programs with aggressive leadership and tough management. Our challenge is to reverse this accident trend and make FY 93 another safe year for soldiers.

Strategic force—decisive victory.

—Chief of Staff of the Army, General Gordon R. Sullivan

*Subsequent to General Sullivan's message, the official rate was adjusted to 1.57 based on a correction in the end-of-year flying hours.

Army losses approaching $1 billion per year

The figure is astonishing, but it's true. The sad thing is, these losses are from accidents—accidents that could have been prevented.

Accidents exact a far greater toll on Army operations than most people realize. Historically, accidents have caused more casualties than were caused by enemy action in every war except the Korean war. And unfortunately, accidents don't just happen during combat; they occur every day as we prepare to be "a total force trained and ready to fight, serving the nation at home and abroad—a strategic force capable of decisive victory."[1]

For the 3 years from 1989 through 1991, the Army averaged losing about 360 soldiers every year as a result of preventable accidents. That means for almost every day of the year, a soldier died. During these 3 years, we also destroyed or damaged a lot of valuable equipment. Each year, we averaged destroying or damaging 137 aircraft, 129 armored combat vehicles (ACVs), and another 1,600 Army motor vehicles (AMVs). Then a banner year occurred. In 1992, fewer soldiers lost their lives, and we damaged less equipment in accidents than we had in any of the previous 3 years (see Chart 1).

Chart 1. Comparison of Accidental Losses for FY 89-91 and FY 92

	FY 89-91 (3-Year Average)	FY 92
Military Fatalities	360	237
Aircraft (Class A-C)	137	112
ACVs (Class A-D)	129	41
AMVs (Class A-D)	1,600	752

We reached new goals in cutting our accident losses during FY 92. However, when we consider military and civilian personal injuries, damaged and destroyed equipment, loss of facilities, environmental clean-up costs, and so forth, the cost associated with accidents is still approaching $1 billion per year.

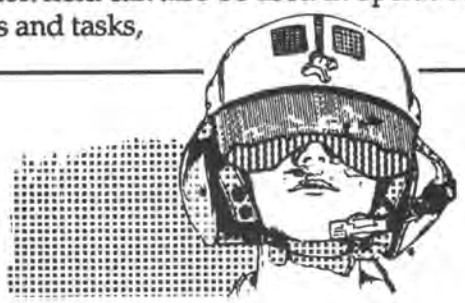
We don't budget for losses in lives, equipment, or productivity that result from accidents; therefore, these losses represent a reduction in combat power. Accidents cannot be written off as "the cost of doing business." From a cost and readiness standpoint, accidents are a waste we simply cannot afford.

As evidenced by the improved statistics for FY 92, we are changing the way we do business. But there is still room for improvement. As leaders and individuals, we share the responsibility to protect our force by reducing accidental losses. And proper risk management is the way we must do business to accomplish this objective.

The risk management tool

Risk management is not a new concept. It's been used for years in private industry—for example, insurance companies gathering information to determine whether to accept you as an accident risk for the price of the premium—and in the Army's acquisition business to design safer equipment. To help protect the force and conserve resources, we're now applying risk management to Army training and operations.

Risk management is the tool commanders, officers, NCOs, safety staff members, and individuals can use to improve performance and avoid accidents. And the rules and process (shown in the sidebar) used successfully in the acquisition field can also be used in operational missions and tasks,



Risk-management rules

1. Integrate risk management into planning.
2. Accept no unnecessary risk.
3. Make risk decisions at the proper level.
4. Accept risk if benefits outweigh the cost.

Risk-management process

1. Identify hazards.
2. Assess hazards.
3. Make a risk decision.
4. Implement controls.
5. Supervise.

[1]Chief of Staff of the Army, General Gordon R. Sullivan

thereby conserving our warfighting capability for decisive action during combat.

The key to successful risk management is to identify as many hazards as possible before the mission and either eliminate them or reduce the likelihood of their occurring. Of course, not all hazards will be identified. If they could, theoretically, we would prevent all accidents. But through mission hazard analysis, many can be identified and controlled through training and supervision. And even for those hazards not identified in the mission hazard analysis, soldiers properly trained in the risk-management process can effectively identify, assess, and control hazards as they are encountered, which in turn will improve unit performance.

Sources of human-error accidents

Human error—the what happened to cause the accident—is responsible for approximately 80 percent of all accidents. Chart 2 shows a breakout of the unit readiness shortcomings—the why the error happened—that are responsible for human error in our aviation night accidents. Individual and leader failures account for two-thirds of the readiness shortcomings. These two readiness shortcomings are attitude-based and indicate a poor command climate for force protection.

Risk-management training can provide the skills soldiers need to identify and correct readiness shortcomings. For example, a lack of self-discipline is the most common cause of human-error accidents. These accidents involve soldiers who choose not to follow rules, regulations, standards, or laws.

Using the Next Accident Test currently being developed by the Army Safety Center (see article, page 4), soldiers can rate themselves to determine their risk of causing the next accident. And the leader's test will help commanders determine the risk of their aviators in causing the next accident. By identifying the hazard early, commanders can then implement more stringent control measures. For example, one control measure is to battle roster an inexperienced or indisciplined aviator with a more experienced, disciplined aviator.

The second readiness shortcoming that most often results in human-error accidents is leader failure. About 18 percent of the night-crew-error accidents resulted because the leader was not ready, willing, or able to enforce known standards.

Eliminating readiness shortcomings is essential to reducing accidents and protecting the force. And we can begin this task by embedding risk management in the schoolhouse. The Army is moving rapidly to incorporate the teaching of safety risk management into its programs of instruction so that it becomes the "way the Army does business." Then we'll have soldiers and leaders who are better prepared to integrate safety into all operations. The result will be ready units with the ability to protect their strength through accident prevention and increase our ability to win fast with minimum casualties.

Conclusion

Risk management is not intended to be a separate process; it's a tool to be used within recognized Army processes; for example, troop-leading and decision-making procedures as well as each step of the training-management cycle. Risk management is the tool that takes safety out of the compliance and afterthought mode and makes it a condition and standard of every operation. Once institutionalized and diligently applied, risk management will enhance all Army

Chart 2. Sources of Human Error in Aviation Night-Crew-Error Accidents

	Readiness Shortcomings
Individual (41%)	■ Soldier knows and is trained to standard but elects not to follow standard (self-discipline). - Attitude - Overconfidence - Haste - Fatigue (self-induced) - Alcohol, drugs
Leader (27%)	■ Leader does not enforce known standard. - Direct supervision - Unit command supervision - Higher command supervision
Training (12%)	■ Soldier not trained to known standard (insufficient, incorrect, or no training on task). - School - Unit - Experience, OJT
Standards (15%)	■ Standards/procedures not clear or practical, or do not exist. - Task - Condition - Standard - Operating procedures (AR, TM, FM, SOP, etc.)
Support (5%)	■ Equipment/materiel improperly designed/not provided; inadequate maintenance/facilities/services.

operations. The idea of hazard identification is expanded to include all hazards, not just the ones presented by the enemy. Training is enhanced because specific hazards are identified early, and many can be eliminated through sound planning. For those hazards that can't be eliminated, we can have specific controls in place to reduce the risk. An integrated risk-management process will impart better decision-making skills to all soldiers, and those skills will help control accidental losses in training and combat, as well as carry over into off-duty activities.

If the Army is to have its maximum combat capability available, we must conserve our soldiers and equipment by learning to manage risks in all operations. With better risk-management skills in the operational Army, individual, leader, training, standard, and support failures that result in human-error accidents can be reduced. When *everyone* assumes the mantle of safety and makes risk management part of their ethic, then we'll be able to turn the corner on avoidable accidents. ♦

Safety Center developing risk assessment survey

Officials at the Army Safety Center hope a survey that's being developed will give commanders yet another tool to raise safety awareness within their units.

Called the Next Accident Test, the survey is loosely based on three questions the Army Aviation Center Commanding General, Major General Dave Robinson, feels soldiers and leaders must ask themselves as part of their personal accident prevention effort. They are:

- Who will have the next accident?
- What kind of accident will it be?
- What am I doing about it?

Command Sergeant Major Samuel Reynolds and Dr. Brenda Miller of the Safety Center are now surveying about 1,000 soldiers and leaders at Fort Rucker in an attempt to validate the Next Accident Test. Their findings will be used to develop a Next Accident Test for use Armywide.

The survey has two components: a self-administered individual test for soldiers and a leader's test used to record unit data.

On the individual test, soldiers rate their self-discipline, their leadership, the training they receive, and the support they get in the performance of their work. Point values are assigned to each answer, allowing soldiers to grade themselves and assess their personal risk of causing an accident.

The leader's test covers the same subject areas, but asks commanders for specific figures on unit training, equipment, test scores, proficiency, and counseling. They can then determine the likelihood of an accident happening within their unit. ♦

—Adapted from the Fort Rucker *Army Flier*

Survival radio requirement for each crewmember delayed

AR 95-3: Aviation: General Provisions, Training, Standardization, and Resource Management, paragraph 7-6b requires each aircraft crewmember be equipped with a survival radio. Headquarters Department of the Army (HQDA) message dated 091936Z Sep 91 delayed implementation of this requirement until 30 September 1992, IAW paragraph 1-5a(2), AR 95-3. And HQDA message dated 291340Z Sep 92 authorizes delay in the complete implementation of AR 95-3, paragraph 7-6b until 30 September 1993.

This delay is to allow redistribution of the AN/PRC-90 survival radio and procurement of additional AN/PRC-112 survival radios, which will be fielded IAW the DA fielding plan.

In the interim, the pilot-in-command (PC) will continue to ensure that not less than one fully operational survival radio is on board the aircraft. This does not preclude crewmembers from carrying additional radios on board the aircraft as assets become available. In addition, the PC will ensure that crewmembers without radios have other signaling devices, that is, L119 foliage penetration flare kit and/or a signaling mirror. ♦

—POC: MAJ Donald Bridge, HQDA, Aviation Logistics Office, DSN 227-0487

It's that time again

Just as surely as football follows summer, colds and viral infections follow the cold temperatures of winter. With more people occupying closer spaces, winter infections spread rapidly. We catch colds, get sore throats, and share any number of stomach viruses. One of the most virulent of the winter diseases is influenza, or flu.

How dangerous is the flu?

In the 1918-19 influenza epidemic, one-quarter of the world's population at that time was infected with the flu virus, and 20 million people died. In the U.S. military, 80 percent of the deaths (43,000 people) during these years were caused by flu.

But that was a long time ago and flu isn't such a big thing anymore, right? It depends on how you look at it. It's true that only 1 in 5,000 to 10,000 people die each year from flu. And most of them are elderly or people suffering from chronic heart or lung disease. But that doesn't mean flu is no longer a threat. In each of seven epidemics in the U.S. from 1977 to 1988, more than 10,000 people died. During two of these epidemics, 40,000 people died each year.

Aside from the risks of dying, flu puts more than 172,000 people in the hospital every year in this country alone. And that in no way accounts for the thousands treated as outpatients and those who manage to get well without ever seeing a doctor. So flu is a serious and costly business—both in terms of money and loss of productivity. It has a great potential for affecting the Army's readiness and warfighting capability.

How does flu affect its victims?

Influenza is a viral infection affecting the ears, nose, throat, and lungs. The abrupt onset of a fever ranging from 102° to 104° for 3 or 4 days, muscle aches, headache, and cough can mean that the victim has influenza. In some cases, patients have complained that even their eyelashes hurt.

Can flu be avoided?

Yes. Immunization is effective in preventing the flu in 67 to 92 percent of the people who receive it. The problem is in making sure that people receive the immunization. There are a variety of reasons people give for avoiding taking flu shots.

■ *"The shot gives me the flu."* No, it doesn't. Flu vaccine is made from highly purified, egg-grown viruses that have been rendered noninfectious (inactivated). Therefore, the vaccine cannot cause influenza.

■ *"I might experience some kind of side effects."* There might be some redness, tenderness, itching, or hardening of the skin in the area where the shot is given. Some people (less than 1 percent) may run a fever within 48 hours of vaccination, but ask anybody who has ever had a case of the flu and they will tell you this is *nothing* compared to what influenza can do to you. To put it simply, current influenza vaccines are very safe and side effects are minimal.

Are there some people who shouldn't receive flu immunization?

There are a few rare cases where people should not be given flu shots, for example:

■ People who are allergic to eggs. The flu vaccine is egg grown, and people who are allergic to eggs may be allergic to the vaccine.

■ Someone who is running a fever caused by some other illness. But after the person becomes well, they should go ahead with the flu shot. A mild respiratory illness with no fever is no reason for delaying taking the flu shot.

Taking the flu shot is good preventive medicine

If you have ever had the flu, you probably don't have to be convinced of this. If you have never had the flu, believe me you don't want to have it. Use good sense, get your flu shot and encourage your family members to do the same.

—LTC Edwin Murdock,
Flight Surgeon, Army Safety Center

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class B

V series - Aircraft had been refueled 1 to 1½ hours before mission. Crew was repositioning aircraft to runway for departure. Aircraft was at 40- to 50-foot hover, below etl to clear dusty area, when crew heard loud bang and engine failed. Aircraft landed hard, damaging landing gear, tail boom, right greenhouse, and chin bubble. Crew exited aircraft unassisted. 9304

UH-1 Class C

H series - Crew chief found evidence of tree strike during daily inspection. Aircraft had been flying NOE and conducting OGE maneuvers in support of exercise during previous day. Crew had completed postflight inspection after dark and failed to find damage. Both rotor blades were replaced.

H series - During takeoff, pilot felt slight side-to-side feedback in controls for about 2 seconds and decided it was due to wind gust. While continuing climb-out, PC came on controls, felt another feedback, and decided to return to airfield. After turning around and calling tower, crew noted engine rpm at 6000. PC elected to begin approach to open field, rpm increased to 6600, and everything seemed normal. At 200 feet agl, crew began increasing power and rpm dropped to 3000. Aircraft landed hard in plowed field. Skid gear collapsed, but aircraft remained upright. Suspect fuel control malfunction.

H series - Daily inspection revealed mixing lever had hit pillow block bolt, scissors had struck inner ring of swashplate, and swashplate inner plate had struck support. After test with hydraulic mule, controls were found to be in rig. Cause of damage is unknown at present.

H series - With main rotor at flat pitch while setting up for manual throttle operations in emergency governor mode, crew removed slack from throttle and noted decrease in rpm. Crew placed governor to emergency position. A few seconds later, rotor rpm increased to 7200. Both pilots reacted by reducing throttle to engine idle stop. When rpm decreased to 3800, crew placed governor switch to governor position and initiated 2-minute cool down. Mount for bellcrank 41 was found delaminating from airframe, allowing throttle control linkage to move out of rig.

UH-60 Class C

A series - During steep approach into single UH-60 LZ, IP in left seat sensed that aircraft was too close to trees on right side. He advised pilot to pull up, as did other crewmembers. Pilot did not respond to instructions and continued to descend until aircraft struck trees. IP was too slow in recovering control of aircraft when it was obvious that pilot was not responding to crew directions.

A series - During postflight inspection, crew found No. 1 engine cowling was missing. Suspect cowling came off during flight.

L series - During slingload operation, crew chief mistakenly released external load (HMMWV) from 8-foot hover. Attempting to make call over ICS, crew chief depressed normal release button on crewmember's pendant.

Attack

AH-1 Class C

F series -During NVG cruise flight while over wires at about 200 feet agl and 40 knots, crew heard rumble and popping sound and saw sparks aft of crew compartment. PC saw N2 at 95 percent and initiated power-on descent. As crew lowered collective, N2 returned to 100 percent and PC continued gradual descent to open field. At 30 feet agl and below etl as PC increased power to terminate approach, engine experienced sudden and severe power drop. PC momentarily lowered collective full down and then pulled all collective pitch at 10 feet agl. Aircraft descended vertically at high rate and impacted in slightly nose-up, wings-level attitude. Aircraft bounced once while rotating 33 degrees clockwise around the nose and moving about 10 feet

Class A Accidents through December

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	8
	December	1		0	
2d Qtr	January	3		0	
	February	1		0	
	March	4		2	
3d Qtr	April	1		0	
	May	1		1	
	June	2		2	
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	22	8	10	10

laterally to the left, coming to rest upright. Investigation revealed that engine failure was caused by internal disintegration of one fifth-stage rotor vane, which broke off at base.

AH-1 Class D

F series - Aircraft was en route to aerial gunnery range for its second firing iteration. As aircraft crossed ridgeline, pilot felt slight shudder that was interpreted as turbulence. While firing rockets, crew noted that only left side was firing. Crew landed aircraft to determine cause and found right rocket pod was missing. Right inboard ejector rack was in unlocked position. Ejector cartridge was not fired. Suspect rack was not fully locked during installation of rocket pod.

AH-1 Class E

F series - During JAAT operation, crew felt buffeting in airframe and heard muffled report. Crew then noticed outboard wing stores had jettisoned. Crew completed landing and normal shutdown. Maintenance found that wires to jettison switch on pilot's collective had been twisted, causing insulation to pull back and expose wire. When switch protective cup was bumped, switch moved, causing wires to touch. Circuit was completed and stores jettisoned.

AH-64 Class A

A series - While in free cruise formation during day VFR tactical training flight, pilot of Chalk 3 initiated descending right turn to reposition behind Chalk 2. Chalk 3 descended into trees, traveling about 330 feet before coming to rest on its right side. No fatalities. 9305

AH-64 Class C

A series - After completing situational training exercise, aircraft arrived at battalion FARP and established OGE hover. While waiting for ground guides, crew allowed aircraft to descend into tree. Neither PC nor pilot detected descent or tree contact. Pilot initiated go-around when he noticed radar altimeter was indicating zero altitude. On next approach, crew landed aircraft successfully at FARP. After refueling, crew departed for home station and completed mission without further incident. During postflight inspection, PC found damage to stabilator and four tail rotor blades.

AH-64 Class E

A series - At 15 feet agl during hover taxi for takeoff, No. 2 nose gearbox chip caution/warning light came on. Crew landed aircraft immediately, retarded No. 2 engine to idle, and ground taxied to parking. Crew chief found large metal fragments on chip detector.

Cargo

CH-47 Class C

D series - While in cruise flight with PU-794/G generator set rigged on center hook, load suddenly released from hook. No master caution or associated segment lights came on. Investigation continues.

Observation

OH-58 Class A

A series - During NVG landing to field site, aircraft rolled right. Main rotor blades struck ground, and aircraft came to rest on its right side. Minor injuries. 9306

C series - IP was conducting NVG PC flight evaluation. At 10-foot agl hover, both crewmembers diverted their attention inside cockpit. Aircraft drifted rearward, and tail rotor struck ground. Aircraft spun several times and landed hard. Minor injuries. 9307

OH-58 Class C

C series - During NOE flight over open terrain, PC noticed three T-72s attempting to engage aircraft and began evasive maneuver. Aerial observer (AO) called overtorque. Because of radio traffic, PC did not hear overtorque call and continued to pull power. Torque reached 124 percent for 1 second. AO then informed PC of overtorque, and PC landed aircraft immediately without further damage. Overtorque requires replacement of K-Flex drive shaft. Transmission and free-wheeling unit will be returned to depot for inspection.

Fixed wing

OV-1 Class E

D series - At 10 nmi from base during descent, all electrical power was lost except battery. Thick, caustic, black smoke filled cockpit. Crew completed emergency procedures and declared emergency with ATC. Crew completed landing without further incident. Maintenance found shorted inverter selector control caused by loose washer that had lodged between two circuit breakers.

Messages

■ Safety-of-flight technical message concerning one-time and recurring inspection of backup control system (BUCS) shear pin actuated decoupler (SPAD) on all AH-64A aircraft with BUCS (AH-64-93-02, 031900Z Nov 92). Summary: BUCS is a backup flight control system installed in the later production AH-64A to provide combat survivability enhancement. It provides a capability to work around a jammed or severed (combat damaged) flight control system. This message affects a total of about 220 aircraft. Of this number, 143 are in the active component; the balance are in the NGB/Reserves/FMS. This message does not affect the earlier aircraft that do not have the BUCS implemented. A recent AH-64A mishap investigation determined the presence of an improperly adjusted BUCS microswitch. This condition prevented the BUCS from activating when a SPAD shear pin broke. A number of aircraft were subsequently inspected and several were found to have relatively minor quality errors. The purpose of this message is to direct a one-time inspection for security and adjustment of the BUCS microswitches located on the SPADs. This inspection will also be required at every phase maintenance inspection. Contact: MAJ Victor P. Malmgren, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning revision to UH-60-92-ASAM-05, inspection and replacement of main rotor blade expandable

pin on all H-60 series aircraft (UH-60-93-ASAM-03, 171800Z Nov 92). Summary: UH-60-93-ASAM-03 revises UH-60-92-ASAM-05 to allow continued use of the P/N ABC6524 and 70103-08107-101 pins as long as the 10-hour/14-day inspection is maintained. The purpose of this message is also to require that P/N ABC6524 and 70103-08107-101 pins be removed and tagged as unserviceable when an adequate number of serviceable -102 pins are available. There are no changes to UH-60-92-ASAM-05 other than those outlined in UH-60-93-ASAM-03. Contact: Mr. Roger H. Heidenreich, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning one-time and recurring inspection of pitch horn bushing on all AH-1 series aircraft (AH-1-93-ASAM-01, 271800Z Oct 92). Summary: Main rotor pitch horn inner bushings have been found cracked. The purpose of this message is to require a one-time and recurring inspection of the pitch horn bushing, P/N 209-010-521-101, for cracks during the preventive maintenance daily. Contact: Mr. Dong K. Nguyen, DSN 693-2085/2285, commercial 314-263-2085/2285.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of OH-58D mast-mounted sight (MMS) cable standpipe assembly on all OH-58D helicopters (OH-58-93-ASAM-01, 271910Z Oct 92). Summary: During flight, the wires in an MMS standpipe cable assembly shorted, resulting in an electrical fire and damage to other MMS components. Based on this incident and previous incidents, it has been determined that the most probable cause for shorting of the wires is chafing of the cable assembly at or near the roof opening. The purpose of this message is to provide procedures to alleviate chafing of the MMS standpipe cable assembly through installation of antichafe material. Contact: Mr. Roger H. Heidenreich, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action information message concerning crew seat cover installation and replacement on all OH-58A/C helicopters (OH-58-93-ASAM-02, 171900Z Nov 92). Summary: Units have complained that replacement crew seat covers are too small and cannot be installed. The purpose of this message is to provide information concerning the proper installation of the replacement covers and clarify replacement requirements. Contact: Mr. Lyell Myers, DSN 693-2285, commercial 314-263-2285.

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

U.S. ARMY SAFETY CENTER

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

S T A C O M

Interim change to TC 1-210

The release of TC 1-210: Aircrew Training Program, Commander's Guide to Individual and Crew Training, dated 20 May 1992, requires major changes in Aircrew Training Program (ATP) administration. As with any new program, it will take some time for aviation units to achieve full standardization.

Feedback from the field indicates that many issues need clarification. The Aviation Center Directorate of Training and Doctrine, the proponent of the TC, is working closely with the Directorate of Evaluation and Standardization (DES) to clarify ambiguous guidance.

A formal Change 1 to the Commander's Guide should be released during the third quarter of FY 93. This STACOM serves as *Interim Change (IC) 1* to TC 1-210 and will be implemented on receipt.

The Department of the Army point of contact (POC) is CW4 Jim Winston, ATZQ-TDI-A, AV 558-3801, commercial 205-255-3801. The DES POC is CW3 Jim Hill, ATZQ-ESF, AV 558-2442, commercial 205-255-2442.

Units should remove and insert pages in TC 1-210 as follows:

Remove pages 2-1 through 2-4

Insert pages 2-1 through 2-4

A copy of this STACOM should be retained and placed in the front of the manual for reference purposes.

STACOM 155 **December 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 offical policy. This information is provided to all commanders to enhance aviation operations and training support.

Edward H. Littlejohn
COL, Aviation
Director, DES

CHAPTER 2

TERMS AND POLICIES

The ATP has added many terms to the aviation vocabulary. Familiarity with these terms is necessary to understand and use this publication. For that reason, terms are explained in this chapter rather than in the glossary, and policy information is included to provide further clarification.

2-1. AIRCREW TRAINING PROGRAM

The ATP consists of qualification, refresher, mission, and continuation training of individuals and crews. The goal of the ATP is to develop mission-ready aviation units.

a. Applicability. The ATP applies to all Army aviators and nonrated crew members in operational/designated flying positions. It also applies to non-crew members who perform crew member duties per AR 600-106. Other individuals authorized to perform crew member duties in Army aircraft will comply with AR 95-1.

b. Implementation. This publication will be used in conjunction with AR 95-series and the Aircrew Training Manuals (listed in Figure 2-1).

2-2. AIRCREW TRAINING PROGRAM TRAINING YEAR

a. The ATP training year is divided into semiannual training periods. For the Active Army and USAR crew member, the first training period begins the first day following the end of his birth month and continues for 6 months. The second training period begins the first day of the seventh month and continues through the end of the crew member's birth month. For example, the first training period for a crew member born on 15 April begins 1 May and ends 31 October. The second training period begins 1 November and ends 30 April.

b. For an ARNG crew member, the training year coincides with the fiscal year. The first training period begins 1 October and ends 31 March. The second training period begins 1 April and ends 30 September.

c. For a DAC crew member, the training year is designated by the commander.

Number	Title
TC 1-209	OH-58D Observation Helicopter, Aviator/Aeroscout Observer
TC 1-211	Utility Helicopter, UH-1
TC 1-212	Utility Helicopter, UH-60
TC 1-213	Attack Helicopter, AH-1
TC 1-214	Attack Helicopter, AH-64
TC 1-215	Observation Helicopter, OH-58A/C
TC 1-216	Cargo Helicopter
FC 1-217	Surveillance Airplane, OV-1
FC 1-218	Utility/Light Cargo Airplane

Figure 2-1. Aircrew Training Manuals

2-3. FLIGHT ACTIVITY CATEGORIES

All operational aviation positions and other designated flying positions in the ATP are classified into one of three flight activity categories. The commander designates FAC 1, FAC 2, or FAC 3 to each duty position.

NOTE: FAC levels do not apply to DACs.

a. **FAC 1**. FAC 1 duty positions require a high degree of skill in the tactical employment of the assigned aircraft and a superior knowledge of the operational doctrine of the unit. All FAC 1 aviators and crew members will be battle-rostered. The requirement for increased mission proficiency of FAC 1 aviators is reflected in their higher semiannual flying-hour minimums shown in Figure 3-5. AOs, AFSOs, CEs, and FEs assigned to TOE units are classified as FAC 1.

b. **FAC 2**. FAC 2 duty positions require less tactical proficiency than FAC 1 duty positions. Examples of aviators assigned FAC 2 duty positions are executive officers, MPs, and staff officers at battalion and higher levels. Although their primary duties do not involve tactical employment of the aircraft, FAC 2 aviators should be battle-rostered.

c. **FAC 3**. FAC 3 duty positions are operational flying positions that require the maintenance of basic flying skills in a flight simulator. Commanders may designate certain staff officer positions as FAC 3 based on METL requirements. Readiness

levels do not apply to FAC 3 aviators, and it is expected that they would not be used in combat operations without refresher or mission training. FAC 3 aviators will—

(1) Be designated by the unit commander using DA Form 7120-R. The aviator must be qualified in his primary aircraft and a compatible simulator (per AR 95-3) must be available for the aviator to fly.

(2) Have no aircraft flying-hour minimums or currency requirements and shall not perform PC/PI duties in Army aircraft.

(3) Maintain a current instrument certification by successfully completing an annual instrument flight evaluation (using the simulator) per AR 95-1 and the ATM. The evaluation will be completed during the 3-month period preceding the end of the aviator's birth month (ARNG crew members see NGR 95-210). The appropriate operator's manual examination shall also be completed during this period.

(4) Maintain FAC 3 simulator flying-hour minimums as stated in the appropriate ATM. Simulator task/iteration requirements will be per the commander's task list. Requirements may be prorated per AR 95-series and this publication.

(5) Demonstrate proficiency to an IE in all instrument tasks listed in Table 5-1 of the appropriate ATM within 90 days if the aviator arrives at a unit without having demonstrated instrument proficiency to an IE within the past 12 months.

(6) Maintain a current flight physical per AR 40-501.

(7) Undergo RL3/RL2 training when redesignated FAC 1/FAC 2.

2-4. COMMANDER'S EVALUATION

a. The commander's evaluation is conducted to determine the initial readiness level of newly assigned crew members. The evaluation consists of a records review and may require a proficiency flight evaluation. It will be completed within 45 calendar days after the crew member signs into the unit or the effective date of the crew member's flying status orders (whichever occurs latest).

b. The commander or his designated representative will review the crew member's IATF and IFRF and compare the individual's qualifications with the tasks required for the assigned duty position. If the appropriate RL can be determined, it will be documented on a comment slip, signed by the commander.

c. If initial RL status cannot be determined by a records review, or if the commander requires it, the crew member will undergo a proficiency flight evaluation. The proficiency flight evaluation should include tasks from each flight mode in which the crew member will be expected to perform duties. The results of the PFE will determine the crew member's RL status. Documentation will be made on the appropriate gradeslips with the commander's endorsement of concurrence or nonconcurrence.

d. Once initial RL status has been determined, the commander will administer qualification, refresher, mission, or continuation training for the crew member, as applicable. Time allotted for completion of required training will begin to accrue effective the date of RL designation. Flight tasks graded satisfactory on the PFE may be credited toward completion of RL training requirements (based on the evaluator's recommendations).

NOTE 1: For Reserve Component crew members, the commander's evaluation must be completed within 45 days of the effective date of operational flying status orders or the effective date of transfer (conditional release).

NOTE 2: Initial Entry Rotary Wing, Aerial Observer, and Aircraft Qualification Course graduates on their first utilization tour shall not receive initial designation as RL2/RL1 based solely on a records review. For initial designation other than RL3, the results of a PFE must also be considered.

NOTE 3: Determination of initial NVG RL status will be conducted per Chapter 4 at a time determined by the commander.

NOTE 4: Initial validation of an instructor/evaluator's qualifications at a new duty station will be conducted in the aircraft.

2-5. READINESS LEVELS

a. Individual Progression.

(1) Readiness levels identify the training

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Flightfax
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REPORT OF ARMY AIRCRAFT ACCIDENTS

We must stop the BLEEDING!

During the first quarter of FY 93, the Army experienced nine Class A aviation flight accidents that resulted in 10 fatalities. That was four more Class As and six more deaths than for the same period last year. The questions are what happened, can we fix it, and are we going to get back on track with our responsibilities in force protection? Our leaders from sergeants to generals are busy identifying hazards and reducing risks. And with individuals of all ranks accepting responsibility for accident prevention and striving to repeat the outstanding year aviation experienced in FY 92, we can stop the bleeding.

The FY 92 record

During FY 92, there were a total of 22 Class A flight accidents, compared to 49 in FY 91 and 32 for the previous 3-year average (FY 88-90). This produced an accident rate of 1.57, compared to 3.77 for FY 91 and 1.86 for the previous 3-year average. FY 92 was a great year in Army safety. Both the low number of Class A flight accidents and the low rate made the FY 92 record the new safety standard for the Army—a truly super job by all.

First quarter of FY 93

Then came 1 October 1992. We experienced nine Class As in less than 90 days. Soldiers' lives were being lost and precious resources damaged or destroyed at an alarming rate.

The red flags went up when analysis revealed that of these nine major accidents, only two (another remains under investigation) resulted from materiel failure—the remainder were the direct result of human error. And the same problem areas identified in previous human-error accidents (see article page 3) continued to persist. What happened to all of the

effective prevention tools we used last year? How could the trends reverse so quickly? I do not have scientific data to support my thoughts on these questions. But I believe it had something to do with personnel turbulence, changes in leadership positions and unit locations, and the fall increases in OPTEMPO. Combined, these circumstances caused us to let our guards down, and the results have not been good.

Although FY 92 had also started off a bit shaky, we were able to get our arms around our operational and personnel problems and achieve high goals and set new benchmarks for safety. But before we had time to enjoy the results of our accomplishments, we had already started an upward trend for FY 93. The eight Class A flight accidents within the first 45 days of FY 93 was much worse than anything since FY 84.

Senior leaders became concerned, and rightfully so. The Chief of Staff of the Army, General Gordon R. Sullivan, issued a message (see December 1992 *Flightfax*) urging leadership at all levels to accept the "challenge to reverse this accident trend and make FY 93 another safe year for soldiers."

Commanders at all levels are busy analyzing reports, data, and procedures and refocusing on the prevention process. Prompt action on the part of leaders and individuals at every level will help us redirect our attention to the requirement to perform every mission to standard.

A shared responsibility

Safety and accident prevention are shared responsibilities that everyone must accept in order to "protect the force." And a major part of force protection is declaring war on human-error accidents. But it's not a war that can be fought single-handedly. It takes a concerted effort from both elements of the safety equation—leaders and individuals. And it cannot be fought only once—it's an every day, 24-hour-a-day battle.

■ *Leaders.* Leaders must know their soldiers' and their unit's capabilities and limitations and pace their OPTEMPO and mission complexity accordingly. Safety begins with the command climate and the commander's approach toward safety. It then relates to the NCOs, officers, and troops and how they individually and collectively make safety part of everything they do. When safety is fully integrated into the Army's functions of acquisition, doctrine, training, sustainment, and warfighting, then "protection of the force" has direction. When it works, leaders ensure that risk management is being used and that proper risk assessments are completed before every mission. Do the benefits of performing the task really outweigh the potential costs?

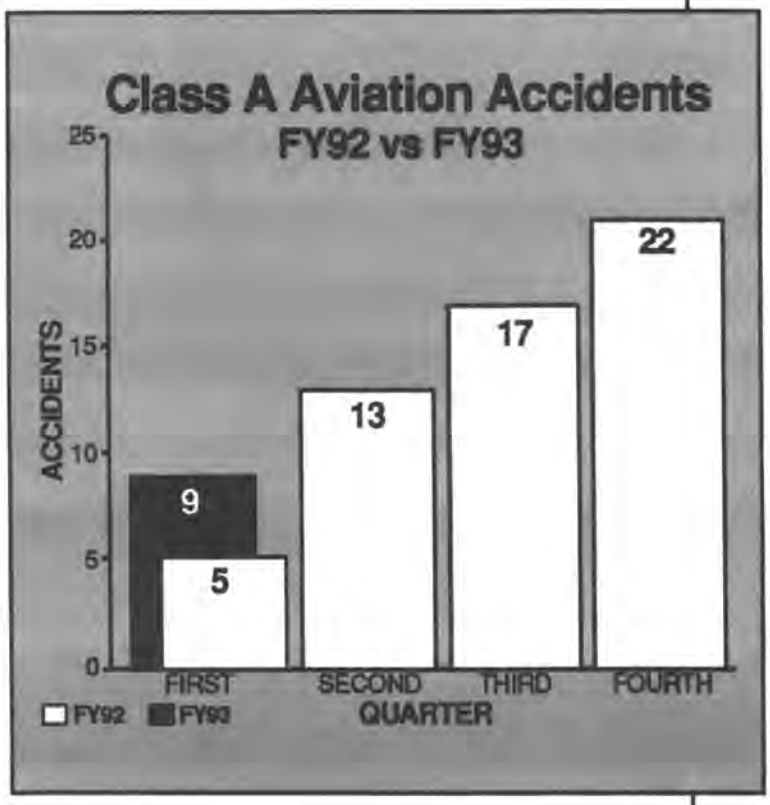
Leaders at all levels must do what leaders are supposed to do: *lead*. Set the example by being safety conscious and demand involvement of everyone. Be a leader who is ready, willing, and able to enforce the standards, even when it is tempting to let minor violations slide. You might not win any points in the popularity contest, but you could save a life by stopping minor violations that, left unchecked, could escalate into a serious accident.

■ *Individuals.* Faced with the Army drawdown and uncertain careers, soldiers may have become preoccupied in some cases, causing safety to be left out. The downsizing is also resulting in more senior leaders retiring and leaving the service early, putting more responsibility on the shoulders of our junior work force. The answer is for everyone to understand that we all have a responsibility when it comes to safety—not just commanders and safety officers.

Professionalism and self-discipline are essential to preventing individual failures that result in accidents. Crewmembers in aircraft and soldiers in flight platoons and maintenance hangars are the ones who hold the keys. Each individual must exhibit the courage to follow the standards, even when nobody is watching. Soldiers must also care enough to ensure their fellow soldiers do the same. When you see violations or shortcuts being taken, you have the moral responsibility to do something about it. You could prevent the next accident. That is what the buddy system is all about.

The weapons

The weapons are in place to help us fight the war on



human-error accidents. Danger lurks in the environments in which we train, with poor crew coordination and complacency taking their toll this year. There is sufficient policy, procedure, and regulatory guidance to ensure we can perform missions safely. And we're rapidly spreading the word on the benefits of proper risk management. Daily we're instructing soldiers in risk management techniques that will help them identify and manage hazards and reduce human-error accidents. What we need now is strict self-discipline and professionalism to follow these known procedures.

Of course, we would have liked for FY 93 to be the milestone year in which our Class A aviation flight accident rate dropped below 1 percent per 100,000 flying hours. But rates are just numbers. Far more important than getting a rate down, we must continue to increase our safety awareness, integrate safety into our daily operations, and stop these preventable accidents that are injuring and killing our people and destroying our equipment. Help us keep safety in the METL business, and we can stop the bleeding. ◆

—BG R. Dennis Kerr, Director of Army Safety

Human error in Class A aviation flight accidents

The same problem areas identified in previous human-error accidents continued to persist in the FY 92 and early FY 93 Class A flight accidents. These problem areas include failure to effectively—

- Scan the flightpath
- Maintain or recover orientation
- Coordinate with other crewmembers
- Perform adequate preflight planning
- Perform adequate in-flight planning
- Diagnose and respond to emergencies
- Detect and avoid hazards or obstacles
- Estimate distance and rate of closure

Of these hazards, crew coordination failures and inadequate preflight mission planning and briefing account for 46 percent of the 22 FY 92 and the first 8 FY 93 Class A flight accident causes. Improving pre-mission planning and briefing may make a major improvement in crew coordination. By assuring that all crewmembers are briefed on each aspect of the mission and know exactly what they are expected to do, everyone will be able to take an active role and assume responsibility for mission success. In turn, improved crew coordination can reduce accident-causing mistakes such as channelizing attention (failure to scan), failing to detect hazardous conditions, and diagnosing and responding to emergency conditions improperly. ◆

Another look at FY 92

In FY 92, the Army experienced 22 Class A aviation flight accidents, all of which except one involved loss of life, destruction of the aircraft, or both. However, a closer look at these 22 accidents reveals that only 5 (23 percent) were caused by materiel failure of the aircraft itself—mostly engine failures. Two more accidents involved failure of the aircraft to operate as designed, combined with human errors. All together, materiel failure was involved in only 7 (32 percent) of the 1992 Class A aviation flight accidents. (In one OH-58D accident in which both crewmembers were killed, the cause(s) of the accident could not be determined.)

Crew-error accidents

As usual, most of the FY 92 Class A accidents—15 or more than two-thirds—involved crew error. One other accident involved errors by civilian personnel who improperly assembled and installed an aircraft component.

■ *Individual failures.* Accident investigations revealed that individual failures accounted for 47 percent of all crew errors that caused or contributed to these Class A accidents. Individual crewmembers knew the proper ways to perform the tasks but chose—for their own reasons—not to perform to the known Army standards. Failures by individual aircrewmembers who are trained to standard but elect not to perform to standard constitute the single largest source of the Army's Class A aviation flight accidents.

■ *Inadequate unit training.* The second largest source of crew error was inadequate unit training. In 25 percent of the FY 92 Class A aviation flight accidents, crewmembers were assigned missions and

attempted to perform tasks for which the unit had not properly trained them or had not provided adequate experience.

■ *Inadequate leadership, standards, and support.* Of the remaining 28 percent of the 1992 crew-error accidents, inadequate leadership (usually at the company/troop or battalion/squadron level) accounted for 18 percent, inadequate standards for 6 percent, and inadequate support for 4 percent.

So, while almost half (47 percent) of the crew errors must be attributed to individual crewmembers who knew how to perform to standard but did not, slightly more than half (53 percent) of the crew errors must be attributed to inadequate unit training, leadership, standards, and support.

If these sources of crew error had been eliminated, at least 59 percent and perhaps as much as 73 percent (includes the OH-58D with unknown causes) of the Class A flight accidents in FY 92 would not have occurred.

Can we improve on the FY 92 record?

That question is *very* difficult to answer because so many factors must be considered. FY 92's Class A flight accident rate of 1.57 per 100,000 flight hours, the lowest ever, was the result of a lot of hard work on the part of commanders at all levels, aircrews, maintenance personnel, and others to plan and execute missions following the risk management process. Even then, we still experienced 22 Class A accidents.

We expect Armywide efforts to protect the force to remain at very high levels. But even with better and better applications of safety countermeasures aimed at identified hazards, it's still going to take significant effort—and maybe even some good luck—to beat our low accident rate set in FY 92. For warfighters, that good luck is enhanced by training to standard and ensuring that safety is in the METL business for individual, crew, and unit tasks.

No question about it, we'll continue working hard and our goal will always be to reduce accidents. But remember, the Class A rate has dipped below 3.0 only 12 times in the last 20 years and below 2.0 only 5 times. The average rate for the 10 years before FY 92 was 2.46 and 2.30 for the last 5 years before FY 92. These figures illustrate the dramatic reduction in the accident rate that 1.57 for FY 92 represents.

Performance to Army standards by individuals who assume more personal responsibility for safety and management of the risks associated with each mission will result in more effective and safer training. When *every* individual unit member becomes proficient in applying the risk management process and principles to each mission, then we'll see fewer human-error accidents. Then perhaps we will be able to get our Class A flight accident rate to approach 1.0 or less per 100,000 flight hours. ◆

Attention all maintenance personnel and test pilots

The Aviation Vibration Analyzer (AVA) is the newest piece of diagnostic equipment used for rotor tracking and balancing the Army's helicopter fleet. The AVA joins, and will replace, the Chadwick Helmuth Vibrex 177A and the Helitune as the only authorized rotor vibration analyzers for use on Army helicopters.

Since delivery of the first AVA kit to the field, several software changes have occurred. The purpose of this article is to ensure that every AVA user knows the current software available for each aircraft, to advise the field of some of the problem areas with the AVA, and to provide instructions for obtaining assistance with AVA equipment failures.

Current software

The current operating software version (displayed on the main menu screen) is the Rotor Analysis Diagnostic System—Advanced Technology (RADS-AT) VERSION 3.10CC35D, and the software by aircraft type is—

Aircraft Type	Software Versions
UH-60	UH60 5.5.1.1 R
UH-1H	UH1 1.23 R
OH-58A/C	OH58AC 5.4 R
OH-58D mast-mounted sight off	OH58D 5.3 R
OH-58D mast-mounted sight on	OH58DM 5.3 R
AH-64	AH64 1.23 R
CH-47	CH47 5.1 R
AH-1 Kaman blades	AH1S 1.22 R
AH-1 Kaman blades and stainless steel pitch change links	AH1SS 1.1 R
AH-1 540 blades	AH1SM 1.8 R
AH-1 540 blades and stainless steel pitch change links	AH1SSM 1.1 R

To obtain the current software updates for your AVA, call Mr. Bob Branhof, DSN 693-2484, commercial 314-263-2484.

Problem areas

Units using the AVA on two-bladed main rotor systems should be aware of possible erroneous solutions provided by the diagnostics when both red and white blades display a "Y" in the edit adjustables page. To correct this problem, continue to use the AVA but turn off one of the blades using the toggle blade option (F3) on the edit adjustables page, and press DO to obtain a workable/usable diagnostic solution. If the blade that was chosen to be toggled off still requires some sweep, the AVA will automatically turn the sweep back on for this blade and will give the correct solution with no further operator input required. This is a normal function of the AVA program, which will not allow forward sweep in the diagnostic solutions. *Note*: Every time the AVA enters diagnostics, it returns to the default settings with both blades turned on.

There has been some confusion with the AH-1 programs on the pitch link adjustments. The adjustments are correct: (+) means increase the length of the pitch change rod, which will bring track down, and (-) means decrease the length of the pitch change rod, which will bring track up.

The UH-60 high-speed shaft photo cell bracket, P/N 29328300, (included in the UH-60 adapter kit) requires a modification that can be done at the user level. This modification information can also be obtained by calling Mr. Bob Branhof.

Assistance with equipment failures

If assistance is required with the AVA components, contact Scientific Atlanta at 1-800-VIB-ARMY. If it becomes necessary to return an AVA kit for repair, use the following procedures:

- Submit a Quality Deficiency Report (SF 368) for equipment failures of individual components.
- Obtain a return merchandise authorization (RMA) number from Scientific Atlanta.
- Ship unit or units that are agreed upon per the RMA number.
- If the repaired item(s) are not returned within 30 days, contact Scientific Atlanta, using the 1-800-VIB-ARMY number.

Points of contact

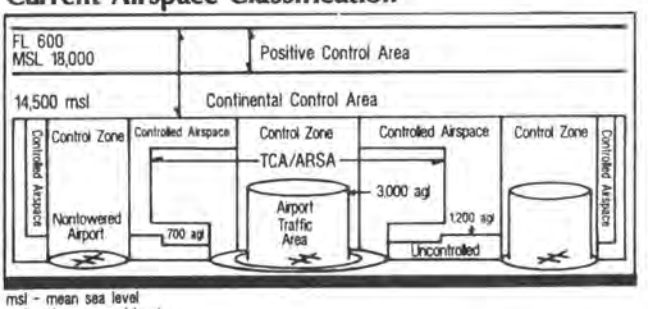
For further information regarding the use of the AVA, contact the Directorate of Evaluation and Standardization at Fort Eustis, VA, DSN 927-3266, commercial 804-878-3266, FAX extension 4164. For AVA training questions, points of contact and telephone numbers for aircraft specific sections within the Maintenance Manager or Maintenance Test Pilot Course at Fort Eustis are as follows:

Aircraft	Point of Contact	DSN
OH-58A/C	CW4 Bruce Bulger	927-3721
CH-47	CW4 Brad Johnson	927-5326
AH-1	CW4 Paul Petrakis	927-3482
AH-64	CW3 Bill Barron	927-1643
UH-1	CW3 Hal Dawkins	927-2605
UH-60	CW3 Gary Helson	927-4224
OH-58D	CW3 John Moltenberry	927-3721

Correction

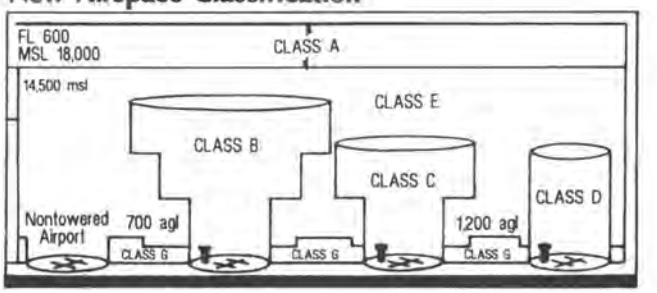
On page 6 of the November 1992 issue of *Flightfax*, the two charts showing FAA airspace classifications were incorrectly captioned and the effective date of the second chart was incorrect. The new airspace classification charts began appearing on 15 October 1992 and will become effective on 16 September 1993. The graphics with the correct captions are shown below.

Current Airspace Classification



msl - mean sea level
agl - above ground level
FL - flight level

New Airspace Classification



AAAA national individual award winners—***May***

Advanced composite materials (ACMs pose a danger to people exposed to aircraft crash sites)—***April***

A commander's safety philosophy (example of excellent safety philosophy statement)—***September***

A good safety program (elements of)—***September***

AH-1 midair collision (accident review)—***November***

AH-1 performance planning and directional control margin (STACOM 152)—***June***

AH-1 performance planning and directional control margin (tail rotor authority)—***June***

Air/Sea Rescue Award (CW3 Julian Council and CW3 Scott Berrier receive Lucas Aerospace-sponsored AAAA award for rescuing two downed aviators)—***May***

Airworthiness release for C-12C, C-12D, and C-12F—***July***

Airworthiness release needed for GPS—***March***

Alcohol and flying (the 48-hour rule)—***March***

A matter of judgment (with only one operative engine, crew elected to fly to destination rather than land at nearest airport)—***January***

Apaches strike wires (accounts of two AH-64 wire strikes during FY 91)—***June***

Army losses approaching $1 billion per year (combined costs of accidents continue to rise; risk management is key to preventing continued losses)—***December***

Attention aviation safety officers (ASO submits makeup session idea for those who miss monthly safety meeting)—***May***

Attention Black Hawk crews (need for single-engine operation flight planning procedures and proper engine cleaning reemphasized)—***November***

Attention medevac commanders and standardization officers (Medical Service Corps advisor for DES name and telephone numbers)—***April***

Attention NCOs (Aviation Accident Prevention Course for NCOs scheduled)—***January***

Aviation Accident Prevention Course schedule for FY 93—***October***

Aviation logistics corner (information adapted from *Aviation Logistics Newsletter*)—***March***

Aviation Night Vision Goggle Operations—Desert Environment (new NVG video available)—***February***

Aviation procedures that are most frequently violated (results of study)—***October***

Aviation safety action messages

■ CH-47D, MH-47D, and MH-47E one-time inspection of generator wire harness at the fire extinguisher discharge tube—***January***

■ CH-47C, CH-47D, MH-47D, and MH-47E rescission of airworthiness releases on tank assembly, 85SDSCC-D-0007-4, and related information—***January***

■ H-60 aircraft inspection for three unserviceable spindle assemblies—***February***

■ CH-54A one-time inspection of vertical hinge pins—***February***

■ OH-58A/C and OH-6 inspection of the fuel controls and governors on T63-A-700/720 engines—***February***

■ OV-1D information on AN/AYA-10 signal data converter connector maintenance improvement—***February***

■ U-8F, BE-65 series, and B-80 aircraft and U-21A/D/G/H, RU-21A/B/C/D/H, and Beech A90 aircraft 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—***February***

■ OH-58D aircraft with T703-AD-700/700A engines require inspection of engine main fuel filter for fuel leaks—***March***

■ General NVG informational message on the dual visor on aviator helmets—***May***

■ General informational message concerning use of discrepant lots of Syn-Tech grease, P/N 3913-G1, on all Army aircraft—***May***

■ UH-1H/V aircraft sent to Operation Desert Storm, report of serial numbers needed for scheduling in STIR program—***May***

■ OH-58A/C/D improper installation of GPS—***May***

■ AH-1E and F aircraft modified per MWO 55-1520-236-50-12 one-time inspection of centrisep particle separator assembly inner gasket for proper sealing and inactivation of the bypass door—***June***

■ CH-47D, MH-47D, and MH-47E aircraft one-time and recurring inspection of cross-shaft adapters—***June***

■ AH-64 procedure to inspect/replace 45-degree bulkhead elbow fitting for APU fuel and nitrogen inerting unit—***June***

■ OH-58A/C nonconforming swashplate bearing pivot bolts—***June***

■ C-12 and RC-12 flight limitations when operating in icing conditions—***June***

■ UH-60A and EH-60A T700-GE-700 gas generator rotor turbine blade failures/engine cleaning, engine life-limited components tracking, and

single-engine flight planning procedures—***July***

■ AH-1E and F series aircraft modified per MWO 55-1520-236-50-12 revision to one-time inspection of the centrisep particle separator assembly inner gasket for proper sealing and inactivation of the bypass door—***July***

■ C-12 and RC-12 windshield anti-ice operating instructions—***July***

■ AH-1 one-time and recurring inspection of the improved particle separator scavenge tubes—***August***

■ AH-64A main rotor stretched strap assembly removal—***August***

■ CH-47D, MH-47D, and MH-47E replacement of Hi-Lok fasteners in left and right butt line 18 beams at fuselage station 83 to 120—***August***

■ All H-6 series aircraft with T63-A-700-720 engines inspection of fuel systems—***August***

■ OV-1D/RV-1D one-time and recurring inspection of nose landing gear outer cylinder drag brace attachment lugs—***August***

■ AH-1 one-time inspection of Kaman 747 blades—***September***

■ OH-58A/C airframe fuel filter installation—***September***

■ UH-1 aircraft one-time and repeat inspection of 90-degree gearbox attachment fitting—***October***

■ H-60 series aircraft inspection and replacement of main rotor blade expandable pin—***October***

■ AH-1 emergency procedures for engine inlet air master caution segment light—***October***

■ OH-58D one-time inspection of tail rotor drive shaft bearings for lubrication holes—***October***

■ OH-58D correction on one-time inspection of tail rotor drive shaft bearings for lubrication holes—***October***

■ UH-1H/V one-time and recurring inspection of droop compensator jackshaft assembly—***November***

■ H-60 Army aircraft one-time inspection for proper hardware on the pedal adjuster assembly —***November***

■ H-60 Black Hawk one-time operational check of the transmission and gearbox chip detector system—***November***

■ AH-64A inspection of the mast support base for corrosion and shear bolts for torque check—***November***

■ H-60 series aircraft inspection and replacement of main rotor blade expandable pin—***December***

■ AH-1 one-time and recurring inspection of pitch horn bushing—***December***

■ OH-58D one-time inspection of MMS cable standpipe assembly—***December***

■ OH-58A/C crew seat cover installation and replacement—***December***

Aviation safety (message from GEN Sullivan issuing challenge to make FY 93 another safe year for soldiers)—***December***

Aviation safety training (information on dates, locations, and POCs for aviation safety training presented by Army Safety Center)—***February***

Black Hawk crews get update on avoiding droop stop pounding—***July***

Black Hawk crews reminded of need for single-engine operation flight planning and proper engine cleaning—***November***

Broken Wing awards (recipients and synopses of emergencies for which awarded)—***January, March, April, June, July, October***

C-12 Class A accident (the Army's first)—***August***

C-12 crew elects to fly to destination rather than land at nearest airport even though they had only one operative engine—***January***

C-12 has outstanding record (not a single Class A accident since 1975)—***January***

CH-47D and MH-47D extended-range fuel system tank assembly (seepage in vicinity of weld in tank skin)—***October***

CH-47 cargo hook accidents (review of two accidents where failure to follow established procedures and lack of communication led to injuries)—***July***

CCAD hot line and ESC support (information on hot line and requirements and procedures for reporting)—***April***

Chlorofluorocarbons/Freon (aviation safety action message)—***August***

Cold weather is on the way (now is the time to prepare)—***September***

Computers (use of portable ones on Army aircraft)—***June***

Congratulations Marne Eagles (10 years without a Class A aviation accident)—***October***

CPO cyclic lockout (interim guidance about flight with CPO cyclic in the lockout position)—***April***

Crashfax video available (reminder about video on *Surviving in the Wire Environment)*—***June***

Current NVG messages (list of current messages as outlined in GEN-92-ASAM-02, 192230Z Dec 91)—***February***

CY 91 *Flightfax* index—***January***

CY 91 STACOM index (STACOM 150)—***January***

Design failures result in human-error accidents (examples of designs recognized as having the potential to cause human-error accidents)—***September***

Design to reduce human error—***September***

Distribution of DA Form 759: Individual Flight Record and Flight Certificate—Army (STACOM 154)—***October***

Engine flushes required!

(accidents reveal engine flushes not being performed as required)—***November***

Entering the date of the Army Aviation Annual Written Examination (AAAWE) on DA Form, Part IV, Block 2 (STACOM 153)—***July***

Extended-range fuel system tank assembly on CH-47 and MH-47 aircraft (seepage in vicinity of weld in tank skin)—***October***

Failures lead to accidents (multiple individual failures led to UH-60 accident)—***April***

Flightfax index for CY 91—***January***

Flightfax 20 years old—***September***

Flu season requires preventive medicine (get your flu shot)—***December***

Followups (information on accidents previously reported)—***January, April, May, August***

Frustration, pride, and overconfidence—a deadly combination (AH-1 midair collision)—***November***

FY 91 safety report (review of accident statistics, problem areas, and countermeasures)—***February***

FY 93 Aviation Accident Prevention Course schedule—***October***

Good aviators die when...(lessons on wartime safety)—***March***

GPS (airworthiness release needed)—***March***

Guide to Aviation Resources Management and Aircraft Mishap Prevention (twelfth edition now available)—***June***

HEED inspections (suggested preflight and postflight inspection procedures)—***May***

HEED—make a decision (why do some helicopter crewmembers choose not to use their HEED bottle?)—***May***

HEED update (needed for multi-engine aircraft flights too and reminder about training)— ***May***

Inspection of OH-58/OH-6 fuel systems (ASAM requiring continuous recurring inspections for contamination)—***June***

Integration of newly graduated IERW aviators into unit ATPs (STACOM 151)—***March***

It's coming...(the snow and ice of winter are just a few short weeks away and now is the time to prepare)—***September***

It's that time again (winter brings on flu season; get your flu shot)—***December***

Kiowa information needed (help ATCOM complete data base of installed equipment)—***November***

Lasers and NVGs—***April***

Lessons on wartime safety. Good aviators die when...(they forget basic aviation safety rules; parallels between India-China airlift in 1944 and Desert Shield/Storm)—***March***

Logging of flight time in the OH-58D Kiowa Warrior (STACOM 153)—***July***

Maintenance test pilots should conduct autorotative rpm checks on prepared surfaces—***January***

Make a decision—why do some helicopter crewmembers choose not to use their HEED bottle? (reprint from December 1991 issue of *Approach*, the Naval Safety Center's monthly publication)—***May***

Marne Eagles—congratulations (10 years without a Class A aviation accident)—***October***

Medical Service Corps advisor for DES—***April***

Midair collision (AH-1 accident review)—***November***

Midair collisions (pilot's role in collision avoidance)—***November***

Most frequently violated aviation procedures (results of study) —***October***

New NVG video available (*Aviation Night Vision Goggle Operations—Desert Environment* video now available)—***February***

NVG current and rescinded messages as outlined in GEN-92-ASAM-02, 192230Z Dec 91—***February***

NVG message update (GEN-92-ASAM-02, 192230Z Dec 91)—***February***

NVGs and lasers—***April***

NVG video available (*Aviation Night Vision Goggle Operations—Desert Environment*)—***February***

OH-58/OH-6 fuel system inspection (ASAM requiring continuous recurring inspections for contamination)—***June***

OH-58A/C information needed (help ATCOM complete data base of installed equipment)—***November***

OH-58 sand ingestion—***March***

Parts is parts! (terms associated with parts service life, how initial service life is established, and what affects how parts perform in service)—***July***

Perceived or real...urgency can kill (UH-1 crew allowed perceived sense of urgency to influence their judgment to continue the mission in deteriorating weather)—***August***

Performance planning and directional control margin (tail rotor authority for AH-1)—***June***

Pilot's role in collision avoidance—***November***

Recap of 3d quarter FY 92 AVSCOM SOF messages—***August***

Recap of 4th quarter FY 91 AVSCOM SOF messages—***January***

Release of chlorofluorocarbons/Freon (AVSCOM ASAM)—***August***

Reminder for maintenance test pilots (conduct autorotative rpm checks on prepared surface)—***January***

Reminder: *Surviving in the Wire Environment* video available—***June***

Rescinded night vision goggle messages as outlined in GEN-92-ASAM-02, 192230Z Dec

91)—***February***

Retention assemblies for SPH-4 flight helmet (old assemblies should be purged from supply system and replaced with new universal retention assembly)—***April***

Risk assessment survey being developed by Safety Center (Next Accident Test will be another tool commanders can use to determine who will have the next accident, what kind of accident it will be, and what can be done about it)—***December***

Risk management is key to preventing continued rising cost of accidents—***December***

Risk management rules and process—***December***

Safety-of-flight messages

■ Technical message concerning engine support bracket on all AH-64 aircraft—***April***

■ Operational message concerning flight limitations because of overstress conditions experienced during flight for certain specified OV-1D and RV-1D aircraft—***April***

■ 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—***May***

■ Technical message concerning ungrounding of all OH-58D aircraft—***October***

■ Operational message concerning fuel crossfeed system in all AH-64A aircraft—***November***

■ Emergency message concerning immediate grounding of CH-47 and MH-47 series aircraft—***November***

■ Technical message concerning ungrounding of CH-47D, MH-47D, and MH-47E aircraft—***November***

■ Technical message concerning one-time and recurring inspection of BUCS SPAD—***December***

Safety-of-use message

■ Mandatory operational message concerning AN/ALQ-144A (V)1 (NSN 5865-01-229-5859, LIN J01849) and AN/ALQ-144A (V)3 (NSN 5865-01-229-5860, LIN J01917) countermeasures set—***January***

Safety philosophy statement (one commander's example)—***September***

Safety report for FY 91 (review of accident statistics, problem areas, and countermeasures)—***February***

Safety schools (information on dates, locations, and points of contact for aviation safety training presented by Army Safety Center)—***February***

See the supports and avoid wires—the French solution—***June***

Share those good ideas and safety tips (tips on how ASOs and managers can increase safety awareness in units)—***October***

Single-engine operation flight planning procedures and need for proper engine cleaning procedures reemphasized for UH-60 crews—***November***

SPH-4 flight helmet retention assemblies (old retention assemblies should be purged from supply system and exchanged for new universal retention assembly)—***April***

STACOM index for CY 91—***January***

STACOMs—***March, June, July, October, December***

Survival radio requirement for each crewmember delayed—***December***

Surviving in the Wire Environment video available—***June***

TC 1-210: Aircrew Training Program, Commander's Guide to Individual and Crew Training (STACOM 154)—***October***

TC 1-210 interim change (STACOM 155)—***December***

The 48-hour rule for alcohol and flying—***March***

The Army's first C-12 Class A accident—***August***

The pilot's role in collision avoidance—***November***

There I Was (an Army aviator tells his story of an in-flight emergency, ditching at sea, and how the crew survived)—***May***

Thunderstorm do's and don'ts review—***May***

Tips on how ASOs and managers can increase safety awareness in units—***October***

UH-1 crew let a perceived or real sense of urgency force them to press on in deteriorating weather to reach port of debarkation (accident review)—***August***

UH-60 maintenance crew and aircrew individual failures led to crash—***April***

Underwater egress training for Army helicopter crews (how to obtain training quotas)—***May***

Update on avoiding droop stop pounding in the Black Hawk—***July***

Updated Guide now available (twelfth edition of *Guide to Aviation Resources Management and Aircraft Mishap Prevention* ready for distribution)—***June***

Urgency! A powerful enemy—***August***

Urgency can kill whether it's perceived or real (urgency to reach port of debarkation resulted in UH-1 crew continuing to press on in deteriorating weather until the aircraft crashed)—***August***

Use of portable computers on Army aircraft—***June***

Violated procedures (study revealing specific procedures that are most frequently violated)—***October***

Wear of Broken Wing award—***March***

What makes a good aviation safety program?—***September***

Wire strikes (accounts of two AH-64 wire strikes during FY 91—***June***

Wire strikes (the French solution)—***June*** ◆

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - At 60 knots and about 400 feet AGL with cargo hook emergency release switch in arm position, hook released load. On shutdown at airfield, crew found cargo hook in open position with shear pin sheared.

V series - During takeoff from unimproved LZ, aircraft browned out. Pilot was on controls and attempting to land when PC increased collective. Pilot noticed torque as it was dropping below 60 pounds. Crew completed landing without further damage. Overtorque inspections in progress.

UH-60 Class B

A series - While conducting low-level flight training and multiple practice instrument approaches to airfield, crew encountered no abnormal conditions, heard no unusual noises, and felt no vibrations. However, as aircraft was being towed into hangar, crew noticed that all four rotor blades had voids in the honeycomb and trailing edge areas. Investigation continues. 9308

UH-60 Class C

A series - During ground taxi to parking, all four rotor blades struck utility pole.

UH-60 Class E

A series - During external load training with pathfinder students, aircraft was hovering over load with cargo hook well lights and cabin lights on. Crew chief was observing hookup procedure through cargo hook access. Student, who was holding static discharge wand to remove electrical charge from cargo hook, inserted wand up through cargo hook access and into cabin. Wand struck crew chief in face, knocking off his NVGs. As student withdrew wand, end of wand contacted crew chief's eyeball, causing corneal abrasion.

Attack

AH-1 Class C

F series - Before engine start, voltmeter indicated 22 volts. During engine start sequence, about 10 to 15 seconds elapsed before any indication of N1 or TGT was displayed. After about 15 seconds, TGT began to rise and spike (oscillate). TGT spiked several times before reaching 750°, at which time crew turned ignition key off. At 20 seconds, crew aborted start when TGT continued to rise and N1 was not increasing. Crew shut off fuel and motored engine. Verification of TGT indicated temperature was in excess of 1,000°. Crew shut off throttle and motored engine for additional 10 seconds until TGT decreased to normal ranges. Crew completed normal shutdown.

F series - While in cruise flight during NVG training mission, crew flew aircraft over set of 150-foot-high wires. PC was flying from front seat and thought aircraft could clear obstacle. While over wires at about 200 feet AGL and 40 knots, crew heard rumble and popping sounds and saw sparks aft of crew compartment. PC saw N2 at 95 percent and initiated power-on descent. As PC lowered collective, N2 returned to 100 percent, and he continued gradual descent to open field. While at 40 feet AGL and below ETL airspeed, PC increased power to terminate approach and engine experienced sudden and severe power drop. PC lowered collective full down momentarily and then pulled all collective pitch at 10 feet AGL. Aircraft descended vertically at high rate and impacted in slightly nose-up, wings-level attitude. Aircraft bounced once while rotating 33 degrees clockwise around nose and moving about 10 feet laterally to left.

AH-64 Class A

A series - At 500 feet AGL and 90 to 100 knots while en route to maintenance test flight area, No. 2 engine failed. Crew performed single-engine emergency procedures and was returning to home base when No. 1 engine flamed out. Crew completed forced landing with aircraft touching down with forward airspeed and traveling 100 yards before coming to rest. During ground run, right landing gear strut collapsed. Aircraft sus-

Class A Accidents through December

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	8
	December	1	1	0	0
2d Qtr	January	3		0	
	February	1		0	
	March	4		2	
3d Qtr	April	1		0	
	May	1		1	
	June	2		2	
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	22	9	10	10

tained extensive airframe damage. 9309

Cargo

CH-47 Class C

D series - During NVG hookup operation, aircraft contacted HMMWV and knocked hookup person off load. Hookup person sustained back injuries, and left doors of HMMWV were damaged.

Observation

OH-58 Class A

D series - During tactical training flight at 100 feet AGL and 20 knots, engine lost power. Aircraft was unable to maintain altitude and crashed into 75-foot-tall trees. One crewmember was seriously injured, and one sustained minor injuries. 9310

OH-58 Class C

C series - During NOE flight, main rotor blades contacted trees, tearing off both rotor tips. Pilot landed aircraft nearby without further incident.

Fixed wing

C-12 Class A

F series - While performing nonradar approach, crew became disoriented and descended earlier than they should have. Aircraft impacted ground. Eight fatalities. 9311

Messages

■ Aviation safety action maintenance mandatory message prohibiting use of Brayco 599 corrosion preventative concentrate (GEN-93-ASAM-01, 011905Z Dec 92). Summary: Brayco 599 corrosion preventative concentrate is currently specified in the preservation of AH-1, UH-1, OH-58, OH-58D, and OH-6 gearboxes and engines during aircraft storage. Information also indicates that Brayco 599 is being used in operating engines and gearboxes as a corrosion preventative in the field. A possibility also exists that other Army aircraft may have been serviced with Brayco 599. Brayco 599 has been linked to high iron content in oil analysis samples. The corrosion preventatives in the Brayco 599 containers are contaminated with iron from an unknown source and are contributing to erroneous high iron readings in oil analysis samples. In many cases, engines and gearboxes are being condemned and removed due to the false oil analysis results. The purpose of this message is to prohibit the use of Brayco 599 on all Army aircraft and to direct the reservicing of gearboxes and engines that are known to have Brayco 599 added. Contact: Ms. Terese McGrew, DSN 693-2258/2085, commercial 314-263-2258/2085.

■ Aviation safety action informational message concerning status of new DA Pam 738-751: Functional Users Manual for the Army Maintenance Management System—Aviation (TAMMS-A), dated 15 June 1992, on all U.S. Army aircraft (GEN-93-ASAM-03, 061300Z Jan 93). Summary: DA Pam 738-751 was issued 1 September 1992. Since then, ATCOM has received numerous DA Form 2028s with recommended changes. All recommended changes have been resolved and will be included in the September 1993 edition of DA Pam 738-751. To eliminate confusion and cause less burden on aviation units and activities, we are providing a list of all approved changes to DA Pam 738-751. Authority for the use of these changes is granted to all U.S. Army aviation units and activities, contract support maintenance units and activities, and related audit and inspection activities. A copy of this message will be inserted in DA Pam 738-751 for reference and use. About every 3 months until the new DA Pam 738-751 is issued, an additional list of new changes will be published and provided. *Note*: Units will continue to use guidance in AVSCOM message 221530Z Mar 91 and *Flightfax* dated June 1991 to complete forms and records for aviation night vision goggles. Contact: Mr. Brad Meyer, DSN 693-2258/2085, commercial 314-263-2258/2085.

■ Aviation safety action maintenance mandatory message concerning revision to UH-60-92-ASAM-06 on one-time inspection for proper hardware on the pedal adjuster assembly, P/N 70400-01613, on all H-60 Army aircraft (UH-60-93-ASAM-04, 011900Z Dec 92). Summary: The pedal adjuster assembly, P/N 70400-01613, on some aircraft have recently been found with the input arm, P/N 70400-01610-042, partially slid off the pedal adjuster mechanism due to deformation of the securing washer. The washer deforms because the nut used to secure the components together is not large enough. With sufficient force, the washer could deform around the nut and allow the input arm to slide off the mechanism. The purpose of this message (revision to UH-60-92-ASAM-06) is to advise the field that due to unforeseen circumstances the delivery of replacement hardware has been delayed and to require a recurring inspection of pedal adjuster assemblies with undersize nuts until proper hardware can be installed. Contact: Mr. Lyell Myers or Mr. Roger H. Heidenreich, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action informational message concerning one-time inspection for tail rotor drive shaft viscous damper bearings on all H-60 Black Hawk aircraft (UH-60-93-ASAM-05, 171800Z Dec 92). Summary: A number of Black Hawk tail rotor drive shaft viscous damper bearings, P/N SB1138-101, manufactured by MRC Bearings (cage code 38443) and issued by the Defense Logistics Agency have incorrect cleaning and lubrication instructions marked on the packaging. These bearings are not to be cleaned or lubricated by field personnel before they are installed in the aircraft. Any attempt by field personnel to clean or lubricate these bearings before they are installed may lead to a premature bearing failure. These bearings have all required cleaning and lubrication accomplished by the manufacturer before they are shipped. The purpose of this message is to inform the field of the improper cleaning and lubrication instructions on the bearing packaging and to provide disposition instructions in the event a suspect bearing has been installed on the aircraft. Contact: Mr. Lyell Myers, DSN 693-2285, commercial 314-263-2285.

■ Aviation safety action maintenance mandatory message concerning one-time inspection to remove suspect tail rotor pitch beams from all H-60 Army

aircraft (UH-60-93-ASAM-06, 171900Z Dec 92). Summary: A dimensional discrepancy has been identified on the tail rotor pitch beam assembly. This discrepancy could cause the pitch beam assembly to be loose after the attaching hardware has been torqued. The purpose of this message is to inspect for discrepant tail rotor pitch beams and remove them from service. Contact: Mr. Lyell Myers, DSN 693-2285, commercial 314-263-2285.

■ Aviation safety action maintenance mandatory message to bias tail rotor rigging 3 degrees on all UH-60A, EH-60A, and UH-60L helicopters built prior to S/N 91-26354 (UH-60-93-ASAM-08, 052000Z Jan 93). Summary: There are currently two Army H-60 tail rotor rigging procedures in use: one for UH-60A/EH-60A and one for UH-60L helicopters. ATCOM conducted flight testing that substantiated the UH-60L tail rotor rigging 3 degrees bias is beneficial to the UH-60A/EH-60A fleet. Aircraft to be corrected are all UH-60A, EH-60A, and UH-60L aircraft built prior to serial number 91-26354, except MH-60K serial number 89-26194. Aircraft serial numbers 91-26354 and subsequent are rigged to 3 degrees bias by the contractor during production and therefore records for aircraft serial numbers 91-26354 (including 89-26194) and subsequent will not require identification of this action. The purpose of this message is to provide instructions necessary for mandatory tail rotor rigging to incorporate the 3-degree bias. Contact: Ms. Terese McGrew, DSN 693-2085/2258, commercial 314-263-2085/2258.

■ Aviation safety action informational message concerning aft and combiner transmission oil cooler fan bearings on all CH-47D and MH-47D aircraft (CH-47-93-ASAM-01, 031700Z Dec 92). Summary: TM 55-1520-240-23-5 erroneously reads: Apply Syn-Tech grease (E190.1) to the aft and combiner transmission cooler fan bearings. It should read: Apply wide-temperature range MIL-G-81322 (E190) to the aft and combiner transmission cooler fan bearings. The purpose of this message is to provide corrections to TM 55-1520-240-23-5. Contact: Ms. Terese McGrew, DSN 693-2085/2258, commercial 314-263-2085/2258.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of main rotor mast nut, screw, and washer on all OH-58A/C aircraft (OH-58-93-ASAM-03, 152000Z Dec 92). Summary: A Category 1 Quality Deficiency Report has been received reporting improperly manufactured screws. The screws retain the main rotor mast nut washer. The screw head protrudes above the top surface of the washer, causing metal to be gouged from the screw during application of torque of the main rotor mast nut and depositing metal particles between the nut and washer. This causes improper torquing. The purpose of this message is to remove all improperly manufactured screws from service and to assure that none are installed on aircraft. Contact: Ms. Terese McGrew, DSN 693-2085/2258, commercial 314-263-2085/2258.

■ Aviation safety action maintenance mandatory message concerning main rotor hub latch bolts with insufficient threads on OH-58A/C helicopters (OH-58-93-ASAM-04, 162000Z Dec 92). Summary: A Category I Equipment Improvement Recommendation has been received reporting that a bolt, P/N 206-010-169-1, had insufficient threads to allow proper sweep adjustment. The source of the deficient bolt could not be determined. The purpose of this message is to advise users to check their stock for bolts, P/N 206-010-169-1, to assure proper length of the thread. Contact: Mr. Lyell Myers, DSN 693-2258, commercial 314-263-2258.

For more information on selected accident briefs, call DSN 558-3262, commercial 205-255-3262.

U.S. ARMY SAFETY CENTER

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

S T A C O M

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STACOM 156 **January 1993**

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Edward H. Littlejohn
COL, Aviation
Director, DES

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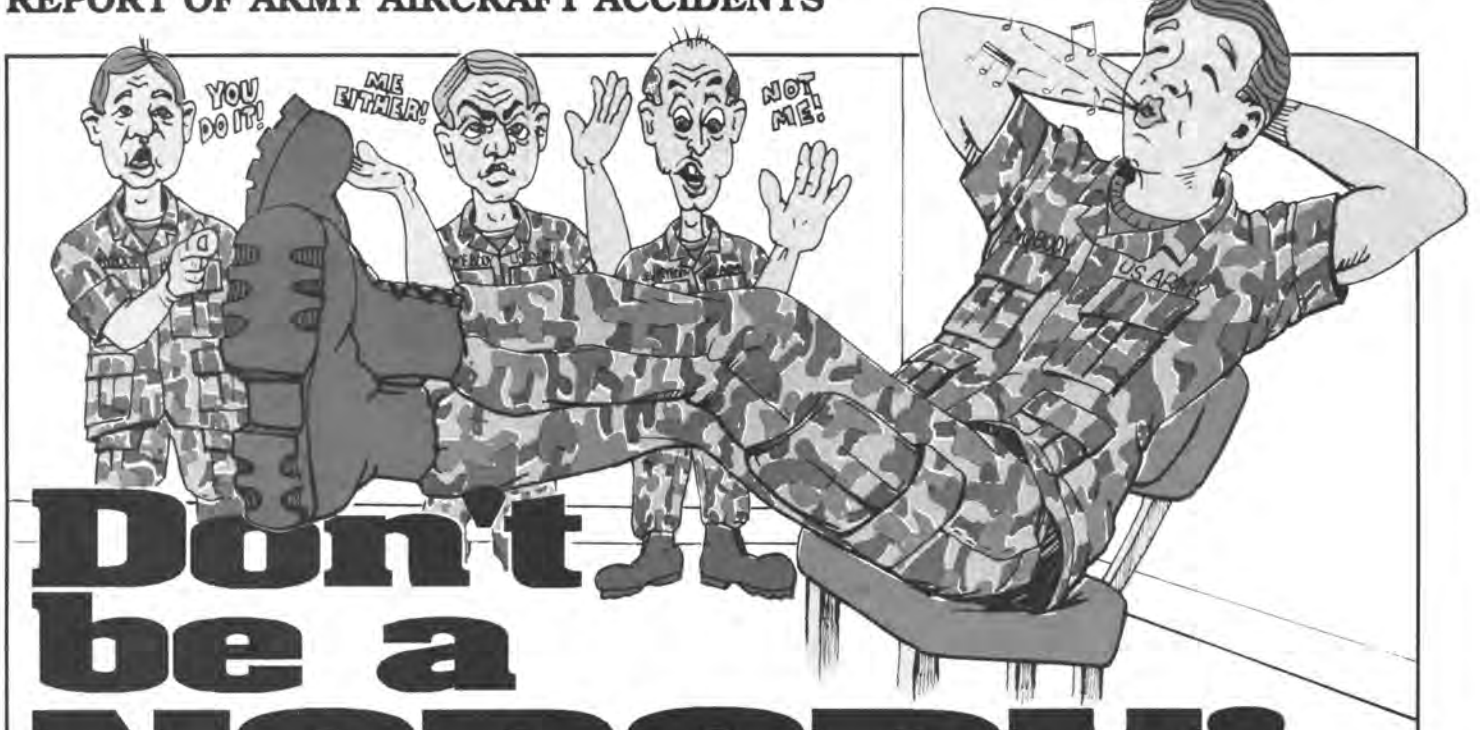
REPORT OF ARMY AIRCRAFT ACCIDENTS



Don't be a NOBODY!

It's not my job! How many times have you heard somebody say that? Well, in one case, it's true: writing an article for *Flightfax* or *Countermeasure* (the Army ground safety publication) isn't your job and it isn't mine. *It's our responsibility.*

The following little story illustrates the part you—the aviator, commander, crew chief—play in getting the word out on hot safety topics:

Four guys in the unit were named Everybody, Somebody, Anybody, and Nobody. There was an important job to be done, and Everybody was sure that Somebody would do it. Anybody could have done it, but Nobody did it. Somebody got angry about that because it was Everybody's job. Everybody thought Anybody could do it, but Nobody realized that Everybody wouldn't do it. It ended up that Everybody blamed Somebody when Nobody did what Anybody could have done.

The point is that you the field aviator, the unit safety officer, the instructor pilot, or the NCO are more than just the "backbone of Army aviation" cliche'. You are the men and women who on a daily basis experience the highs and lows of Army aviation. You live with the hours of sheer boredom, and you sweat the moments of stark terror. You've been there; you are there.

Your observations, experiences, hints, and tips are important. We need the lessons passed down to you from "the old guys," as well as the lessons you've learned the hard way.

As a unit pilot and safety officer, my favorite reason for not getting involved and writing for *Flightfax* or *Countermeasure* was always my lack of confidence in my basic writing skills. I relied on the shotgun technique with punctuation—if I put enough in, some were bound to hit the target.

Not to worry, the Army Safety Center has a fine group of writers, editors, and graphic artists. You provide the experience, the idea, and the draft (short or long—this is not Composition 101 in

which you have to meet a requirement for a certain number of pages or words). The editorial staff will polish your draft into an article that will clearly express your safety-related ideas. The folks in the media arts section will lay it out and provide illustrations if needed. And you get the credit. But most important, you might pass on a safety tip that could save a life.

Finally, if you need help getting data for your article or if you simply want to bounce your ideas off someone new, I'll be glad to help. Or if you need assistance with format, organization, or just plain getting started with an introduction, our writers and editors will be glad to "talk you through the tough spots." Write to: Commander, U.S. Army Safety Center, ATTN: CSSC-PT (CW4 Rauch) or ATTN: CSSC-PMA (*Flightfax*), Fort Rucker, AL 36362-5363.

Remember, sharing your ideas through safety publications may not be your job, but it is Everybody's responsibility. Anybody can do it. But if you expect Somebody to do it, it might just end up being done by Nobody. Don't be a Nobody; be the Somebody who shares ideas. ♦

—POC: CW4 Stephen V. Rauch, Training Branch, DSN 558-2947/3367, commercial 205-255-2947/3367

Editor's note: CW4 Rauch was assigned to the Army Safety Center's Training Section in August 1992, following a 6-year tour at Ansbach Army Heliport in Germany. We join CW4 Rauch, in urging all members of the aviation team to contribute material to our accident prevention publications. And, yes, he's right. We will gladly assist you. No degrees in English or Journalism are required. We just need your input—your ideas on how to make Army aviation safer.

Night vision goggle message

Following is aviation safety action maintenance mandatory message (GEN-93-ASAM-02) adapted for publication in *Flightfax*. This message provides an update of information published in previous night vision goggle (NVG) messages and applies to all U.S. Army aircraft. (A forthcoming TB 1-1500-346-20 will supersede this message and TB 1-1500-346-20 dated 15 April 1992. The new TB 1-1500-346-20 will be effective until 31 December 1993 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 the sidebar on page 3 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 5.

Distortion testing

Individuals required to conduct NVG and ANVIS distortion checks must have viewed TVT 46-18, *Night Vision Goggle Distortion Inspection*. Perform distortion testing on AN/AVS-6 IAW TM 11-5855-263-23 & P. Perform distortion testing on AN/PVS-5 IAW CDRAVSCOM message 172225Z Mar 89 paragraph 4c(1) and CDRAVSCOM message 172359Z Mar 89 paragraph 4c(2) until TM 11-5855-238-23 & P is published. This is a clarification of an existing requirement.

Use DD Form 1576: Test/Modification Tag to tag and return aviation goggles to the user after AVIM maintenance has changed either one or both image intensifiers in the system. Mark tag "Operational distortion evaluation is required prior to use."

TM 11-5855-263-23 & P will be changed to include the following corrections. However, these corrections should be implemented immediately.

■ *Page 2-15, paragraph 2-10.* Change the second sentence of the first paragraph to read "Only experienced ANVIS/NVG pilots are authorized to perform the distortion check."

■ *Page 2-16, paragraph 2-10 (continued).* Change the first sentence in the second paragraph from the top to read "...must first be evaluated by each of the pilots using..."

■ *Page 2-17, paragraph 2-10 (continued).* Change the sentence under *Personnel Required* to read "A minimum of two experienced ANVIS/NVG pilots."

■ *Page 2-19, paragraph 2-10 (continued).* Change the sentence under *Personnel Required* to read "A minimum of two experienced ANVIS/NVG pilots."

The distortion evaluator requirements for the AN/PVS-5 are changed to reflect the same requirements as the ANVIS. To accomplish this

action, make the first and second statements in paragraph 9 of CDRAVSCOM message 172225Z Mar 89 read "Select a minimum of two of the unit's most experienced and current ANVIS/NVG pilots to perform the evaluation. Each NVG and ANVIS device and every tube assembly must be evaluated by each of the pilots." This information will be in the forthcoming TM 11-5855-238-23 & P.

NVG maintenance training

New equipment training for AN/AVS-6 was completed in February 1993. Commanders are now responsible for training and should contact their CECOM logistics assistance representatives (LARs). An exportable training package is scheduled for release in April 1993.

AN/PVS-5 NVGs

■ *AN/PVS-5 goggle modified faceplate.* TM 11-5855-238-10 is scheduled for publication in April 1993. Upon publication of this manual, AN/PVS-5 goggles with modified faceplates will no longer be authorized for aviation use. TM 11-5855-238-10 will not contain pre-operational checks for modified faceplates. Distribution of AN/AVS-6 and/or GM-6 kits has been accomplished to meet unit requirements. If the loss of modified faceplates adversely impacts operational capabilities, contact PM-NVEO point of contact (POC), Mr. Glen Nowak, DSN 656-3277/4277, commercial 703-806-3277/4277, FAX 703-806-3284, for justified exceptions.

■ *AN/PVS-5 image intensifier tube (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."

■ *AN/PVS-5 and GM-6 aviation maintenance.* Publication of TM 11-5855-238-23 & P has been delayed. The approved AN/PVS-5 and GM-6 aviation maintenance allocation chart

Current NVG messages

Aviation safety action maintenance mandatory message concerning updated information on night vision goggles messages for all U.S. Army aircraft (GEN-93-ASAM-02, 211830Z Dec 92) and the following messages are current and shall be complied with until expired as noted:

■ 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 has expired for ANVIS and will expire for AN/PVS-5 upon receipt of TM 11-5855-238-23 & P.

■ 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 upon the receipt of TM 11-5855-238-23 & P.

■ HQDA message, 042006Z Aug 89, subject: Airspace Management in Cantonment Areas, Training Areas, and Ranges. This message expires upon revision of TC 95-93, dated March 1989.

■ 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 receipt of TM 11-5855-238-23 & 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 receipt of TM 11-5855-238-23 & 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 December 1988.

■ PMNVEO message, 221530Z Mar 91, subject: Aviation Night Vision Goggle (NVG) Maintenance. This message expires 1 June 1993.

■ 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 March 1990.

■ PMNVEO message, 161700Z Mar 92, subject: Revised Operator and Maintenance Manuals for ANVIS. This message expires when incorporated into TM 11-5855-263-10, dated 15 September 1991 and TM 11-5855-263-23 & P, dated 15 January 1992.

■ CDRAVSCOM message 301400 Mar 92, subject: Night Vision Goggle Information Concerning the Dual Visor on Aviators' Helmets (GEN-92-ASAM-06). This message expires on 1 April 1993.

■ CDRATCOM message, 052130Z Nov 92, subject: Correction of Obvious Errors in DA Pam 738-751: Functional Users Manual for the Army Maintenance Management System—Aviation (TAMMS-A), dated 15 June 1992. This message will expire with the update to DA Pam 738-751 scheduled during the first quarter of FY 94. ♦

can be obtained from CECOM POC, Mr. Mike Ayers, DSN 992-2208, commercial 908-532-2407.

Commercial NVGs

Commercial NVGs, including procured GSA-cataloged goggles and spare parts, are not authorized for aviation use. These nonstandard NVGs and parts have not been adequately tested for military use (for example, electromagnetic interference).

AN/AVS-6 (ANVIS)

Newly fielded ANVIS that either fail the service upon receipt of material inspection or fail before the expiration of the warranty must be reported on an SF 368: Product Quality Deficiency Report (PQDR). The PQDR must be processed through the local CECOM LAR. This will ensure the unit submitting the PQDR will receive credit for that ANVIS.

The light interference filter (LIF) MS-11428/AN/AVS-6(V), NSN 6650-01-328-5135, is a laser-protective device designed for use with the ANVIS. If the unit receives this item, take the LIF kit and the selected ANVIS to the AVIM or direct support/general support (DS/GS) for installation. POC for this action is Mr. Glen Nowak, DSN 656-3277/4277, commercial 703-806-3277/4277, FAX 703-806-3284.

The LIF for the AN/AVS-6 should contain an accelerator for the adhesive. If you receive an LIF that does not contain an accelerator, you can order it using NSN 8040-01-230-1502 for the 1.75-ounce size. If you need to order additional adhesive, use NSN 8040-01-284-3984.

Modification of AN/AVS-6(V2), NSN 5855-01-138-4748, binoculars to an AN/AVS-6(V1), NSN 5855-01-138-4749, version by replacement of the pivot adjustment shelf is not authorized.

TM 11-5855-263-23 & P will be changed to include the following corrections. However, these corrections should be implemented immediately.

■ *Appendix B, Section III, Tools and Test Equipment.* Torque wrench, NSN 5120-01-618-4433, replaces item number 16. It is used to perform tasks on the AN/AVS-6 using the tube retaining wrench with the 1/4-inch drive.

■ *Appendix B, Section III, Tools and Test Equipment.* Soldering iron NSN 3439-01-183-4623 replaces the currently listed NSN.

■ *Page C-2-1, item 2 (P/N 1-1/2SC).* The correct NSN for "Eyepiece Lens Cap" is NSN 5340-01-058-5930.

■ *Page C-2-1, item 11.* The correct NSN for "Objective Lens Cap With Light Interference Filter (LIF) Adapter" is NSN 5340-00-558-4962. Change the part number listed to EC-23.

■ *Page C-2-1, item 11.* The correct NSN for "Objective Lens Cap Without Light Interference Filter (LIF) Adapter" is NSN 5855-01-152-5849. Change the part number listed to SF-10. This part must be altered by cutting out the inside ridge before use. This is authorized at the unit level.

■ *Appendix E.* Add the following fabricated tool to use as the screwdriver bit to accomplish the torque of the AN/AVS-6 inside the purge ports: "Fabricate screwdriver blade bit, NSN 5130-00-021-2015, by cutting the shank in half and welding 5 inches of 3/32 stainless steel rod between the two halves."

■ *Page 2-36, paragraph 2-14.* This paragraph describes the AN/AVS-6 power pack test. Clarification is required for the low battery indicator test. The -G1, P/N 66868-300680, version power packs cannot be tested using this method on the TS-3895A/UV (not the TS-3895/UV) for test set serial numbers 1001-1999. For these power packs, use the alternative power pack test listed in paragraph 2-15 on page 2-39 during the 180-day service.

Battery and battery pack information

Batteries authorized for aviation NVG use are BA-5567/U lithium battery and BA-3058/U AA alkaline battery. No other batteries (nicad, mercury, carbon, etc.) are authorized for NVG aviation use. CECOM POC is Mr. John Christopulos, DSN 994-4985, commercial 908-544-4985.

Stock contamination has occurred for the AN/AVS-6 AA battery pack cartridge shown in TM 11-5855-263-23 & P, figure C1, item 9. Orders are being filled with an incorrect item. Change the part number for item 9 on page C-1-1 to 5008902. CECOM is taking steps to get a new NSN assigned. Until that time, submit requisitions off line with a DD Form 1348-6: DOD Single Line Item Requisition System Document (Manual Long-Form) IAW DA Pam 710-2-1: Using Unit Supply System Manual Procedures, paragraph 2-10.

Repair of aviation goggle battery power packs for AN/AVS-6 or GM-6 systems is not authorized.

Test sets

TS-4348/UV and TS-3895A/UV test sets require calibration every 12 months. To identify the first

calibration due dates for the TS-4348/UV, locate the warranty date on the TS-4348/UV body. Subtract 6 months. This is the date that the first calibration is due. If there is no warranty label, calibration is due immediately. Subsequent calibrations are tracked with DA Label 80: U.S. Army Calibrated Instrument that is attached to the body. Notify your local calibration shop when the test set is first received.

TS-3895/UV (not the "A" version) test set does not require calibration. DA Label 80 must be stamped with "CNR" (calibration not required) and affixed to the main plate. The test set must be serviced annually by the AVIM or DS/GS IAW chapter 5 of TM 11-5855-264-14 dated 15 October 1990.

For maintenance guidance on TS-3895A/UV, TS-3895/UV, or TS-4348/UV, contact U.S. Army Test, Measurement, and Diagnostic Equipment Activity POC, Mr. Tom Stonich, FAX 205-876-3070, commercial 205-876-3054 or PM-NVEO POC, Mr. Glen Nowak, DSN 656-3277/4277, commercial 703-806-3277/4277, FAX 703-806-3284.

The alternate test method for checking resolution IAW PMNVEO message 041500 Feb 88 (paragraph 13a) is no longer authorized for aviation-modified AN/PVS-5s.

Note: During crewmember pre-operational checks, the TS-4348/UV may be used as an optional check to assist in evaluating image-intensifier resolution and clarity. Operate the test set IAW TM 11-5855-263-10 and TM 11-5855-299-12.

Modification work orders

The following modification work orders (MWOs) must be applied to aircraft prior to NVG operations. (For aircraft with NVG-compatible components that have been replaced since initial application of the NVG MWO, see the *Note* in the paragraph on red and white lighting.)

■ *UH-60A and UH-60L.* Aircraft serial number 85-24462 and subsequent are authorized for NVG use when delivered. Aircraft serial number 85-24461 and prior—along with 85-24745 through 85-24750, 85-25511, and 85-25512—are required to have MWO 55-1520-237-50-20 installed for NVG use.

■ *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 is required for NVG use.

■ *OH-58A.* MWO 55-1520-228-50-31 or MWO 55-1520-228-50-22 is required for NVG use.

■ *OH-58C.* MWO 55-1520-228-50-32 is required for NVG use.

■ *OH-58D.* All aircraft are acceptable or safe for NVG use from production. No MWO is required.

■ *OH-6.* MWO 55-1520-214-50-16 is required for NVG use.

■ *CH-47C.* MWO 55-1520-227-50-27 and MWO 55-1520-227-50-33 are required for NVG use.

■ *CH-47D.* All CH-47D aircraft are authorized for NVG use when delivered with the exception of aircraft serial number 84-24187 and prior, which are required to have MWO 55-1520-240-50-3 installed for NVG use.

Rescinded NVG messages

As a result of aviation safety action maintenance mandatory message concerning updated information on night vision goggles for all U.S. Army aircraft (GEN-93-ASAM-02, 211830Z Dec 92), the following messages are rescinded:

■ PMNVEO message, 041500Z Feb 88, safety-of-use operational message, subject: Alternative Test Method for AN/PVS-5 Night Vision Goggles.

■ CDRAVSCOM message, 092100Z Dec 88, maintenance information message (UH-1-88-MIN-08), subject: Night Vision Goggle Operation for all UH-1/EH-1 Series Aircraft.

■ CDRCECOM message, 231015Z Feb 91, subject: Maintenance Level Authorization for the Installation of AN/AVS-6 Light Interference Filter (LIF).

■ CDRCECOM message, 202200Z Dec 91, safety-of-use message (CECOM-91-12-20), subject: AN/AVS-6 ANVIS Night Vision Goggles.

■ CDRCECOM message, 2201820 Apr 92, safety-of-use message (92-04-03), subject: Monocular Housing Assembly, NSN 5855-01-149-4100, Part of the AN/AVS-6 ANVIS.

■ CDRCECOM message, 291800 Apr 92, safety-of-use message (92-04-03), subject: Monocular Housing Assembly, NSN 5855-01-149-4100, Part of the AN/AVS-6 ANVIS.

■ CECOM message, 061900Z Aug 92, subject: AN/AVS-6(V1) and AN/AVS-6(V2) ANVIS Monocular Housing Assemblies (MHAs).

Note: Aircraft serial numbers 81-23381 through 81-23384 are not authorized for NVG use.

■ *AH-1S.* MWO 55-1520-234-50-1 and MWO 55-1520-234-50-4 are required for NVG use.

■ *AH-1E, F, and P.* MWO 55-1520-236-50-4 and MWO 55-1520-236-50-5 are required for NVG use.

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. *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.

Effective 30 December 1993, unless rescinded or superseded, the following policy will replace the previous *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 replaced or modified for NVG compatibility." Variation in wording is acceptable. This circle red X entry may not—repeat—may not be cleared by taping or turning off. Only replacing the component or modifying the component IAW the applicable NVG MWO is acceptable. Efforts are being made to provide the field with a standard NVG configuration of the cockpit for each aircraft system and replacement NVG-compatible components.

■ *Supplemental lighting.* Supplemental lighting is defined as additional blue-green interior lighting that may consist of lip lights (microphone lights), finger lights, flashlights with filters, and other similar devices. Lip or microphone lights and finger lights do not fulfill the flashlight requirement of AR 95-1: Army Aviation Flight Regulations.

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 or warnings associated with the lighting.
- Demonstration of degradation of NVG performance caused by supplementary lights.
- A means to verify knowledge of use.

Note: At the discretion of the pilot-in-command, flashlights with red or white light may be used for ground operations or in the cargo compartment of UH-1, UH-60, or CH-47 aircraft.

The following steps outline a method for evaluating the effects of supplemental lighting with ANVIS:

1. At night in an aircraft located in an area of low ambient light (landing zone, etc.) with interior lighting set for NVG operation and with the ANVIS prepared for use, position a reflective material (for example, a map sheet, note card, or vinyl checklist) at reading distance (about 12 to 18 inches) from your eyes.
2. Shine the supplemental light onto the material. With the unaided eye, look at the resultant reflection cast on the windscreen.
3. Observe this same reflection through the ANVIS. An acceptable supplemental light source will allow ANVIS-aided vision through the reflection. The reflection can even disappear.
4. If the reflection blocks ANVIS-aided vision, the light source should be deemed unacceptable.

Note: 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-acceptable filtered light.

■ *Flashlight filters.* Any blue-green flashlight filter may be used on flashlights during NVG flight until an Army standard filter is fielded. It should be noted that some blue-green filters cause degradation to the NVGs. The use of multiple blue-green filters may be required to gain the desired effect.

■ *Current evaluations.* Evaluations of various types of lights and filters that may be used with AN/AVS-6 NVGs are continuing.

■ *Infrared (IR) bandpass filters.* The IR filter (pink light), P/N EGO-0931-1, may be installed on either the searchlight or landing light based on operational requirements as 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	Candle-power
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

Physical security

Units should use the following references and their local requirements for NVG and ANVIS security and accountability:

■ Physical Security Update 2 in AR 190-51: Security of Army Property at Unit and Installation Level.

■ Unit Supply Update 13 in AR 710-2: Supply Policy Below the Wholesale Level and AR 735-5: Policies and Procedures for Property Accountability.

For further guidance, contact the local physical security manager or officer.

Miscellaneous information

■ AN/PVS-7s are not authorized for aviation use.

■ NVG operations in the AH-64 aircraft will be conducted IAW the interim statement of airworthiness qualification dated 20 October 1992.

■ NVG maintenance documentation errors referenced in CDRATCOM message 052130Z Nov 92, paragraph 4c(12), will be corrected in a forthcoming consolidated maintenance message. This forthcoming message will rescind PMNVEO message 221530Z Mar 91 paragraph 4c(7). A *Flightfax* article will follow the consolidation message with illustrations and further guidance on the use of appropriate forms.

■ The only black spot target authorized for use has a machine-printed NSN 5855-01-305-9524 in the lower right corner and "Do Not Reproduce" in the lower left corner. Stock for the target has been contaminated with targets that have the wrong spot sizes. These defectively produced targets have the NSN handwritten in the lower corner.

Points of contact

POCs for this message are:

■ PM-NVEO, Mr. Glen Nowak, DSN 656-3277/4277, commercial 703-806-3277/4277, FAX 703-806-3284.

■ Aviation Training Brigade, MW4 Rodney Rowe, CW4 Malcolm Colbert, or SFC Sherman Loney, DSN 558-5858/5812, commercial 205-255-5858/5812.

■ CECOM, Mr. Jay Hanrahan, DSN 992-0084, commercial 908-532-0084.

■ ATCOM, supplemental lighting, Ms. Kelly Jeanotte, DSN 693-1130, commercial 314-263-1130.

■ ATCOM, Mr. Brad Meyer, DSN 693-2085, commercial 314-263-2085.

■ After hours, ATCOM Command Operations Center, DSN 693-2066/2067, commercial 314-263-2066/2067.

■ Night Vision Forward Office for U.S. Army—Europe, Mr. Larry Marshall, DSN 370-3618, commercial 49-6221-57-7618.

■ Army Safety Center, MW4(P) Robert A. Brooks, DSN 558-3262, commercial 205-255-3262. ♦

Aviators needed

The U.S. Army Aeromedical Research Laboratory (USAARL) at Fort Rucker, Alabama, is in the process of conducting a variety of research protocols. Aviator volunteers are needed to participate in these studies.

Many of these studies will require a 2-week commitment. And participants will be able to acquire either simulator or aircraft time, depending on the study.

Temporary duty funds and travel funds will be provided by USAARL on a case-by-case basis. Anyone interested in participating in the research should contact Mr. Larry Woodrum, DSN 558-6834, commercial 205-255-6834. ♦

UH-60 configurations

With the introduction of various configurations of the UH-60, how does the operator know how the aircraft is configured and what capabilities the aircraft has based on that configuration? The following information should help answer many questions that are currently circulating among the UH-60 community concerning the operators manual, TM 55-1520-237-10. This STACOM does not take precedence over any limitations in the TM; this is a summary of the information in the operators manual.

UH-60A. UH-60A aircraft with serial numbers 77-22715 through 82-23748 were produced without the external stores support system (ESSS) hardpoints and the improved airspeed sensing canted (wedge-mounted) pitot tube installation. These aircraft cannot accept the ESSS installation and may have up to a 10 KIAS error when operating at high gross weights. These aircraft are scheduled to be modified to the upgraded configuration with the canted pitot tube installation beginning in FY 93 and the ESSS hardpoints at some future date.

If the UH-60A does not have the wedge-mounted pitot tubes, then the aircraft can be operated to a maximum gross weight of 20,250 pounds.

If *both* engines on your UH-60A have the stud mount balancing modification work order (MWO) applied (verified by a review of the historical records) along with the installation of the wedge-mounted pitot tubes, then the aircraft may be operated up to a gross weight of 22,000 pounds. If the application of the stud mount balancing MWO to *both* engines cannot be verified and/or the wedge-mounted pitot tubes are not installed, then the aircraft is still restricted to 20,250 pounds.

UH-60A aircraft with serial numbers 77-22715 through 84-23934 were produced without the hover infrared suppressor system (HIRSS) or hardpoints. The hardpoints for the HIRSS were incorporated on serial numbers 84-23935 and subsequent, and the completed HIRSS was incorporated on serial numbers 87-24583 and subsequent. Retrofit actions are currently in progress to equip all remaining UH-60A aircraft with HIRSS.

At the present time, UH-60A aircraft do not have biased tail rotors and, therefore, must operate according to paragraph 5-25d(2) of the operators manual. On 5 January 1993, the Aviation and Troop Command issued an aviation safety action maintenance mandatory message that incorporates biasing of the tail rotors of all UH-60A and L series aircraft. This will allow for sideward and rearward flight limitations in paragraph 5-25d(1) and eliminate figure 5-5.

UH-60L. Currently there are two versions of the UH-60L aircraft. All UH-60L aircraft are equipped with engine drive shaft balance bolts (stud mount balancing). Retrofit kits are now being applied to all UH-60A aircraft. All UH-60A and L series aircraft with *both* engine drive shafts balanced within 0.5 inches per second (along with the wedge-mounted pitot tubes) are authorized to operate at up to 22,000 pounds gross weight.

The *unplacarded* UH-60L, production models from serial numbers 91-26354 to the present, have the wedge-mounted pitot system, engine stud mount balancing, ESSS hardpoints, HIRSS, tail rotor bias, and the improved main rotor flight controls. Operators of this particular version may apply the torque limits of 120-percent dual engine at or below 80 KIAS and 100-percent dual engine above 80 KIAS. In addition, the sideward and rearward flight limit chart in figure 5-5 does not apply. For sideward and rearward flight, refer to paragraph 5-25d(1).

Note 1: All UH-60Ls prior to serial number 91-26354 (placarded aircraft) are restricted to the placard limits until scheduled retrofits can be completed. Retrofits, which will involve the installation of the improved strength main rotor flight controls, are scheduled to start in FY 93.

Note 2: Those UH-60Ls prior to serial number 91-26354 (placarded aircraft) operating under an airworthiness release (AWR) will continue to operate according to the provisions of the AWR until the provisions of the AWR are incorporated into the operators manual or the AWR is rescinded.

The placarded UH-60L aircraft will be operated according to the placard torque limitations regardless of airspeed. If the tail rotor is biased, then refer to paragraph 5-25d(1); otherwise, the sideward and rearward flight limits in figure 5-5 apply. These restrictions are due to the increased load levels and increased antitorque requirements at the higher torque settings.

Under the present configuration-management system, there is no positive way to know precisely how a particular UH-60A or L series aircraft is configured (that is, stud mount balancing, tail rotor biasing, or improved main rotor flight controls) unless it can be verified through a research of the aircraft historical records. Without proper verification of the configuration, one can only assume these MWOs have not been applied and the aircraft would be restricted accordingly.

If additional information is required, Directorate of Evaluation and Standardization point of contact is CW3 Richard Gotz, ATTN: ATZQ-ESF, Fort Rucker, Alabama 36362-5208, DSN 558-2442/6309, commercial 205-255-2442/6309. ♦

STACOM 157 **February 1993**

Prepared by the Directorate of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208, DSN 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.

Edward H. Littlejohn
COL, Aviation
Director, DES

Update on release of chlorofluorocarbons/Freon

In June 1992, Aviation Systems Command (AVSCOM) issued an aviation safety action informational message concerning the use of recovery/recycle equipment on all air-conditioning or refrigerant systems that use chlorofluorocarbons (CFC)/Freon (UH-60-92-ASAM-04, 161330Z Jun 92). The content of the message also appeared in article format in the August 1992 issue of *Flightfax*.

The original message and subsequent *Flightfax* article contained an error. Paragraph 4d(4) of the message and bullet four of the *Flightfax* article state "Inform units that the MOS to be trained for this equipment will be 67T." The statement in the message and the subsequent article should have read "**Inform units that the MOS to be trained for this equipment will be 52C.**"

An agreement that 52C is the MOS to be trained was reached by the Environmental Protection Agency and the Army during negotiations to determine who is eligible for certification to use the recovery/recycling equipment. To ensure that intermediate level maintenance units will have the required personnel, a check was made of the modified table of organization and equipment to verify that these units are authorized both MOS 67T and 52C.

Information pertaining to points of contact (POCs) has been updated due to the reorganization of Troop Support Command and AVSCOM into one command, Aviation and Troop Command (ATCOM). For information concerning training and certification conducted by ATCOM logistics assistance representatives, contact Mr. Helmuth Ruppe, DSN 693-1221, commercial 314-263-1221. The POCs for other issues are Mr. James Vincent or Mr. Terry Blackmore, DSN 693-3266, commercial 314-263-3266.

The limited resources of recovery/recycle equipment that were available to ATCOM have been exhausted. Recovery/recycle equipment, NSN 4130-01-338-2707, can be requisitioned as a stock fund item from the Defense Logistics Agency, Defense General Supply Center, Richmond, VA.

—POC: Mr. Terry Blackmore, ATCOM, Weapon Systems Management Office for Environmental Control & Refrigeration Equipment

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class D

H series - About 2 minutes into hover taxi, crew heard engine wind up and noticed engine tachometer needle drop to zero. Rotor tachometer needle climbed to 7,000 on engine scale, and crew entered autorotation. Inspection revealed overspeed governor and tachometer drive assembly had failed.

H series - Crew started engine with main rotor blade tied down. At about 35 percent N1, tiedown broke and blades began to rotate. Tiedown rod, still attached to main rotor blade, hit tail rotor blades during 5 to 10 rotations before main rotor blades stopped.

UH-1 Class E

V series - During IMC flight and while descending through 3,000 feet MSL at 400 feet per minute and in a 10-degree left bank, aircraft experienced severe right 30-degree yaw. Rotor and N2 RPM increased, engine noise increased, and RPM warning light came on. PC took controls and reduced throttle with no effect on RPM. PC then placed governor switch to emergency position and maintained manual throttle control. Crew saw N2 at 6900 RPM, and it appeared pegged at gauge limit. All other systems were within limits. Highest N1 reading was 92 percent. Crew declared an emergency and was given radar vectors for final approach to destination. Inspection revealed overspeed governor had failed

UH-60 Class C

A series - While on approach to land at tactical LZ, aircraft encountered brownout and crew lost visual reference with LZ. Pilot took controls and initiated go-around. On climbout, main rotor blades struck trees along left side of road.

Attack

AH-1 Class C

F series - During hot refueling, refueler removed fuel nozzle from port and fuel sprayed on side of aircraft. Exhaust ignited fuel. Pilot, who was standing fireguard, extinguished fire with fire extinguisher.

F series - While performing maintenance test flight hover operations, TGT rose past 950°C and torque rose from 72 to 90 percent. Both crewmembers noticed burning odor throughout cockpit. Another aircraft and control tower made radio calls to aircraft stating that they saw glowing chunks and sparks coming from exhaust. Crew landed aircraft without further incident and performed emergency shutdown. Inspection revealed bolt and washer in improved particle separator and shank of bolt in compressor section.

AH-64 Class A

A series - During night vision system zone reconnaissance training mission, aircraft experienced tail rotor malfunction and settled into trees. Aircraft came to rest on its left side. Main rotor system was destroyed, tail rotor was destroyed, left wing was torn off, and one canopy was broken. No injuries. 9312

AH-64 Class C

A series - While in climb at about 15,600 feet density altitude and 60 knots during experimental test flight, crew felt high-frequency vibration throughout aircraft. Crew elected to terminate testing and return to airfield. During descent, about 20 seconds after vibration began, crew heard loud bang and vibration stopped. Crew performed controllability check with normal responses, and chase aircraft saw no visible damage to aircraft. At onset of vibration, master caution light had come on briefly but extinguished before crew

Class A Accidents through January

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	6
	December	1	1	0	0
2d Qtr	January	3	1	0	0
	February	1		0	
	March	4		2	
3d Qtr	April	1		0	
	May	1		1	
	June	2		2	
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	22	10	10	8

could identify accompanying segment light. No other warning or caution segment lights came on for remainder of flight. Crew elected to perform high-speed run-on landing in case problem involved tail rotor or flight controls. After landing, high-frequency vibration returned and pilots smelled smoke in cockpit. Crew completed emergency engine shutdown. Inspection revealed major damage to aircraft. Investigation continues.

AH-64 Class D

A series - As aircraft was approaching rearm pad, tail wheel struck concrete culvert. Crew felt jolt and immediately landed aircraft. Neither crewmember nor ground guide could see culvert, which was in 3-foot drainage area and obscured by tall brush. Inspection revealed minor damage to tail wheel assembly. Rearm pad was relocated and hazard marked.

Cargo

CH-47 Class D

D series - On postflight inspection, crew discovered No. 1 tunnel cover was missing. Further inspection revealed damage to No. 2 sync shaft. Suspect crew chief failed to secure tunnel cover, and PC failed to physically ensure security of all cowlings and covers during preflight.

CH-47 Class E

D Series - During takeoff, crew chief noticed fluid coming from forward pylon area. Crew made precautonary landing. During shutdown, oil was running out of forward yellow blade pitch varying housing. Further inspection revealed inner seal had failed.

Observation

OH-58 Class B

D series - During NVG landing to ship, pilot gave direction for "no more slip left." PC either did not hear or misunderstood. Aircraft continued to slip left and struck ship's landing light extension pole. Aircraft sustained extensive damage to all four main rotor blades, drive shaft, and 45- and 90-degree gearboxes.

OH-58 Class E

A series - At NOE altitude, crew increased collective from about 70 to 80 percent torque. As torque increased, N2 drooped to about 94 percent, activating RPM warning light and audio. Crew reduced collective and landed aircraft. Inspection revealed linear actuator was out of rig.

A series - While in cruise flight, pilot began acceleration to Vne and applied too much collective, resulting in overtorque of 102 percent for 2 seconds. IP reduced collective and made precautionary landing.

Messages

■ Aviation safety action maintenance mandatory message concerning one-time inspection of cartridge-type fuel boost pump system on all OH-58D helicopters (OH-58-93-ASAM-05, 121400Z Jan 93). Summary: An incident has occurred where the shut-in arm of the cartridge-type fuel boost pump was found bent. This condition is unacceptable and may result in power loss or flameout because of a restriction of the fuel flow. The aircraft involved also had a defective fuel pressure switch, and the fuel-boost-fail caution message may not have been activated. The purpose of this message is to require a one-time inspection of the cartridge-type boost pump and fuel pressure caution system. Contact: Mr. Roger H. Heidenreich, DSN 693-2285, commercial 314-263-2285.

■ Aviation safety action maintenance mandatory message concerning recall of suspect fuel hoses that may be installed on OH-58A/C and H-6 series aircraft with T63-A-720 engines (OH-6-93-ASAM-06 and OH-6-93-ASAM-01, 121600 Jan 93). Summary: TB 1-2840-241-20-11 (SOF messages OH-58-92-04/OH-6-92-03) was published to recall 50 T63-A-720 fuel hose assemblies, P/N 23005205 (TM 55-2840-241-23 & P, figure 12, item 29), that may have been manufactured incorrectly. Although TB 1-2840- 241-20-11 has been rescinded, all suspect hoses must still be replaced.

The suspect hoses may have an internal leak that could allow fuel to leak from the center Teflon core and result in bulging of (and possible leakage from) the rubber fire sleeve. The fuel leakage is a potential fire hazard. The purpose of this message is to remind users that not all hoses from the lot number identified in this message have been returned to the contractor, and users are to replace these suspect hoses on T63-A-720 engines that bear serial numbers as listed in this message. Contact: Mr. Lyell Myers, DSN 693-2258, commercial 314-263-2258.

For more information on selected accident briefs, call DSN 558-3262, commercial 205-255-3262.

Followups

Information on accidents previously reported

UH-1 Class A

Reported in April 1992 issue as 9216 - While air taxiing into tactical parking area, PC made improper decision to land abeam another operating aircraft without having a visual, fixed reference point to use in maintaining clearance from the other aircraft. Without a visual reference point and without receiving clearance information from right-seat pilot, PC lost sight of other aircraft in blowing snow. Ground track carried aircraft too close to aircraft operating at engine idle in its designated parking area. As aircraft settled into loose snow, its rotor blades contacted rotor blades of parked aircraft, causing

extensive damage to both aircraft. Crew had just completed cold refueling in subzero temperatures and were extremely uncomfortable. PC was anxious to secure the aircraft and move out of the cold.

AH-64 Class A

Reported in December 1991 issue as 9205 - During a day VFR postphase general maintenance test flight (MTF), crew had completed rotor track checks and determined results were satisfactory. For autorotation RPM check, MP directed pilot to climb to 3,500 feet pressure altitude (PA) and maintain airspeed of 80 knots. Once established on downwind leg for selected emergency landing area, pilot transferred controls to MP. After confirming less than 54 percent dual engine torque, MP repositioned No. 2 engine power lever to idle position. No. 2 engine Ng (N1) readings indicated engine was still running. On final approach, heading 270 degrees, MP entered autorotation by lowering collective. Triple tachometer indicated Nr of 98 percent. Aircraft was at 80 knots and in trim. MP then repositioned No. 1 engine power lever to idle position. As aircraft descended through 2,000 feet PA, Nr was recorded as 94 percent. At about 1,500 feet PA, MP recovered aircraft by repositioning both engine power levers to fly position. While MP was advancing power levers, Nr continued to decrease well below normal operating RPM. Automatic stabilator horn sounded, indicating that generators had come off line because of low rotor RPM. MP observed airspeed between 65 and 70 knots and pushed forward on cyclic in an effort to regain airspeed. MP stopped both engine power levers about 1 inch from fly position because he feared an engine overspeed. At about 200 feet PA, MP applied small amount of collective pitch to clear wires. MP then decided to commit to full touchdown autorotation. He lowered collective pitch and repositioned both engine power levers to idle position. Impending impact point appeared to be in tree line on upwind edge of selected emergency landing area. To clear tree line, MP again applied collective pitch and changed aircraft heading about 50 degrees right, attempting to land in small cotton field. MP misjudged autorotative glide angle because of a lack of unit training in executing autorotations from altitude to unimproved areas—even with power recoveries. (This was also MP's first postphase general MTF.) As the aircraft began to descend into 75-foot-tall pine trees, MP applied remaining collective pitch to cushion the touchdown. Aircraft impacted ground in nose-low attitude with almost no forward momentum and came to rest upright on its three landing gears.

OH-58 Class A

Reported in March 1992 issue as 9214 - At 20 to 30 feet above trees and 20 to 40 knots while en route to tactical landing area on ridgeline, aircraft experienced malfunction of engine fuel control (P/N 2524911-4). Pilot observed low rotor RPM light and heard audio warning when engine lost power and main rotor RPM started slowing. Crew regained rotor RPM by reducing collective in descending right turn toward clear area at lower elevation. Rotor RPM warning light and audio again activated during approach to intended landing area. Pilot attempted low-level autorotation, which terminated approach short of intended landing area with resultant hard landing and major aircraft damage. Subsequent testing of fuel control duplicated malfunction, but teardown analysis failed to determine exact cause. Due to aircraft history and condition of fuel pump, it is suspected undetected sand in fuel control caused malfunction.

C-12 Class B

Reported in December 1991 issue as 9207 - During roundout for power approach precision landing, crew heard unusual scraping and ticking sound and noticed aircraft fuselage was lower to ground than normal. Crew then realized landing gear was not extended and a safe go-around could not be accomplished. Pilot held aircraft off runway as long as possible and then touched down in level attitude. After aircraft slid to stop, crew shut down engines and egressed through main exit. During traffic pattern flight, IP had failed to follow procedures. He did not orally call out checklist items and verify action using pilot's checklist IAW TM 55-1510-221-10, paragraph 8-10. As a result, landing gear was not extended during before-landing checks and illumination of landing-gear-down indicator lights was not verified during landing check. After observing illumination of red landing gear warning light, IP still did not recognize that it indicated a gear-unsafe condition. Pilot also failed to associate light display with an unsafe condition. Therefore, crew allowed aircraft to land without landing gear extended.

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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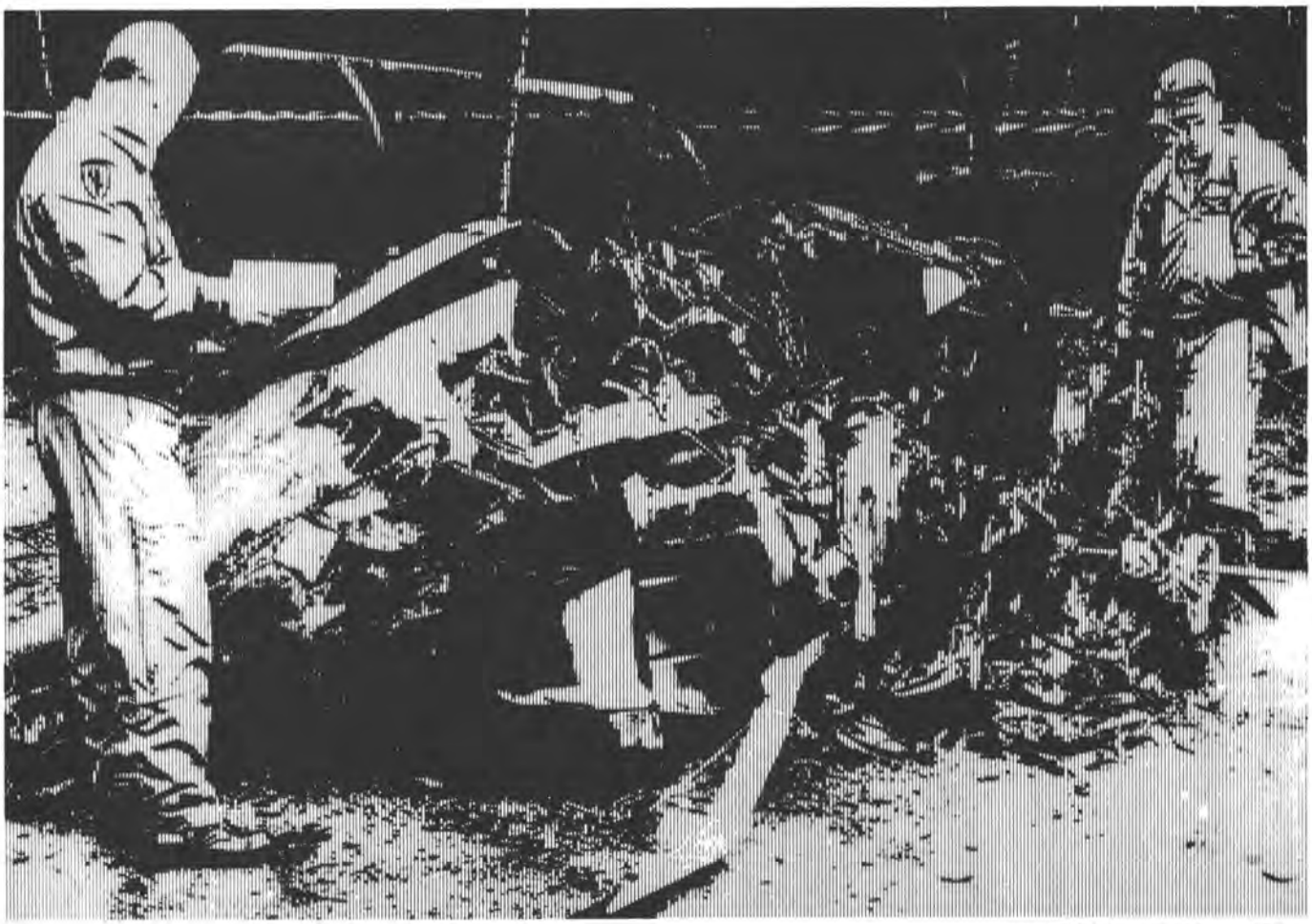
REPORT OF ARMY AIRCRAFT ACCIDENTS



Where did Safety GO?

In just 3 weeks, we've experienced 5 Class A aviation accidents. Within 36 hours, four lives were lost in two separate training accidents. Two weeks later, another pilot was killed when his aircraft crashed during a single-pilot, night mission in deteriorating weather and another 4 lives were lost when a UH-60 crashed during a service mission.

People are grieving, aircrews are apprehensive, and the Army is deeply troubled by these painful losses. The air within the aviation community is heavy with questions. What are we doing wrong?

The safety-first, take-no-unnecessary-risk shield that crewmembers used to make FY 92 the best year ever in Army aviation has cracked, leaving our crewmembers vulnerable and prime targets for accident-causing mistakes. Why have we lost that hard-earned "safety" touch that so carefully guided us through FY 92? Where did safety go? And most of all, how do we get it back? Answers are few at this time. But there is a process for finding answers to the questions, and that process is accident investigation. ♦

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Accident investigation— a necessity for safety

Without accident investigation, many questions would go unanswered, prevention measures could not be developed, and aircrews would be left to make the same mistakes that often took the lives of fellow aircrewmembers.

Obviously, the most-asked question following an accident is "What happened?" Was it caused by materiel failure? Were environmental factors responsible for the accident? Or was it human error? But we also must know "Why it happened." If a weakness in leadership, training, standards, or support functions led to the tragedy, then we must find that weakness.

When an accident occurs, determining the circumstances surrounding the accident and finding answers to these questions becomes a driving force. Following an accident, the very reliability of the aircraft is sometimes questioned. If a mechanical malfunction caused the accident, the possibility exists that the same malfunction could strike other aircraft. Although mechanical malfunctions do occur, the majority of accidents result from human error. And we need to know why the errors occurred.

Before prevention measures can be developed, we must determine what happened, what caused it to happen, and why specific errors occurred. If cause factors can be determined, then the question becomes "What can we do to prevent this kind of accident from happening again?"

Centralized accident investigation

These basic questions (What happened?, Why did it happen?, and What can be done to prevent this kind of accident from happening again?) are sometimes referred to as the 3-W questions. They are not new ones, and they do not apply only to these recent aviation accidents. These questions are relevant to all accidents. And they are questions we at the Army Safety Center have been attempting to find answers for since April 1978 when the Army began a trial period of centralized accident investigation (CAI).

CAI has proven so effective, it is still the process we use to find answers to the 3-W questions. Today, the Army Safety Center investigates all Class A and selected Class B aviation accidents Armywide. The success of the program was such that following a 6-month test program that began on 1 October 1982, the Army expanded CAI to include selected Class A and B ground accidents.

The quest for answers

Even as this issue of *Flightfax* is being prepared, accident investigators are diligently searching for answers, trying to determine what happened and why. But it will be some time before those answers are known.

Sometimes in spite of all the enormous efforts of the CAI team and the specialists who are called in to assist with the analysis of what little evidence is available, definitive answers cannot be found. In a few cases, suspected scenarios are the only "answers" that can be determined. All accidents are tragic, but these are especially so because unanswered questions limit our ability to develop prevention measures.

But in most cases, the accident investigation process yields answers. And based upon those answers, the readiness shortcomings—whether they be individual, leader, training, standards, or support failures (and often combinations of failures)—are identified. The focus can then be diverted to finding ways to enhance the safety of our aircrews. Sometimes the "fix" is at unit level, such as improving unit training or enforcing the standards. Other times, the fix is at Army level, such as improving school training or changing equipment design or operating procedures.

Safety is about helping units conserve resources through accident prevention. And accident investigation is a necessity in our safety program. With the information obtained from accident investigations, safety programs and prevention measures can be developed to protect and safeguard our aviation resources in similar situations, bringing safety back as our frontline defense. ♦

Editor's Note: Although CAI has been in existence for 15 years, a few misconceptions still exist concerning the accident report. Problems arise because some portions of an accident report contain privileged information. Confusion exists on how these accident reports may be used and who should have access to various pieces of information contained in the reports. Many are still unclear about the distinction between an accident investigation and a collateral investigation, how information from each of these investigations can and cannot be used, and why it is necessary to have both accident and collateral investigations. The Army Safety Center Command Judge Advocate attempts to clarify some of these problem areas in the following two articles.

Command misuse of protected portions of accident reports is prohibited

DA Pamphlet 385-95: Safety: Aircraft Accident Investigation and Reporting provides that witnesses who are called to testify before an accident investigation board will be advised that their statements will be used for accident prevention purposes only. AR 385-40: Accident Reporting and Records states that because witnesses have been promised their statements would not be used for purposes other than accident prevention, these statements will not be provided to other investigators.

This rule is intended to overcome any natural reluctance witnesses might have to testify candidly before the accident investigation board. For example, people involved in an accident may fear that what they say may be used in proceedings such as flight evaluation boards, reports of survey, letters of reprimand, or other adverse administrative actions. In some cases, they may even worry that what they say to accident investigators could be used against them in a criminal context; for example, to support nonjudicial punishment under Article 15, Uniform Code of Military Justice, or even in a trial by court-martial.

Although accidents involving human error seldom result in any of these adverse consequences, the fears and concern of witnesses are very real. We must reassure them that they have nothing to fear from telling safety investigators everything they know about the accident.

The Army's accident investigation process depends heavily on the investigators' ability to obtain full disclosure from people directly involved in the accident as well as any other witnesses. Fear that their careers or the careers of others are on the line could cause witnesses to hold back certain information out of a desire to protect either their own interests or those of a friend. If this happens, our ability to prevent accidents will be seriously impaired.

Factual material (for example: maps, photographs, and teardown analysis) from the accident investigation may be provided to other investigators (criminal, report of survey, line of duty, collateral, and so forth). But neither the content of witness statements nor the accident board's findings and recommendations are released to such investigators. The only purpose for which this information can be released or used within DOD is on a need-to-know basis for safety and accident prevention. Pursuant to AR 385-40, requests from within DOD must state the purpose for which such information is needed. If the requester intends to use the material for any purpose other than accident prevention and safety, the request will be denied. Further, the protected portion of accident reports may not be used

either as evidence or to obtain evidence in connection with any disciplinary proceeding.

It is important to clarify at this point that the restrictions on the use of witness statements and accident investigation board findings and recommendations are not intended to prevent commanders from taking adverse action against persons involved in an accident. This is a commander's prerogative and the decision whether to take such action is made by the commander. It must be understood, however, that any contemplated adverse action must be based on the collateral investigation, not the accident investigation. DODI 6055.7: Mishap Investigation, Reporting and Record Keeping states that a collateral is mandatory in the case of anticipated disciplinary or adverse administrative action against any individual. AR 385-40 also states that the collateral is to form the basis for taking disciplinary and administrative action in a case.

This dual investigation process is vital to our ability to protect the separate identity of accident investigation reports. Court decisions protecting the privileged status of accident reports note the critical difference between the safety and collateral investigations. An extremely important factor is that the protected portions of accident reports are not released or used even within the military for purposes other than safety. In a case involving a claim or possible litigation against the Government—even where its use would benefit the Government's defense—the protected material is not provided to the Government's own attorneys. The fact that the Army will not breach this privilege even to defend itself is an extremely important factor in convincing the courts how important this principle is to the continued success of our safety program.

As is often the case, the system must rely on the integrity of those who administer it. The chain of command has access to both the safety and collateral reports; therefore, some might question whether it is asking too much to expect the command to base its decision on whether to take adverse action solely upon the collateral without being influenced by protected portions of the safety report. The answer is that commanders are called upon to make similar decisions every day. That they do so is a testament to the importance they attach to the principles they are upholding.

Any contemplated adverse action must be based on the collateral investigation, not the accident investigation.

To use a common analogy, we expect our officers and NCOs sitting on court-martial panels to follow the instructions of the military judge. Certain items of evidence are admitted for a limited purpose, and the panel is instructed to consider the evidence only for that purpose. At other times, court-martial members are instructed to disregard a certain piece of evidence altogether. Similarly, they are told that they must disregard anything they may have heard about a case and render a decision based solely on the evidence admitted in court. Our judicial system depends upon the ability of people to follow such rules. Isn't it reasonable, therefore, to expect a commander to make decisions based on the facts produced by the collateral investigation even though he is privy to information from the accident investigation that he cannot consider?

In the event the chain-of-command allowed protected portions of the accident report to be used in taking administrative or legal action against someone involved in an accident, such a misuse of the protected information may generate numerous appeals and challenges by the protected person. An even greater loss would be that once the assurance to witnesses that their statements are protected is breached, the Army's credibility is lost and the future of our accident prevention program is jeopardized. The system is only as good as those who make it work. It is a responsibility that can never be taken lightly, both for the protection of the individual and the Army as a whole. ♦

—MAJ William R. Rodis, Command Judge Advocate, DSN 558-3960, commercial 205-255-3960

Collateral investigations: key to protecting safety reports

The military uses a dual accident investigation system. The accident investigation required by AR 385-40: Accident Reporting and Records is solely for safety and accident prevention. The collateral investigation, pursuant to DODI 6055.7: Mishap Investigation, Reporting, and Record Keeping and AR 385-40, is used to collect and preserve evidence for use in litigation, claims, disciplinary action, or adverse administrative action. While factual portions of the accident investigation report may be provided to the collateral investigator and other investigators, certain sensitive, privileged portions may not be. For example, the findings and recommendations of accident investigation reports are privileged and are released within DOD on a need-to-know basis for purposes of accident prevention only. Also, while the Freedom of Information Act (FOIA) provides for disclosure of certain information to the public, the findings and recommendations of safety reports are protected from public disclosure.

Why a collateral investigation is needed

An important point to keep in mind is that our ability to protect the safety report is closely related to the collateral investigation process. To understand this point fully, we first need to understand when a collateral investigation is required.

DODI 6055.7 and AR 385-40 require a collateral investigation in the case of a fatality or other Class A accident in which a limited-use investigation is conducted. A collateral is also required in cases involving anticipated litigation for or against the Government or a government contractor, in cases where disciplinary or adverse administrative action is anticipated against any individual, and in cases where a high degree of public interest is probable.

Because portions of the accident report may only be used within DOD for accident prevention purposes, the collateral investigation must serve as the basis for any disciplinary or adverse administrative action. If no collateral investigation was performed in a case where one was required, improper use of the safety report could result.

The local public affairs office (PAO) should use the collateral as *the* accident investigation in answering media requests for information. The press, family members, and other interested members of the public naturally want to know what happened and why. But because the findings and recommendations of the safety report are privileged, these answers must come from the collateral. This is another case where without a collateral, improper use of the safety report could result.

As shown by these examples, the existence of a collateral report is important to the military's ability to protect the sensitive portions of the accident report. Requesters seeking a complete copy of the accident report sometimes resort to the courts to try to get it under the FOIA. Court decisions emphasize the fact that the requester has been given a complete copy of the collateral investigation; therefore, there is no need to release the protected portions of the accident report.

If there is no collateral investigation

But what happens if there is no collateral? When this occurs, the command may find itself with nothing to use as a basis for taking adverse action in a case. There may be every reason for taking such action; for example, a letter of reprimand, report of survey, and so forth, but without a collateral investigation, there is nothing on which to base the action. In the absence of a collateral, the PAO may also find itself without a source on which to base answers to press inquiries.

A recent case demonstrates how problems can arise when people do not understand the difference between an accident investigation report and a collateral report.

The command that experienced the accident advised family members and other requesters that they could obtain a complete copy of the accident report, which would answer their questions about what happened and how. In addition to the fact that this advice is simply incorrect (findings and recommendations of the investigation board are privileged and are not released to the public), this kind of misinformation creates an ex-

pectation that can only lead to disappointment and frustration when the requester tries to obtain a complete copy of the report from the Army Safety Center.

To prevent this kind of thing from happening, it is important to reemphasize that the collateral report is *the* source of information from which all public requests for information should be satisfied. Individuals should be advised that the accident report is an internal DOD document used solely for accident prevention. It contains privileged material that is not publicly releasable. In this way, requesters seeking a copy of the safety report will not be misled into thinking the safety report is available to them, only to be frustrated when they learn otherwise. This way, we will not create an expectation that we cannot satisfy.

When no collateral investigation is conducted, an even more difficult problem than the one just described can arise. It is far easier to protect the accident report and the privileged information it contains when there is a collateral to turn to as an alternate source of information. But when there is no collateral, it is much more difficult to successfully protect the privileged portions of the accident report. In such a case, if we do not release the accident report, there may be nothing to release. This is not going to satisfy most requesters, and litigation is more likely under these circumstances.

To avoid these problems, when a case meets the criteria set forth in DODI 6055.7 requiring a collateral investigation, it is very important that such an investigation be conducted. In addition to providing a basis for any anticipated litigation or disciplinary/adverse administrative action against an individual, the collateral will enable the command to more easily protect the privileged portions of the accident investigation report.

—MAJ William R. Rodis, Command Judge Advocate, DSN 558-3960, commercial 205-255-3960

What do I do now?

I've had the training, I'm responsible, and I've got to get moving.

These are just a few of the many thoughts that raced through my mind as I stood there fighting against the numbing effects of shock. I had arrived on the scene of a safety officer's worst nightmare. I saw the burning, twisted wreckage of one of our Army aircraft where it had crashed into two civilian homes, damaging one severely. In addition to the aircraft crew, somewhere in the midst of this wreckage was an unknown number of civilian casualties. And some 200 feet away, still attached to an unopened parachute, a best friend lay dead.

I was a qualified, school-trained aviation safety officer (ASO). I knew that I was supposed to know what to do, but at that moment, I'm sure I must have been "brain dead." The overwhelming shock had momentarily halted my thinking processes. I needed a one-two-three checklist to help me get started without having to think.

Several things came to my rescue. The local fire department was on the scene immediately with the proper equipment to extinguish the fire. As a result of previous safety classes, members of the unit produced engineer tape, ropes, stakes, mauls, and protective equipment they would need to quickly secure the area. With outstanding support from local authorities, the area was quickly cleared of unnecessary people. We then established a site-pass system and traffic control around the area.

By this time, our unit's pre-accident plan was functioning well. The notification process was ongoing, areas of responsibility had been assigned, and "things" were beginning to work again. And none too soon. Within 15 minutes of the accident, the first of three TV-network crews arrived on the scene. I assigned escorts and allowed one team at a time to do their report and leave the area before allowing another team in.

The pace slowed from panic to frantic as the centralized accident investigation (CAI) team from the Army Safety Center arrived. Believe me, I was more than glad to hand over control of and responsibility for the situation to the investigation team.

From that point on, I acted as coordinator between the CAI team and the unit. I arranged for local investigation board members to supplement the CAI team. And I also took care of other support, such as personnel to search for missing parts of the wreckage, clear away debris, or to crate exhibits for shipment to maintenance facilities or laboratories for further examination and analysis.

After the CAI team arrived, I simply followed their instructions. But during those first few hours after the accident, I was responsible. And I can tell you, in those first few minutes, I questioned my own ability to handle the enormous number of details needed to get the situation under control.

School training is necessary and valuable, but no amount of classroom work can fully prepare an ASO to deal with the multitude of details requiring attention following a major accident. It's true that you can't fully comprehend this kind of situation until it actually happens to you. I hope you won't have to gain that experience first-hand, but as an ASO, you must be prepared or at least as prepared as you possibly can be.

Lessons learned

During the past 7 years since I stood there that hot July afternoon looking at the crash site, I've gained a lot more experience in dealing with aircraft accidents as both an ASO and an accident investigator. The following suggestions and lessons I've learned might prove helpful to others:

■ Identify, equip, and train an emergency-response team that is able to react on a moment's notice. These are the people who will go with you to the accident site, and these are the people who should be responsible for having the necessary supplies and equipment to secure the site and preserve the evidence.

■ Ensure that your unit's preaccident plan is as comprehensive as it can be. Ask others for their ideas about what should be included in the plan. Then select an individual and an alternate to implement the plan. You will be far too busy at the accident site to do this yourself.

■ Plan ahead to ensure that a reliable communications system to your home station or facility is available. Make sure telephones are secure to prevent leaks of premature and inappropriate information.

■ Ensure that local authorities are aware of the special requirements that arise from a military accident that occurs off the military base. A pamphlet on *What To Do and How to Report Military Aircraft Accidents* is an excellent guide you can provide to civil authorities, firefighters, and emergency medical personnel. Copies of the pamphlet can be obtained by writing to Commander, U.S. Army Safety Center, ATTN: CSSC-IM (Ms. Sharrel Forehand), Fort Rucker, AL 36362 or by calling DSN 558-2062/4806, commercial 205-255-2062/4806.

Some 200 feet away, still attached to an unopened parachute, a best friend lay dead.

■ When an accident occurs off a military base and civilian injuries and property damage occur (such as happened in my first accident), additional problems and questions for which you will have no answers must be addressed. Therefore, it is vital that you have legal and logistics personnel promptly address civilian questions, take care of medical expenses, and provide temporary lodging for those who may be displaced from their homes.

■ Officials from the Public Affairs Office (PAO) are the only ones who should release information to the news media. However, there will be times when PAO personnel are not readily available, and the media will be all over you. Remember, you cannot legally keep them from an accident site once the firefighting and crash rescue efforts are completed. Work with these people. But you must also remember that you can only give generic statements, such as "The accident is under investigation. No details are available at this time. The Public Affairs Office will issue a statement as soon as details become available."

■ Consider issuing small index cards to all of your aircrewmembers and have them list who should be notified in case of their death. Also have them include who they would like to make the notification and a last, short message if desired. This will serve two purposes. First, it will serve as a solemn reminder to all aircrewmembers of the inherent danger lurking in the environment in which they operate daily and possibly make them more safety conscious. Second, providing the requested information will ensure that a person of their choice—a close friend, their company commander, their chaplain—will be the one to tell their family about the tragedy should that dreadful notification process become necessary.

It's not an easy job to put an accident plan in motion. But as

the unit ASO, it's your responsibility to see that it is done effectively and efficiently. You're in charge until the accident investigation team arrives. The first thing you have to do is fight the shock and panic and quickly get your thinking processes back in action. Remember the lessons you've been taught in formal schools and those you've learned from others, like me, who have had similar tasks to do.

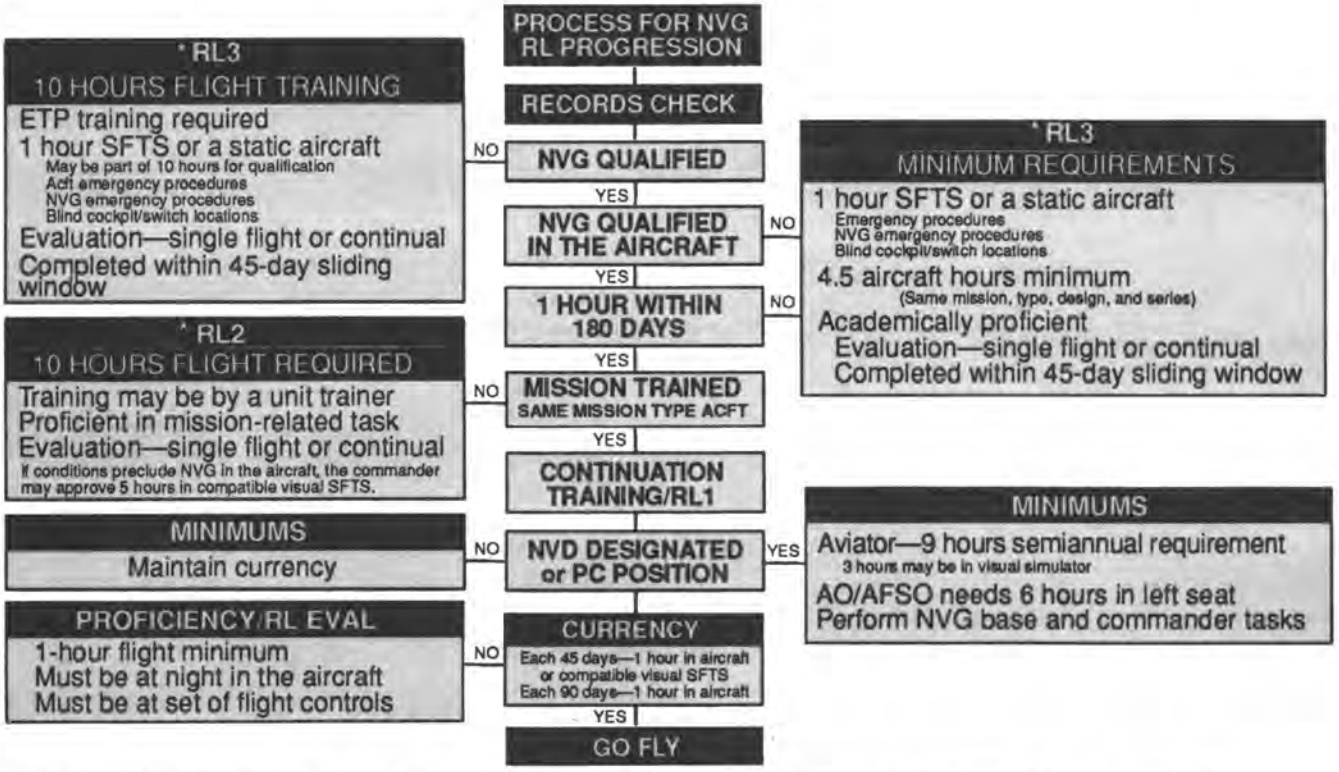
As unpleasant and demanding as this part of your job will be, the actions you take in handling the situation until the CAI team arrives will make it that much easier for the investigators to come in and begin their analysis. The sooner questions can be answered, the sooner it can be determined what can be done to prevent a similar accident from happening. And that equates to saving lives and equipment.

Accept the challenge: to the best of your ability, prepare yourself now for what you could face someday at an accident site—it's your responsibility. ♦

—POC: MAJ Franklin D. Beggs, Investigations Branch, DSN 558-3262, commercial 205-255-3262

Process for NVG RL progression

The following aviator night vision goggle training progression chart was developed by Department of the Army civilian Mr. Ernie Howell, 1/212th Aviation Battalion, Standardization Section, Fort Rucker, AL. The chart can be a useful tool when a quick reference is needed. If greater detail is required, refer to TC 1-210: Aircrew Training Program, Commander's Guide to Individual and Crew Training.



***Must progress to the next RL within 90 days for Active Army and USAR technicians/AGR or 1 year for USAR crewmembers. (Excludes days for TDY, suspension, leave, and HQDA aircraft grounding. All ARNG see NGR 95-210 App. B.)**

USASC POC is MW4(P) Robert A. Brooks, Aviation Section, DSN 558-3262, commercial 205-255-3262. USAAVNC POC is MW4 Rodney Rowe, Night Vision Device Branch, Aviation Training Brigade, DSN 558-5858/5812, commercial 205-255-5858/5812. ♦

Rigging procedures

The Army Transportation School at Fort Eustis is the proponent for helicopter external transport for the Department of Defense. Since the release of the Multiservice Helicopter External Air Transport Manuals on 11 February 1991, the biggest problem the school has encountered is in letting people in the field know when new certified rigging procedures become available.

In some cases, it has taken as long as 1 year for units to even learn that certified rigging procedures are available for specific pieces of equipment in their units. And formal changes to the manuals are released only about every 18 months.

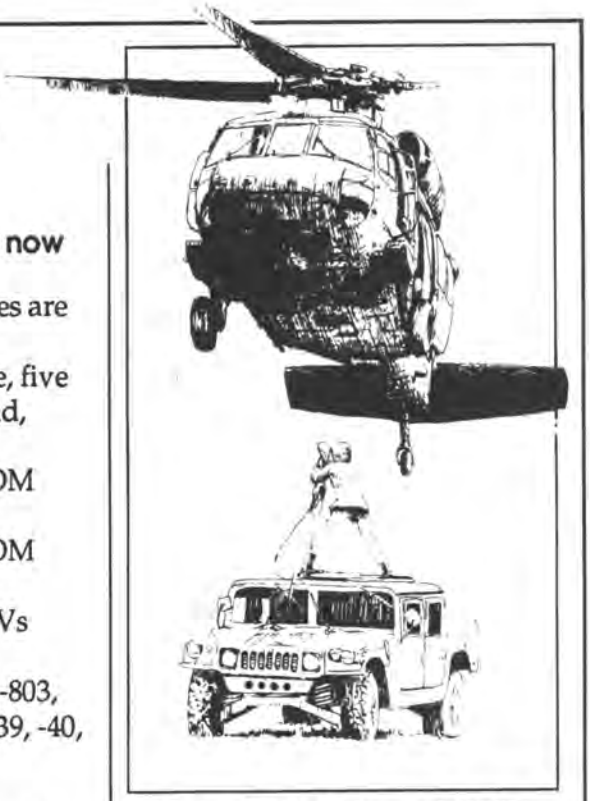
Because of the delay in getting certified rigging procedures to the field, some units have begun developing their own procedures. Without input from the Aviation and Troop Command; Natick Research; Development and Engineering Command, which certifies the rigging procedures; Transportation School, proponent for external air transport; or Training and Doctrine Command, these self-written rigging procedures may compromise safety. They are also undermining the entire certification process and causing a high level of dissatisfaction in the field.

Letting units know about certified rigging procedures as soon as they become available will help eliminate these potential problems. Beginning with this issue, a list of new certified rigging procedures will be included in *Flightfax* as they become available.

New rigging procedures now available

Certified rigging procedures are now available for—

- Medium girder bridge, five bays, double story open end, undecked (USMC).
- NATO airbase SATCOM (NABS) power pallet
- NATO airbase SATCOM (NABS) shelter pallet
- Side-by-side HMMWVs
- Tactical quiet generators—PU-800, -802, -803, -804, -805, -806, AN/MJQ-39, -40, -41 on M200A1 trailer
- Tactical quiet generators—PU-797, -798, -799, -801 on M116A3 trailer
- Tactical quiet generators—AN/MJQ-35 mounted on M116A3 trailer
- Tactical quiet generators—AN/MJQ-37, -38 on M103A3/A4 trailer
- Fielded ribbon bridge, ramp bays
- Fielded ribbon bridge, interior bays
- Fielded ribbon bridge, erection boat (MK2)
- Mobile subscriber equipment (MSE) contingency commo package/light forces on M1097 HMMWV
- M1037 shelter carrier with AN/TPQ-36 firefinder antenna radar on M103A1 trailer



If units need copies of certified rigging procedures for any of these pieces of equipment, they may contact the U.S. Army Transportation School, Helicopter Transport Section, ATTN: ATSP-TIP-M (Mr. Ted Rodriguez), Fort Eustis, VA 23604-5408. ♦

—POC: Mr. Ted Rodriguez, DSN 927-6570, commercial 804-878-6570, FAX 927-6980 or commercial FAX 804-878-6980

Help us help you!

Recent comments from the field indicate that some units are having problems getting issues of *Flightfax* and other Safety Center publications. With all the downsizing and restructuring that's going on in the Army, it is difficult to keep all the addresses on our distribution list current. If your unit has moved and we haven't received an address correction, we've probably lost track of where you are.

If you're having a problem getting *Flightfax* or would simply like to be added to our distribution list, let us know and we'll update your address or add you to our mailing list. Write to Commander, U.S. Army Safety Center, ATTN: CSSC-IM, Fort Rucker, AL 36362-5363 and give us your current address. ♦

—POC: Ms. Shamel Forehand, Media Management and Production Branch, DSN 558-2062/4806, commercial 205-255-2062/4806

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - During student pilot training flight, aircraft crashed into plowed field near stagefield. Aircraft impacted ground nose low and in left-bank attitude, sustaining extensive airframe damage. Two fatalities. 9314

UH-1 Class C

H series - During MOC, maintenance test pilot placed governor control switch in emergency position and pushed governor control circuit breaker in while at full operating RPM (6600). RPM rose uncontrolled to 7500 for about 2 seconds.

UH-60 Class A

A series - While on short final for night landing in clear conditions, pilot initiated right bank to land at VIP pad. At about 100 feet AGL, pilot noted stiffness in controls and asked IP if he was on controls. IP was not on controls but got on controls with pilot as bank angle continued to increase. Aircraft began right turn, became uncontrollable, and impacted ground on right side. Right external fuel tank ruptured and burst into flames. Four fatalities. 9315

UH-60 Class C

A series - At 75 feet AGL and 20 knots, No. 1 engine lost power as crew was repositioning aircraft for departure. No. 2 engine was unable to sustain OGE hover taxi. PC maneuvered aircraft between fuel truck and small fixed wing aircraft to clear taxiway. Aircraft landed hard, right side low and in a right drift. Right main landing gear strut stroked 8 inches and caused MILES gear, mounted on right front hardpoint, to strike ground and be torn free. Aircraft continued to roll forward for 100 feet before stopping. No injuries.

L series - Aircraft was in cruise flight when pilot noticed TGT increasing to 900°C. TGT then decreased to normal limitations. Pilot elected to make precautionary landing. Postflight inspection revealed V-band clamp on exhaust module had failed.

Class A Accidents through February

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	6
	December	1	1	0	0
2d Qtr	January	3	1	0	0
	February	1	5	0	8
	March	4		2	
3d Qtr	April	1		0	
	May	1		1	
	June	2		2	
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	22	15	10	16

Attack

AH-1 Class C

F series - During descent, No. 2 hydraulic and master caution lights came on. On short final, pilot in front seat inadvertently placed governor switch in emergency-governor position instead of emergency-hydraulic-pump-on position. Crew noted N2 at 110 percent for 5 seconds on two occasions. Crew completed landing without further incident. Suspect rotor head, engine, and drive train damage because of overspeed.

AH-1 Class D

F series - During night training exercise, aircraft was stationary at an in-ground-effect hover. Gunner attempted to fire at target unaided through telescopic sight unit. Rounds departed aircraft 90 degrees to the left and struck another aircraft in tail boom.

AH-64 Class A

A series - While conducting night OGE hover in battle position using pilot night vision imaging system, Chalk 3 entered undetected left rearward descending drift toward rising terrain. Main and tail rotor systems contacted trees, and aircraft entered right spin and crashed into trees. Aircraft sustained major damage and came to rest on right side. One injury. 9316

AH-64 Class C

A series - Right engine work platform came open in flight and sustained structural damage. Investigation in progress.

Cargo

CH-47 Class D

D series - While in cruise flight, crew chief told PC that walls of extended-range fuel system tank had collapsed and he was turning fuel pumps off. Crew had failed to remove tank vent cap as required by checklist.

CH-47 Class E

D series - During systems check on engine runup, MP observed transmission oil temperature indicating 160°C. When aft transmission was selected, the temperature read -70°C. MP asked flight engineer (FE) to open cowling to inspect temperature bulb. FE noticed plastic bag around No. 9 drive shaft and broken wires to bulb. Crew shut down aircraft. Investigation revealed that plastic bag had been placed over aft transmission

filler cap during aircraft wash just before test flight. Pilot had spotted bag during preflight and told FE to remove it before flight. However, pilot did not write it up in logbook, and MP and pilot failed to follow up to ensure FE removed bag.

D series - After takeoff with external load, aircraft gained airspeed to an estimated 25 knots. At about 100 feet AGL, aircraft began vertical bounce. PC asked FE what external load was doing, and FE replied that load was riding steady. Bounce became more violent, and PC told FE to release external load (scrap metal truck ramp). PC then instructed pilot to turn advanced flight control system (AFCS) off. After pilot turned AFCS off, bounce lessened. Pilot completed safe landing on ship loading dock and shut down aircraft without further incident.

Observation

OH-6 Class A

C series - Following scheduled refuel stop, aircraft departed in marginal VFR conditions at about 1750. No radio communications were received from aircraft for 90 minutes following takeoff. At about 1920, pilot informed tower that he was 24 nautical miles north of takeoff point and was returning for landing. AFB received satellite ELT signal at about 2100 and notified Army operations center. One fatality. 9317

OH-6 Class E

A series - During maintenance test flight for replacement of main rotor pitch change bearing, maintenance test pilot applied collective to takeoff to hover and engine lost power. Crew terminated test flight. Inspection revealed rigid line from diffuser to PC air filter was loose. Air line had not been properly torqued, and air leak had caused engine to lose power.

OH-58 Class A

A series - While conducting night aerial observer training, aircraft impacted sparsely wooded terrain with high G forces. Aircraft was consumed by fire. Both crewmembers were fatally injured. 9318

OH-58 Class D

C series - While conducting scout weapons team battle drill, PC unmasked aircraft to observe enemy. After observing enemy, pilot stated "get down." PC made right, descending masking maneuver and hit 12-foot tree with both main rotor blades. Crew landed aircraft without further incident.

OH-58 Class E

C series - While participating in gunnery exercise on TOW range, pilot made improper decision and passed in front of AH-1 that had just fired TOW. Aerial observer saw wire pass above windscreen. Crew decided it was a TOW wire and landed aircraft immediately. TOW wire was wrapped around main rotor pitch change tubes.

Fixed wing

C-12 Class B

F series - Aircraft drifted left of centerline during landing and impacted snowbank. On touchdown, aircraft traveled 300 to 400 feet before coming to rest. Nose gear collapsed and nose and props sustained major damage. 9319

C-12 Class C

C series - After performing normal landing, crew placed power levers in reverse and then back to beta and moved flap switch to retract position. After 1,850 feet, aircraft had slowed to about 40 knots and flaps were almost completely retracted. Landing gear motor then began retracting gear. In less than 1 second, weight of aircraft collapsed both main gears, jamming main gear actuators and gearbox assembly. Circuit breaker for landing gear motor tripped, stopping motor.

D series - During night taxi of aircraft onto ramp at civilian airport, crew inadvertently taxied through 12-inch-high snow berm. Crew felt no unusual indications in cockpit. On return to home station, crew noted that propeller RPM at idle on right engine was 300 RPM higher than on left engine. Inspection revealed that both engine-driven fuel pump mounts were cracked. Because of sudden stoppage, both engines, engine baskets and mounts, and propellers must be replaced.

Messages

■ Aviation safety action maintenance mandatory message concerning updated instructions for troubleshooting the electronic supervisory control (ESC) on all OH-58D aircraft (OH-58-93-ASAM-07, 041600Z Feb 93). Summary: Units have experienced OH-58D ESC fault codes after the installation of a newly modified ESC. The ungrounding message (OH-58-92-06) specifically restricted any troubleshooting of the ESC. This message updates the instructions contained in paragraph 9c of the ungrounding message with regard to troubleshooting. A review of the airframe and engine maintenance and maintenance test flight manuals indicates published troubleshooting instructions for ESC fault codes may be insufficient to adequately diagnose the problem. Additional instructions are provided in this message to assist in isolating the problem. The purpose of this message is to modify the instructions contained in paragraph 9c of the ungrounding message (OH-58-92-06) with regard to troubleshooting and disposition of the ESCs. Contact: Mr. Lyell Myers, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning use of dual visor on SPH-4B aviator helmets and related information (GEN-93-ASAM-04, 011500Z Mar 93). Summary: AVSCOM message 301400Z Mar 92 stated that the dual visor shall not be used with the aviator's night vision imaging system (ANVIS) or the GM-6 night vision goggles (NVG). An Army study indicated that some pilots using the dual visor assembly with the SPH-4B helmet required additional upward tilt range. As a result of further testing, certain procedures are considered necessary and must be completed before the first NVG flight with the SPH-4B helmet. The purpose of this message is to rescind AVSCOM message 301400Z Mar 92 and to authorize the use of ANVIS and GM-6 with the SPH-4B helmet provided that procedures outlined in paragraph 9 of this message are followed. In addition, reports of an inadequate adhesive have been received. This inadequate adhesive is being used to secure screws when installing the AN/AVS-6 visor shield to the helmet. This specific adhesive shall not be used because it is extremely damaging to all NVG plastic parts. Cylinlock 822 anaerobic adhesive

(green liquid with a mild odor) made by Hernon Manufacturing, Inc. is not authorized for use on NVG equipment. Contact: Mr. Brad Meyer, DSN 693-2085, commercial 314-263-2085.

For more information on selected accident briefs, call DSN 558-3262, commercial 205-255-3262.

Followups

Information on accidents previously reported

UH-1 Class A

Reported in December 1991 issue as 9201 - Flight of four UH-1s departed on NVG navigation and formation training flight. As light rain began to fall, flight landed for refueling. While aircraft were being refueled, pilots obtained weather updates that advised weather along planned route was deteriorating. Air mission commander canceled scheduled training and elected to return to base by direct route at 500 feet AGL. About 5 minutes after departure, flight was in staggered-left formation at 200 feet AGL and 70 knots when it encountered unforecast, rapidly deteriorating weather conditions of 300-foot ceilings and 1 to 2 miles' visibility with rainshowers. Unit trainer (UT) of trail aircraft perceived they were flying too close to other aircraft and too low. He directed rated student pilot to increase separation and altitude. Pilot increased collective to initiate climb and intended to reduce airspeed. During climb, crew lost visual contact with flight and ground. Pilot experienced spatial disorientation, and UT perceived aircraft in an unusual attitude. Airspeed was about 30 knots and pitch attitude was level, but aircraft was in 35-degree right bank. UT took controls and leveled aircraft. However, he failed to add power to establish a climb as prescribed in TC 1-211, Task 1083, Vertical Helicopter Instrument Recovery Procedures. At 50 to 60 knots in near-level attitude, aircraft impacted 3-degree uphill slope on heading of 068 degrees. Front landing skid crosstube collapsed on impact. Aircraft slid about 86 feet, then became airborne for another 169 feet. Aircraft contacted ground a second time in right-side-low, nose-low attitude. Aircraft then rotated right along roll axis three times before coming to rest in upright position on heading of 330 degrees. Crewmembers exited aircraft unassisted.

UH-60 Class B

Reported in December 1992 issue as 9203 - Following takeoff for first pass during internal unit gunnery training, crew heard high-frequency whine. Crew had just initiated left turn to return to arming pad when they heard a bang. Pilot shut down No. 1 engine. At that time, aircraft was at less than 40 knots and 120 feet AGL. Crew selected landing area in dry river bed to their right front. At 20 feet AGL, crew pulled power and rotor drooped to 90 percent. Aircraft landed hard with little forward movement. FLIR turret was pushed into soft ground and damaged. Post-flight inspection revealed that No. 1 engine high-speed shaft had come loose from its forward mounting point. Laboratory analysis showed that flex pack had signs of progressive fatigue and one mounting bolt had let go.

UH-60 Class B

Reported in March 1992 issue as 9214 - First leg of flight was unaided, cross-country flight to NVG training mission start point (SP). About two-thirds of the way to SP, crew goggled up while in flight. About 10 kilometers out from the SP, PC directed pilot to descend into river valley to about 200 feet AGL. About 2 kilometers before reaching SP, crew chief advised pilots that he had a goggles failure. Pilot brought aircraft to a hover while crew chief exchanged his goggles for extra set on board. As crew continued in valley at about 200 feet AGL and 30 knots en route to low-level route SP, pilot alerted crew that he saw wires. He immediately pulled collective in an attempt to pass over wires. Aircraft went into and through wires, breaking five of seven 5/8-inch power transmission wires. Wires impacted aircraft on right engine cowling. Realizing aircraft was still controllable, crew repositioned to safe landing area on top of ridge. In preparation for mission, PC had failed to update flight hazard map. As a result, he was unaware of electrical wires that aircraft struck. Additionally, although he had been instructed to do so by the mission briefing officer, the PC had failed to read all requirements in the brigade SOP for operating in the designated training area. Subsequently, he instructed the pilot to descend below authorized minimum altitude before reaching the SP of the low-level route and unexpectedly encountered wires.

OH-58 Class A

Reported in January 1992 issue as 9209 - Shortly after ferry flight departed, lead aircraft PC reported to air mission commander (AMC) that weather was deteriorating rapidly. Lead aircraft PC recommended flight return to point of departure and AMC concurred. Flight turned back to airfield in loose, stacked, trail formation. Flight entered right traffic for final approach heading of 140 degrees with winds 120 degrees at 16 knots. First three aircraft landed without incident. At 125 feet AGL as Chalk 4 turned from downwind to base leg in landing pattern, it suddenly lost engine power. Upon recognizing power loss, PC immediately lowered collective and nose of aircraft, attempting to gain airspeed and build rotor RPM. PC then placed aircraft in decelerative attitude to slow rate of descent. He applied initial collective and continued applying collective, rapidly dissipating rotor RPM. PC was unable to effectively cushion touchdown because of excessive RPM bleed-off of rotor system, and aircraft landed hard in marshy area. Nose-mounted WSPS dug into ground, providing pivot point for aircraft to rotate over nose. Aircraft sustained major structural damage as fuselage came to rest on its right side. Cause of engine loss of power could not be determined. However, teardown analysis did reveal that there was very little internal rotational damage to engine, indicating that engine was not running under its own power at impact.

dress questions about content to DSN 558-3262. Address distribution questions to DSN 558-2062/4806.

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

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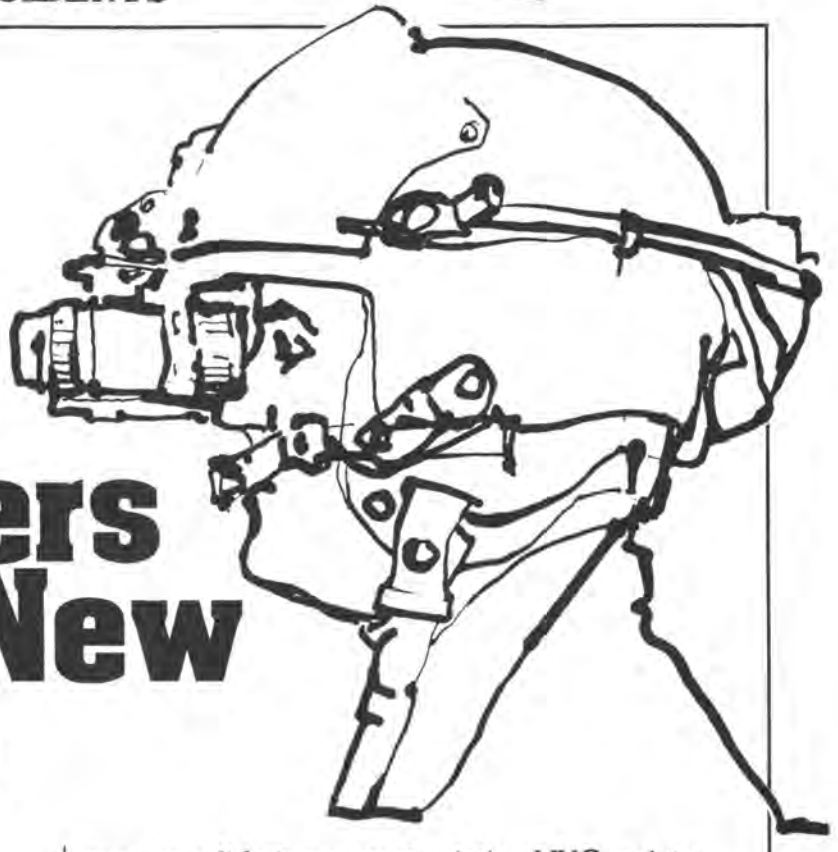
Flightfax

April 1993 Vol 21 No 7

REPORT OF ARMY AIRCRAFT ACCIDENTS

Aviation NVG Maintainers Receive New Guidance



For several years, aviation night vision goggle (NVG) personnel struggled to comply with multiple references: manuals, messages (as many as 77 at one time), booklets, and articles on NVG maintenance. The Army Aviation Center realized the difficulty and sometimes pure frustration NVG personnel were experiencing in attempting to determine which references to use, specific NVG services required, how often the service was required, and who should perform the service.

Help arrived

With assistance from representatives of the Project Manager Night Vision & Electro-Optics (PMNVEO) and the Aviation Systems Command, the Aviation Center began work to consolidate all of the current instructions and procedures into one document. The Herculean effort to reduce the number of references to a more-workable level was completed in March 1991.

On 22 March 1991, PMNVEO released a message consolidating current aviation NVG maintenance requirements and updating requirements for maintenance documentation. And in June 1991, *Flightfax* published the 221530Z Mar 91 PMNVEO message text and included sample forms to show maintenance personnel how to complete the forms.

Even after almost 2 years, we still get comments from the field and from NVG subject matter experts indicating that this NVG maintenance message and the sample forms provided in *Flightfax* quickly became the NVG maintainer's bible.

New guidance

The Aviation and Troop Command has just issued an aviation safety action message (ASAM) outlining new aviation NVG maintenance documentation requirements (GEN-93-ASAM-05, 091330Z Mar 93). In hopes that *Flightfax* can be of help again, we are reproducing the text of the new message and including sample forms to assist maintainers responsible for complying with the message documentation requirements. ♦

Aviation NVG maintenance documentation requirements

Following is the revised text of an aviation safety action message (ASAM) concerning aviation NVG maintenance documentation (GEN-93-ASAM-05, 091330Z Mar 93) issued by the Aviation and Troop Command (ATCOM). This message updates present aviation NVG maintenance documentation requirements and becomes effective immediately upon receipt. This 091330Z Mar 93 ASAM supersedes Project Manager Night Vision & Electro-Optics (PMNVEO) message 221530Z Mar 91 and the subsequent reprint of that message in the June 1991 issue of *Flightfax*. GEN-93-ASAM-05 will be used to supplement DA Pam 738-751: Functional Users Manual for the Army Maintenance Management System—Aviation (TAMMS-A), dated 15 June 1992. The new aviation NVG maintenance documentation message will expire on 31 December 1993.

Current NVG forms and maintenance documentation requirements

■ *Equipment record folder (logbook).* Each set of NVGs will have a logbook. The logbook (NSN 7510-01-065-0166) is illustrated in DA Pam 738-750: Functional Users Manual for the Army Maintenance Management System (TAMMS), page 9, figure 2-1, and is available at self-service supply centers. It will be used to maintain NVG historical records.

■ *Forms.* DA Form 2404: Equipment Inspection and Maintenance Worksheet and DA Form 2408-18: Equipment Inspection List are no longer required for NVG maintenance documentation. DA Forms 2407, 2408-5, 2408-15, 2408-22, 2408-30, and 5504 and DD Forms 1574, 1576, and 1577-2 will be used to document NVG maintenance requirements. A new DA Pam 738-751 will be issued in September 1993 and will reflect these NVG maintenance documentation requirements.

Note: Damaged or obliterated forms will be processed IAW DA Pam 738-751.

Note: Red X status symbols must be cleared by an individual designated in writing by the unit commander IAW DA Pam 738-751.

❑ *DA Form 2407: Maintenance Request or DA Form 5504: Maintenance Request.* Use this form to forward NVGs to a higher maintenance level for scheduled or unscheduled maintenance. After completion of maintenance and receipt of NVGs, place the "organizational" copy of DA Form 2407 or DA Form 5504 in the pocket located inside the back cover of the logbook. Dispose of DA Form 2407 or 5504 IAW DA Pam 738-751.

❑ *DA Form 2408-5: Equipment Modification Record (figure 1).* Place this form in the first vinyl page of the logbook and use it to document authorized DA modifications to the NVGs. Dispose of this form IAW DA Pam 738-751.

❑ *DA Form 2408-15: Historical Record for Aircraft (figure 2).* Place this form in the second vinyl page of the logbook and use it to document the following:

- One-time inspections; for example, successful distortion evaluations and service upon receipt inspection.
- Compliance with safety-of-flight (SOF) messages, ASAMs, safety-of-use (SOU) messages, and technical bulletins (TBs).
- Replacement of image intensifier tube(s). Record the new serial numbers.
- Installation of light interference filter kit.

❑ *DA Form 2408-22: Helmet and Oxygen Mask/Connector Inspection Record (figure 3).* This form provides a record of helmet and NVG visor inspections and maintenance performed. Use it to document the 120-day visor continuity check. In block 7, record the type of NVG visor or mount installed on the helmet. Maintain this form separately from the NVG records and dispose of it IAW DA Pam 738-751.

❑ *DA Form 2408-30: NVG Inspection and Maintenance Record (figure 4).* A current DA Form 2408-30 is the only form required to be maintained in the NVG carrying case.

- Use this form to record all faults and document all corrective actions taken for the following:

—Deficiencies discovered while performing operator checks.

Note: There is no requirement to document "Pre-operational check due" or "Operators check due" on DA Form 2408-30.

—90-day preventive maintenance checks and services

(PMCS).

—180-day services.

—Special inspections; for example, distortion evaluations.

• The current DA Form 2408-30 will be managed by the owning unit. It is recommended that units retain the DA Form 2408-30 at aviation unit maintenance while NVGs are at aviation intermediate maintenance (AVIM). After NVGs are returned from a maintenance facility, the owning unit will complete the DA Form 2408-30 by signing off the completed work under Part II—Correcting Information block. Examples are "180-day service completed; see DA Form 2407 or 5504 work order number XXXXXX" or "intensifier tube replaced, serial number XXXXXX; see DA Form 2407 or 5504 work order number XXXXXX." Variation of wording is acceptable. Under Part I—Fault Information, record the next scheduled inspection. Calculate the next scheduled 90-day PMCS and 180-day service due dates from block 26 of DA Form 2407 or block 37A of DA Form 5504. Enter these calculated dates in block 6 of DA Form 2408-30.

• The current DA Form 2408-30 will not be maintained in the logbook. Maintain it in the NVG carrying case until completely filled. When DA Form 2408-30 is completely filled, close it out and place it in the third vinyl page of the logbook. The form will remain there for 1 year from the date of the last entry. If more than one DA Form 2408-30 is closed out during the year, place the form(s) in the fourth vinyl page of the logbook. To complete a closeout, initiate a new DA Form 2408-30 and indicate the next inspections due (90-day PMCS and 180-day service) in block 6. Under Part I—Fault Information, record the next scheduled inspection and any uncorrected faults. This DA Form 2408-30 will then become the current form.

• NVG hours will not be entered on DA Form 2408-30 unless the unit is directed to do so by the MACOM.

❑ *DD Form 1574: Serviceable Tag—Materiel.* Use this form to identify serviceable NVGs returned from maintenance. Destroy this form after DA Form 2408-30 has been updated.

❑ *DD Form 1576: Test/Modification Tag—Materiel.* This form is used by AVIM to identify NVGs requiring a distortion evaluation. After replacement of either one or both image intensifiers, AVIM will mark the form "distortion evaluation is required prior to use." Variation of wording is acceptable. Destroy this form after a successful distortion evaluation has been completed and entered on DA Form 2408-15.

❑ *DD Form 1577-2: Unserviceable (Reparable) Tag—Materiel.* Use this form to identify an unserviceable NVG; for example, one with a cracked monocular housing or one that failed the distortion evaluation. Destroy this form when no longer required.

Summary of form locations

■ Maintain the following forms in the *NVG logbook:*

❑ DA Form 2408-5—first vinyl page.

❑ DA Form 2408-15—second vinyl page.

❑ DA Form 2408-30 (current closeout)—third vinyl page.

❑ DA Form 2408-30 (other closeouts)—fourth vinyl page.

❑ DA Form 2407 or 5504 (organizational copy)—inside back cover.

■ Maintain the current DA Form 2408-30 in the *NVG carrying case.* Fold the form to fit inside the NVG case. This is the only form required to be maintained in the NVG carrying case.

■ Maintain the DA Form 2408-22 separately from the NVG logbook.

Recurring tests, inspections, and documentation requirements for AN/PVS-5, GM-6, and ANVIS

■ *Operator checks.* The operator will accomplish the operator checks IAW the appropriate operators manual. In addition to these checks, an optional low/high light resolution test may be performed by the operator using the TS-4348/UV in accordance with TM 11-5855-263-10. Record deficiencies found during the operator checks on DA Form 2408-30.

■ *90-day PMCS.* Document the accomplishment of the 90-day PMCS on DA Form 2408-30. This inspection is performed by aviation unit maintenance IAW appropriate maintenance publications and consists of—

❑ Inspection, checks, and servicing of the NVG and power pack.

❑ Low/high light resolution test.

❑ Inspection of modified faceplate (AN/PVS-5 series only).

Note: The 90-day PMCS may be accomplished within, but not to exceed, a 10-percent plus or minus tolerance from the scheduled calendar date.

■ *180-day service.* Document the accomplishment of the 180-day service on DA Form 2408-30. This inspection is performed by AVIM IAW appropriate maintenance publications and consists of—

❑ The 90-day PMCS on the

Page 1 of 1

1. NOMENCLATURE	2. MODEL	3. AIRCRAFT SERIAL NUMBER
NIGHT VISION GOGGLE	AN/PVS-5 (GM-6)	2684 A

4. MWO NUMBER AND DATE	5. MWO TITLE	6. ORGANIZATION APPLYING MWO	7. NAME OR PID	8. DATE	9. MAN-HRS
AVSCOM MSG 312000Z JUL 90 M F	ONE-TIME WIRING OF GM-6 MOUNT	DOL MAINT FT. RUCKER, AL	T. Bogie	12 SEP 90	1.0

DA FORM 2408-5, OCT 91

EDITION OF JAN 64 IS OBSOLETE

EQUIPMENT MODIFICATION RECORD

For use of this form, see DA PAM 738-751;the proponent agency is DCSLOG

Figure 1. Example of a completed DA Form 2408-5: Equipment Modification Record

Page 1 of 1

1. AIRCRAFT MODEL	2. NOMENCLATURE	3. AIRCRAFT SERIAL NUMBER
AN/AVS-6 (V) 1	ANVIS	2641 A

4. REMARKS	5. ORGANIZATION LOCATION	6. DATE	7. ENTRY NUMBER	8. PID
LIGHT INTERFERENCE FILTER (LIF) KIT INSTALLED	HHC, ATB FT. RUCKER, AL.	6 FEB 93	1	S. Loney
RIGHT IMAGE INTENSIFIER REPLACED SN 05362 AA	HHC, ATB FT. RUCKER, AL.	9 APR 93	1	S. Loney
DISTORTION EVALUATION COMPLETED	HHC, ATB FT. RUCKER, AL	14 APR 93	1	S. Loney

DA FORM 2408-15, OCT 91

EDITION OF JAN 64 IS OBSOLETE

HISTORICAL RECORD FOR AIRCRAFT

For use of this form, see DA PAM 738-751, the proponent agency is DCSLOG

Figure 2. Example of a completed DA Form 2408-15: Historical Record for Aircraft

Page 1 of 1

1. NAME	2. RANK	3. ORGANIZATION
ROWE, RODNEY H.	MW4	HHC, ATB

4. ANNUAL FITTING	5. HELMET TYPE	6. SIZE	7. OXYGEN MASK TYPE / VISOR	8. SIZE
	SPH-4B	X-LGE	ANVIS	

9. HELMET AND OXYGEN MASK/CONNECTOR INSPECTION RECORD

INSPECTION DATE a	REMARKS b	NAME c	NEXT INSPECTION DUE d
15 MAR 93	120-DAY HELMET INSP.	C. Smith	13 JUL 93
2 APR 93	120-DAY VISOR CONTINUITY CK	C. Smith	13 JUL 93

10. HELMET AND MASK REPAIR DATA			11. TECHNICAL INSPECTION		
DATE a	INITIALS b	COMPONENT REPAIR/REPLACE c	DATE a	INITIALS b	REMARKS c
2 APR 93	C. S.	INSTALLED ANVIS	2 APR 93	T. B.	
		MOUNT			

DA FORM 2408-22, DEC 91 **HELMET AND OXYGEN MASK/CONNECTOR INSPECTION RECORD**

EDITION OF DEC 84 IS OBSOLETE For use of this form, see DA PAM 738-751; the proponent agency is DCSLOG

Figure 3. Example of a completed DA Form 2408-22: Helmet and Oxygen Mask/Connector Inspection Record

1. NOMENCLATURE	2. MODEL	3. SERIAL NUMBER	4. NSN	5. UIC
ANVIS	AN/AVS-6 V1		2641 A	WOU950

6. NEXT INSPECTIONS DUE 90-DAY PMCS DUE 23 MAY 93 180-DAY SERVICE DUE 21 AUG 93

PART I - FAULT INFORMATION

STATUS	SYS	DATE	NO	TIME	PID
L		4 FEB 93		0800	

FAULT/REMARKS 180-DAY SERVICE DUE 12 FEB 93 S. Loney

A/C HRS	WHEN DISC	HOW REC	MAL EFF	WUC

W.O.	REQ	OTHER

STATUS	SYS	DATE	NO	TIME	PID
L		24 FEB 93		1330	

FAULT/REMARKS MOC DUE FOR COMPLETION OF 180-DAY SERVICE S. Loney

A/C HRS	WHEN DISC	HOW REC	MAL EFF	WUC

W.O.	REQ	OTHER

PART II - CORRECTING INFORMATION

DATE	TIME	HRS
24 FEB 93	1320	

ACTION CODE WUC

ACTION SERVICE COMPLETED, SEE 2407 # 879620 S. Loney

PID	HOURS	PID	HOURS	PID	HOURS

CMH	OMH	FMH	DMH

TIPID TI MAN-HOURS

DATE	TIME	HRS
24 FEB 93	1400	

ACTION CODE WUC

ACTION MOC COMPLETED S. Loney

PID	HOURS	PID	HOURS	PID	HOURS

CMH	OMH	FMH	DMH

TIPID TI MAN-HOURS

DA FORM 2408-30, DEC 91 **NVG INSPECTION AND MAINTENANCE RECORD**

For use of this form, see DA PAM 738-751; the proponent agency is DCSLOG

Figure 4. Example of completed DA Form 2408-30: NVG Inspection and Maintenance Record (front)

STATUS	SYS	DATE	NO	TIME	PID	DATE	TIME	HRS
G		26 FEB 93		1015		26 FEB 93	1030	

ACTION CODE: | WUC:

FAULT/REMARKS: INDOOR DISTORTION EVAL DUE S. Loney

ACTION: EVAL COMPLETED, DISTORTION OBSERVED R. Rowe, M. Colbert

PID	HOURS	PID	HOURS	PID	HOURS

A/C HRS	WHEN DISC	HOW REC	MAL EFF	WUC	CMH	OMH	FMH	DMH

W O | REQ | OTHER | TIPID | TI MAN-HOURS

STATUS	SYS	DATE	NO	TIME	PID	DATE	TIME	HRS
G		1 MAR 93		2015		1 MAR 93	2030	

ACTION CODE: | WUC:

FAULT/REMARKS: OUTDOOR DISTORTION EVAL DUE S. Loney

ACTION: EVAL COMPLETED, RELEASED FOR FLIGHT R Rowe, M. Colbert

PID	HOURS	PID	HOURS	PID	HOURS

A/C HRS	WHEN DISC	HOW REC	MAL EFF	WUC	CMH	OMH	FMH	DMH

W O | REQ | OTHER | TIPID | TI MAN-HOURS

STATUS	SYS	DATE	NO	TIME	PID	DATE	TIME	HRS
—		2 MAR 93		0900				

ACTION CODE: | WUC:

FAULT/REMARKS: 90-DAY PMCS DUE 23 MAY 93 S. Loney

ACTION:

PID	HOURS	PID	HOURS	PID	HOURS

A/C HRS	WHEN DISC	HOW REC	MAL EFF	WUC	CMH	OMH	FMH	DMH

W O | REQ | OTHER | TIPID | TI MAN-HOURS

7 NVG OPERATIONAL HOURS | a CURRENT | b TODAY | c TOTAL

REVERSE OF DA FORM 2408-30, DEC 91

*U.S. Government Printing Office: 1992 — 311-330/50158

Figure 4. Example of completed DA Form 2408-30: NVG Inspection and Maintenance Record (reverse)

STATUS	SYS	DATE	NO	TIME	PID	DATE	TIME	HRS
X		2 APR 93		2310		14 APR 93	1000	

ACTION CODE: | WUC: INSP OK

FAULT/REMARKS: RIGHT TUBE DISTORTED J. Riley

ACTION: TUBE REPL SN 05362AA SEE 2407 # 215852 C. Smith

PID	HOURS	PID	HOURS	PID	HOURS

A/C HRS	WHEN DISC	HOW REC	MAL EFF	WUC	CMH	OMH	FMH	DMH

W O | REQ | OTHER | TIPID: S. Loney | TI MAN-HOURS

STATUS	SYS	DATE	NO	TIME	PID	DATE	TIME	HRS
G		14 APR 93		1015		14 APR 93	1030	

ACTION CODE: | WUC:

FAULT/REMARKS: INDOOR DISTORTION EVAL DUE S. Loney

ACTION: EVAL COMPLETED, RELEASED FOR FLT R Rowe, M Colbert

PID	HOURS	PID	HOURS	PID	HOURS

A/C HRS	WHEN DISC	HOW REC	MAL EFF	WUC	CMH	OMH	FMH	DMH

W O | REQ | OTHER | TIPID | TI MAN-HOURS

STATUS	SYS	DATE	NO	TIME	PID	DATE	TIME	HRS
S		16 APR 93		2100		16 APR 93	2105	

ACTION CODE: | WUC:

FAULT/REMARKS: TM 11-5855-263-10 IS NOT IN NVG CASE R Rowe

ACTION: INSTALLED OPERATORS MANUAL INSIDE NVG CASE C. Smith

PID	HOURS	PID	HOURS	PID	HOURS

A/C HRS	WHEN DISC	HOW REC	MAL EFF	WUC	CMH	OMH	FMH	DMH

W O | REQ | OTHER | TIPID | TI MAN-HOURS

7 NVG OPERATIONAL HOURS | a CURRENT | b TODAY | c TOTAL

REVERSE OF DA FORM 2408-30, DEC 91

*U.S. Government Printing Office: 1992 — 311-330/50158

Figure 4. Additional examples of completed DA Form 2408-30: NVG Inspection and Maintenance Record (reverse)

NVG and power pack.

❑ System current drain test.

❑ Infinity focus check (ANVIS only).

❑ Collimation check.

❑ Nitrogen purge.

Note: The 180-day service may be accomplished within, but not to exceed, a 10-percent plus or minus tolerance from the scheduled calendar date.

■ *Maintenance operational check (MOC).*

❑ When maintenance has been performed by AVIM, the owning unit will accomplish an MOC using table 2-1 of the appropriate unit/intermediate maintenance manual.

❑ Document the completion of the MOC on DA Form 2408-30.

❑ The low/high light resolution test is not required as part of the MOC.

Dual battery pack (power pack)

■ All power packs require a 90-day PMCS and a 180-day service IAW the appropriate technical manual.

■ All power packs will have a gummed label attached that will indicate the 90-day PMCS and 180-day service due dates.

Note: The 90-day PMCS and 180-day service may be accomplished within, but not to exceed, a 10-percent plus or minus tolerance from the scheduled calendar date.

120-day visor continuity check documentation requirements

■ All visors that are placed into service are required to have a recurring 120-day visor continuity check.

Note: Anytime a visor is installed on a helmet, it is placed into service and requires a 120-day continuity check. This includes removing a visor from one helmet and installing it on another helmet.

■ Document this check on the DA Form 2408-22 for that helmet.

Distortion testing

■ References 6, 9, and 10 on page 8 describe specific procedures for accomplishing the distortion test.

■ A distortion test is required for the following conditions:

❑ Service upon receipt of materiel (newly fielded NVGs or newly assigned NVGs without successful distortion evaluation documentation).

❑ Replacement of image intensifier tube(s).

❑ Receipt of NVGs with a DD Form 1576 attached.

■ Document all distortion tests and results on the current DA Form 2408-30. Also, document the completion of a successful distortion test on DA Form 2408-15.

GM-6 operator checks

Use the following checklist to accomplish GM-6 operator checks. Maintain a copy of these checks with TM 11-5855-238-10 dated 1 April 1988. Record deficiencies found during operator checks on DA Form 2408-30.

■ *GM-6 binocular mount.* Inspect the bracket for cracks and security of the pivot adjustment shelf. Check the pivot assembly dual contact and spring balls for dirt and wear.

■ *ANVIS visor mount assembly.* Check the mount for security. Inspect the assembly for cracks and the mounting holes for wear.

■ *Wiring.* Check for loose or frayed wires.

■ *Low-battery-indicator check.* With batteries installed, set the lower system power switch to the ON position. Unscrew the lower battery cap. The low-battery-indicator light should illuminate to indicate a simulated low-battery condition. Screw the lower battery cap on. Repeat the process to check the upper battery system.

■ *Lenses.* Inspect the objective and eyepiece lenses for dirt, dust, fingerprints, scratches, chips, or cracks. Document the location of chips or cracks, and return the NVGs to the maintainer. When necessary, clean and dry lenses using clean water and lens paper.

■ *Binocular contacts.* Inspect the dual contacts for dirt and wear. Clean if dirty, and return to the maintainer if worn.

■ *Adjustments.* Move adjustments through their full range of travel to ensure freedom of movement.

References

Current NVG maintenance references are listed on page 8. If there is a conflict between this message and any other reference listed on page 8, this message takes precedence.

Points of contact (POCs)

■ Army Aviation Center, MW4 Rodney Rowe, CW4 Malcolm Colbert, or SFC Sherman Loney, DSN 558-5858/5812/3720, commercial 205-255-5858/5812/3720.

■ PMNVEO, Mr. Glen Nowak, DSN 656-4278/4277, commercial 703-806-4278/4277.

■ ATCOM, DA Pam 738-751, Mr. Bill Waldrop or Ms. Ann Waldack, DSN 693-1821/1822, commercial 314-263-1821/1822.

■ ATCOM, safety, Mr. Brad Meyer, DSN 693-2085, commercial 314-263-2085.

■ After hours, contact ATCOM Command Operations Center, DSN 693-2066/2067, commercial 314-263-2066/2067. ♦

Recap of NVG maintenance references

1. TM 11-5855-238-10: Operator's Manual, Night Vision Goggles, AN/PVS-5, 5A, 5B, and 5C, dated 1 Apr 88. (Under revision.)

2. TM 11-5855-238-20: Unit Maintenance Manual, Night Vision Goggles AN/PVS-5, AN/PVS-5A (NSN 5855-00-150-1820), AN/PVS-5B (NSN 5855-01-228-0938), AN/PVS-5C (NSN 5855-01-228-0936), dated 15 Oct 88. (Under revision.)

3. TM 11-5855-238-24 & P: Organizational, Direct Support, and General Support Maintenance Manual, Including Repair Parts and Special Tools List, (Including Depot Maintenance Repair Parts and Special Tools), Night Vision Goggles AN/PVS-5 and AN/PVS-5A, dated Dec 77. (Under revision.)

4. TM 11-5855-238-24 & P: Organizational, Direct Support, and General Support Maintenance Repair Kits and Special Tools List, (Including Depot Maintenance Repair Parts and Special Tools), Night Vision Goggles AN/PVS-5, AN/PVS-5A, AN/PVS-5B, and AN/PVS-5C, dated 1 Oct 87. (Under revision.)

5. TM 11-5855-263-10: Operator's Manual, Aviator's Night Vision Imaging System (ANVIS) AN/AVS-6(V1) (NSN 5855-01-138-4749) and AN/AVS-6(V2) (NSN 5855-01-138-4748), dated 15 Sep 91.

6. TM 11-5855-263-23 & P: Aviation Unit and Intermediate Maintenance Manual, Aviator's Night Vision Imaging System. AN/AVS-6(V1) and AN/AVS-6(V2), dated 15 Jan 92.

7. TM 10-8415-206-12 & P: Operator's and Organizational Maintenance Manual, (Including Repair Parts and Special Tool List), dated 5 May 86. (SPH-4 helmet manual.)

8. DA Pam 738-751: Functional Users Manual for the Army Maintenance Management System—Aviation (TAMMS-A), dated 15 Jun 92. (Under revision.)

9. CDRAVSCOM message 172225Z Mar 89, subject: Aviation Night Vision Goggle, Operational Evaluation, One-Time Evaluation of All AN/PVS-5A, 5B, and 5C Series Night Vision Goggles (NVG) and AN/AVS-6 Aviator's Night Vision Imaging System (ANVIS). (This message has expired for ANVIS and will expire for AN/PVS-5 upon receipt of TM 11-5855-238-23 & P.)

10. CDRAVSCOM message 172359Z Mar 89, subject: Maintenance Advisory for AN/PVS-5A, 5B, and 5C Series Night Vision Goggles and AN/AVS-6 Aviator's Night Vision Imaging System (ANVIS) Returned For Unacceptable Distortion. (This message will expire upon receipt of TM 11-5855-238-23 & P.)

11. CDRAVSCOM message, 312000Z Jul 90, subject: One-Time Wiring Modification of All PVS-5 Series NVGs Utilizing the Aviation GM-6 Mount. (This message will expire upon receipt of TM 11-5855-238-23 & P.)

12. 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 will expire upon receipt of TM 11-5855-238-23 & P.)

13. CDRATCOM message 211830Z Dec 92, subject: Aviation Safety Action Message, Maintenance Mandatory, Updated Information on Night Vision Goggles (GEN-93-ASAM-02). (TB 1-1500-346-20 dated 24 Dec 92 superseded this message and TB 1-1500-346-20 dated 15 Apr 92.)

14. CDRATCOM message 061300Z Jan 93, subject: Aviation Safety Action Message, Informational, Status of New DA Pam 738-751: Functional Users Manual for The Army Maintenance Management System—Aviation (TAMMS—A), dated 15 Jun 92 (GEN-93-ASAM-03). (NVG guidance contained in this message is rescinded effective immediately.)

15. CDRATCOM message 011500Z Mar 93, subject: Aviation Safety Action Message, Maintenance Mandatory, Use of Dual Visor on SPH-4B Aviator Helmet and Related Information (GEN-93-ASAM-04). (TB 1-1500-347-30 expires on 31 December 1993.) ♦

The privileged status of cockpit voice recordings

The intracockpit voice recorder is an extremely important tool for accident investigation boards. In a case where there are no survivors or eyewitnesses to the accident, the recorder may be absolutely critical to our efforts to reconstruct what happened in the cockpit as the accident sequence unfolded. This recording of intracockpit crew communications can provide what no other technical data can—an illustration of actual crew coordination efforts during that critical period. This information is essential in determining the cause of a particular accident, as well as to preventing future such tragedies. These intracockpit voice recordings—as distinguished from communications between aircraft or to the tower—constitute (along with confidential witness statements and the board's analysis, findings, and recommendations) privileged information.

Privileged information from accident investigation reports is withheld from mandatory public release under the Freedom of Information Act. This information is restricted to use for accident prevention purposes and is closely protected and controlled in order to increase the effectiveness of the Army's force protection effort. Upcoming revisions of AR 385-40: Accident Reporting and Records and DA Pam 385-95: Safety: Aircraft Accident Investigation and Reporting will include provisions to extend privileged information status to intracockpit voice recordings.

Information from two kinds of recorders is involved: the cockpit voice recorder, which is installed on certain fixed wing aircraft, and video monitors that are on board certain rotary wing aircraft. The policy of protecting privileged information applies equally to both kinds of recordings.

Cockpit voice recorders

This kind of recorder is installed on certain fixed wing aircraft that were acquired by the Army from the Air Force or from a commercial source. These recorders were installed, based on FAA requirements, as a safety measure. Information provided by the recorders is intended for study in the event of an accident, and its purpose is solely for accident prevention.

Video monitors

The second kind of recording device includes such things as video monitors aboard some of the Army's rotary wing aircraft, such as the AH-64 and OH-58D. An example is the video recording used along with the Forward Looking Infrared Radar (FLIR) system. Under normal conditions, this equipment is used for damage assessment, reconnaissance, and mission debriefing, as well as for training/safety. Accidents, of course, are not expected to happen. Still, if an in-flight emergency occurs, the effect of video monitors on crewmembers could be the same as cockpit voice recorders in fixed wing aircraft.

As an in-flight emergency develops, crewmembers must feel no inhibitions in communicating freely with each other. They must be able to communicate freely without worrying that something they say might embarrass or somehow harm the interests of the Government, a manufacturer, or any individual, including themselves.

This is especially critical during the early stages of an accident sequence, before the crew fully appreciates the extent of what is about to develop into a life-or-death emergency. Once they are engaged in a full-blown emergency—with life or death literally depending on their actions during the next few seconds—the presence of a recording device would most likely not be material. It is during the earlier stages of the developing problem that the issue becomes critical. During that time, the presence of a recording device might inhibit crewmembers from freely communicating with one another. There is a natural inhibition that affects anyone who knows his communications are being recorded.

We have already established that the cockpit recording becomes an essential element of accident prevention and safety by assisting investigators in reconstructing the accident. Its presence in the aircraft, however, must not be allowed to jeopardize crew safety. Public dissemination of information from these devices could create just such a situation. If knowing that what they say in the cockpit is being recorded affects open communication between crewmembers during the early critical stages of an accident sequence, the result could be disastrous.

Other privileged information

A similar rationale applies to the privileged status of confidential witness statements and accident investigation board findings and recommendations. Board members must be completely free to express their candid assessments regarding what caused the accident and what needs to be done to prevent future similar accidents. They must not have to worry about whether their findings would embarrass or

harm the interests of the Government, a manufacturer, or an individual. If we allowed such extraneous factors to enter into the investigative process, it would result in board members being concerned about involvement in lawsuits, depositions, expert witness requests, and subpoenas. Such a situation would naturally tend to inhibit board members and could make them reluctant to find anyone responsible for the mishap.

The analogy of conferring privileged information status on cockpit voice recordings is a sound one because the protection serves the same purpose as it does for other portions of the accident investigation process. Why, for example, do we protect confidential witness statements? Again, it is because we want witnesses to feel free to express their absolutely candid feelings about what happened without fear of recrimination, embarrassment, adverse action, and so forth. If such factors were injected into the process, our entire accident prevention effort would be jeopardized. Witnesses would naturally tend to hold something back when their own self-interests or the interests of a friend might be at stake.

The purpose for extending privileged status is the same for both kinds of cockpit recordings. The prospect of these recordings being publicly disseminated could cause crewmembers to feel inhibited about expressing themselves freely during the initial stages of an accident scenario. This could seriously jeopardize crew safety. Thus, something that could be critical to the military's force protection effort might wind up jeopardizing that very same interest.

The need to protect critically important information obtained from cockpit recording devices becomes even greater when there are no survivors or eyewitnesses to the accident. Unless these recordings are accorded privileged status, we will not only endanger crew safety but will also stand to lose critical information that is essential to our efforts to understand how an accident happened. Failing to accord privileged status to cockpit recordings will seriously jeopardize our force protection effort and our national security.

The Army's position that cockpit voice and video monitor recordings are privileged information is also shared by the other military services. The Air Force informs aircrews of the privileged status of such information through updates in the Flight Crew Information Folder. Other means by which Army crewmembers might be informed that these communications are privileged are crewmember safety briefings, inclusion in unit safety SOPs, and reading files. Installation-level safety offices can play a vital role by helping to ensure that this information is disseminated to all flight crew personnel. ♦

—MAJ William R. Rodis, USASC Command Judge Advocate, DSN 558-3960, commercial 205-255-3960

Congratulations AAAA winners!

The Army Aviation Association of America national award recipients for 1992 are as follows:

■ *Aviation Unit Award (Active Army).* 12th Aviation Brigade, Unit 29632, APO AE 09096; Commander, COL Thomas M. Hayes; Senior Noncommissioned Officer, CSM Timothy L. Fosque.

■ *Aviation Unit Award (ARNG).* 1st Battalion (Attack Helicopter), 211th Aviation Regiment, 8692 South 4000 West, West Jordan, UT 84088-5425; Commander, LTC Robert G. Holt; Senior Noncommissioned Officer, CSM Travis R. Heywood.

■ *Aviation Unit Award (USAR).* 2-123d Attack Helicopter Battalion, 6th Infantry Division (Light) Round Out, 680 Bayfield Road, St. Paul Downtown Airport (Holman Field), St. Paul, MN 55107-1096; Commander, LTC Daniel J. McGraw; Senior Noncommissioned Officer, CSM Gary C. Gustner.

■ *Army Aviator of the Year Award.* MW4(P) Randolph Wise Jones, B Company, 1/160th Special Operations Aviation, Aviation Regiment (Airborne), Fort Campbell, KY 42223-5000.

■ *Aviation Soldier of the Year Award.* SSG Donald C. Maddox, E Troop, 4th Squadron, 17th Cavalry, 18th Aviation Brigade, Fort Bragg, NC 28307-5000.

■ *Joseph P. Cribbins DAC of the Year Award.* Mr. James E. Speigner, Hq and Hq Detachment, 1st Battalion, 212th Aviation, Aviation Training Brigade, Fort Rucker, AL 36362-5000.

■ *James H. McClellan Aviation Safety Award:* CW4 Michael S. Olin, A Company, 1/501st Aviation, 17th Aviation Brigade, K-16 (Seoul Air Base), Unit 15238, APO AP 96205-0011.

■ *Robert M. Leich Award.* U.S. Army Combat Aviation Training Brigade, III Corps and Fort Hood, TX 76544-5085; Commander, COL Gerald D. Saltness; Senior Noncommissioned Officer, CSM Jerome G. Chapelle.

■ *The President's Award.* The Honorable Stephen K. Conver, former Assistant Secretary of the Army (Research, Development, & Acquisition).

■ *Top Chapter Award.* Corpus Christi, 308 Crecy Street, Corpus Christi, TX 78419-5260; Chapter President, COL Thomas E. Johnson.

Congratulations to all recipients for their significant achievements in Army aviation. ♦

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - During multiship training mission, two UH-1s collided in midair. Five fatalities. 9320

UH-1 Class C

H series - While on short final, IP scanned left and saw rotor blade hit top of pine tree. Crew felt no abnormal feedback in controls. Crew landed aircraft, and passengers got out. Because of location, crew flew aircraft down valley to airfield and shut it down.

UH-1 Class D

V series - While rotor was coasting down, gusting winds caused main rotor blade to flex down and contact tail rotor drive shaft.

UH-60 Class C

A series - At about 15 feet AGL while on approach to pinnacle, tarp was blown up and into main rotor system. PC felt severe vibrations and uncommanded left bank. PC leveled aircraft and repositioned for landing. Aircraft landed hard, damaging tail wheel and right fuselage sheet metal. PC completed emergency engine shutdown.

UH-60 Class D

A series - During tactical mission, passenger in rear of aircraft inadvertently jettisoned right side cargo door windows.

L series - Crew was recovering OH-58C to home station. After setting OH-58 down, crew chief directed pilot to slide left. Crew chief then called OH-58 clear and told pilot to release load. Winds caught sling assembly, and clevis made glancing impact on right top of OH-58 fuselage.

Attack

AH-1 Class E

S series - While at stabilized hover, crew brought nose of aircraft up 6 degrees for indirect fire. Crew fired one pair of MK-66 rockets, and aircraft began to shake. Crew noted that torque was bouncing between 35 and 62 PSI. Crew completed landing at nearest safe area.

AH-64 Class C

A series - During postdeployment maintenance test flight, left inboard missile launcher assembly with one training and two dummy missiles separated from aircraft. Crew did not realize mishap had occurred until they returned to airfield. Investigation ongoing.

A series - During flight, forward fairing on left inboard weapons pylon assembly departed aircraft and flew into main rotor system. Crew completed landing and shut down engine without further incident.

AH-64 Class D

A series - While aircraft hovered during rocket engagement, training rocket departed left launcher and broke into pieces. Some pieces hit aircraft, breaking portion of copilot's canopy and denting side of aircraft.

A series - During cruise terrain flight, aircraft was Chalk 4 in flight of 5 when rear-seat pilot experienced IHADSS failure. Crew executed emergency procedures and aborted mission. Several seconds later while en route to tactical assembly area, front-seat pilot also experienced IHADSS failure. About 30 to 45 seconds later, aircraft contacted upper wire of electrical transmission line at 100 feet AGL. Crew landed aircraft immediately without further incident.

A series - While at parking pad with APU running, crew brought power levers to idle. As Np was going to idle, momentary interruption in electrical power caused hard shutdown of aircraft electrical system. About 20 seconds later, crew heard growling noise, which increased in intensity, coming from turtleback area. IP initiated emergency shutdown. As crew pulled power levers to off position, APU fire light came on. Before pilot could reach APU fire handle, fire light went out and APU shut down.

A series - While flying NOE, aircraft hit top of tree. Crew felt no unusual feedback in controls and returned to assembly area. Inspection revealed damage to TADS.

Cargo

CH-47 Class E

D series - During cruise flight, flight engineer (FE) discovered top left fuel pump on fuel pump board was leaking. While FE was attempting to soak up fuel with shop towel, electrical arc from pump ignited fuel-

Class A Accidents through March

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	6
	December	1	1	0	0
2d Qtr	January	3	1	0	0
	February	1	5	0	8
	March	4	1	2	5
3d Qtr	April	1		0	
	May	1		1	
	June	2		2	
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	22	16	10	21

soaked towel. Crew quickly extinguished fire and disconnected electrical connection to pump.

Observation

OH-6 Class C

J series - Hard landing resulted in extensive damage. No injuries. Investigation continues.

Fixed wing

C-12 Class E

D series - At 200 feet AGL following takeoff, crew placed landing gear control switch in up position. Crew heard no gear motor noise, and gear did not retract. Crew returned landing gear control switch to down position and landing-gear-down position indicator lights came on. Crew checked all circuit breakers and found them in normal position. Crew returned to base and completed uneventful landing. Investigation revealed fault in landing gear motor.

OV-1 Class C

D series - During night readiness level training flight, aircraft was on short final when a deer crossed runway from right to left in front of aircraft. IP initiated go-around, but nose gear assembly struck deer, causing extensive damage to nose gear assembly. IP verified gear-down indications during go-around and returned for emergency landing. Crew completed landing without further incident.

U-21 Class D

A series - After takeoff on functional check for landing gear replacement, gear transit light stayed on after crew retracted gear. Aircraft remained in closed traffic, and crew extended gear with safe indication (green lights) on all three. Crew completed precautionary landing without further incident. Inspection revealed lower drag brace arm was bent and actuator would not fully retract.

Messages

■ Safety-of-flight operational message concerning cancellation/rescinding of the operating restrictions while using JP-8/JP-5 fuel (C-12-93-01 and U-21-93-01, 041730Z Mar 93). Summary: AVSCOM messages 212300Z Feb 89 and 282300Z Mar 89 limited flight durations at or below -50°F when using JP-8/JP-5 or any commercial equivalent fuel. Evaluation of fuel system performance when using JP-8 and Jet-A fuel at cold ambient temperatures revealed that there was no indication of lack of gravity feed due to fuel freezing during follow-on flight test program. The purpose of this message is to cancel/rescind restrictions during operations of all RC/C-12 and RU/U-21 series aircraft when using JP-8/JP-5/Jet-A fuel as prescribed in the 212300Z Feb 89 and 282300Z Mar 89 SOF messages. Contact: Mr. Roger Heidenreich, DSN 693-2258, commercial 314-263-2258.

■ Aviation safety action maintenance mandatory message concerning inspection of Hi-Lok fasteners at fuselage station 83 to 120 on all CH-47D, MH-47D, and MH-47E aircraft (CH-47-93-ASAM-02, 021600Z Mar 93). Summary: CH-47-92-ASAM-05 required replacement of Hi-Lok fasteners because of oversize holes and improper deburring during production. This replace ment was not completed because of a shortage in replacement Hi-Lok fasteners. Several waivers were granted providing interim instructions. This message provides criteria for correcting loose fasteners and requires a recurring inspection at each phase inspection. The purpose of this message is to rescind CH-47-92-ASAM-05 and related waivers, require inspection of the subject Hi-Loks for looseness and necessary corrections, and remind units of the inspection requirement for loose fasteners at each phase inspection. Contact: Mr. Brad Meyer, DSN 693-2085, commercial 314-263-2085.

■ Aviation safety action maintenance mandatory message concerning one-time inspection of hydraulic pumping unit (NSN 1650-01-240-4341) on all CH-47D, MH-47D, and MH-47E helicopters (CH-47-93-ASAM-03, 121900Z Mar 93). Summary: The CH-47 fleet is currently experiencing hydraulic system failures. A typical scenario is during normal flight, the hydraulic systen pressure indicates pressur fluctuations from a max mum of 4,000 PSI to a min mum of 2,000 PSI, followe by illumination of the h draulic flight control se ment light. Also, hig temperatures in the h draulic system have be noted when the aircraft w shut down. An intensive vestigation is being c ducted. The investigation is centered on the flight control/utility hydraulic pump at this time, although it is not certain that the pump is the root cause. The suspect pumps are manufactured by Strato-Power and the serial numbers have a suffix "BO", NSN 1650-01-240-4341, P/N 64WE075102 and/or 938555. It should be noted that no abnormal problems have been reported with the Vickers pump, NSN 1650-01-115-3948, P/N PV3-075-20. Further information and instructions will be disseminated as soon as it is available. Report all failures through the QDR (quality deficiency report) system to support the investigation. The CH-47 has three hydraulic pumps on board and any one is capable of powering the flight controls. The power transfer unit can be used in emergency conditions when powered by the utility hydraulic pump or APU motor pump. In the event such a failure occurs, use current procedures in paragraph 9-49 of TM 55-1520-240-10. The purpose of this message is to alert users of the potential problem and to require inspection for and reporting of suspect pumps to facilitate eventual corrective action. The CH-47D has a triple redundant system, and this is a low-risk safety issue. Contact: Ms. Terese McGrew, DSN 693-2085/2258, commercial 314-263-2085/2258.

Fort Rucker, AL 36362-5363. Information is for accident prevention purposes only. Specifically prohibited for use for punitive purposes or matters of liability, litigation, or competition. Direct communication is authorized by AR 10-29. Address questions about content to DSN 558-3262. Address distribution questions to DSN 558-2062/4806.

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

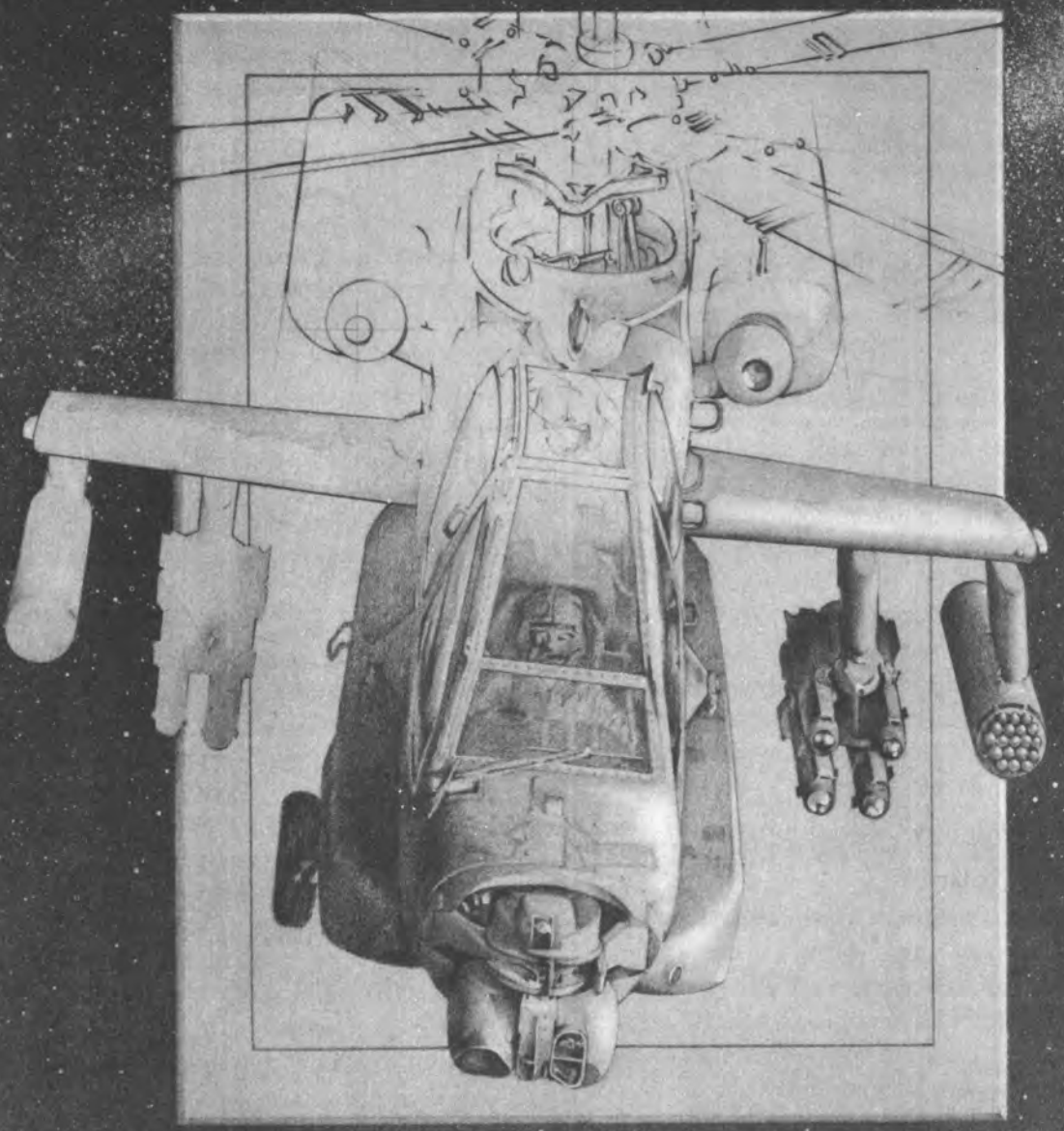
Flightfax

June 1993 Vol 21 No 8

REPORT OF ARMY AIRCRAFT ACCIDENTS

Sullivan sends

Protecting the aviation force by risk management



The Army aviation safety record this fiscal year remains troublesome. There have been 24 Class A aircraft accidents resulting in 25 deaths, 16 injured, and over $90 million in costs. We still have a lot of flying to do this year. At the current rate, there is a potential to destroy 42 aircraft with untold deaths and injuries by the end of the fiscal year. This is a leadership matter for all TOE/TDA commanders...all components. *I need your help now!*

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Fort Rucker, AL 36362-5163

We must exploit our leadership strengths to solve this problem. Everyone in the chain of command, not just the aviation community, must take responsibility. I want you to apply risk management principles against aviation OPTEMPO and mission demands to assess the impact of personnel turbulence and drawdown in your units. The "crawl, walk, run" training assessment is a simple but valuable tool to protect the force. This is particularly important when aviator/crew proficiency versus currency is at the margin.

Analysis shows that human error has been a factor in over 75 percent of the accidents this year. Inadequate risk management, poor flight crew coordination, and individual errors are the leading causes. Our accident record shows risk management methods have not been internalized and applied to the operational environment. We must understand where and when we are vulnerable and adjust our training activities accordingly.

I expect risk management to be taught at all levels, including our senior leader courses, pre-command training, and the ADC (assistant division commander) training curriculum. Use the professionals available in your units. Our instructor pilots and standardization and safety personnel are top-notch folks trained to identify risks. They are essential to having a healthy aviation safety program. In the near future, we will get the crew coordination equipment into your simulators so crews can see their mistakes. Fly with your aircrews on day and night missions, understand the challenges of goggle operations, ensure a safe altitude for nap-of-the-earth training, and always build in a margin of safety.

I am directing a safety standdown day for all aviation units within 45 days after receipt of this message. Be involved and use this day to show your personal commitment to safe operations in units under your command. Here are the specific issues I want addressed:

■ **Risk management**. Get back to basics in risk management and accept no unnecessary risks unless the benefits outweigh the cost. Use the U.S. Army Safety Center (USASC) video titled "Risk Management." It is available and required viewing by aviation units during the standdown.

■ **Accident analysis**. Review recent accidents, identify high-risk individuals, look for ways to enhance unit safety, and enforce accountability. USASC has developed an excellent tool titled the "Next Accident Test." Use it in your analysis. Worldwide distribution to aviation units is ongoing, and local reproduction is authorized. In conjunction with the "Next Accident Test," company-level seminars and anonymous surveys will be used to ask the question "What is the dumbest thing you have done as an aircrewmember or aviation soldier since you have been in this unit?" The answers will surprise you. These tools can be used to discover good safety ideas and practices that can be forwarded to USASC for publication in *Flightfax*.

■ **Accident avoidance**. Commanders should analyze their operations and personnel to determine the high-risk areas that could lead to an accident. The U.S. Army Aviation Center has distributed a video titled "Eliminating the Avoidable Accident" to help commanders in this process. I want every aviator to see this video.

When I visit your unit, brief me on your safety programs and how you are applying risk management to protect the force—specifically aviation. Let's get with it—show me we have a trained and ready aviation force! ■

—Chief of Staff of the Army, General Gordon R. Sullivan

Postcrash fires: a real hazard

When the crashworthy fuel system for Army aircraft was fielded in the early 1970s, the danger of postcrash fires in potentially survivable aviation accidents decreased dramatically. A review of accident data reveals numerous cases where these fuel systems withstood severe crushing and G-forces.

With the introduction of crashworthy fuel systems, fire—once the greatest killer in survivable crash impacts—became a much less significant threat. Unfortunately, this success story has a serious drawback. Believing that a postcrash fire will not occur because the aircraft is equipped with a crashworthy fuel system has created an unwarranted sense of complacency among some commanders and crewmembers.

Unauthorized flight clothing

Some units have already received the aviation battle dress uniform (ABDU). However, development and fielding of the ABDU Nomex flight jacket is behind schedule. Confident in the capabilities of the crashworthy fuel systems, some unit commanders have assessed the risk of fire as low and authorized wearing Gortex field jackets with the ABDU.

Ironically, the Safety Center received a request for an official safety position on this issue shortly after a UH-60 accident involving an explosive postcrash fire. Four fatalities and four severe burn injuries were sustained by crewmembers and passengers in that accident.

A melted Gortex field jacket had to be torn from the body of one severely burned passenger. Fortunately in this case, the melted synthetic fabric did not contribute to his injuries because it was removed quickly and he was wearing several layers of clothing beneath it. However, wearing clothing made from 100-percent synthetic materials, such as the Gortex field jacket, does increase the potential for and severity of burn injuries should an aircraft fire occur.

Serviceable protective equipment

In that same UH-60 accident, the pilot was wearing a pair of Nomex flight gloves, but the tips of the fingers had holes in them. As a result, he suffered disabling burns to his right hand that might have been prevented had he been wearing *serviceable* Nomex gloves.

The pilot-in-command (PC) of the aircraft suffered the least serious injuries. In large part, this was due to where he was sitting in the aircraft. However, for that particular flight he had worn his Nomex flight jacket instead of stuffing it in his helmet bag as he normally did. Although his flight jacket was severely scorched on the outside, it functioned as designed and bought him some valuable time when he had difficulty releasing his restraint system and egressing the burning wreckage. Further, his *serviceable* Nomex gloves protected his hands, which allowed him to release his buckle and

force the door handle, and he had turned up his collar. The PC's most serious burns were on his unprotected face.

A review of lessons learned

Commanders have many responsibilities and sometimes leave personal safety to each individual. However, it is the commander's (and the aviation safety officer's) responsibility to insist that the regulations, rules, or do's and don'ts on personal equipment are followed. But ultimately it's each individual crewmember's and passenger's responsibility to wear protective clothing and equipment and to wear it properly.

Appropriate precautions taken *before* a flight can enhance the chances of surviving an aircraft fire. The following lessons learned from the UH-60 accident aren't new ones, but they do need repeating:

■ Wear approved, protective flight clothing and equipment, and wear it as it was designed to be worn. Don't make the mistake of not fully using *all* the safety gear that's available.

■ DX unserviceable gloves and flight suits. If your protective clothing is frayed or torn, it can't provide the maximum protection you will need should a fire occur.

■ Do not wear synthetic fabrics as underwear or as an outer garment during flight. Whether you're a crewmember or passenger, wearing unauthorized flight items is an unnecessary risk.

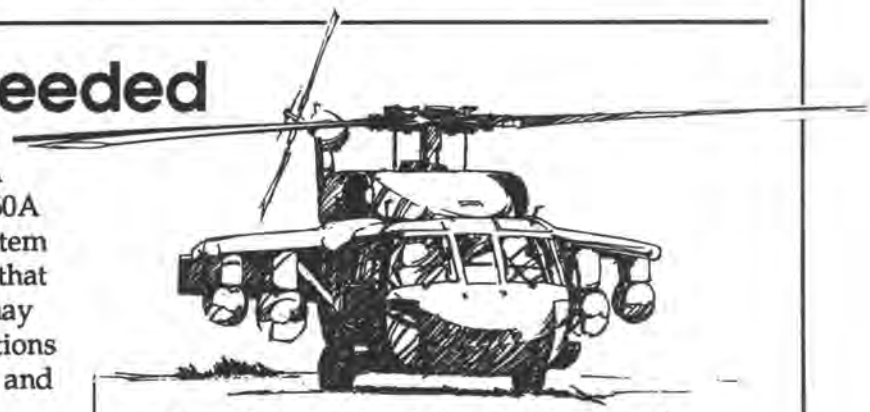
■ Take passenger briefings and emergency egress training seriously. Knowing what to do should an in-flight emergency occur and where the exits are located can eliminate confusion and save precious seconds as you scramble to get out of a burning aircraft.

The UH-60 accident was not an exception to the rule; in-flight and postcrash fires occur more often than one might think. From 1 January 1988 through 12 May 1993, 67 Class A aviation accidents have involved fires. In those 67 accidents, 50 crewmembers and/or passengers sustained burn injuries.

These numbers should correct the misperception that crashworthy fuel systems eliminate all fires. Postcrash fires remain a real hazard; therefore, all crewmembers and passengers need to ensure their protective clothing and equipment is serviceable and worn so that it can afford the protection it was designed to provide. ■

—MAJ Henry S. Morgan, Jr., Executive Officer

ESSS information needed



During the investigation of a Class A aviation accident involving a UH-60A with the external store support system (ESSS) installed, an issue surfaced that indicates lateral center of gravity problems may occur when asymmetrical fuel loading conditions exist. An extensive effort is underway to find and correct the problems with the system.

The Army Safety Center requests that units report **all** UH-60 ESSS-related incidents for inclusion in the safety data base. Submit these incidents through the preliminary report of aircraft mishap (PRAM) system even if the mission was completed safely. ■

—MAJ Henry S. Morgan, Jr., Executive Officer

Aviators needed

The U.S. Army Aeromedical Research Laboratory (USAARL) at Fort Rucker, AL, needs aviator volunteers to participate in several research studies. Many of these studies will require a 2-week commitment. And participants will be able to acquire either simulator or aircraft time, depending on the study.

Temporary duty funds and travel funds will be provided by USAARL on a case-by-case basis. Anyone interested in participating in the research should contact Mr. Larry Woodrum, DSN 558-6834, commercial 205-255-6834. ■

Risk management: a good investment

The risk management process is designed to help soldiers at all levels identify and minimize hazards. Effectively applying the risk management process and principles improves the odds of completing the mission successfully.

Risk management isn't an obstacle or paperwork drill that must be overcome before the mission can begin. If it is viewed in that light, hazards will not be identified and mission risk assessments will be poorly done or not done at all. And the results can be costly, even deadly.

Failure to apply risk management

The following examples illustrate what can happen when aircrews fail to manage risks and apply risk management principles. If the aircrews in these examples had identified and assessed the hazards and then made appropriate risk decisions, perhaps these tragic accidents could have been avoided.

MH-6

Mission: Unauthorized flight

Synopsis: While on the second leg of a cross-country flight, the single pilot—flying night unaided in marginal weather conditions—struck several trees in steep, upsloping terrain. The aircraft was destroyed, and the pilot was killed.

Hazards:

- Pilot was frustrated over a unit status report
- Flying single pilot
- Flying in forecast severe turbulent weather, including snow showers
- Aircraft was not equipped for weather conditions

Risk management failures:

- Pilot failed/chose not to assess hazards
- Pilot made poor risk decision to fly
- Pilot chose not to follow regulatory and command guidance

UH-60

Mission: Day VMC training to conduct a commander's evaluation of a new pilot

Synopsis: After taking the controls from the pilot during a poor instrument landing system approach, the IP landed and taxied the aircraft toward the hangar. While executing a right turn to parking, the aircraft's main rotor and tail boom impacted the corner of the hangar. The aircraft rolled onto its left side. The tail boom and tail rotor were severed, and all four rotor blades separated from the aircraft.

Hazards:

- Pilot was unprepared for checkride; he was not familiar with aircraft procedures, systems, and limitations
- Inadequate facilities (no taxiway markings and no ground-handling equipment)
- IP was frustrated over pilot's poor performance
- Because of cockpit climate, IP was having to function in single-pilot mode
- Aircraft was taxied too close to hangar

Risk management failures:

- IP failed to identify and assess ground taxiing hazards—probably due to frustration over pilot's extremely poor performance
- Poor risk decision to assign aircraft to a location with inadequate facilities

C-12

Mission: VIP transport

Synopsis: While performing a nonradar approach, the crew became disoriented. As a result, they descended sooner than they should have and impacted a mountain. Eight people were killed.

Hazards:

- Mountain-flying region
- Crew tension between PC and pilot (pilot was late for takeoff; PC was pilot's rater)
- Both crewmembers were flying without a current APART
- Poor attitude toward safety

Risk management failures:

- Command did not enforce regulatory requirements; control options were ignored
- PC failed to recognize the in-flight hazards

that resulted from the poor crew coordination conditions

■ Command made a poor risk decision when it either failed or elected not to maintain safe flying attitudes in pilots

UH-60

Mission: Night, service, administrative, VIP transport

Synopsis: While on short final, aircraft experienced an uncontrolled right turn and descended. The crew could not recover the aircraft, and fuel tanks ruptured on impact. Suspect a lateral center of gravity problem related to asymmetric fuel flow from auxiliary fuel tanks and passenger seating arrangement. Four fatalities, three major injuries, and one minor injury resulted.

Hazards:

■ Inadequate fuel management information available to the crew

Risk management failures:

■ Pending completion of investigation, external stores support system design remains suspect

UH-1

Mission: Day VMC formation flight training

Synopsis: Flight of two UH-1s was conducting low-level formation flight training. The aircraft were in an unauthorized flight formation (abeam and parallel). The PC on the controls in the left seat of Chalk 2 did not maintain aircraft separation when Chalk 1 initiated a slight left turn to follow terrain. The air mission commander (AMC) in the right seat of Chalk 2 was videotaping the mission rather than clearing aircraft. The AMC and video equipment restricted the Chalk 2 PC's view of Chalk 1. The aircraft collided and descended into trees. Five crewmembers were fatally injured, and two received minor injuries.

Hazards:

■ Unbriefed use of video recording equipment

■ Pilot in a Chalk 2 crew position was using recording equipment instead of providing aircraft separation

■ PC on the controls of Chalk 2 used an unauthorized, unbriefed formation

■ PC on the controls of Chalk 2 was on the opposite side from Chalk 1 and because of the right-seat pilot's actions could not see Chalk 1

Risk management failures:

■ Chalk 2 PC failed to identify and assess the hazard of flying abeam and parallel to Chalk 1

■ AMC did not include an assessment of the risks associated with using video recording equipment to film the formation flight training

■ AMC failed to enforce proper formations for training (supervision error)

Make an investment

Take the time to learn all you can about risk management; it's a good defense against preventable accidents. Risk management isn't hard to learn—just five basic steps in the process and four basic principles. Once you understand the concept, practice applying risk management both on and off duty. The more you practice using it, the more second nature it will become. Investing your time in learning risk management will yield a good return. As shown in the examples, failure to make the investment and failure to apply risk management to all missions, even the routine ones, could cost you your life. ■

POC: LTC Michael Lenhart, Systems Management Division, DSN 558-4402/3857, commercial 205-255-4402/3857

New safety videos available

The following safety videos have been distributed to visual information libraries throughout the Army. You may obtain a copy by asking your local audiovisual library for—

■ **Eliminating the Avoidable Accident** (TVT 46-145, PIN 710219). In this roundtable discussion video, MG John D. Robinson, Commander of the U.S. Army Aviation Center and Fort Rucker, is joined by other leaders within the aviation community to discuss the causes of many Army aviation accidents. Drawing from their own personal experiences, leaders discuss specific incidents and accidents and make recommendations on how the accidents could have been avoided.

■ **Army Safety Leadership on Risk Management** (TVT 20-1012, PIN 710271). In this video, BG R. Dennis Kerr, Director of Army Safety, and CSM(D) Samuel R. Reynolds, Sergeant Major of the Army Safety Center, discuss the basics of risk management and how they apply to today's smaller Army. This video is designed to help commanders understand what risk management is and how to use it to make their commands safer. The video also shows how accidents can happen when risk management is not used. ■

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class C

H series - During NOE flight, aircraft unexpectedly pitched down and descended. PC applied power and aft left cyclic to stop descent into trees but was unable to prevent aircraft from striking pine tree. Aircraft continued flight, but pedals were stuck in fixed-pitch setting. PC elected to fly to airfield and performed a run-on landing with no further damage. Postflight inspection revealed broken chin bubbles, severed pedal linkage between pedals on right-side tail rotor, broken battery compartment door, bent battery compartment frame and wipers and guards, and dented nose.

H series - While aircraft was hovering, internal N2 drive system failed, resulting in engine and main rotor overspeed. Crew immediately landed aircraft and performed normal shutdown.

H series - While performing engine response check during maintenance test flight, N2 and engine oil pressure gauges fluctuated. Pilot descended to 5-foot hover, and smoke and flames were seen coming from engine tailpipe. Pilot lowered collective to land, and aircraft experienced several engine compressor stalls.

UH-60 Class B

A series - Unforecast winds probably in excess of 45 knots hit aircraft while it was sitting parked on ramp. Damage to anti-flaps discovered the following day. Suspect additional damage to spindles and hub. 9328

UH-60 Class C

A series - As crew was landing to rescue stranded backpackers, blowing snow diminished visibility. Crew allowed blade tip caps to contact tree branches.

A series - During VMC approach to dirt soccer field, pilot encountered dust cloud and lowered collective at about 10 feet AGL. Aircraft landed hard and bounced once. When aircraft came back down, tail wheel strut collapsed, causing sheet metal damage to tail boom.

L series - During NVG approach to desert floor, aircrew misinterpreted terrain relief because of restricted visibility (zero illumination and external wing tanks). Aircraft came to rest on the bank of a wadi in 8-degree nose-up and 27-degree right roll.

L series - After landing to ship, crew shut down engines normally. Ship turned as aircraft rotor blades were winding down, and gust of wind caused blades to windmill, damaging spindle assembly and anti-flap restrainers.

Attack

AH-1 Class B

S series - While at 1,500 feet MSL and 100 knots, aircraft flew into and cut six 46,000-volt high-line power cables. Crew continued flight for about 8 miles following wire strike and executed running landing at air station. 9329

AH-1 Class C

F series - During confined area takeoff, PC failed to ensure proper obstacle clearance and allowed aircraft to strike tree. Postflight inspection revealed damage to both main rotor blades.

F series - During hot refueling operation, crew discovered 90-degree gearbox fairing access door was open. Crew shut down aircraft to close access door and found fluid level in gearbox was ¼-inch below preflight level. Further inspection revealed fluid was dripping out of gearbox fairing and also on bottom side of tail cone and tail boom rivets. Maintenance replaced 90-degree gearbox seal.

F series - During cruise flight, crew noticed engine oil hot light and saw temperature rapidly rise to 125°. While crew was searching for landing area, transmission oil temperature began rising and transmission oil temperature light came on. Crew completed landing without further incident. Suspect oil cooler fan failure.

S series - While firing first pair of rockets during

Class A Accidents through May

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	6
	December	1	1	0	0
2d Qtr	January	3	1	0	0
	February	1	5	0	8
	March	4	1	2	5
3d Qtr	April	1	6*	0	0
	May	1	2	1	1
	June	2		2	
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	22	24	10	22

*Two accidents previously reported as Class As have been downgraded

aerial gunnery training, torque spiked to 70 PSI with a low of 35 PSI. Before returning to OGE hover torque, IP instructed pilot to return master arm to standby and wing stores armed switch to off. Because aircraft was over impact area and rough terrain, nearest suitable landing area was at rearm pad. IP completed landing without further incident.

AH-64 Class A

A series - While at stagefield with IP in front seat and rated student pilot in rear seat in bag using PNVS, IP observed thunderstorm, took aircraft controls, put aircraft on ground, and told pilot to lock tail wheel. As aircraft came to stop, microburst hit aircraft and rolled it onto its right side. Main rotor blades disintegrated, tail boom separated from aircraft, and Hellfire training missiles and launchers separated from aircraft. Pilot shut down engines and exited aircraft unassisted. One fatality. 9330

AH-64 Class B

A series - During night currency training mission, aircraft drifted rearward and main rotor blades struck oak tree. Crew executed controlled landing to field. Left main and tail struts and four main rotor blades were destroyed. No injuries. 9331

AH-64 Class C

A series - At about 3 to 4 knots during takeoff roll, 30mm gun barrel made uncommanded depression and dug into runway 6 to 8 inches. Crew landed aircraft and shut it down. Postflight inspection revealed gun mount was partially severed from airframe and hydraulic lines were torn. No injuries.

A series - When crew advanced power levers to fly, No. 1 engine accelerated to maximum power with flames from exhaust suppressor. Crew noted No. 1 engine Np at 120 percent and shut down aircraft. Inspection revealed HMU failure.

A series - While two aircraft were taxiing to parking at civilian airport, first aircraft stopped and reduced to idle. As crew of second aircraft was trying to lock tail wheel, they taxied too close to first aircraft and rotor blades made contact. Pilot of second aircraft backed aircraft up about 20 feet after contact. Crews shut down both aircraft without further damage. Inspection revealed damage to two main rotor blades on one aircraft and damage to one main rotor blade on other aircraft.

Cargo

CH-47 Class B

D series - During routine IFR training flight at 6,000 feet AGL, lightning struck main rotor heads and blades. 9332

CH-47 Class C

D series - While being vectored for ground control approach, aircraft entered area of precipitation that contained hail. Crew requested vectors to clear severe weather. Aircraft was again vectored into precipitation that contained hail. Crew initiated turn out of precipitation and after obtaining VFR flight conditions, completed landing. Just as aircraft landed, hail storm struck airfield and engulfed aircraft. When storm passed, crew taxied to parking and completed normal shutdown. Postflight inspection revealed moderate hail damage to aircraft.

D series - During IFR flight on radar vectors for descent to final approach at Army airfield, IP turned advanced flight control system (AFCS) off just before entering IMC. Aircraft entered IMC, pitched up, and yawed right. Pilot's attitude indicator was discolored, causing IP increased reaction time to regain control. Wind caused by out-of-trim condition tore ramp upper cargo door away at its mounting points before IP could regain control of aircraft. Flight engineer was thrown under internally-loaded vehicle, injuring his leg, and passenger was struck on head by loose oil can. IP regained control after encountering VMC and completed precautionary landing without further incident.

Observation

OH-6 Class C

H series - Crew attempted to start aircraft with main rotor blade tied down.

OH-58 Class B

D series - At 30- to 35-foot AGL hover while firing Hellfire missiles, aircraft experienced compressor stall. Crew reduced collective, and aircraft began to yaw left. Aircraft continued to yaw left about 360°, and crew entered autorotation from about 20 feet AGL. Aircraft landed hard on uneven terrain and rolled over on its side. 9333

OH-58 Class C

A series - After landing to field site, pilot repositioned aircraft to park tactically. During shutdown, observer on ground advised pilot that main rotor might have struck tree limb. Postflight inspection confirmed tree strike.

A series - Pilot initiated engine start sequence by pressing starter switch, and TOT rose above 800°C and began stabilizing. As secondary fuel engaged, TOT began rapid rise. Pilot closed throttle at about 900°C and held starter down. TOT rose to 1,000°C. Pilot held starter until TOT was below 400°C and completed shutdown without further incident.

A series - PC and pilot confirmed outside air temperature at 0° before start, which required minimum of 13 percent N1 before opening throttle to flight idle position. PC and pilot discussed minimum criteria for temperature and reviewed start procedures. Pilot started clock and depressed starter. PC remarked that start might be hot because fuel boost light started flashing—sometimes an indication of a low battery. When minimum 13 percent N1 stabilized and was confirmed by PC, pilot opened throttle to flight idle. Turbine outlet temperature (TOT) increased rapidly. As TOT approached 900°, PC advised pilot to shut down engine. PC saw TOT reach 1,000° for about 2.5 seconds before pilot could get throttle detent depressed and retard throttle to full off position. Starter continued to engage until TOT was below 200°.

A series - While in cruise flight about 1 mile from destination airport, engine failed due to fuel exhaustion. Pilot executed autorotation to center di-

vider of four-lane highway. Rotor decayed below 225 RPM, causing damage to tail boom and transmission.

A series - During NOE flight while on tactical training mission, aircraft crossed ridge and PC initiated descent to follow terrain. When PC applied power to arrest descent, aircraft did not respond rapidly enough and main and tail rotor struck tree. PC continued flight for another 100 meters and landed aircraft in open field.

C series - Aircraft lost power and descended into trees. Crewmembers proceeded on foot until they were located by rescue personnel. Minor injuries.

C series - PC was flying into wind when wind suddenly shifted to left side of aircraft, causing sudden right yaw. PC applied left pedal but yaw continued. Simultaneously, PC applied more power and left pedal and increased airspeed. Aerial observer saw torque reach 116 to 118 percent and informed pilot. Pilot looked inside, verified overtorque, and performed precautionary landing without further incident.

D series - During OGE hover checks at 65 feet AGL, aircraft developed tail rotor and airframe vibrations. Crew landed aircraft and completed shutdown. Inspection revealed that counterweight support of white tail rotor blade had failed, subsequently striking red tail rotor blade and then red main rotor blade.

Fixed wing

C-12 Class C

F series - Aircraft was on routine mission at 29,000 feet and 180 knots. No unusual weather activity showed on aircraft radar. Aircraft was in light rain when both sides of airframe were struck by lightning. As pilot made immediate descent to return to home station, aircraft was again struck by lightning. Crew completed landing without further incident or damage.

Messages

■ Safety-of-flight technical message concerning one-time visual inspection of T700-GE-701C engine fuel hose assembly on all AH-64A, MH-60K, and UH-60L aircraft equipped with -701C engines (AH-64-93-03/UH-60-93-01, 082100Z Apr 93).

■ Safety-of-flight technical message concerning one-time visual inspection of T700-GE-701C engine fuel hose assembly for additional serial numbers on all AH-64A, MK-60K, and UH-60L aircraft equipped with -701C engines (AH-64-93-04/UH-60-93-02, 161842Z Apr 93).

■ Safety-of-flight technical message concerning one-time inspection of cyclic control tube for possible interference with lower electrical clamp in the center post area of all OH-58A/C aircraft (OH-58-93-01, 251530Z Mar 93).

■ Aviation safety action maintenance mandatory message concerning all aircraft equipped with sked litter systems (GEN-93-ASAM-07, 101523Z May 93).

■ Aviation safety action informational message concerning status of the new DA Pam 738-751: Functional Users Manual for the Army Maintenance Management System—Aviation (TAMMS-A) (GEN-93-ASAM-08, 201620Z May 93).

■ Aviation safety action informational message concerning secure voice FM KY-58 radio mount on all UH-1 series aircraft (UH-1-93-ASAM-02, 192008Z Apr 93).

■ Aviation safety action maintenance mandatory message concerning one-time inspection to determine compliance with system modification work orders (MWOs) on all H-60 series aircraft (UH-60-93-ASAM-09, 251715Z Mar 93).

■ Aviation safety action maintenance mandatory message concerning one-time inspection and recurring inspection/cleaning of the external stores support system (ESSS) valves and pneumatic lines on all UH-60A, EH-60A, and UH-60L aircraft (UH-60-93-ASAM-10, 012000Z Apr 93).

■ Aviation safety action maintenance mandatory message concerning inspection and replacement of ARA crew restraint, buckle/crotch assemblies on all H-60 Black Hawk helicopters (UH-60-93-ASAM-11, 081915Z Mar 93).

■ Aviation safety action operational message concerning abrupt change in main rotor track/vibrations on all H-60 (EH/UH/MH) series aircraft (UH-60-93-ASAM-12, 271725Z Apr 93).

■ Aviation safety action maintenance mandatory message concerning one-time inspection of the hose assembly, P/N 209-060-668-236-12, on all AH-1E and AH-1F aircraft modified by MWO 55-1520-236-50-12 (AH-1-93-ASAM-02, 201950Z May 93).

■ Aviation safety action informational message concerning maintenance information for T55-L-712 engines on all CH-47 and MH-47 series aircraft (CH-47-93-ASAM-04, 201730Z Apr 93).

■ Aviation safety action operational message concerning advance notification regarding the operation of the electric flight instrumentation system (EFIS) and other operational issues on all RC-12N aircraft (C-12-93-ASAM-01, 181320Z May 93).

■ Aviation safety action maintenance mandatory message concerning one-time and recurring inspection of the emergency manual canopy jettison system on all OV-1D/RV-1D aircraft (OV-1-93-ASAM-01, 281529Z Apr 93).

For more information on selected accident briefs, call DSN 558-3262, commercial 205-255-3262.

U.S. ARMY SAFETY CENTER

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Take care of your own aircrew and aircraft first!

■ While conducting support missions during a training exercise, a UH-1 aircrew witnessed the crash of a CH-47D and decided to land to render assistance. The aircrew located an area close to the crash site, but they did not perform a low recon of the confined area. While attempting to land, the aircraft's main rotor blades struck a tree. The crew was unaware of the tree strike but realized the confined area was too small and repositioned to another area. Postflight inspection revealed aircraft damage cost of almost $34,000.

■ During an NVG refresher training flight, air traffic control (ATC) flight following requested a UH-60 crew recon coordinates for a possible downed aircraft. The recon revealed nothing. But during hot refueling at home station, ATC requested the crew recon another set of coordinates. As the aircraft neared the coordinates, the crew heard an emergency locator transmitter beacon over the radio and saw what appeared to be emergency vehicles. Without establishing visual contact with known wire obstacles in the area, the PC decided to make an approach to the site to determine if this was the downed aircraft. Shortly after the PC initiated a descent, the aircraft struck a guy wire from a power line support tower. Although the crew sustained only minor injuries, the aircraft damage cost exceeded $430,800.

Understandably, both of these crews wanted to provide assistance to the crews of the downed aircraft and emergency personnel. Unfortunately, they let their sense of urgency cause them to expose their own aircraft and everyone on board to unnecessary hazards. The lesson to be learned from these two accidents is that you can't do the downed crew a bit of good if you become part of the accident data yourself.

Following established procedures in all situations is your best protection against becoming a statistic too. Even a strong desire to help in emergency situations does not warrant taking unnecessary chances. Kick in your risk management skills. Identify and assess the hazards before deciding to proceed. Slow the pace down for a moment, and take sufficient time to ensure the safety of your crew and aircraft first! ■

—SFC John Mark Morthole, Aviation Branch, DSN 558-3262, commercial 205-255-3262

"The Next Accident Assessment"

If you knew who in your unit was going to cause the next accident, you could implement control measures to prevent that person from hurting himself or another soldier or damaging costly equipment. Unfortunately, there aren't any crystal balls for looking into the future, but there is a device to help you determine who's going to have the next accident in your unit.

It isn't a guarantee against all accidents; but it's a reliable instrument developed by the Army Safety Center that will help predict accident probability. "The Next Accident Assessment" can help commanders, leaders, and individuals identify risk-generating factors. Every aviator, every crew chief, every maintainer has these risk-generating factors. Some have more than others. And those with the most are the ones who are most susceptible to human-error accidents.

"The Next Accident Assessment" is a short test that is based on the top five causes of human-error accidents in both ground and aviation over the last 10 years: self-discipline, leadership, training, standards, and support. Actually, there are two parts to the test: a commanders/leaders assessment of personnel they rate and an assessment for individuals to complete on themselves.

The assessments appear on the last two pages of this issue. Tear them out, reproduce them, and keep a copy for future use.

These assessments evaluate the risk of an individual or unit causing the next accident. They're not cure-alls. But using the information obtained from the assessments, necessary measures to help prevent accidents and ensure safer operations can be developed. ■

Accident Risk Assessment of Personnel Rated by Commanders/Leaders

KEEP FOR YOUR RECORDS

Risk Factors (From Next-Accident Test)	Points	Names of Rated Personnel					
1. Self-discipline (dependability)—soldiers know and are trained to std, but don't follow std. a. Counseled for poor performance (3 times last 12 mos, or more than 4 times last 24 mos).	8						
b. Had at-fault accidents/citations (2-4 last 12 mos or 5 or more last 24 mos).	8						
c. Abused alcohol/drugs (last 12 mos) or referred to community mental health (last 24 mos).	8						
d. Had judicial/nonjudicial punishment (last 24 mos).	8						
e. GT score 90 or less (enlisted only).	8						
f. Male under age 25.	8						
2. Leadership (enforcement of std)—leaders not ready, willing, or able to supervise and enforce performance to std. a. Insufficient knowledge/experience (each subordinate leader who fits this example).	6						
b. Tolerates below-standard performance (each subordinate leader who fits this example).	12						
3. Training (job skills and knowledge)—soldiers lack training to perform tasks to std. a. MOS SDT (SQT) score less than 70.	9						
b. Not proficient in assigned tasks outside MOS (has not received OJT, school, unit, or task training).	9						
4. Standards—soldiers performing task for which task-condition-standard or procedures— a. Do not exist (example: two vehicles operating in opposite directions on test track run into each other because there is no std on track direction).	4						
b. Are not clear/practical (example: TM shows soldier changing 195-pound tire by himself).	4						
5. Support—soldiers not receiving support needed to perform task to std. a. Personnel (not full crew, wrong MOS, not trained to std).	2						
b. Equipment (TA-50, weapons, transportation, safety).	2						
c. Supplies (ammo, fuel, food, water, parts, clothing, publications).	2						
d. Services/facilities (maintenance, medical, personal svcs, storage).	2						
Points: 0-20 / 21-30 / 31+ **Risk: Low (L) / Medium (M) / High (H)**	**Each Person's**	**Points**					
		Risk					

Individual Accident Risk Assessment

KEEP FOR YOUR RECORDS

Risk Factors (From Next-Accident Test)	Points	Names of Rated Personnel					
1. Self-discipline (dependability)—you know and are trained to std, but don't follow std. a. Counseled for poor performance (3 times last 12 mos, or more than 4 times last 24 mos).	8						
b. Had at-fault accidents/citations (2-4 last 12 mos or 5 or more last 24 mos).	8						
c. Abused alcohol/drugs (last 12 mos) or referred to community mental health (last 24 mos).	8						
d. Had judicial/nonjudicial punishment (last 24 mos).	8						
e. GT score 90 or less (enlisted only).	8						
f. Male under age 25.	8						
2. Leadership (enforcement of std)—your immediate supervisor is not ready, willing, or able to supervise and enforce performance to std. a. Supervisor does not have sufficient knowledge/experience.	6						
b. Supervisor tolerates below-standard performance.	12						
3. Training (job skills and knowledge)—you have not received training to perform tasks to std. a. MOS SDT (SQT) score less than 70.	9						
b. Not proficient in assigned tasks outside MOS (have not received OJT, school, unit, or task training).	9						
4. Standards—you perform tasks for which task-condition-standard or procedures— a. Do not exist (example: two vehicles operating in opposite directions on test track run into each other because there is no std on track direction).	4						
b. Are not clear/practical (example: TM shows soldier changing 195-pound tire by himself).	4						
5. Support—you do not receive support needed to perform task to std. a. Personnel (not full crew, wrong MOS, not trained to std).	2						
b. Equipment (TA-50, weapons, transportation, safety).	2						
c. Supplies (ammo, fuel, food, water, parts, clothing, publications).	2						
d. Services/facilities (maintenance, medical, personal svcs, storage).	2						
Points: 0-20 / 21-30 / 31+ — Risk: Low (L) / Medium (M) / High (H)	**Each Person's Points**						
	Each Person's Risk						

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May 1993 Vol 21 No 8
REPORT OF ARMY AIRCRAFT ACCIDENTS

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It's a dismal picture—24 Class A flight accidents and 24 fatalities as of 30 April. We were riding high coming off the best year ever in aviation safety and barely into FY 93 when our safety shield cracked. We started losing soldiers and destroying aircraft in accidents that should have been prevented. To date, we haven't been able to reverse this alarming trend. Losing soldiers and aircraft needlessly is a tragedy felt across the Army and one we cannot afford.

A closer look at FY 93 accidents and rates

Since 1 October 1992, the Army has experienced 24 Class A flight accidents that have resulted in 24 fatalities (21 military, 1 Army civilian, 2 non-DoD civilians). In addition to the fatalities, crewmembers have sustained 16 nonfatal injuries and we've incurred more than $91 million in damage and injury costs in Class A accidents alone.

■ **Class A accidents.** The 24 Class A flight accidents resulted in a rate of 3.37 per 100,000 flight hours, compared to a rate of 1.91 (14 Class A accidents) for the same time period during FY 92. The FY 92 end-of-year Class A rate was 1.57, and the 3-year average (FYs 90, 91, and 92) was 2.32.

■ **Class A through C accidents.** The 71 FY 93 Class A through C flight accidents and rate of 9.91 has overtaken the 57 FY 92 accidents and rate of 7.79. Although the 71 FY 93 accidents is lower than the 3-year average of 73, the rate is higher than the 3-year average rate of 9.09. Additionally, the current Class A through C rate exceeds both the FY 92 end-of-year rate of 8.00 and the 3-year average end-of-year rate of 8.64.

■ **Fatalities.** The 24 fatalities experienced thus far in FY 93 is up considerably from the seven in FY 92 at this point. The increase in fatalities is due primarily to three accidents; eight fatalities in a C-12 accident, four in a UH-60 accident, and five in a UH-1 accident. The other four fatal accidents resulted in seven additional fatalities.

■ **Damage and injury costs.** The $95 million in damage and injury costs for Class A through C accidents is also higher for FY 93 than the $56 million incurred in FY 92 through 30 April. This is due in part to eight Class A accidents in three of our more expensive aircraft: five AH-64As, two UH-60As, and one CH-47D.

Class A flight accident analysis

Table 1 shows the 24 FY 93 Class A flight accidents by aircraft type. Class A rates for the following aircraft are based on accidents and flying hours through 30 April.

■ **OH-58A/C.** The FY 93 Class A accident rate for the OH-58A/C is 4.89, which is up from FY 92 and the 3-year average rates of 3.43 and 4.55 respectively. Analysis of the six OH-58 accidents revealed three crew coordination failures where crewmembers failed to adequately communicate during flight maneuvers, three failures to maintain or recover orientation, one detection failure that led to a dynamic rollover, and one materiel failure (suspected engine failure). Three of the five human-error accidents occurred with a single rated aviator on board the aircraft. Three accidents are still under investigation.

■ **OH-58D.** The FY 93 Class A accident rate for the OH-58D is 15.38, which is up from FY 92 and the 3-year average rates of 15.03 and 12.66 respectively. One accident was a result of human error (not on the part of the flight crew) and a materiel malfunction. The other accident is still under investigation.

■ **UH-1.** The FY 93 Class A accident rate is 1.99 compared to the FY 92 rate of 0.76 and the 3-year average rate of 1.47. Analysis of two UH-1

Table 1. Class A Flight Accidents (FY93 to Date)

A/C Type	Number of Accidents	Number of Military Fatalities	Number of Destroyed A/C	Human Error	Materiel Failure
OH-58 A-C	6	2	6	5	1
OH-58D	2		1	2	1
UH-1	5[1]	8[2]	6	3	2
UH-60	2	4	1	2	
AH-64	5		4	4	1
CH-47	1		1		1
H-6	2	1	2	2	1
C-12	1	6[3]	1	1	
TOTAL	24	21	22	19	7

As of 4 May 93
Notes:
[1]One accident involved two aircraft
[2]Excludes one non-DoD civilian
[3]Excludes one DAC and one non-DoD civilian

accidents revealed poor risk management and indiscipline led to seven fatalities. A materiel failure resulted in two fatalities. The last two accidents are still under investigation.

■ **UH-60.** The FY 93 Class A accident rate for this aircraft is 1.95 compared to 0.00 for FY 92 and 2.06 for the 3-year average. One UH-60 accident was a night, administrative mission that resulted in four fatalities. It is still under investigation (suspected materiel malfunction). Flight tests are in progress, trying to duplicate the accident sequence. This accident is the first UH-60 Class A accident since FY 91. The second UH-60 accident resulted when the crew failed to properly estimate distance while ground taxiing and hit a hangar.

■ **AH-64.** The FY 93 Class A accident rate is 8.96, which is more than double last year's rate of 4.09 and more than the 3-year average of 7.29. Analysis of the four human-error AH-64 accidents points to several key factors:

• High mission demand; for example, night, NOE, confined areas, and multi-ship operations.

• Channelized attention on aircraft systems, such as pilot night vision system or weapons systems.

• Inadequate crew coordination; for example, failure to provide aircraft systems status and maintain firing position.

There were three crew coordination failures, one scanning failure, one estimation error, and one failure to detect drift in a confined area.

In addition to the human errors, there was one materiel failure (engine failure). The crews of two AH-64 accident aircraft were current in accordance with regulations, but their individual and crew proficiency were suspect due to the low amount of flight time before the accidents.

■ **CH-47.** The FY 93 Class A accident rate in this aircraft is 3.04 compared to the FY 92 rate of 0.00 and the 3-year average rate of 3.31. The CH-47 accident involved a materiel failure that remarkably resulted in only one disabling injury. This was the first Class A accident in this aircraft since FY 91.

■ **AH/MH-6.** Due to the limited number of hours this airframe receives, the resulting Class A accident rate for this year is 14.11 compared to last year's rate of 0.00 and the 3-year average rate of 2.05. The MH-6 accident was single pilot, at night, and in marginal weather. Poor risk management contributed to the accident, which was the first H-6 Class A accident since FY 91. The AH-6 accident is still under investigation.

■ **C-12.** The FY 93 Class A accident rate for this aircraft is 2.45 compared to the FY 92 rate of 2.74 and the previous 3-year average rate of 0.87. This accident was an administrative mission that failed due to a lack of pre-mission planning and poor crew coordination during the mission. Eight fatalities resulted when this aircraft crashed into a mountain.

Accident causes

Remember, accidents may have more than one cause factor. In fact, 2 of the 24 accidents have more than one cause factor at present.

■ Human error was a definite or suspect cause factor in 19 of the FY 93 Class A accidents. However, this may change since 10 accidents are still under investigation.

• Although the data is somewhat preliminary for FY 93, a comparison to FY 92 shows crew coordination failures are the largest problem area in both years.

• The readiness shortcomings that caused or contributed to the latest seven accidents are still under investigation.

■ Materiel failure trends are up at this point in time, but a cause factor has not been determined at this time. There have been seven definite or suspected materiel failure Class A accidents so far this year compared to only three at this time last year and only five for all of FY 92.

Conclusions

Since 1975, with the exception of Desert Storm accidents, the number of Class A accidents in a single month has exceeded the eight experienced in April 1993 only three times (each with only nine) and is matched only three other times.

No evidence exists to suggest this unusually high number of Class A accidents is related to a single problem in Army aviation. However, a review of flight records for crewmembers involved in the FY 93 accidents indicates that the individuals and crews had not logged many flight hours before the accidents. Constrained resources and training programs as well as unit/personnel turbulence may be playing a much larger role in accidents than we realize.

The types of hazards that are being encountered today are not new; they're the same ones we've always faced. However, as flight time

and time on the controls decrease, the risk level increases and the probability of an accident increases. Currency requirements as defined in the ATMs do not necessarily ensure individual or crew **proficiency.**

Analysis does suggest the core aviation problem areas that are causing these accidents are the same problem areas experienced previously: poor crew coordination and failure to employ solid risk management skills. Analysis of the accident data also suggests that if thorough risk management principles had been applied, the probability is good that at least 12 of the human-error accidents could have been prevented (see table 2). From the data, we have also been able to identify the risk management step that most likely failed first and the number of accidents where crew coordination was a problem or an issue.

Recommendations

■ Implement risk management at all levels in the command, maintenance included.

■ Sustain a flying hour program that stabilizes aircraft and crew proficiency on individual and collective training tasks.

■ Use the crawl-walk-run philosophy in training.

■ Implement the Aviation Center's Crew Coordination Training Program upon receipt.

■ Enforce standards (make soldiers accountable for their actions).◆

POC: LTC Gregory M. Gainer, Chief, ORSA/Stats Branch, DSN 558-3530, commercial 205-255-3530

Table 2. Risk Management Failure Step Matrix

	Probability of Accident Prevention Through Risk Management			
Step	Good	Fair	Poor	Totals
1. ID Hazard	3		3	6
2. Assess Hazard	5		1	6
3. Make Decision & Develop Controls	3	1	1	5
4. Implement Controls	1			1
5. Supervise				
Totals	12	1	5	18
Crew coordination problems	6	2	3	11
Single-pilot operation	3			

Note: The cause of one accident (OH-58) is charged to human error but cannot be charged to any of the risk management steps.

Army Aircraft Safety Performance Review

The *Army Aircraft Safety Performance Review* was prepared to provide aviation commanders, safety officers, aircrews, and maintenance personnel an overview of UH-60, OH-58D, AH-64, and MH/CH-47D safety performance for fiscal years 1987-91. The report is in five sections. Section 1 describes overall Army aviation experience. Sections 2 through 5 provide overviews of the accident experience of each aircraft system along with synopses of selected Class A and B accidents. These synopses concentrate on the primary cause factor and do not necessarily reflect all factors contributing to the accident.

The review is now available and can be obtained by writing to Commander, U.S. Army Safety Center, ATTN: CSSC-IM, Fort Rucker, Alabama 36362 or by calling Ms. Sharrel Forehand, DSN 558-2062/4806, commercial 205-255-2062/4806.

U.S. ARMY SAFETY CENTER

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

OH-58 trends

A review of recent OH-58 preliminary reports of accidents shows an increase in hot starts. Comments on the reports indicate that pilots were aware of weak batteries yet continued the attempt to start the engines. The task error in each incident was human error and overconfidence in the ability of the pilot or instructor pilot to catch the overtemperature condition in time to avoid a hot start.

Chapter 8 of TM 55-1520-228-10: Operator's Manual, Army Model OH-58A/C Helicopter prescribes free-air temperature and minimum N1 speeds to avoid possible hot starts. Further in paragraph 8-17f, the TM tells the crew to monitor turbine outlet temperature for overtemperature conditions.

The most likely causes of a hot start remain a weak battery or attempting to start the aircraft with the tail into the wind. One report indicated the crew attempted to start the aircraft with a weak battery and the tail into the wind.

Hot starts can easily be avoided. If the aircraft battery is weak, take the time to locate and use an auxiliary power unit. Doing so will avoid hot starts, conserve Army assets, and increase availability of aircraft, which in turn will also increase unit training time. Ultimately, these combined benefits will equate to safer daily operations.◆

POC: MW4 John Allmer, Systems Manager, Aviation Section, DSN 558-3262, commercial 205-255-3262

Warning label not authorized on aviation flight helmets

Several years ago, the Army Safety Center developed a safety packet for motorcycles that contained the warning label shown in figure 1. This warning label was designed for use on motorcycle helmets.

We receive numerous calls about this label: some callers want to know how they can obtain the warning labels, and others want to know what the authority is for placing this warning label on aviation flight helmets.

The Safety Center never intended this warning label to be placed on aviation flight helmets. The warning may be valid for aviation helmets too; however, the Safety Center cannot authorize placement of this warning label on aviation flight helmets.

Safety officers and aviation life support equipment personnel need to ensure that flight helmets are being maintained in accordance with TM 10-84-206-12 & P. They should also ensure that this warning label and all other unauthorized items are removed from aviation flight helmets within their units.◆

POC: CW4 Daniel O. Baxter, Aviation Section, DSN 558-3262, commercial 205-255-3262

Figure 1. Motorcycle helmet label; not authorized for use on flight helmets

New rigging procedures now available

Certified rigging procedures are now available for—

- M1037 shelter carrier with AN/TPQ-36 firefinder antenna radar on an M103A1 trailer.
- Mobile Over Snow Transport (MOST) and sled in a 10,000-pound cargo net. *This is a suitable load.*

If units need copies of certified rigging procedures for any of these pieces of equipment, they may contact the U.S. Army Transportation School, Helicopter Transport Section, ATTN: ATSP-TIP-M (Mr. Ted Rodriguez), Fort Eustis, VA 23604-5408.◆

POC: Mr. Ted Rodriguez, DSN 927-6570, commercial 804-878-6570, FAX 927-6980 or commercial FAX 804-878-6980

Where is your NVG neck cord?

A group of small bones that are stacked one upon the other and held together by ligaments and muscles form the structure of the spinal column. When an aircraft strikes the ground during a hard landing, the sudden stop of the upper body causes shear and bending forces that can tear the ligaments and separate the neck bones. The extent of the injury depends on the head deceleration and the mass supported by the neck. In most cases, the neck-supported mass includes the head and flight helmet. The allowable weight and center-of-mass for current flight helmets are limited by the strength of the neck.

NVGs and the breakaway mount

Night vision goggles (NVGs) and other masses added to the helmet create a new problem. In a crash, the neck is exposed to the additional mass of the helmet-mounted NVGs and the likelihood of neck injuries increases. To protect the neck, a breakaway feature has been designed into the helmet mount for the NVGs. When there is a rapid acceleration of the NVGs or helmet, the goggles fall away from the mount and the neck is freed from this mass.

Often when the goggles bump against an aircraft doorframe or other structure, the NVGs will fall from the mount. To protect the expensive goggles and to ease refitting the NVGs to the helmet, a neck cord is attached.

A recent accident

During an NVG mission, an OH-58 struck rising terrain. The forward speed caused shearing of the skids and crushing of the nose and floor of the aircraft.

The crewmembers' helmets (figure 1) were evaluated at the U.S. Army Aeromedical Research Laboratory (USAARL). The pilot's helmet sustained several severe impacts. Progressive destruction of the shell and liner protected the pilot's head from deceleration injuries, but the pilot died of a neck injury caused by sudden deceleration.

Severe neck injuries can be caused by striking structures within the aircraft or sudden deceleration of the head. In this case, the pilot had tied his NVG neck cord to the top of his helmet. When the aircraft struck the rising terrain, the goggles were "attached" to the pilot's head and his neck was exposed to the deceleration force of the head, helmet, and NVGs. While it isn't clear that this caused the neck injury in this particular case, securing the NVGs to the helmet does increase the risk of a neck injury, even in a minor mishap.

Figure 1. Accident SPH-4 flight helmet with NVG neck cord *improperly* attached

Correct placement of the safety cord

The weight of the NVGs must not be attached to the head when the goggles break free from the mount. Let the NVG neck cord hang around the base of your neck. Do not tie the goggles to the helmet or attach the neck cord to any place on the helmet because this will defeat the purpose of the breakaway mount.

Please check your helmet and your buddy's helmet. Then pass this tip along to others; it could prevent a serious neck injury.◆

POCs: MAJ James E. Bruckart, Mr. Joseph R. Licina, or Mr. Joseph L. Haley, Jr., USAARL Injury Tolerance and Protection Division, DSN 558-6897, commercial 205-558-6897

More information on night vision goggles

■ **Message diskette.** Don't wait until you're scheduled for an NVG inspection to request the latest NVG message disk. We recommend that you update your NVG message disk quarterly. Get the latest diskette now by sending a 5.25- or 3.5-inch disk to Commander, Aviation Training Brigade, ATTN: ATZQ-ATB-NS, Fort Rucker, AL 36362-5218. NVG messages are available in either WordPerfect or ASCII format. Please specify the desired format. If you have questions, contact the Night Vision Device Branch, Aviation Training Brigade, Fort Rucker, AL, at DSN 558-5812/5858/3720, commercial 205-255-5812/5858/3720.

■ **Exportable Training Package (ETP).** Before you request an NVG ETP, check with your battalion and brigade. They may already have a copy of the ETP. If not, the brigade may submit a written request to Commander, U.S. Army Aviation Center, ATTN: ATZQ-TDI-D, Fort Rucker, AL 36362-5035. Requests may also be faxed to DSN 558-4328, commercial 205-255-4328. Point of contact is Mr. Danny Flowers, DSN 558-3011/6012, commercial 205-255-3011/6012.◆

Radar altimeter lighting

Aviation safety action maintenance mandatory message (GEN-93-ASAM-02) 211830Z Dec 92 requires that 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. If you're having problems meeting these requirements for the radar altimeters installed in your unit's aircraft, don't lose hope. The Communications-Electronics Command (CECOM) has come to your rescue.

TYPE	STATUS	NSN	NOTE
RT-1115A	red-lit	5841-01-096-8673	1
RT-1115B	red-lit	5841-01-140-0941	1
RT-1115C	ANVIS	5481-01-245-9090	
RT-1115D	ANVIS	5841-01-245-9091	
ID-1917	red-lit	5841-01-058-7994	2
ID-1917A	red-lit	5841-01-137-8445	2
ID-1917B	ANVIS	5841-01-245-9092	
ID-1917C	ANVIS	5841-01-245-9093	
RT1411	ANVIS	5841-01-140-1700	3
RT1411A	ANVIS	5841-01-245-9094	3

Note 1: Can be upgraded at repair facility to RT-1115C.
Note 2: Can be upgraded at repair facility to ID-1917B.
Note 3: ANVIS lighting provided by databus display.

The CECOM item manager for the APN-209 radar altimeter has released an updated list of receiver/transmitters (RTs) and instrument/displays (IDs) that provides the national stock numbers (NSNs) for red-lit and Aviator Night Vision Imaging System (ANVIS) compatible components.

Users should be aware that all the RTs and IDs are interchangeable within each type (for example, RT 1115A and RT 1115C) regardless of lighting. If the radar altimeters presently installed in the aircraft in your unit are red-lit, use the ANVIS NSN when reordering.

CECOM reports that RTs and IDs are currently in short supply. So be sure to turn in old RTs and IDs to supply for credit. Don't forget that old RTs and IDs can be upgraded to ANVIS-compatible components at the Tobyhanna Depot facility.

Points of contact are:

■ CECOM, Mr. Robert P. Gearty, DSN 992-4791, commercial 908-532-4791.

■ Army Safety Center, MW4(P) Robert A. Brooks, DSN 558-3262, commercial 205-255-3262.◆

—SFC(P) Robert E. Price, Aviation Section

Safe thunderstorms? Not a chance

Viewing any thunderstorm as safe is a fallacy—one that could lead to disastrous consequences. There are no safe thunderstorms.

The latest meteorological information shows that *all* thunderstorms still represent a significant hazard to pilots. Surprised? You shouldn't be. It has been stressed repeatedly, no thunderstorm is safe and *all* thunderstorms represent a serious threat to pilots.

More than 44,000 thunderstorms occur throughout the world each day, and each one contains more energy than was released by both nuclear bombs dropped on Hiroshima and Nagasaki, Japan, combined. With this type of potential energy, clearly *no thunderstorm is safe.*

Thunderstorm life cycle

A thunderstorm requires three things to develop: unstable air, lifting action, and moisture. When these elements come together in the correct order, cumulus clouds develop, which is the first stage of the three-stage life cycle of a thunderstorm.

■ **First stage.** All cumulus clouds are supported by updrafts but not all will develop into thunderstorms. If a cumulus cloud is able to continue its vertical development, it is reclassified as cumulus congestus or "towering cumulus." These clouds can have vertical updrafts of 3,000 feet per minute, and the updrafts can extend several thousand feet above the visible cloud top. This represents the true genesis of a thunderstorm. Once the cloud has reached this stage, the release of heat from water droplets in the updrafts provides the energy to sustain the growth of the thunderstorm.

■ **Mature stage.** Because of the strong updrafts, there is little or no falling precipitation in the cumulus stage. The beginning of rain or hail marks the transition into the mature stage of the thunderstorm because significant downdrafts now exist in the thunderstorm. These downdrafts can average 2,500 feet per minute while the updrafts have strengthened to 6,000 feet per minute.

The mature thunderstorm contains the most energy and is the most dangerous. The coexistence of updrafts and downdrafts can create extreme shear and turbulence that can shred an aircraft to pieces. The opposing drafts can also create hail if a water droplet is repeatedly tossed above and below the freezing level.

When the downdraft reaches the earth's surface, it spreads out laterally and creates a gust front—strong winds that could completely reverse the previous wind direction. This is an extremely dangerous situation for aircraft during takeoffs and landings. Also, during the mature thunderstorm stage, lightning is most frequent, rainfall most intense, and the cloud tops will have reached their peaks.

■ **Dissipating stage.** The thunderstorm passes into the final dissipating stage of the life cycle when downdrafts become more dominant than updrafts. Updrafts provide the energy to sustain the thunderstorm and when they cease, the thunderstorm falls apart. The anvil top is usually associated with this stage; however, it's important to remember that an anvil top may be present in the latter half of the mature thunderstorm stage. Therefore, severe weather may still be present even when the anvil top is visible.

The lifespan of a single-cell thunderstorm, from cumulus to dissipation, is 30 minutes. But most thunderstorms occur in groups. And these multicell groups contain thunderstorms in different stages of development. Hence, the gust front from one cell may help strengthen the development of another cell. This is most common when some other system, such as a cold front or squall line, is helping sustain the thunderstorm, and this situation often leads to a severe thunderstorm.

Thunderstorm weather hazards

■ **Turbulence.** The strongest turbulence occurs within the cloud because of the strong updrafts and downdrafts. However, severe turbulence can be encountered several thousand feet above the cloud and 20 miles laterally from a storm. It can also exist up to 30 miles downwind in the anvil top.

Closer to the surface, the gust front can affect areas up to 15 miles away, changing the horizontal wind direction an average of 40 percent. Wind speeds can be affected by as much as 50 percent up to 1,500 feet AGL.

Also, there can be secondary and tertiary gust fronts from a storm. Roll clouds, which always indicate areas of strong turbulence, may

accompany these gust fronts.

■ **Hail.** As a general rule, the larger the thunderstorm, the more likely it will have hail associated with it. Hail can be encountered at 45,000 feet and can be carried as far as 10 miles from the thunderstorm.

■ **Icing.** Icing generally occurs where the temperature is between 0° and -20°C, with the most severe icing occurring between 0° and -10°C. The heaviest rainfall and strongest turbulence usually occurs at freezing-level altitude.

■ **Lightning.** Lightning occurs at all levels of a thunderstorm and is a frequently reported weather-related incident. Most lightning strikes occur when aircraft are operating in one or more of the following conditions:

- Within 8°C of the freezing level
- Within about 5,000 feet of the freezing level
- In clouds
- In some turbulence

Aircraft are rarely struck by lightning when operating below 1,000 feet AGL. Most lightning is cloud to cloud, and only a small percentage of lightning bolts actually hit the ground. However, it is quite possible to be struck by lightning several miles from a thunderstorm.

■ **Tornadoes.** Tornadoes are one of the most feared aspects of severe thunderstorms. They are funnel-shaped vortices of wind several hundred yards wide and have been observed extending out to 20 miles from the main body of the thunderstorm. Wind speeds can reach up to 300 miles per hour, but they move at only an average of 40 miles per hour. Tornadoes usually form on the southern or southwestern flank of the thunderstorm and can last from a few minutes up to 6 hours.

Not all tornadoes can be spotted. When the wind vortice has no associated funnel cloud, tornadoes may be hidden among cumulus clouds or be completely invisible. Even airborne radar cannot spot a spinning column of air. The only way to spot these "invisible tornadoes" is by looking for swirls of dust on the ground or swirls in the clouds.

Altimeter effects

As a thunderstorm approaches, pressure usually falls rapidly, rises sharply with the gust front and rainshowers, and then returns to normal as the storm passes. This is a relatively minor concern compared to other thunderstorm hazards, but it can result in significant altitude errors.

Flight procedures

Operators manuals for most aircraft contain a section outlining speeds, configurations, and techniques for flying through lightning and thunderstorm areas. In addition to the specific procedures outlined in the aircraft operators manual, the following are some general guidelines to use if you must fly through a thunderstorm:

■ Before entering the thunderstorm, use your airborne radar and also call the nearest pilot-to-metro-service (PMSV). The weather station can often provide information the airborne radar cannot.

■ Ready your aircraft for the thunderstorm. Turn instrument and cockpit lights full bright. Turn pitot heat on. Tighten and lock safety belts and shoulder harnesses. Set proper power settings.

■ Maintain a constant attitude. Do not chase the altitude. This increases stress on the aircraft.

■ Do not fly under the cirrus anvil. This area has the greatest chance of severe hail.

■ Do not fly near the freezing level. Try to avoid it by at least 8°C.

■ Avoid unnecessary maneuvering. Do not turn around. This will increase your time in the storm.

■ Once clear of the storm, give a pilot report over the PMSV. Thunderstorms can change quickly, so timeliness is important.

While the specific procedures outlined in the aircraft operations manual and these general guidelines are the best procedures to use when thunderstorm penetration is inevitable, they are not an endorsement to fly through any thunderstorm. No one should ever intentionally attempt to fly through, under, or over a thunderstorm. The best rule is *avoid all thunderstorms*.

Thunderstorms are extremely powerful storms that contain many serious hazards to safe flight. *There are no safe thunderstorms*. Flight into a thunderstorm can make severe demands of even the most experienced aviator. Summer flying and the turbulence often associated with it require that you remain constantly alert.◆

POC: 1Lt Ryan W. Myers USAF, Assistant Staff Weather Officer, Detachment 9, 1st Weather Group (ACC), Fort Rucker, AL, DSN 558-2804/3902, commercial 205-255-2804/3902. **(Portions of this article were adapted from Air Force Manual 51-12: Weather for Aircrews.)**

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class A

H series - While returning from maintenance test flight, pilot noticed engine torque had dropped to zero. Engine chip light came on, and pilot reduced power to initiate precautionary landing. Detecting smoke, pilot increased rate of descent to land as soon as possible. Pilot completed landing on vacated concrete pad, saw that aircraft was on fire, completed emergency shutdown procedures, and egressed aircraft. Aircraft sustained extensive fire damage in engine area and heat damage forward to main generators and aft to tail boom attaching points. No injuries. 9321

UH-1 Class B

H series - At about 75 feet AGL while on approach to LZ located on pinnacle (8,400 feet MSL), engine/rotor RPM began to bleed off. PC attempted to maneuver aircraft toward lower terrain to the right. Aircraft flew about 200 meters as engine/rotor RPM continued to decay and impacted 20-foot-high trees on 15-degree sloping terrain. Aircraft came to rest upright. One injury. 9322

UH-60 Class A

A series - After landing, crew was taxiing aircraft and executing right turn when tail struck corner of hangar. Aircraft rolled onto its left side. All four main rotor blades were separated. Tail boom was severed from fuselage and tail rotor was separated. No injuries. 9323

Attack

AH-64 Class A

A series - While at 100 feet AGL hover during APART training, IP initiated maneuver to place aircraft in unusual attitude. IP then transferred controls to pilot. Pilot initiated unusual attitude recovery procedures but was unsuccessful in regaining control of aircraft. IP saw pilot was having problems and took controls but was also unsuccessful in regaining control of aircraft. Aircraft began to spin, and IP assumed he had a tail rotor thrust problem. He tried to arrest spin with judicious application of collective but was unsuccessful. He then increased collective and activated chop collar. Aircraft impacted ground hard, bounced into air, flipped, and came to rest inverted. Crew saw fire in engine area, reported it to tower, and jettisoned canopy to egress from aircraft. No injuries. 9324

Observation

OH-6 Class A

J series - After making low-level run while firing minigun, pilot broke right. During turn, aircraft began to mush through and main rotor RPM began to droop. Main rotor blades contacted ground. Main rotor system, tail boom, skids, and rocket pods separated from aircraft as it tumbled before coming to rest. One minor injury. 9325

OH-58 Class A

A series - During night unaided approach to airfield with zero percent illumination, aircraft struck ground in near-level attitude about 1 mile short of intended landing point. Skids collapsed during impact, and wire strike prevention system dug into ground. Indications are that aircraft was left side low and main rotor contacted ground on left side of aircraft. Aircraft turned about 100 degrees left and came to rest upright. Main rotor separated during impact, and aircraft sustained major damage to fuselage, drive system, and tail boom. Minor injury. 9326

A series - Following refueling, crew flew aircraft for about 5 miles en route to NOE training area and was at 300 feet AGL when engine failed. Crew attempted autorotation to terraced field. Aircraft impacted ground hard, coming to rest on right side. Two injuries. 9327

For more information on selected accident briefs, call DSN 558-3262, commercial 205-255-3262

Class A Accidents through April

	Month	Class A Flight Accidents		Army Military Fatalities	
		FY92	FY93	FY92	FY93
1st Qtr	October	1	6	0	2
	November	3	2	4	6
	December	1	1	0	0
2d Qtr	January	3	1	0	0
	February	1	5	0	8
	March	4	1	2	5
3d Qtr	April	1	8	0	0
	May	1		1	
	June	2		2	
4th Qtr	July	2		1	
	August	1		0	
	September	2		0	
	Total	22	24	10	21

Changes to TC 1-216

Units should make the following pen and ink changes to TC 1-216: Aircrew Training Manual, Cargo Helicopter, CH-47:

■ **Page 2-6, Figure 2-5.** Change the caption to read: "Training tasks for NVG qualification/ refresher training."

■ **Page 3-1, paragraph 3-2b.** Add the following sentence: "Chapter 2, Figure 2-5, shows those tasks the crew member must perform during NVG refresher training."

■ **Page 4-2, paragraph 4-2b(2).** Change the first sentence of the paragraph to read: "NVG mission training for newly qualified NVG RCMs consists of a minimum of 10 hours of NVG flight training." Delete the second and third sentences: "On a case . . . proficiency. (Any reduction . . . Aviation Training Folder.)"

■ **Page 5-4, Figure 5-1, Task 1080.** Delete the "X" in column I.

■ **Page 6-34, Task 1006.** Delete; this page is a duplication of page 6-33. Change the table of contents to reflect the correct page numbers for subsequent tasks in chapter 6.

■ **Page 6-41, Task 1016, STANDARDS, paragraph 1d.** Delete the words "and record."

■ **Page 6-46, Task 1018, STANDARDS, paragraph 1b.** Change this sentence to read: "Initiate the takeoff from the ground or from an appropriate hover ± 3 feet."

■ **Page 6-76, Task 1076, CONDITIONS.** Delete "VMC."

■ **Page 6-78, Task 1077, CONDITIONS.** Delete "VMC."

■ **Page 6-80, Task 1078, CONDITIONS.** Delete "VMC or."

■ **Page 6-91, Task 1099, CONDITIONS.** Change to read: "In a CH-47 helicopter equipped with the Mark XII IFF System and given a mission briefing that includes signal operation instructions and a keyed system, in a CH-47FS, or orally in a classroom environment."

■ **Page 6-103, Task 2009, NIGHT OR NVG CONSIDERATIONS.** Change paragraph b(2)(a) to read: "**Above 80 feet AHO**. Straight-trail, free-cruise, staggered, and echelon formations." Change paragraph b(2)(b) to read: "**At 80 feet AHO and below**. Free-cruise formations in conjunction with techniques of movement." Delete paragraphs b(2)(c) and b(2)(d).

■ **Page 6-134, Task 2089, DESCRIPTION.** After paragraph 3e, add the following paragraphs:

"• f. **Lights.** The CE will assist the P* and P in checking and setting their searchlights and will notify the MP that the anticollision, position, and formation lights are operational.

"• g. **Fire pull handle and cross-feed fuel valve checks.** The CE will position himself to observe the fuel and cross-feed valves. When the MP pulls the fire pull handle or places the cross-feed valve switch to the open position, the CE will check the fuel valves and appropriate lights for proper operation. When the MP pushes in the fire pull handle or places the cross-feed valve switch to the closed position, the CE will check the valves and lights for proper operation.

"• h. **Flight control travel and hydraulics check.** The CE will check the hydraulic gauges on the maintenance panel and notify the MP when a pressure has dropped or returned to normal. During the control interlock check, the CE will tell the MP the pressures at which the flight control hydraulic systems change over."

■ **Page 7-1, introductory paragraph, line 3.** After the sentence ending with " . . . and evaluation," add the following: "Tasks in this chapter will be performed only when a qualified and current MP or ME is occupying a flight crew station."

■ **Page 7-2, Task 2900, STANDARDS.** Change paragraph 2 to read: "Correctly review appropriate information in TM 55-1520-240-PM and on DA Forms 2408-12, 2408-13, 2408-13-1, 2408-13-2, 2408-14, and 2408-18 for completeness."

■ **Page 9-8, Figure 9-5, item 16.** Circle the number "16."

■ **Page 9-8, Figure 9-5, item 33.** Delete the square around the number "33."

Units should insert page 6-37.1. And a copy of this STACOM should be retained and placed in the front of the manual for reference purposes.◆

STACOM 158 **May 1993**

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 offical policy. This information is provided to all commanders to enhance aviation operations and training support.

Edward H. Littlejohn
COL, Aviation
Director, DES

TASK 1014

TASK: Clear the aircraft and maintain airspace surveillance.

CONDITIONS: In a CH-47 helicopter.

STANDARDS: Immediately inform the P* of all air traffic or obstacles that pose a threat to the aircraft.

DESCRIPTION: Maintain close surveillance of the airspace surrounding the aircraft. (The CE will move about the aircraft as necessary to ensure total coverage.) Inform the P* immediately of air traffic or obstacles that pose a threat to the aircraft. Call out the location of traffic or obstacles by the clock-and-distance method. (The 12 o'clock position is at the nose of the aircraft.) Give distance in statute miles for air traffic and in feet for ground obstacles. When reporting air traffic, specify the type of aircraft if known.

WARNING

While moving about during flight, the CE must be secured to the aircraft.

NIGHT OR NVG CONSIDERATIONS: The PC will assign overlapping sectors of search to all crew members during the crew briefing. Crew members will use proper scanning techniques while conducting airspace surveillance. They will inform the PC when flight duties will divert their attention from assigned sectors of search.

REFERENCES:

FM 1-301
FM 1-402
FM 17-95
FM 20-150
FM 55-450-3
FM 55-450-4
FM 55-450-5
TC 1-201
TC 1-204
Unit SOP

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