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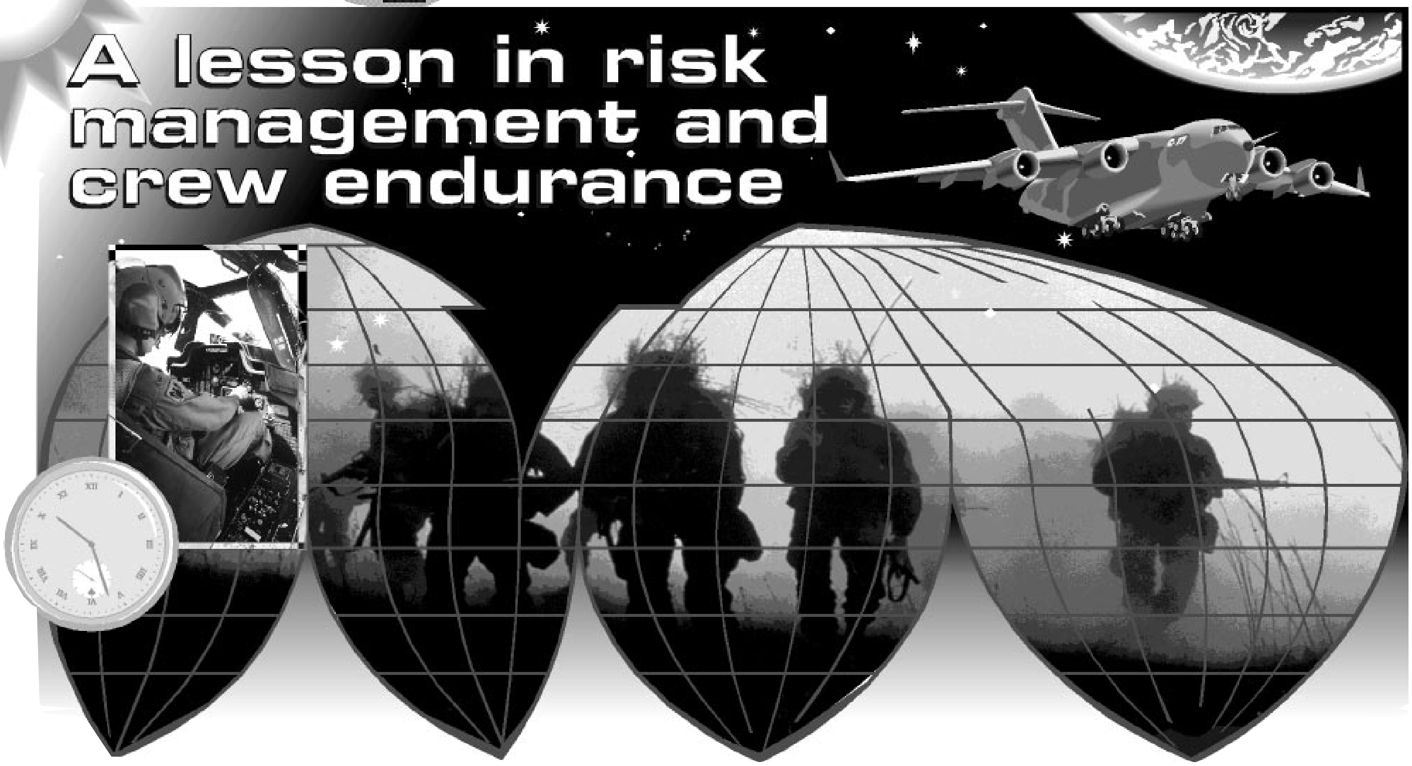
A lesson in risk management and crew endurance



Stress, fatigue, lack of sleep, and changing schedules have always been critical issues in Army aviation. But they have become even more critical in this new Army of ours where working environments and schedules can change with little notice or time to adjust as we deploy back and forth across time zones. We may be working in the desert one week and in an urban area the next, flying days this week and nights the next, doing not only traditional military missions but also new and different ones. In addition, the sophistication of today's aviation equipment requires more alertness and concentration by all of us, aviators and maintainers alike. These factors combine to make crew-endurance issues more important than ever before.

Last summer at Fort Rucker, the U.S. Army Aeromedical Research Laboratory and the Army Safety Center jointly produced the *Leader's Guide to Crew Endurance* to give leaders the latest information on recognizing when human performance can be expected to decline and how to control crew-endurance-related hazards.

Here's an overview of the section on work schedules and the body clock.

The biological clock

Our biological clock regulates the availability of our mental and physical resources, which fluctuate during the 24-hour day. The best and worst times of day are determined mostly by light cues received by the body clock. Exposure to daylight after a normal night's sleep sets the body clock in a day-oriented pattern, which means that physical and mental energy peaks between 0800 and 1200, decays slightly between 1300 and 1500, increases between 1500 and 2100, and finally declines from 2200 through 0600.

Inconsistency in daylight exposure times will result in unpredictable availability of alertness and energy. If wake-up times and daylight exposure vary continuously from day to day, the body clock receives inputs similar to frequent travel across time zones. Unstable sleep wake schedules, whether caused by changes in work schedules or travel across time zones, may disrupt body-clock timing and ultimately induce **circadian desynchronosis**.

Circadian desynchronosis causes classic symptoms of jet lag and shift lag, including fatigue, malaise, sleepiness, digestive disorders, confusion, and lack of motivation. These body-clock disruptions increase mission risk levels and can compromise safety if risks are not managed. Working the five-step risk-management process offers a simple way to control the risks.

> **"Circadian"**
>
> **(Latin: circa = about; dies = day) describes biological and behavioral rhythms regulated by the body clock.**

The risk-management process

Step 1: Identify the hazard

It's usually easy to predict shift lag or jet lag. Anytime the work schedule and sleep/wake cycle are shifted suddenly, soldiers will be at risk for circadian desynchronosis. Given sufficient notice, leaders and individuals can take measures to minimize the effects of this body-clock disruption.

Circadian desynchronosis can be detected by a variety of signs. However, most of these signs are also characteristic of simple fatigue, so it is important to consider the context of the situation and recent body-clock history of individuals involved. For example, the following may be present in soldiers suffering from circadian desynchronosis, with or without simple fatigue:

- Vacant stare.
- Glazed eyes.
- Pale skin.
- Body swaying upon standing.
- Walking into objects.
- Degraded personal hygiene.
- Loss of concentration during briefings.
- Slurred speech.

Step 2: Assess the hazard

Gauging the severity of circadian desynchronosis depends largely on the operational scenario. For example, a sudden change of eight time zones is obviously of more concern than a long-planned trip across three. Factors such as the severity of and soldier susceptibility to desynchronosis can assist in assessing the magnitude of the hazard.

Leaders should consider the following factors when planning changes in work schedules:

- Rotations from daytime to nighttime or early morning duty hours will result in some degree of sleep loss and fatigue the first day. Controls should be implemented from the beginning of the work-schedule change.
- Night shifts ending around sunrise will pose the greatest challenge to the body clock and are associated with more severe desynchronosis.
- Rotations from daytime duty hours to afternoon or evening work schedules do not require rapid adjustment of the body clock. These rotations can be considered benign compared to rotations into night or early-morning duty hours.
- Return to daytime duty hours after several days or weeks of nighttime or early morning duty hours produces significant desynchronosis and should not be underestimated. At least 3 days are required to rotate from nighttime to daytime duty hours.
- Eastward or westward travel across more than one time zone will result in some degree of jet lag. This may manifest as fatigue in the early night for westward travelers and reductions in total sleep duration for eastward travelers. Increasing the number of time zones crossed increases the severity of symptoms.

Jet lag, shift lag: What's the difference?

Although the symptoms of jet lag and shift lag are similar, their mechanisms differ. In jet lag, desynchronosis is induced by the change in sunrise and sunset times that results from crossing several time zones. In shift lag, desynchronosis is caused by changes in work and sleep schedules and the corresponding change in daylight exposure time.

Individual differences make some people more susceptible to jet lag or shift lag than others. It may be useful to consider the following tendencies in shift assignments and specific missions:

- People who prefer early-morning rise times (0400-0600) and early bedtimes (2000-2100) tend to adjust easily to early-morning duty hours. In contrast, those who prefer to retire at 2200 or later and rise after 0700 tend to adjust more easily to nighttime duty hours. Preferences are often masked by work schedules, so they are not easy to detect. It may be useful to determine preferred off-day bedtimes and rise times.
- Soldiers over 40 may experience sleep disturbances and gastrointestinal disorders more frequently than younger soldiers. Controls are required for all soldiers, although younger soldiers tend to benefit more quickly than the over-40 group.

Once circadian desynchronosis has developed, it is difficult to treat. To estimate the magnitude of a body-clock problem, consider the soldier's body-clock history, the severity of the signs and symptoms previously listed, and the following factors that may affect safety:

- **Impaired self-observation.** Desynchronosis is usually accompanied by severe sleep loss, with an attendant fatigue-related inability to adequately judge one's own behavior. Crewmembers may not be able to reliably determine if they are safe to fly and may not respond to subtle warning remarks made by peers.
- **Impaired communication.** Soldiers suffering from desynchronosis may have difficulty communicating critical mission, flight, or safety information. Conversation may become fragmented and contain repetitive phrases and ideas. In addition, weariness tends to result in misinterpretation of verbal communications.
- **Increased irritability.** Irritability and impatience are commonly experienced in association with desynchronosis. One positive aspect of increased arguing is that it shows soldiers are still talking to each other, exchanging orders and messages. Cessation of bickering may indicate mental exhaustion. This is particularly dangerous if a crew is flying between 0400 and 0700. During this period, crewmembers may experience sleepiness and degraded alertness, and cognitive function will be at its lowest. The combination of acute fatigue and desynchronosis can be lethal. When possible, avoid flying between 0400 and 0700 after working all night. Fatigue can be overcome more easily between 2400 and 0300.
- **Physical exertion.** The perception of exertion changes as a function of time of day. Desynchronosis can interfere with soldiers' ability to judge the physical difficulty of a task.

Step 3: Develop controls

The timing of sleep is critical to managing and preventing desynchronosis. Maintaining consistent schedules that ensure well-timed sleep is essential but can be difficult in the operational setting. Once shift lag or jet lag actually develops, returning to normal can take several weeks of a consistent sleep/wake schedule. Desynchronosis symptoms are unlikely to disappear in just a few days of normal sleep. The following controls can be helpful in preventing circadian desynchronosis:

■ **Napping.** In the context of body-clock adjustment, naps are recommended if soldiers rotate from day to night shift, if they cannot sleep more than 4 to 5 hours during the sleep period, and if the next night is going to be another work period.

■ **Pre-adaptation.** Before deployment, a unit can attempt to pre-adapt to the new work shift or destination time zone. While potentially useful, pre-adaptation requires much coordination and cooperation from all levels of the involved unit. In a pre-adaptation scenario, deploying elements typically begin shifting their sleep/wake cycle toward the new cycle several days before transition.

■ **Timed light exposure.** The timing of daylight exposure is critical for resynchronizing the body's biological clock. By carefully scheduling exposure to sunlight or proper artificial light, it is possible to speed adaptation to a new work schedule or time zone. However, incorrect timing of light exposure can actually worsen jet lag.

The following example illustrates the control-development step of the risk-management process:

A mission is received that will require UH-60 crews to fly nightly troop lifts to forward combat positions for approximately 2 weeks beginning that night. Mission durations vary, with some missions ending between 0100 and 0300 and others ending between 0500 and 0600. Crews will be assigned to missions randomly, so it is difficult to assure the same schedule from night to night. The tasking will require soldiers to work a full daytime duty day on the first day.

Here's what planners came up with to reduce the effects of shifting to the night schedule:

■ Soldiers working the night shift will be required to nap between 1800 and 1930 during the first 3 days of the transition. Naps will improve alertness during the night, but crews should, if possible, avoid flying the early morning hours (0300-0700) on the first day of the rotation. Leaders will need to be sure that meals are available at times that will not interfere with the napping schedule.

■ To orient the body clock to a nighttime work cycle, sleep should begin as close to 0400 as possible, even if flying is completed before that. Every effort should be made to begin sleep well before sunrise to avoid exposure to daylight. Daylight exposure should be delayed until 1200. Soldiers will wear dark sunglasses to reduce sunlight exposure when it cannot be avoided.

■ Exposure to bright light between 2000 and 0300 could improve adaptation to this schedule. Therefore, bright lights will be used in the tactical operations center, maintenance shops, and other areas where soldiers are required to work nighttime hours. (Note: This would not be recommended for flight crews or drivers because of night-vision impairment.)

■ Soldiers working the night shift will eat breakfast upon awakening. This means breakfast must be served in the early afternoon.

■ Soldiers working the night shift will be required to wear sleep masks during their sleep period to avoid inadvertent exposure to daylight.

■ All briefings, maintenance, and training will be scheduled to take place outside the designated sleep period.

■ The sleep period will be protected from noise by using power generators to mask sound. Commercially available sound-masking devices may also be used. Earplugs provide an alternative, and combining their use with sound-masking may be most effective.

Problems unique to nighttime aviators

Because of the necessity to protect their night vision, aviation crewmembers are not usually able to get the amount of light exposure that would help adjust their body clocks to a night-duty schedule. In addition, the quality and duration of their sleep are frequently degraded by lack of properly darkened sleeping quarters and lack of control over environmental noise.

There are, however, several effective countermeasures that nighttime aviation crewmembers can employ. A general night operations crew-rest plan might include the following:

■ Avoid working after 0400 to prevent the harmful effects of fatigue on performance and the pronounced tendency to fall asleep from 0400 to 0700.

■ Avoid exposure to daylight in the morning after flying a night mission. Exposure to sunlight before bedtime can severely retard adaptation to night shift and result in reduced sleep time and quality.

■ Schedule sleep to begin between 0400 and sunrise, and delay exposure to sunlight until noon. Engage in outdoor activities as much as possible in the afternoon. Reduce unavoidable early-morning exposure to sunlight by wearing dark sunglasses.

■ When possible, sleep in complete darkness and avoid even momentary exposure to sunlight during the sleep period. Sleep quarters should isolate night-shift personnel from the activity of day-shifters, reduce environmental noise, and reduce sunlight in all living areas, including restrooms, during sleep periods.

Steps 4-5: Implement controls & supervise

The commander and planners have now identified controls to mitigate the risk. The implementation measure best used in this example would be to insert the control measures into the operations order. Supervision in the form of spot checks would ensure that the controls are followed.

Summary

Soldiers—even aviators—are only human. Therefore, Army leaders must clearly understand how human-endurance limitations can degrade human performance, which, in turn, can jeopardize both the safety of their soldiers and unit readiness. It's also critical that leaders understand how they can use the five-step risk-management process to control the risks.

For more information on the subject of crew endurance, request a copy of *Leader's Guide to Crew Endurance* from Sharrel Forehand at the Army Safety Center, DSN 558-2062 (334-255-2062).

ShortFAX
Keeping you up to date

Aircrew-coordination training update

Field input indicates that aircrew-coordination training (ACT) has been progressing very well. All your suggestions for improvement were considered, and many of them have been implemented. Following are highlights of the most significant changes:

■ All active Army aircrewmembers will be qualified in aircrew coordination by 31 May 1997. ARNG/USAR aircrew-members have until 31 May 1998.

■ Effective 1 June 1997 (1 Jun 98 for ARNG/USAR), rated and nonrated aircrewmembers may not progress to RL1 status until they have completed Aircrew Coordination Qualification Training. Those who are already RL1 on 1 June 1997 but have not completed the training will be immediately redesignated RL2 until the training has been completed.

■ Simulator devices cannot be used to train nonrated aircrewmembers. They will attend and complete the same academic training as rated crew-members but must receive their training and evaluation in the actual aircraft.

■ The Aircrew Coordination Exportable Training Package has been revised as follows: Because the Student Guide closely parallels the Instructor Guide, it is recommended that the Instructor Guide be used by all students undergoing qualification training. However, if the Instructor Guide is used for qualification, chapter 11 and appendix E need to be extracted from the Student Guide.

■ Do not reprint the Trainer Guide.

■ The pretraining evaluation can be deleted from the course.

■ The introduction to ACT in chapter III of the Instructor Guide may be reduced from 4 hours to not less than 1 hour.

■ Instrument flight examiners in all units can be certified as ACT trainers. Once certified, the IE may conduct ACT in the category that IE duties are performed. The IE is restricted to the use of instrument scenarios or instrument flight when conducting the flight portion of ACT.

■ Effective with IERW Class 95-07, ACT has been included in initial entry training. All subsequent IERW classes should have the entry "ACT qualified" annotated on their DA 759.

■ There is no resident ACT course at Fort Rucker. All ACT is taught from the Exportable Training Package. The Train-the-Trainer team assembled at Fort Rucker has completed its task and no longer conducts training.

These changes have improved the ACT course without compromising the content. Direct responsibility for managing the program now rests with Directorate of Training, Doctrine, and Simulation at Fort Rucker. If you do not have a copy of the latest changes or have questions about ACT, please contact CW4 Smith or CW4 Johnson by phone, DSN 558-9660/9661/9658 (334-255-9660/9661/9658); fax, 334-255-9662; or e-mail, atzqatm@rucker-emh4.army.mil.

Keep the hazards out of staying warm

With the onset of winter, it's time to review what aviation crewmembers should be wearing to keep warm. By now, we all know about the hazards of wearing nylon-based fabric in outer garments, undergarments, or boots. However, the new issue cold-weather long undergarment for all soldiers is made of a nylon-based (polypropylene) material. Although great for general use, comfortable, and quite warm, this undergarment should not be worn while performing flight duties or in any high-fire-potential environment such as is common within the armor community. The old cotton/wool long under-garments that were issued for years are now out of the inventory. So what do we do?

The Air Force has a quilted under-garment that has fire-protection qualities. This two-piece garment can be obtained only through federal stock as a unit-issue item and is governed under CTA 50-900 by climatic region:

■ **CWU-43P Drawers, Flyer's, Anti-Exposure, Aramid**
NSN 8415-00-467-4075, Small
NSN 8415-00-467-4076, Medium
NSN 8415-00-467-4078, Large
NSN 8415-00-467-4100, Extra Large

■ **CWU-43P Undershirt, Flyer's, Anti-Exposure, Aramid**
NSN 8415-00-485-6547, Small
NSN 8415-00-485-6548, Medium
NSN 8415-00-485-6680, Large
NSN 8415-00-485-6881, Extra Large

Your unit may or may not be able to obtain these based on a myriad of requirements within the logistics system. Fort Rucker, for example, falls into a zone that is not authorized these items, but the need for cold-weather undergarments clearly exists during the winter months. Mrs. Edna Whitely of the Army Aviation Branch Military Clothing Sales Store has provided us two excellent options for aircrewmembers.

There is a two-layer set of long underwear with an inner layer of cotton and an outer layer of wool; it contains a minimal amount of nylon to allow for stretch while maintaining the form of the underwear. It is known as the Duofold 410LS for the long-sleeved top and 410LD for the long drawers. Both top and bottom come in small, medium, large, extra large, and extra-extra large. They can be ordered from any Army or Air Force Exchange and are in major retail stores across the U.S.

For those who would like a lighter-weight protective layer, a 100-percent cotton single-layer cold-weather top and bottom is available through the supply system:

■ **Drawers, Extreme Cold Weather, Cotton, Men, Women**
NSN 8415-01-051-1175, Extra Small
NSN 8415-00-782-3226, Small
NSN 8415-00-782-3227, Medium
NSN 8415-00-782-3228, Large
NSN 8415-00-782-3229, Extra Large

■ **Undershirt, Extreme Cold Weather, Cotton, Men, Women**
NSN 8415-00-270-2012, Small
NSN 8415-00-270-2013, Medium
NSN 8415-00-270-2014, Large
NSN 8415-00-270-2015, Extra Large

We are not singularly endorsing these items as the only cotton- and wool-based undergarments available. If you can find undergarments that provide the desired protection, do buy and use them. Your helmet, Nomex flight coveralls, flight gloves, leather boots, and Nomex jacket are all part of your issued winter ensemble; be sure to finish off your ensemble safely.

For more information, contact Mr. Joseph Licina or CW5 Joel Voisine, U.S. Army Aeromedical Research Laboratory, P.O. Box 620577, Fort Rucker, AL 36362-0577, DSN 558-6893/6895 (334-255-6893/6895). You may also phone the Fort Rucker Military Clothing Sales Store at DSN 558-2186/3313 (334-255-2186/3313).

Pull-out posters on pages 5-8

Accident briefs

Information based on *preliminary* reports of aircraft accidents

AH1

Class C
F series

■ While hovering to parking pad at night, aircraft No. 1 backed into aircraft No. 2, which was parked on pad directly behind it. Tail rotor, 90-degree gearbox assembly, and tail boom of aircraft No. 1 were damaged as was main rotor blade of aircraft No. 2.

Class E
F series

■ Aft fuel boost pump segment light came on during cruise flight. Boost pump was replaced.

■ Transmission chip-detector and master caution lights came on in cruise flight. Transmission was replaced.

■ During start sequence, fire guard noticed fuel leaking from start fuel purge solenoid to fuel line. Fuel line was replaced.

■ During approach at night, master caution and rectifier/alternator lights came on. Alternator was replaced.

AH64

Class B
A series

■ While applying full forward cyclic in cruise flight at 800 feet agl, crew heard loud pop and noted damage to PNVS and WSPS. After landing and shutdown, additional damage to three main rotor blades was discovered.

Class C
A series

■ Crew heard loud noise and fire light came on during taxi to parking. Crew activated fire extinguishers and performed emergency shutdown. Clutch bearing seized and caused fire.

Class D
A series

■ During maintenance test flight, pilot noticed that forward end of right side pylon P-3 panel had broken off. Maintenance determined that several worn dzus fasteners came loose in flight, causing pylon P-3 panel to break. Panel was replaced and aircraft released for flight.

Class E
A series

■ Upon starting, APU gave loud reports indicative of compressor stall. APU was shut down immediately and replaced.

■ Avionics bay cooling fan bearing failed in cruise flight, causing high-pitched whine.

■ Aircraft HARS/DASE system malfunctioned during cruise flight, causing uncommanded control inputs. Pilot released DASE system and landed at home station. Maintenance replaced the DASE, and MOC was completed okay.

■ During NOE flight, braided utility hydraulic line chaffed against fuel line clamp until it failed. Utility hydraulic system fluid was drained, line was replaced, and aircraft returned to service.

■ No. 1 engine spun up to 27-percent NG during start. After power lever was advanced, engine did not ignite. Exciter was replaced.

■ PNVS picture lost all contrast and became solid green during NVS flight. Contrast control was inoperative during attempt to adjust FLIR picture. Pilot's fire control panel and display adjust panel were replaced.

■ During attempt to start No. 2 engine during runup, engine failed to develop tgt. No. 2 engine alternator was replaced.

CH47

Class C
D series

■ During NVG mission, as IP was positioning aircraft on ground after releasing external load, right-side fuel pods contacted load block. Pods were not punctured, and no fuel leakage occurred.

■ **Flight related.** Slingloaded HMMWV was inadvertently released during cruise flight at night. HMMWV was destroyed, but aircraft was not damaged. Cause under investigation.

Class E
D series

■ During normal start sequence, No. 2 engine failed to start and N1 temperature failed to increase. Compressor section had failed internally with no other indications.

■ During static internal-load training, cable snapped while winching M119A1 howitzer into aircraft. Aircraft returned to home station, where cable was replaced and aircraft released for flight.

■ No. 1 fire light illuminated dimly during instrument training flight. Flight engineer could not see a fire in the engine. As aircraft was on final for active runway in IMC, crew decided to continue approach. SIP shut down No. 1 engine and completed a roll-on landing. Inspection revealed a chaffed detector line.

■ During takeoff, No. 1 flight hydraulic caution light came on. PC made precautionary landing and performed normal shutdown. No. 1 flight hydraulic line was found loose. Line was tightened and hydraulic fluid replaced.

■ Low side beep trim failed after repositioning from refuel. Maintenance inspection revealed broken wire on No. 2 minimum beep resistor.

■ No. 2 engine oversped during engine start. Rotor reacted 110 percent, and PTIT reached 900°C. When placing No. 2 ECL to stop failed to control engine, No. 2 fire pull handle was pulled and PC was able to control N1 with emergency engine trim. After normal shutdown, No. 2 engine was replaced, and aircraft returned to service.

■ No. 1 engine produced intermittent vibrations through the airframe during hover check. Aircraft returned to parking with no further incident. Maintenance inspection revealed bleed band actuator out of adjustment.

OH6

Class B
J series

■ One hour after takeoff, engine failed at 500 feet. Crew autorotated to wet cotton field, touching down at near-zero airspeed. Aircraft rolled forward, stopping inverted. Tail boom separated. Crew suffered minor injuries.

OH58

Class C
A series

■ Crew was unaware that, during NVG

aerial recon, rotor blades hit tree. Damage was found during daylight preflight by next aircrew. Investigation continues.

Class E

A series

■ Engine shut down during runup. Caused by fuel starvation to engine caused by release of trapped air in deck-mounted fuel filter. Fuel system was bled of air and ground run for 20 minutes. Test flight was completed with no incident.

■ DC generator segment light came on during landing, and amps went to zero. Reset attempt failed. Suspect starter-generator failure.

C series

■ Vibration was felt during approach and again at approximately 5 feet agl. Caused by failure of swashplate seal.

D series

■ During OGE hover, crew smelled smoke, and mast-mounted-sight (MMS) and transformer-rectifier messages displayed on multi-function display. On landing, avionics and aft electrical compartments were inspected for fire, but none was detected. Maintenance inspection revealed damage to MMS power supply, right torquer sensor, and elevation gimbal drive system. Suspect damage was caused by failure of elevation gimbal drive system.

■ Forward crosstube broke at skid cuff and separated during landing. Fatigue failure.

■ Crew heard loud humming sound from rear of aircraft while on the ground, and tail rotor pedals developed severe vibration. Cause unknown.

■ Right front crosstube was found broken on postflight. Crosstube was replaced.

■ After 5 minutes in parking with force trim on, tail rotor pedals drove themselves to full left stop. Could not be duplicated with hydraulic mule connected to aircraft.

UH1

Class E

H series

■ While in cruise flight at 2,000 feet agl over large urban area at night, PC noticed engine oil temperature above red line at 120°C. Engine oil pressure was fluctuating 5 to 8 pounds within green arc. During descent, smoke began filling cabin and cockpit. PC continued approach to large, well-lit parking lot. At 200 to 500 feet agl, copilot called out engine chip light. Noting good rotor and engine rpm, PC continued powered approach but prepared for possible engine failure. Aircraft landed with power and without damage, and crew performed emergency shutdown with large amounts of smoke now filling the cockpit. Both crewmembers and their passenger exited aircraft safely. Inspection revealed breakaway fitting on oil tank connecting tank to N1 accessory gearbox vent hose failed and pressurized N1 gearbox. Engine was replaced and Category I QDR submitted.

V series

■ On climbout passing through 2100 feet msl, aircraft yawed hard right. PC initiated procedures for engine overspeed and selected a forced-landing site. Passing through 500 feet agl, engine failed. PC entered autorotation, completed a 180-degree turn to avoid high-voltage wires in flight path, and landed with no damage.

UH60

Class A

K series

■ During night training with ANVIS-6 in use, aircraft had hovered about 50 meters from parking site on range when it became enveloped in dust. As crew applied power to avoid dust, low rpm audio sounded. Aircraft settled to the ground and rolled onto its right side. Tail rotor, stabilator, and all four main rotor blades were damaged. No one was injured.

Class B

L series

■ While at a hover over foot-deep loose snow at night, aircraft began uncommanded roll to the left, and main rotor system struck ground. Aircraft sustained extensive damage to main rotor system, ESSS support structure, and stabilator.

Class C

A series

■ Chalk 1 of flight of three Black Hawks lost right cargo door window panels due to inadvertent tripping of emergency release lever by a passenger. First window did no damage; second window flew through tail rotor blades. Aircraft returned to PZ and landed without incident.

■ During roll-on landing to unimproved area, tail wheel struck 12-inch ditch and collapsed. Tail boom was cracked at mounting point struts.

■ During roll-on landing, aircraft touched down tail wheel first in a 15° nose-high attitude. Rated student pilot reduced collective and, as main wheels touched down, IP noted vibration and took the controls. As he increased collective to reposition aircraft for parking, it entered an uncommanded right spin. IP then lowered collective and landed after aircraft completed a 520° spin. Aircraft sustained damage to main rotor blades and tail rotor drive shaft.

K series

■ Aircraft failed to maintain positive climb after rolling takeoff, and low rotor audio sounded. PC verified rotor rpm at 93 percent and took No. 2 engine power-control lever to lockout. Upon beginning a climb, PC noticed that No. 2 engine tgt was 1024°. He retarded PCL and again experienced low rotor rpm. When he advanced PCL to regain rotor rpm, No. 2 engine tgt was 1024° and torque was 116 percent. He circled and completed roll-on landing without incident.

Class E

A series

■ During right turn in NDB holding at 2,000 feet, electrical sparks were seen below pilot's side HSI instrument. Indicator panel was replaced.

■ During RL1 checkride, aircraft was on ground with PCLs at "fly." When aviator placed No. 2 PCL to ECU lockout at IP's direction, sparks flew from PCL housing area. Aircraft was shut down in place without further incident. Sparks were due to frayed wires. Maintenance replaced No. 2 engine control assembly quadrant.

■ During engine start, No. 1 engine made sounds like a compressor stall. NG was fluctuating between zero and single numbers. PC shut down engine, waited a few minutes, and attempted a second start. When NG and tgt failed to increase, he shut down engine again. Maintenance replaced No. 1 starter.

C12

Class E

C series

■ When power levers were moved to

adjust cruise power after leveling off at 14,000 feet msl, No. 2 engine would not respond and was stuck at 99-percent torque. Power lever would go from forward to aft setting without response from No. 2 engine. After consulting with maintenance personnel over the radio, crew secured No. 2 engine and made a single-engine approach and landing without incident at an Army airfield. Maintenance inspection revealed that No. 2 engine breather hose had slipped out of position, causing fuel control rod to hang up at 99-percent torque.

■ During landing roll, tower advised of smoke from left main gear. Aircraft was shut down in place. Maintenance personnel found that left outer tire was worn through and flat. When they removed the wheel, hydraulic fluid started pouring onto the ground due to defective O ring. Suspect that O ring caused left outer brake to stick during landing.

■ During descent for landing, flaps would not extend when flap switch was lowered. Flap switch and circuit breakers were recycled, but all attempts to lower the flaps failed. A no-flap landing was made without incident. Maintenance found corrosion in split-flap mechanism fuse. Corrosion created an open circuit, preventing flaps from functioning. Fuse was replaced.

D series

■ Crew noted vibration on takeoff roll and aborted takeoff. Inspection revealed flat spot on tires.

F series

■ During before-landing check, landing gear failed to extend. Gear lever was placed in down position, but no gear-in-transit light or green landing-gear lights illuminated. Pilot recycled gear with same results and initiated a go-around. After emergency gear-extension procedure was initiated and gear was manually pumped down, safe indication was verified by three green landing-gear lights. Aircraft completed approach and landed without further incident. Maintenance determined a faulty landing-gear power relay switch caused the problem.

■ During cruise flight at FL 200, a loud pop was heard and cracks in copilot's right windshield were noticed. Only outside layer of glass was cracked. PC reduced airspeed and descended to 10,000 feet. Cabin pressure was stabilized at 4 psi differential, and airplane returned to home base without further incident.

■ While being vectored for visual approach final course, master warning and No. 1 engine chip detector lights came on. Engine was shut down, cleanup was completed, and single-engine landing was made without incident. Engine was replaced.

G series

■ No. 1 fuel transfer segment light would not extinguish after engine start and up to 10 minutes after start. Maintenance replaced pressure switch.

R series

■ During cruise flight with autopilot engaged, aircraft would not maintain altitude (climbing). When CWS was depressed, aircraft pitched up. Electric trim was inop, and manual trim took excessive force to move. Emergency electric trim failure procedures were followed, and aircraft landed. Maintenance determined that trim system had frozen; inspection showed no damage.

N series

■ Aircraft was descending through 10,000 feet msl at 180 KIAS when crew heard loud thump followed by strong airframe shudder then loud bang. UT in right seat looked out CP's window and saw outboard and top No. 2 engine cowling had blown off. Inboard cowling was attached but flapping in the wind. PI slowed to 130 KIAS, continued the descent, and landed without further incident.

■ Crew smelled fuel odor in flight but could not determine source. Crew elected to return to base and land. During taxi to parking, pilots noted fuel leaking from the right nacelle. Fuel continued to leak after shutdown. Maintenance found a hole in nacelle tank bladder. Suspect hole was caused by fuel-bladder hanger.

For more information on selected accident briefs, call DSN 558-2785 (334-255-2785).

STACOM

STACOM 168 ◆ January 1997

Recent DES evaluations have made it clear that some units are unsure how to document auxiliary-power-unit (APU) operation orders for nonaviators. Some units are not making APU authorization/evaluation entries, relying instead on Part II (Authorized Flight Duties/Stations) of DA Form 7120-R and the applicable ATM tasks to suffice as orders from the commander.

AR 95-1, paragraph 3-17d, says that commanders may authorize nonaviator personnel to start, operate, and stop aircraft APUs. These personnel, however, must be trained on all functions they are authorized to perform and have written authorization from the commander.

NGR (AR) 95-1, paragraph 3-17d, states that commanders may authorize nonaviator personnel to operate the APU for the purpose of conducting MOCs. These personnel must be trained in accordance with NGR (AR) 95-210, chapter 5, and have written authorization from the commander. Such authorization must specify the operations and checks permitted and must be posted in the facility and unit operations and maintenance offices.

APU-operation authorizations will be annotated in the remarks block of Part II on DA Form 7120-R or DA Form 7120-3R. Only marking the CE block in Part II does not accurately reflect the crewmember's RL status. The crewmember must be an RL3 and is not required to do all base tasks (CH-47).

Commanders may include an evaluation requirement for their nonaviators on APU-operation orders. This evaluation requirement may be annotated on DA Form 7120-R, Part IV.

—POC: SFC Dean Christopher, DES, DSN 558-3475 (334-255-3475)

Standardization Communication ■ Prepared by the Division of Evaluation and Standardization, USAAVNC, Fort Rucker, AL 36362-5208, DSN 558-2603/2442. Information published in STACOM may precede formal staffing and distribution of Department of the Army official policy. Information is provided to enhance aviation operations and training support.

Aviation messages

Recap of selected aviation safety messages

Safety-action messages

AH-64-97-ASAM-02, 181546Z Nov 96, maintenance mandatory.
A discrepant lot of filler necks has been issued to the depot and installed on aircraft. These filler necks may allow static electricity to generate sparks during gravity refueling, which could cause a fire. The purpose of this message is to direct a one-time inspection for discrepant forward fuel cell filler necks. ATCOM contact: Mr. Jim Wilkins, DSN 693-2258 (314-263-2258).

AH-64-97-ASAM-03, 181600Z Nov 96, maintenance mandatory.
A Category I QDR from the Utah National Guard reported chaffing and subsequent arcing and burning of the ALQ-144 radar jammer power lines on the aft mixer support bell crank upon power-up of the radar jammer. Without proper clamping and routing, chafing may occur when the collective is full up and the cyclic forward, similar to when the aircraft is in a 30-degree dive. The purpose of this message is to require a one-time inspection of suspect area to repair and reroute lines as necessary. ATCOM contact: Mr. Jim Wilkins, DSN 693-2258 (314-263-2258).

Safety-of-flight messages

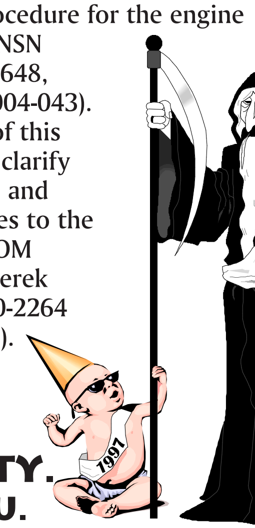
UH-1-97-01, 021643Z Dec 96, technical.
This is a follow-on message to SOF UH-1-96-03, which required certain operational restrictions due to numerous failures of the engine N2 accessory drive carrier assembly. The purpose of this message is to provide necessary instructions to clear the circle red X imposed by the earlier message and to ensure that engine and aircraft records are properly annotated. ATCOM contact: Mr. Jim Wilkins, DSN 693-2258 (314-263-2258).

UH-60-97-01, 021657Z Dec 96, technical.
A swashplate assembly removed from a UH-60A for rough operation and binding when rotated by hand was found to have improperly machined liners. Swashplate assemblies that had new liners installed during overhaul will be removed to ensure liners are properly machined. The purpose of this message is to perform a records check to identify suspect swashplate assemblies and to remove them before next flight. ATCOM contact: Mr. Jim Wilkins, DSN 693-2258 (314-263-2258).

Maintenance-information messages

CH-47-97-MIM-01, 201414Z Nov 96.
It has been reported that some CH-47 engine transmission main housings have corrosion damage to the flanged area that contains the holes used to mount the engine transmission to the engine. The purpose of this message is to modify maintenance procedures to correct the problem. ATCOM contact: Mr. Matthew Wesselschmidt, DSN 490-2267 (314-260-2267).

UH-60-97-MIM-001, 251712Z Nov 96.
TMs 1-1520-237-23 and 1-1520-250-23 contain a discrepancy in the 30-hour inspection procedure for the engine output shaft (NSN 2835-01-123-7648, P/N 70361-08004-043). The purpose of this message is to clarify the procedure and outline changes to the manuals. ATCOM contact: Mr. Derek Dinh, DSN 490-2264 (314-260-2264).



YOU'RE NEVER TOO JUNIOR OR TOO SENIOR FOR SAFETY.
NEW YEAR'S RESOLUTION TIME! BEST WISHES FROM US TO YOU.

IN THIS ISSUE

Class A Accidents

thru November

		Class A Flight Accidents		Army Military Fatalities	
		96	97	96	97
1ST QTR	October	1	0	0	0
	November	0	0	0	0
	December	0		0	
2D QTR	January	1		0	
	February	0		0	
	March	2		7	
3D QTR	April	1		3	
	May	0		0	
	June	1		6	
4TH QTR	July	0		0	
	August	0		0	
	September	1		0	
	TOTAL	7	0	16	0

U.S. ARMY SAFETY CENTER

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