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It is impossible to
accurately measure
the results of
aviation safety.

No one can count
the fires
that never start,
the aborted takeoffs
that do not occur,
the engine failures
and the forced landings
that never take place.

And one can neither evaluate
the lives that are not lost,
nor plumb the depths of human
misery we have been spared.

But the individuals with
the flight controls,
fueling hose, wrench, radar,
or dispatch order can find
lasting satisfaction in the knowledge
they have worked wisely and well,
and that safety has been
the prime consideration.

(author unknown—modified by N.E. Villaire)

Preserving combat readiness and saving defense dollars are top priorities with everyone these days. Fortunately, Army aviation will soon be able to reduce accidental losses of lives and equipment with the introduction of some amazing new inspection technology.

In the first quarter of FY 96, the Army will equip its first aviation intermediate maintenance (AVIM) unit with state-of-the-art nondestructive test equipment (NDTE). Material flaws hidden from the human eye can be detected with the NDTE during inspections, and tragic accidents resulting from catastrophic structural failures can be prevented.

New NDTE system for Army aviation

Nondestructive test equipment is used in two significant ways. The first is in "fingerprinting" (documenting the as-manufactured state) of new parts and assemblies before putting the hardware into service. These fingerprints can subsequently be compared to fingerprints of the same parts and assemblies after they have been in service for a period of time. The results of the comparison will reveal important structural changes (flaws, including debonds) for a period of service. Nondestructive testing is a method of determining the actual part/assembly life. The obvious benefit is the increased service life for time-change components.

The second and most common way in which NDTE will be used is in the detection of flaws in structural areas of airframes that were not initially fingerprinted. The easiest way to explain this process is to visualize small (or large) imperfections (flaws) that exist in structural airframe materials such as ferrous and nonferrous metal parts as well as composite material parts. Many times these flaws, which occur for many different reasons, are below the surface of the material and therefore hidden from the human eye. Needless to say, these flaws have the potential to result in catastrophic structural failures.

Introduction of new inspection technology

The Army's current capability to detect such flaws is primarily by outdated and costly processes such as—

- Liquid dye penetrant testing (PT).
- Magnetic particle testing (MT).
- Removing parts/assemblies and shipping to a depot for inspection.
- Using medical x-ray equipment.

In addition to such processes, inspections by local contractors or collocated sister services may be employed.

The NDTE system comprises the following items of inspection equipment:

harmonic bond tester

ultrasonic flaw detector

portable x-ray machine

- Radiographic test unit (RT). See sidebar regarding required implementation of a comprehensive radiation protection program.
- Ultrasonic flaw detector (UT).
- Eddy current tester (ET).
- Harmonic bond tester (HBT).

In addition to these primary items of equipment, many accessory items are required to perform the various kinds of testing. Some of the additional

Marines have operated this type of equipment as a standard process with great success and cost savings/avoidance, the Army to date has used this technology only on a limited basis. NDTE program management has insisted from the beginning that we should not "replow plowed ground." If the Army's aircraft nondestructive test requirements are not greater than the capabilities of equipment other services have procured, tested, operated, and are still using today, we should not waste taxpayer dollars repeating procurement actions. This is the essence of the nondevelopmental item acquisition process. Consequently, the Army will procure the NDTE system and logistical support (as required) via a military interdepartmental purchase request (MIPR) and memorandum of agreement (MOA) with the Air Force. This will result in savings to both the Army and the Air Force.

Recapping the benefits of NDTE

The facts are clear. When the NDTE system and trained personnel are fielded, the Army will save lives and dollars and combat readiness will increase. Cost and readiness improvements will accrue in the following areas:

- Increased weapons system availability.
- Reduced maintenance manhours.
- Reduced ozone-depleting chemicals.
- Reduced dependency on contractors.
- Aircraft will fly longer and more safely.
- Maintenance manhours per flight hour will decrease.

For assistance . . .

Contact the Army's Nondestructive Testing Program Office at ATCOM. The primary functions of this office are to—

- Serve as a central worldwide management point for nondestructive testing, including activities at aviation unit maintenance (AVUM) and AVIM units and depots.
- Ensure standardization of equipment and support for fielded systems.
- Develop Army nondestructive testing policy and provide guidance.
- Serve as nondestructive testing POC for PEO aviation programs.
- Provide training support and guidance.
- Manage requirements and technology updates.

Some will say that "it's about time!" But fielding the *right* equipment is important, and at the Aviation Ground Support Equipment Weapon Systems Management Office of the Aviation and Troop Command (ATCOM) in St. Louis, MO, which is charged with fielding this new technology, we believe that it will have been worth the wait.

The Army's new NDTE is coming soon! For those MOS 68Ds who are eagerly waiting to begin doing nondestructive testing in a far superior way, get into that ITRO school and get yourselves trained. There are two ways to accomplish this: TDY en route and TDY and return. For further information, contact the ATCOM NDT/I Program Office.

POC: Mr. Wayne Suchman, ATCOM NDT/I Program Office Manager, DSN 693-9307 (314-263-9307)

Finger and lip lights are on the way

Supplemental cockpit lighting is a subject of high interest among pilots flying night-aided and unaided missions. Aviators use various lighting devices that include mini-mag style flashlights, gooseneck lights, and lip and finger lights of various designs. However, lip lights and finger lights currently available do not meet military specifications and are not completely NVG compatible.

The Army is working to establish military specification standards for both lip and finger lights that will be completely NVG compatible. In the interim, a program is underway to provide authorized supplemental lighting to aviators within about 6 months.

In January 1995, the Defense General Supply Center, Richmond, VA, established two contracts with Seitz Scientific Industries, Inc. to provide finger lights, NSN 6230-01-357-2175 and lip lights, NSN 6240-01-362-4902, for shipment to Army aviation units. The contract is for over 12,000 units of each item.

A third contract was made with Hoffman Engineering Corp. for approximately 2,800 Army flashlight NVG-compatible filters, NSN 6230-01-369-1658. The filters will be fielded during the same period as the lip and finger lights.

The finger lights, lip lights, and flashlight filters will be sent to aviation units that have NVGs. Units will receive these items without requesting them on a one-time issue basis. Units that want to know the quantity they will receive may call CW4 Popovitch, Directorate of Combat Developments, U.S. Army Aviation Center, Fort Rucker, AL, DSN 558-9130 or commercial 334-255-9130.

Although the items are assigned NSNs, the proponent agency, Project Manager, Soldier, does not plan to provide the lights through the Army supply system. Units or individuals can purchase finger lights and lip lights (Mike Lite) directly from Seitz Scientific Industries, Inc., 201 E. Hickory Bend Road, Enterprise, AL 36330-1007, telephone 334-347-9713 or FAX 334-393-2381. The NVG-compatible flashlight filters can be purchased from Hoffman Engineering Corp., 22 Omega, 8 River Bend Center, Stamford, CT 06907, telephone 203-425-8900.

Unit SOP and aviator training requirements for use of supplemental lighting, including lip and finger lights, are contained in TB 1-1500-346-20: Updated Information On Night Vision Goggles, 20 January 1995.

POC: CW5 Daniel W. Medina, Investigations Division, DSN 558-9857 (334-255-9857)

accessories are radiographic film-developing equipment and materials, radiation safety devices, tester probes, transducers, and so forth. Current planning is for each AVIM and National Guard aviation classification repair activity depot (AVCRAD) unit to be outfitted with one RT and two each of the UTs, ETs, and HBTs and their associated accessories.

Training

Operator/tester training is a major part of the NDTE program. The MOS 68D, Powertrain Repairman, has been selected to perform nondestructive testing for the Army. There are approximately 35 technicians who are currently qualified to operate and perform aircraft nondestructive testing with the NDTE system. These technicians received their special training at the Interservice Training Review Organization (ITRO) in Millington, TN. The Army plans to increase the number of personnel in this training as required to match or exceed the fielding of NDTE systems.

NDTE system support

Daily and scheduled maintenance for the NDTE system will be performed by the MOS 68D technician. All other required maintenance for the system below the depot level will be performed by the MOS 35H—Test, Measurement, and Diagnostic Equipment (TMDE) technician. The x-ray unit tube head will be maintained and repaired by the U.S. Air Force depots. Air Force technical orders (TOs) will be revised to become Air Force TOs/U.S. Army Technical Manuals (TMs).

Airframe and component nondestructive testing/inspection (NDT/I) procedures are currently being written and validated at Corpus Christi, TX. There will be approximately 400 new procedures as well as existing procedures, which will be converted from the PT or MT processes, designed to support current Army rotary wing aircraft. These procedures will be supplemented by video films that will greatly augment the NDT/I procedures.

EDDY CURRENT TESTER

Saving lives and dollars

The Army's "throw-away" mentality is changing, especially on high-dollar parts. Costs now "drive the train." For structural flaw detection in Army aviation, nondestructive testing is the best choice.

■ **NDTE advantages**. The gains to be made from the operation of the NDTE system by the Army accrue primarily from two advantages: finding defects that are not visible by any other means can prevent catastrophic failures, saving lives and preventing losses of equipment; and avoiding premature disassembly and removal of aircraft parts and assemblies to perform structural inspection that can now be performed in shops only. Also to be avoided is the outright replacement of parts from time before overhaul, retirement life, or condition change where there is no means of inspection.

■ **Procuring the NDTE.** One interesting aspect of the Army's NDTE program is the fact that the NDTE and its Integrated Logistics Support System will be procured through the U.S. Air Force. While the Air Force, Navy, and

Implementation of comprehensive radiation protection program

The nondestructive test equipment to be fielded by ATCOM includes a 160-kilovolt portable industrial x-ray system. This system emits hazardous levels of radiation, and its safe use depends on strict adherence to established safety procedures.

A comprehensive radiation protection program must be fully implemented in each unit before initiation of industrial radiography operations. Adequacy of this program must also be verified by ATCOM before radiography equipment will be issued.

To facilitate implementation of this program, ATCOM has provided detailed radiological safety information directly to the commander and to supporting safety personnel of each AVIM and AVCRAD. Commanders must review this information and assure full implementation of all radiation protection program requirements prior to materiel fielding of nondestructive test equipment.

Contact your radiation protection officer, MACOM radiation control officer, or the ATCOM health physicist if additional radiation safety information is required. The ATCOM health physicist, Mr. Dennis Chambers, may be contacted at DSN 693-2196 (314-263-2196).

Flight helmet success stories

... and another reminder about proper wear, fit, and maintenance

The SPH-4 flight helmet has received improvements and modifications since its fielding in 1970. One feature that hasn't changed is its invaluable protection for the most vulnerable part of the body: the head. The SPH-4 flight helmet and its derivative, the SPH-4B, have saved a lot of crewmembers' lives and prevented or reduced many injuries since entering service with the U. S. Army.

Another save for the SPH-4 flight helmet! Following hydraulics-off running landing, aircraft rolled over, pinning IP in wreckage. His head was protected by his helmet.

Success stories

While we often hear stories of helmet failures during crash sequences, most of the success stories, such as the following, have gone unnoticed.

■ At 100 feet AGL and 100 knots while on approach to landing, a UH-60 struck a sea gull. The bird penetrated the windscreen and parts of it splattered around the cockpit. Fortunately, the pilot on the controls had his visor down and was protected from the bird debris. Without the visor protection, he likely would have suffered eye injuries or temporary vision impairment. Thanks to the protection the helmet and visor afforded, the pilot was able to land the aircraft safely.

■ A UH-60 on a night flight landed hard (in excess of 12 Gs). The upper body of the occupant in the right gunner's seat was tossed forward and laterally. His head struck the M60 machine gun pintle. Fortunately his flight helmet took the impact and protected his head from serious injury—another save for the helmet. The helmet received a 2-inch crack in its shell and was rendered unserviceable.

■ A UH-60 on an NVG mission inadvertently flew into the ground. Both pilots' heads struck with strong impact forces against cockpit structures. Both helmets sustained broken visor shell covers, and both styrofoam liners were compressed by impact with the helmet's headband. The pilots suffered only minor head injuries. Chalk up two saves for the helmets.

■ An OH-58 struck the ground hard. The pilot's shoulder harness did not lock properly and his head swung forward and down. The visor on the pilot's helmet struck the cyclic stick, causing it to be scarred and rendering it unserviceable. Without the visor's protection, the pilot's eyes could have been seriously injured and his flying career ended.

The HGU-56/P

Agencies that developed, procured, fielded, and continue to support our SPH-4 have done commendable work. Now the Army is fielding its next generation flight helmet, the HGU-56/P. This helmet is lighter, stronger, more versatile, and provides better head protection than the SPH-4 and -4B.

Proper wear, fit, and maintenance required

Regardless of which helmet an aviator is issued, its protection is reduced to the lowest denominator if it's not maintained, fitted, and worn correctly.

During a recent accident investigation, four crewmember helmets were inspected for serviceability. Each of the four had maintenance flaws (not resulting from the accident); three had red-X discrepancies. The majority of the discrepancies should have been discovered by the crewmember (operator) during preflight inspection. Unfortunately, this example is repeated over and over in Army aviation.

It is imperative that flight crews preflight their helmets and flight gear. No one has more at stake than the person who is counting on his or her flight helmet for protection. Preflight checklists are found in the helmet maintenance manuals: SPH-4—TM 10-8415-206-12 &P, SPH-4B—TM 10-8415-215-12 &P, and HGU-56/P—TM 1-8415-216-12 &P. Helmets with discrepancies should immediately be taken to the unit ALSE maintainer for correction.

The Army's desire is for you to always have the best helmet available but to never have an opportunity to prove it. If the worst does happen, however, careful inspection and fitting and proper wear of your helmet will maximize protection for the most important and most vulnerable part of your body: your head.

POC: CW5 Daniel W. Medina, Investigations Division, DSN 558-9857 (334-255-9857)

Plastic sunglasses: issues, answers, and solutions

Some military aviators have reported difficulty distinguishing the color of cockpit warning lights when wearing sunglasses with plastic lenses. This could be due to lenses that are too dark or that lack neutrality and therefore distort color vision. The U.S. Army Aeromedical Research Laboratory (USAARL) conducted a study to determine the origin of this problem and recommend solutions.

Five pairs of plastic sunglasses (-4 to +4D power) were ordered from each of seven military optical labs (70 lenses total). Each lab was instructed to dye the lenses a neutral gray with 21-percent transmittance. Light transmittance and color distortion were measured on all lenses.

Surprisingly, sunglass transmittance varied widely across optical labs (1 percent to 30 percent). Color distortion also varied between labs, and this effect was related inversely to light transmittance (high color distortion with low light transmittance).

USAARL felt that both factors could be corrected by accurate verification of transmittance with commercially-available transmittance meters. However, USAARL determined that these meters read too high. Plastic sunglass dyes transmit a disproportionate amount of deep red/infrared light that is read as visible light by the meters, making readings too high.

To improve the accuracy of these meters, USAARL identified a correction filter that blocks deep red light. When this filter is placed in the optical path of the transmittance meter, accurate readings are obtained.

All U.S. Army optical labs have been directed to obtain electronic transmittance meters. USAARL is providing correction filters and guidance to ensure that the meters give accurate readings.

To ensure that all currently fielded sunglasses are within military standards, each Army optometry service is conducting visual inspections of fielded aviator sunglasses as well as those being received from optical labs. The criterion used is that no sunglasses should be darker than a neutral gray 15-percent glass comparison lens (N15).

Aviators and aircrewmembers should take their current sunglasses to the nearest military optometrist for visual inspection. If the lenses are within military standards, the service member can safely wear the sunglasses in flight during appropriate weather conditions.

POCs: LTC Jeff Rabin, Dr. Roger Wiley, SGT James Wicks, and SPC Antonia Rivers, USAARL, DSN 558-6876 (334-255-6876)

Aviator cold-weather underwear —what do we order?

The Logistics and Soldier Systems Division (LSSD) of the U.S. Army Aviation Center Directorate of Combat Developments has been alerted to a potentially dangerous problem related to cold-weather underwear for aviation crewmembers.

All aviation personnel are advised that effective immediately, they are *not* to requisition cold-weather underwear using the following NSNs:

- Cold-weather drawers, NSN 8415-01-285-0153(S).
- Cold-weather undershirt, NSN 8415-01-285-0159(S).

Cold-weather underwear has historically been fabricated of 50-percent cotton and 50-percent wool. However, during Desert Storm, the Army agreed to use a commercial item made of 50-percent cotton and 50-percent polyester as an interim substitute. Stock of the interim items was commingled with the standard cotton and wool version under the same NSNs.

The undesired cotton and polyester underwear was purchased under DLA contract number DLA100-091-C-0364. It can also be identified by its color, which is natural white, rather than the brown shade 436 used for standard cotton and wool items.

Due to the potential for injuries resulting from heat and flame during a fire, crewmembers should not wear the cotton and polyester underwear under their flight suits. Crewmembers requiring cold-weather long underwear should requisition a 100-percent cotton type that is available using the following NSNs:

- Cold-weather drawers, NSN 8415-00-782-3226(S).
- Cold-weather undershirt, NSN 8415-00-270-2012(S).

POC: CPT Rudy Schulz, LSSD, DSN 558-3154 (334-255-3154)

Starching ABDUs increases risk of burn injuries

Soldiers like to look "sharp," and starching battle dress uniforms (BDUs) makes them look sharp. But the aviation battle dress uniform (ABDU) isn't supposed to be starched. The ABDU as well as the one-piece flight suit it replaces are made of Nomex, and starching Nomex defeats its protective nature.

Nomex—do not starch

Nomex material is highly flame resistant and will protect the wearer from degrees of flame and heat that would severely injure and incapacitate an unprotected individual. But uniforms made of Nomex can fail to protect the wearer if they are worn improperly, damaged, or contaminated. Contaminants such as POL and solvents can cause Nomex uniforms to burn. Even something as seemingly innocent as starching Nomex degrades the material's flame- and heat-resistant qualities, which can lead to severe burns if the wearer is caught in a fire.

Rising concerns

Concern exists about the dangerous practice of starching the ABDU. The Natick Research, Development, and Engineering Center (NRDEC) is the materiel developer for the ABDU. According to NRDEC, starch in the ABDU will cause the uniform to burn during an aircraft fire. A burning, starched ABDU will be of little or no value to the wearer and will contribute to greater bodily injuries received during a fire.

The U.S. Army Aeromedical Research Laboratory (USAARL) and the U.S. Army Aviation Center Branch Safety Office concur with this assessment. Mr. Joe Licina—a member of the USAARL staff who has investigated numerous aircraft accidents and has documented burn injuries intensified by the improper wear of protective clothing, the wear of unauthorized clothing, and the wear of damaged protective clothing—states that "under no circumstances should the ABDU be starched."

No ABDUs should be starched for the sake of looking sharp or for any other reason. It's better to live with a few wrinkles than to be a well-dressed burn victim. If a starched uniform is required, the crewmember should *not* wear the ABDU.

POCs: Mr. Bernard Roberson or CPT Rudy Schulz, Logistics and Soldier Systems Division, Directorate of Combat Developments, USAAVNC, DSN 558-3154 ext 284 (334-255-3154)

Requirements for use of reach pendants on external slingloads

Reach pendants (11K or 25K) can be used with all loads carried externally from military helicopters. Reach pendants are strongly recommended for use on all HMMWV-mounted shelter loads when there is not adequate clearance between the load and the helicopter during hookup.

The requirement for a static discharge person during hookup under helicopters does not apply when a reach pendant is used. The 5-foot reach pendant provides sufficient insulation between the hookup person and the hook.

There has also been a problem with chafing of sling legs where they rest against the top edge of the LMS and S-250 type shelters mounted on HMMWVs. The nylon portion of the sling contacts the edge of the shelter, and this has resulted in chafing and cuts in single, tandem, and dual-point configurations under CH-47 and CH-53 helicopters.

The spreader bar from the ambulance HMMWV kit has been used to alleviate this problem, but it is difficult to store, rig, and keep in place once rigged. Another solution is to use sling extensions (the chain portion of an additional sling leg) on all four sling legs so that there will be metal-to-metal contact between the chain and the shelter edge. Using the sling extensions also reduces the sling angle. Extensions are the best solution to the chafing problems, however there is one disadvantage because additional sling legs are required—eight legs in the case of a tandem load. The U. S. Army Research, Development, and Engineering Center (Natick) has certified all HMMWV shelter loads with the extensions (chains).

POC: Mr. Ted Rodriguez, U.S. Army Transportation School, DSN 927-6570 (804-878-6570)

AN/APX-100(V) operating procedures advisory

The Aviation and Troop Command recently reissued a Naval Air Systems Command message concerning an operating procedures advisory to operating forces that certain AN/APX-100 switch position combinations will inhibit identification, friend or foe (IFF) cockpit warnings that no reply has been transmitted to a valid interrogation.

Operating instructions

The following general operating instructions for audio-light-out switch and antenna positions are recommended. Formal changes to training, operating procedures, and publications should be directed via separate correspondence.

■ ***AN/APX-100 mode audio-light-out switch***. When conducting tactical Mode 4 operations, this switch should be placed in the audio position at all times. With the master switch in normal and the Mode 4 select switch on, the audio position provides ICS indications when the received code does not match the installed code and a Mode 4 caution indication when the system is not replying to a valid Mode 4 interrogation. The light position provides only a Mode 4 caution when the system is not replying to a valid Mode 4 interrogation and no indications as to improper code matching. Selecting the out switch position disables all Mode 4 caution indications. ***Caution: Use of switch positions other than audio will deny the aircrew mission-critical system status.***

■ ***AN/APX-100 antenna selection (top-diversity-bottom) or (top-auto-bottom) switch***. This switch shall be operated in the div/auto position at all times except as determined by special mission requirements. ***Caution: Use of the top or bottom position may result in no replies being transmitted to a valid IFF interrogation in any mode (1/2/3/4/C).***

Background summary

The DOD AIMS program office issued an alert/advisory message (WR ALC Robins AFB, 031456Z Nov 94) that stated specific selections of the AN/APX-100 transponder Mode 4 audio-light-out switch and the antenna selection switch could result in no reply to valid interrogations and no subsequent cockpit IFF warnings. Interim operating procedures were also recommended for all concerned.

The U.S. Navy, as the executive service for AN/APX-100 program management, recently completed engineering analysis and functional tests to determine corrective action. These tests demonstrated that the AN/APX-100 met performance specs and worked as designed. However, it was determined that certain switch positions could result in a hazardous situation during combat operations. There are also minor differences in AN/APX-72 and AN/APX-100 switch functionality that contribute to improper AN/APX-100 switch selection.

The Mode 4 audio-light-out switch was the initial switch tested. It was determined that the switch works properly if the system has been keyed with the correct code and is operating normally. It was confirmed that when the switch is placed in the out position, the Mode 4 caution is disabled. The Mode 4 caution alerts the flight crew when the system is not replying to valid Mode 4 interrogations. As a result, in the out position, the system replies if properly keyed and operating normally; however, should conditions exist where a reply is not transmitted (zeroized key, incorrect A/B code, power transient, and so forth) and the out position is selected, then no cockpit warning of this condition is provided. The out switch position was designed to disable the Mode 4 caution in order to prevent this caution signal from masking other aircraft master caution conditions such as low fuel. In the out position on an AN/APX-72, the Mode 4 caution is enabled at all times when the system is operating normally and when no reply is generated to a valid Mode 4 interrogation.

The antenna selection (top-diversity-bottom) or (top-auto-bottom) switch was also tested and determined to function as designed. The AN/APX-100 in all IFF modes of operation was designed to receive the signals from both the top and bottom antennas and to transmit a reply to the antenna from which the stronger interrogation signal was received. If either top or bottom is selected and if the deselected antenna receives a signal that is stronger than the selected antenna, then a reply is not transmitted and no cockpit indications are displayed. This is different from the AN/APX-72 where a reply is always transmitted from the selected antenna. The diversity or auto position allows a reply to be transmitted to all valid interrogations.

It is also recommended that training in the differences between the AN/APX-72 and AN/APX-100 be conducted immediately. This may help prevent improper operations of the AN/APX-100 due to habit patterns associated with the AN/APX-72 equipment. An action team has been formed to address the status and update requirements of related training, publications, and operations procedures.

Points of contact

■ Naval Air Systems Command POC is Cdr. Doug Dickman, 703-604-2500 extension 8862.

■ Operations/training/publications action team POC is MAJ George Brown, U.S. Marine Corps, 703-604-2500 extension 8871.

■ U.S. Army Aviation and Troop Command POC is Mr. Dennis Sparks, DSN 693-9947 (314-263-9947). ❑

Broken Wing award

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

■ **CW4 Larry L. Thornton, Headquarters and Headquarters Company, 2d Battalion, 501st Aviation Regiment, APO AP 96271.** At 90 knots and 800 feet AGL in mountainous terrain, the UH-1H was on a single-ship mission conducting an extraction of pathfinders from a pinnacle when power was lost. CW4 Thornton, the PC, was at the controls when the N2 dropped to 5200 RPM. He checked the throttle to ensure it had not backed off and simultaneously entered autorotation. As he reduced the collective, he instructed the pilot to place the governor switch in the emergency position. Anticipating a rapid increase in engine RPM, he reduced the throttle about one-quarter turn. The engine RPM increased rapidly for about 5 seconds. CW4 Thornton adjusted collective pitch to prevent an overspeed and arrested the descent momentarily. The engine lost power again and did not respond to throttle adjustments. At about 85 feet AGL, CW4 Thornton entered autorotation again. His options were few: a farm village out the left door, a flooded rice paddy directly below, and a steep, wooded hillside to his right. The only viable option was to maneuver the aircraft across a set of 40-foot-high power lines to reach a dry, plowed rice paddy roughly 200 meters ahead. He adjusted the collective and glided across the wires. As the aircraft cleared the wires, he lowered the collective and applied full left pedal to line up with the long axis of the plowed field. He applied aft cyclic to decelerate the aircraft, lining up the skids with the furrows. At about 3 feet AGL, he applied coordinated collective pitch to complete a controlled touchdown with no injuries to personnel on board or damage to the aircraft.

■ **CW3 David A. Swann, C Company, 3d Battalion, 227th Aviation Regiment, 4th Aviation Brigade, 1st Armored Division, APO AE 09165.** CW3 Swann was conducting aerial gunnery qualification in an AH-64 with a new crewmember in the front seat. While at a 100-foot OGE hover under night vision devices (NVD), the No. 2 generator seized, causing it to catch on fire and disintegrate. The crew smelled the smoke and saw the master caution and No. 2 generator segment lights illuminate. As the cockpit filled with smoke, CW3 Swann identified the emergency in progress, made a distress call, initiated the emergency procedure of shutting down the No. 2 generator, and began scanning for a suitable place to perform an emergency landing. During the search for a landing area, the crew could see flames coming from the right side of the aircraft. An OH-58, acting as a safety aircraft, informed the crew that they did indeed have a fire on the right side of the aircraft. As the AH-64 was maneuvering into position, the CPG announced that the NP/NR was down to 96 percent and bleeding off. (This was found to have been caused by the No. 2 generator shaft not shearing as designed and putting increased drag on the transmission, resulting in the NP/NR droop). CW3 Swann, dealing with the reduced visibility in the cockpit and poor natural illumination, attempted to maneuver the aircraft into an opening he had noticed earlier that day. Knowing that if the rotor RPM (NR) dropped below 89 to 92 percent most of the electrical systems, including the NVD, would be lost, CW3 Swann managed collective applications to accomplish a minimum power landing in the only available area. Upon landing, the crew completed an emergency shutdown, exited the aircraft, and used the onboard fire extinguisher to extinguish the fire and cool the overheated generator. During daylight recovery, it was discovered that if the aircraft had landed just a few feet to the east of its position, it would have impacted a safety berm, damaging the underside or entering dynamic rollover if it had landed on top of the berm. The tail rotor would also have hit some trees and bushes and would probably have caused a subsequent loss of control.

■ **CW2 William R. Armstrong, Army Aviation Support Facility, Alaska Army National Guard.** At 250 feet AGL and 70 knots, the UH-1H was making an approach to landing after completing a tail rotor maintenance test flight check. CW2 Armstrong was about one-quarter mile south of the helipad and was just crossing a four-lane divided highway when he and his crew chief heard a loud growling noise coming from the engine compartment. The growling noise grew louder and rotor RPM dropped to 290. CW2 Armstrong entered autorotation and announced "engine failure" to the tower. He could not go to his immediate right due to traffic on the highway, and he could not maneuver left due to trees. He continued with the autorotation straight ahead and aimed for a small gravel access road that ran parallel to a 10-foot-high chain link fence. CW2 Armstrong

noted that his altitude was too low and airspeed too high to stop before encountering the main gate access road into Fort Richardson, so he performed a very steep nose-high flare to reduce his forward airspeed to zero and land on the main gate road perpendicular to his flight path. His tail skid contacted the ground 20 feet from the main gate road. With remaining main rotor blade inertia, CW2 Armstrong pulled pitch and settled the UH-1H up onto the 4-foot-high road bed with a ground run of 8 feet and no damage to the aircraft. The N1 section of the engine was still running after termination of the autorotation. CW2 Armstrong shut down the engine, inspected for any damage, and noted that the main rotor blades could not be turned backwards, indicating that the engine had seized in place.

Accident briefs

Information based on preliminary reports of aircraft accidents

Utility

UH-1 Class B

H series - As aircraft was hovered with tail into wind during IERW solo training, crew reported loss of control of aircraft. Aircraft impacted ground and sustained major damage. Minor injuries to crew and one civilian on ground.

H series - During night unaided right hovering turn about the tail, aircraft right skid struck ground sideways. Right skid broke, and aircraft rolled onto its right side. Aircraft came to rest inverted, causing major damage to aircraft. One crewmember sustained minor injuries.

UH-1 Class C

H series - Crew reported hydraulic failure during maintenance test flight, followed by collective hardover (full up) and engine overtorque (60 PSI).

UH-1 Class E

H series - On final approach for landing from long cross-country flight, pilot noticed that anti-torque pedals felt "strange." Crew completed normal landing with no writeup. Later during phase inspection, maintenance found damage to vertical drive shaft of tail rotor. Damage was caused by loose tail rotor control cables and chain contacting shaft. Maintenance replaced cables and chain.

V series - During simulated engine failure at altitude, IP noted rotor and N2 decreasing together. Rotor reached 270 RPM and N1 dropped to 70 percent with no needle split. In accordance with dash 10, IP reestablished engine RPM and landed aircraft. Maintenance checked freewheeling action and found it okay.

V series - In cruise flight at 2,500 feet MSL, aircraft developed loud noise and severe vibration and smoke and burning odor filled cockpit and cabin area. Crew immediately performed precautionary landing to open field and shut down aircraft. Bearing failed on blower unit for muff heater.

UH-60 Class C

A series - Aircraft departed on limited test flight for track and balance. Upon postflight adjustment, damage was discovered on top of one main rotor blade. Pair of damaged wire cutters was discovered 100 yards away from aircraft.

A series - During preflight inspection, crew found damage to underside (VHF/FM, ADF sense, and Doppler antennas) of aircraft. Aircraft had been flown previously during night readiness level progression training that included only approaches to improved landing sites and approaches using the fast rope insertion/extraction system.

L series - During preflight, crew discovered damage to all four blades. Suspect damage caused by contact with ALQ144.

L series - Aircraft experienced engine loss of power and landed hard in muddy area. Aircraft landing gear stroked, and aircraft sustained suspected structural damage to left side.

UH-60 Class D

A series - Upon landing at the LZ, crew chief stated he wanted to do walk-around inspection because he had observed something go past aircraft while it was on approach to LZ. During walk around, crew chief noticed left APU compartment door was missing. Crew noticed no unusual sound or vibrations. Search to locate APU door was unsuccessful. Inspection of other unit UH-60s revealed one other aircraft with an unserviceable hinge on APU door. QDR submitted.

UH-60 Class E

A series - Aircraft was Chalk 2 in flight of two climbing through 400 feet AGL at 80 knots when stabilator audio sounded and master warning and stabilator caution lights activated. PC initiated auto control reset and system momentarily engaged and then failed. Crew slewed stabilator to 0 degrees and returned to base for termination. Inspection revealed that stabilator had failed internally.

Attack

AH-1 Class C

F series - While hovering sideways at 5 feet AGL and less than 5 knots, crew heard loud report, followed by abrupt left yaw, activation of low RPM audio, and loss of engine power. Suspecting compressor stall, pilot, under NVGs, initially lowered collective to land. Aircraft made initial contact with ground while moving laterally. Pilot increased collective, stopped lateral movement, and then cushioned landing. Inspection revealed that engine had seized.

AH-1 Class E

F series - At 5-foot hover, pilot was unable to complete 360-degree left pedal turn. Pilot felt feedback in pedals and landed aircraft without further incident. Inspection revealed tail rotor required rigging adjustments.

F series - At about 75 feet AGL, aircraft flew over parked OH-58. Rotorwash from AH-1 blew door off OH-58. Suspect door of OH-58 was not completely latched.

F series - During initial hover check, aircraft began yawing erratically left and right with no pilot input on tail rotor pedals. Crew disengaged yaw SCAS channel, and aircraft returned to normal stabilized hover. Maintenance repaired broken electrical wire leading to SCAS servo actuator.

AH-64 Class B

A series - All main rotor blades contacted tree during test flight and were damaged beyond repair.

AH-64 Class C

A series - Following maintenance test flight, crew suspected maintenance problem in tail rotor system. System was visually inspected. During aircraft runup, tail rotor system failed. Tail rotor swung 90 degrees, two main rotor blades contacted vertical and horizontal fins, tail wheel strut collapsed, and FM antenna was destroyed.

AH-64 Class E

A series - As aircraft taxied from parking, ground personnel noticed something fall from No. 1 engine area. Ground personnel signaled for aircrew to hold and shut down aircraft. Crews found piece of 3-inch by 5-inch metal on ground. Maintenance inspected aircraft and found that No. 2 primary exhaust nozzle had failed.

A series - After completing refueling, PC executed bubble burn procedures. PC moved crossfeed switch to aft position and started to increase collective to 60-percent torque on No. 1 engine. As torque approached 35 percent, PC noticed master caution and No. 1 engine fuel PSI caution/warning lights illuminate. PC lowered collective and was attempting to return fuel crossfeed switch to normal when No. 1 engine flamed out. Aircraft experienced hard shutdown. Maintenance found that K4 relay of fuel panel assembly had failed.

A series - During maintenance test flight, crew was in process of performing maximum power TGT limiter check on No. 1 engine. No. 2 engine was at idle (65-percent torque), and No. 1 engine (test engine) was at 98-percent torque. TGT limiting was in effect with No. 1 engine when No. 2 engine failed. Torque on No. 1 engine increased to 112 percent for 2 seconds, and NP and NR increased to 108 percent. Engine instruments and caution lights confirmed No. 2 engine failure. Crew returned aircraft to station without further incident. Maintenance found that yellow cable to ECU had shorted out and had sent erroneous signal to No. 2 engine. Signal indicated that No. 2 engine was overspeeding and caused ECU to shut down No. 2 engine.

A series - During roll-on landing, IP and pilot smelled smoke. IP alerted tower and landed aircraft without further incident. Inspection revealed that paper had been ingested by standby fan in right forward avionics bay, causing it to jam and motor to burn out.

A series - While aircraft was running at 100 percent on ground, crew noticed odor of electrical fire and immediately shut down aircraft. Inspection revealed No. 1 generator had seized.

Cargo

CH-47 Class E

D series - Approximately 35 minutes after taking off, rear sling around fuselage of RA-5C failed at upper clevis. Flight engineer announced failure to flight crew and manually released load as nose of RA-5C began to rotate toward aircraft. RA-5C settled tail first, then began to rotate nose down until it impacted in slightly nose-low attitude on dirt road.

D series - During slope operations with AFCS off, master caution light illuminated with no other associated segment lights when aft right landing gear touched down. On termination, forward cyclic speed trim would not extend to ground position from auto position. Manual operation was required to position cyclic speed trim. Aircraft has history of electrical short that burns up master caution panel.

Observation

OH-58 Class C

A series - While hovering on ridgeline during battalion battle drill, aircraft main rotor blades struck trees. When PC applied power, aircraft yawed and tail rotor also struck trees. Crew immediately began descent to land in small open area and completed landing without further incident. Aircraft sustained major damage to main and tail rotors, transmission, and drive train.

D series - During gunnery training, engine experienced overtorque (recorded at 131 percent) and mast overtorque (recorded at 118 percent).

OH-58 Class D

A series - During cruise flight, pilot's right-side armor panel blew open and was ripped from aircraft by wind force. Crew unsuccessfully attempted to recover panel. Suspect latch rim was loose.

OH-58 Class E

A series - During preventive maintenance daily following night flight, crew chief found battery switch in on position, pitot heater switch in on position, and pitot tube cover burned.

Fixed wing

C-12 Class C

C series - At about 9,000 feet MSL during climbout from IFR departure, passenger door came to full-open position. Crew declared an emergency and returned to Army airfield. During emergency landing, door made contact with ground from point of rollout until aircraft came to full stop.

C-26 Class D

B series - During single-engine operation training maneuver, aircraft drifted to left side of runway and contacted runway light with left propeller.

C-26 Class E

B series - During takeoff roll, pilot overtorqued No. 2 engine to 120 percent for 2 to 2.5 seconds. Pilot aborted mission without further incident.

OV-1 Class E

D series - After takeoff check, pilot noticed that nose gear indication was in transient condition. Crew also heard unusual wind noise from below pilot area. Crew advised ATC and requested vectors for ILS approach, completed before-landing check (gear indicated down and locked), and completed normal landing. Maintenance found that system had too much air and not enough hydraulic fluid.

D series - During cruise descent, autopilot would not disengage with control stick button or with switch on autopilot control head. Pilot placed compass in backup position and fast erected system. Autopilot still failed to disengage. Pilot then turned off inverters to disengage autopilot. Aircraft continued to base in VMC with no gyro without further incident. Maintenance replaced autopilot reference control and roll actuator shear pin.

D series - During approach, crew placed landing gear handle in down position. Left main gear indicated unsafe on wheel and flap indicator. Crew recycled gear with same result. Crew pulled landing gear emergency blowdown handle but unsafe gear indication was still present. Crew landed aircraft at home base without further incident. Maintenance replaced downlock switch.

Messages

■ Safety-of-flight (SOF) technical message concerning revision to visual inspections of tail booms required by SOF message OH-58-95-01 (OH-58-95-02, 222140Z Mar 95). Summary: SOF message OH-58-95-01 required an initial inspection prior to next flight, a 2.5-hour recurring inspection, a 20-hour recurring inspection and restricted forward indicated airspeed to 80 knots except for maintenance test flights. As a result of field input and engineering analysis, the requirements of OH-58-95-01 need revising. Implement the requirements of this message at the next 2.5-hour recurring tail boom inspection required by OH-58-95-01. This message supersedes SOF OH-58-95-01 entirely and makes the following changes:

• Removes from service all tail booms with previous repairs made to the skin aft of the horizontal stabilator.

• Increases the size of the inspection area.

• Requires the use of fluorescent penetrant inspection in lieu of visual inspection.

• Requires use of CPC Mil-C-16173, grade 4 to protect inspection area.

• Increases inspection interval to 8 hours.

Contact: Mr. Brad Meyer, DSN 693-2085 (314-263-2085).

■ Aviation safety action maintenance mandatory message concerning one-time inspection for Stratopower pumps, NSN 1650-01-249-4341 and reporting for turnaround program on all CH-47D, MH-47D, and MH-47E aircraft (CH-47-95-ASAM-04, 222239Z Mar 95). Summary: ATCOM has received numerous reports from the field of leaking and pressure fluctuations being experienced with the Stratopower hydraulic pumps. A typical scenario is that during normal flight, the hydraulic system indicates pressure fluctuations from a maximum of 4,000 PSI to a minimum of 2,000 PSI, followed by illumination of the hydraulic flight control segment light. Also, high temperatures in the hydraulic system have been noted when the aircraft is shut down. An intensive investigation has been completed, resulting in design changes to the Stratopower pump for improved reliability of the pump. The investigation revealed friction between the counterbalance sleeve and piston, failure of the counterbalance sleeve in fatigue that caused external leakage and prevented free movement of the counterbalance piston, and failure of the compensator housing mounting screw(s) in fatigue. An engineering change proposal was developed to create a new counterbalance piston, sleeve and seat, pump housing, control piston, compensator assembly mounting screws, compensator housing and pilot spool, and matched compensator housing/spool assembly. Extensive bench testing (300 hours) and field testing (12 modified pumps have accumulated more than 3,000 flight hours and are still ongoing without failure) have resulted in a full qualification approval for the new design features. The purpose of this message is to direct the field and supply depots to locate Stratopower hydraulic pumps and report to the logistical point of contact so a turnaround program can be established. Contact: Mr. Brad Meyer, DSN 693-2085 (314-263-2085).

For more information on selected accident briefs, call DSN 558-2119 (334-255-2119).

In this issue:

- New NDTE system for Army aviation
- Implementation of comprehensive radiation protection program
- Finger and lip lights are on the way
- Flight helmet success stories
- Plastic sunglasses: issues, answers, and solutions
- Aviator cold-weather underwear—what do we order?
- Starching ABDUs increases risk of burn injuries
- Reach pendants on external slingloads
- AN/APX-100 (V) operating procedures advisory
- Broken Wing Awards

Class A Accidents through April

		Class A Flight Accidents		Army Military Fatalities	
		94	95	94	95
1ST QTR	October	2	0	0	0
	November	3	0	0	0
	December	2	1	2	0
2D QTR	January	1	1	2	1
	February	2	0	0	0
	March	0	1	0	0
3D QTR	April	5	1	2	5
	May	0		0	
	June	0		0	
4TH QTR	July	4		5	
	August	1		0	
	September	1		0	
	TOTAL	21	4	11	6

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Address q
558-3770. Address questions about distribution to DSN 558-2062. To submit information for FlightFax, use FAX DSN 558-9377, Ms. Jane Wise.

Thomas W. Garrett
Brigadier General, USA
Commanding General
U.S. Army Safety Center

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