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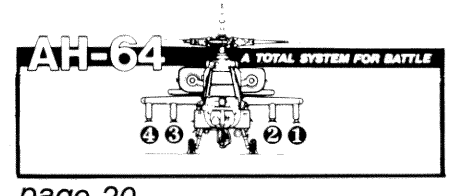

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Major General Ellis D. Parker
Chief, Army Aviation Branch

Aircraft Survivability Equipment Trainer II

AVIATION'S success and survivability on the modern battlefield are directly related to the quality and capability of its aircraft survivability equipment (ASE), and to its comprehensive threat and countermeasures training for the aviator.

Since the Vietnam era, the Army aircraft survivability program has emerged as a vital part of Army Aviation's success. We developed a five-step approach to improve survivability. These steps are tactics, signature reduction, warning, jamming and aircraft hardening. Employing these steps and increasing threat training will enable us to survive in the next conflict. We know that ASE has the same lifesaving potential and successful mission capability as the engine, transmission and flight instruments on the aircraft. Therefore, to help our pilots obtain the same proficiency with ASE as with other aircraft instruments, the U.S Army Aviation Center, along with the project manager—ASE, has designed two ASE desktop trainers.

The first of these two trainers, ASET I, was fielded in 1985 and serves as the springboard for our long-term optimum trainer, ASET II. The ASET I is a SECRET software package that is used with the AN/UYK-71 Microfix Computer System to teach threat, tactics and countermeasures for the AH-1S Cobra and OH-58A and C Kiowa aircraft.

Our follow-on optimum ASE trainer is ASET II. This SECRET software package will teach threat, ASE, tactics and countermeasures for the scout, attack, cargo, utility and special electronic mission aircraft. The ASET II will use the electronic information delivery system (EIDS) as its delivery vehicle.

The ASET will be designed into three modes—tutorial, game and management. The highly interactive courseware will allow the aviator to learn all aspects of threat identification, threat evaluation and ASE operation and apply them practically in tactical situations.

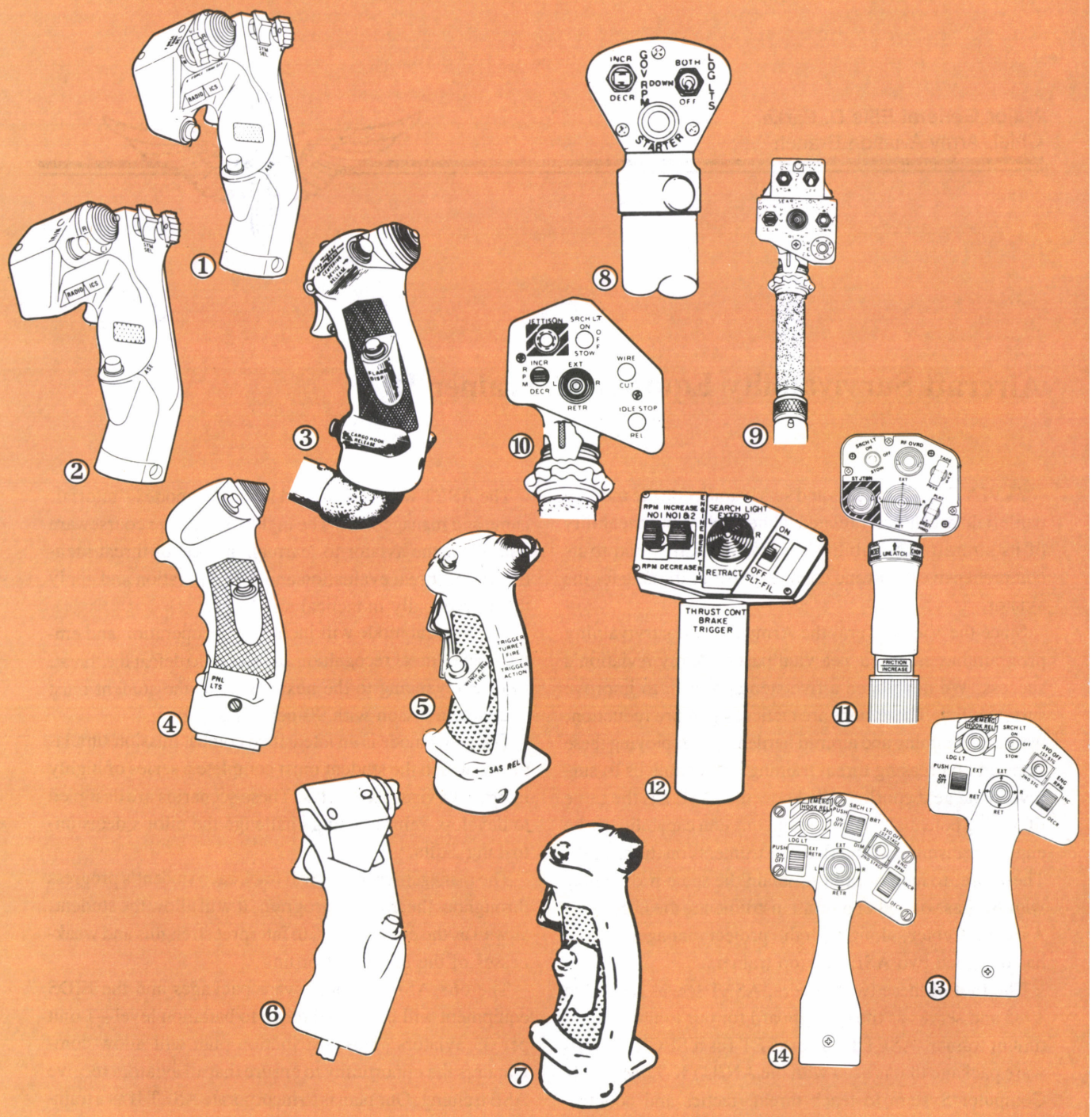
The tutorial mode will include ASE operation and employment, threat recognition and tactics to defeat the threat. Before advancing to the next segment, the student must complete a lesson with 90-percent accuracy.

The game mode is an intensified combat mission simulation in which the student must complete a series of highly interactive visual scenarios. These scenarios are designed to develop, reinforce and challenge the pilot's decision-making skills.

The management mode will track each student's progress throughout the training program. It will allow the student, as well as the commander, to interpret strengths and weaknesses of the individual or unit.

The 668 ASET I courseware packages and the EIDS equipment will be fielded down to battalion level—1 unit per 33 aviators. This distribution plan will allow commanders the opportunity to ensure that all aviators receive ASE training. Our plan is to incorporate ASET II as a training requirement of the aircrew training manual.

Both ASET I and II will certainly improve our survivability on the next battlefield. With properly trained pilots at the controls, Army aircraft provide the speed, firepower and maneuverability to accomplish the AirLand Battle mission. ASET I and II provide this training. Take advantage of this valuable training tool now with ASET I and with ASET II when it is fielded in late fiscal year 1989.



In this article are shown several of the cyclic and collective controls from the current inventory of aircraft. Take a few minutes to look at them to see how many you can identify and the aircraft to which they belong. As you evaluate each one of these controls, note the different switches and their locations. Answers are on page 10.

MONTHLY WRITING AWARD

STANDARDIZATION OF COCKPIT CONTROLS

Mr. Jim Steelman

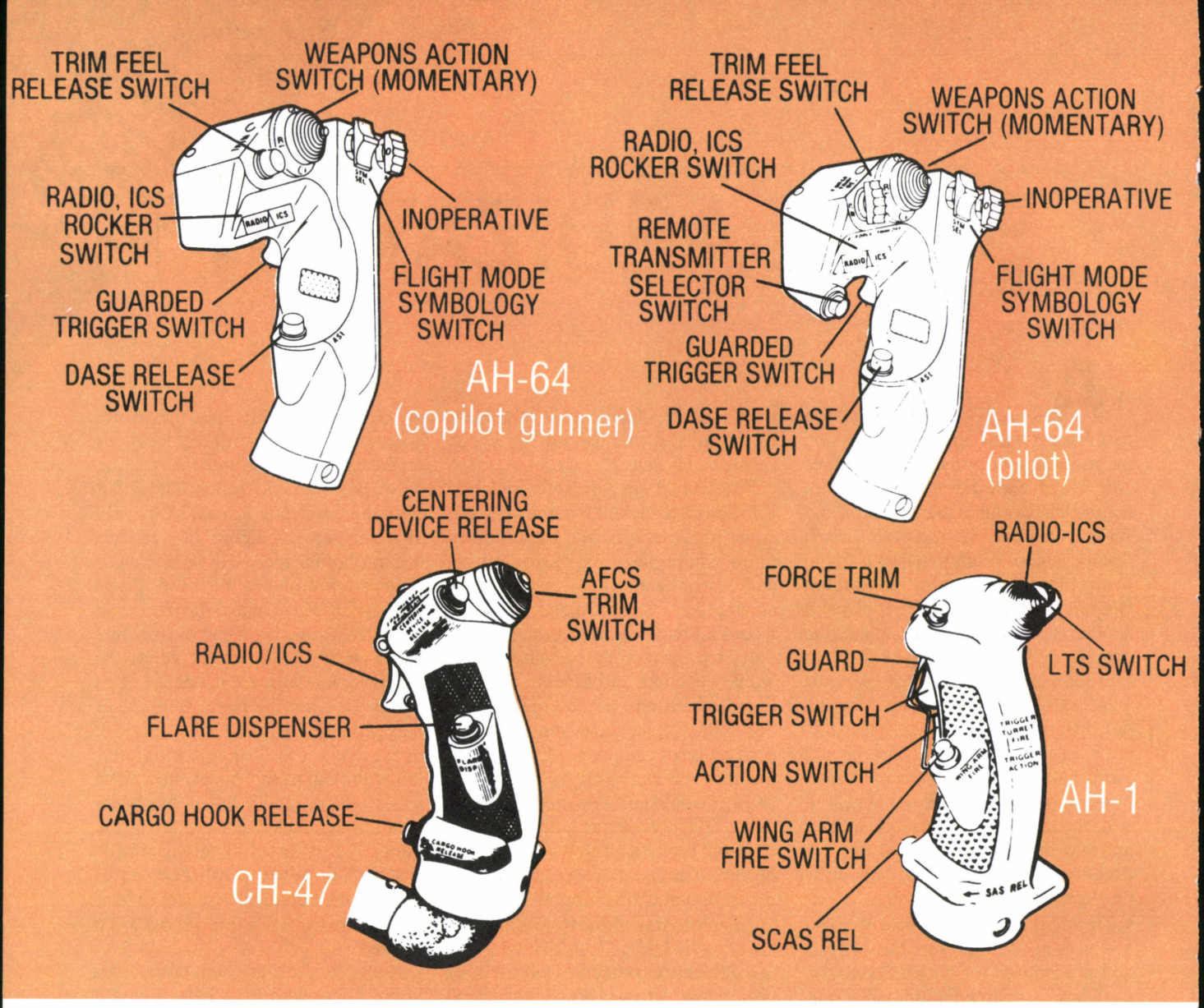
AS AVIATORS transition from one type of aircraft to another, they no doubt suddenly find themselves confronted with the problems of becoming comfortable in the cockpit and finding the controls. A certain switch that the aviator needs to locate is found in one place in one type of aircraft but is often located in a different place in another type of aircraft. Along with the problem of switches being in different locations is the problem of switches and controls having the same function but different names in different aircraft. The myriad of controls and switches seem to increase with each new aircraft. This trend has appeared with the current inventory of aircraft and may increase as new equipment is procured for placement in units throughout the U.S. Army.

During the process of procurement and design of new aircraft, the methods and procedures for cockpit controls, switches, instrumentation and terminology have become nonstandardized. Readers who serve on aircraft configuration boards should not become defensive at this point about this asserted nonstandardization; they should wait until they have tackled the identification and comparison of cyclic controls on page 2.

Pilots need standardized cockpits. Pilots need a cockpit that they can become proficient in, and they need to know where all of the basic controls and instruments are or where they should be. Standardized cockpits would allow for a much easier transition from one aircraft to another. Pilots would become proficient quicker. Standardization would reduce the possibility of accidents and cause less destruction of equipment. It would also increase the availability of pilots because it would cost less money to train them, and it would provide for a standardized force of aircrews and aircraft needed to transport troops and provide protection and fire support.

As pilots transition from the UH-l Huey to the UH-60 Black Hawk, they are suddenly exposed to a multitude of different switches, instrumentation and terminology. The only control that is the same on the UH-l and the UH-60 collective is the search light control. The cyclic control stick grip is the same shape in both aircraft. Most of the cyclic grip switches are the same; however, they are in different locations on the cyclic grip. A pilot in training may ask, "What is the big deal about changing switches around? I can fly anything and changing of switches doesn't bother me." However, these pilots are few and far between. Pilots may ask, "Why change the name and location of switches?" They may further assert, "If the buyer wants the cargo hook release switch changed on the cyclic from the lower left side of the cyclic stick grip to the top right side of the cyclic grip, the seller will certainly do that to sell his product. The seller will no doubt think that is the location desired by a majority of the pilots who fly or will fly his aircraft." The truth is, however, pilots are rarely asked their opinion on where switches or instrumentation should be located.

How does the placement of switches affect pilots who have been flying a UH-l or a CH-47 Chinook and have just been, or are in the process of being, qualified in the UH-60? When these pilots are thrown into a critical situation, while flying, more than like-

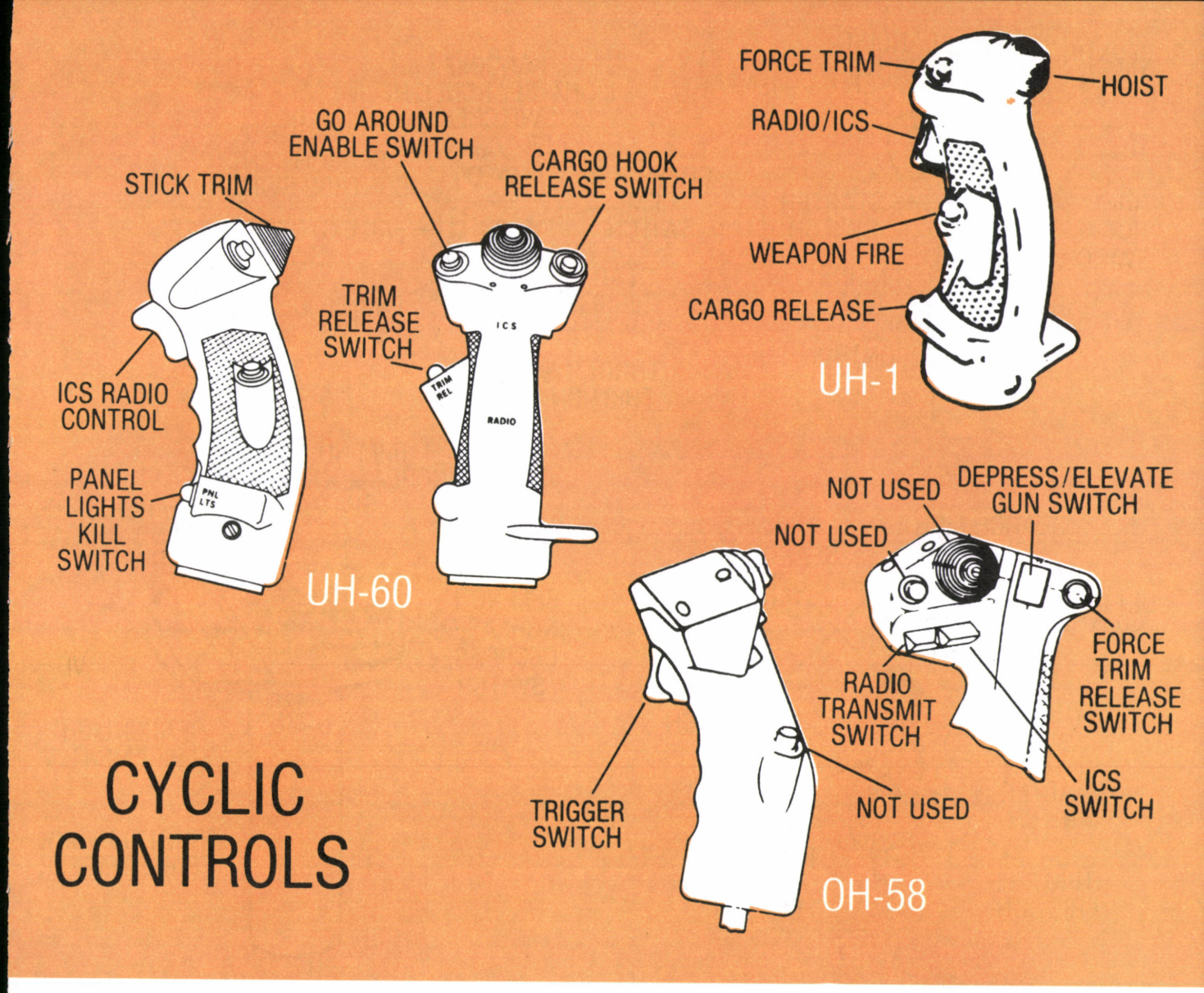


ly they will revert back to their standard cyclic grip, press the night vision goggles panel lights kill switch in a day visual meteorological condition and cause a normal slingload mission to develop into a major accident. Why? Because a cyclic switch was changed and negative habit transfer has occurred.

First, let us compare three cyclic stick grips: the UH-1, CH-47 and the UH-60. The switches have been completely changed around in these three aircraft. Note the feature of the intercom/transmit switch on the UH-60 cyclic stick grip. It is extremely difficult for aviators who transition into the UH-60 to adapt to this switch. The upper position is for intercom, and the lower is for transmit. This switch is reversed from what aviators are accustomed to using in other aircraft.

I am qualified to fly in more than 30 aircraft, and this switch is a first for me. This switch, the one different feature on the cyclic stick grip, is not only distracting, but it is also awkward to use. The only aircraft in which I have found the two cyclic stick grips almost the same, with switches in similar positions, are the UH-1 and the CH-47. All other cyclic grips have switches in different places.

From 1956 through 1966, helicopter switches were standardized on the CH-34 Choctaw, CH-21 Shawnee, CH-37 Mojave, UH-1 and the UH-19 Chickasaw. Since the procurement of the AH-1 Cobra, AH-64 Apache, OH-58

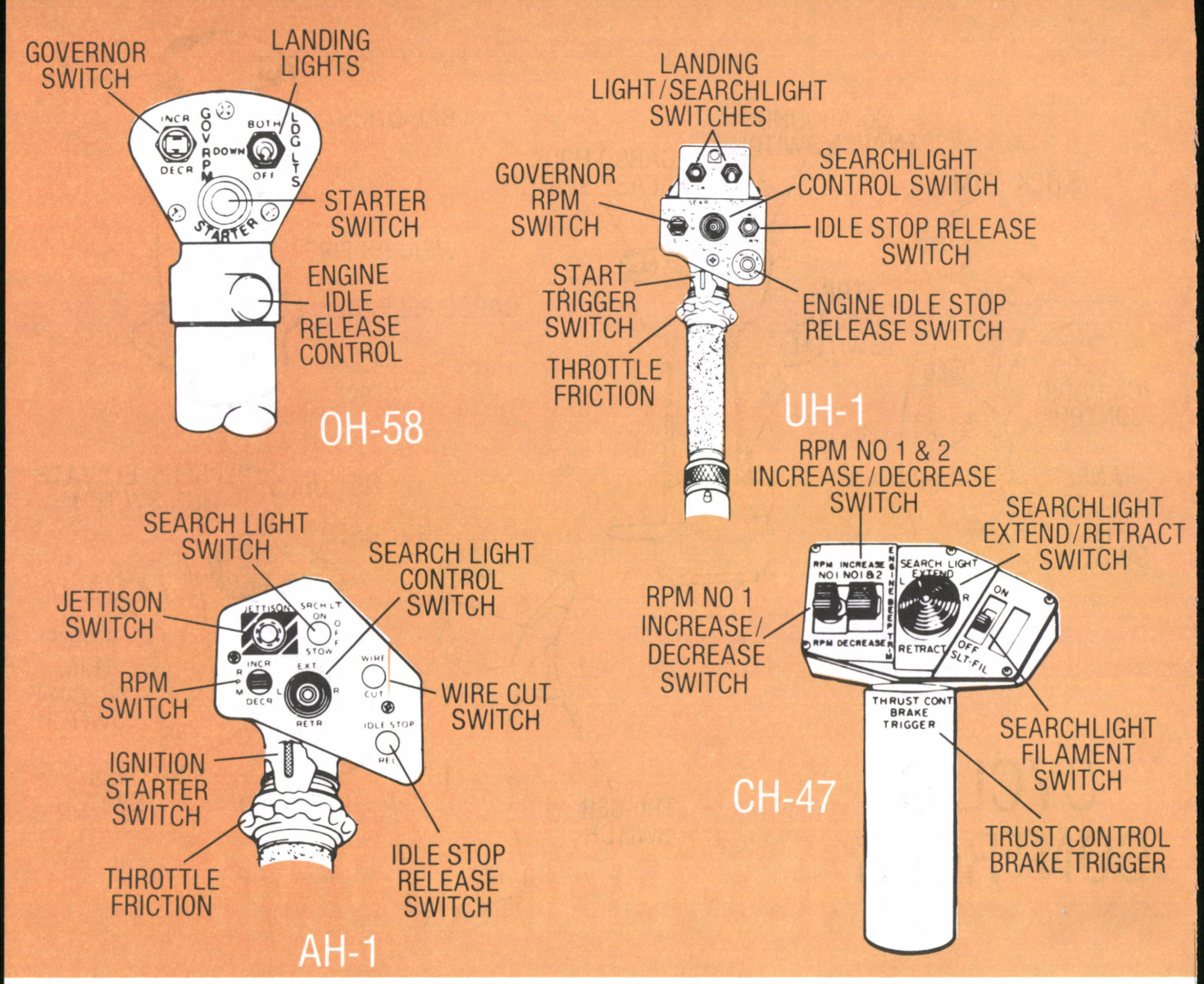


CYCLIC CONTROLS

Kiowa and the UH-60, the concept of standardized cyclic and collective controls and switches has vanished.

The problem of nonstandardization does not stop with cyclic controls; it continues with collective controls and switches. The same collective controls in different aircraft do not have the same names. For example, the OH-58 collective control is called pilot collective lever; the AH-1, collective control stick; the AH-64, collective stick control; the UH-60, collective pitch control stick and the CH-47, thrust control. These controls all have the same function: they change the pitch in the rotor system.

Second, let us consider some of the current design features of collective pitch controls that need standardization. The UH-1, programed to be in use until around the year 2010, has a governor increase/decrease (INCR-DECR) switch and a search light extend retract control installed adjacent to one another. In any night operation, after making a good approach, or not so good as the case may be, and after completing a prelanding check, a pilot adjusts the search light and, in doing so, presses the revolutions per minute (rpm) DECR switch; as a result, the helicopter settles to an unintended landing surface. The pilot may have thought the engine had failed when the audio and rpm warning light came on and may have swiftly lowered the collective, thus driving the aircraft into the ground and causing major materiel



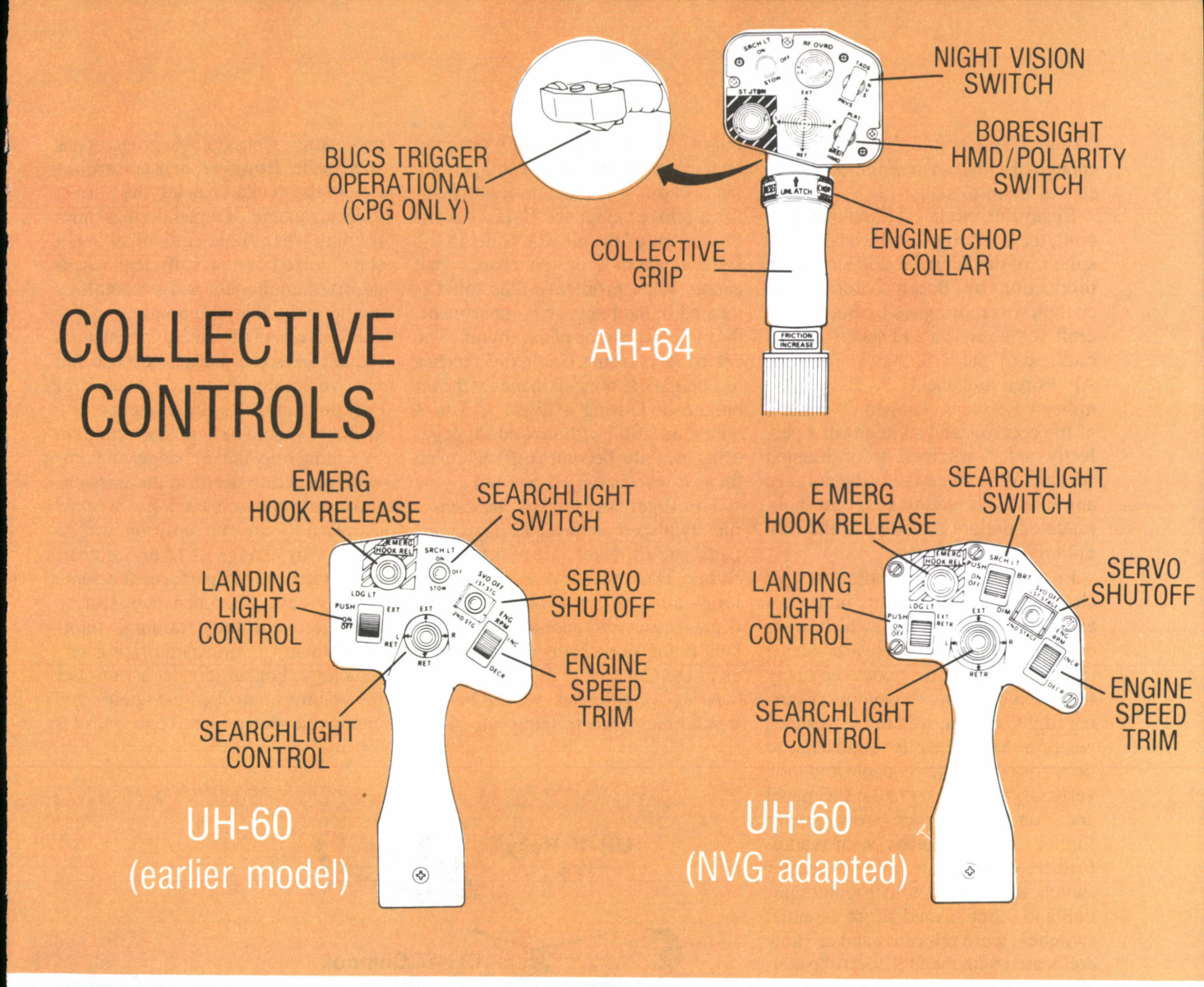
damage to the UH-1 and possible injuries to those onboard.

For another example, consider the AH-1 with the same feature as the UH-1. As an added feature on the AH-1, a jettison switch is placed just above the INCR-DECR switch so that, if pilots are not careful while adjusting their rpm, they may "pickle" a full load of rockets or even the pods.

The CH-47, UH-60 and the AH-64 also have the same design features as the UH-1 and AH-1. In the CH-47, the number 1 and 2 engine INCR-DECR switches are adjacent to the search light extend-retract switches. With the aircraft carrying a heavy slingload at night, the pilot's repositioning the search or the INCR-DECR by mistake, thinking there was a problem with the engine, could cause a mishap. In the UH-60, the emergency cargo hook release switch is located immediately above the push/on-off landing light switch. If the pilot presses the cargo release switch by mistake after completing a cargo flight, the cargo will drop and, if he is not aware of the cargo being released, he can land on it. A copilot recently released a slingload while adjusting the landing light for the pilot. The cost of the lost slingload was $40,000. A crewchief of a CH-47 caused a similar accident. Pressing a pendant to talk, he pressed the wrong switch near the intercom switch and released the slingload.

Some systems use audio signals to alert pilots of problems. The stabilator

COLLECTIVE CONTROLS



audio in the UH-60 has a tone similar to that of the low rpm audio in the UH-1. In the event the stabilator should fail in a UH-60, and if the pilot has had recent UH-1 time, he is inclined to lower the collective, thinking the engine has failed. This could be a fatal move. The UH-60 operator's manual contains a warning that, if acceleration is continued or *collective* is *decreased* with the stabilator in a trailing edge down position, longitudinal control will be lost.

Because of the location of switches on the UH-60 collective, an emergency procedure was inserted in the operator's manual. If a servo light comes on, the procedure requires a check to see if the servo switch was inadvertently turned off. Should a pilot mistakenly turn one of these servos off, there is the possibility that the other servo will fail. The UH-60 must have one of these systems operational to fly.

In a recent fixed wing accident, four persons were killed when an aircraft stalled and dived into the ground immediately after takeoff. The investigators concluded that the control levers were mounted in a different location from the previous aircraft the pilot had flown. Previous engine controls were mounted as follows: propeller-throttle-mixture, sequenced from left to right; while the fatal aircraft engine control levers were mounted throttle-propeller-mixture. The pilot on takeoff mistakenly pulled back on the prop controls when attempting to reduce power after

takeoff. This could have imposed enough of a load on the engines to have caused them to stall.

Regarding our latest fixed wing aircraft, the C-12 Huron, which is a direct spinoff of the King Air 200 already in production by Beech Aircraft, the cockpit was redesigned by Beech Aircraft at the request and specifications outlined by the U.S. Army, the U.S. Air Force and the U.S. Navy. The military Services changed 80 percent of the controls and switches in a perfectly safe, efficient, pilot-oriented cockpit. Why? It certainly did not save any money. If anything, it cost thousands of dollars to retool to the new military specifications.

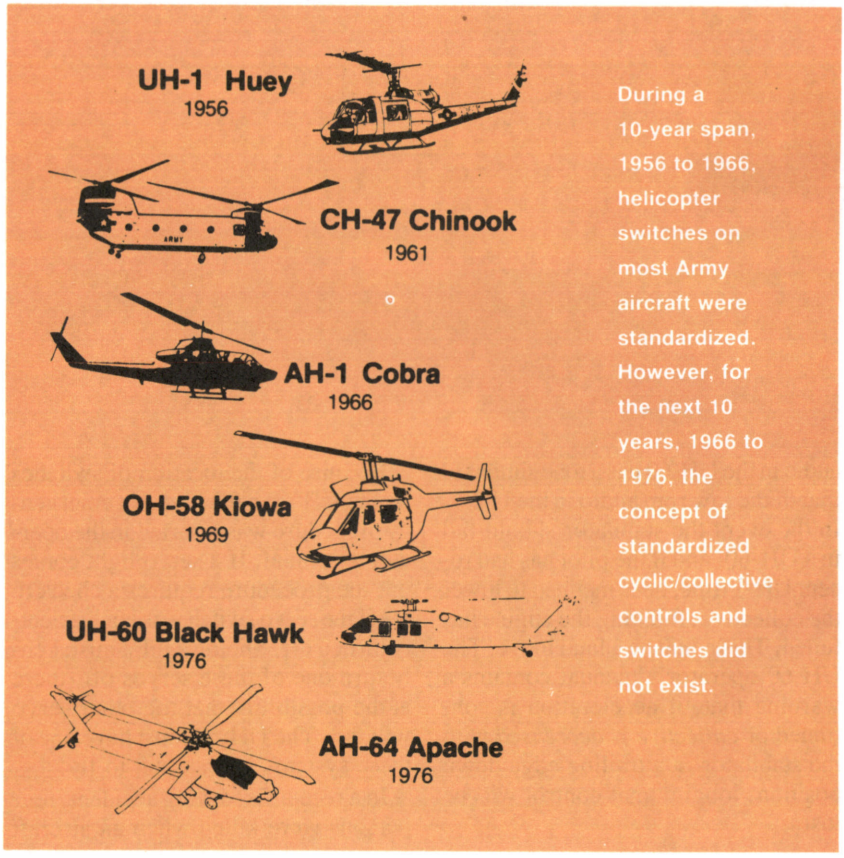
In what way was the cockpit changed? The fuel quantity indicators and fuel control panel, which were originally on the left forward side of the cockpit where they could be easily reviewed by both crewmembers during flight, were moved to an overhead position. Now, the pilot almost has to lie across the center console and look vertically up to observe the fuel panel and control switches. Also, other flight-essential switches, such as autofeather, engine start, avonics master switch, the master switches, autoignition and other related flight-essential switches, were relocated and are now collocated with the fuel control panel. This creates a maze of switches overhead. With the new location of cockpit switches and controls, pilots can become spatially disoriented or sustain a swirl effect while flying at night or under instrument conditions.

Engine instruments were placed on the right side of the instrument panel centerline, which causes the pilot in the left seat to lean to the right during takeoff to prevent an overtorque or ensure temperature limits are not exceeded. The UHF (ultrahigh frequency) radio and transponder were placed to the extreme rear of the avonics console, which causes the crewmember who is adjusting the radio or setting the transponder to become spatially disoriented. When getting into the cockpit, the crew must fold down a panel and step on the center console to avoid stepping on the radios. In the King Air 200, one may be 6 feet 6 inches tall and still get into the cockpit. It is much more difficult for a pilot to enter the C-12 cockpit. Placement of the electric toilet in the C-12 is another design change that causes some problems. The toilet is located in the baggage compartment, the most aft position of the aircraft. The cabin tapers from a height of 57 inches to a height of about 40 inches at the aft bulkhead. During a flight of 3 to 4 hours' duration with stowed baggage, using the toilet becomes difficult, even for one who is only 5 feet tall.

The flight instruments are conveniently placed on the C-12 instrument panel and allow for ease of instrument flying. They were left where they belong—an excellent layout. Helicopter flight instruments should be standardized in the same pattern and location as in the C-12.

Army Aviation has worked hard to standardize pilot training and flight procedures. Considerable progress has been made. However, nonstandardization of the cockpit has left the pilot at a disadvantage. To standardize pilot training when flight equipment is not standardized is not sufficient. Standardized equipment and terminology would make the job complete.

Procurement of new equipment does require that some changes be made, but not wholesale changes. Changes of cockpit controls, instruments and switches should be kept to a minimum by adding only those changes in hardware needed to perform the mission. If a cargo release switch has worked successfully in one position for 25 years, why change it? Many controls and switches that perform the same function have different names. During transition and unit training, pilots spend many hours memorizing terminology. For starters, let us consider the volume control on navigation and communication radios. That control is



During a 10-year span, 1956 to 1966, helicopter switches on most Army aircraft were standardized. However, for the next 10 years, 1966 to 1976, the concept of standardized cyclic/collective controls and switches did not exist.

referred to as volume, gain and audio control. These three terms all mean the same thing: control sound levels. Why not use one term for the volume control? Some of the abbreviations used in referring to turbine engine temperatures are TGT, TOT, ITT and TIT. All of these abbreviations refer to a measurement for operating engine temperatures. The source of the limiting operating temperatures is not really that important to the pilot.

Rotor speeds are referred to by different terms. These abbreviations are rotor rpm, Nr and %rpmr. Gas turbine speeds are referred to as N_1 or Ng. Engine power turbine speeds are abbreviated as Np, N_2 and %rpm. Stability systems are referred to as SCAS, SAS, ASE and AFCS. Vne, which means never exceed speed, is defined a different way in each operator's manual. These abbreviations are merely a few of those having the same meaning but different names.

In chapter 1 of the AH-64 operator's manual, a statement is made that the abbreviations and terms that are used in the text clarify the text in that manual only and *they are not necessarily standard abbreviations*. This kind of nonstandardized aviation language not only makes it difficult for one aviator to converse with another but also causes confusion throughout the entire aviator chain of command. Investigations of accidents and correct conclusions can also be adversely affected by lack of standardized language.

The Federal Aviation Administration (FAA) recently made a ruling *requiring standardized flight controls* for Part 23 aircraft (small aircraft) to make flight decks (cockpits) less confusing. The new FAA regulation requires all Part 23 aircraft certified after 11 August 1986 to have aerodynamics, powerplants, fuel systems and auxiliary cockpit controls in the same shape and a similar position. This action was taken to minimize accidents caused by random location, operations and arrangements of cockpit controls for small airplanes. This FAA policy is consistent with that established for larger aircraft.

Pilots form habit patterns from the first time they start learning how to fly. The more aircraft that pilots transition into, the more habit patterns they must expand. The UH-60 copilot's pressing the emergency cargo release located next to the landing light press-on-off switch and the CH-47 crewchief's transmitting the cargo to the ground are examples of habit transfers that resulted in mishaps.

The instructor pilot's (IP's) mission is to train aviation personnel in the proper method and procedures for certain types of aircraft. Their task is made more difficult by the redesign, redesignation and the nonstandard placement of switches and controls that have the same functions. The redesign and placement of switches in different locations on new aircraft not only increase training time required for the individual to become proficient, but also create inherent safety problems. Most of the time, missions are accomplished and all goes well. Problems arise, however, when the crew is thrown into a demand overload situation or when they become too relaxed and encounter a pressured situation. As so often happens, they automatically will revert back to a previous habit pattern while flying in a new type aircraft. Crewmembers press a switch, then look, instead of looking and then actuating the correct switch or control.

In a recent article in the *Army Times*, General Glenn K. Otis, the U.S. Army European commander, addressed standardization of organizations and procedures. He stated that his goal is to standardize organizations and procedures because, as they are, they create an unnecessary workload. What can Army Aviation do to correct the design of equipment and the placement of controls and switches? The answer is, "Don't just preach standardization; initiate, monitor and *follow up* on standardization. Perhaps one agency should be in control of the cockpit configuration of aircraft. I have been a part of Army Aviation for 31 years. During this time I have not been asked for advice on the configuration of cockpits nor, to my knowledge, have any of my line pilot associates. Personnel with a high level of operational experience should advise and recommend changes in the location of controls, instruments and switches. Given the maze and location of cockpit controls, it appears that control authorities who approve these cockpit changes and designs do not communicate with those with operational expertise. Obviously, this communication is a must.

The following summaries are typical of the mishaps caused by inadvertent jettisoning of external stores, sling-loads, doors and windows:

- A pilot was spraying for mosquitoes with a new type of sprayer slung beneath his UH-1V. While spraying at about 70 feet above ground level and at 50 knots speed, the pilot inadvertently pushed the cargo release button, releasing the load. The pilot was flying with his right index finger on the intercom switch and his middle finger on the cargo release button. As he pressed the intercom switch, he inadvertently and simultaneously pushed the cargo release button. The spray rig was damaged when it hit the ground in a rice field. The damage to the rice field was negligible.
- During a jump mission in a UH-60, the jumpmaster inadvertently jettisoned both escape panels from the left cargo door when attempting to open the left cargo door. The jumpmaster was properly briefed; however, he released the escape panels, instead of opening the cargo door. Upon landing, the aircraft was inspected for damage. No damage was found; the aircraft was released for flight. To prevent this type of mishap, it was recommended that a design change be considered. This problem still exists since no design change has been made. The latest mishap occurred in 1988 when an aircraft's windows were inadvertently jettisoned.
- Another instance of this type of mishap occurred in a CH-47D. The aircraft was at a stable hover with an external load about 35 feet above the ground. The flight engineer and crewchief cleared the load and aircraft for descent. As the copilot began the de-

scent, he inadvertently depressed the cargo hook release button, allowing the external load to fall the remaining 30 feet to the ground. The external load sustained extensive damage to its undercarriage and body. There were no injuries.

• An external load was inadvertently released by the crewchief flying a CH-54A Tarhe. The crewchief used the cyclic intercom switch instead of the floor switch, mistakingly pushing the cargo release button. The load sank. The crewchief notified the Coast Guard. The slings that were lost were later retrieved.

• During recovery from diving fire, a student flying an AH-lS did not respond to the IP's command to "go cold" (safe the weapon system). As the aircraft was put into a left bank, the rotor rpms started to increase. The IP applied collective pitch (CP) to reduce the rotor rpm. Then he immediately reached for the CP master arm switch to safe the weapon system. In his haste, the IP unintentionally jettisoned all the external stores except for the left inboard M-200 rocket pod, which failed to release from its aft attaching point. One M-200 rocket pod and two TOW missile racks were damaged, and one M-200 rocket pod was destroyed.

• In still another incident, an AH-64A was on the ground with blades stopped but auxiliary power unit (APU) running. The copilot received the signal from the pilot in command who was out of the aircraft to complete aircraft shutdown. The APU was shutdown before the generator was turned off. The stabilator failure horn sounded. The copilot reached to reset the horn without visually checking the button and pressed the jettison all button. The rocket pods were jettisoned from the aircraft. Later, the pylons were removed, cleared, inspected, reassembled and reinstalled.

• While at cruise speed, the pilot of an OV-lD Mohawk observed hydraulic fluid leaking and running on the floor in front of the cockpit next to his feet. The pilot noticed the No. 2 hydraulic pressure gauge/system went to zero. The No. 1 hydraulic system was fluctuating. While performing emergency landing gear extension, the pilot inadvertently pulled the emergency stores release handle, jettisoning the right drop tank before landing. The left drop tank did not release from the wing store and remained on the aircraft. The landing was uneventful. The pilot mistakenly pulled the emergency stores release handle instead of the emergency landing gear release handle. Both handles are painted yellow and black striped. The wiper motor seal failed, causing hydraulic fluid leakage in the cockpit.

Such types of mishaps have cost the U.S. Government more than $622,000 since 1983. Army Aviation cannot continue supporting such costs in damages to its aircraft. Certainly, an ounce of prevention is worth a pound of cure. Standardization of cockpit controls is that ounce of prevention that could ensure the pound of cure is not needed.

Answers to cyclic and collective controls identification from page 2.

Cyclic Controls

1. AH-64 (pilot)
2. AH-64 (copilot gunner)
3. CH-47
4. UH-60
5. AH-1
6. OH-58
7. UH-1

Collective Controls

8. OH-58
9. UH-1
10. AH-1
11. AH-64
12. CH-47
13. UH-60 (earlier model)
14. UH-60 (NVG adapted)

ABOUT THE AUTHOR

Mr. Jim Steelman was an aviation warrant officer for 20 years, graduating from the U.S. Army Aviation Flight School at Ft. Rucker, AL, in December 1957. He retired in 1977 as a CW4. Mr. Steelman's last assignment before his retirement was with the U.S. Army Forces Command Flight Detachment, Ft. McPherson, GA, where he performed the duties of flight standardization officer and was the primary pilot for General Bernard Rogers.

He is qualified in flying more than 30 aircraft, having had 8,000 hours of fixed wing and 6,000 hours of rotary wing flying time. He is currently a Department of the Army civilian instructor pilot teaching in the UH-60 Black Hawk aircraft qualification course at Ft. Rucker.

THREAT

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THE WARSAW PACT VIEW—

Engaging Attack Helicopters With Tanks

SINCE WORLD WAR II, tanks have been the primary ground striking force on the battlefield. Their lethality has called forth various responses, among them antitank guided missiles (ATGMs) and attack helicopters. First making their appearance during the Vietnam conflict, U.S. modified UH-l Hueys and AH-l Cobras impressed Soviet observers so much that they quickly produced their own attack helicopter, the Mi-24 Hind. At the same time, the Soviets became increasingly aware and concerned that dedicated air defense systems might not be able to neutralize this new antitank threat on the battlefield.

During the late 1970s and the early 1980s, the Soviets and their Warsaw Pact ally, Poland, forthrightly addressed the issue in several publications. First, antihelicopter defense is the responsibility of all elements of the combined arms force. Interestingly enough, the U.S. Army, during the last 2 years, has adopted much the same philosophy against Soviet antitank attack helicopters with the forward area air defense system.

Second, because of their relatively low speed, low flying altitude and lack of armor protection, helicopters are vulnerable to the firing of all weapons in a combat unit, including tanks. Of course, the modern Soviet tank is equipped with a dedicated antiaircraft system, the 12.7 mm machinegun mounted on the turret. However, even with this weapon, the Soviet Union and Poland have developed helicopter engagement tactics and doctrine for tank main guns.

Initially, on the battlefield, the Soviet battalion tank commander will brief his subordinates concerning natural screens from which North Atlantic Treaty Organization (NATO) helicopters could deliver attacks; moreover, along

Engaging Attack Helicopters With Tanks

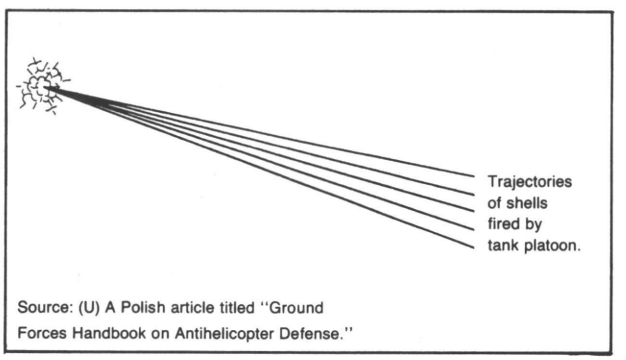
Soviet T-55 tank platoon.

the main axis of advance probable ambush locations, helicopter approaches and attack positions are noted. To bring greater reliability into this integrated system, air surveillance sectors for tank companies, air defense weapons and battalion observation posts overlap. Supplementary observation posts are situated on probable helicopter approach axes. Finally, detection and early warning of airborne helicopters are also the responsibility of combat reconnaissance patrols and the flank companies.

Target selection takes place as soon as a group of helicopters launches its attack. The helicopter posing the greatest threat receives first priority. Individual tanks of a platoon or company open fire on targets assigned or on those targets being engaged by the commander.

The primary technique employed against helicopters by tank main guns is the barrage-firing technique. Employed by an entire platoon or only one tank, the first barrage will be fired when the target is at a range of 4 kilometers (km); the second barrage will be launched when the helicopter is 3.5 km away; and the third barrage will be fired when the target reaches a range of 3 km. Consisting of one round from each tank, the number of barrages is a function of the target's range at the moment of its detection, the effectiveness of the preceding barrage and the number of targets in the attacking group. Barrage firing by several tanks will

FIGURE 1: Clustered salvos (simultaneous explosion of five shells).



Source: (U) A Polish article titled "Ground Forces Handbook on Antihelicopter Defense."

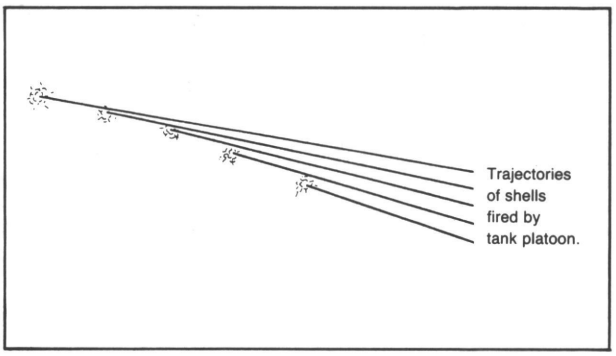


FIGURE 2: Graduated salvos.

ensure a higher probability of kill because of the concentration of fire.

Employing 100 mm antiaircraft cartridges (UO-415) with time fuzes (VM 30), Polish T-54/55 tanks could execute the barrage-firing operation in one of four ways:

- A clustered salvo (figure 1) calls for all tanks of a given unit to simultaneously fire one round each at the same initial target-coordinate settings.
- A second method is the graduated salvo firing technique (figure 2). Here all tanks in a unit proceed as in the clustered-salvo method except with the rounds having slightly different time-fuze settings. This technique produces a fragment impact zone that extends along the line of fire. Such a technique is employed when the helicopter's range has not been determined accurately. This method will increase the probability of "covering" the target with an area of explosions and fragments. (Generally, a change of 2 settings on the timed fuzes increases or decreases the burst by 200 meters.)
- The third technique advocated is the rapid concentrated firing method, whereby a tank platoon or company fires at a helicopter whose range has been precisely determined and remains unchanged while the firing is in progress. In this case, tank crews will quickly prepare weapons, take aim and fire on their own initiative. Firing ceases when it has been ascertained that the target has been destroyed or hit. Such a technique makes it possible to open fire more quickly and consumes less ammunition than the clustered-salvo firing technique. One disadvantage is that this method might "warn" the helicopter crew since a few shells are bound to miss their target.
- The fourth technique is the graduated-burst method, whereby a tank platoon fires on a helicopter by aiming at the same target with different time-fuze settings and with identical range settings. However, the tanks do not fire their guns simultaneously on a single command, thus creating bursting fragmentation explosions at different ranges and at different times. Such a method could prove very distracting to the crew of a helicopter.

The U.S. Army also has been concerned with the vulnerability of attack helicopters to tank main guns. The first study (Army Aerial Direct Fire Support Systems) involved calculating the effectiveness of a Soviet T-62 tank, 115 mm gun against helicopters. In this study the helicopters were placed in one of three modes: hover flight, 50 knots (kts) flight at right angles to the tank and 100 kts per flight at right angles to the engaging tank. At a range of up to 1,500 meters, the tank has a better than 50 percent probability of hitting the helicopter in the hover mode. On the other hand, in the crossing scheme the probability of hit is much less. The hit probability is 74 percent at 250 meters and a speed of 50 kts per flight. At the same range and a speed of 100 kts per flight, the hit probability drops to 50 percent. At 1,500 meters this capability is reduced to 10 percent and 6 percent with the respective flight speeds of 50 and 100 kts per flight.

The second study (Equal Cost Firepower Study II) involved again a 115 mm tank gun against a maneuvering side-slipping helicopter. The Army found that the tank main gun had only a 10 percent hit capability at 500 meters and a 4.7 percent hit capability at 1,500 meters.

During the 1980s, the Soviet Union placed a new ATGM, the AT-8/Songster, on their T-64B and T-80 tanks. It is estimated that, with its distinct speed advantage over earlier ATGMs and the use of a laser rangefinder, these tanks may be able to acquire a helicopter and fire before the helicopter launches its ATGMs. To further assist the tank in such target acquisition, it has been suggested that a small tank-mounted battlefield surveillance radar be employed to identify helicopters. If acquired, the tank could launch its protective smoke grenades or engage the helicopter with its main gun or machinegun.

The greatest danger to NATO helicopters from tank main guns would occur when the tanks are not actively engaged with enemy ground forces (e.g., during short halts on road marches, awaiting orders in an assembly area or in defensive positions awaiting the enemy).

In any case, the primary responsibility for destroying helicopters belongs to dedicated air defense weapons like the ZSU-23-4 and SA-16 rather than to tanks. Therefore, although the Soviets and their Warsaw Pact allies have developed a doctrine for tanks to engage helicopters, U.S. and NATO helicopters face a far more formidable threat from dedicated air defense systems than from Soviet and Warsaw Pact main tank guns.

Training to Standard is Key to Reducing Human Error Accidents

HUMAN ERROR is a definite cause in more than 80 percent of all Army accidents—air and ground. Future reductions in Army accident losses will be directly related to reducing human errors with accident-causing potential.

Accident experience shows that human-error accidents are frequently clear indicators of training weaknesses—the same training weaknesses that would quickly deplete a unit's capability to fight in combat.

The root cause of the problem is failure to train to standard or to the right standard. The solution lies in integrating safety into training and operational processes.

Too many people misunderstand the term "human error." For example, when an aircraft accident investigation team lists pilot error as a cause factor, it doesn't necessarily mean the pilot went out and did something to intentionally cause the crash. Pilot error means the aircraft crashed because the pilot made a performance error. He did something wrong or failed to do something that caused the crash. The reason he made the performance error, however, could be lack of training, lack of established standards or failure to follow standards.

The point is, when standards are not clear or practical or do not exist and the pilot makes an error, that error is the result of command failure—failure to establish standards. If standards exist but are not known or ways to achieve them are not known, and the pilot crashes an aircraft because he does not know the standards, we have a training failure. When standards exist and are known but leaders fail to enforce them, pilot error is the result of leader failure. When standards are known, but not followed—when pilots fail to perform to established and enforced performance standards—then we have individual failure. While we realize that most accidents are caused by a combination of failures, we are deliberately emphasizing only one teaching point in the following accident summaries.

Major Reasons for Human Error

Standards are not clear or practical or do not exist	Command Failure
Standards exist but are not known or ways to achieve them are not known	Training Failure
Standards are known but are not enforced	Leader Failure
Standards are known but are not followed	Individual Failure

Individual Failure

An OH-58 Kiowa pilot was approaching a landing area at 85 knots. When the helicopter was about 10 feet off the ground in a 20-degree bank left turn, and still traveling at 85 knots, the main rotor blade hit gently sloping ground to the left. The OH-58 hit the ground and came to rest on its side. The pilot made an unnecessary high-speed landing approach. *He knew the standard but failed to follow it—an individual failure.*

A UH-60 Black Hawk on a night vision goggles (NVG) mission hit wires 67 feet above the ground and crashed. The wires were marked on the wire hazards map in operations. *The pilot knew that he was supposed to mark the wires on his maps, but he did not do it even though time and opportunity were available for him to do so—another individual failure.*

Leader Failure

A UH-l Huey was the lead in a flight of four proceeding down a valley 100 to 150 feet above ground level at an airspeed of 90 to 100 knots. The helicopter hit wires and crashed. *The mission was being flown at an airspeed excessive for the terrain and altitude. No route/hazard reconnaissance had been made as required by the unit standing operating procedure (SOP). The unit commander was onboard one of the aircraft in the flight yet took no corrective action. Standards were known but not enforced—leader failure.*

Training Failure

Two UH-1H pilots decided to make a low-level, high-speed flyby. As the aircraft were in a side-by-side formation, the wing aircraft converged on the lead aircraft. During an evasive maneuver by the pilot of the wing aircraft, the overlapping rotor blades of the two aircraft meshed. Both helicopters crashed.

This accident was the result of a training failure. Although regulations and SOPs prohibited this type of maneuver, almost all of the people interviewed after the accident were unaware the maneuver was prohibited.

Command Failure

Accident experience has shown that, in many instances, aviators decide what level of risk they will accept rather than the command establishing operational parameters. A UH-60 crew on an NVG training mission was asked to help locate a downed CH-47 Chinook. The crew located the CH-47, led a MEDEVAC aircraft to the area and returned to the airfield.

Half an hour later, the UH-60 crew was asked to lead a CH-47 to the crash site. This was done, and the UH-60 crew departed for the airfield. Before they reached the airfield, they were called by the tower operator and asked to relay a message to the CH-47 crew. The UH-60 pilot could not contact the CH-47 by radio, so he decided to go back to the crash site.

As the UH-60 neared the site, the pilot descended to about 300 feet. He began flying up a valley at 10 to 20 knots and almost immediately saw a wire strand through his right windshield. The aircraft hit several strands of wire and crashed.

When the pilot accepted the missions back into the crash area, he did so without command approval and without a mission update briefing. *There were no established procedures in the unit for pilots to receive command approval and mission rebrief in the event of a mission change. In this case, pilot error began with command failure.*

Safe performance is a predictable result of performing to standard, and performing to standard is a result of training to standard. Training to standard leads directly to discipline—both collectively and individually. And disciplined aviators are inherently safe.

The standards that guide our training must reflect the requirements of the battlefield. Leaders are responsible for the establishment of unit standards and ensuring that desired objectives are met.

Effective training is the key not only to sustaining a combat-ready Army but also to reducing human-error accidents.

Training to Standard Leads to Safety!

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Manpower Requirements Criteria (MARC) Study

All aviation life support equipment (ALSE) personnel interviewed in several studies and questionnaires expounded on the necessity for an ALSE military occupational speciality (MOS).

The ALSE MARC study document was boarded at Headquarters, U.S. Army Training and Doctrine Command (TRADOC) on 15 August 1987. Before the board, the study was provided to the U.S. Army Aviation Center, U.S. Army Combined Arms Center, U.S. Army Logistics Center and TRADOC according to guidance contained in Army Regulation (AR) 570-2 with U.S. Army Materiel Command/TRADOC supplement 1. TRADOC provided copies of the study to U.S. Army Materiel Readiness Development Activity. Representatives from these commands, along with the U.S. Army Aviation Systems Command and the program manager (PM)-ALSE, made up the board. (PEARL'S is letting you know some of the participants and the inner working of the ALSE MOS board. This should let you know why the ALSE MOS has been so time-consuming.)

Ninety-nine comments were provided by respondents on this MARC study document. Eighty-two of the comments were included in the final MARC study document.

The ALSE repairer supervisor's requirements will be addressed in a separate MARC study. We cannot forget that we have many warrant officers and a number of commissioned officers working and supporting the ALSE effort and inspection requirements.

The proliferation of complex ALSE has increased the need for personnel dedicated to the inspection, maintenance and repair of ALSE and the aviation life support system program. At least one ALSE specialist, above and beyond the other career management field 67 manpower requirements, must maintain ALSE. The study conclusions, when implemented, are certainly a step in a positive direction. We sincerely appreciate the ALSE MOS board members for their continued support.

Night Vision Goggles (NVG)/Aircraft Integration Responsibility

Some recent changes have been made in the responsibility for integrating NVG with the aircraft. The PM-ALSE point of contact (POC) and action officer is Mr. James Dittmer, AUTOVON 693-3215. The aircraft electronics management office now handles cockpit secure lighting; the office symbol is AMSAV-2. LTC(P) Richard Hassinger is the commander, and Mr. Tom Benbrook is the POC, AUTOVON 693-1391/1407.

SRU-21/P Survival Vest

Relocation of components of the SRU-21/P survival vest and/or standard individual survival kits is permissable; however, these procedures should be followed: The net,

multipurpose, national stock number (NSN) 8465-00-300-2138, has been removed from the subject vests and transferred to each of the standard individual survival kits—NSNs 1680-00-973-1861, hot climate; 1680-00-973-1862, cold climate; 1680-00-973-1863, overwater.

The net, multipurpose, is not considered as a short-term survival item; therefore, to reduce the bulk of the survival vest, a more appropriate location for this item was determined to be in the individual kits.

Survival Matches

New survival matches, NSN 9920-01-154-7199, no longer require the inclusion of match box, NSN 8465-00-265-4925, as a survival kit component. The above changes, and those of the survival vests and standard individual survival kits, can be accomplished during the next scheduled inspection. These changes will be incorporated in the next change to Technical Manual (TM) 1680-317-23 and P. The action officer is PM-ALSE-L, Mr. Boone Hopkins, AUTOVON 693-3215.

Water Purification Tablet, Iodine, 8 Milligram (mg)

Activities will destroy the following materiel according to AR 40-61, paragraph 3-52, under the provision of AR 735-11, paragraph 2-10, as unsuitable for issue: NSN 6850-00-985-7166, water purification tablet, iodine, 8 mg, manufactured by Wisconsin Pharmacal, all contracts, all lots manufactured in 1984. *Reason:* Serviceability testing is not considered cost effective since reporting quantities indicated that only limited quantities are available. Credit and replacement do not apply. Standard Army Integrated Logistical System ABX 8701095 does apply. Materiel is a component of these kits and may be a component of other major assemblies: NSNs as follows: 6454-00-927-3000, 6545-00-927-4925, 6545-00-823-8165, 6545-00-231-9421, 6545-00-116-1410, 6545-00-139-3671, 6545-01-094-8412 and 6545-01-120-2632. U.S. Army Medical Materiel Activity will confirm this information in Department of Army (DA) Supply Bulletin 8-75 series publications. The POC is T. Bess, SGMMA-OC, AUTOVON 343-2045.

SPH-4 Helmet Liner Silicone Adhesive

Sometimes a "good" thing should be repeated. Unfortunately, quite a number of people missed the article on the SPH-4 helmet silicone liner adhesive in the January 1987 *Aviation Digest* PEARL'S article. We are quoting it again as it was listed.

"We have received several calls pertaining to the correct adhesive for SPH-4 helmet liner material.

"The correct silicone adhesive for the helmet liner is NSN 8040-00-833-9563; this is also listed in the new TM 10-8415-206-12 and P, dated 4 May 1986."

The action officer is Mr. Boone Hopkins, AMCPM-ALSE-L, AUTOVON 693-3215.

ALSE/Survival School

The sponsor for the Army Western Region Aviation Life Support Equipment/Survival School (AWRASS) is the Deputy Chief of Staff for Training, Sixth U.S. Army, who is responsible for establishing school policy, procedures and the resources required to support the school's program of instruction. The mission of this school is to provide ALSE training for ALSE technicians and officers. See February 1988 *Aviation Digest*, PEARL'S, Army Western Region Aviation Survival School, for additional information and more details about issue, title, dates and numbers.

Eligible students will be members of the Ready Reserve Unit (Troop Program Unit, Active Guard Reserve, Individual Ready Reserve, or Individual Mobilization Augmentee) on extended Active Duty, or Department of Army defense civilians. Other personnel applying for the course must be approved by the Deputy Chief of Staff for Training, Sixth U.S. Army. Aircrew personnel must show evidence of medical clearance to fly. Other personnel must show evidence of a military-approved physical examination within the last 48 months. Active Duty personnel should request approval from their local training officers.

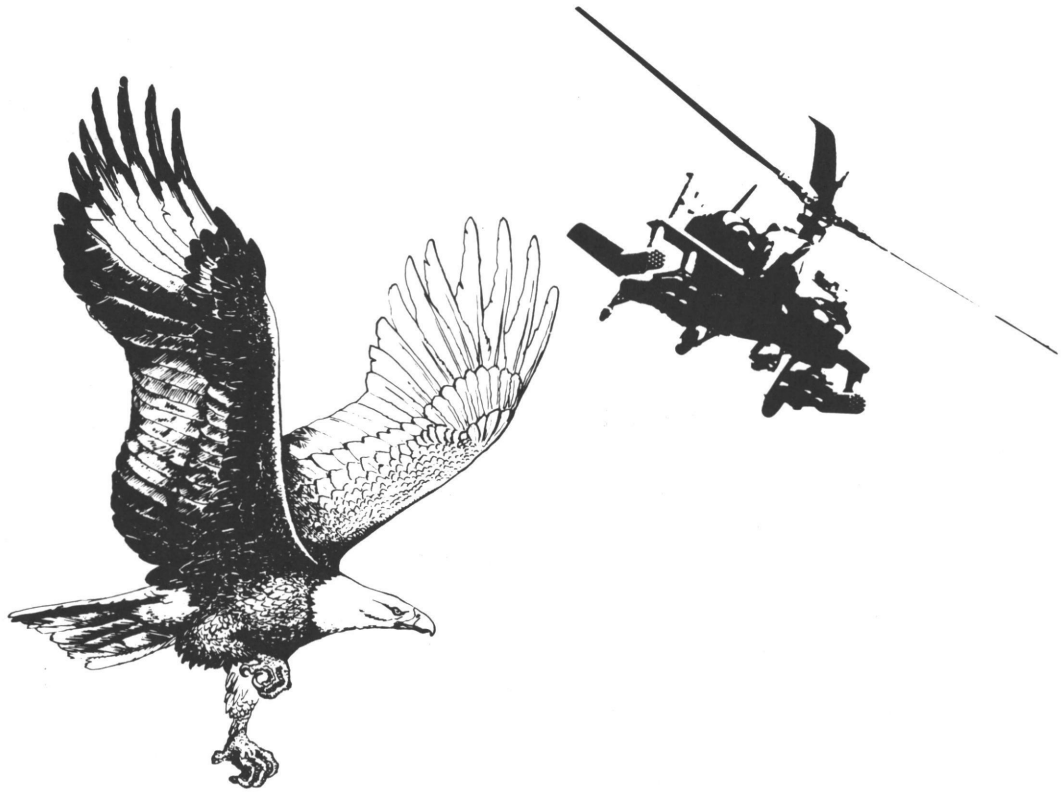
Procedures For the Destruction of ALSE

What are you saying? Destroy ALSE? Yes, it is true under certain combat conditions. TM 750-244-1-2 prescribes equipment priorities, methods and techniques that will be used to destroy ALSE to prevent enemy use when capture or abandonment of the equipment is imminent. We recommend your unit secure a copy of this TM since it contains much information as to what, and the appropriate procedures to destroy ALSE. Your commander will issue the order when destruction is required in a combat situation.

PEARL'S Articles

We could use some appropriate PEARL'S articles. Send them to PEARL'S, 4300 Goodfellow Boulevard, ATTN: AMCPM-ALSE-L, St. Louis, MO 63120-1798; we will get them published and give you credit. PEARL'S will appreciate your effort.

If you have a question about personal equipment or rescue/survival gear, write PEARL'S, AMC Product Management Office, ATTN: AMCPM-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-3817 or Commercial 314-263-3817.



No Harm Intended

Lieutenant Colonel Brian A. Dean

AS SHE SAT contentedly, watching the hills and trees around her, the sun reddened in the east and slowly brightened the sky. She had awakened early. Hungry and impatient as always, she had gone fishing and had caught a migrating salmon that she devoured immediately. Hunger sated, she returned to her main occupation these days, preparing for the birth. Her concept of time was measured only by the rising and setting of the sun and by the changing seasons, but she knew instinctively that the birth was not far away.

As the sun crept above the horizon, it bathed the earth in a reddish glow, and her snow-white head reflected the color as a dazzling pink. She cocked her head, first to one side, then to the other, straining her keen ears to pick out the sound. Something was disturbing the wilderness, but the sounds were indistinct and strange. Suddenly the sound was sharper, and her heartbeat and breathing increased dramatically as she realized that the sound was caused by the only thing in the world that she feared... man.

She hunched down over the two speckled eggs in the nest, protecting them with her warmth as she watched the horizon toward the direction of the fearful sound of the approaching

helicopter. She had seen the huge man-birds before but always at a distance where they seemed not threatening. Now, for the first time, she was a mother, and with a mother's protective instincts, her fear for her offspring was paramount. As an eagle, she would stand and fight for her children, willing to die rather than run.

The sound grew louder as she watched without moving. One moment it was just the sound; the next it was a fearful shape rapidly approaching from 2 miles away. Perched atop an old, dead fir tree, her great nest had always been impervious to predators. Now it stood out in sharp relief against the sky, and she knew the man-bird could see her. As it approached, the beast began to slow its flight and the sound level increased until it was more than even the thunderstorms. Now it turned slightly away from her, and she realized that it would fly past but very close. As it went past, it turned to circle behind her. This was an act of aggression! It was going to attack from the rear! Her heart screaming in her breast, she rose to her feet and turned to face her tormentor. She spread her 6-foot wings and shrieked her defiance, her razor-sharp beak open and prepared to slash. Now it came very close once again and circled and circled the terrified bird. She maneuvered quickly about the nest, hopping from side-to-side, keeping the man-bird always in front of her.

As quickly as it had come, the helicopter moved away and flew from sight. After long minutes when it did not come back, her breathing returned to normal and she settled back down to keep her eggs warm. Immediately, she knew that something wasn't right. Standing up again, she looked down to see that both eggs were cracked. In her panic, she had stepped on them. Not knowing anything else to do, she again settled onto the eggs with her soft breast to keep them warm.

In the cockpit of the helicopter, the conversation was spirited:

"Man! wasn't that some sight!"

"Yea, she was beautiful!"

"I've seen pictures but I've never seen a real one before."

"Yea, the symbol of America. Sure makes you proud!"

Three miles away, in the top of an old, dead fir tree, two tiny bald eagles died in their shells.

Every year, unthinking pilots cause damage to our natural resources. The pilots of the helicopter in our story were not intentionally cruel. They were genuinely interested in what they saw and totally ignorant of the damage they caused. They were only using their advantage of height and mobility for a unique look at an eagle. Unknown to them, they were in patent violation of a number of Federal and state laws. Despite their "naivete," conviction could cost them their fortunes and years of their freedom. That, however, is not the point. The point is that those eaglets died and an endangered species came a little closer to extinction.

The agencies charged with stewardship of our natural resources report that aircraft incursions are becoming more frequent and more damaging every year. The damage most often occurs to wildlife that is sensitive to trespass into its habitat. The sight and sound of a low-flying aircraft generates panic amid wild species. Birds kick eggs out of their nests. Breeding patterns are interrupted. Fleeting animals run into fallen logs and over cliffs, breaking legs and condemning themselves to death.

The ironic part of this story is that many of these acts occur on lands set aside for the protection and preservation of these species. National wildlife refuges, parks, forests and various state lands are supposed to be inviolate homes for these critters. As a pilot, do you know how to determine where these critters are? As a pilot, military or civil, do you have a responsibility to protect our natural resources? Think of it this way. What you do each time you fly affects the legacy you will leave your grandchildren. Every tiny chip in the ecology multiplies over the years unless time is sufficient for healing. We are chipping away faster than nature can repair the damage.

The note in the margin of your sectional aeronautical chart requests that you maintain at least 2,000 feet altitude above these lands. Take a few minutes to read that note again. You notice that it is a request. It isn't a rule and is not enforceable, at least from the Federal Aviation Administration's point of view. Do the aviators not care? I do not believe that this is the case, at least on an individual pilot basis. More likely, aviators are frequently seen harassing wildlife because they had no idea of the damage they are causing. Now you have a better understanding. May we count on your cooperation to help protect our wildlife from needless decline?

ABOUT THE AUTHOR

LTC Brian A Dean, U.S. Army Reserve, holds an individual mobilization augmentee position in the office of the Department of the Army Regional Representative, Southwest Region, Federal Aviation Administration, Ft. Worth, TX. In his other life he is the National aviation safety manager, Bureau of Land Management, Department of Interior, and the immediate past president of the International Association of Natural Resource Pilots.

Mr. Ron Brunelle

Mr. Philip A. Mooney

AH-64

A TOTAL SYSTEM FOR BATTLE

This article is the tenth in a series on the AH-64A Apache aircraft and weapons systems. The systems addressed include the external stores system and the aerial rocket control system. The information contained in this article is for familiarization with the AH-64A. It must not *be used to operate or maintain the aircraft.*

External Stores System

The helicopter has four external stores stations (figure 1), two on each wing. For identification, the stores stations are numbered 1 through 4, starting with the left outboard station.

At the present time, the external stores below are available. Many symmetrical combinations of stores may be carried.

- M272 launcher with up to four M34, M36 and/or air-to-ground missile (AGM) 114 HELLFIRE missiles per launcher.
- M261 19-shot rocket pods.
- Auxiliary fuel tanks.

The external stores system (ESS) provides for the mounting and positional control of external stores. The ESS consists of a pylon assembly and an external stores controller. The aircraft may be configured with either two or four pylons. Each pylon is held on by four mounting bolts. Hydraulic and electrical quick-disconnects between the pylon and wing mate when the pylon is installed and bolted into place.

The external stores controller is located behind the aft ammo feed fairing. It controls the position of all ejector racks simultaneously.

Each pylon contains a pylon actuator controller (PAC), a pylon actuator and an ejector rack.

External stores pylon

The external stores pylon (figure 2) provides mounting for the station director, pylon multiplex remote terminal unit, PAC hydraulic actuator and

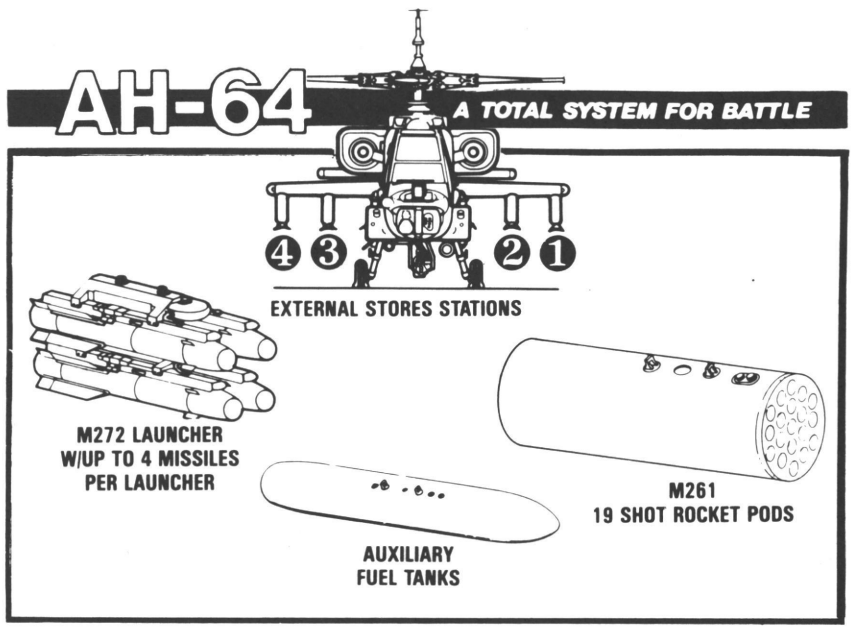


FIGURE 1: External stores.

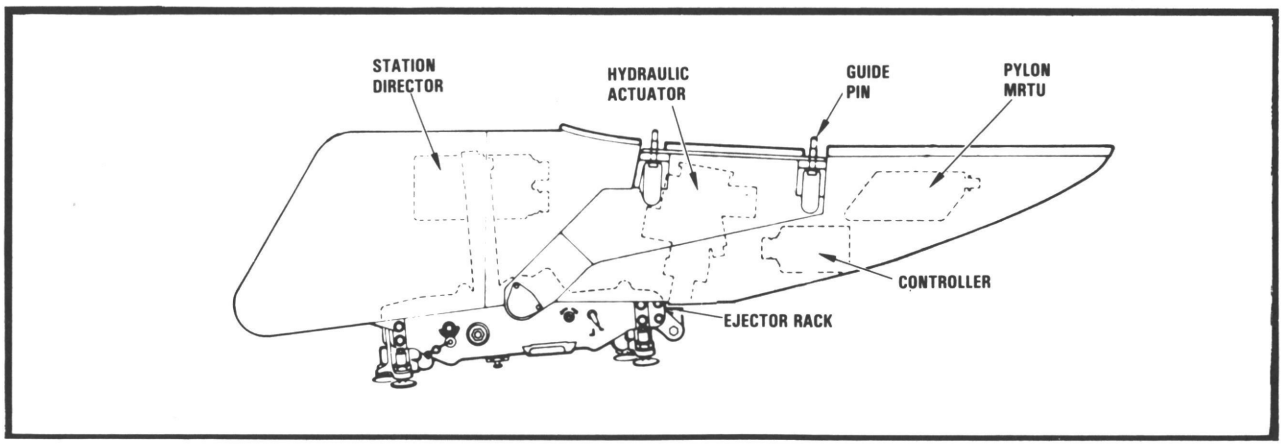


FIGURE 2: External stores pylon.

ejector rack. The pylon is enclosed in an aerodynamic fairing for minimum drag.

Rack assembly

The rack assembly (figure 3) is used to attach the external stores to the aircraft. It rotates about a pivot point to allow stores articulation for fire control system range solutions.

Each rack has a self-contained capability for stores jettison. In autorotation, the ejector assembly is capable of jettisoning empty external fuel tanks clear of the helicopter.

The rack uses two hooks to retain the store. A lock/unlock indicator will indicate a lock condition only when both store bail lugs are engaged by both hooks simultaneously.

A manual release is provided to release the hooks from the store bail lugs. Rotating the manual release drive counterclockwise will release the store. A ground safety pin is provided to prevent accidental store release on the ground.

Before a store may be attached to the rack, the hooks must be opened manually. When the store is in position, both hooks will close automatically and the lock/unlock indicator will show locked.

A bail retention arm is attached to the front of the rack. The arm is used to pull the electrical quick-disconnect to the store when the store is jettisoned.

During boresight procedure for the aircraft, the racks are boresighted to the armament datum line. Since the racks are boresighted, any stores attached are also boresighted; further boresighting is not required.

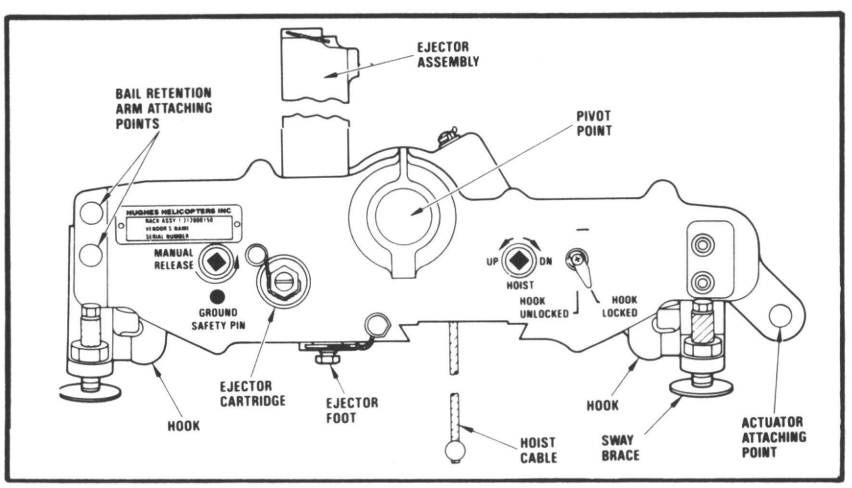


FIGURE 3: Rack assembly.

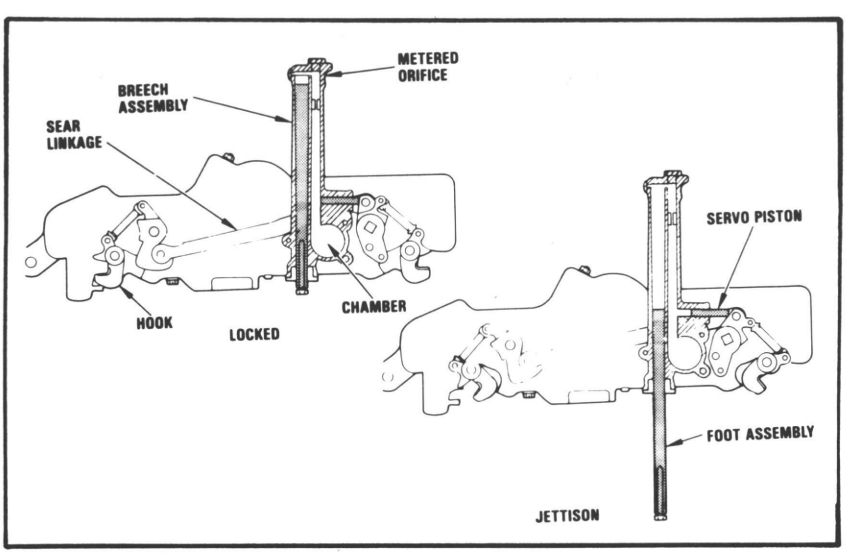


FIGURE 4: Stores jettison.

ESS operation

Based on inputs from the bus controller, the ground maintenance switch, squat switch, pilot fire control panel (FCP) and copilot gunner (CPG) FCP, the external stores elevation controller (ESEC), through the PAC in each pylon, control the position (elevation) of each pylon rack simultaneously.

When the ESEC receives the on-the-ground signal from the squat switch, it will position all pylon racks to the ground stow position (-5 degrees) 5 seconds after landing. When the ESEC receives the in-the-air signal, it will position the racks to the flight stow position (+4 degrees). Once the rack is in either position, it is locked in that position (lock signal through PAC to actuator).

For maintenance purposes, the momentary ground maintenance switch (left forward avionics bay (LFAB)) may be used to position the rack to the flight stow position (up) or ground stow position (down) with electrical and hydraulic power on the aircraft.

When neither crewmember has actioned either the missile or rocket system and the aircraft is airborne, the ESEC will position and lock the racks in the flight stow position at all airspeeds.

If either crewmember places his rocket (RKT) switch in the ground

stow (GND STOW) position, the ESEC will position and lock the racks in the GND STOW position at airspeeds below 100 knots. (That crewmember's FCP must be in the safe or armed condition.)

If neither crewmember selects RKT to GND STOW and one selects RKT normal (NRML) and actions the rocket system, the ESEC unlocks the actuators and positions the racks based on bus controller commands derived from crewmember's line of sight (range solution). When airspeed exceeds 100 knots, the ESEC will override range solution, positioning and locking racks in the flight stow position.

If a crewmember places his missile (MSL) switch *ON* and actions the missile system (opposite crewmember's RKT switch is not in GND STOW), the ESEC will respond to the bus controller command derived from the remote HELLFIRE electronics (RHE) as follows, overriding rockets.

- Lock on before launch positions the racks 4 degrees above the locked on missile(s) seeker line of sight.
- Lock on after launch positions the racks 4 degrees above the heading and altitude reference set horizon.

When airspeed exceeds 100 knots, the ESEC will override the RHE solution, positioning and locking the racks in the flight stow position.

Stores jettison

Each rack contains an ejector assembly, which consists of the cartridge, breech assembly and foot assembly (figure 4). When activated, the ejector assembly will cause the store to be released, and then drive the store away from the rack.

When the cartridge is fired, expanding gases will be restricted by the metered orifice, thus driving the servo piston to activate the sear linkage, retracting the hooks and releasing the store.

The expanding gases will pass through the metered orifice, and will drive the foot assembly downward, thus pushing the store away from the aircraft.

Jettison controls

The jettison subsystem (figure 5) will cause the immediate release of external stores when commanded by either crewmember. The pilot station has a selectable and emergency jettison capability for the external stores.

Four guarded two-position spring loaded toggle switches located in a panel on the pilot's left-hand console provide the selectable jettison capability. Lifting the guarded cover and moving the switch forward will jettison the selected store.

A recessed button that will immediately jettison all the external stores provides the emergency jettison capability. This capability has two electrically independent circuits, one powered from the primary bus and the other from the emergency bus.

The CPG's station has one emergency jettison capability for the immediate release of all external stores.

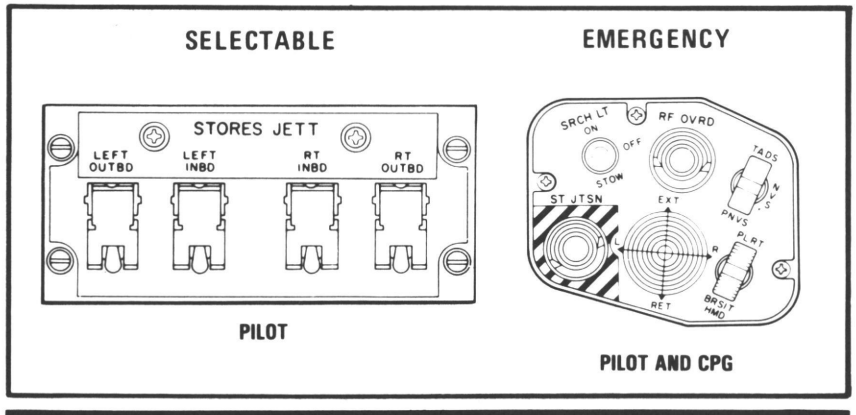


FIGURE 5: Jettison controls.

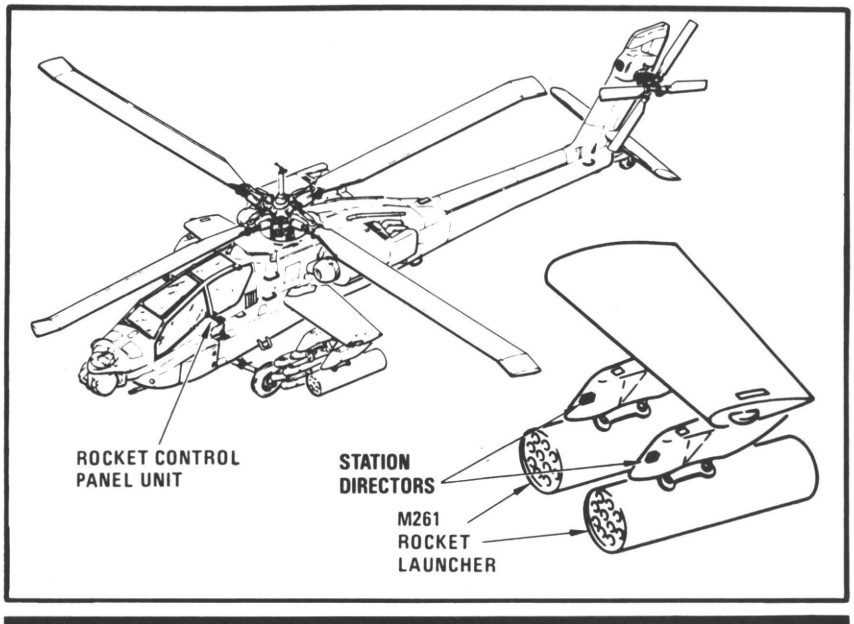


FIGURE 6: ARCS components.

Aerial Rocket Control System

The aerial rocket control system (ARCS) (figure 6, page 23) provides the pilot with the capability to select and set warhead/fuze combinations. It also provides the capability to fire rockets from the selected launcher configuration so that up to five different types of rocket/warhead/fuze combinations can be used on each mission.

The ARCS consists of the rocket control panel unit (RCPU), the station directors and the M261 19-shot rocket pods.

Rocket control panel unit

The RCPU (figure 7) is located in the pilot's crewstation in the left console. It receives operating power from the pilot's FCP when the panel is in either the safe or arm condition.

The RCPU provides several functions. These functions are as follows:

- *Zone inventory* informs the fire control system of the type warhead/fuze combination loaded in that zone.
- *RND REM* provides the pilot with rockets remaining in each zone.
- *ZONE SEL* enables the pilot to select one type of rocket (warhead/fuze combination) for firing.
- *QTY* enables the pilot to select the maximum number of rockets to be lauched when the trigger is pulled.
- *PEN-M* enables the pilot to select the penetration depth of the time set fuzes.
- *RNG-KM* enables the pilot to select the range the fire control system will use for line of sight range.

Rocket station directors

The station director provides a charging signal (fuze set) and/or a firing signal to each rocket tube. One station director is in the leading edge of each pylon.

The station director interrogates the quantity of rockets in each zone and sends this information to the RCPU through the pylon multiplex remote terminal unit and the fire control system. It also sets the fuze of selected rockets, as determined by the RCPU, and fires the rockets as selected by the RCPU. The launch signal (fire pulse) is at least 3 amps for 10 milliseconds.

Lightweight rocket launchers

Each launcher has three zones (figure 8). (A total of 19 rockets may be loaded.) Zone 1 has 12 rockets.

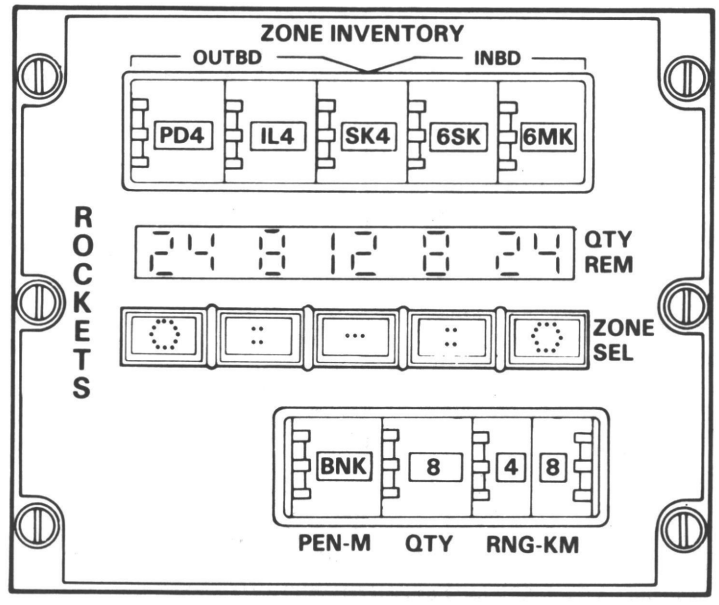


FIGURE 7: Rocket control panel unit.

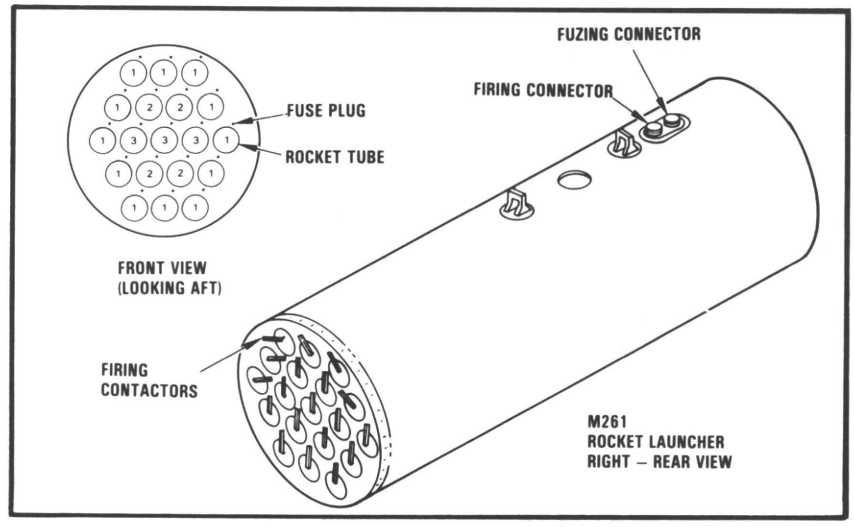


FIGURE 8: Lightweight rocket launchers.

Zone 2 has 4 rockets. Zone 3 has 3 rockets.

If the fuze can be remote set, the connector from that fuze is plugged into the fuze plug adjacent to the rocket tube when the rocket is loaded. Empty weight is 80 pounds. A fully loaded pod, used as a shipping container, may be uploaded using the built-in hoist in each pylon rack.

ARCS operation

Zones are identified by their location, both by pylon and by rocket tube.

When the pilot's FCP is in the safe or armed condition, power is applied to the RCPU. When either crewmember positions his rocket switch out of the *OFF* position, the RCPU will perform built-in test, then set the rocket/fuze combination as set on the ZONE INVENTORY.

The fire control system receives rounds-remaining data through the pylon multiplex remote terminal unit, and passes these data to the RCPU for display.

The fire control system, through the LFAB multiplex remote terminal unit, will remove the firing enable signal to the RCPU (inhibit the ARCS) when—

- The missile system is actioned.
- Vertical acceleration is 0.5 G or more, or
- Pylon position is more than 3.5 degrees out of coincidence from commanded position of the integrated helmet and display sight system (IHADSS) or 0.5 degrees from the target acquisition and designation sight (TADS).

When the crewmember actioning the rocket system has the FCP in the armed condition and no inhibit signals are present, an enable signal is sent to each station director. At the same time, the ESS responds to articulation commands.

When the trigger is pulled, the RCPU will send fire signals to the appropriate station director(s) to include firing sequence (zone), time between launches, quantity to be launched and rocket fuzing.

RCPU operation

ZONE INVENTORY is set initially when uploaded and verified by the aircrew before flight. The position informs the fire control system what type of warhead/fuze combination is loaded in each zone (figure 9). These combinations are as follows:

Type Motor		
MK40	MK66	Description
PD4	6PD	Point detonation, high explosive (HE)
RC4	6RC	Penetration, HE
DP4	-	Point detonation, HE, dual purpose
WP4	-	Point detonation, white phosphorus
IL4	6IL	Time, illumination
SK4	6SK	Time, smoke
-	6MP	Time, multipurpose submunition

If the type set is incorrect, the fire control system will attempt to set the loaded rocket as selected on the ZONE INVENTORY. No fault will be displayed in this case.

The QTY REM displays quantity of rockets remaining in each zone. The station director can interrogate quantity, not type.

ZONE SEL enables the pilot to select the type of rocket for firing by depressing the switch. The dot pattern on each switch represents the rocket tubes comprising that zone.

When one zone is selected, all other zones that are set by the same in the ZONE INVENTORY will automatically be selected. The switch(es) of the selected zone(s) will illuminate when selected. Selecting another zone will deselect any selected zone.

RCPU operation

The bottom thumbwheels on the RCPU are used as follows:

PEN-M sets the time constraint (RC) for the M433 fuze (RC4 or 6RC

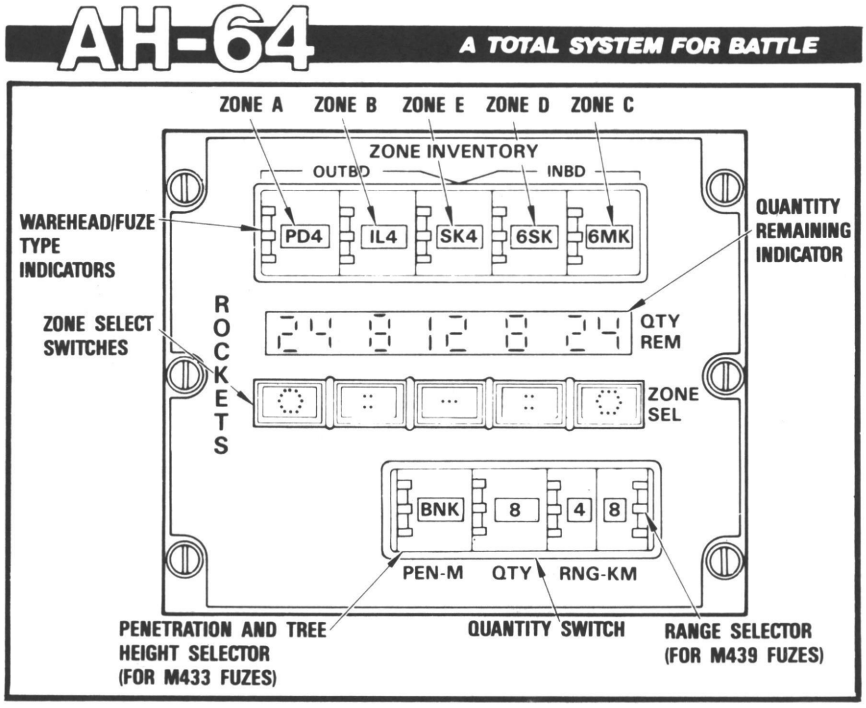


FIGURE 9: RCPU operation.

selected on the ZONE SEL).

Intervals are as follows:

BNK - Bunker penetration
SPQ - Super quick
10
15 Forest penetration,
20 in meters, after
25 initial contact
30 with trees (for
35 double and triple
40 canopy forests).
45

QTY selects the quantity of rockets to be fired per triggerpull if the trigger is held in the firing position. Releasing the trigger before the selected quantity has been fired will stop the firing sequence and reset for the next.

RANGE SELECTOR is used to provide manual range input to the fire control system for the pilot's line of sight. This range is in kilometers (km) and tenths of a km (maximum 8.9 km).

By selecting the letter "A" in the left thumbwheel, automatic ranging (IHADSS line of sight triangulation) is used for pilot's line of sight range (maximum 32.6 km).

Rocket symbology

The rocket steering curser (NRML) (figure 10) indicates the required orientation to align the helicopter into constraints for rocket engagements. The symbol is directional, based on the crewmember's line of sight. Fly the curser to the target.

This symbol will appear only to the pilot when the pilot actions the rocket system; it will appear to both crewmembers when the CPG actions the rocket system.

To engage the target (either crewstation), hold the line of sight reticle on the target and maneuver the aircraft to place the verticle bar on the target. The length of the bar represents the articulation limits of the pylon. The fire control system will position the pylon rack (pod) based on range to target. As long as the vertical bar and line of sight reticle are on the target, the rockets may be employed.

The rocket steering curser (fixed) symbol also indicates the orientation to align the helicopter into constraints, but it will be displayed in place of the NRML curser when one of the crewstation RKT switches is in the GND STOW position, or airspeed is more than 100 knots true airspeed.

When this symbol is displayed, the pylons are inhibited from articulating. The open space in the symbols vertical bar is the predicted impact point for the range.

To engage the target, maneuver the aircraft until the line of sight reticle and the open space of the vertical bar are on the target, then fire the rockets.

If the target is more than 20 degrees off the nose of the aircraft (azimuth), the curser at the edge of the display indicates direction to the target.

Cooperative precision engagement

To maximize the inherent capabilities of the aircraft and to obtain maximum accuracy using the rocket system, a cooperative, or precision, engagement may be used.

When the CPG selects the TADS, the laser is armed, both crewmembers place the rocket switch to the NRML position and both action the rocket system. Then the fire control system interprets this as a cooperative engagement, and will use laser range.

The CPG tracks the target using the TADS and lases the target for accurate range.

The pilot flies the aircraft to bring the rocket steering curser on the target. Since the fire control system is using the CPG's line of sight for range/azimuth, the pilot does not need to maintain his reticle on the target. When the rocket steering curser is on the target, the pilot fires the rocket.

This procedure uses the stability and accuracy of the TADS line of sight, the accurate laser range and the reflexes of the pilot, as he can gauge aircraft movement and pull the trigger when constraints are satisfied.

The article has addressed capabilities and characteristics of the AH-64 Apache weapons system in the subsystem of ESS and ARCS. The next article in the Apache series will address the point target weapons system and the area weapons system.

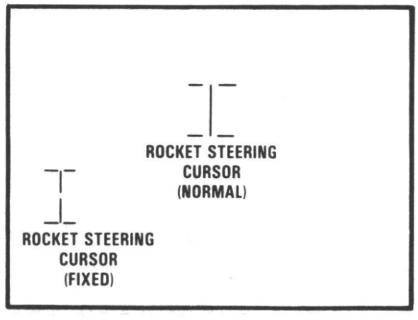


FIGURE 10: Rocket symbology.

ABOUT THE AUTHORS

Mr. Ron Brunelle is responsible for the design, development and presentation of the Apache aircrew training courses as well as defining training device requirements, specification, modifications and implementation.

He has more than 20 years of experience in aviation including instructional system background in both the flight simulators and classroom environment. He is retired from the U.S. Navy and is a private pilot.

Mr. Philip A. Mooney has been responsible for managing the marketing activities for the Apache and Defender helicopters since joining the McDonnell Douglas Helicopter Company in 1984.

He has more than 21 years' aviation experience in both rotary and fixed wing aircraft. Mr. Mooney's assignments included tours as a commander, aircraft maintenance officer, instructor pilot and aviation research and development program manager. He is retired from the U.S. Army.

USAASO SEZ

VFR Flights Near Noise-Sensitive Areas

Mr. Robert C. Cole
U.S. Army Aeronautical Services Office
Cameron Station, Alexandria, VA

BECAUSE OF the increasing number of congressional and Department of Army level noise complaints received, it appears prudent to publish extracts from the Federal Aviation Administrative Advisory Circular 91-36C, "VFR Flights Near Noise-Sensitive Areas."

This advisory circular encourages pilots making visual flight rules (VFR) flights near noise-sensitive areas to fly at altitudes higher than the minimum permitted by regulation and on flight paths that will reduce aircraft noise in such areas. The advisory circular extract follows:

BACKGROUND.

The Federal Aviation Administration continually receives complaints concerning low flying aircraft over noise-sensitive areas. These complaints have prompted requests for regulatory action prohibiting low altitudes flight over identified noise-sensitive locations. We believe that a satisfactory solution can be realized by means of a pilot/industry cooperative endeavor rather than through the regulatory process.

Increased emphasis on improving the quality of the environment requires continued effort to provide relief and protection from aircraft noise.

Excessive aircraft noise can result in discomfort, inconvenience, or interference with the use and enjoyment of property, and can adversely affect wildlife. It is particularly undesirable near outdoor assemblies of persons, churches, hospitals, schools, nursing homes, noise-sensitive residential areas and national park areas which should be preserved as important historic, cultural and natural aspects of our national heritage.

Adherence to the practices described below would be a practical indication of pilot concern for environmental improvement, would build support for aviation and forestall possible regulatory action.

VOLUNTARY PRACTICES.

Avoidance of noise-sensitive areas, if practical, is preferable to overflight at relatively low altitudes.

Pilots operating fixed and rotary wing aircraft under VFR over noise-sensitive areas should make every effort to fly not less than 2,000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of Federal Aviation Regulations 91.79, Minimum Safe Altitudes. Typical of noise-sensitive areas are: outdoor assemblies of persons, churches, hospitals, schools, nursing homes, residential areas designated as noise-sensitive by airports or by an airport noise compatibility plan or program and national park areas (including parks, forest, primitive areas, wilderness areas, recreational areas, national seashores, national monuments, national lakeshores, and national wildlife refuge and range areas).

For the purpose of this advisory circular, the surface of a national park area is defined as: the highest terrain within 2,000 feet laterally of the route of flight, or the uppermost rim of a canyon or valley.

NOTE: The intent of the 2,000 feet recommendation is to reduce potential interference with wildlife, and complaints of noise disturbances from low flying aircraft in canyons and valleys.

During departure or arrival from/to an airport, climb after takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas.

This procedure does not apply where it would conflict with air traffic control clearances or instructions or where an altitude of less than 2,000 feet is considered necessary by a pilot in order to adequately exercise his or her primary responsibility for safe flight.

COOPERATIVE ACTIONS.

Aviation/airfield commanders, aircraft operators and others are asked to assist in implementing the procedures contained herein by publicizing them and distributing information regarding known noise-sensitive areas.

Information regarding the U.S. Army fly neighborly/noise abatement program is available by calling Mr. Robert Cole, AUTOVON 284-7796/6304 or Commercial 202-274-7796/6304.

Operator's Manual Changes—User Influence

Captain Jerry Kidrick
Directorate of Evaluation and Standardization
U.S. Army Aviation Center
Fort Rucker, AL

THE U.S. ARMY Aviation Systems Command (AVSCOM) and the U.S. Army Aviation Center Joint Operating Agreement (JOA) has tasked the Literature Review Branch, Directorate of Evaluation and Standardization (DES), at the Aviation Center, to represent you, the user, for all recommended changes and revisions to operator's technical manuals (TMs) and checklists (CLs). Specifically, the branch provides all procedures and techniques for chapters 8 and 9 of the applicable TMs and the CLs and represents you at AVSCOM manual review conferences.

As a further tasking, per the JOA, the Aviation Center hosts an annual user review conference for each aircraft. To accomplish this, a message similar to the one below is sent to all major Army commands (MACOMs) (having a particular aircraft) requesting user participation.

SUBJECT: USER REVIEW CONFERENCE FOR TM 55-1510-213-10 and CL
1. A USER REVIEW CONFERENCE COVERING ALL CHAPTERS OF TM 55-1510-213-10 and CL (OV-1D/RV-1D) WILL BE HELD AT USAAVNC ON 22 THRU 26 FEB 88. THE MEETING WILL CONVENE AT 1300, 22 FEB, AT THE RECREATION CENTER, BLDG 9204, FT. RUCKER, AL. ALL USERS ARE REQUESTED AND ENCOURAGED TO SUBMIT RECOMMENDED CHANGES TO THIS OFFICE NLT 8 FEB 88.
2. POINT OF CONTACT FOR THIS CONFERENCE IS MR. JAMES, AV 558-4770. MAILING ADDRESS IS CDR, USAAVNC, ATTN: ATZQ-ESO-L, FT. RUCKER, AL 36362-5211.

The MACOMs select subject matter experts to attend the reviews as representatives of users in that command.

After the user review conference, all recommendations will be forwarded to AVSCOM for their consideration.

Since it is not possible for every user to attend our user review conferences, you are encouraged to participate by submitting your recommended changes. Mail DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 (Recommended Changes to Equipment Technical Publications), located in the back of the operator's manual, through your commander (per Army Regulation 95-1, "Flight Regulation"), to Commander, USAAVSCOM, ATTN: AMSAV-MPSD, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. This policy permits you to discuss problems with your unit standardization instructor pilot and commander to get their concurrences and recommendations before forwarding your proposal. A reply will be furnished directly to you.

The AVSCOM will forward a copy of your DA Form 2028 to DES for evaluation and recommendations. If the recommendations appear to be of an urgent

nature, AVSCOM will phone DES and discuss the proposed changes to minimize the time delay in formulating a safety-of-flight message or an urgent change. Be assured that the moment your DA Form 2028 is received, it will be carefully reviewed. If it warrants an urgent change or a safety-of-flight message, one will be prepared and transmitted as soon as possible.

Write the proposed changes exactly as you think they should be printed in the operator's manual with a reason for the recommendation. This does not mean your recommended changes will be published immediately. Those suggestions that do not warrant a safety-of-flight or urgent change will be retained until the next scheduled user review conference when the attendees will review them. Recommended changes may be adopted as written or, in part, with some modifications. Your recommendations are seldom rejected. However, because of budget constraints and soaring costs of publishing revisions, only *necessary* changes will be published. (If it ain't broke, it won't be fixed.)

The operator's manual *is not* a maintenance or training manual. As its name clearly states, it is a manual intended to help operators fly their aircraft. Note at the beginning of chapter 1, "This manual contains the best operating instructions and procedures for the aircraft under most circumstances. The observance of limitations, performance, and weight/balance data provided is mandatory. The observance of procedures is mandatory except when modification is required because of multiple emergencies, adverse weather, terrain, etc. Your flying experience is recognized; therefore, basic flight principles are not included."

Remember, DES, Literature Review Branch, represents you, *the user*. To help us better represent you, we need your participation in developing appropriate changes. Your recommendations are an important part of the manual development and revision process.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, F. Rucker, AL 36362-5208; or call us at AUTOVON 558-3504 or Commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or Commercial 205-255-6487 and leave a message.

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours	Rate	Army Fatalities	Total Cost (in millions)
FY87 (through 31 March)	16	753,292	2.12	19	$36.9
FY88 (through 31 March)	11	822,277*	1.34	28	$31.8

*estimated

AVIATION PERSONNEL NOTES

Reserve Officer Training Corps (ROTC) Accessions

The 1988 ROTC Accessions Board met in December 1987. The Aviation Branch enjoys the benefits of an exciting, challenging opportunity. This gives us access to some of the very best cadets with academic degrees. Fiscal year (FY) 1988 selections consist of an impressive 92 percent Regular Army (RA) officers and 40 percent with engineering or science degrees.

	TOTAL	RA	ENGR	SCIENCE	BUSINESS	OTHER
MEN	111	103	15	16	37	43
WOMEN	17	15	0	3	6	8
TOTAL	128	118	15	19	43	51
MINORITY	10	7	4	0	4	2

FIGURE 1: FY 1988 ROTC selections.

Figure 1 gives the full breakdown of FY 1988 ROTC selections.

Aviation Branch Active Duty accessions are targeted against lieutenant requirements and are apportioned among ROTC, Officer Candidate School and the United States Military Academy. Each year a number of late graduating and educational delay students are branch-selected then carried forward to the next FY. The complete FY 1988 aviation accessions program is shown in figure 2.

Enlisted Standards are Rising

Every year in February the centralized promotion board cycle starts. The Aviation Branch has to brief the enlisted board members on the status of the personnel within the Aviation Branch. The averages for the specific areas the board is interested in have been rising over the past few years. To give you an idea on where you stand with your peers, the information in figure 3 was provided the sergeants major (SGM) command sergeant major selection board in February 1988. These averages were computed from the personnel files of master sergeants being considered for the FY 1988 SGM selection board.

	MEN	WOMEN	TOTAL
United States Military Academy	96	4	100
Officer Candidate School	37	2	39
Carry Overs From FY 1987 ROTC Selections	102	11	113
FY 1988 Accessions Board	107	21	128
Total FY 1988 Accessions	342	38	380

FIGURE 2: FY 1988 accessions.

	Military Occupational Specialty				
	35P	67Z	93D	93J	93P
Average Civilian Education	2 years college	1 year college	1 year college	2 years college	1 year college
Military Education	ANCOC*	ANCOC	ANCOC	ANCOC	ANCOC
Last Skill Qualification Test Score Averages	90	87	90	88	83

*Advanced Noncommissioned Officers Course

FIGURE 3: Average civilian and military education by MOSs.

Enlisted Personnel

The Military Personnel Center was restructured to better serve the soldier. Part of this restructure was to change the name to the Total Army Personnel Agency (TAPA). The enlisted side of the Aviation Branch is shown in figure 4.

The professional development noncommissioned officers (NCOs) each manage a series of military occupational specialties (MOSs), and inquiries should be directed to the NCO managing your MOS.

SFC Billy R. Goodwin manages 35K, 35L, 35M, 35P, 35R, 68B, 68D, 68F, 68G, 68H and 68K.

SFC Michael J. Morris manages 66 and 67H, 66 and 67U, 67Z, 66 and 68J, and 68M.

Branch Chief	LTC Danny L. Rhodes	AUTOVON: 221-8323/24 Commercial: 703-325-8323/24
Aviation/ Transportation Division SGM	SGM Walter Cole	AUTOVON: 221-8323/24 Commercial: 703-325-8323/24
Aviation Branch NCOIC	MSG Randy B. Newman	AUTOVON: 221-8322 Commercial: 703-325-8322
Senior Career Division	Professional Development NCOs	AUTOVON: 221-8322 Commercial: 703-325-8322

FIGURE 4: Aviation Enlisted Branch.

Mr. Ronald J. Floden manages 66 and 66N, 66 and 67R, 66 and 67S, and 66 and 67T.

SFC Robert E. Wolfgram manages 66 and 67V, and 66 and 67Y.

SFC Floyd A. Weaver manages 93B.

SFC Joseph D. Prescott manages 93C, 93D, 93H, 93J and 93P.

SFC Floyd A. Weaver and SFC(P) Esquire McCoy manage force modernization.

To reach your professional development NCO by mail, the address is as follows: Commander, USATAPA, ATTN: DAPC-EPL-TA, Alexandria, VA 22331-0453.

Aviation Warrant Officers

Within the Warrant Officer Division (WOD) of TAPA, the aviation career managers are organized under the Warrant Officer Aviation Branch. Branch managers continually attempt to provide the best possible service in spite of the limited telephone service. The WOD plans to provide the Aviation Branch with more than two telephone lines. Until that time, however, Aviation Branch managers will continue to do the best job possible for the nearly 7,000 aviation warrant officers. Figures 5 and 6 list the current organization for the Aviation Branch. Address correspondence to: Commander, USATAPA, ATTN: DAPC-OPW-AV, 200 Stovall Street, Alexandria, VA 22332-0400.

WOD Chief	COL Billy Miller	AV 221-7831
WOD Deputy Chief	LTC George F. Copping	AV 221-7832
Personnel Actions Branch Chief	CW3 Al Delucia	AV-221-5285/6
Professional Development Branch Chief	CW4 John R. Dougherty	AV 221-7843/4

FIGURE 5: Warrant Officer Division.

Aviation Branch Chief	CW4 Thomas Story (AV 221-7835/6)
MOSs	Branch Manager
154B, 154C, 155D, 155E, 156A, 151A	CW4 Harry Arthur
153D	CW4 William Clark
153B	CW4 Timothy Cline
152G	CW4 Don Conaway
152F	CW4 Mead Roberts
152B, 152C, 152D, 153C	CW4 Chris Vermillion

FIGURE 6: Aviation Warrant Officer Branch.

Aviation Commissioned Officers

Within the Aviation Branch, professional assignment officers provide the best possible personnel management services in the Army. The points of contact at the Aviation Branch and their phone numbers are listed in figures 7 and 8. Address correspondence to: Commander, USATAPA, ATTN: DAPC-OPE-V, 200 Stovall Street, Alexandria, VA 22332-0414 for the Aviation Branch; Commander, USATAPA, ATTN: DAPC-OPZ-AV, 200 Stovall Street, Alexandria, VA 22332-0410 for the Aviation Plans and Programs Office.

Aviation Branch Chief	LTC Robert Seigle	AV 221-9366/ 7822/0433/0794
LTC assignments	MAJ(P) Charlie Walker MAJ(P) John Hirsch	AV 221-0794 AV 221-7822
Major assignments (Branch 15 assignments/ROTC)	MAJ(P) Bill Zorn	AV 221-7822
15M Major/Functional area assignments/ ROTC/U.S. Army Recruiting Command (USAREC)	MAJ(P) Phil Stewart	AV 221-7822
CPT assignments/ ROTC/USAREC/ Functional Area	CPT Tom Wiecks	AV 221-9366
CPT assignments (Branch 15 and 15T assignments) (MEL 6)	CPT Ann Fields	AV 221-9366
LT assignments and Aviation Officer Advanced Course (MEL 7)	CPT Tom Gibbons CPT Bob Graham	AV 221-0433
Aviation Officer Basic Course, Initial Entry Rotary Wing Assignments	Ms. Brenda Twyford Ms. Regina Staton Ms. Sandi Sanders Ms. Florence Winbush Ms. Jaqi Ennis Ms. Rhonda Hall	AV 221-0433 AV 221-0433 AV 221-0433 AV 221-0433 AV 221-0433 AV 221-0433

FIGURE 7: Aviation Branch.

Aviation Plans and Programs Office Chief	MAJ Bob Carter	AV 221-8156/57
Aviation Schools	SGM Bernard Berger	AV 221-8156
Aviation Career Incentive Pay	Ms. Jean Arnold	AV 221-8156

FIGURE 8: Aviation Plans and Programs Office.

Dynamite in Small Packages

CW2 Michael D. Kirkpatrick
U.S. Army Infantry Center
Fort Benning, GA

EVER WONDERED what all that stuff in the survival vest first aid kit was, or what it was for? Yes, it does have a reason for being there other than to counterbalance the Skoal cans, candy bars and other necessary survival items that get stuffed in the radio pocket. The contents of that small bag can spell the difference between walking out of a survival situation or being carried out.

The survival kit, individual, aircrew, tropical (and all this time you thought it was just a first aid kit, didn't you?) is designed to provide the necessary equipment and medical supplies that, when used with the other equipment in the survival vest, will increase your chances of being a survivor instead of a statistic. In a pinch, this little kit by itself will give you the bare necessities to keep breath and bone together in a survival situation.

Like any other piece of equipment, the kit is only as useful as you can make it to be and that, in turn, depends entirely on how much you know about it. Since survival 101 isn't on the program of instruction for aircrews in Army schools (not yet, anyway), a quick look here at the components of the kit and a few helpful hints and cautions on their use are in order.

Water resistant matches—Note that they aren't waterproof. Keep them somewhere dry when not being used.

Razor—Folds neatly into its handle to keep you from slicing off your fingers. Used to cut clothing away from wounds, it's also handy for anything else that needs to be cut.

Twist top plastic bags—There are three of these. Use them to store food, water or items that you want to keep dry (remember the matches?).

Wire saw—Does a pretty good job of cutting firewood **IF** you know how to use it. Find a green branch about 2 feet long by 1 to 1½ inches in diameter. Notch the ends to hold the string loops of the saw. Hook one loop of the saw in the notch of one end of the branch, bend the branch in a "U" shape and slip the free loop of the saw into the notch at the other end of the branch. Viola! You now have a bow saw. Using the branch keeps an equal pressure along the length of the wire while cutting to keep it from binding and snapping. If you try to hold the string loops while cutting, your fingers will turn purple and drop off long before the wood does.

Insect repellent—Does a good job of keeping the crawling creepies away. Apply to exposed skin and around the tops of your boots. The repellent also makes a good fire starter if smeared on some of the tender before you light it.

Headnet and mittens—Keeps the buzzing bloodsuckers from draining you dry. Rub the insect repellent on the mesh to make it even more effective.

Water purification tablets—Use these with all water before drinking it, no matter how clean or pure it appears to be. Use 1 tablet in 1 pint of water, shake to dissolve and let it sit for 20 minutes. Shake again, then drink. Since a measuring cup isn't included in the kit, isn't it fortunate that the small plastic bags happen to hold 1 pint when full?

Gauze bandage—Use to cover larger wounds. As a fire starter, a 1-foot-long strip, coated with insect repellent and rolled into a ball, will light even damp wood. The dry bandage also can be shredded and loosely piled together for an excellent source of tender.

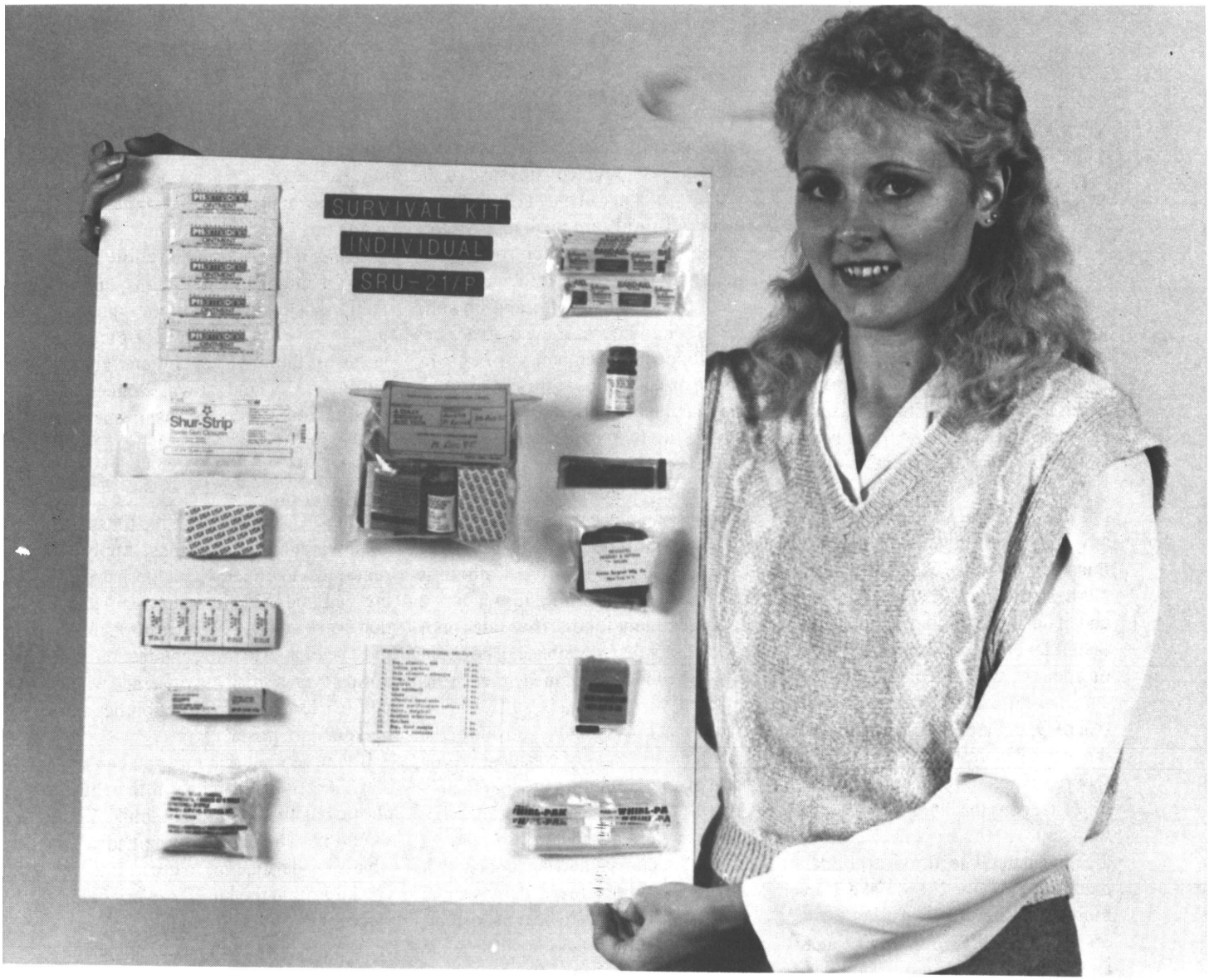
Adhesive bandages—Better known as Band-Aids. Use to protect small wounds, minor cuts and abrasions.

Adhesive strips—To be used in place of stitches to close large open wounds, hold bandages in place or any job that requires adhesive tape.

Soap bar—Cleaning injuries and personal hygiene. It also can be whittled into little animals when you're totally bored.

Before describing the medicines in the kit, there are a few points that deserve special attention.

If you have had problems using medications that contain aspirin, sulfa compounds, iodine, barbiturates or any



SURVIVAL KIT, INDIVIDUAL, AIRCREW, TROPICAL

1. **Povidine-Iodine Ointment, 10 ea**
2. **Skin Closure, Adhesive, 1 pkg of 10**
3. **Soap, Nonfloating, 1 ea**
4. **Aspirin, 10 ea**
5. **Eye Ointment, 1 ea**
6. **Bandage, Gauze, Elastic, 2″x5 yds**
7. **Bag, Plastic, 6″x6,″ 1 ea**
8. **List of Contents**
9. **Bandage, Adhesive, ¾″x3,″ 12 ea**
10. **Water Purification Tablets, 1 Btl**
11. **Razor, Surgical Preparation, 1 ea**
12. **Mosquito Headnet and Mittens**
13. **Matches, Waterproof, 1 ea**
14. **Bag, Food Storage, 3 ea**

Not shown: Antimalaria Tablets, Antidiarrhea Tablets and Flexible Saw

derivatives of these, you should consult your flight surgeon and aviation life support system (ALSS) people immediately. A special kit containing more suitable medications can be made for you. In a situation that requires that you use the drugs in the kit, be alert for any of the following symptoms: nausea, vomiting, dizziness, diarrhea, bloody stools, drowsiness, excessive sweating, headaches, visual problems, skin disorders, numbness, euphoria,

Dynamite in Small Packages

abdominal pain, darkening of the urine or swelling of the gums.

If any of these symptoms develop after taking one of the medicines, stop using it immediately. Do not resume its use unless it is the only alternative in a life threatening situation, such as extreme diarrhea that cannot be controlled by other treatment.

These medicines do their jobs well, provided they are used properly. Like anything else, they can be harmful if misused. They are especially dangerous to small children. The antidiarrhea and malaria tablets in particular can be fatal if taken by children under 6 years of age. As with all medications, the survival kit must be kept out of their reach. Of course, everyone knows that the survival vest is supposed to be secured when not in use, but it sometimes happens that it finds its way home with you. All those pockets and bulges are guaranteed to draw a child like metal to a magnet. To make it even more of a sure thing, just lay the vest on a chair, tell them "don't touch," and walk out of the room. They'll have every pocket unzipped and stripped before you can walk back in. So, unless you're fond of midnight trips and stomach pumps, take that extra time and care to ensure that a child can't get to it with anything less than a hacksaw and cutting torch.

Having said all that, let's take a look at the medicines themselves.

Antidiarrhea tablets—Better known as Lomotil. Ten small, individually wrapped, tablets on a cardboard strip are included. It is used to control diarrhea, which is the most potentially dangerous illness you can have in a survival situation. The dehydration it causes can rapidly result in death unless it is properly cared for. However, Lomotil is a powerful drug that contains narcotic derivatives and must be used only as directed. Because of the way it works, it can only be taken when plenty of fluids are available. Before taking Lomotil, try to control the diarrhea with rest, plenty of clear liquids such as water or broth, and no solid foods for 24 hours. If the diarrhea has not stopped by then, you can begin by taking one tablet four times daily. Once the diarrhea is under control, reduce dosage to two tablets daily until it stops.

Lomotil is a controlled substance, which is one of the reasons that the survival vest must be secured when not in use. Like any other drug, Lomotil is meant to be used, not abused. It is a good treatment for diarrhea but a poor choice for substance abuse. The quantity of Lomotil contained in each individual survival kit is sufficient, if taken all at once, to give you one of the most amazing cases of constipation you have ever had; but not enough to produce a "buzz." The difference between the amount that will produce a sense of euphoria, and the amount that will cause coma, brain damage and death, is so small as to be nonexistent. Remember, Lomotil is only to be taken in a survival situation after other precautions have been used.

Antimalaria tablets—Two large, foil wrapped tablets. They are used to prevent the occurrence of malaria, not cure it once it has been contracted. If you are down in an area where malaria is known to exist, take one tablet immediately, preferably with food or after eating. Swallow, don't chew. Take the second tablet 1 week later, on the same day that you took the first.

Aspirin—Ten medium-sized, white tablets. Used as a pain reliever and to reduce swelling. Take 1 to 2 tablets 4 times daily, not to exceed 10 tablets in a 24-hour period. Aspirin is one of the most misunderstood and most abused medicines in general use today. The range of complications and possible side effects it can have is truly astounding. However, it is also one of the best pain relievers and anti-inflammatories available. Use with caution.

Eye ointment—Small, yellow tube. Use for minor eye irritations and infections. Do not use if there is any injury to the eye. Apply by grasping the lashes of the lower eyelid and gently pulling away and down. Squeeze a small amount onto the inside surface of the eyelid four times daily. Don't rub the eye.

Antiseptic ointment—Ten foil pouches. Use as an antiseptic for small cuts, wounds and abrasions. Apply as required and cover with a loose dressing or Band-Aid. In a survival situation every injury, no matter how small, must be treated to prevent infection. Ignoring even a small cut or scrape when you're a long way from antibiotics can be your last mistake!

If you've read this far, you can see that there is a lot more in that little plastic bag than you might think. You should now have a pretty fair idea of what's inside and how to use it. But did you know that the kit, like every other piece of Army equipment, also has operator checks and maintenance? Your unit aviation life support technicians will inspect the kit every 120 days, but a lot can go wrong in that length of time. Murphy's Law never fails. When you preflight your aircraft, don't forget that "mission equipment" also means your survival gear. Take that extra minute to eyeball this important piece of equipment. If the bag is torn or the seals broken, if the EXPIRATION/ REINSPECTION dates are past due, or if any of the contents are broken, leaking or torn, take it to your unit ALSS shop NOW! Don't wait until the mission is over or the next inspection is due. You must be the final inspector who decides that everything needed to do the job is ready to go. Just be sure that the decision you make isn't more final than you meant it to be!

The Black Hawk leaves Chambersburg airport with two 450-gallon prototype fuel tanks attached. The helicopter flew to Ft. Rucker, AL, for flight testing.

Fuel Tanks Added to Black Hawks

EMPLOYEES of the Letterkenny Army Depot, Chambersburg, PA, recently installed the first 450-gallon prototype fuel tanks for the Army's UH-60 Black Hawk helicopter.

photographs by F. L. Ferrell

Letterkenny Army Depot employees mount a 450-gallon prototype fuel tank to a Black Hawk helicopter.

The 20-foot-long tanks, coupled with two smaller 230-gallon tanks, make the Black Hawk capable of being flown more than 1,000 miles without refueling. This enables the helicopter to self-deploy overseas.

Two modified fuel tanks were attached to a Black Hawk at the Chambersburg airport near the depot. The helicopter was then flown to Ft. Rucker, AL, for flight testing at the U.S. Army Aviation Development Test Activity. Testing is expected to take about 6 months.

Once testing is completed, depot employees hope to modify 288 such fuel tanks for the Army.

Ms. Linda S. Dura
Public Affairs Office
Letterkenny Army Depot, PA

To Be Measured By

CW4 Dennis E. Dura
Ohio Army National Guard
Army Aviation Support Facility No. 2
Worthington, OH

HOLDING a "guided discussion" recently on special tasks in the aircrew training manual (ATM), the subject of standardization came up. Especially that sentence in chapter 7 of the ATM that allows the evaluator to consider deviations from the ideal during the evaluation and make "appropriate" adjustments to the standards.

Of course, I got put on the hot seat right away with comments like, "That sentence proves that the Army gives lip service to standardization, and evaluations are still very subjective." Or, "We know when you have had a bad day, because you take it out on us in no notice checkrides and demand perfection." I immediately denied being a bad guy. But, I knew, no matter how I tried to fast talk myself from center stage, I had to seriously address the issue of standardization with them.

Standardization is the conscience of our training program. It keeps us honest. We cannot kid ourselves into believing we are "Above the Best" if we do not meet or exceed the "standards."

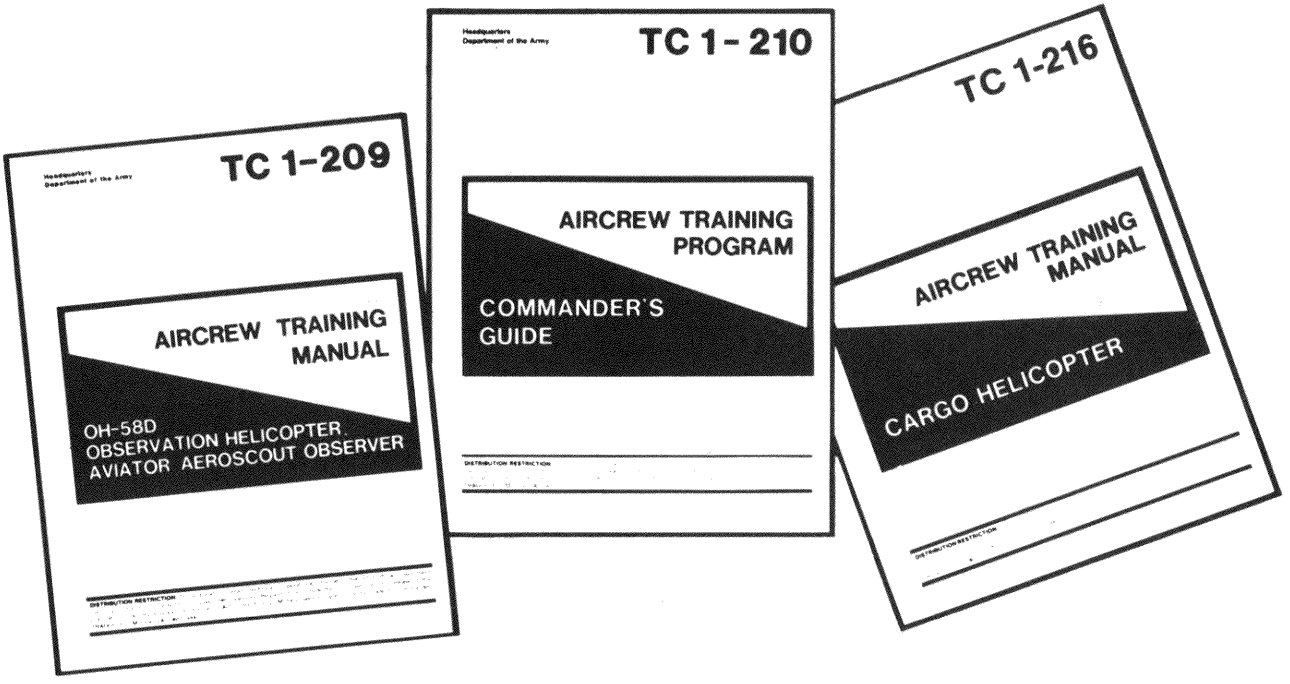
What is meant by standards and what is standardization? First of all, a standard is what we measure our performance against. When you take a ruler and measure pieces of wood to build something, you want to measure as precise as possible to have a strong and straight structure. For all the time and effort you put into something, you are not likely to be satisfied with "about" when the performance of a maneuver may mean life or death in everyday flying, not to mention combat.

Since we are human beings and live in an imperfect world, it would be idealistic drivel to demand adherence to an absolute standard. That is why human standards have a range of performance. The absolute standard is found within the range. The closer you come to the absolute value under ideal conditions, the more proficient you are in performing the task. Like building that structure, the smaller the variation about the absolute standard in the given range, the stronger the aviator becomes in his or her skills.

Because of special circumstances or conditions, that range has to be adjusted at times. It would be unrealistic to demand the same range of performance from a student pilot that was expected of a graduate pilot. Or, to expect a pilot to constantly maintain a particular range of performance under adverse meteorological conditions. However, you would expect the aviator to constantly strive to stay within the published range of performance.

The standards, or range of performance, have been established by testing, experience and safety considerations. When the aviator is measured against the standard, the evaluator takes into consideration outside influences such as weather, traffic, etc. In the interests of safety or common sense, the evaluator has the option to increase the range—not decrease. I might expect a high-time aviator to be more proficient than a low-time aviator, but I cannot demand it. As long as both aviators' demonstrated performance falls within the published standards, then they are both satisfactory. In the quest to get a better performance from an aviator, an instructor pilot may seem like he or she is not satisfied with anything less than perfection. The flight instructor sometimes walks a tight rope between creating positive motivation and causing frustration in the aviator.

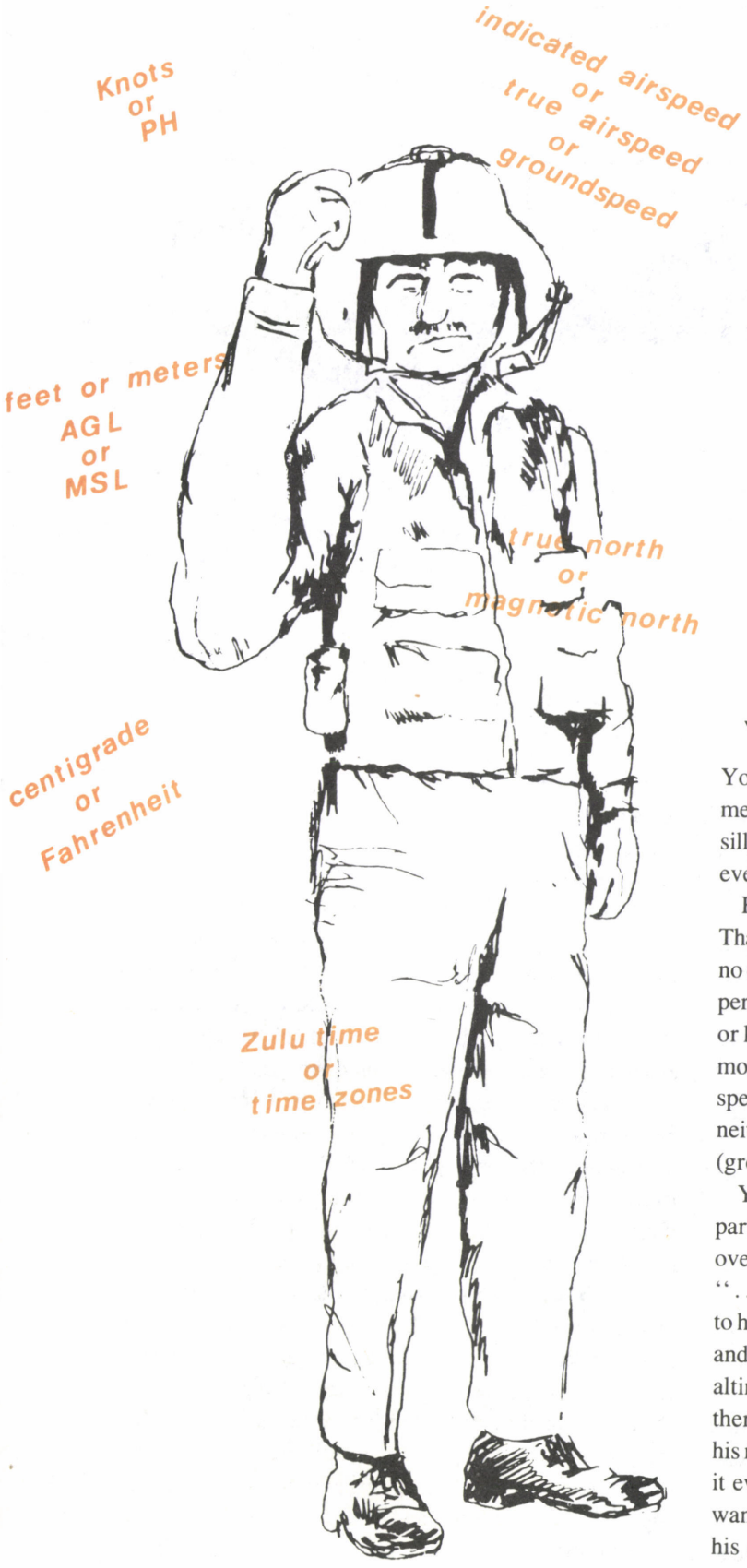
Standardization is all of us doing something the same way. The series of actions that make up the performance of any maneuver is the same worldwide. A visual meteo-



rological conditions approach is performed the same in the United States, Europe, Asia, etc. The pilot does a before landing check, initiates the approach at a particular entry point, at a particular altitude, at a particular airspeed, maintains a certain approach path and terminates to the landing area. The sequence of events are all the same, in order that we can talk the same "language" and maintain control in our training. Any Army aviator can talk to any other Army aviator about various flight maneuvers and be understood. Since we all do flight tasks the same, there only needs to be one ATM for each type aircraft. If the methodology for a particular maneuver is not going to work, the problem will surface quickly and early because we are all trying to do the same thing.

One must not mistake technique for standardization. Technique is the way we fly the aircraft. Standardization is the way we fly the maneuver. Being individuals, we all have different emotional and mental responses to outside stimuli. We may scan the instrument panel a little differently than the next pilot. We may adjust power a little sooner or later in the course of a maneuver than the next pilot. We all physically and mentally fly the aircraft a little differently than the next pilot, but we collectively strive for the same standards. We also, collectively, perform the sequence of events that make up a maneuver in the same manner. We are standardized—we all do the same thing the same way.

To ensure that our training is adequate and we are combat ready, we undergo periodic evaluations. Evaluations ensure that we meet the standards and that we are standard in the conduct of our training. Of course, the ATM also standardizes the minimum number of subject areas to be evaluated during the oral portion of an ATM evaluation. Since each subject area may have a large amount of information associated with it, it is up to the evaluator to separate the essential items from the trivia. Obviously, some subjective evaluation may creep into the oral evaluation, but if the evaluator is careful, the questions can be kept to pertinent, factual type questions. An evaluation determines the credibility of our training, it is not training. After the fact, you may learn something from an evaluation, but it is not meant to teach. We in Army Aviation depend upon standardization to keep us a safe and effective fighting team. By using standardized training as a solid basis for our flying proficiency, we can extend ourselves into more demanding modes of flight during combat situations. By aggressively pursuing the standards, we will always be "Above the Best."



Metric? Metric? Who Needs Metric?

Mr. Nathan H. Cleek Jr.
Directorate of Combat Developments
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Fort Rucker, AL

YOU DON'T WANT to buy your milk by the liter? Your steak tasted different by the kilogram? A 1,000 kilometer trip is longer than a 620-mile one? And what is a silly millimeter longer than, anyway? Standardization isn't everyone's cup of tea, but pity the poor aviator.

For starters, his instruments tell him his speed in knots. That's nautical miles per hour to you desk jockeys and bears no easy relationship to miles per hour or even to kilometers per hour. Of course, all his maps are nicely laid out in miles or kilometers to make it more interesting. Oh, to give him more to do—his airspeed indicator shows "indicated airspeed," which is not the same as "true airspeed," and neither of those is how fast he is going over the ground (groundspeed).

Your truly dedicated aviator also considers it the better part of valor to make certain he flies higher than the ground over which he is passing. He is aware that studies show "... not staying higher than the terrain can be hazardous to his health," there being few tunnels built for helicopters and airplanes. Therefore, he pays close attention to his altimeter, which tells him his altitude in feet. To be sure, there are problems with this. First of all, the majority of his maps give the land elevation in meters. Second, to make it even more thought-provoking, what the aviator really wants to know is above ground level (AGL) altitude, and his altimeter tells mean sea level (MSL) altitude.

By the way, there's a little fact that the aviator has to keep track of that combines the thoughts of the last two paragraphs. It's the speed associated with gaining and losing altitude, and the sky jockey learns that from his *vertical speed indicator.* Of course, since this is another speed it's NOT given in knots, but, rather, in feet per minute. This, in spite of the fact that all other flying is done in hours.

Convinced yet? How about running out of gas? It's more embarrassing in the air than on the ground. The aviator puts his gas in just like you do, by the gallon, but he takes it out by the *pound.*

Need more? Bet you didn't think they could mess up time, did you? Only one kind of timescale in the world, right? Everybody uses hours, minutes and seconds, and there is no way aviation can change that, no? Dig this, flight time is in hours and tenths of an hour. If that's not enough, flight plans are done on Zulu time (what time it is in Greenwich, England), but all other references are to local times. Try crossing several time zones! Crossing the zones doesn't change Zulu time at all, but it does change what local time is. No wonder aviators wear such fancy watches.

Temperature? That affects his performance (how well the aircraft functions). His tables and his instruments tell him what to expect in centigrade. The weather man, nasty soul, tells him in Fahrenheit.

There is one simple thing he keeps track of, his heading. That's a simple number from 0 to 360 that tells him exactly which way he's going. For example, a 45-degree heading means he's going exactly northeast. To keep track of where he's going, he also needs the wind heading. It's reported the exact same way, that is, a number from 0 to 360. Just to keep everyone on his or her toes, though, it means exactly the opposite. When there is a 45-degree wind, it doesn't mean the wind is going northeast. The wind is coming *from* the northeast; it's actually heading southwest.

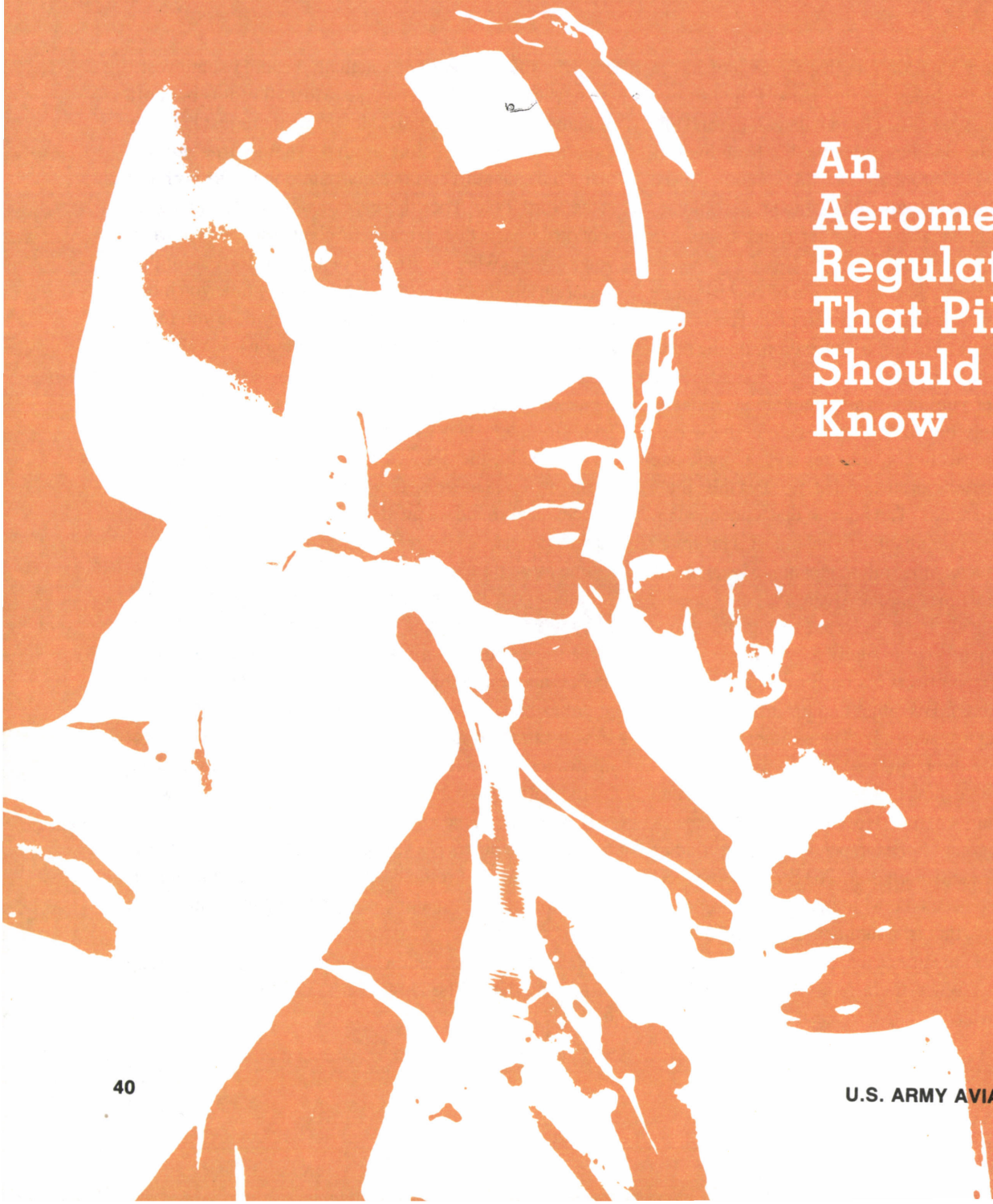
This heading stuff gets worse. Most all of it is built off of knowing where north is. However, there just happens to be three norths floating around. There's *true north*—that's the exact direction you have to point to be pointing at the North Pole. Then there's *magnetic north*—that's the spot on the earth that all magnetic compasses point at when you ask them where north is. You have to correct for that variation and the correction changes every time you move either east or west. (It also changes every time you move north or south, too. However, this variation is usually, but not always, smaller than that caused by east-west movement. Actually, every spot on earth has its own correction factor for magnetic variation. They're just not *unique* factors.) Finally, there's *grid north*—that's all wrapped up in the differences you get when you try to take a three-dimensional round world and put in on a two-dimensional square paper.

One more thing to pile on top of what your heading is. Mainly—your heading isn't where you're going! Sorry, but you're going along a thing called your track. A track is the trace your aircraft is making over the ground. That track is determined by, among other things, your airspeed, your heading, the wind's airspeed and the wind's heading. If you combine all those things and make the correct allowances for magnetic errors and those errors induced by the flat map—you may, just may, go where you want.

By the way, in the air it is *not* true that the shortest route between two points is a straight line. What's actually true is that the shortest route between two points on a globe is the minor arc of the major circle passing through those two points. Got that?

Metric? Standardization? The pilot will have that cup of tea any day. Who cares if it's 35 degrees centigrade outside?

ARMA SAT



An Aeromedical Regulation That Pilots Should Know

Major Kevin T. Mason, M.D.
Major Mason was assigned to the U.S. Army
Aerospace Medicine Residency Program,
U.S. Army School of Aviation Medicine,
Fort Rucker, AL, when he wrote this article.

SOME aircrewmembers probably have noticed box number 73 on the back side of their flight physical form (Standard Form (SF) 88) that simply states, "ARMA SAT."

"Just some more mystical medical mumbo-jumbo!," some aviators would say.

And, when the flight surgeon mumbles "ARMA SAT" while filling out the flight physical form before the aircrewmember leaves the office, often the aircrewmember responds, "What did you say?"

This article should clear up the "muddy waters" around the ARMA regulation for those aircrewmembers who are not quite sure what it is all about.

ARMA stands for "adaptability rating for military aeronautics." The details of this rating can be found in the Army medical regulation, Army Regulation (AR) 40-501, chapter 4-30. As you recall, chapters 2 and 4 in AR 40-501 list all the medical conditions that disqualify aviators for Army Aviation duties. The ARMA section lists medical disqualifications that the average aircrewmember does not know. When aircrewmembers read the regulation, they find that they do not understand it very well.

The ARMA disqualifications are unique; they deal with the "gray area" of psychosocial attitudes and behavior rather than straightforward medical disqualifications, such as a broken arm or pneumonia, which are listed in other aeromedical sections of the regulation.

Gray area is that one aviator can see plainly that a disqualification listed in the ARMA regulation pertains to preserving flight safety, while another aviator might consider the disqualifying act as normal behavior with no relationship to flight safety. With such a schism of interpretations by aircrewmembers, one easily can see that this regulation is perceived as one of the most emotionally charged of the aeromedical regulations, especially when aircrewmembers are grounded and they do not understand why. This perception is not surprising since the regulation deals with emotional issues.

Aircrewmembers should know that this regulation obligates them, and their commander, to seek aeromedical consultation if they know that they have an unsatisfactory adaptability rating for military aeronautics. Most of the psychosocial disqualifications listed in the regulation result in only a temporary aeromedical grounding, the same as for an ear infection or knee sprain. Some psychosocial situations and behaviors may be so severe or chronically recurring, however, that a more prolonged aeromedical grounding is required.

My own experience has taught me that the more severe psychosocial situations are often accompanied by a swirling tide of physical and legal problems, leading to multiple aeromedical disqualifications. Therefore, an unsatisfactory ARMA is rarely the sole or primary disqualification that leads to permanent aeromedical grounding.

I will attempt to guide the reader through this regulation step-by-step to achieve a better understanding of its contents.

First, the ARMA regulation says that the cause of medical unfitness for flying duty for all classes 1 through 3 is an unsatisfactory adaptability rating for military aeronautics. This rating is due to a failure to meet aptitude standards or the presence of psychological factors not adaptable to military aeronautics. The ARMA regulation does not deal directly with major mental diseases such as psychosis, depression, drug and alcohol addiction and fear of flying. It addresses issues of behavior, attitude and psychosocial disorders such as marital dysfunction, the inability to function as a team member and immaturity.

The flight surgeon must investigate an unsatisfactory ARMA as revealed by review of records, interviews, personal observation, command requests or any other source, such as family or instructor pilot, when there is a potential hazard to flight safety. He must determine the nature and extent of this disqualification and, as per regulation, ground the aircrewmember. The length of grounding depends on the nature of the psychosocial disqualification, and whether the problem is temporary or chronic.

Aircrewmembers must report to their flight surgeon when they know that they have an unsatisfactory ARMA, just as they would report an illness or injury. For example, an aviator who has just received a divorce court summons is experiencing enough marital dysfunction and psychosocial upheaval that he or she should be aeromedically grounded until the personal, stressful situation improves.

An aircrewmember's commander must consult the flight surgeon when an aircrewmember develops an unsatisfactory ARMA. This is important because an aircrewmember, suffering from psychosocial disruptions, is often unable to objectively observe that flight safety is endangered by these mental distractions. Yet those around him are quite aware that the aircrewmember is not functioning to his fullest capacity.

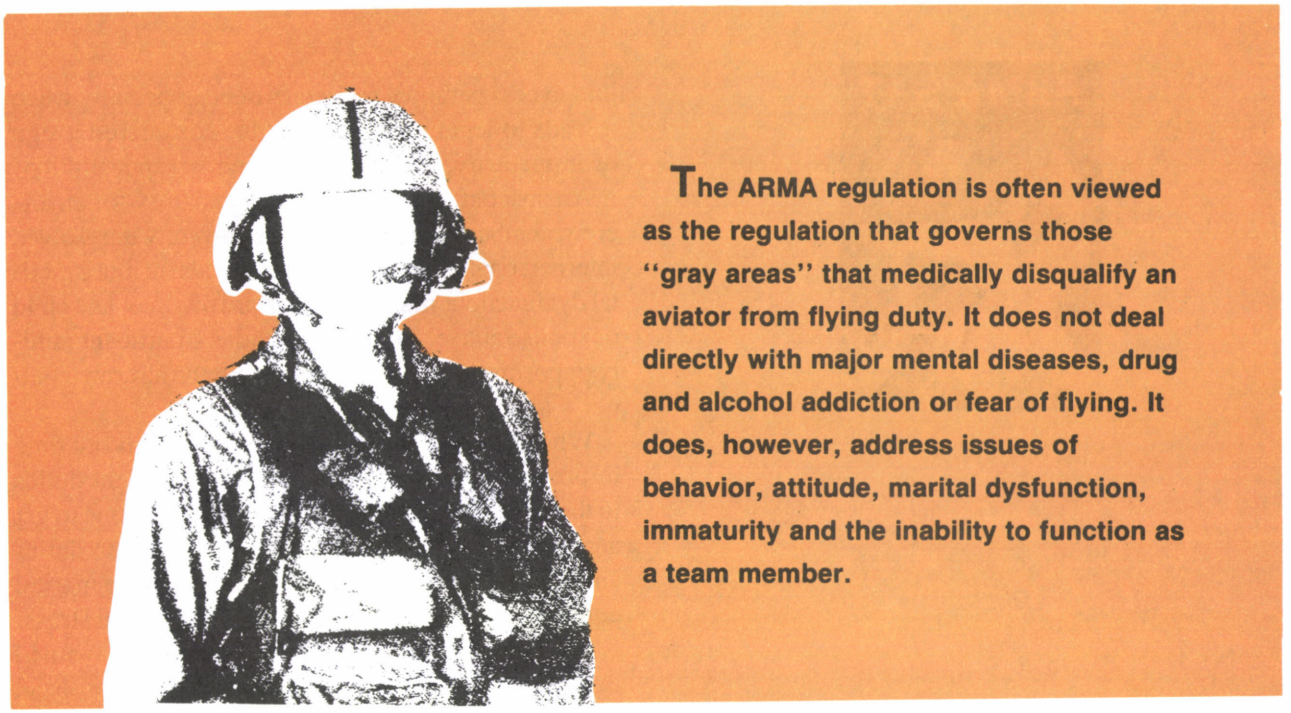
For example, an aviator may feel that the best way to get his mind off that brewing divorce settlement is to go flying, when logically this is only a natural denial of the stress being experienced. One does not cope with stress by immersing himself in a stressful environment such as flying. Now add an inflight emergency to that stress, and one can see that the aviator may not function to the best of his ability, and may even "crack under the strain," just when intellect and physical abilities are needed most.

In practice, because of the general lack of knowledge about this regulation, aircrewmembers and commanders may not seek the consultation of the flight surgeon when psychosocial problems are first noted. Often, problems will then accumulate or become more severe without aeromedical intervention. In this case, the aircrewmember may develop a long list of disqualifications before the psychosocial crisis comes to the attention of the attending flight surgeon. The result is that an aircrewmember's career may be prematurely and permanently ended, when early intervention and treatment may have prevented this.

Under what conditions or situations is an unsatisfactory ARMA mandatory? The list is involved, but with the reader's patience, the web of the ARMA regulation is nearly untangled.

An unsatisfactory ARMA is mandatory when an aircrewmember attempts to conceal significant and/or disqualifying medical conditions on his medical history form, SF 93, or during an interview with the flight surgeon.

I am sure that you have heard of the flight school applicant who forgot to tell the flight surgeon he had asthma and suddenly became short of breath in warrant officer candidate training. Or the story of the pilot who had his kidney stone extracted by a private physician while on leave and forgot to tell his flight surgeon. The act of failing to report these medical conditions is grounds for an unsatisfactory ARMA.



The ARMA regulation is often viewed as the regulation that governs those "gray areas" that medically disqualify an aviator from flying duty. It does not deal directly with major mental diseases, drug and alcohol addiction or fear of flying. It does, however, address issues of behavior, attitude, marital dysfunction, immaturity and the inability to function as a team member.

An unsatisfactory ARMA is mandatory for any aircrewmember who develops or has a history of psychiatric diseases listed in AR 40-501, chapters 2-32, 2-33, 2-34 and 4-24. This includes psychiatric disorders such as psychosis (a mental break from reality), affective disorders (depression), neurosis (an intense anxiety interfering with normal functioning), conversion reactions (hysterical paralysis is a common example of this), chronic personality disorders, alcohol and drug abuse, fear of flying, suicidal thoughts or plans and stress syndrome.

An unsatisfactory ARMA is mandatory for an aircrewmember who has an attitude toward flying that is clearly less than optimal.

For example, an aircrewmember's motivation for flying should not be based on the prestige, extra pay or other secondary gains. It is mentally healthier that an aircrewmember's motivation for flying be based on professional satisfaction, technical accomplishment and enjoyment of flight.

An unsatisfactory ARMA is mandatory for aircrewmembers displaying clearly noticeable personality traits that may interfere with group functioning as aviation team members, especially when they demonstrate immaturity, self-isolation, difficulty with authority, poor interpersonal relationships or impaired impulse controls. Aviation "cowboys" and "loners" are unable to function as aviation team members and are a threat to aviation safety.

An unsatisfactory ARMA is mandatory when aircrewmembers have recurring physical complaints that may indicate the presence of acute or chronic fatigue, stress syndrome, psychosomatic disorder (the tendency to express psychological pain or stress as physical complaints, like a headache or backache), or an underlying affective disorder (unrecognized depression).

It is becoming generally accepted, by physicians and patients alike, that a frequent sign of underlying psychosocial turmoil is regular visits to the physician with multiple, often vague, physical complaints. This is commonly seen as a sign of the body's failure to cope with and adapt to stress and fatigue, eventually increasing the patient's inability to deal with minor discomfort or actually increase susceptibility to

disease. Of course, such vague symptoms may be the early signs of a serious disease, such as invasive cancer, and this possibility must not be overlooked.

An unsatisfactory ARMA is mandatory for an aircrewmember having a history of arrests, illicit drug use or socially "acting out": indicating immaturity, impulsiveness or antisocial traits. Included in this section would be abnormal emotional responses to stressful situations, whether in peacetime or combat, when such reactions, in the opinion of the flight surgeon, might interfere with flight efficiency and safe performance of the individual's flight duties.

Driving under-the-influence, writing "hot" checks or spouse abuse are common legal problems, not necessarily felonies, leading to an arrest that results in an unsatisfactory ARMA. Illicit drug use includes the use of drugs such as marijuana and cocaine that may be socially acceptable to certain social groups or cultures. Socially acting out means committing an act demonstrating recklessness or immaturity, usually physically expressing an underlying emotional conflict. Juvenile delinquency is the classic example of socially acting out, but other examples might include smashing your neighbor's mailbox after some minor conflict or drag racing on a busy boulevard. Antisocial behavior includes stealing, white-collar criminality, racketeering, chronic lying, sexual promiscuity, irresponsible gambling, and recurrent acts of hostility or brawling. An aircrewmember habitually getting into excess personal monetary debt, especially when it leads to legal problems, is also considered a sign of immaturity, impulsiveness and irresponsibility.

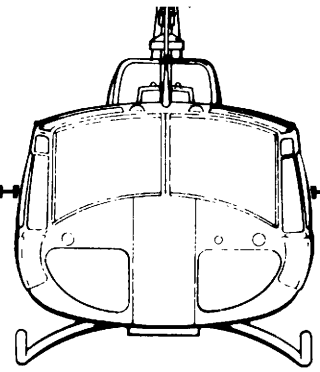
An unsatisfactory ARMA is mandatory for an aircrewmember with prolonged or currently unresolved interpersonal or family problems. This includes marital dysfunction, marital separation, divorce, and child or spouse abuse. This also includes significant family opposition or conflict concerning the aircrewmember's aviation career.

When your spouse walks out on you, it is not time to pretend that you can carry out your flight duties to the best of your abilities; but rather it is time to get aeromedically grounded, relieved of routine duties and put on emergency leave to resolve those marital conflicts and reduce the overall psychosocial stress.

A final section in the ARMA regulation is worded as a "catch-all" for even milder levels of psychosocial disorders than those previously listed.

An unsatisfactory ARMA may be given for lower levels of signs and symptoms than those mentioned in the regulation if, in the opinion of the flight surgeon, the mental and physical factors might be exacerbated under the stresses of military aviation or the person might not be able to carry out assigned duties in a mature and responsible fashion. In addition, a person may be disqualified for any combination of factors listed in the regulation, or because of personal habits or appearance indicative of attitudes of carelessness, poor motivation or other characteristics that are unsafe or undesirable in the aviation environment.

That covers the little known ARMA aeromedical regulation that every aircrewmember should know. It is true that this regulation covers many private, sensitive and emotional psychosocial issues. Based on one's personal social values, attitudes and perspectives, it may be difficult to assign a definitive value of severity to a particular psychosocial problem, making this regulation controversial to some. However, an unsatisfactory ARMA remains an all too common contributing factor to aviation mishaps involving aircrewmember error; that human, personal and difficult to define factor that is a major cause of aviation mishaps. So it is a serious aeromedical regulation that defines psychosocial and behavorial disqualifications for aviation duties and contributes to the overall effort to enhance aviation safety.



Engine Failure IMC With Low Ceilings

A Testimonial for Good Crew/Cockpit Prebriefings

Mr. Jerry A. Burton
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IT STARTED AS a training flight in the instrument flight examiner (IFE) course on 22 May 1987 from Cairns Army Airfield (AAF), Ft. Rucker, AL, and ended in a peanut field 5 miles southwest of Glenwood, AL, with no damage to the aircraft as a result of the successful autorotation.

The flight conditions were IMC (instrument meteorological conditions), the instructor pilot (IP) was in the jump seat and the two students were occupying the front left and right seats. The right seat rated student pilot (RSP) was Chief Warrant Officer (CWO) Edward Specht, a Minnesota National Guard technician IP. The left seat RSP was CWO Lanny Brooks, an Indiana National Guard technician IP. The aircraft was a UH-1H Huey with auxiliary fuel tank installed, the last four digits of the serial number ended in *1107*, your two basic lucky numbers!

We had made one approach at Montgomery, AL, had not broken out and were continuing on our return flight to Cairns AAF. We had just departed CRENS intersection on a radar vector and were in a climb at 4,600 feet mean sea level when the engine suddenly and completely failed. CWO Specht was flying the aircraft under "partial panel" conditions at the time of failure and immediately entered the autorotation.

During the descent, CWO Brooks took control of the aircraft, while CWO Specht removed his hood and attitude indicator cover and began assisting in a restart attempt to include emergency governor operations. From the jump seat, the only things I could assist with were radio calls to air traffic control advising them of our peril, calling off instrument indications and offering comfort and advice to the two aviators who held in their hands my fate—along with that of their own. We knew the ceilings were 400 to 500 feet above ground level (AGL) and maintained our heading (about 150 degrees) until we broke out beneath the overcast. At about 500 feet AGL we broke out and, as far as could be seen, nothing but trees were ahead. Only one opening appeared at our 9 o'clock position, and CWO Brooks immediately began to maneuver to the area. He performed a 140-degree autorotation with turn, just barely clearing the trees on the approach end of the clearing. CWO Brooks performed an excellent touchdown, sliding only 22 feet before coming to rest with three thankful aviators onboard. After we egressed the aircraft and found it safe to return for our flight gear, I radioed to another aircraft in the area that we had survived and were not injured. We monitored our PRC 90 radio until the MEDEVAC came upon the scene and then used it to vector the aircraft to our position.

During my past 22 years and 9,000 plus hours of aviation service to Uncle Sam, I've thought many times of "WHAT WILL I DO IF." This attitude followed me as I began teaching the IFE course back in 1983.

I found that I became more comfortable as the IP riding in the jump seat by being as thorough as possible during crew briefings. My crew coordination briefings were always thorough, but much more so when the ceilings came down. We as a crew had thoroughly discussed those actions that each one would accomplish should the worst emergency occur to us. Some of those actions were:

- Who would be flying the aircraft during the descent?
- Who would make the radio calls?
- Who would perform the restart sequence?
- How would the aircraft be flown all the way to the ground should the ceilings or terrain not permit us to make visual contact until time to decelerate for touchdown?

This crew coordination, along with CWO Brooks' excellent flying skill, and a little old fashioned luck, were the direct causes for this successful emergency landing.

The moral of this story is to conduct a thorough preflight crew briefing before each and every flight and, if the flight should present any unique circumstances, i.e., low ceilings or adverse conditions, be certain that you as a crewmember know what should be done under the worst of emergencies. If you're wondering about their grades for that day, remember that the students failed to request a lower altitude, and they didn't cancel their flight plan when they landed.

ATC FOCUS

U.S. Army Air Traffic Control Activity

ATC Focus Introduction

Ms. Betty J. Bragan
U.S. Army Air Traffic Control Activity
Fort Rucker, AL

THE U.S. ARMY Air Traffic Control Activity (USAATCA), Ft. Rucker, AL, is pleased to introduce Air Traffic Control (ATC) Focus. The intent of ATC Focus is to provide updates on issues that cover all areas of ATC, from controller phraseology to ATC equipment.

As the proponent for Army ATC, USAATCA's main objectives are to—

- Improve combat readiness.
- Establish and maintain ATC data base.
- Conduct worldwide systems evaluation/assistance visits.
- Interface with Federal Aviation Administration (FAA) and Foreign Service/Government agencies.

In the area of combat readiness, USAATCA coordinating with the field and Director of Combat Developments plan and evaluate new and improved ATC facilities/equipment. In addition, USAATCA evaluates overall controller and maintenance personnel training and proficiency, and coordinates controller assignments worldwide.

The ATC data base is the key to managing ATC personnel and resources. This data base enables USAATCA to monitor ongoing projects and needs of the ATC community.

System evaluations are performed on Army ATC/navigation facilities. These evaluations include flight check of navigational equipment, inspection of maintenance equipment, and evaluation of controller proficiency and training. Assistance visits to units/facilities are provided for maintenance and ATC procedures upon request.

The USAATCA represents the Department of the Army (DA) at the national and international levels in matters of airspace. At the national level the Activity manages Army airspace within the National Airspace System (NAS) to include air traffic regulations, flight procedures and aeronautical information. It also serves as the DA executive staff officer to the Deputy Chief of Staff of Operations (DCSOPS). Internationally, USAATCA acts as liaison between the DA and host governments in matters concerning Army ATC facilities, airspace and flight information of concern to the Army.

To meet these objectives USAATCA is organized into four major offices: management, development, systems evaluation maintenance and aeronautical services. The management office provides guidance on the operation, policies and procedures of ATC units/facilities and manages funds for ATC operations worldwide. The development office identifies and validates requirements, programs and manages the procurement of ATC/navigational aids equipment. The systems evaluation/maintenance office performs flight/ground operation checks and provides onsite technical and maintenance assistance. The aeronautical services office manages Army airspace within the NAS and acts as liaison with host nations. In addition to these offices, USAATCA maintains a DA ATC liaison officer who acts as a force integration staff officer in DA DCSOPS (DAMO-FDV) for air traffic management/ATC.

Recently a distinctive emblem was approved for the *U.S. Army ATC* function. The emblem, depicted above, can be readily identified by the inscription *U.S. Army ATC* across the top. The ATC's combined mission is depicted by a tactical radar set and a fixed based tower to show the direct relationship and interdependence between each functional area. Army ATC is looking toward the future as illustrated by the advanced rotary wing and fixed wing aircraft in support of joint operations and the combined arms team. The earth illustrates ATC's worldwide mission and the Aviation Branch insignia denotes the incorporation of Army ATC into the Aviation Branch.

We invite readers to actively participate in ATC Focus with their ideas and questions on Army ATC.

Readers are encouraged to address matters concerning air traffic control to: Commander, USAAVNC, ATTN: ATZQ-ATC-MO, Fort Rucker, AL 36362-5265.