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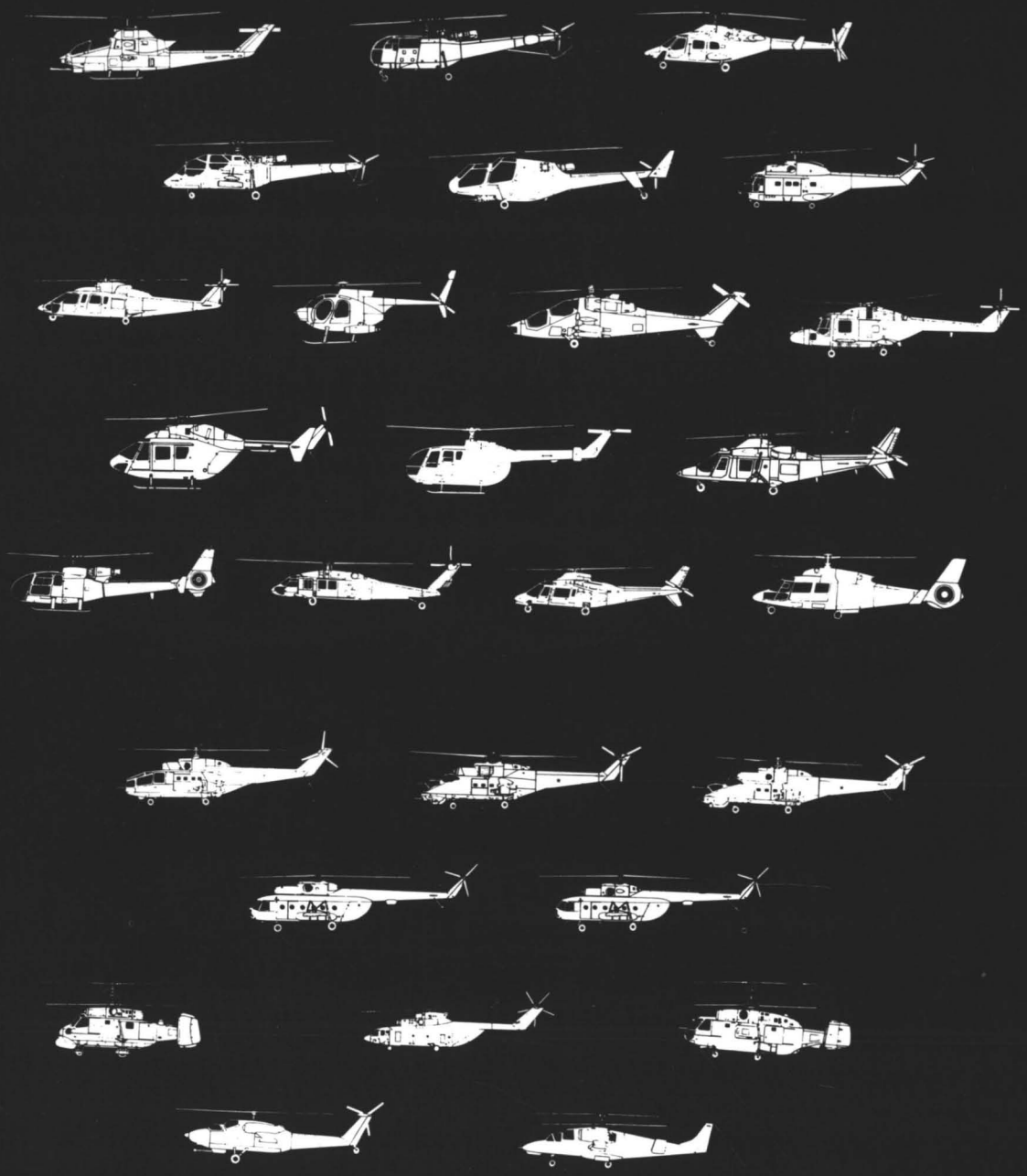

Professional Bulletin 1-87-3

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PROFESSIONAL BULLETIN

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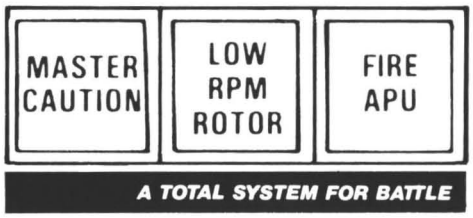

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Major General Ellis D. Parker
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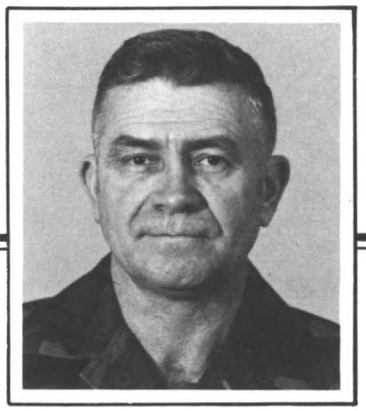
Major General Ellis D. Parker
Chief, Army Aviation Branch



93C Air Traffic Controller

On 1 October 1987, the Army Air Traffic Control School at Ft. Rucker reached a significant milestone in merging military occupational specialty (MOS) 93H (Air Traffic Control Tower Operator) and MOS 93J (Air Traffic Control Radar Controller) courses into a single track 93C Air Traffic Controller (ATC) Course. The realignment of these two courses into one will provide the first soldiers to the field in January 1988 in line with the implementation of the 93C MOS worldwide in December 1987. This merger will give the commander in the field a more effective controller, as well as more latitude in personnel assignments.

The Air Operations Division of the Department of Enlisted Training is responsible for training our air traffic controllers. Skill level one advanced individual training is conducted in three phases: common ATC subjects, tower/radar peculiar and combat support training. The common subjects phase prepares the student for the Federal Aviation Administration Control Tower Operator examination. After completing the examination, the student progresses into aircraft designations, general operating procedures, flight information publications, weather, radio telephone/interphone procedures, nonradar instrument flight rules academics and nonradar approach control.

In the tower phase, the student controller is trained in general airport procedures, communications, light gun signals, runway use, airfield lighting, aircraft separation, instrument/visual flight rules (VFR) and special VFR operations. Instruction in the tower labs begins with simulated light traffic that becomes heavier as the course progresses.

Upon completion of tower training, the student controllers move into radar academics, alignment, fundamentals and operation. In the radar simulation lab, they receive practical training in radar separation, identification, target confirmation, radar-out procedures, vectoring, clearances, emergency procedures, traffic advisories and pilot reports.

The combat support phase covers the installation, operation and maintenance of tactical ATC equipment. The final week of training consists of a field training exercise in which the students work in a tactical ATC facility and control live traffic for the first time.

After completing the Ft. Rucker course, the controllers next become facility rated at their station of assignment. After that, they receive over-the-shoulder evaluations and semiannual written examinations. All training and testing is designed to produce a highly qualified professional soldier and air traffic controller whose main concern is the safe and expeditious flow of aircraft.

We are now in the process of developing doctrine and upgrading equipment to support Army Aviation in the AirLand Battle. The first step, the consolidation of our controllers into a single MOS, has been completed. With equipment upgrades still in the development phase, our controllers will continue to rely on skill, resourcefulness and determination combined with an intensive training program to accomplish their vital tasks.

Air traffic control has come a long way from the days of ragwing aircraft, 90-horsepower engines and semaphore communication. With today's faster, heavier, more sophisticated aircraft, the work of Army air traffic controllers is indeed crucial to the safety of our aircrews and aircraft.

MONTHLY WRITING AWARD

Needed, needed right now—

AGGRESSOR HELICOPTER TRAINING UNIT

"Fear kills more people than death."
General George S. Patton

THE INTERMITTENT snow and fog that blew across The Steppes was a well-known forerunner of the Russian winter. A cold predawn darkness offered nothing new to end the monotonous routine of the soldiers of the Third Rumanian Army. They have long been guarding the northern flank of the German forces that were locked in the death throes of wresting control of the metropolis of Stalingrad from the forces of the Soviet Union. The Rumanian Third Army was about to become the goat of the battle that turned the tide of the Second World War.

At precisely 0630, on 19 November 1942, a rolling artillery barrage signaled the beginning of the end of the Third Reich. Operation Uranus, the Soviet offensive that was aimed at encircling the Nazi forces attacking the city on the Volga, had specifically targeted the poorly trained and inexperienced Axis' allied Rumania Army for destruction. Eighty minutes of concentrated artillery bombardment was only a prelude to the inevitable armored onslaught. When the roar of guns ceased, the ominous sound of tank engines and creaking tracks of the Russian Fifth Tank Army could be heard in the straw-lined Rumanian trenches. The initial waves of Russian infantry were adequately dealt with, but as the first T-34s burst out of the grey mist, the Rumanians soon found themselves in a situation for which they were not in any way prepared.

As the Russian armor began to make headway, the cry of "tanks in the rear" spread like wildfire through the Rumanian trenches. Great numbers of Rumanian troops succumbed to a phenomenon known as "tank fright"; a panic that seized entire units inexperienced in operations against armor. Hysterical Rumanians leaped from their trenches and prepared positions, screaming that Russian tanks were hot on their heels. This hysteria conveyed itself like a row of dominoes up and down the lines and soon destroyed any semblance of order in the Axis front; the organized line of resistance crumbled as the massed Russian armored formations sped on to their objectives far into the German rear.

History was in the making. Within 2 months, an entire German Field Army was reduced to ashes in the surrounded city of Stalingrad, and the course of western civilization was inexorably changed. For the lack of proper training of one unit against the dominant maneuver weapon system of the era, Nazi Germany would suffer one of the most crushing and humiliating defeats in the annals of military history. To be sure, the Nazi regime would have been crushed sooner or later, but at that moment, at that particular place, a military organization succumbed to fear through inexperience and failed in its mission; failed for the lack of having adequate training against a realistically portrayed enemy force.

Times change, but soldiers remain the same. The linear battlefields of the Russian front have now given way to the vertical and horizontal mixing of air and ground forces under the doctrine of the AirLand Battle. Positional warfare has been replaced by the maneuver school of doctrine that relies heavily upon instilling the tenets of agility, synchronization, depth and initiative into our soldiers to produce victory while fighting outnumbered. At the forefront of this concept of warfighting stands the concept of "air mechanization," the use of vertical maneuver, facilitated by the employment of the modern attack helicopter. Pioneered by the U.S. Army, this concept has developed the Aviation Branch into an extremely fluid maneuver force, capable of waging war throughout the entire spectrum of the deep, close and rear battle areas.

But we are not alone. The forces of the Warsaw Pact have simultaneously seen the potential in the use of the attack helicopter and have developed a vast array of combat helicop-

Captain (P) Greg R. Hampton
Air Combat Division
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

FIGURE 1: The vast variety of combat helicopters that make up the world's inventory of threat rotorcraft.

AFGHANISTAN
Mi-8 Hip, Mi-24 Hind D

ALGERIA
Mi-8 Hip, Mi-24 Hind D, SA-319 Alouette III

ANGOLA
Mi-8 Hip, Mi-17 Hip K, Mi-24 Hind D, SA-316 Alouette III, SA-342 Gazelle

ARGENTINA
Agusta A-109, SA-332 Puma

BOLIVIA
Hughes 500

BRAZIL
Hughes 500 D, Mi-17 Hip K, SA-332 Super Puma

BULGARIA
Mi-8 Hip, Mi-24 Hind D

CHINA
Sikorsky S-70, SA-316 Alouette III, SA-365 Dauphin, MBB BO-105

COLUMBIA
Hughes 500, OH-6 Cayuse

CUBA
Mi-8 Hip, Mi-17 Hip K, SA-332 Super Puma, Mi-24 Hind D

CZECHOSLOVAKIA
Mi-8 Hip, Mi-24 Hind D

DENMARK
Hughes 500

EGYPT
SA-342 Gazelle, Mi-8 Hip, AH-1S Cobra

ETHIOPIA
Mi-8 Hip, Mi-24 Hind D, SA-316 Alouette III

FRANCE
SA-318/319 Alouette III, SA-342 Gazelle, SA-330 Puma

EAST GERMANY
Mi-8 Hip, Mi-24 Hind D/E

WEST GERMANY
MBB BO-105P, PAH-1, Sikorsky CH-53

GUINEA (BISSAU)
Mi-8 Hip, Mi-17 Hip K, SA-316 Alouette III, SA-342 Gazelle

HUNGARY
Mi-8 Hip, Mi-24 Hind D

INDIA
Mi-8 Hip, Mi-17 Hip K, Mi-26 Halo, SA-365 Dauphin

IRAN
AH-1J Cobra, Bell 214, Hughes 500 D

IRAQ
Mi-8 Hip, Mi-24 Hind D, SA-342 Gazelle, MBB BO-105, Alouette III, Hughes 500 D

ISRAEL
AH-1S Cobra, Hughes 500 MD, Sikorsky S-70

ITALY
Agusta A-109, Agusta A-129 Mangusta

JAPAN
AH-1S Cobra, Hughes OH-6 Cayuse

JORDAN
AH-1S Cobra, Hughes 500 MD, Sikorsky S-76

KENYA
Hughes 500 D/MD

KOREA, NORTH
Mi-8 Hip, Hughes 500D

KOREA, SOUTH
Hughes 500 MD, AH-1S Cobra

LAOS
Mi-8 Hip, Mi-24 Hind A

LIBYA
Mi-8 Hip, Mi-24 Hind D, Alouette III

MOROCCO
Hughes 500 MD, SA-342 Gazelle

MOZAMBIQUE
Mi-8 Hip, Mi-24 Hind D

NETHERLANDS
MBB BO-105

NICARAGUA
Mi-8 Hip, Mi-17 Hip K, Mi-24 Hind D

NIGERIA
MBB BO-105

PAKISTAN
AH-1S Cobra, Mi-8 Hip, SA-332 Puma, SA-316 Alouette III

PHILIPPINES
Sikorsky AUH-76, Hughes 500 D

POLAND
Mi-8 Hip, Mi-24 Hind D

ROMANIA
Mi-8 Hip, SA-342 Alouette III, SA-332 Puma

EL SALVADOR
UH-1H, Hughes 500

SAUDI ARABIA
Sikorsky S-70

SOMALIA
Mi-8 Hip

SOUTH AFRICA
SA-332 Puma, SA-312 Alouette III

SYRIA
Mi-8 Hip, SA-342 Gazelle, Mi-24 Hind D, Agusta A-109

TAIWAN
Hughes 500 D/MD, Sikorsky S-70

TURKEY
AH-1S Cobra

UNITED KINGDOM
SA-314 Alouette II, SA-330 Puma, Agusta A-109, Westland Lynx, Westland Scout

UNITED STATES
UH-1H Huey, UH-60 Black Hawk, CH-46E Sea Knight, CH-47D Chinook, CH-53E Super Sea Stallion, AH-1T/W Cobra, AH-64 Apache

USSR
Mi-4 Hound, Mi-6 Hook, Mi-8 Hip C, Mi-17 Hip K, Mi-26 Halo, Mi-24 Hind D/E/F, Mi-28 Havoc, KA-? Hokum, KA-25 Hormone, KA-32 Helix

VENEZUELA
Agusta A-109, SA-316 Alouette III

VIETNAM
Mi-8 Hip, Mi-24 Hind D

YEMEN REPUBLIC
Mi-8 Hip

YEMEN, SOUTH
Mi-8 Hip, Mi-24 Hind D

YUGOSLAVIA
Mi-8 Hip, SA-341 Gazela, Agusta A-109

ZAMBIA
Mi-8 Hip

SOURCES: *The Military Balance 1986-87*, International Institute for Strategic Studies, 1987. *Defense Helicopter World, "The Military Balance 1986,"* Vol. 5 No. 2, April-May 1986.

ters in order to promulgate vertical maneuver and envelopment. Other nations of the world also have seen the light and, as figure 1 on page 3 reflects, a vast spectrum of combat rotorcraft will be employed in any major conflict in the future.

It therefore behooves us to prepare to counter the combat helicopter threat in the development of our doctrine and materiel requirements, but more importantly, in our *training*, for it is here that an army hones its fighting edge. Only by training relentlessly against a realistically portrayed and equipped threat helicopter force can we gain the experience in peacetime of how to fight one of the battlefield's most destructive and elusive enemies . . . the attack helicopter.

the Concept

"We can always learn from each other."
General George S. Patton

What is needed now is an Army owned and operated rotary wing adversarial organization designed to promote and foster an awareness of and a means to counter enemy helicopters. This organization's prime focus would be to act as an enemy helicopter force during collective training events throughout the continental United States and in Europe at both home station and at Army collective training centers. Its goal, during these training events, is to train the combined arms team members by portraying and replicating the battlefield capabilities of the threat attack helicopter force and thereby provide realistic training experience in peacetime without the cost of war. Quite simply, the Army rotary wing adversary force will provide the necessary bridge between intelligence and tactical knowledge to the common soldier.

This concept is really nothing new. For years now, the U.S. Air Force and U.S. Navy have been employing specialized adversary forces to train their aircrews in dissimilar air combat maneuver training. This requirement was brought about by the dismal performance exhibited by both services during aerial engagements in the Vietnam conflict. Both the Navy "Ault Report" (1968) and the Air Force "Red Baron" study (1972) determined that previous forms of training were inadequate. The Air Force and Navy had both concentrated too extensively on improving the machine without spending enough effort on the men who were flying the aircraft. As a result, the two services found their once vaunted enemy kill versus friendly loss ratios drop from 9:1 in Korea to a dismal 2.42:1 for the Navy and 2.25:1 for the Air Force during the period 1965 to 1968.

An alarmed Navy initiated the conversion of the Pacific Fleet Replacement Training Squadron, VF-121, during the 1968-69 bombing halt, into "the Navy Post Graduate Course in Fighter Weapons, Tactics and Doctrine," better known as "Top Gun." This school used A-4 and F-5 aircraft as aggressors who studied and reproduced the tactics and "mind-set" of the enemy air threat. Graduates of this course who returned to Vietnam dramatically improved the Navy air combat kill ratio during 1970 to 1973 to an amazing 12.50:1 while the Air Force performance actually worsened (1.92:1).

The Air Force quickly got onto the same track with the formation of the 64th Fighter Weapon Squadron at Nellis Air Force Base, NV, in October 1972. This aggressor organization quickly gave birth to three additional adversary organizations based throughout the world that fly F-5, MiG-21 surrogate aircraft to train Air Force aircrews as to enemy tactics, formations and mind-set. Subsequently, the Air Force established the continuing "Red Flag" series of exercises that employ the aggressors as well as ground air defense systems in fully instrumented, realistic "battles" above the deserts of the Nellis test ranges.

The success of the Red Flag series of exercises by the Air Force led directly to the Army's activation of the Ft. Irwin, CA, military reservation as the National Training Center (NTC) and the conversion of two ground maneuver battalions (the 6th Battalion, 31st Infantry, and the 1st Battalion, 73d Armor) for use as the opposing force (OPFOR). The NTC has shown itself to be the most realistic collective training tool the Army has ever had, short of actual war, and has led to the proposed development of a light infantry oriented training complex at Ft. Chaffe, AR, as well as a European training facility at Hohenfels, Federal Republic of Germany, all aimed at providing realistic combined arms training experience against an enemy who fights as we expect him to fight. Indeed we can and have learned from each other.

the Threat

"It is currently impossible to imagine modern combined arms combat without the use of combat helicopters."
LT GEN V. Sadovniko
Chief of the Combat Training Directorate
Group of Soviet Forces, Germany

The combat helicopter threat posed to the combined arms team is a formidable one to consider. Today and in the future combat helicopters will proliferate the battlefield in order to exploit the vertical maneuver dimension's fluid nature. The principal adversary to the North Atlantic Treaty Organization (NATO) Alliance, the forces of the Warsaw Pact led by the Soviet Union, have apparently adopted the concept of helicopter vertical envelopment. The purpose is to facilitate the offensive momentum necessary for the promulgation of their operational maneuver group doctrine. They have carved out a niche in their force struc-

ture for the employment of the armed helicopter. All indications seem to point to an ever-expanding mission role for the Soviet rotary wing combat arm. Many combat missions are assigned to Warsaw Pact helicopters to include:

- Close air support
- Ground attack
- Antitank operations
- Escort of airmobile assaults
- Antihelicopter operations.

Consequently, the Soviets employ attack helicopters in every major exercise as a vital part of their combined arms doctrine.

Naturally, the Soviets have been upgrading the number and quality of their helicopter forces. These assets have virtually doubled in quantity and effectiveness since 1979. A growing decentralization effort has pushed Soviet Army aviation forces down to division level and has bolstered existing Hind/Hip formations at independent regimental and Army/*Front* levels. Existing Hind-equipped formations are seeing product improvements and modernization to enhance their survivability on the increasingly lethal battlefield.

The Soviets are now rapidly equipping their helicopters with a wide variety of infrared jammers, suppressors and decoy devices, in addition to bolted-on armor plate, no doubt as a result of 8 years of combat experience in Afghanistan. Additionally, the Soviets have further developed the capability to vertically move armored forces through the development and fielding of the world's largest production helicopter, the Mi-26 Halo, which is capable of moving 2 airborne infantry combat vehicles or 90 combat troops deep into enemy territory.

But what is most disheartening to the NATO maneuver commanders is the Russian development of an Apache-like, point designed antitank helicopter, the Mi-28 Havoc. The thought of being drilled by threat attack helicopters with Apache-like characteristics from standoff ranges in excess of many friendly air defense systems has the NATO Alliance concerned and rightfully so. The Havoc is expected to be deployed soon and, in conjunction with the deployment of the Kamov Hokum air superiority helicopter will, for the first time, challenge NATO for the maneuver rights of the third dimension of the battlefield.

In all, more than 4,400 Soviet combat helicopters stand ready to wage three-dimensional war against us in any major conflict, and they are getting better at it every day.

The nations of the Third World also must be addressed. Recently, the armed helicopter has proven its worth in several brushfire conflicts around the world. The *New York Times* has reported that the Iraqi tank forces have been all but paralyzed during daylight hours by Iranian helicopter gunships. The Syrians managed to severely disrupt the Israelis during the Lebanon incursion in 1982, by employing Gazelle helicopters armed with antitank missiles. Conversely, the Israelis made good use of their Hughes 500 Defender helicopters against the Syrians during the final stages of that brief war, destroying numerous tanks and armored infantry vehicles with seeming impunity.

More recently we have seen, and continue to witness, export versions of the Mi-24 Hind helicopter being used in counterinsurgency operations in Nicaragua with great effectiveness.

The Chinese Army is pressing hard to acquire and develop a combat helicopter capability through the acquisition of many types of First World helicopters to include S-70 commercial Blackhawks and SA-365 Dauphin aircraft. Indeed, a potential enemy might employ a tremendous variety of combat helicopters against us.

What this discussion leads to is:

- What helicopter will the Army rotary wing adversary force use?
- Who will fly them in training exercises?
- How will they be organized?
- Where will they be stationed?
- And of course, what will be the cost?

the Aircraft

"The primitive can also be a weapon."
Adolph Galland
World War II German Fighter Ace

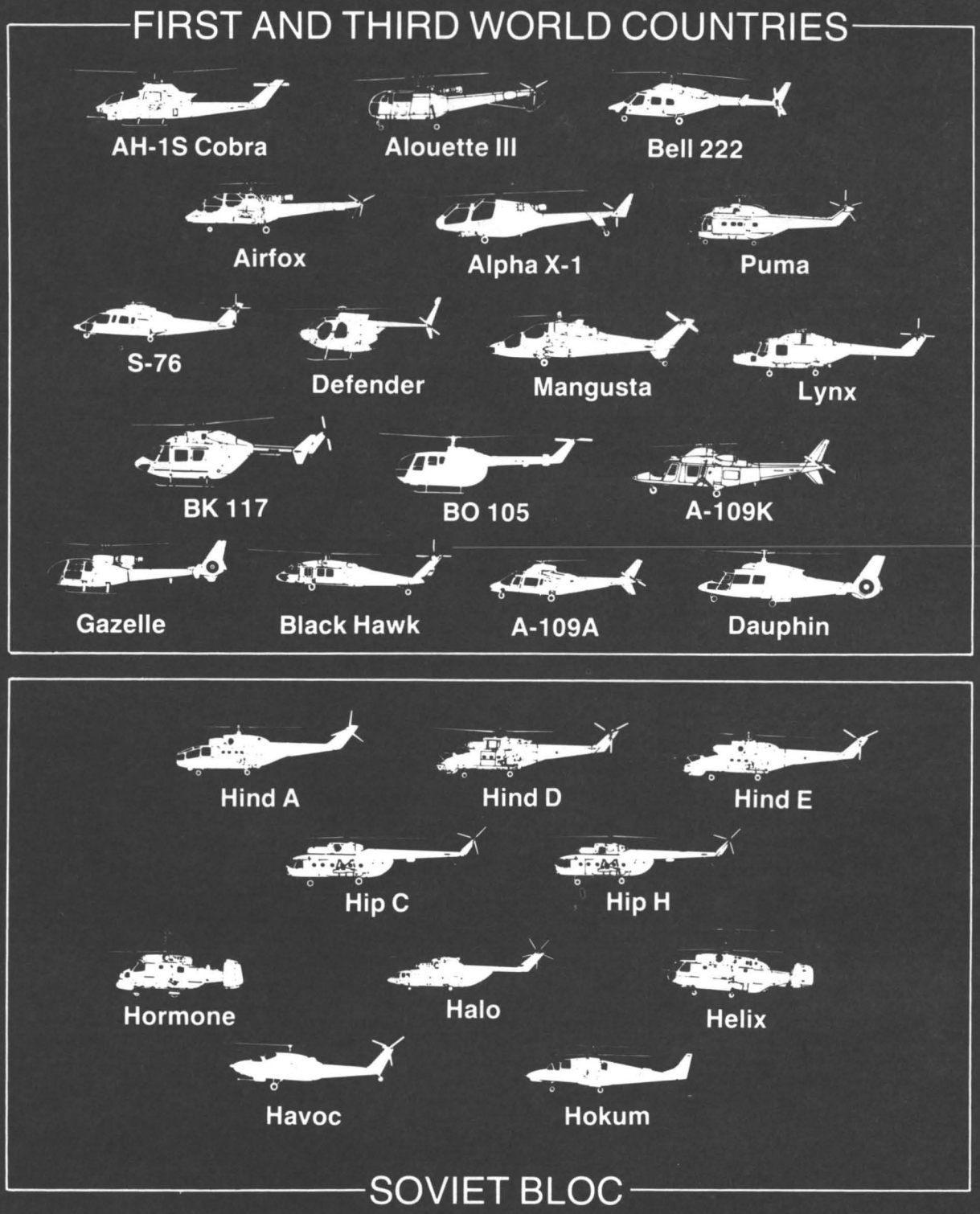
The wide spectrum of rotorcraft that face use in any possible conflict must be considered carefully before selecting any potential aircraft. Idealistically (or better yet simplistically), it would be nice to acquire one of each of the actual threat helicopters for use but money and political concerns, as well as logistical concerns, rule out the acquisition of any single threat helicopter for day-to-day training use. As figure 2 (on page 6) demonstrates, there are just too many of them out there. Therefore, we must concentrate our efforts on obtaining a helicopter that:

- Can perform inflight equal to or better than that of our potential enemies.
- Possesses a mission equipment package (or simulation thereof) of what we assess the bad guy to be capable of.
- Is reliable enough to facilitate high-density use.
- Looks different enough to promote the aircraft identification and recognition process.
- Can be modified or "fine tuned' to replicate the various other signatures that threat aircraft possess.
- Not be currently employed as a front-line attack helicopter by any of the members of the NATO Alliance.

The bottom line for performance for any aircraft we acquire will be that it possesses the true battlefield capabilities of the threat helicopter forces in our training.

Several candidates have surfaced and are depicted in figure 3 (page 7). All possess the flight characteristics or can be slightly altered to reflect the adversary's needs. While none of these aircraft really look like the frontline Soviet helicopter threat, they all are *different* in appearance. This fact enables the soldier to still

FIGURE 2: World helicopter threat.



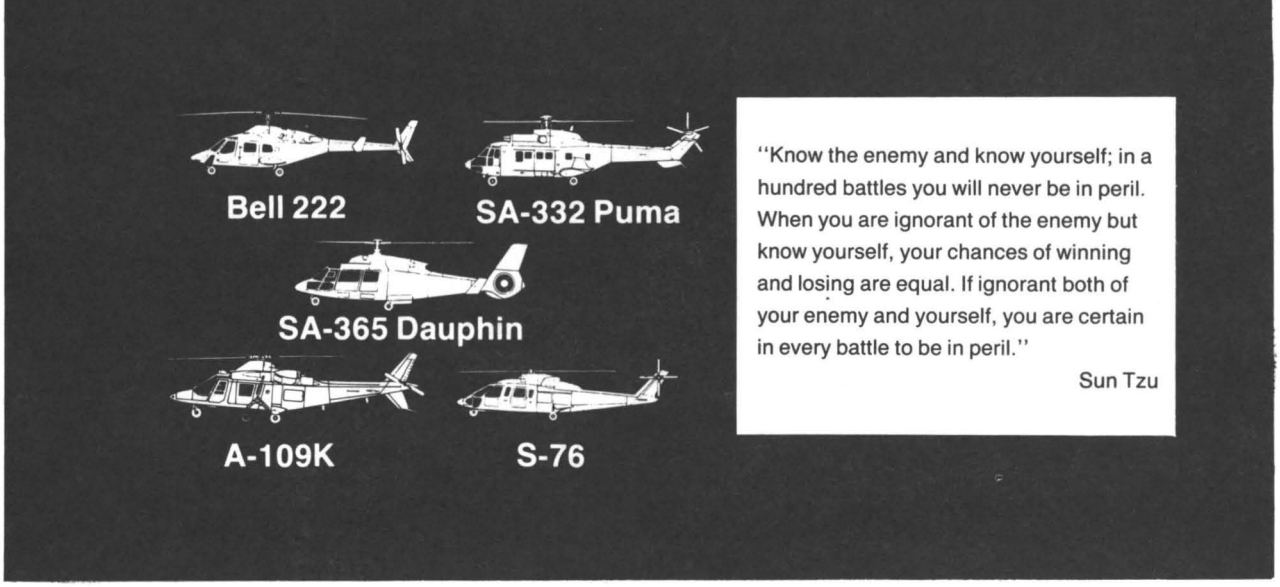


FIGURE 3: Possible adversary forces aircraft candidates.

train effectively as he or she must still use the recognition process to identify them as *not* friendly and subsequently facilitate engagement. The Air Force and Navy both have found that this is the case and that replicating the performance as well as tactics and mission equipment performance is what promotes good, realistic training. Above all, it must be understood that the adversary aircraft is not an end in itself, but merely a tool to demonstrate threat helicopter doctrine, tactics, formations and weapons effectiveness.

One of the most important learning tools that the adversary aircraft will employ will be extensive engagement debriefings. Videotape recordings from onboard gun cameras, as well as verbal comments made by the adversary crews during actual engagements, will be reviewed by all members of the combined arms team who train with it. The aircraft will have the capability of landing at a unit's location and conducting an on-the-spot afteraction review using the onboard video and immediately discuss the unit's strength and weaknesses and reinforce lessons learned. Additionally, the adversary aircraft will employ a real-time casualty assessment system, such as MILES/AGES I or II, to add realism to all engagements; but the heart and soul of this initiative resides in the pilots who convey the tactics and capabilities of the aircraft.

the Pilots

"Man is the only war machine."

General George S. Patton

Army rotary wing adversary pilots will be experts in Soviet capabilities and will provide a valuable source of soldier/crew education on threat helicopter doctrine, tactics, formations, weapon systems and "fighting philosophy." These aviators will provide an effective interface between the intelligence community and the soldiers in the field and will improve the soldiers' knowledge of the enemy and eventually their ability to fight and win on the modern battlefield. The men and women who fly our adversary aircraft must be experienced aviators who possess a firm knowledge of *our* tactics and doctrine. They must then be schooled in the Soviet mind-set and fully immersed into the threat's doctrinal background and aware of their ethnocentrisms so as to completely reproduce the Soviet pilot's way of doing things. We must literally breed out the typical American aggressiveness and replace it with the Soviet "do as I do" rigid command and control thought process that causes the threat pilots to fly the way they do.

Most importantly, however, we must employ aviators who are *trainers, teachers, subject matter experts* but are *not* competitors. These trainers of men must be able to accept (and we hope this happens on a regular basis) their daily destruction in training. Egos will have no place in this organization. These aviators must be recognized as the enemy but they also must be the best we've got, for they will be hanging it out on the line day-in and day-out in training. Additionally, these people must be retained in their positions for the maximum amount of time possible considering it will take at least 6 months to train them to become adversaries. *The best must be used to train the force.*

the Organization

"War is no longer fought in a series of scattered individual encounters. War today is fought by organized masses of men and machines."

Giulio Douhet
Prophet of Modern Aerial Warfare

No matter how effective an individual aircrew or helicopter is by itself, it must be properly organized and employed to gain the most good for the money. The Army rotary wing adversary force is no exception to this rule and is extremely dependent upon its organizational tenets to execute its training mission. The Army rotary wing adversary force will reflect one single focal point—that of meeting the day-to-day counterhelicopter training needs of the U.S. Army.

The force design required for this initiative must reflect both a resemblance to how our principal opponent has organized his helicopters and also facilitate effective and efficient employment of assets in day-to-day training at the Army's collective training facilities and unit home station. Figure 4 reflects the necessary force design for this to take place. This organization mirrors the principle concerning issues of the Soviet-style divisional helicopter squadron, that is designed to employ multiple attack helicopters simultaneously while also being able to conduct lift and assault operations with an organic transport platoon. The adversary force design allows for this capability by having two separate combat helicopter platoons that employ a generic attack/assault helicopter that can be tailored by the addition of wing stores to reflect either type of combat helicopter. Additionally, the force design allows for the simultaneous employment of assets at, and away from, the training center location. This will allow for home station training of many Army units (Active, Reserve, National Guard) throughout each regional district as shown in figure 5. By basing one of these organizations at the NTC, the Joint Readiness Training Center (Ft. Chaffe), and at the Combat Maneu-

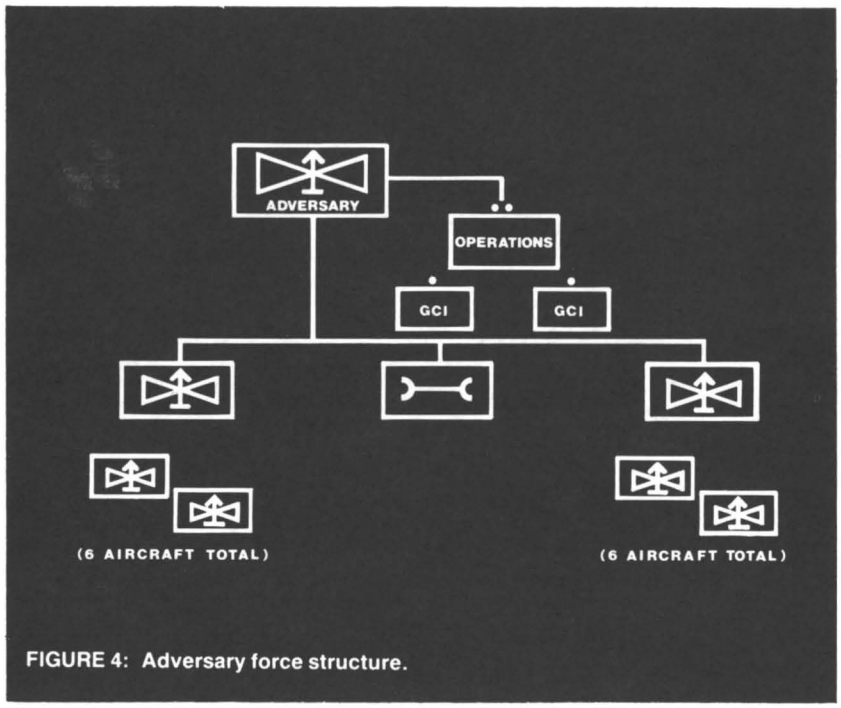


FIGURE 4: Adversary force structure.

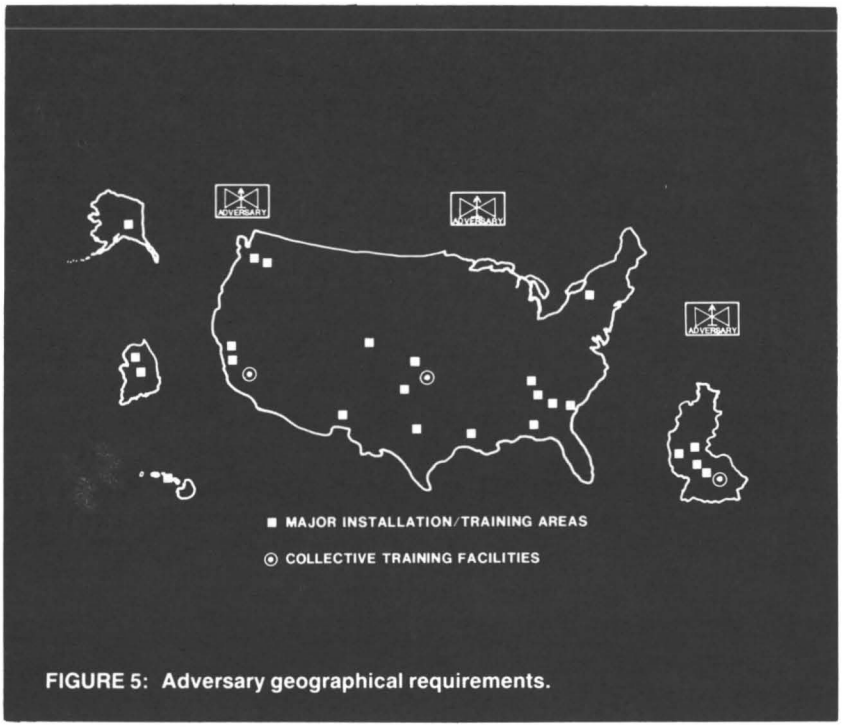


FIGURE 5: Adversary geographical requirements.

ver Training Complex in Germany, the adversary force can facilitate this important training both in collective combined arms scenarios and in individual unit training at home station while still maintaining a presence at its base location. This "road show" capability will be one of the biggest selling points of the initiative and will greatly enhance Army home station training.

the Cost

"Brother, can you spare a dime?"

Anonymous

Today, when additions to a "capped" Army force structure are suggested, the immediate reaction is "No,—we can't afford it!" or "Are you prepared to take it out of your hide?" However, careful examination of adversary training has proven to be far less expensive and, more importantly, far more effective than any other training we execute using Blue force-on-force scenarios. But what is the price of training?

It is hard to really define a valid means of gauging its value, but we do know that the ultimate test will be our effectiveness in actual combat. Those who have faced an aggressor—be they Air Force pilots, Naval aviator graduates of Top Gun, or soldiers returning from their annual thrashing by the OPFOR at the NTC—all of them indicate the unqualified success of this type of training.

The bottom line on the acquisition of 36 adversary helicopters is bound to be one of the major stumbling blocks of this program, but it is a cost that must be paid. The combat helicopter threat is one that affects all of the members of the combined arms team and, therefore, must be jointly paid for because all will end up fighting that threat. Moreover, the "faces and spaces" for the 36 pilots and yet to be determined ground personnel of each of the separate adversary companies must be apportioned throughout the Army as the Aviation Branch cannot absorb fielding the entire force structure requirement alone. The diversion of acquisition and operational funds to procure and man unique helicopters for the Army rotary wing adversary program would have a minor effect upon the overall Army budget, especially if a phased approach toward aircraft acquisition is undertaken. Examine the tradeoffs. The skills gained from helicopter adversary training would not only reduce the number of our combat systems lost in battle but would also result in greater numbers of threat helicopters being destroyed, thus negating one of the enemy's most potent maneuver assets. We have learned through example that combat is not the place to train.

The U.S. Army has recently undertaken a massive effort to come to grips with the combat helicopter threat to our ground forces through the development of the Forward Area Air Defense System initiative. Army doctrine and tactical manuals now address the need to counter these formidable aerial weapons platforms in a combined arms manner with all team members contributing to the effort. But, *what is preached also must be practiced* and we must train regularly against a realistically portrayed helicopter force to realize an effective capability. Rarely do opponents simulate threat helicopter formations, tactics or weapons employment during REFORGER (Return of Forces to Germany) or division and brigade-level training maneuvers. If a threat capability is simulated, the forces that emulate the Red side often introduce inaccuracies in simulation that envariably produce erroneous sight cues and improper habit patterns. Additionally, units that train against each other regularly tend to develop tactics that counter the opponents tactics and machines rather than that of the threat. When you fight Blue versus Blue, you learn the best means of fighting yourself, not the enemy. Realism is a must-have requirement for training and we must pay for it.

the Payoff

"In no other profession are the penalties for employing untrained personnel so appalling or so irrevocable as in the military."

General Douglas S. MacArthur

If the key to the effective projection of combat power on the battlefield is the soldier and crew that mans the weapon system, then the realistic training portion of the equation is the most important aspect of readiness. It has been shown by our other services, as well as through our experiences at the NTC, that the best way to achieve this readiness is through aggressive, structured, regular and realistic training. This facet of the combat developments star has habitually been last on our list of priorities, but the growing realization of our reliance upon the human factor in war demands that we pay attention to the practical, hands-on use of our combat systems in conjunction with our combined arms brethren. History has clearly demonstrated that technology alone is a poor substitute for training.

The groundwork has been laid and the results have been impressive. The Army rotary wing adversary force will simply add on to an already established training system and make us, for the first time, have to contest the vertical maneuver dimension in our training and thus make us better prepared for war. The cost will have to be paid but reflect upon these facts:

If *1* Havoc can kill *15* U.S. M-1s/BFVs
and *4* Havoc's conduct *4* sorties a day
then *240* armored fighting vehicles
or *2* brigades cease to exist.

But, if through realistic training, we reduce the threat attack helicopter's effectiveness by 50 percent, then the savings are immense. A savings of 120 combat systems, with a price tag in excess of $210 million, not to mention the lives of the crews, is realized.

The Army rotary wing adversary force is needed—needed right now.

MILES/AGES-AD

PROGRAM OVERVIEW

THE RESULTS and quality of force on force exercises have for many years been dependent on the quality of the controllers. The determination of who shot whom was a judgment call of the controller, if in a good vantage point to observe. Multiple Intergrated Laser Engagement Systems (MILES) was developed to eliminate this problem and to provide real-time casualty assessment during the exercises.

MILES uses gallium arsenide diode lasers to replicate firing of the weapon. An array of detectors is installed on the player vehicle to receive the coded laser beams and to record a hit. A microprocessor on the target decodes the message and determines the appropriate effect (near-miss, hit or kill). The probability of kill given a hit is programed for each system. The MILES also accounts for ammunition expended. This keeps the number of shots fired in line with that of the actual system.

Basic MILES to support armor, mechanized and infantry was fielded in 1980 with great success. Air-to-ground engagement simulation-air defense (AGES-AD), as a follow-on to the basic MILES, added aviation and air defense to the training battlefield. The MILES/AGES-AD program provided systems for the AH-1 Cobra, OH-58 Kiowa and UH-1H Huey helicopters and also supported the Vulcan, Chaparral and Stinger air defense weapons.

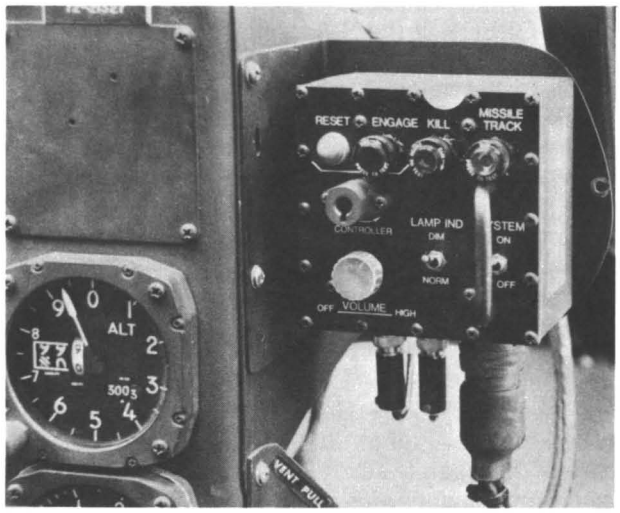
Since the fielding of MILES/AGES-AD in 1985, it has received both praise and criticism. To quote Colonel James Lloyd, commander, 4th Aviation Brigade, 1st Armored Division, "MILES is the key to realistic attack helicopter training." However, there is still much room for improvement. Many lessons have been learned and changes are underway.

CW4 Perry M. Smith
Directorate of Training and Doctrine
New Systems Training and Simulator
Acquisition Division
U.S. Army Aviation Center
Fort Rucker, AL

Areas of Concern

A major concern of MILES/AGES-AD is weapon performance, i.e., range and kill dispersion patterns. However, eye safety must be guarded/maintained. A laser is nothing more than a light beam. Factors of the environment have a major impact on it. Weapons designed with a range of 3,500 meters are able to simulate a kill at 5,000 meters on a clear day at Ft. Huachuca, AZ. Yet, on a rainy day in West Germany, maximum range is 2,500 meters. The theory that the laser can penetrate as far as the eye can see isn't totally correct. This is quite apparent at the National Training Center (NTC). Dust and smoke deflect the coded laser to an extent that kills aren't recorded when dust or smoke obscures the target. The tech-

The cockpit kill indicator for the OH-58A and OH-58C has been relocated to the right side of the instrument panel to resolve visibility obstruction.



nology used for this design is about 11 years old. There are studies ongoing to find a solution. The collection of dust and dirt on the glass that covers the laser transmitter and the detectors are also considered negative factors. Attempts should be made to keep these areas clean.

The effectiveness of the AH-1 MILES/AGES-AD often has been questioned. Tests have attributed the majority of the problems to environmental conditions as mentioned above and the boresight of the telescopic sight unit (TSU): boresight should be done as often as practical. It is essential that boresight be performed at the beginning of an exercise and at any time there is a change in temperature of ± 15 degrees F. Verification should be done at a minimum of daily. (Verification is simply firing the weapon at a MILES equipped target.) The "Instructor's MILES AH-1S Helicopter System Training Guide," page 73, states, "TOW alignment must be performed with auxiliary power unit (APU) power only. Do not use internal power." This places a burden on tactical units. To reduce this burden, the development of an alignment device is underway. The device will attach to the front of the TSU and eliminate the need for an APU and a distant aiming target.

Another aspect of the MILES/AGES-AD effectiveness is that it relies on the actual weapon system to be functional to operate. Each of the systems is complex. The MILES/AGES-AD and the weapon system should be thoroughly checked prior to an exercise. The contractor logistics support (CLS) is responsible for checking the MILES prior to issue; however, the MILES test set is being fielded to assist operators in troubleshooting. Furthermore, Army Training Support Center has positioned a MILES contract training specialist at major installations to provide training and assistance.

Installation of the MILES/AGES-AD, in particular on the AH-1, is a time-consuming process. Some units have the training systems installed and left on the aircraft for extended periods, which facilitates the potential accumulation of rust and corrosion that will drastically reduce the reliability of the system. The systems should not remain installed on the aircraft for more than 30 days. In addition, components suspected of being faulty should be tagged and turned in to the appropriate activity for repair. Every effort has been made to reduce the installation process; however, no significant breakthroughs have yet been made. It should be noted that the more often a unit uses the system, the time required to install it is less. The benefits are worth the effort.

The MILES TOW transmitter has the same laser code for both the airborne and the ground TOW systems. This presents the problem of who shot whom in large-scale exercises. An estimate of $15 million has been made to modify the system to differentiate between the two. The instrumentation systems that are being installed at the major combat training centers will resolve the problem for those locations. The current position is to rely on the controller to overcome this situation in small scale exercises.

The time of flight (TOF) for the actual TOW missile varies with range. An eye safe rangefinder is not available for the AH-1 and since no range data is available, a medium time of 12 seconds is used for all TOW shots. This is considered to be the normal engagement range TOF (about 2,200 meters) for the airborne TOW.

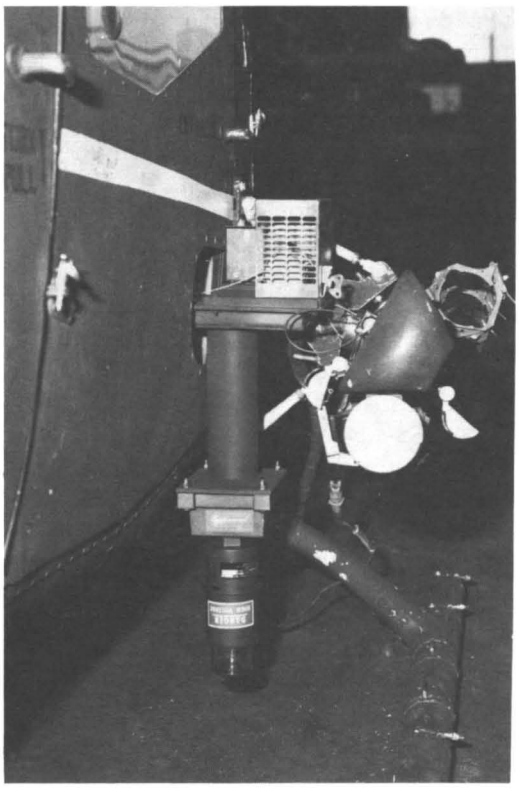
The OH-58 A and C aircraft were restricted from flight with MILES/AGES-AD in May 1986. An interim solution has been achieved and 14 sets have been fielded to the NTC. Actions are ongoing to satisfy the Joint Readiness Training Center and the Combat Maneuver Training Complex. The Armywide fix is anticipated by third quarter 1988.

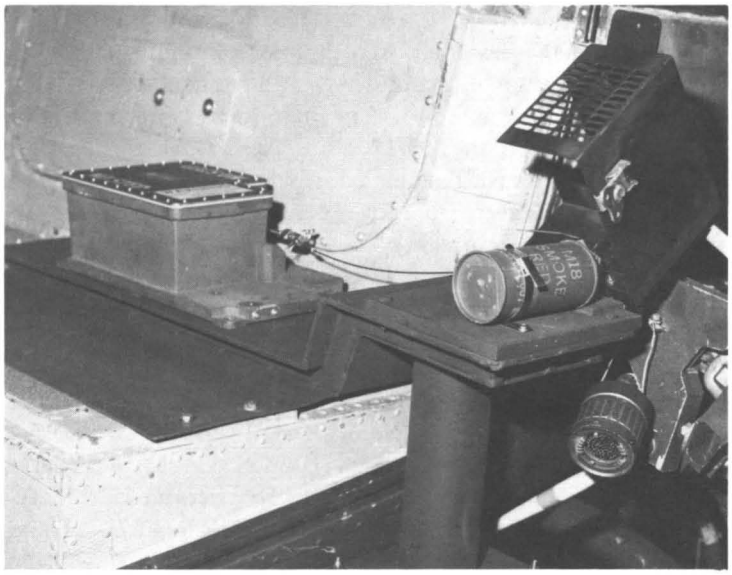
Bogus kills also have been a major concern for MILES/AGES-AD. A bogus kill is identified as the activation of the kill indication system for no apparent reason. Several factors have been identified as contributing: weak system batteries; accidentally switched off; radar emitions; sun rays; and improper grounding of MILES to the aircraft. Shielding has been added to components of the system to reduce these problems.

Many aviators who have been on exercises at the NTC believe the opposing force armored vehicles have a prewarning of a MILES TOW engagement. This is not possible with the design of the current system. The MILES control box requires 22 TOW kill words to register a hit. The system will not provide any indication until the 22 TOW words are received and/or a 10-second engagement period has elapsed. One explanation for the intermittent flash of the strobe is engagement by another weapon.

Another issue surfaced at the NTC is the difficulty in killing a tank in hull defilade. The detectors around the turret are masked from the aircraft by the ground. There are no detectors installed on top of the turret. In addition to this, an engagement that occurs from the flank of a tank has the same hit/kill probability as a frontal shot if the tank turret is turned toward the engaging system. This is due to the detectors being mounted on the base of the turret.

(Note: The CATA publication, "NTC Lessons Learned: MILES Checklist," June 1986, will help units prepare to conduct effective MILES training at the NTC.)





The smoke grenade and strobe are externally attached (left) to be compatible with the air-to-air Stinger and visible to ground personnel during force-on-force training. The aircraft kill indicator is mounted on a pallet (above) in the same location as the M27E1 minigun.

MILES/AGES-AD Upgrades

The lights on the cockpit kill indicator are not night vision goggles (NVG) compatible. The replacement of the lights with the blue/green NVG filters will solve this issue. This can be done by the local CLS sites.

Installation of the MILES transmitter into the laser augmented airborne TOW TSU is on hold waiting implementation of the C-Nite Program. C-Nite will provide, among other things, forward looking infrared capability for the AH-1. Fielding of the C-Nite Program is scheduled for fiscal year 1990.

The capability to fire actual rockets and cannons while simultaneously firing the MILES missiles has been requested by the field units. The request for a change has been forwarded by Training and Doctrine Command to the Project Manager for Training Devices. The fielding date for such a capability has not been determined as yet. This effort will support AH-1 and AH-64 Apache helicopters.

The immediate need for MILES/AGES-AD to support Black Hawk training was surfaced in 1985. To satisfy the requirement on an interim basis, kits to modify 127 UH-1H MILES/AGES sets was completed in August 1987. Armywide fielding of these sets began in January 1987. These systems are to be replaced with the delivery of the AGES II program.

To support the single station fielding of the Apache battalions, 20 AH-64 accelerated AGES II kits will be delivered to Ft. Hood, TX, through December 1987. The accelerated systems will be built to prototype specifications and will be upgraded to production standards during Lot #1 production.

New Systems

The air-to-ground engagement simulation II (AGES II) is a follow-on to the original MILES/AGES-AD program. AGES II will support tactical engagement simulation for the AH-64, UH-60, OH-58D, CH-47D and the HELLFIRE ground support system (HGSS). Even though AGES II is being built by another firm, the systems will remain compatible. Fielding for the AGES II is to begin second quarter fiscal year 1989.

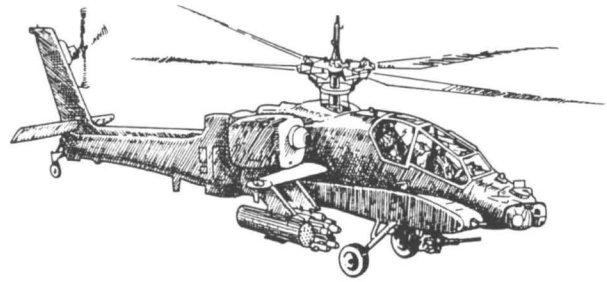
The AGES II program will have several major improvements over the original program. Each system will have a discrete player identification code. This will enable a player that has been engaged to know not only the type weapon that fired (as with the original system) but also which player fired the shot. Event recording also will be incorporated into AGES II. During a mission, 250 events will be recorded for each player equipped with AGES II to support afteraction review (AAR). Furthermore, there has been a reduction in the number of belts required for the detection system.

Aircraft survivability equipment (ASE) had not been factored into the MILES/AGES-AD probability of hit (Ph) or probability of kill (Pk). This is being rectified with the AGES II program. If a particular piece of ASE is installed and employed properly, the Ph/Pk will be adjusted accordingly.

In addition to providing laser codes to activate the kill systems, the AGES II will provide eye safe laser rangefinder/designator (LRF/D) capabilities via an erbium glass laser. Through the use of the AGES II LRF/D, actual TOF will be available for HELLFIRE shots; autonomous and remote HELLFIRE launches will be possible. The OH-58D, HGSS and another AH-64 may designate for remote launches.

The air-to-air Stinger (ATAS) is to be fielded in fiscal year 1990. A draft appendix to the ATAS required operational capability is being staffed to provide MILES ATAS and concept formulation is currently underway. Fielding of the MILES ATAS is anticipated to follow the *actual* weapon system by about 6 months.

The concept of embedded training will be used in the future for MILES/AGES as well as other training support requirements. The LHX and the V-22 Osprey are scheduled to be supported in this manner. This will eliminate requirements such as downloading rocket pods or tactical lasers and replacing them with training components. It will also lead to a much more user friendly system with reduced redundancy of components.



Current Situation

MILES/AGES-AD and other associated programs have many valuable aspects, but the most significant role it supports is the afteraction review. The AAR, when performed properly, provides all players, the staff and the commanders immediate review of events and lessons learned. All too often the AAR is omitted for various reasons. This results in a great deal of lost valuable training data. Controllers and commanders must realize this to prevent the same mistakes from happening over and over again.

Aviation assets are vulnerable. The only way we can find out our weaknesses and means of correcting them, without spilling blood, is through the use of MILES/AGES-AD in force-on-force exercises. History reflects that we will fight as we train. If we don't train well, our performance on the battlefield will be poor.

As stated, there are shortcomings in the MILES/AGES-AD program. However, if the systems are not used, nothing will be improved. Many units only use MILES/AGES-AD when going to the NTC. The NTC is not the location to learn how MILES/AGES works (or does not work). The Army has based its force-on-force, collective battlefield training on MILES/AGES-AD. It is the responsibility of each soldier to strive to improve the training program. The way to accomplish this with the MILES/AGES-AD program is through written correspondence (message, letter, memorandum, etc.) to Directorate of Training and Doctrine at the U.S. Army Aviation Center. Please be as specific as possible about what the problem is. If you have a recommended solution, it would be welcome.

Send comments to: CDR USAAVNC, ATZQ-TDS-AS, Ft. Rucker, AL 36362-5163.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

SPH-4 Flyer's Helmet

The SPH-4 flyer's helmet retention assembly, national stock number (NSN) 8415-01-056-0699, is no longer being procured. The correct replacement item is the regular retention assembly, NSN 8415-01-056-0699. This retention assembly has now been redesignated as a one size fits all for both sizes of the SPH-4 helmet. Action officer is Mr. James C. Dittmer, AMCPM-ALSE-L, AUTOVON 693-3215 or commercial 314-263-3215.

Career MOS for ALSE Technician/Specialist

This action item has a long history dating back to 1969 when the first draft study was prepared, and finally in 1975, a coordinated aviation life support equipment (ALSE) military occupational specialty (MOS) study was forwarded to Military Personnel Center at Department of the Army (DA).

When the U.S. Army Aviation Branch was formally established in 1984, everyone thought at long last Army Aviation and Army Aviation life support has come into its own and all necessary support services would fall into place. No quite so—in the case of ALSE we are still light years behind the other services, both of whom have clearly identified career fields and MOSs, well qualified and trained personnel in these vital skills.

We see many aviation units of the Active Army, the Army National Guard and Reserves using manpower assets taken "out of their hides." Now we know that this is certainly not the way to do it, but somehow they are doing the best they can with very little. The ALSE MOS requirement is not a dead issue. It is alive, and we are getting much more visibility from the DA level down. There isn't a day that goes by that we don't hear about the requirement for the ALSE MOS, and I am firmly convinced it will come about and surely be a distinct benefit to the ALSE program.

Yes, we do have a Q2 additional skill identifier, but what we need is a career MOS and at least a line in the TOE and MTOE of every aviation unit affected. Giant steps have been made in the last 5 years with formal ALSE training courses at Ft. Eustis, VA; Reserve ALSE training, Vancouver, WA, under the auspices of Sixth Army Aviation Officer; and Army National Guard training on ALSE continues.

Many personnel have been trained in this critical field, but it is difficult to keep track of them. Once they go PCS, we lose them. The career MOS would give us the tool to track these specialists and keep them in the ALSE program.

Another action we should consider is the upward mobility program; wherein, we can get interested personnel into the ALSE program and train and promote in all phases of the ALSE effort.

Now the challenge must continue for a formal ALSE career MOS field in the Army.

PRC-90 Survival Radio Antenna

We can now give you some welcome news. Through the attention and concern of one of our action officers, we have identified a new improved survival radio antenna

in the Army supply system for the PRC-90 radio.

As you probably recall, the old antenna used to break when it was folded into the survival vest or accidentally stretched, making the antenna useless. The new antenna has a shorter base and is much more flexible and therefore less susceptible to breakage. The NSN will remain the same as that of the old antenna. When you receive this new antenna and put it into service, please let us know about its effectiveness.

Army Support Activity Today

Have you ordered your new Support Activity Supply Digest? The latest Supply Digest is no. 3-87. The Digest can be secured from the U.S. Army Support Activity, P.O. Box 13460, Philadelphia, PA 19101-8419, ATTN: Vickie Di Domenico (STRAP-P) or call her on AUTOVON 444-2569. The Digest contains a wealth of information pertaining to supply of ALSE clothing, etc. Action officer is Mr. Rainy Bell, AMCPM-ALSE-L, AUTOVON 693-3215.

Items In Short Supply Release Dates

The following items of clothing were released for issue during the months August to September 1987: coveralls, flyer's—36L, 38S, 40S, 42L; helmet, flyer's, SPH-4 XL; jacket, flyer's, Nomex, lightweight—XS-R, M-L, L-R, L-L, XL-R, XL-L.

Flight Helmet Protective Bag

The flight helmet protective bag was designed to protect the flight helmet and as a protective covering whenever the helmet is being carried, i.e., to and from the ALSE shop/aircraft or while on TDY or any other time it is not being worn. While traveling TDY on commercial aircraft the helmet will be carried in the helmet bag and carried onboard as carryon luggage. It should be stored in the overhead storage compartment. The helmet and storage bag will fit in commercial aircraft carryon luggage areas except possibly in the smaller commercial aircraft. Too many helmets are being damaged while being shipped as airline baggage. Some aircrew personnel have been using the aircrew kit bag with the flight helmet being shipped inside with other clothing. Following the procedures above will minimize damage to the flight helmet.

Night Vision Goggles (NVG)

This office (AMCPM-ALSE-L), has become quite involved in the NVG area, and an excellent article is published in *Flightfax*, Volume 15, Number 18, 11 February 1987. We also suggest you secure copies of *Flightfax*, PEARL'S and ALSSGRAMs.

Requisitioning Special Measurement Clothing

To avoid delay in the processing and filling of requirements for special measurement clothing, requisitions should be submitted in accordance with the instructions contained in:

- AR 32-4 (DLAR4235.18), dated 25 February 1975, "Special Measurement Clothing and Footwear, Orthopedic Footwear, Guidons, Streamers and Footwear."
- AR 700-84 unit supply update, dated 24 November 1986, "Issue and Sale of Personal Clothing," chapter 7—special measurement clothing and footwear.

The following forms should be filled out completely.

- DD Form 358, Special Measurement Blank—Clothing for Men.
- DD Form 111, Armed Forces Measurement Blank—Special Sized Clothing for Women.
- DD Form 150, Special Measurement Blank for Special Measurement/Orthopedic Boots and Shoes.

Graduation date should be shown on all requisitions (when applicable). All requisitioners should indicate a point of contact. Document identifier AOE/A05 (with remarks) must be used, the RIC is S9T. Mail special measurement clothing requisitions off-line to:

Defense Personnel Support Center
ATTN: DPSC-VC
2800 South 20th Street
Philadelphia, PA 19101-8419.

Note: To avoid a "RF" (no record) status code, follow-ups should be made off-line, by mail, message or telephone.

From the date of receipt, DPSC has 49 calendar days to process woolen coats and flight items and 35 calendar days to process other items. Requisitions for stocked sizes submitted as special measurement requisitions will be rejected by OPSC-VC (Directorate for Manufacturing). Note: Requirements for special measurement orthopedic footwear are still to be submitted to the defense orthopedic footwear clinic.

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.

AH-64

A TOTAL SYSTEM FOR BATTLE

This sixth article in the series on the AH-64A Apache aircraft addresses the caution/warning, fault detection/location and multiplex systems. The information contained here is for familiarization only and must not be used to operate or maintain the aircraft.

Caution and Warning System

This system provides visual indicators in one or both crew stations to alert the aircrew to the existence of a hazardous condition. It also produces audio warnings of a condition critical to aircraft survival. The system is operational anytime 24/28 Vdc is present on the dc emergency bus.

Two *identical* master caution and warning (C/W) panels, figure 1, are installed in the aircraft. One is located on the top center of the pilot's instrument panel and the other on the top right of the copilot gunner's (CPG's) instrument panel.

The master C/W panels operate independently with common sensors; once activated, each panel must be reset individually. The master C/W panels contain the following segments:

- Master Caution—An amber segment switch that flashes at 5 ± 1 hertz (Hz) rate. When the segment is pressed and released it will reset to the off condition. The *master caution* segment will illuminate when one of the other segments of the master C/W panel illuminates.

The following red segments *have no flashing function*; they will illuminate steady-on upon detection of a fault condition.

- Low revolutions per minute (rpm) rotor—Rotor speed (N_r) has dropped below 94 percent.
- Fire auxiliary power unit (APU)—Flames are present within the APU compartment.
- Engine 1 out and engine 2 out—Corresponding engine has failed. Two engine speed signals are monitored as follows:

When an engine's power level is in the *fly* position and the engine's N_p is below 89 percent, the respective *engine out* segment will illuminate. The *engine out* light will also illuminate when engine N_g drops below 63 percent.

- Engine chop—Both engine chop relays have closed and removed the N_p reference signal to both engines.
- High rpm rotor—Rotor speed has climbed above 104 percent.
- Backup control system (BUCS) fail—A component within the BUCS system has failed.
- Press-to-test—A nonilluminating edgelite segment switch that, while pressed and held, will apply power for lamp test to all master C/W panel segments, all C/W panel segments and all other advisory indicators.

There are two C/W panels, figure 2, one in each crewstation, on the bottom right-hand side of the pilot's and the CPG's instrument panels. The pilot's panel contains 75 segments while the CPG's panel contains 32. Some segments are split to increase panel capacity.

Segments are illuminated by a fail/fault signal from the appropriate fail/fault sensor. Upon initial illumination, the segment will *flash* at 2 ± 1 Hz rate to alert the respective crewmember. When the crewmember acknowledges the fault by resetting the *master caution* segment, the C/W panel segment will remain illuminated in the *steady-on* state, and remain on until the fail/fault is corrected.

An audio warning tone will be activated in both crewstations by the illumination of either the *low rpm rotor, engine 1 out or engine 2 out* segments on the master C/W panels. This tone is a 700 to 1,700 Hz continuous sweep

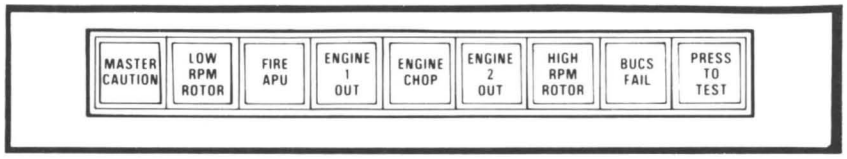


FIGURE 1: Master caution and warning panel.

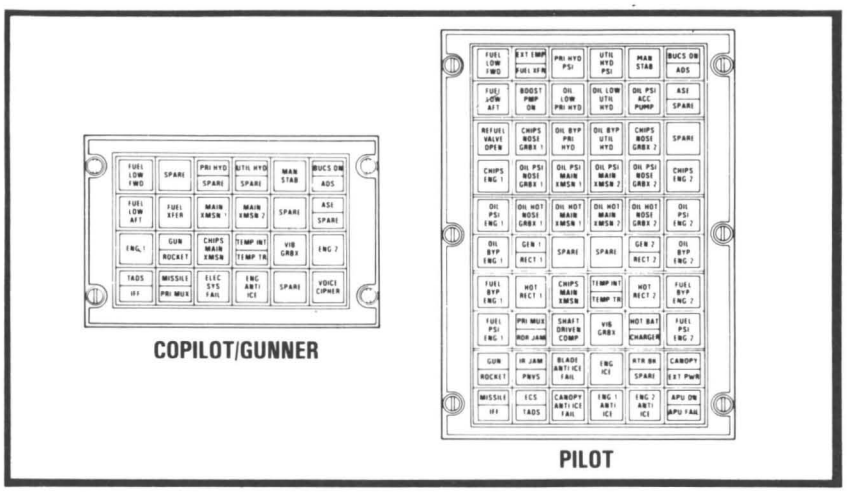


FIGURE 2: Caution and warning panels.

tone that is preset in volume. It is reset in both crewstations by either crewmember pressing either the engine 1 out or the engine 2 out segments.

An audio warning tone also will be activated in both crewstations when the stabilator automatic mode fails. This tone is a 1,000 Hz continuous tone that is also preset in volume. It is reset in both crewstations by either crewmember pressing the *reset* button on the stabilator control panel, which is located on each collective stick.

Advisory indicators are located within each crewstation as indicated in figure 3.

The intensity of the C/W lights is controlled independently within each crewstation, figure 4. The flight instrument control on each internal light control panel provides the *bright/dim* control.

In the *off* position, the C/W light intensities will be bright; any other position will set the intensities dim.

Both the pilot's and CPG's C/W systems are protected by a caution circuit breaker located on the emergency section of the respective crewstation's circuit breaker panel.

AH-64 A TOTAL SYSTEM FOR BATTLE

Indicator	Location
• REMOTE TRANSMIT SELECT SWITCH	Pilot's Center Console
• TAIL WHEEL UNLOCKED	Pilot's Tail Wheel Lock Control Panel
• ANTI-ICE ON	Pilot's Anti-ice Control Panel
• BLADE DEICE ON	Pilot's Anti-ice Control Panel
• EMERGENCY POWER	Pilot's Engine Overspeed Test Control Panel
• ORDNANCE SAFE	Adjacent to Pilot's and Copilot's Master Switch
• ORDNANCE ARMED	Adjacent to Pilot's and Copilot/Gunner's Master Arm Switch
• FIRE BOTTLE DISCHARGE	Pilot's Fire Detector Test Control Panel
• ENGINE START	Pilot's Power Lever Quadrant

FIGURE 3: Advisory indicators.

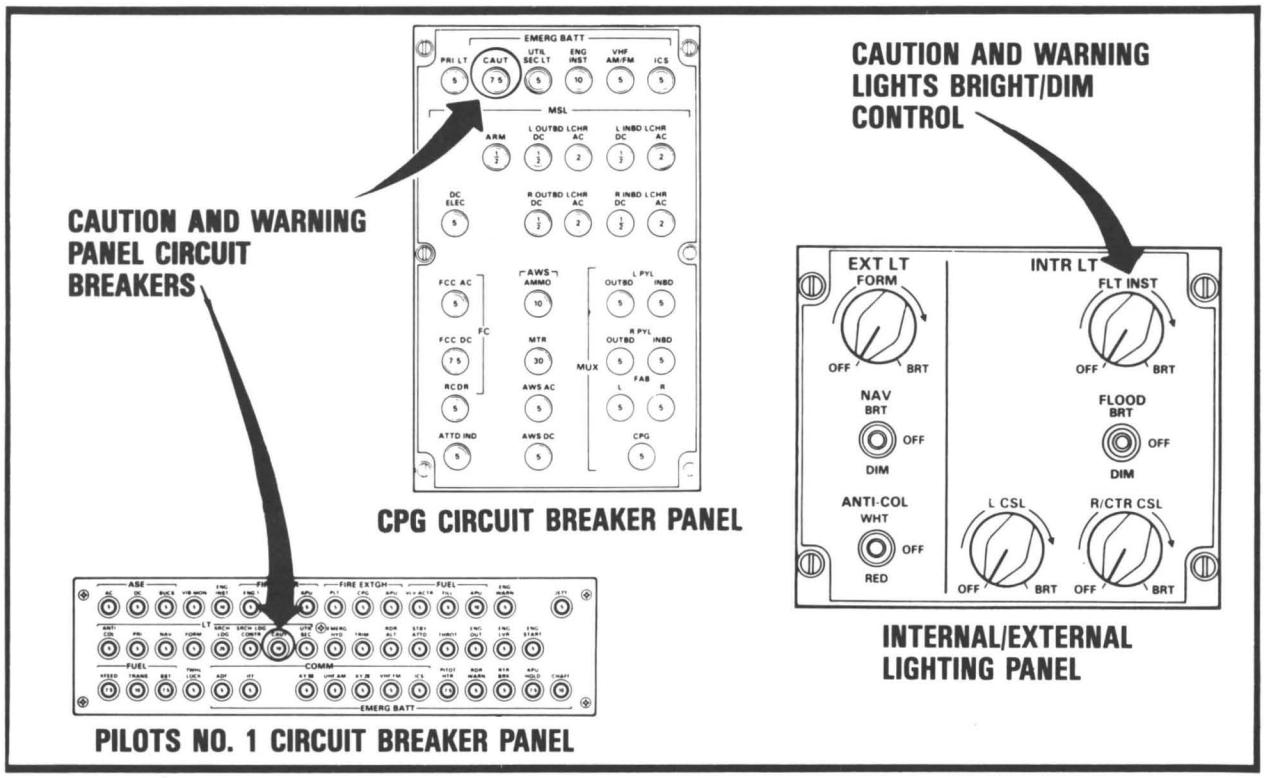


FIGURE 4: Lighting control and circuit protection.

Fault Detection/Location System (FD/LS)

The purpose of the FD/LS is to:

- Detect faults in the systems monitored.
- Alert subsystem failures to the flight crew.
- Identify the failed system.
- Identify the failed AVUM line replaceable unit (LRU) and its approximate location on the aircraft.

The fault detection/location system interactive system devices, figure 5, work together to perform all FD/LS functions.

- Fire control computer (FCC)—*Primary computer* for the FD/LS. It contains *all* FD/LS test and display software routines.
- Multiplex remote terminal units (MRTUs)—Provide interface between the multiplex system and the monitored aircraft systems. Each MRTU contains built-in test circuitry to detect 95 percent of all faults within itself.
- Backup bus controller (BBC)—Automatically assumes control of the manual override switch (MUX) system if the hardwired FCC signal to the BBC indicates a failure *and* if there is a loss of data on both data buses for a specified period of time. The BBC assumes control if the MUX on the fire control panel is placed in the secondary (SEC) position. If the BBC is the primary bus controller, no FD/LS capability exists.
- Data entry keyboard shown in figure 5 provides the copilot gunner with the means to enter the FD/LS test modes and to acknowledge actions taken. When the function switch *is not* in the FD/LS position, internal self-testing of subsystems is continuously monitored by the bus controller.
- Target acquisition and designation sight (TADS)—FD/LS provides three system messages: head-out display, head-down display and alphanumeric display (AND). The integrated helmet and display sight system (IHADSS) can also display FD/LS messages. Included are test progress, required operator action items and status information.
- Symbol generator (SYM GEN)—Provides all symbology for the IHADSS and TADS (except the AND) including image auto track gates, TADS reticle, and TADS/IHADSS grey scale. In addition, the SYM GEN performs self-tests on a continuous basis.
- Aircraft system fault sensors—Multiple fault sensors located throughout the aircraft are integral to the FD/LS system.
- Multiplex system data bus—Manner by which elements of FD/LS data are transmitted to the FCC in digital form.

The FD/LS provides in-flight go/no-go status of mission essential and flight critical systems as follows:

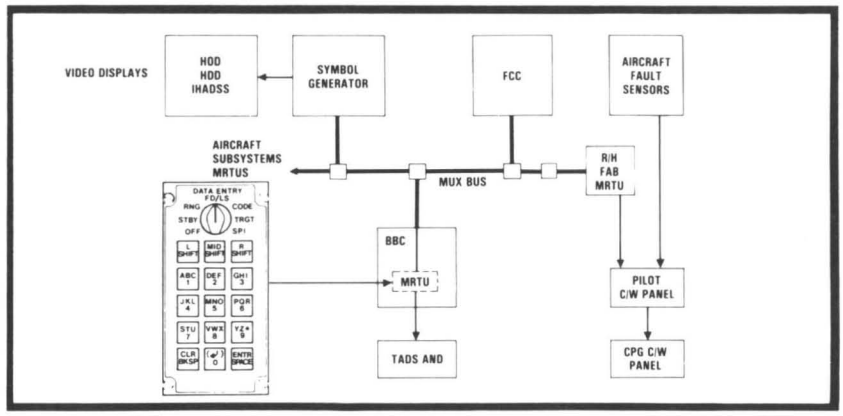


FIGURE 5: Fault detection/location system interactive system devices.

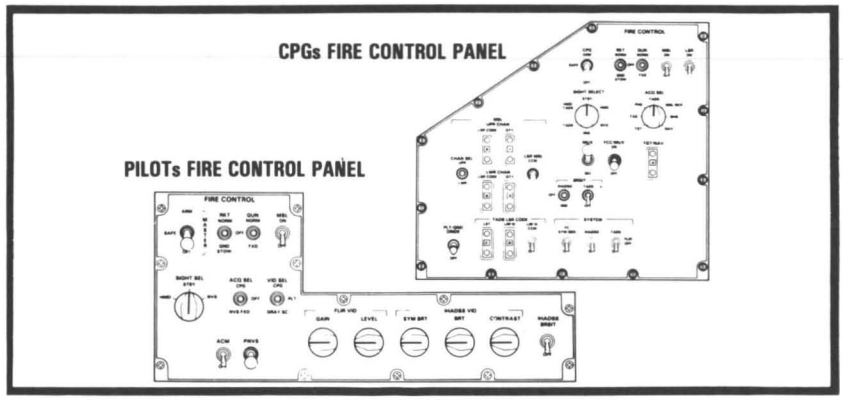


FIGURE 6: Fault detection/location system video switchology.

• FD/LS video switchology, figure 6, enables the FD/LS to display initial and continuous monitor of detected failures or keyboard initiated displays/messages. This will occur when the CPG fire control symbol generator (FC SYM GEN) switch is set to the SYM GEN position or the CPG TADS switch is set to either the forward looking infrared (FLIR) OFF or the TADS position. In addition to this the CPG IHADSS switch is set to the IHADSS position.

• The CPG will be able to view both continuous monitor detected failure indications and keyboard initiated displays/messages. The pilot will be able to view only initial contin-

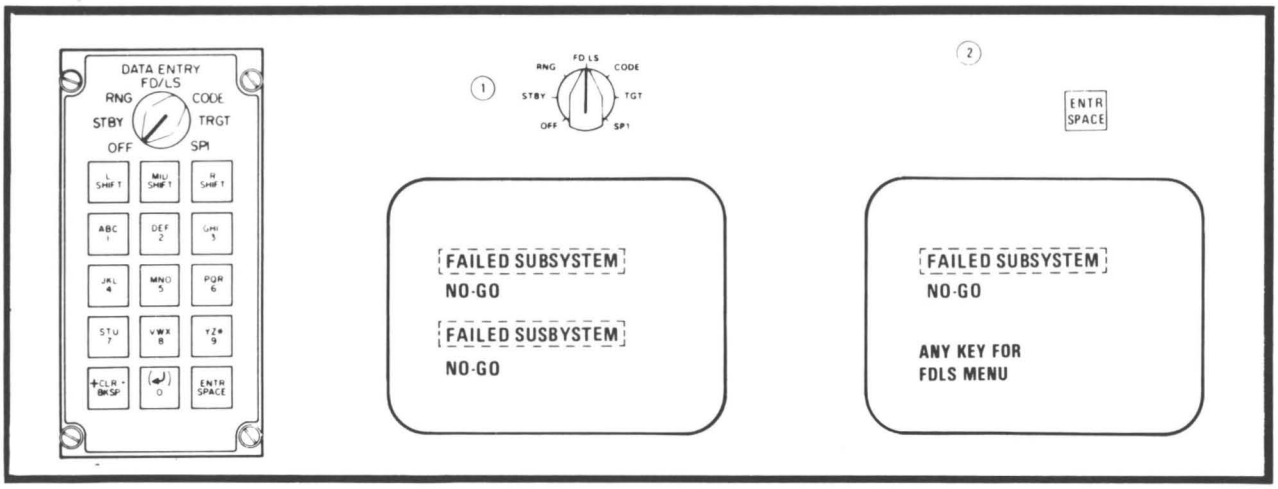


FIGURE 7: Fault detection/location system continuous monitor failure callup.

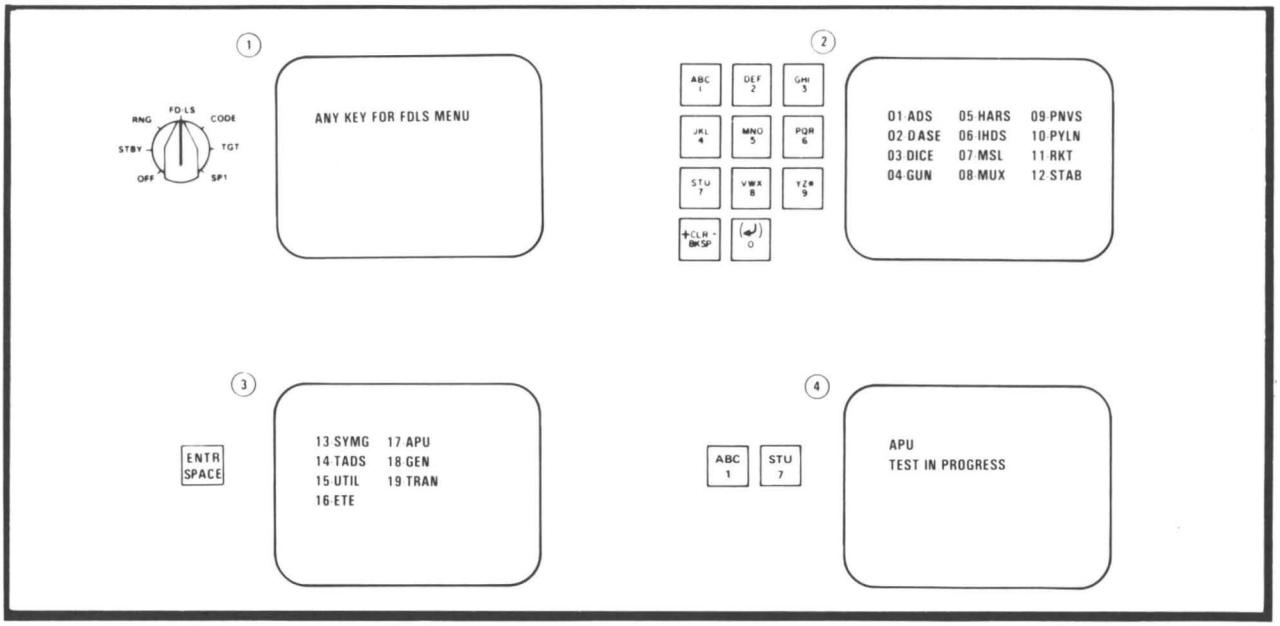


FIGURE 8: Fault detection/location system keyboard initiated tests.

uous monitor detected failure indications with the pilot's video select (VID SEL) switch in pilot. If the pilot places his VID SEL switch in CPG, he will see what the CPG is viewing.

• FD/LS continuous monitor failure callup, figure 7; if a failure is shown on the CPG's TADS or IHADSS it displays as the word "FDLS" alternating with the sensor selected message, to check for system no-go status, the CPG will proceed as follows:

(1) Position the selector switch on the data entry keyboard to the FD/LS position. The symbology will blank and up to two failed systems can be displayed at one time.

(2) If two systems are displayed, press the ENTR SPACE key to scroll the display to enable other failed systems to be displayed. Continue to scroll the display until the message "ANY KEY FOR FDLS MENU" is displayed. This indicates all continuous monitor failures have been displayed. If the ENTR SPACE key is pressed again, the failure call-outs will be repeated.

Return the data entry keyboard selector switch to the STBY position. This resets the FD/LS and allows symbology to be displayed.

• FD/LS, keyboard initiated system tests, figure 8, verify the go/no-go status of the LRUs of a given system. The LRUs of systems numbered 01 to 19 in the figure can be tested. The main transmission and engine nose gearbox temperature and pressure absolute values also can be called up for display, while the end-to-end test will verify the status of all monitored LRUs.

• FD/LS keyboard initiated tests; when a system LRU status needs to be verified, or a failed LRU within a no-go system needs to be identified, proceed as follows:

(1) Position the selector on the data entry keyboard to the FD/LS position. The symbology will blank and the message "ANY KEY FOR FDLS MENU" will be displayed after all system no-gos have been scrolled.

(2) When one data entry keyboard key (0-9 or CLR/BKSP) is pressed, the first half of the FD/LS menu will be displayed.

(3) Press the ENTR SPACE key to scroll the menu to display the second half of the menu.

(4) Select the system to be tested and enter the appropriate number code for that system. Observe the number present for about 1 second prior to the test starting. The system will automatically perform the test and announce failed LRUs on the display.

Return the data entry keyboard selector switch to the STBY position. This will reset the FD/LS, blank the FD/LS display and enable symbology to be shown.

The aircrew and maintenance personnel are also part of the FD/LS. Faults/failures that can be isolated and identified by observation *are not* on the aircraft FD/LS.

photo by L. Thompson

They're there but you can't see them. . . the caution/warning, FD/LS and multiplex systems.

Multiplex System

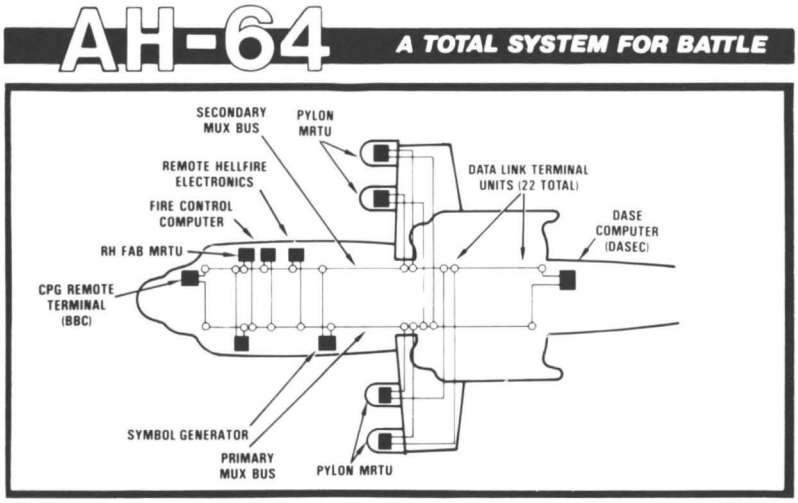


FIGURE 9: Multiplex system.

This system, figure 9, is a general purpose, electronic information transfer system. It provides a flexible, redundant interface between avionic and mission equipment interconnected with the MUX system. Also, it provides for FD/LS signal routing and processing. The MUX system is designed with a 50 percent growth capacity.

The AH-64 system contains the following components: Dual (redundant) data buses; the *primary* data bus is on the left side of the aircraft while the *secondary* data bus is on the right side.

Located in the right forward avionics bay is the primary bus controller, the fire control computer.

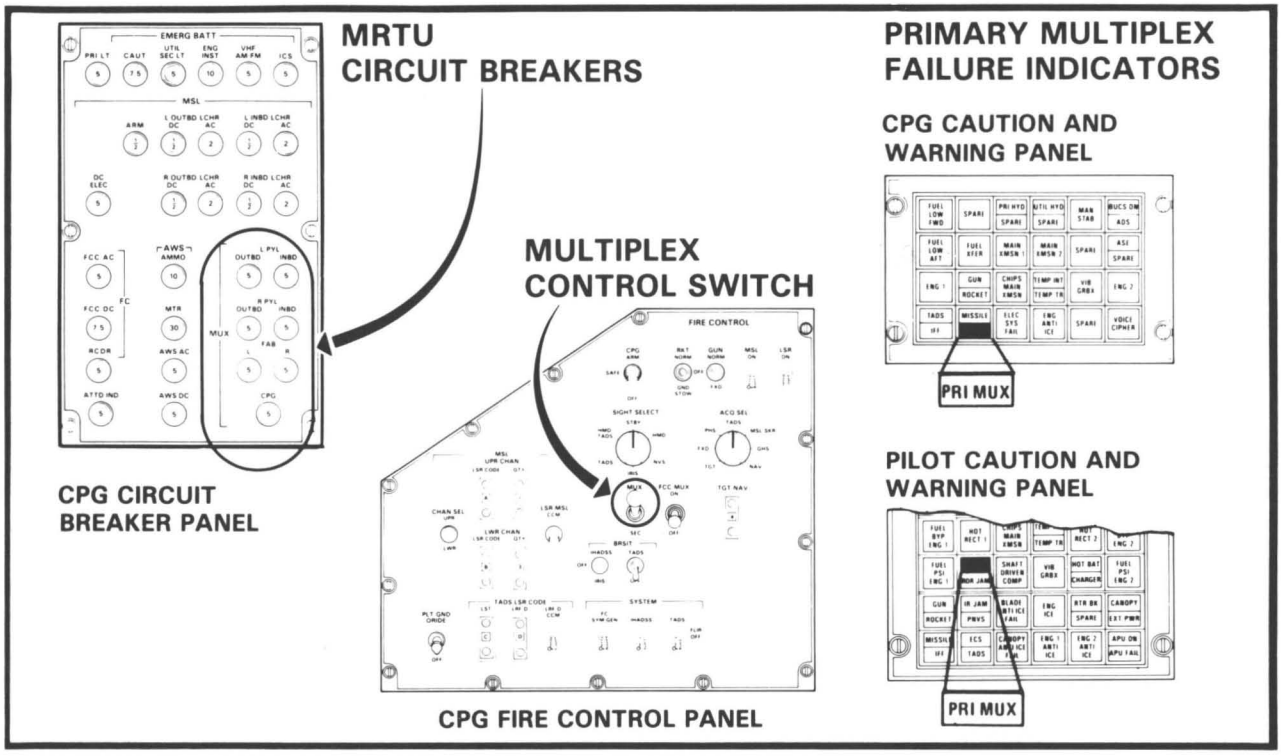


FIGURE 10: Multiplex system controls and indicators.

The BBC is the CPG's multiplex remote terminal unit. It is located in the CPG's crewstation compartment.

Location of other items is: SYM GEN—left forward avionics bay; remote HELLFIRE electronics—right forward avionics bay; an MRTU—right forward avionics bay; digital automatic stabilization equipment (DASE)—the aft avionics bay; pylon MRTUs—each wing pylon.

Data link terminal units are used for all connections to the data bus throughout the aircraft.

• Multiplex data bus, figure 10, consists of a low-loss, twisted, shielded pair of wires terminated at each end for impedance matching. Data transfer can be in either direction on the data bus, but in only one direction at a time (half duplex). Time division multiplexing allows transmission of signals to more than one unit over one data bus line by staggering the time sequence of the signals.

All connections to the data bus use a small shielded, data-link terminal unit; these provide impedance matching and short-circuit isolation.

Operation of the MUX system is automatic, being activated when external power is applied to the aircraft or at least one generator is on line.

The primary multiplex (PRI MUX) segment light on both C/W panels will illuminate when the backup bus controller has determined that the FCC has failed and the BBC has assumed control of the bus. If the FCC regains control, the PRI MUX light will go out. The MUX control switch allows the CPG to select the PRI data bus or the SEC data bus. Placing this switch in the SEC position disables the PRI MUX caution light and commands the BBC to assume control.

Each multiplex remote terminal unit is protected by individual circuit breakers on the CPG's panel.

The PRI bus controller is in the FCC and it controls all transmissions on the PRI data bus during normal operations. Using addressed command words, it communicates individually, with each MRTU, the remote HELLFIRE electronics, the SYM GEN and the DASE computer.

The BBC monitors the PRI bus controller during normal operations. It automatically assumes bus control on sensing a FCC failure or loss of data transmissions on both data buses for a specified time. The CPG can select the BBC as the active bus controller by placing the MUX switch on his fire control panel to the SEC position.

MRTUs are used to interface the MUX system with the selected aircraft subsystems or components. Each MRTU can detect 95 percent of the faults within itself, and perform fault isolation tests on command.

A video display unit receives data from the FCC via the MUX data bus. This provides the AH-64 with a very flexible primary flight instrument, since the symbology can be changed or updated by software modifications.

The SYM GEN receives mission equipment status, video switching information and FD/LS information via the MUX data bus; this data can be displayed on the IHADSS and the TADS.

A remote HELLFIRE electronics unit receives missile status, launcher errors and TADS and laser data via the MUX data bus. It outputs missile commands, display data and FD/LS data.

The DASE computer receives air data sensor and heading attitude reference system information via the MUX data bus and functions as the MRTU for the aft avionics bay area.

If an MRTU or other MUX system component does not respond correctly on the PRI data bus, the primary bus controller will select the secondary data bus to communicate with the failed unit only. All other transmissions will stay on the PRI data bus.

Should the FCC be unable to communicate with a unit on either data bus, it will take appropriate action, such as displaying a subsystem fail status. The FCC's internal software programing selects the appropriate display.

When the BBC assumes bus control, it will communicate with the MRTUs and the MUX system components on the same data bus that the FCC was using when it failed or relinquished control. All system components respond on the same data bus that they receive their commands. If a system component fails to respond, the BBC will switch the data bus to that component. If the component still does not communicate, the BBC will take appropriate action.

When the FCC is able to assume data bus control and is capable of normal operation, the BBC will relinquish control upon receipt of a valid signal from the FCC.

This sixth article in the series has covered capabilities and characteristics of the AH-64A Apache's subsystems of caution/warning, fault detection/location and multiplex systems. The next article will address the electrical, digital automatic stabilization equipment and utility systems.

ABOUT THE AUTHORS

Mr. Ron Brunelle is responsible for the design, development and presentation of the Apache aircrew training courses as well as for defining training device requirements, specifications, modifications and implementation. He has more than 20 years of experience in aviation, including an instructional background in both the flight simulators and classroom environment. He is retired from the U.S. Navy and is a private pilot. Since joining McDonnell Douglas Helicopter Company in 1984, Mr. Brunelle has held positions in aircrew training and trainer engineering.

Mr. Ray E. Deyo has been responsible for managing AH-64A Apache advanced programs since October 1982. These responsibilities include applications of the Apache to customers other than the U.S. Army, both domestically and internationally, as well as managing those development programs that will result in future improvements to the Apache. He has 28 years' service with McDonnell Douglas Helicopter Company and its predecessors, including duties in contracts management and ordnance program management.

Aviation Standardization and Training Seminars—May 1987

Mr. Bill Weber
Directorate of Evaluation and Standardization
U.S. Army Aviation Center
Fort Rucker, AL

The Directorate of Evaluation and Standardization (DES) has been conducting Aviation Standardization and Training Seminars (ASTS) since July 1983. During this timeframe, the ASTS team has visited virtually every aviation unit in the world. The team has surfaced and resolved many issues that were brought to our attention by the participating unit. Until recently, we have had no way of answering similar questions raised by other units prior to their assistance visit. We hope to rectify this problem through the *Aviation Digest*.

Once per quarter, we will select issues from recent ASTS visits and publish them here. This will enhance the information exchange between the Aviation Center and the field. We at DES are here to serve Army Aviation and you, the Army aviator. If you have any questions about these issues and their responses, please contact the Evaluation Division of the Directorate of Evaluation and Standardization, ATTN: ATZQ-ESE, Ft. Rucker, AL 36362-5216, or call AUTOVON 558-4691/6571.

Line 5 of the DA Form 759 requires that the individual fill in his grade, branch and component. What should a warrant officer list as his official branch and component?

The official branch designation is Aviation (AV) and the component designation is either RA, USAR or NG.

In the new "J" series table of organization and equipment (TOE), the technical inspector (TI) slots are not meeting the needs of the units. When a unit has more than one type aircraft, they need more than one TI. Since the 66 military occupational specialty (MOS) is divided by specific aircraft, can a 66V inspect a UH-1 Huey or a 66N inspect an OH-58 Kiowa? What does a unit do if their only TI is sick, on leave, TDY or in the field? Can the commander designate in writing someone to perform TI duties or can he have another 66 MOS conduct the inspection?

The regulation does not prohibit the commander from designating anyone on unit orders to perform TI duties. It is assumed, however, that the commander would designate someone with extensive training and experience on that particular aircraft. AR 611-201, "Enlisted CMF and MOS," dated 1 March 1986, states that a TI, MOS 66-, is qualified to perform TI duties on his/her particular aircraft.

Therefore, he should not perform TI duties on other aircraft. Should a situation exist where only one TI of a particular MOS is assigned, and that TI is absent for whatever reason, the unit should call on its supporting or supported unit for TI assistance. This issue is currently being staffed at Ft. Eustis, VA, concerning the restrictive nature of the 66 MOS. When staffing is complete and the issue resolved, the official response will be distributed to all aviation units worldwide.

A school, such as the Basic Noncommissioned Officer Course (BNCOC), needs to be developed to train 93P E5 and E6 level soldiers. Are there any plans to open such a school? If not, why not?

A plan to establish a resident and nonresident 93P E5/E6 BNCOC has been developed and was implemented on 31 July 1987, at Ft. Rucker, AL. Questions pertaining to this course should be directed to the Directorate of Enlisted Training, ATTN: ATZQ-DET, Ft. Rucker, AL 36362.

HQDA message, DAMO-ZA, dated 17145OZ January 1984, subject: Night Vision Goggles (NVG) Training/Operations and Pilot in Command Qualifications and Selections, states that the PIC board will consist of as a minimum one standardization instructor pilot/instructor pilot, one safety officer and one PIC. Will AR 95-1 be changed to reflect this message?

The referenced message was rescinded by DA message 042121Z February 1987, subject: Status of DA Standardization and Training Messages (01-87). AR 95-1, paragraph 3-20.1a applies.

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, Ft. Rucker, AL 36362-5000; 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 (estimated)	Rate	Fatalities	Total Cost (in millions)
FY 87 (through 31 October)	3	132,404	2.27	4	$10.1
FY 88 (through 31 October)	2	132,404	1.51	1	$2.6

AVIATION PERSONNEL NOTES

Engineering Test Pilot (ETP)

A concerted effort is being made to develop a viable career program for Army Aviation engineering test pilots (ASI 3P). There have been some problems in the past concerning career managment/progression of these highly specialized aviators. Part of the solution to past problems includes ensuring a feasible grade structure and implementation of a viable career track that ensures all ETPs are branch qualified. The Engineering Test Pilot Program is being incorporated into the Army Aviation Personnel Plan. Army aviators interested in the Army Aviation Engineering Test Pilot Training Program are advised to review DA Circular 351-87-1, dated 15 March 1987.

Revised Career Management Under TWOS

Questions continue to arise about the status of the Total Warrant Officer System (TWOS) proposal to manage warrant officers by years of warrant officer service (WOS) rather than by years of active Federal service (AFS).

The Army Chief of Staff expressed his support for this important feature of TWOS. When the appropriate changes to current personnel management policy are approved later this year, *years of AFS will no longer be considered* in career management decisions affecting warrant officer schooling, promotions, assignments and retirement.

Under TWOS, warrant officers will be managed by years of WOS. Management by WOS means the personnel management clock will be reset to zero when an enlisted soldier is appointed a warrant officer. This will enable each individual to retain seniority for pay and retirement, while affording him or her the opportunity to serve a full 30 years as a warrant officer, or until reaching mandatory retirement age.

Currently, other than Regular Army (OTRA) warrant officers are released from Active Duty upon completion of 20 years AFS. Under revised career management procedures, promotion to CW3 normally will occur at the eighth year of WOS. This means that enlisted personnel who become warrant officers with 12 or more years of AFS will have to be continued on Active Duty beyond their 20th year of AFS in order to compete for promotion to CW3.

Once TWOS is fully implemented, warrants will be required to integrate into the Regular Army upon promotion to CW3. Warrant officers promoted to CW4 could serve at least 24 years of WOS under proposed policy changes. Warrants selected for training and use as master warrant officers (MWOs) would have the opportunity to serve a full 30-year warrant officer career. Nonselection for MWO will not constitute a passover or require separation prior to the 24th year of WOS under the proposed policy.

If these changes are confusing, two examples may help illustrate how the revised career management will work.

In the first example, SGT Smith has 4 years AFS when he is appointed a warrant officer. He can expect to be promoted to CW2 after 2 years (6 years AFS). In his eighth

year of WOS (12 years AFS), he should be promoted to CW3 and mandatorily integrated into the Regular Army. Promotion to CW4 normally would occur at Smith's 14th year of WOS (18 years AFS) and would enable him to serve up to 24 years of WOS (28 years AFS). If Smith is later selected to be a MWO, he will be permitted to serve up to 30 years of WOS by deferring his retirement to 34 years of AFS. If not selected for MWO, Smith would face mandatory retirement at 24 years WOS.

In the second example, SFC Jones is appointed with 14 years AFS. As an OTRA warrant officer, Jones will need to continue beyond 20 years AFS in order to compete for promotion to CW3 and mandatory RA intergration in his eighth year of WOS (22d year of AFS). Jones normally would be promoted to CW4 in his 14th year of WOS (34 years of AFS). Jones' retirement points would be adjusted to permit him to complete 24 years WOS as a CW4 and 30 years WOS as a MWO (or until age 62, whichever occurs first).

These proposed policy changes are being reviewed by the Army staff. Major commands will be given an opportunity to comment on the proposed changes before they are sent to the Deputy Chief of Staff for Personnel, Headquarters, Department of the Army, for approval.

FAA Form 8500-9

The Federal Aviation Administration (FAA) no longer requires Active Duty military air traffic controllers to obtain a Class 2A medical certificate (FAA Form 8500-9, Medical Certificate).

All air traffic controllers will still be required to pass an annual Class 2A medical examination. However, controllers will not be issued an FAA Form 8500-9. The flight surgeon will issue a recommendation for flying duty, DA Form 4186; and a copy of this form, once approved, will be attached to the controllers' training records at the air traffic control facility.

ASI Q8 (Tactical Air Operations)

A recent revision to AR 611-201 now authorizes the use of additional skill identifier (ASI) Q8 (tactical air operations) with military occupational specialty (MOS) 93P. The ASI will be used to identify positions that require soldiers trained in the use of close air support, tactical airlift and tactical air reconnaissance in support of joint operations using ground and tactical air units. To qualify for award of ASI Q8, the soldier must have successfully completed the Joint Firepower Control Course, U.S. Air Force Air Ground Operations School, Hurlburt Field, FL. The ASI will be used to identify operations sergeant and assistant operations sergeant positions in attack battalions, air cavalry squadrons and aviation brigades.

Change to ASI W5 AH-64/OH-58 Maintenance

The requirement to have AH-64 training prior to attending training for ASI W5 has been dropped for MOS 68B, 68D and 68F. Since the OH-58D is not presently programed to be fielded with the AH-64, the prerequisite training no longer applies. OH-58D training was pulled out of the 35K, Avionic Mechanic, and 35R, Avionic Special Equipment Repairer courses due to the small number of OH-58Ds being fielded. The avionic training will be conducted as an ASI course and ASI W5 awarded to successful graduates at Ft. Gordon, GA.

Consolidation of MOS 68J and 68M

In July 1987, a proposal to combine MOS 68J, Aircraft Fire Control Repairer, and 68M, Aircraft Weapons System Repairer, was approved by the Deputy Chief of Staff for Personnel. The proposal eliminates 68M as an MOS and establishes 68J as the only MOS responsible for all maintenance of armament on Army aircraft. The 66J Armament Technical Inspector MOS remains unchanged by this consolidation. Table(s) of organization and equipment changes and reclassification dates will be established by the Soldier Support Center in their letter of notification.

Army Aviation Noncommissioned Officers' Academy

The Army Aviation Noncommissioned Officers' (NCO) Academy opened officially at Ft. Rucker, AL, on 2 October 1987.

Each branch of the Army has been tasked under the U.S. Army Training and Doctrine Command's noncommissioned officers' education system to form its own branch NCO Academy. The first level of training, which will be taught at various installations, is the branch immaterial Primary Leader Development Course for E4s and E3s. For Aviation Branch, the NCO Academy will provide the second level (Basic Noncommissioned Officer Course) and the third level (Advanced Noncommissioned Officer Course) of training to prepare NCOs to be tactically and technically qualified leaders in the Aviation Branch. The fourth and capstone course is the Sergeants Major Academy, located at Ft. Bliss, TX.

For additional information about the NCO Academy, please call: MSG(P) Gary L. Wright, AUTOVON: 558-2392/5407; Commercial: 205-255-2392/5407; or write to: Commandant, NCOA, ATTN: MSG(P) Wright, Ft. Rucker, AL 36362.

Automated ≠* Robotics (*DOES NOT EQUAL)

In an Automated Flight Service Station

Mr. Shelby W. Harrod
U.S. Army Aeronautical Services Office
Cameron Station, Alexandria, VA

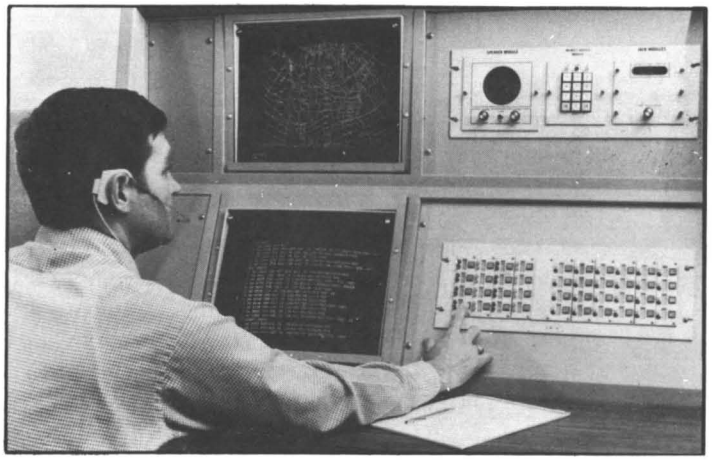
THE TERM automated flight service station (AFSS) seems to conjure up visions of robots or endless banks of cold unfeeling machinery. One can imagine some machine dispensing and receiving data without regard to the sensitivities of a human at the other end of the communications link. Fortunately for the user, that's not the way the Federal Aviation Administration (FAA) envisions "automated," as it's used to modify the familiar term FSS. The acronym AFSS is used to designate the rapidly growing number of newly commissioned, super flight service stations. As each AFSS is activated, it normally will replace at least one manual FSS. Following initial transition, as many as 10 existing facilities may be consolidated into an AFSS over several years. The term automated refers primarily to the addition of the computer as a tool for the station specialist to use for improving the managment and retrieval of flight service information.

Just what does automation mean to the aviator? How does it change the quality of services provided before automation? Are the services rendered after automation better, the same or less than previously provided? There are, no doubt, many more questions begging an answer; however, in this article we'll just consider the issues raised by the above questions.

The most significant difference the pilot will notice when contacting an AFSS is that there will be a prerecorded voice answer, which directs the caller to the various service choices available. The proper procedures will be explained and a menu of services will be offered via what is called the voice retrieval system. From this point, callers with touchtone phone capabilities can choose to talk with a station specialist or select another service such as fast file or one of a series of prerecorded weather briefings. The rotary and pulse dial user automatically will be referred to a specialist. If you choose to talk with a station specialist, then you will be asked to hold until one is available. The waiting time will vary with the density of telephone traffic into the station at the time you call.

Each station specialist will have a Model 1 (Mod 1) computer at his/her working position (figure 1). With this computer, the specialist can type in a flight plan and then process it through the proper channels to the appropriate destination. By typing a few keystrokes on the Mod 1 keyboard, specified weather data or notices to airmen will be displayed on a television monitor for any station

FIGURE 1: A depiction of how a typical automated flight service station working position looks. The lower screen shows an alphanumeric display of a Model I with the keyboard just showing under the operator's right arm. The upper screen shows a color weather graphics capability now available in only a few automated flight service stations. The panels to the right are used for communications.



requested. All the data necessary to provide a preflight briefing, as well as accepting, processing and closing flight plans, will be right at the fingertips of the station specialist. As indicated, the real automation occurs in providing the briefer access to the data and not the briefing itself.

There are certain services within the AFSS that do not require the attention of a specialist each time the information is requested. These services are listed as separate menu items when someone first calls the AFSS. Such things as a general synopsis of the weather for certain sectors, a soaring balloon outlook, or announcements regarding aviation special events are prerecorded items for use by the pilot gathering initial flight planning data. Since the weather information presented on these prerecorded tapes is not sufficient to qualify as a preflight weather briefing, the pilot must eventually talk to a specialist or obtain a full weather briefing from another source.

Fast file is another menu item that will get a caller service by the AFSS without talking with a specialist. Fast file can be used for instrument flight rules or visual flight rules flight plan filing and at selected AFSSs/FSSs to amend and cancel flight plans. This service is currently available at many manual FSSs as well as all AFSSs throughout the continental United States. The term "fast" relates to the time it takes the caller to present the flight plan information to the FSS and not the time required to get a flight plan into the air traffic control system. When using fast file, the caller is merely placing the flight plan onto a recording that is later played back, typed into the computer and then processed through the appropriate channels by a station specialist. Fast file is much like a typical answering machine with oral and visual alarms to alert the station specialists when a flight plan is placed on the system. The time it takes for the station specialist to process a flight plan may vary, depending on the current workload.

The so called automatic functions just described are really only minor services provided by the AFSS. Its primary mission is, as it always has been, to provide inflight and preflight services, and to serve the aviation public in emergency situations. All three of these areas of responsibility are still serviced by a "person" via radio or telephone communication. Walk-in service is still available at the airport on which the AFSS is located.

There are about 14 services provided by a typical FSS; however, 4 of these services normally will not be supported upon conversion to automated status (figure 2). Of the 4 services not transferred, only airport advisories will actually be discontinued. The other functions will be as follows:

- Weather observations will be provided by contract weather observers.
- Pilot control of lighting will substitute for airport lighting.
- Navigational aid monitoring will be performed by other FAA facilities, such as approach controls and air route traffic control centers.

Inflight services, such as flight watch and emergency assistance, are provided over the AFSS's large land area through the use of remote communications outlets. The FAA has affirmed that it intends to continue to provide essential services, through the resources of the AFSS, as well or better than it currently does with manual stations.

There has been much talk lately about delayed flights, reduced efficiency and loss of services in areas where an AFSS has been commissioned. Some of these perceived losses are merely a matter of perspective. The pilot who was accustomed to walking into the local FSS and receiving a face-to-face briefing is now relegated to a telephonic briefing and would naturally claim a loss of services. Yet, a fellow pilot in the next county who had to use the telephone all along may perceive an increase in efficiency because the specialist now has faster access to briefing data.

We should keep in mind that the real purpose of the AFSS is to improve services provided to all users. There will also be bugs in the system no matter how much planning or money goes into a new technological upgrade such as this. There are two courses of action that might be taken, one being to sit back, scoff and complain—the other being to educate ourselves about the system, learn to use it and help with constructive suggestions for improving the plan.

If an AFSS is being commissioned in your area, take the time to make a personal visit; they will be more than happy to accommodate you. This simple action on your part will make the new AFSS more useful to you as a professional pilot.

FIGURE 2: Services provided by a typical flight service station.

- **Preflight briefing**
- **En route flight advisory service (EFAS)**
- **Communications with en route aircraft**
- **Emergency assistance**
- **Notices to Airmen (NOTAM)**
- **Transcribed weather broadcasts (TWEB)**
- **Pilot automatic telephone weather answering service (PATWAS)**
- **Accepting, processing and closing flight plans**
- **Search and rescue activity**
- **Weather observations***
- **Airport lighting (When ATCT is closed)***
- **Airport advisories (When ATCT is closed)***
- **Customs notifications**
- **NAVAID monitoring***

*Denotes services not normally transferred to the AFSS.

U.S. ARMY SAFETY CENTER

HUMAN FRAILTY

CW4 Robert J. Rendzio

This is the second article in a four-part series on the problems aviators experience detecting and avoiding wire hazards. In this article the author addresses issues on what the human eye is capable of seeing, how what we see can be deceiving, and what impact these limitations have on the aviator's ability to detect and avoid wire strikes. Next month watch for Part III, "Wire Protection: A Step Forward."

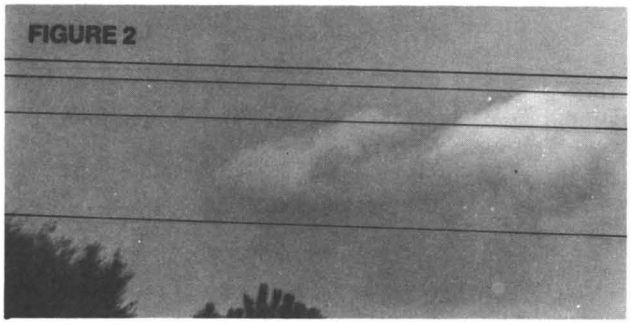
The opinions expressed in this article are those of the author and are not necessarily those of the Department of the Army or the U.S. Army Safety Center.

THE PILOTS OF the AH-1 Cobra were flying contour along a river valley network at about 70 knots. They were trail in a flight of four aircraft that were maintaining about the same speed and altitude, except as tactical necessity required. During the course of the flight, the lead pilot had been calling out wires as the aircraft came upon them, but he didn't see the set of wires he had just flown over, even though it was on his map. Chalks 2 and 3 flew over the wires, too. The trail aircraft didn't—it was about 30 feet lower than the others. Fortunately for the aircraft's crew, they were able to land without any injuries.

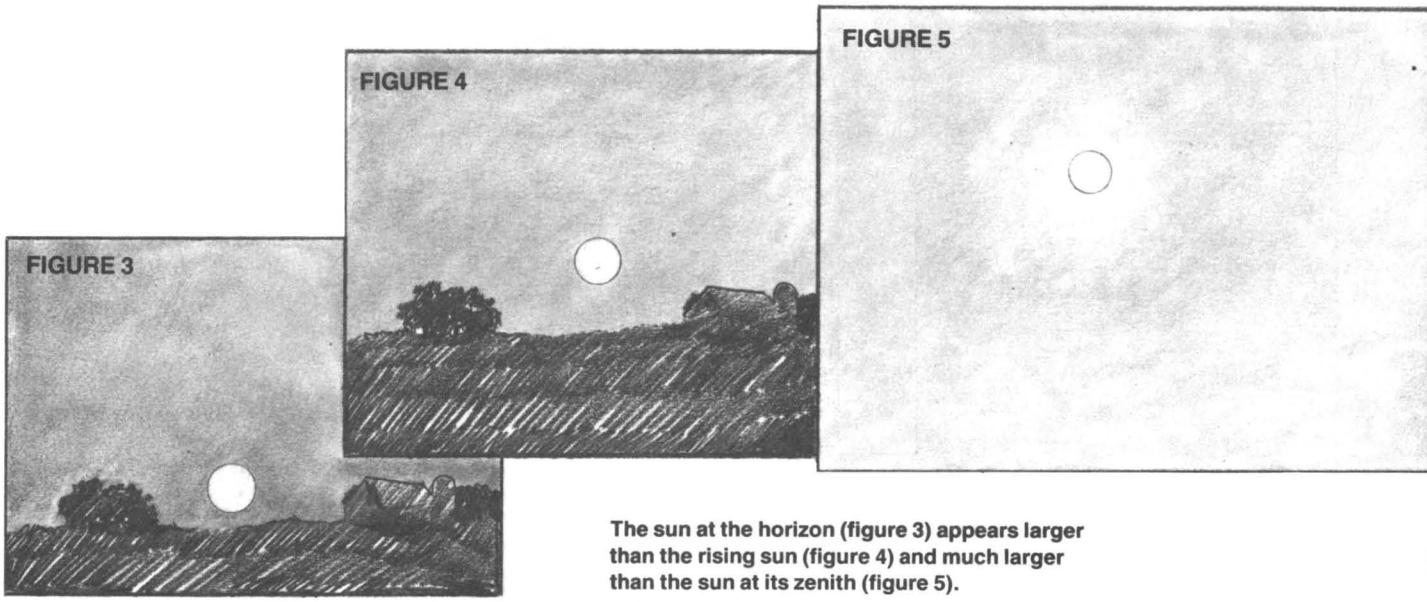
The question remains, however, "How could the pilots of four aircraft miss seeing the wires?" The wires stretched across a river valley and they were well marked on the maps, yet all of the crews missed seeing them. As you shall see, however, visually detecting objects, including wires, can be not only difficult, at

FIGURE 1

FIGURE 2



In figure 1 static lines located above the power lines are almost undetectable. In figure 2 the lines have been isolated from the more distinctive power lines, making them easier to see.



The sun at the horizon (figure 3) appears larger than the rising sun (figure 4) and much larger than the sun at its zenith (figure 5).

times it can seemingly be beyond human capability.

Let's look at figure 1 and figure 2. As you can see, the static lines along the top of the power line in figure 1 seem almost undetectable. In figure 2, they seem to stand out much better, once they have been isolated. Both photographs, however, were taken at the same time. Yet, in the first photograph, the uppermost lines are less conspicuous. This is because we don't see parts of a scene, we see an entire picture; a picture that can be dominated by elements of a particular scene. We mentally process what is visually detected and unconsciously highlight or subdue portions we think are required. As a result, the information we react upon may not necessarily be correct. The information also can be varied for different people.

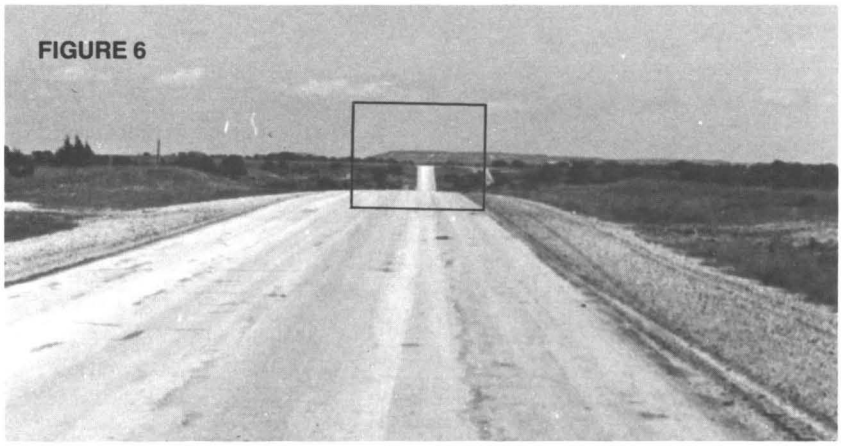
Let's look at another example. Here are three views of the sun. Figure 3 shows what is perceived by someone viewing the rising sun. The second view (figure 4) is an example of the rising sun. Note that the sun's disk in figure 5, the sun at its zenith, is the same size as the rising sun in figure 4, yet both appear smaller than what is perceived of the rising sun.

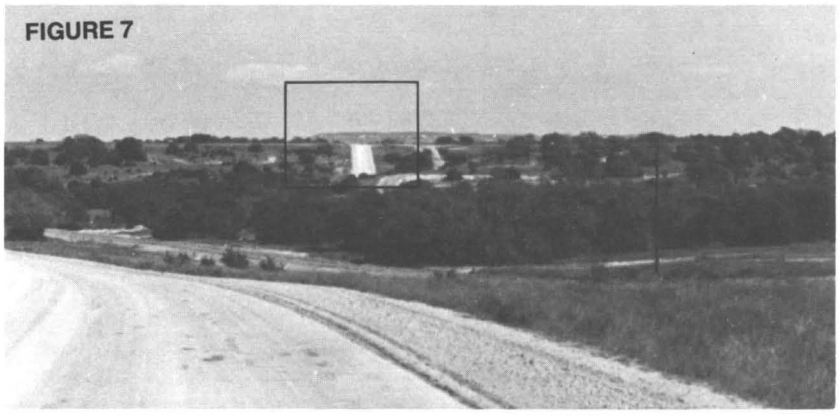
These examples show that the size of the sun does not change while it rises or sets. Although we see an enlarged sun (or moon) at those times, the difference in size is in our minds. What happens is that we normally process the sun's or moon's disk in relation to the nearby horizon. Thus, to compensate for the relative size and distance, we mentally enlarge the size of the sun or moon. Other factors such as color and humidity also play a significant role in size determination and affect our perception of size.

As human beings, our frailty is such that visual information is easily distorted and changed. We tend to complete a mental picture based on insufficient data or, at times, we are unable to draw conclusions from what is available. For aviators, this can be especially troublesome and can lead to misinterpretation and error.

Figures 6 and 7 (page 32) illustrate this point. A road that appears to be straight in figure 6 actually has a sharp bend to the left as shown in figure 7. People at Ft. Hood, TX, who frequently drive east on Turkey Run Road, may no longer even be aware that this illusion exists, but someone who isn't familiar with the road would be totally unprepared for the curve, based on what can be seen in the first photograph. We have all experienced similar occurrences whether it be the missing step on a staircase (because ours has one more step) or a sudden bend in the road that we almost miss. Unfortunately for aviators, our panorama changes constantly and we make similar inadvertent errors in a more hazardous three-dimensional plane.

One of the most common errors is that of perspective, which includes autorotations or landings to long and wide runways (e.g., Edwards AFB,





In figure 6 the road appears to be straight, but in figure 7 we can see that the road actually has a sharp bend to the left.

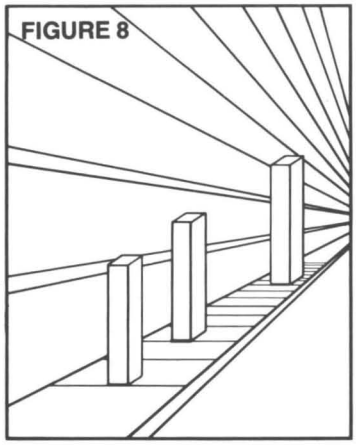


illustration courtesy Dover Publications, Inc.

The posts in the figure 8 illustration from "The Psychology of Visual Illusions" by M. Luckiesh appear to be different sizes but they are actually all the same size.

CA, where the runway is 14,995 feet long by 300 feet wide). Even though you might be aware of the size of the runway, the effect of the visual impact on your actions would be difficult to control. Figure 8 illustrates this point. The posts are all the same size, even though they appear different. Our perception of distance and size is based on not only the item we view, but its surroundings. In fact, our environment affects what we see and, as we have already found out, it can alter what we think is there, as in the rising sun or moon.

Although we can arm ourselves with knowledge of perspective, its impact upon us can still be difficult to control. Then, when we add a new variable such as contrast, visual detection difficulties are magnified.

Contrast, to us as aviators, is one of the most important requirements for visual detection, but it becomes even more critical in certain operations, such as the detection of wires. However, all too often contrast works against us. Figure 9 shows a wire, appearing silver in color, whose background is open sky. Yet the wire is difficult to see. Figure 10 is the same wire as viewed from the opposite direction. In this photograph, the wire appears black and it is much more visible.

Figure 9 was taken with the sun behind us and figure 10 was made into the sun. As you can see, wires reflect quite a bit of light and they tend to blend in with the sky when the sun is behind us. Their contrast in relation to the background drops to nominal values.

Conversely, when wires are not in a position to reflect light, they tend to stand out against "open sky" as in figure 10, which shows high contrast. To see this for yourself, look at wires around your home when they look silver and note the change for yourself as you change position. Then look at wires near dusk or on a cloudy day. However, even if we can't see the wires, we should be able to see the poles. Thus, through association and map correlation, we should be able to avoid a wire hazard. But let's take a look at the effects of camouflage first.

During a night maneuver with the moon's illumination at 100 percent, the driver of an M60A1 tank was told to move the tank under a nearby tree. As the tank was being moved, a soldier lying under the tree was accidentally run over because the tank driver was unable to see the soldier on the ground. Figure 11 is a photograph of the tank made during daylight hours. Figure 12 was taken with high-speed film the night following the accident to show that the shadowing was severe enough to partially obscure the driver's vision. Figure 13 shows the

FIGURE 9

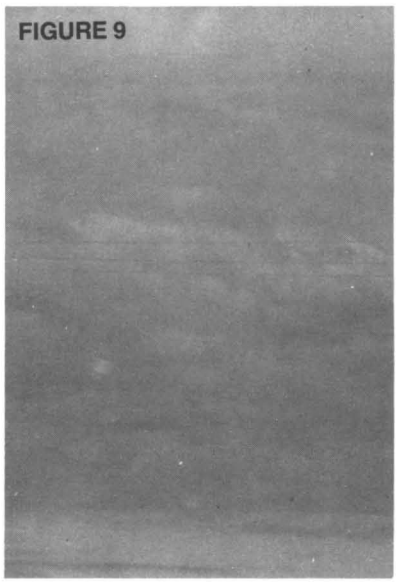


FIGURE 10

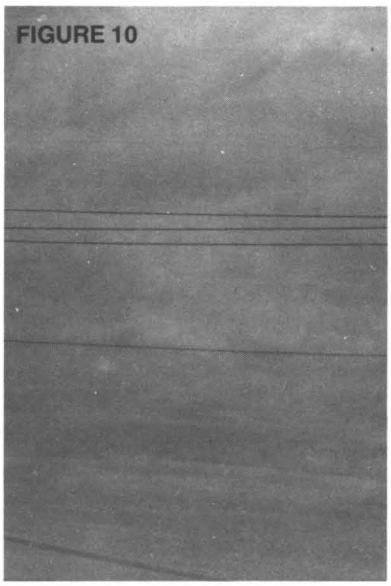


Figure 9 was taken with the sun behind the photographer, and reflection of light from the wires tends to make them blend in with the sky. Figure 10 was made into the sun, and the wires are not in a position to reflect light, thus they tend to stand out.

FIGURE 11

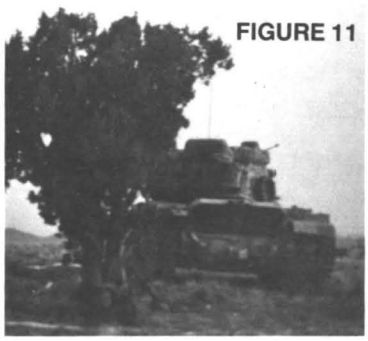
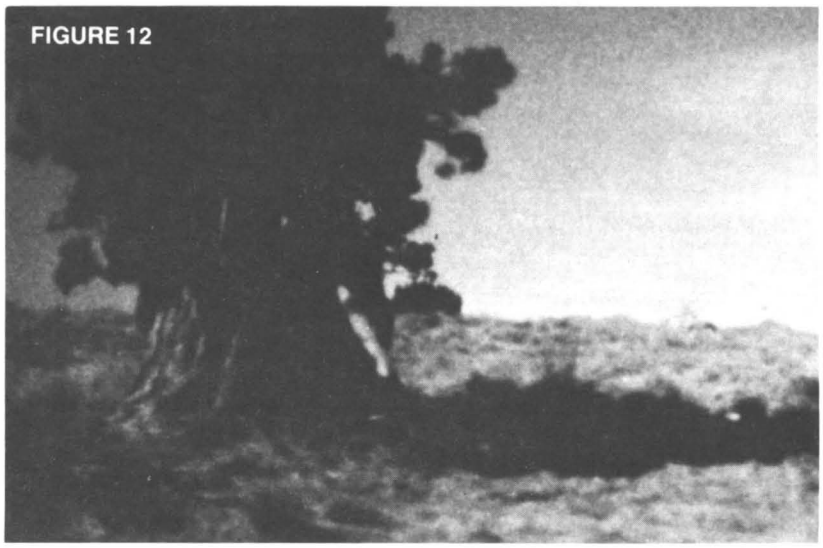


Figure 11 is a photograph of a tank made during daylight hours. Figure 12 was taken with high-speed film at night, and shows that shadowing was severe enough to partially obscure the driver's vision. In figure 13 the shaded area shows the blind spot of the tank driver.

FIGURE 12



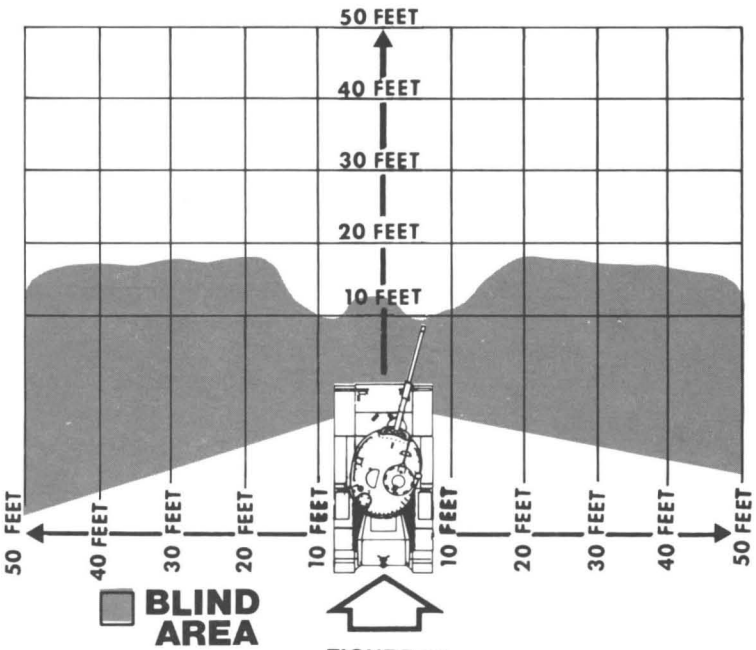


FIGURE 13

A field test was conducted to determine if the typical obstructed field of view (blind spot) of an M60A1 tank from the driver's position contributes to a driver's failure to recognize and analyze objects on the ground. Marks were placed on the ground and the driver was required to identify as many of the marks as he could. In figure 13 the shaded area shows the driver's blind spot extends about 9 feet to the front and as much as 50 feet to either side of the tank.

Wires shown in figure 14 are plainly visible with the sky as a background, but they tend to become obscured when their contrast level to surrounding terrain is lowered.

blind spot of the tank driver (shaded area).

During the tank's movement, the soldier lying down was at a low contrast level compared to the shadow and, because only portions of the soldier were visible to the driver, the soldier was not recognizable (a key element to good camouflage).

You see, we determine what something is, or is not, by expectations and elements of the object. In this case, even though the driver may have been on the watch for someone next to the tree, key data was not present to develop his picture. Due to camouflage and poor contrast, the picture could not be completed; thus, visual recognition was beyond his visual capability. More than any other element that affects our ability to detect wires, contrast and camouflage affect us most.

Figure 14 shows a set of wires at Ft. Irwin, CA. Note how the wires are plainly visible with the sky as a background and how they tend to become obscured when their contrast level to the surrounding terrain is lowered. This problem becomes compounded when the poles on which wires are strung are themselves obscured from easy viewing. Hence, a pilot who is searching for wires, based on a map display and association, can physically miss seeing an impending hazard. His visual cues to develop the image have been removed. As a result, in the pilot's mind, the wire hazard may no longer be present or his navigation is not accurate. He's over it, passed it, it's not properly annotated, and as far as he can tell it's not there. The rest of us in the aviation community might not see the wires either, simply because our human frailty wouldn't allow us to see them.

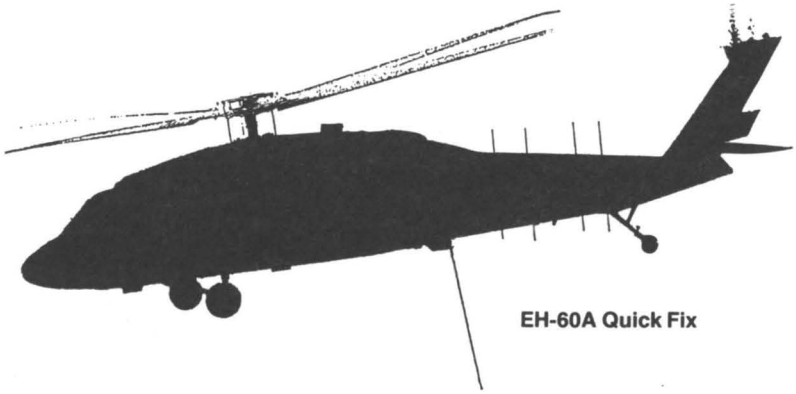
The Army recognizes the need to reduce deaths, injuries and materiel losses resulting from wire strikes, and an important and aggressive program has been initiated to install wire strike protection systems (wire cutters) on our aircraft. How these systems operate and how well they have performed with be the subject of my next article.

ABOUT THE AUTHOR

CW4 Robert J. Rendzio is a safety officer assigned to the 3d MI Battalion in Korea. He has been involved with aviation safety for more than 10 years, serving in that capacity at various levels within the Army. At the time this article was written, CW4 Rendzio was assigned as an investigator with the U.S. Army Safety Center.

15C35:

An Exception to OPMS II



EH-60A Quick Fix

On 29 May 1987, the Chief of Staff of the Army approved an exception to Officer Personnel Management System II—OPMS II—that will allow aviation tactical intelligence officers to acquire training in one of three military intelligence (MI) areas of concentration (AOC) and to have that MI AOC designated as their functional area (FA). This article will explain why the exception to OPMS II was necessary and how the decision will be implemented.

Background

Special electronic mission aircraft (SEMA) systems such as the EH-1X/EH-60 mounted Quick Fix at division and those fixed wing systems found in the MI aerial exploitation battalion (AEB) represent an exceptionally responsive intelligence collection capability. Combat development initiatives in the SEMA arena are producing better and more sophisticated aircraft and systems. In conjunction with the important role of the AEB within intelligence support operations is a corresponding increase in emphasis on solid intelligence support to the combat aviation brigade (CAB) of the division and corps.

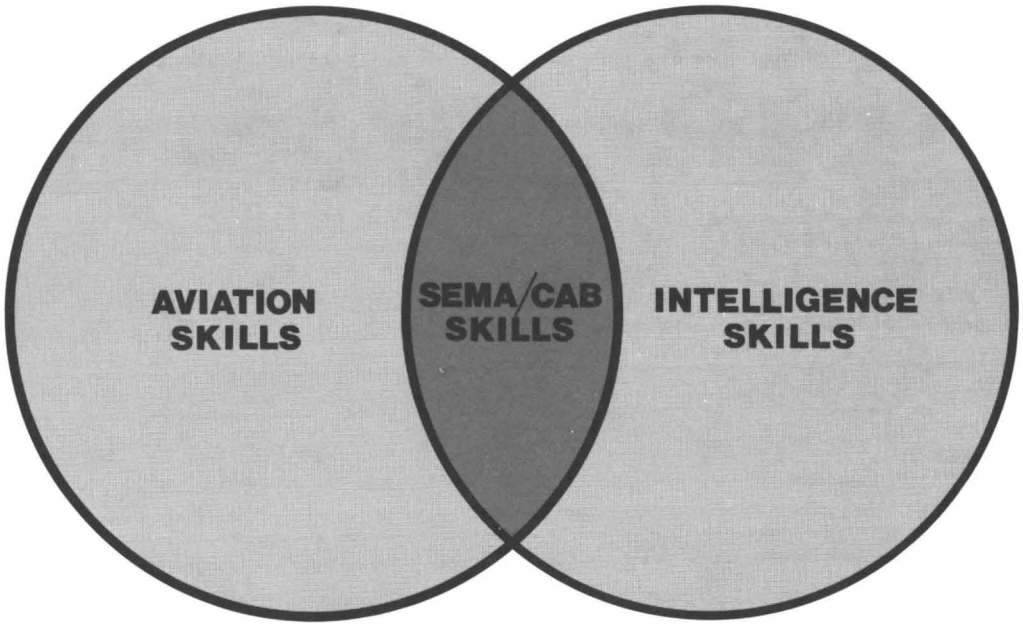
SEMA support allows the corps commander to see deep with organic assets in order to execute deep operations, while the CAB allows division and corps commanders to quickly maneuver fire support to win engagements and battles during close and rear operations. The 15C* officer involved in SEMA and AEB operations must be highly trained and skilled in both aviation and intelligence requirements. As the complexities and sophistication of the future AirLand Battlefield grow, it becomes increasingly important to have properly trained and experienced 15C officers within the field force.

The aviation intelligence officer must possess a detailed knowledge of the intelligence system and its component parts, plus the capabilities of assigned systems. The 15C also requires knowledge and expertise in a number of critical aviation skills. The development of equal proficiency in both areas (figure on page 36) allows them to effectively lead the SEMA battalion in the accomplishment of its mission or in support of the CAB. A shortfall in either aviation expertise or intelligence expertise creates the potentially serious problem of the inability of the AEB to support the division and corps commanders with the best organic intelligence capability.

A number of independent personnel actions caused significant impact on aviation intelligence. Each taken separately produced a relatively small impact on the aviation intelligence officer population. However, when overlayed, serious ramifications occurred.

Prior to the creation of Aviation Branch, the commissioned aviators involved in intelligence support of tactical

*Under a revised AOC proposal submitted by the Aviation Center, AOC 15M becomes AOC 15C.



15C Aviation and Intelligence Skills

aviation units and serving in fixed wing SEMA units were assigned to one of the branches of the U.S. Army, usually MI. The commissioned aviator was free to pursue multiple career paths and opportunities. The officer personnel management strategy of the day facilitated this flexibility.

With the advent of Aviation Branch in 1983, the situation changed. The formation of Aviation Branch signaled the ascendancy of aviation as a key aspect in U.S. Army doctrinal development to support the AirLand Battle. Conditions of the Secretary of the Army mandate to create Aviation Branch allowed full-time flight pay incentives only to those officers who elected to transfer into Aviation Branch, less Medical Service Corps pilots. All but a few commissioned aviators in MI Branch transferred to Aviation Branch and became 15M, combat intelligence aviators.

OPMS I's dual branch concept produced a situation where the 15M pilot held an additional specialty in MI. The training, development and assignment opportunities continued to promote flexibility and produce the critical equal proficiency in both aviation and intelligence skills essential for CAB and SEMA missions. The 15M officer population served with distinction in intelligence and aviation assignments worldwide. The professional manner in which they accomplished intelligence duties offset the die-hard notion that these fixed wing aviation officers were "merely fixed wing taxi drivers." The implementation of the combat electronic warfare and intelligence (CEWI) brigade at corps level institutionalized the requirement to develop aviation officers with indepth MI skills. The success of the CEWI brigades worldwide has validated both the operational and organizational concepts to include that of the AEB and its commissioned aviation officers.

In 1984 and 1985, Department of the Army reviewed the officer personnel management strategy. One of the major perceived shortfalls of OPMS I was the require-

ment to professionally develop each officer in two distinct branches. Although this was a valid shortfall in a majority of the U.S. Army officer corps, it was a major strength in the development of SEMA aviators. Dual branch proficiency produced Aviation Branch commissioned pilots who became proficient in both the aviation-related requirements such as maintenance and operation of aircraft as well as the intelligence-related aspects of SEMA and CAB operations. This extremely effective cross-fertilization between Aviation Branch and MI Branch provided the optimum expertise to support the CAB and to maximize the collection capabilities of aerial collection platforms of the AEB. The final result of the officer personnel management review was the development and implementation of the Officer Personnel Management System II—OPMS II.

OPMS II established a requirement for one branch per officer. This basic tenet of OPMS II eliminated the mechanism to develop SEMA officers equally proficient in aviation and intelligence skills. An equally serious impact of OPMS II concerned ideal professional development of the SEMA aviators. Aviation Branch developed OPMS II professional development guidelines to ensure that its officers were competitive for schooling, promotion and career progression. This career model is based on repetitive assignments in rotary wing aviation units at all levels. The nature of fixed wing SEMA systems and units created a situation in which SEMA aviators could not meet Aviation Branch professional development requirements. The serious impact on SEMA units and pilots was recognized in June 1985 by both the U.S. Army Intelligence Center and School and the U.S. Army Aviation Center. Both organizations, in conjunction with the U.S. Army Military Personnel Center and the Office of the Deputy Chief of Staff for Personnel, joined forces to find a viable alternative.

The Decision

Efforts to find a solution within the established framework of OPMS II were unsuccessful. The only viable alternative involved approval by the Chief of Staff of the Army of an exception to OPMS II policy. This exception is based on the OPMS II requirement for each combat arms officer, e.g., Aviation Branch officers, to hold a branch and acquire an FA.

The proposed strategy formulated by the Army Aviation Center and the Army Intelligence Center calls for Aviation Branch (15) officers in AOC 15C, aviation intelligence officer, to obtain one of three MI (35) AOCs as an FA. The three MI AOCs available for 15C are: 35C (imagery intelligence); 35D (tactical intelligence); and 35G (signals intelligence/electronic warfare). These three AOCs provide focused intelligence discipline training that supports the tactical intelligence requirements of the CAB and the technical requirements of the AEB. These MI AOCs will be an FA only for AOC 15C officers. The 15C officer will then serve in 25C assignments and ground positions within the specific MI AOC in which training has been received.

The major advantage to this strategy is establishment of a mechanism to provide the 15C officer with both aviation and intelligence skills critical to the aviation intelligence mission, both SEMA and CAB. These 15C officers will be eligible and competitive within MI for promotion, schooling and command of AEBs and of MI ground units within the respective MI AOC.

Implementation

Aviation Branch will designate 45 officers per year group for AOC 15C. Eight of these officers will be designated at the grade of second lieutenant and receive fixed wing and SEMA systems qualification training in order to meet lieutenant requirements in SEMA units. The remaining 37 officers will transition to 15C through attendance at the MI Officer Advanced Course (MIOAC) where AOC training in 35C, 35D or 35G will be acquired. Subsequent to MIOAC, as soon as training seats are available, these officers will receive a fixed wing transition and SEMA qualification training. The remainder of a 15C's career will be spent in various assignments in SEMA units, CAB intelligence sections and MI AOC duties.

Summary

The exception to OPMS II represents the best solution to the requirement to provide effective intelligence support to the commander today and for the future. The key points of this approved exception are:

- 15C officers will attend the MIOAC.
- 15C officers will receive training in one of the following three MI AOC: 35C (imagery intelligence); 35D (tactical intelligence); and 35G (signals intelligence/electronic warfare).
- The MI AOC in which they receive training will be the FA for 15C officers.
- 15C35 officers will be used only in 15 or 35 positions.

For additional specific information, contact the Directorate of Aviation Proponency, Office of Personnel Systems, AUTOVON 558-5706/4313; or Aviation Branch Assignments, MILPERCEN, AUTOVON 221-9366/7822.

Sustainment of the Combat Aviation Brigade

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The opinions expressed in this article are those of the author and do not necessarily reflect the views of any Department of Defense agency

DURING THE BRIEF period of existence as a separate branch, Army Aviation has made phenomenal strides in consolidating the diverse functions of training, doctrine, combat developments and force packaging into a cohesive and comprehensible structure. The Mission Area Analysis process clearly shows the magnitude and complexity of the efforts of many dedicated persons to achieve this end.

Army Aviation's Achilles Heel?

The purpose of this article is not to denigrate the quality of these efforts but to raise the issue that the effort is incomplete. Aviation planners are one area short of providing visibility and focus to the full range of aviation functional issues. The missing piece is the functional area of sustainment.

This void is evident in reviewing the Army Aviation Development Plan (AADP). The AADP is a fundamental document that provides a planning framework of mission area subsystems for identifying issues within a functional framework and establishes proponency for issue areas. Section IV of the AADP identifies aviation subsystems as:

- Aviation Concepts, Doctrine and Tactics
- Aviation Organization and Forces Structure
- Training
- Aviation Materiel Systems Needs
- Life-Cycle Aviation Personnel Management

Sustainment of the Combat Aviation Brigade

AVLOG

This slicing of the aviation "pie" is revealing for it does not identify a major subelement for intensive management that is critical to all five individually as well as the whole. This is the area of *sustainment*. It is this oversight that I contend places attainment of Army Aviation's overall objective, "Successful development of the full possibilities of Army Aviation. . . ," at risk.

This may sound like a heretical statement but it is based on the fundamental management premise that to achieve broad goals, one must identify the key component issues and put someone in charge. By example, the AADP identifies the key players for critical functions: Ft. Rucker, AL, is our "trainer"; Ft. Leavenworth, KS, is our "doctrinal intergrator"; and Ft. Eustis, VA, is our "maintainer."

My contention is that we do not have a complete package. The missing functionary is a "sustainer." According to the AADP, no single agent is charged to wrestle collectively with the complex issues of sustainment for Army Aviation. If you don't consider this significant, then save your time and skip to another article.

For those of you still interested, I'll attempt to illustrate why it is essential that we focus attention on and responsibility for sustainment of today's Army Aviation forces. The reason rests in the combination of the increased technical complexity of our equipment, linked with the dynamics of how we employ aviation on the battlefield and the critical nature of this combined arms team: to maintain a robust aerial partner in the fight.

A first step in this process is to redefine aviation logistics from the traditional maintenance and repair parts focus—to encompass the full range of logistics, Class I to IX, as well as all maintenance and services required to keep an organization fighting on the high intensity battlefield. This requires a modification to the traditional mindset that sustainment is generic; "beans is beans, bullets is bullets, and gas is gas."

Logisticians and aviators must recognize that sustainment challenges for modern aviation forces are far more complex today when one understands the dynamics of the new doctrine coupled with the complexity and range of systems and subsystems found in today's combat aviation brigade (CAB). Such an appreciation tells me that we must develop a focused management approach to develop logistic concepts and force structures that complement rather than impede operational aviation doctrine. The key here, to me, is that the concepts and organizations one employs to support a force should be related to the dynamics of the support requirement: and, they are as different for aviation as they are for light infantry organizations in complexity, range of support and volume.

That aviation logistics is not a "focused," broad ranging discipline today is best illustrated by the article "AVLOG '84" in the January 1984 issue of *Army Aviation Digest*. This conference, billed as "the first aviation logistics conference," was an honest attempt to address key logistics issues impacting on Army Aviation. In the keynote address, Major General Aaron Lilley (Retired) clearly articulated a fundamental truth saying, "Aviation logistics is the most critical aspect of aviation power, and without logistics it could very well restrict the employment of the commander's aviation assets."

Such an opening should have set the stage for an aggressive threshing of the overall logistics support concepts, doctrine and force structure for Army Aviation. Unfortunately, this did not occur.

Rather than focus on the broad issue of overall sustainment, the conferees fell back into the traditional mindset that aviation logistics is fundamentally maintenance and repair parts, missing a golden opportunity to open new territory and take the initiative along the broad front. Ninety percent of the effort was expended dealing with the traditional and controversial issues of test, measurement and diagnostic equipment proliferation, aircraft recovery, night maintenance, etc. These are all important elements in sustainment, but they fall short of the "gut" issue.

When the opportunity arose to address the broader issue, the need for an aviation forward support battalion, it was "ducked" and quietly slipped into the "too hard to handle" box. Further in the article, the authors indirectly state the real issue when they conclude: "Because of the split responsibilities for Classes II and V, ground mainte-

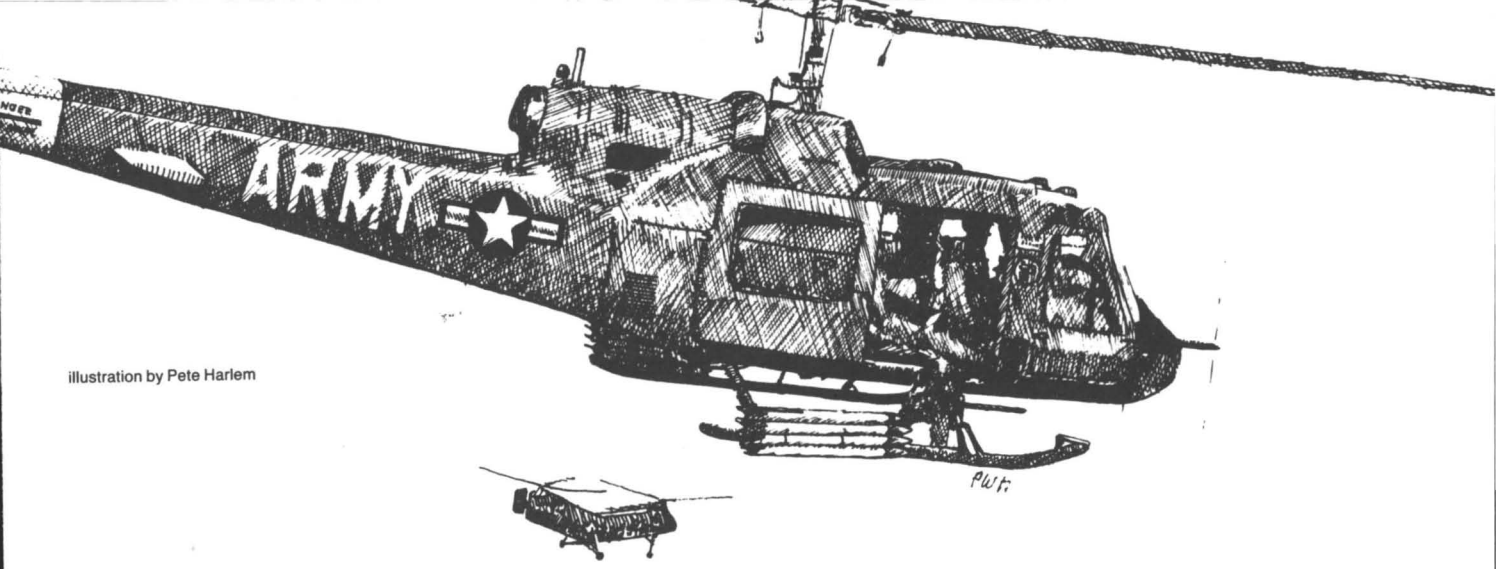
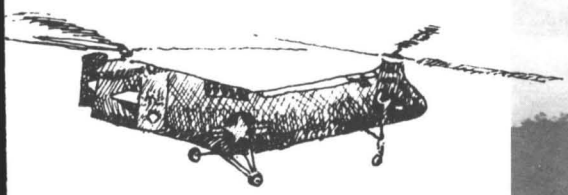


illustration by Pete Harlem



Vietnam era

During the Vietnam era, the most complicated maintenance challenges were the reliable but complex turbine engines and the new weapons systems on the "Charlie" model Huey.

nance and other elements of aviation logistics, it served as an education forum and provided the opportunity for all proponents to develop the package of employment and logistics necessary for successful combat aviation operations." All the words are there to illustrate my point, "split responsibilities," "all proponents"; a diffusion of focus and lack of central responsibility that seriously undercuts the full exploitation of aviation forces.

By now, if you have been paying attention, you should be asking, "Why is all this a problem?" The answer is that logistics for aviation has not kept pace with the evolution of modern Army Aviation equipment, force structure and employment doctrine.

To illustrate this brash statement one needs to quickly trace the last 20 years of evolution in Army Aviation. In the dark ages of the Vietnam era G-series structure, division aviation was organized into two major operational elements; the general support aviation battalion and the air cavalry troop. In addition, each maneuver brigade and the division artillery had small aviation sections.

The frontline equipment consisted of the relatively unsophisticated UH-1C armed helicopter, the UH-1D util-

Late 1970s

In the late 1970s, the reciprocating engine observation helicopters were replaced by the turbine powered OH-6 and OH-58.

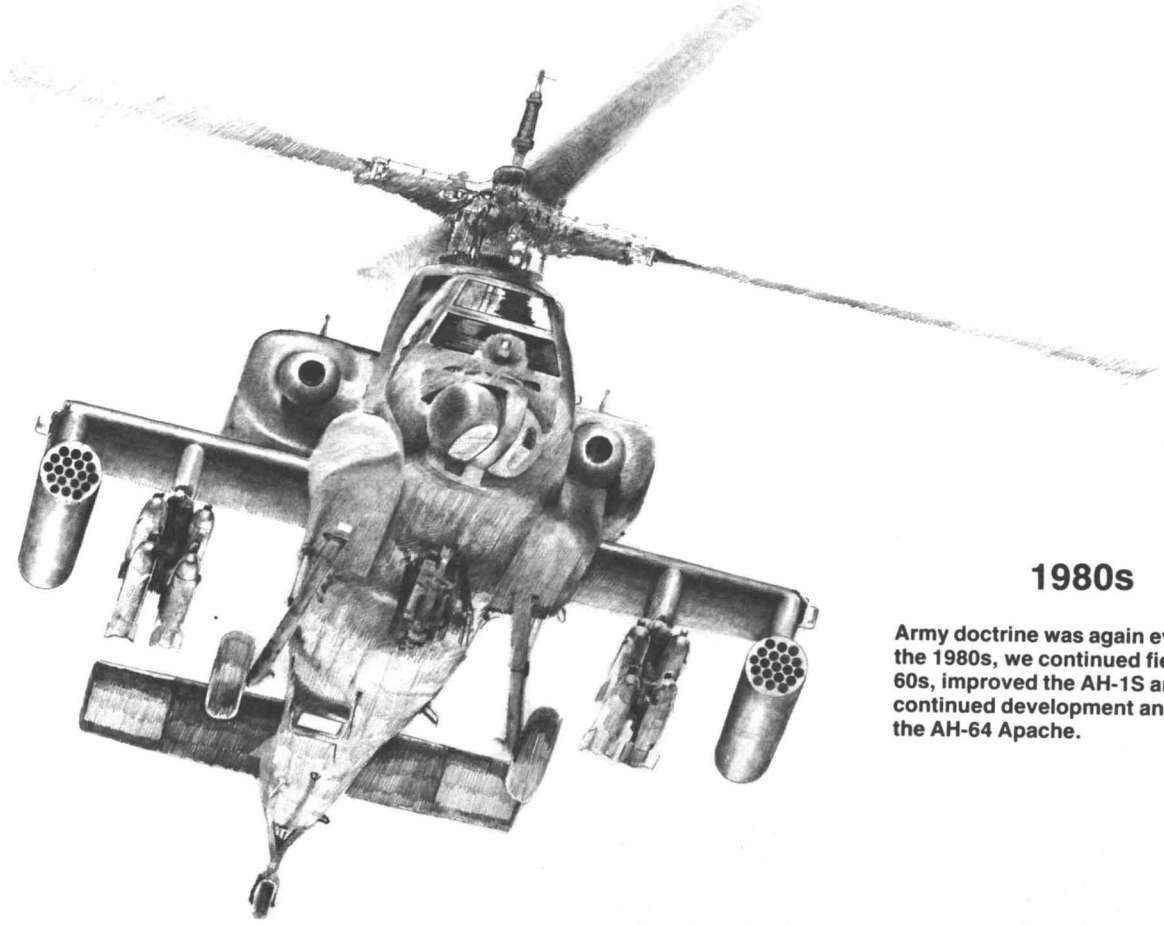
ity helicopter, and either the OH-13 or OH-23 observation helicopters. The most complicated maintenance challenges for this era were the more reliable but more complex turbine engines and the new weapons systems on the "Charlie" model Huey. Direct support level maintenance and repair parts were provided by a transportation aircraft maintenance company in the maintenance battalion of the division support command, operating under the traditional four-level maintenance concept. This arrangement worked quite well as it fit the degree of equipment complexity and the employment concept for aviation during that era. Aircraft generally operated from fixed bases, they were relatively unsophisticated and aviation units were employed in direct and general support of ground forces.

In the late 1970s Army Aviation force structure underwent a major revision. This was the Aviation Requirements for the Combat Support of the Army III (ARCSA III) initiative. It reflected the changing role in both employment and capability of Army Aviation engendered by the Vietnam experience and the fielding of new, more complex and capable aerial weapons systems. The gunship had evolved from the UH-1C, through the AH-1G to the first true tank-killing aerial platform, the AH-1S with its varied weaponry and sophisticated visionics. The UH-60 was emerging to complement the UH-1 and fill the

void between the Huey and the medium lift fleet. Gone were the old piston powered observation aircraft, replaced by the turbine powered OH-6/OH-58 systems. Divisional aviation was recarved into a centralized, cohesive offensive oriented force bringing under its control all the separate aviation sections.

At the same time there emerged a maintenance support concept tailored to the new, more sophisticated systems and designed to complement the operational doctrine and organizational changes. The three-level maintenance concept was implemented that was more responsive by placing a greater capability at the unit level. Along with this, a major and significant structural change occurred when the division's intermediate (direct support) level maintenance company was integrated into the new combat aviation battalion. This centralized and focused the major elements of aviation operations and support under one organization.

We entered the 1980s with this concept, but Army doctrine was again evolving and the emphasis was on maneu-



1980s

Army doctrine was again evolving in the 1980s, we continued fielding UH-60s, improved the AH-1S and continued development and fielding of the AH-64 Apache.

ver, firepower and offensive operations. The new concept called for smaller units, equipped with more sophisticated weapons, operating more independently and exploiting the principles of mobility and surprise. We again reorganized our aviation forces to support the new doctrine and to take advantage of newer systems, with inherently greater lethality and reliability. This excursion was Division 86, which basically reordered divisional aviation into more battalions but they would be smaller in size. The ARCSA III aviation company essentially became a battalion, platoons became companies, and so on. At the same time we continued to field the UH-60, continued improvements to the AH-1S and pressed on with development and fielding of the AH-64 Apache. Concurrently, we formed the Army Aviation Branch as a separate entity in recognition of its full partnership with the traditional combat arms. Before this restructure could be fully implemented, we shifted to the Army of Excellence (AOE) structure that we have today. Two major elements of the AOE structure directly impact upon the issue of this paper.

First, AOE is, by any other name, an honest attempt to squeeze every ounce of productivity out of our capped force structure while at the same time create spaces to form new divisions. As a result, a conscious effort was made to cut every table of organization and equipment (TOE) in the Army to the barest essentials.

Both the operational and support sides of the forces felt the impact. The net effect on aviation as well as on other elements was to pare back significantly the number of support personnel and offset this by improvements in end item supportability. An example in the attack helicopter battalion (AH-64) TOE is that there currently is only one aircraft electrician authorized to support 18 AH-64s, 2 UH-60s and 13 OH-58Ds.

I offer this not to throw rocks at the AOE implementation but to illustrate the basic point that, as our systems have become more complex, we have fewer folks to watch over them and we're employing these systems further forward *and* they are more widely dispersed. Something seems out of "synch."

On the intermediate level, we developed another new wrinkle to supporting aviation. This could be called the "two-steps backward approach" by which we transferred the transportation aircraft maintenance company back to the division support command that, under ARCSA III, was organic to the aviation battalion.

At the same time, within the ground maneuver brigades, a new support concept was adopted and called "forward support" and carried with the activation of forward support battalions; division support command (DISCOM) units dedicated to each ground maneuver brigade to provide the total range of logistical support and services, up forward with the ground forces. The purpose was to complement the inherent mobility of the new M-1/M-2/M-3 weapons systems and to provide the requisite technical expertise where the action was. This is the second major impact of AOE and the stimulus for the assertion that Army Aviation is less sustainable under the current structure than its ground counterpart, and that aviation does not have a sustainment doctrine in tune with the manner in which it must be employed operationally.

This "sin" is compounded when one takes into consideration that the new combat aviation brigade now has the added capability and sustainment burden of the division's cavalry squadron. Simply stated, the CAB:

- Has a greater range, depth and complexity of sustainment challenges.
- Is designed to operate over a broader front.
- Yet, has a fragmented, unfocused and inherently less responsive sustainment structure. The support arrangement for the aviation brigade is out of synch structurally and conceptually with the manner in which it is planned to be employed.

A logical question at this point is, "How did this happen?" I can't answer in an authoritative fashion for I didn't participate in the AOE exercise. I can offer some unsubstantiated probabilities however. First, I theorize that aviation force designers had a tremendous amount on their plate as did the logisticians when the AOE space "bogey" was developed for each arm. The traditional mindset when confronted with such tradeoff drills is to minimize the impact on warfighting. This translates to slice the "tail" before you extract "teeth." And in honesty, AOE required the pulling of a few teeth spaces. Why then does it appear the sustainment teeth of Army Aviation took a disproportionate "hit"? I contend it happened for the very reason cited early in this article; lack of a focused proponency and concept for aviation sustainment and a preoccupation with the traditional view of aviation logistics as simply maintenance and repair parts. Until this is fixed, aviation sustainment will continue to be piecemealed.

A second personal conviction is the aviation community got caught up in our "can do" loop. One of our greatest strengths as a community is our long tradition of somehow getting the toughest challenges done through dedication, innovation and cohesiveness. We may have gone a bridge too far in this instance. I am convinced that in the peacetime Army, at our very low flying hour rates and propensity to patch together ad hoc arrangements

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for exercises—coupled with that overwhelming desire to stay "Above the Best"—we will not permit the arrangement a fair trial, for in our hearts we know it may put us in a "can't do" position.

If this sounds like heresy, then you haven't been reading the previous pages with an open mind. I submit that a nonattribution poll of all aviation brigade commanders since the implementation of the AOE reorganization will cite *sustainment* overwhelmingly, as their *major concern* and limitation. If someone wants to do that and provide the results, I'll wager your brand against mine that this is true.

Finally, you ask, "How do we fix it?" All I can offer here is a recommendation for I don't have all the answers (just the questions, unfortunately). I don't pretend to know where the true answer lies, but I do know we need to study it carefully. I would start with a working group of bright young tacticians and logisticians and scrub the heavy division TOE. I believe that using the current transportation aircraft maintenance company as the core, the spaces can be found within the DISCOM and the combat aviation brigade to form a robust aviation forward support battalion that does not break the AOE spaces ceiling and will provide the same proactive sustainment for the combat aviation brigade as is enjoyed by the ground maneuver counterparts.

In summary, I have laid out the case that we have a vital combat capability at some risk due to its questionable sustainment potential. I am being parochial when I say that logistics for aviation is different, for I believe that even more today than when I started in this business more than 20 years ago. It is a far more complex challenge than it was then and we have even fewer folks now than before. Today's doctrine depends more than ever on Army Aviation, and for that reason alone we must make the investment in structure design and logistic doctrine to ensure that we can exploit the full potential of this critical element of the combined arms team. Let's get some smart folks working the issue and lay out the specifics before we find out the answer the hard way.

ATC ACTION LINE

Exterior Lighting for NVS in the NAS

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Cameron Station, Alexandria, VA

Through the past several years, USAASO has received numerous questions concerning the exterior lighting requirement for Army helicopters conducting Night Vision System (NVS) operations in the National Airspace System (NAS). Some of these, along with responses thereto, are provided below.

Is it permissible to conduct NVS operations in the NAS with the anticollision light off?

Yes. The FARs do not require military aircraft to have the anticollision light on. It is required by AR 95-1. This light, and all other exterior lights, may be turned off when operating in accordance with the FAA Grant of Exemption No. 3946A. (Also see para 4-2, AR 95-50.) In addition, lights-out operations may be conducted inside Army designated restricted areas provided those areas have been previously approved for aircraft operations. Such operations may not exceed 1,000 feet AGL.

Is it permissible to conduct NVS operations in the NAS with position lights off?

Yes. See above answer.

Is it permissible to conduct NVS operations in the NAS with position lights on dim?

Yes, provided such operation is at or below 400 feet AGL, avoids all airport traffic areas (ATAs), and avoids, by 3 miles, public airports that do not have an ATA.

May a formation of helicopters be flown in the NAS with only the trail or the lead and the trail aircraft position lights on?

No. Such operations are in violation of the FARs.

May NVS aircraft operate lights out in an airfield traffic pattern with other aircraft that have position lights on?

No. This is hazardous since air traffic controllers and pilots of *other than NVS* aircraft cannot see the NVS aircraft.

May NVS aircraft be operated at an airfield in a closed traffic pattern where nonparticipating aircraft are not a factor?

Yes, provided such operation is in accordance with the above referenced Grant of Exemption.

Is it permissible to tape over a portion of the position lights and still operate in the NAS?

Yes. Tape may be used to reduce glare in the cockpit provided it does not prohibit the aircraft from being seen by the crews of other aircraft. (Note: The tape should be removed when NVS training is not being conducted.)

For additional information contact Mr. Jesse Burch, AUTOVON 284-7796, or Mr. Jim Jones, AUTOVON 558-2025.

Readers are encouraged to address matters concerning air traffic control to: Director, U.S. Army Aeronautical Services Office, Cameron Station, Alexandria, VA 22304-5050.

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