UNITED STATES ARMY

AVIATION DIGEST

JUNE 1977

Captain Joseph M. Watson Jr., and his Piper Cub "Mary Ellen," used throughout most of Tunisian and Italian Campaigns

See "Army Organic Light Aviation: The Founding Fathers," page 2

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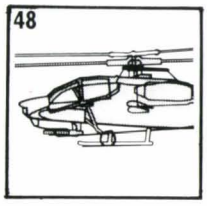

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ABOUT THE COVER

We thank Joseph M. Watson Jr., for offering his personal photographs for use on the cover and in the story beginning on page 2

The mission of the *U.S. ARMY AVIATION DIGEST* is to provide information of an operational or functional nature concerning safety and aircraft accident prevention. training. maintenance. operations. research and development. aviation medicine and other related data.

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Articles. photos. and items of interest on Army aviation are invited. Direct communication is authorized to: Editor. *U.S. ARMY AVIATION DIGEST*. Fort Rucker. AL 36362.

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EPMS- OFFICERS' ROADMAP

What every Army officer should know about EPMS

Major General Charles K. Heiden
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Alexandria, VA

IF SOMEONE WERE to ask you what you know about the new Enlisted Personnel Management System (EPMS) what would your answer be? Do you really understand what EPMS is all about?

This question has been asked of many of your fellow officers. Most have been well informed, but some still are confused about EPMS. Either they lack sufficient knowledge of the subject or they perceive EPMS as strictly an enlisted matter. They don't understand where they fit into the picture. This situation is a matter of concern.

Years have been spent developing a system which benefits the individual Soldier and at the same time enhances the professional status of the entire Army. EPMS is a good program, but its success is largely dependent on the active participation of the officer corps. Below, I cover what every officer should know about EPMS.

The old system served us well for a number of years. But, times have changed and the Army had to change with them. It was recognized early that to have a truly professional force we would have to develop a different system for the management, training and evaluation of our enlisted Soldiers.

The EPMS task force was formed at Military Personnel Center (MILPERCEN) and Training and Doctrine Command (TRADOC) to work on this problem. Its members spent 18 months seeking counsel, ideas and opinions from about 20,000 Soldiers to develop the framework for EPMS.

During group interviews statements like these frequently were heard:

- *I'm in a dead end Military Occupational Specialty (MOS).*
- *I'm an E9 — been in the Army 27 years. Advanced Individual Training (AIT) was the last formal school that I had the opportunity to attend.*
- *I can't get promoted as long as I stay in my MOS, and the Army won't let me reclassify into a new MOS.*
- *I'm a deep sea diver, and the Army sent me to Noncommissioned Officers Education System (NCOES) in a transportation MOS. It just doesn't make sense.*
- *My job is boring, and I'll probably get out after this (first) hitch.*
- *Last month I graduated tops in my advanced NCOES course. My current job has nothing to do with my MOS.*
- *The green machine has had me. I can't get there (grade E8) from here (grade E6).*

Unfortunately many of the above were valid comments. They describe some factual Sol-

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Army Organic Light Aviation: The Founding Fathers

Dr. Laurence B. Epstein
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St. Louis, MO

TODAY'S ARMY aviation program, with its proven airmobile/air assault doctrine, began prior to World War II as an effort by individual members of the Field Artillery to obtain adequate aerial observation to adjust Artillery fire. The vehicles they judged best for their purposes were unarmed, unarmored, single engined, tandem two-seater aircraft which cruised at about 70 miles per hour and could be found any Sunday buzzing local civilian airports. They were powered by 65-horsepower engines. Their flight instrumentation consisted of airspeed indicators, nonsensitive altimeters and magnetic compasses – but with no turn-and-bank indicators, lights (they were not flown after dark) or navigational radios.

Observation always has been essential to the successful employment of an army in the field. Wellington swore at Waterloo that he would give up half his army to know what was happening on the other side of the hill. The U.S. Army's first experience with aerial observation came during the Civil War through the use of balloons.

Professor Thaddeus S.C. Lowe, Director of the Balloon Corps of the Army of the Potomac from 1861 to 1863, was the most successful balloonist. Using telegraph and a balloon over Fort Corcoran, outside Washington, DC, he directed Artillery fire in 1861 against Confederate positions across the Potomac River in Virginia. During the Spanish-American War, a balloon was instrumental in the American success in 1893 at the Battle of San Juan Hill.

During World War I, airplanes joined balloons to provide ground commanders with critically needed information. [Balloons, due to their vulnerability to airplane attacks and lack of mobility, were abandoned almost entirely by 1940.]

The role of air observation and the adjustment of Artillery fire was of critical importance to the Field Artillery during World War I. The increased range of its field guns added to the difficulties of locating, adjusting and hitting targets quickly on a rapidly moving battlefield. Corps aviation squadrons were assigned to corps headquarters exclusively to perform Artillery spotting missions. All requests were made through corps headquarters.

The assigned aircraft, stationed at an airdrome in the rear, flew to the front where it contacted the requesting division's Artillery by radio. The gunners never knew or met the observers and, upon completion of the mission, the pilots returned to their airfield for another assignment.

Since the Air Service observers were not responsible to the Artillery commanders whom they served, the latter sacrificed a vital element of command. The Field Artillery found these aircraft few in number, rarely available when wanted, and unfamiliar with the needs of Artillery.

The Growing Artillery/Aviation Rift. The experience of World War I led Artillery and the Army's air segment to conclude divergent doctrines. The rift widened during the interwar years. Major General Robert M. Danford, Chief of Field Artillery, was convinced that air observation was essential to the effective use of Artillery. He ordered a thorough study of the Field Artillery's experience with balloons and aircraft during the previous war.

The study concluded that to be effective the airborne observer should be Artillery, familiar to and with the gunners being directed, and that the aircraft should be organic to the Artillery

As part of Army aviation's 35th anniversary the *DIGEST* is carrying the following story. It features the first published interviews with Joseph McCord Watson Jr., who played an unprecedented role in bringing about the birth of Army aviation on 6 June 1942. In photo at left an Army Cub takes off from a temporary forward landing strip in North Africa

units they served. This meant they should be owned, operated and maintained in the same manner as the unit's field guns and trucks. The pilots and observers should be members of the Field Artillery and regularly assigned to their parent Artillery units.

During the 1920s and 1930s, aviation made rapid technological advances. However, as aircraft became capable of flying higher, faster and farther, they became less suited to the air observation needs of the Field Artillery. Army observation aircraft became so heavy that they were limited to flying from permanent airfields with prepared runways. They also required elaborate repair and maintenance facilities. Tied to operating from these sophisticated airfields, they became less mobile while field armies were becoming more mobile.

The split in doctrine was more complex from the Army Air Corps side, which was established as a separate combat arm by Congress in 1926. It was complicated by psychological growing pains. Air observation and the adjustment of Artillery fire were only two of the roles the Air Corps had to perform. And, the Air Corps did not consider these to be its primary roles. Many aviators emerged from World War I convinced that military aviation should be an autonomous service coequal with the Army and Navy. They strongly felt it should not be chained to the ground combat forces in the observation, reconnaissance and Artillery spotting roles.

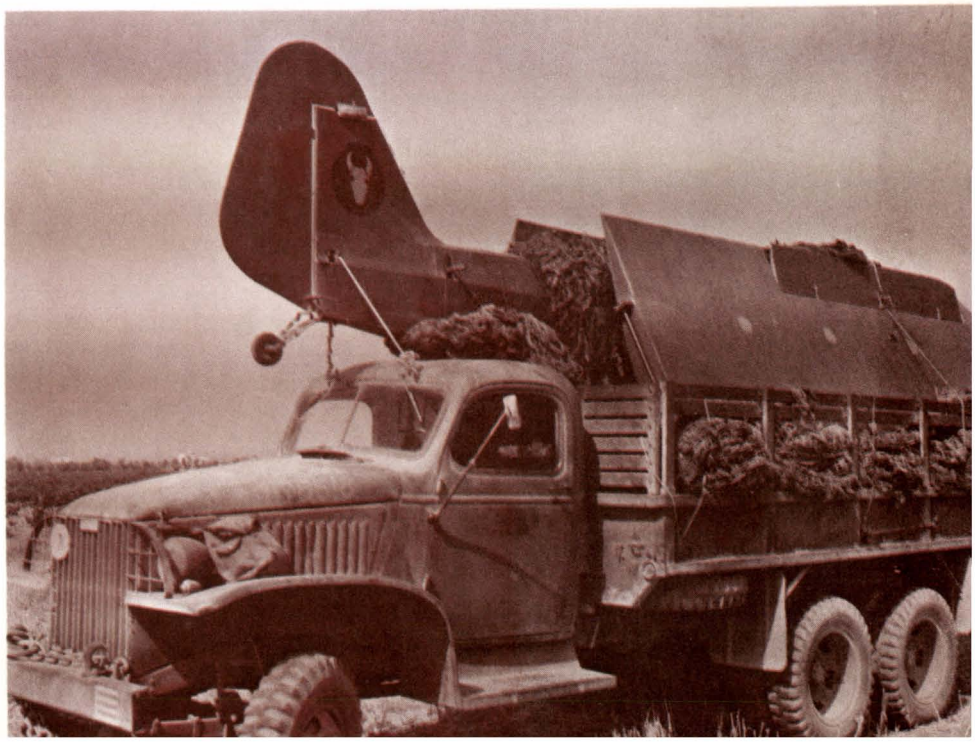
Development and devotion to the doctrine of strategic air bombardment led the Air Corps – short on funds and struggling toward autonomy – to weaken all elements of its ground support program. These suffered as the Air Corps battled to achieve the autonomy it considered essential to fully develop military airpower.

Rallying around their leader, Brigadier General William "Billy" Mitchell, most of those developing the Army's air power advocated the doctrine of strategic bombing. This concept would mass aviation resources in long-range, heavy bomber aircraft groups capable of hitting strategic industrial and military targets deep within the enemy's homeland. They were convinced the enemy would capitulate quickly, long before the armies could become decisive and naval blockades effective. While sincere in their desire to prevent future wars of attrition deadlocked in trench warfare, they also were aware that their claims for autonomy depended upon a weapons system and strategy distinct from either service.

The development in 1937 of the B-17 Flying Fortress, a fast, high altitude, four-engine heavy bomber, finally gave the Air Corps a weapons system capable of translating its theories into reality.

The Air Corps was suspicious of any effort to place aircraft under the control of ground force commanders. It had long fought any such move and was enjoying some success. The Artillery observers were to be members of the Air Corps. The reasoning was that furnishing a pilot and airplane to only transport an observer from Artillery about the battlefield demoted the Air Corps from the status of a combat arm to that of a taxi service.

The Air Corps was being affected by a rapidly expanding technology. It was involved in an interservice "war" with both the U.S. Navy and its parent [U.S.



Camouflaged Piper Cub loaded on 2½-ton truck for movement forward after dark

Army] service of which it was but a small component. And, it was suffering from limited appropriations that an extremely frugal Congress was doling out to the military with the approval of an isolationist American public. These conditions all helped divert the Air Corps' interest from its ground support role. But the crux of the matter was that within the Army only the Air Corps had the authorization to purchase or use an airplane.

The Origins Of Organic Army Aviation. Charles Lindbergh captured the imagination of the world in 1927 when he became the first to fly the Atlantic alone. Aviation became the dream of youth as its technological advances continued to rapidly supersede one another. Many Americans believed that within their lifetimes the private airplane would become almost as common as the automobile. Flying was the way of the future. The ownership of a light airplane was expected to be within the capability of every middleclass American family.

One unassuming young man who played a key role in making organic Army aviation a reality was Joseph McCord Watson Jr. Returning from the University of Alabama to his home in San Antonio, TX, in 1928, he went to work in his father's prosperous retail shoe company. He believed in the future of aviation and was determined to learn to fly. He arranged to take lessons from two friends who held instructor ratings in civilian light aircraft. The next year, with 50 hours flying time, Mr. Watson became the 6,619th person to receive his private pilot license from the CAA (Civil Aeronautics Authority).

Convinced that another war was probable, Mr. Watson and several of his friends in 1930 enlisted in the U.S. Army Reserves. Following completion of the necessary courses at Ft. Sam Houston, TX, he was commissioned a second lieutenant in the Field Artillery Reserve. He became a first lieutenant 3 years later, all this time continuing to fly as a hobby.

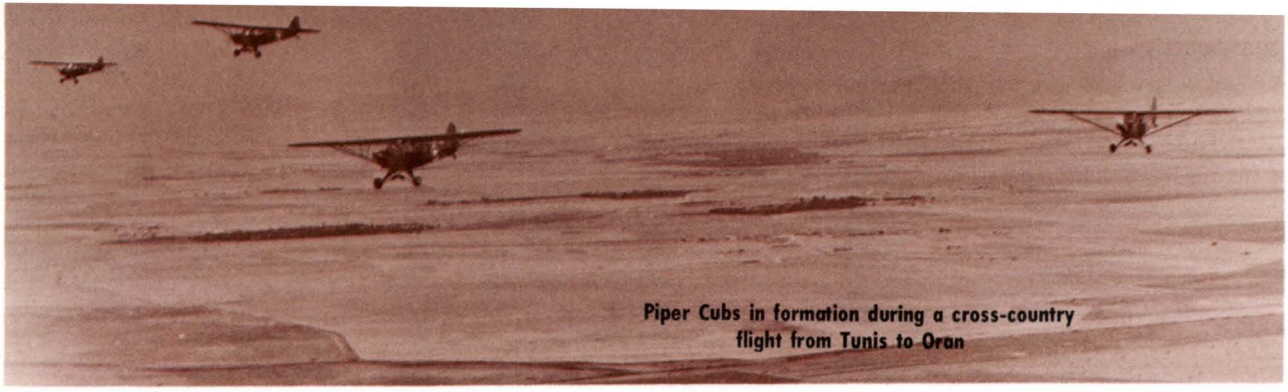
Lieutenant Watson transferred out of the Reserves to 36th Infantry Division, Texas National Guard, commanded by Brigadier General Claude Birkead. The young officer served as S4 on the staff of the 61st Field Artillery Brigade. He began to develop his concept of Artillery spotting from the air in 1936. Confident that good air-ground communications could be established from a commercial light aircraft, Lieutenant Watson enlisted the support of Captain John K. Burr, the headquarters battery commander and a nonflyer.

From 1936 to 1938, Lieutenant Watson rented airplanes at Stinson Field. The rental fee came out of his pocket, with Captain Burr sometimes chipping in. The two men experimented with establishing air-ground radio communications between the airplane and trucks or jeeps on the ground. They would strap various types of Field Artillery radios on the shelf behind the second seat of a Taylor Cub (it became the Piper Cub in 1937) and dangle a 10 to 12-foot chain out the window to serve as an antenna. Satisfactory communications were achieved at distances up to 15 miles with line of sight being mandatory between the airplane and the radio vehicle on the ground. They also tried their hand at directing vehicles on the "march."

The 36th Division was assembled at Camp Beauregard, LA, for maneuvers during its annual summer encampment in August 1939. The recently promoted Captain Watson rented a Piper Cub on several occasions to practice the adjustment of Artillery fire. He was the only man in the division who had a pilot's license.

In 1940 Captain Watson proposed to Brigadier General Robert O. Whiteaker, commander of the

Army Cub lands on gravel strip constructed by the 34th Division Air Operations in Italy. The gravel was collected from Italian roads. The strip was 10 feet wide and 150 yards long. The gravel enabled the Cubs to operate in any type weather. At right, an aerial view of the same runway



Piper Cubs in formation during a cross-country flight from Tunis to Oran

61st Field Artillery Brigade, that the Piper Aircraft Corporation be asked if it would furnish a couple of its airplanes to experiment with the adjustment of Artillery fire. In July of that year, Captain Watson telephoned Mr. William T. Piper Sr., who promised to have Mr. Thomas A. Case, his district sales manager for the Eastern United States who was working with the Piper dealers in New Orleans, participate in the maneuvers.

The Piper Aircraft Corporation, located in Lock Haven, PA, formerly was known as the Taylor Aircraft Company. It marketed the Taylor Cub (the forerunner of the modern popular-priced American light airplane), developed by its president, C.G. Taylor. Mr. Piper was the treasurer until 1937 when he bought out Mr. Taylor, thereby becoming both president and general manager.

Mr. Taylor moved to Alliance, OH, where he started a new aircraft company named Taylorcraft.

During its first full year of production in 1938, Mr. Piper sold 737 Cubs. Most were painted bright yellow for better visibility in the air. The factory produced 1,806 the next year and 3,016 the year after. The 10,000th Cub rolled out the doors before the end of 1941.

As Mr. Piper promised, Tom Case flew a radioless J-4, a side-by-side two seater Piper Cub coupe, to Camp Beauregard on 12 August 1940 for a 2-day stay. Mr. Case thought the demonstrations went well. But he found the loud rendition of "Stars and Stripes" by the division band at reveille obnoxious. On the first day, he flew Captain Watson and other Artillery officers in slow circles above the batteries on the Artillery range while they practiced adjusting Artillery fire. Due to the airborne observers' ability to see the explosions beyond the vision of the gunners, the latter were able to accurately hit the targets more quickly and with fewer shells than before.

On the second day, Mr. Case observed and controlled the brigade's long column on its 93-mile return march from the Artillery ranges near Camp Beauregard to its base camp near Cavens, LA. Following the demonstrations, Tom Case flew back to the factory to discuss the details of the exercise with Mr. Piper. Captain Watson and Mr. Case continued their dialogue on the problems encountered and possible solutions during the following months.

The 36th Division, a veteran of the Meuse-Argonne Campaign in 1918, again was activated on 25 November 1940. It was assembled at Camp Bowie near Brownwood, TX. When the Artillery ranges were completed, General Whiteaker wrote to Mr. Piper requesting more extensive tests in light of the favorable results achieved the previous summer. He wanted to compile the factual data necessary for a formal recommendation for organic aviation.

Recounting the experience of the first demonstration, the general noted that the Cub's ability to maneuver at low speeds and extremely low altitudes allowed the airborne observer to give commands directly to the battery commanders either by voice or by dropping messages attached to orange or red streamers. This avoided the delays encountered using Air Corps aircraft.

The target could be hit quickly and with fewer rounds of ammunition. In fact, General Whiteaker wrote that the savings of 40 rounds of 155 mm or 200 rounds of 75 mm shells would exceed the retail purchase price of a Piper Cub ($1,700).

Use of the Cub for column control during the long road march from the Artillery range convinced General Whiteaker of the light aircraft's value for these functions. Other merits of the Cub were:

- Its ability to land and takeoff from unprepared fields near the batteries or on any country road without obstructions within 500 feet.
- The small consumption of fuel and lubricants which limited the burden upon the supply system.
- The ease with which a pilot with limited training could successfully fly the aircraft.

General Whiteaker suggested that a built-in radio would be superior to the Field Artillery's SCR 178 and 194 sets whose bulk interfered with the freedom of movement of the pilot and observer. Folding or detachable wings would enable the airplanes to be transported by truck when not needed – or when grounded by weather.

Captain Watson's initiative in contacting the Piper Aircraft Cor-

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You don't have to penetrate a line system or dodge around a single cell to have a bout with nature at its worst. The dangers can exist as far as 5 miles away!

BEWARE OF THE SUMMER THUNDERBUMPER

USAAAVS
Larry Collier
Reprinted by permission of ROTOR & WING, July/August 1976

WITH THE HAZARDS of winter flying forgotten for another year, pilots everywhere breathe a sigh of relief and look forward to easy-going summer flying. But many are the pilots who have flown into the serenity of summer only to be sucked up, pelted with hail, covered with ice, shaken by windsheers, and, if lucky, blown out of a summer thunderstorm. Make no mistake – weather is a year-round hazard, and the summer thunderstorm is a most deadly adversary.

A local weather phenomenon, the summer thunderstorm develops from a cumulus cell and is modified by its immediate surroundings. It's the ultimate growth form of cumulus activity and must be considered highly dangerous because of its heavy rain, icing conditions, hail, lightning, strong windsheers, and severe turbulence. Thus the nickname, "Thunderbumper."

Obviously these packets of violence must be avoided, but that is not always easily done. With a good working knowledge of this weather phenomenon and using tried flying techniques associated with it, your chances of survival are vastly improved.

Generally, thunderstorms are common from late winter to early fall, with June, July, and August being the months having the highest frequency of storms. Although the Pacific coast has an occasional summer thunderstorm, the Southeast, especially Florida, has the highest number of instances per day, per year, over a specific region. Stretching from the Dakotas to parts of Texas is a region called "Tornado Alley," and it lives up to its name. Summer thunderstorms mass in a line and march across the plains, causing much crop and material damage.

There are four basic requirements for a thunderstorm to build. These ingredients are:

- Unstable air
- Lifting action
- High moisture content
- Sufficient condensation nuclei

When the actual lapse rate of an air layer is higher than that of the dry adiabatic lapse rate, the air layer is said to be unstable. An air mass lifted in this condition will be warmer than the surrounding air, and like a hot-air balloon, will be forced even higher. Air of this nature, if forced to rise, will become more unstable and can cause severe turbulence. The greater the lapse rate difference, the more unstable the air.

Lifting action may be the result of any type of weather front, mountainous or rough terrain, heating from below, or air convergence. If warm air from the surface region is thus carried to the free convection level, the potential for moisture condensation increases.

If the air does not contain enough moisture, cloud buildup cannot take place. In this instance, clear air turbulence (CAT) may be experienced. When adequate moisture for cell building does exist, the heat produced from the moisture condensation process tends to make the air even more unstable.

Condensation nuclei may be anything from particles of dust carried aloft by lifting action, to artificial condensation nuclei such as sodium iodide used in cloud modification. Iron, salt, and even other ice particles are often a part of the process. Anything that moisture can condense and build on is considered nuclei.

A thunderstorm cell must breathe and feed itself to live. The breathing takes place in the form of updrafts and downdrafts, and the feeding occurs when condensation nuclei and moisture are carried into the cell on updrafts.

Drafts are nothing more than large, vertical air currents that are continuous through thousands of feet in height and may cover the entire length of an individual cell. Drafts should not be confused with gusts, which are short in duration.

Although updrafts and downdrafts may occur throughout any cloud cell, there are two general guidelines for finding these major feeders. In a single cell, the major inflow feeder is found on the rear portion of the cell (rear in relation to its movement), while the outflow is forward. On a linetype system, which may be hundreds of miles in length, this inflow/outflow process is reversed, with the inflow now located along the leading edge and the outflow to the rear. These areas of inflow or outflow are usually indicated by scud clouds, which are caused by moisture condensing at a lower level due to fast-moving air currents going in and out of the cloud base. These scud clouds often appear to be an extension of the cloud edge, hanging down and out.

In the beginning or building stage of a thunderstorm cell, updrafts may move as fast as 3000 fpm. There is no rain falling, as it is suspended or being carried aloft, and no lightning is present. It is the mature part of the cycle that contains hazards in the extreme; therefore, it is here the emphasis is put.

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OPMS CORNER

Officer Personnel Management System

AVIATION MATERIEL MANAGEMENT— OPMS SPECIALTY 71

Major Thomas M. Walker
Aviation Management Branch
Professional Development Division
Officer Personnel Management Directorate

AVIATION MATERIEL Management (Specialty 71) is an Officer Personnel Management System (OPMS) specialty encompassing operational and nonoperational flying positions relating to the life cycle management of aviation materiel. This includes aircraft engines; airframes; components; accessories; instruments; rotor blades; power trains; or hydraulic, mechanical and electrical fuel systems.

Officer aviators designated this specialty may perform a variety of functions concerned with research and development; test and evaluation; procurement and production control; inventory control; storage; distribution; maintenance; supply; and transportation. The Department of the Army (DA) staff proponent for Aviation Materiel Management is the Deputy Chief of Staff for Logistics (DCSLOG), while the Training and Doctrine Command (TRADOC) school proponency rests with the U.S. Army Transportation School at Ft. Eustis, VA.

Specialty 71 is designated a primary specialty for commissioned officer aviators assigned to the Transportation Corps or an alternate specialty for officers assigned to other Officer Personnel Management Directorate (OPMD) branches. Transportation Corps second lieutenants designated specialty 71 attend Army flight training following completion of the officer basic course. Upon completion of flight training specialty 71 officers attend the Aviation Maintenance Officer Course (AMOC) at Ft. Eustis. The length of AMOC is 13 weeks and it provides the aviator the technical knowledge required to accomplish maintenance test flights and quality assurance on Army aircraft. Flight school and AMOC represent the basic schooling qualifications for specialty 71.

Utilization. As with all graduates of flight training, specialty 71 aviators receive DA directed operational flying assignments for utilization of both their aviation and aviation maintenance officer training. Normally, the length of these assignments is 3 years. The assignments are designed to provide the officer with a solid foundation in Aviation Materiel Management. Additionally, early utilization ensures a high probability of successfully passing the 12-year Aviation Career Incentive Act (ACIA) gate – that is, 72 months operational flying experience during the first 12 years of aviation service.

Upon completion of initial utilization specialty 71 aviators usually are assigned to duties which increase their expertise in their primary or alternate specialty. Ideally, whenever possible, the assigned duties support the officer's primary or alternate specialties. Although OPMS has accomplished great strides in developing the right number of qualified officers for the Aviation Materiel Management specialty, some assignments outside an officer's designated specialties will continue in support of Army requirements.

Along with the various functions previously addressed, an Aviation Materiel Management officer may serve in key positions both as commander and staff officer. For example, the officer may serve as commander of a section, platoon, detachment, company, battalion or group engaged in aviation unit maintenance (AVUM), aviation intermediate maintenance (AVIM) or depot support level maintenance and supply. As a staff officer, duties may be performed at battalion and higher troop command, commodity command or high level staff. Additionally, specialty 71 officers may serve as a project manager (PM) for an aviation system that has entered the production/deployment or operation and support phase of its life cycle management.

Considering the increased complexity of new and emerging aviation systems, the challenges associated with duties as a PM are evident. Factors which influence utilization/assignment to these positions are:

- Army requirements.
- Professional development needs of the officer.
- The officer's manner of performance and potential.
- The officer's desires.

Transition/Saved Pay Provision Terminated 31 May 1977

The January 1977 edition of the *AVIATION DIGEST* carried an article in the OPMS Corner with this title. The article states that warrant officers with 30 years or more Total Federal Officer Service (TFOS) cannot receive flight pay. Since that time it has been determined that the Aviation Career Incentive Act does not place a service limit on flight pay for warrant officers. Accordingly, MILPERCEN has initiated action to change AR 37-104-3 and to have the Finance Center continue flight pay for warrant officers with 30 years or more TFOS.

- Availability of officers with required qualification.
- The grade, specialty, education and experience of the officer.
- Policy considerations such as stability of assignments and short tour equity.
- Personal factors.

The type of assignments available to officers in the Aviation Materiel Management specialty are as varied as any specialty within OPMS. Current position requirements by command stated authorization (CSA) for members of specialty 71 are 136 lieutenants, 348 captains, 90 majors, 66 lieutenant colonels and 22 colonels. These figures represent both operational and nonoperational flying positions. Commissioned aviators designated specialty 71 as a primary or alternate specialty are 266 lieutenants, 677 captains, 234 majors, 272 lieutenant colonels and 20 colonels. In comparing assets with requirements it is evident that utilization rates at the company grade level are higher than at field grade. Aviation Materiel Management officers, when not assigned to 71 positions, may serve in their alternate or another logistics specialty – depending on Army requirements.

Professional Development. Officer professional development under OPMS is defined as "the development of the professional attributes and capabilities of Army officers to meet the needs of the Army through planned assignments and schooling." The basic elements which impact on the professional development of specialty 71 officers are:

- Planned and progressive rotation of duties which may or may not mean assignment changes.
- Officer professional education, to include resident and nonresident instruction, on-the-job training, individual study, and, when appropriate, civilian education.
- Officer evaluation system.
- Officer promotion system.
- Individual participation in professional development. The importance of officers participating in their professional development planning cannot be overemphasized. Each officer, specialty 71 included, must be familiar with OPMS professional development policies and the impact that will be made on an individual's career. In layman's terms, the individual officer continues to represent the key link in the personnel management chain.
- Professional development counseling.

Alternate specialty designation also is an essential part of officer professional development. Aviation Materiel Management officers may be designated an alternate specialty from any of the OPMS specialties with the exception of the Infantry, Armor, Field Artillery and Air Defense Artillery specialties.

Restrictions in the choice of an alternate specialty are few. In determining OPMS specialty combinations for specialty 71, two basic factors are evaluated: (1) utilization rates of specialties, and (2) compatibility of specialties. Numerous OPMS specialties satisfy utilization and compatibility goals for designation with specialty 71. Some examples are Procurement (97); Research and Development (51); Transportation Management (95); Supply Management (92); Traffic Management (86); and Maintenance Management(91).

As discussed earlier, successful completion of initial flight training and the Aviation Maintenance Officer Course are fundamental qualifications for specialty 71. Other specialty related military courses supportive of Aviation Materiel Management officer professional development include:

- Aircraft qualification courses
- Defense procurement
- Defense inventory management
- Transportation Officer Advanced Course (TOAC)
- Army provisioning management
- Defense international logistics
- Logistics management development
- Logistics Executive Development Course (LEDC)

Professional development guidance, educational opportunities – both military and civilian – and assignment opportunities for the Aviation Materiel Management specialty are addressed in DA Pamphlet 600-3, "The Officer Personnel Management System." This pamphlet currently is under revision and should be ready for distribution to the field by the fourth quarter fiscal year 1977.

Command. Command opportunity is and will con-

Continued on page 27

The Founding Fathers

Continued from page 5

poration was the catalyst that led to the establishment of organic Army aviation. Many thought the commercial light airplane was superior to the standard Air Corps observation aircraft, and the value of air observation to the Field Artillery was undisputed. But Captain Watson was the first to undertake actual experiments with light aircraft – and at his initiative and expense. He approached Piper because he could fly the Cub and he knew it was suitable for the role. Aeronca and Taylorcraft produced similar airplanes.

It was an uphill struggle for organic Army aviation, but Captain Watson could not have enlisted the support of a more vigorous advocate than William T. Piper Sr. He already was a successful businessman in 1929 when C.G. Taylor asked him to invest $600 in his fledgling aircraft company.

Mr. Piper believed in the future of light aviation in America. The practical, affordable and dependable little airplanes he sold were an exponent of his philosophy. He believed that only by getting a large number of Americans to fly could the future of light aviation be secured. It was only common sense that some of these pilots were going to want to buy their own airplanes. The young Lieutenant Watson's unusual request did not seem unreasonable to a man who often traveled long distances to demonstrate the capabilities of one of his airplanes to anyone who showed the slightest interest.

Concerned that light aviation might be overlooked in the confusion surrounding the Nation's rush to rearm, Mr. Piper sent a letter to Secretary of War Henry L. Stimson suggesting a number of military and semimilitary uses of light aviation. Surprisingly, the adjustment of Artillery fire was not among them. Included were control of columns from the air, liaison, evacuation of the wounded, and their use as radio-controlled flying bombs.

Although a commercial venture, Mr. Piper pointed out that his company represented 50 percent of the country's light aircraft industry and wished to contribute to the Nation's defense. He informed Secretary Stimson that the bearer of the letter had his authority to act for the company.

The bearer of the letter was banker John Edwards Parsons Morgan, who had known little about aviation when he was voted onto the board of directors at Piper. A man of great energy, Mr. Morgan founded the National Ski Patrol. It was intended to both rescue skiers in distress and also serve as a model for American ski troop training during World War II. He also was responsible for building the first ski lift, which was located at Sun Valley, ID. Equally important, he knew many of the Nation's prominent citizens, including Robert A. Lovett from college days at Yale.

Mr. Lovett was a former U.S. Naval Reserve pilot who had taken up flying in light airplanes as a hobby when President Franklin D. Roosevelt appointed him Special Assistant to the Secretary of War and later Assistant Secretary of War for Air.

Mr. Morgan remained in Washington where he became an effective lobbyist for the Piper company. He also later served as a spokesman for the Aeronca and Taylorcraft aircraft companies whom he asked to join in a bipartisan campaign to sell light aircraft to the Army.

Another who played a large role in the development of Army aviation was Major William W. Ford, a career Soldier in the Field Artillery. Major Ford began flying as a hobby in 1934 and by 1941 accrued more than 500 hours as a pilot. He wrote an "explosive" article, "Wings For Santa Barbara," for the April 1941 issue of *The Field Artillery Journal* (see June 1974 *DIGEST* for a reprint of the article). In it, he noted that not once during the 4 months of maneuvers with the Third Army during 1940 were actual air observers available to adjust fire of their Artillery battalions. More importantly, Major Ford believed the flat terrain at the Artillery School at Ft. Sill, OK, misled gunners into thinking that observed fire and good maps were the rule – not the exception. Major Ford's article greatly impressed Major General Robert M. Danford, the Chief of Field Artillery, who also played an instrumental role in bringing about the birth of Army aviation.

Never during the Third Army exercises did the terrain allow for observed fire. And, the maps used were inadequate. The airplane was the solution, but Major Ford wrote in his article, "The trouble is that we do not have an adequate number of planes or observers for this purpose; nor are they on order; nor are the types of planes we contemplate the best suited to the job." He advocated a pilot and "flivver" type commercial airplane organic to each Artillery battalion to carry a trained Field Artillery observer. There "were thousands of commercial light planes in this country, available upon requisition" and "thousands of civilian pilots holding CAA certificates of competency to fly them." An inadequate number of observers and aircraft were available and Major Ford saw little hope of improving the situation without such a program.

Ford noted in his article that the "flivver" airplane had a low horsepower engine and a slow

cruising and landing speed. It could land on roads, cow pastures and lightly plowed fields (although the editor noted that recent tests showed "repeated" landings on "cow pastures" caused the landing gear to break).

Major Ford thought the "flivver" would be more survivable than the standard heavy Air Corps observation airplane due to its maneuverability, ability to fly below tree level, and its need to be in the air only during the few minutes required for the fire mission. Air observation would be available whenever the battalion commander needed it. And, the close teamwork essential to effective Artillery fire would result from "belonging" to the unit it served.

The light "flivver" airplane cost about $1,500, whereas the standard Air Corps observation airplanes cost 20 to 30 times more and required large ground crews and sophisticated facilities far removed from the battlefield. The standard commercial airplanes were available, meaning the money and resources needed to procure the Air Corps observation aircraft could be used to purchase more needed combat aircraft.

The Piper Flying Circus. While Mr. Morgan was conducting his "assault" on the War Department, the Piper company was contacting other Army commands with an offer to demonstrate the usefulness of their airplanes. As a result, Tom Case made several short trips to Ft. Sill.

W.T. Piper responded to Brigadier General Whiteaker's request to return for more extensive testing. Tom Case joined Mr. Piper and three other company pilots – all in radio-equipped Cubs – at Camp Bowie, where they lived in the field from 9 to 23 May 1941. Captain Watson was in charge of running all the tests and seeing to the needs of the guests and their airplanes.

Mr. Piper and the general were of similar personalities and formed an amiable relationship. Tom Case was impressed most with the accuracy of the gunners. With practice, the air observers would get on target after firing two to four rounds. The gunners would lay their sights on the airplane flying above the target. Using fence line intersections as targets, they could place a shell in each of the four quadrants within 10 feet of the intersection. The brigade's three Artillery regiments were using 37 mm guns in place of their 75 mm guns which had been sent to the British fighting in North Africa.

In addition to taking Artillery officers aloft to adjust Artillery fire, the Cub pilots also tested air-to-ground communications, camouflage effectiveness and observation. They practiced column control during a 6½-hour road march from Barkley, TX, back to Camp Bowie. The pilots landed their Cubs on roads and refueled at local filling stations.

Large-scale maneuvers continued as the Army continued to absorb the influx of draftees and work out flaws in organization, doctrine, tactics and equipment. The war in Europe was nearing the end of its second year. The maneuvers were not games, but a race against time. American warships were engaging German submarines as convoys crossed the Atlantic to Britain – a weary survivor of the air battle over its home islands. England faced the threat of invasion from German armies which also were slashing deep into Russia, routing the Soviets as they went.

As war clouds threatened, the United States scheduled an important series of maneuvers for the summer and fall of 1941. Second Army maneuvers around Camp Forrest, TN (2 to 28 June) were followed by those of Third Army at Ft. Bliss near El Paso, TX (14 to 26 July) and at Ft. Beauregard (11 to 30 August). The Second Army joined the Third in combined maneuvers at Ft. Beauregard for the entire month of September. The First Army held two series of maneuvers (6 October to 1 November and 3 to 30 November) in the Carolina maneuver area.

Robert Lovett, recalling Piper had provided some light airplanes for tests with the Field Artillery at Ft. Sill, wrote to Mr. Morgan early

Army jeep and motorcycle on flight line prior to Oran, North Africa conference which Generals Eisenhower, Clark and Rider, among others, attended during the summer of 1943

in June, "It might be a useful experiment to have 10 or 12 of these light planes, piloted by men you might select, attached to an Artillery unit." Mr. Morgan replied that Piper would be happy to supply 10 or 12 airplanes and also would ask Aeronca and Taylorcraft each to send aircraft to make it an industry test.

General Henry "Hap" Arnold, Chief of the Air Corps, approved the arrangements. The manufacturers supplied the radios for their airplanes, while the Army provided ground radios and the observers, and also housed and fed the men and furnished gasoline. Two Air Corps squadrons of 0-49 observation aircraft also were assigned. General Arnold directed that all ground units make complete reports on the value or use of the light airplanes in the maneuvers. The tests were to be official!

Tennessee Maneuvers. On 18 June 1941, Henry Wann, Tom Case, James M. Helbert and Jules Parmentier flew their Piper Cubs to Manchester in eastern Tennessee where the Second Army was to conduct its war games around Camp Forrest. They were joined by four additional Cubs and two airplanes each from the Aeronca and Taylorcraft companies. All were equipped with RCA two-way radios.

It was not an unqualified success because someone had failed to get the word to all involved. The "brass" was puzzled by the appearance of civilians flying puddle-jumpers. Consequently, the volunteer squadron received few orders and it was not until the fourth (and last) week that the umpires discovered that the only way to find out what was going on was from the backseat of the little civilian airplanes. The squadron pilots slept under the wings of their airplanes and had to scrounge for their food.

Operating from a landing strip 298 paces long on a heavily wooded mountainside, the Cub pilots observed 155 mm gunfire by flying at 1,000 feet above and behind the guns. The excellent visibility they enjoyed, their slow speed, and the ease with which one man was able to handle the aircraft favorably impressed the officers with whom they worked. Besides the adjustment of Artillery fire, the provisional squadron performed scouting missions, delivered messages, and transported commanders and staff officers about the battlefield as they performed their duties. They also worked with the regular Air Corps observation squadrons.

Army Piper Cub on reconnaissance mission over North Africa in 1943

The unique ability of the light aircraft to land almost anywhere was demonstrated in 102 landings upon dirt roads, fields and pastures. When the exercises were completed, they dropped flares in front of some hard-charging tank units to inform them so. When one commander failed to comprehend, a Cub landed in a nearby field and taxied up the road to the startled tankers.

The rapidly expanding Army was suffering growing pains as it was forced to take half-trained cadres to staff newly formed divisions. It lacked adequate numbers of modern equipment (civilian trucks posed as tanks and wooden guns as antiaircraft weapons) but found the volunteer squadron to be one of the highlights of the maneuvers.

Ft. Bliss Manuevers. The volunteer squadron, composed of the same airplanes and pilots from Piper, Aeronca and Taylorcraft, and joined by two additional Cubs, flew to Ft. Bliss. This was in response to an invitation to participate in the desert maneuvers from 11 to 26 July 1941, among the sand, cacti and clumps of grass.

General Arnold cut orders for them to be based at Biggs Field, outside El Paso, TX. The post commander, a National Guardsman called to active duty, told them, "I know nothing about you or why you are here." He refused to allow the motley gang of civilians with their Sunday-flying airplanes onto the airfield. After several frustrating days at the civilian airport in El Paso, Mr. Morgan telephoned Secretary Lovett who quickly got the commander straightened out.

The nickname "grasshopper" was bestowed upon the light aircraft during these maneuvers. Major General Innis P. Swift, commanding general of the 1st Cavalry Division, was startled to see a Piper Cub land on the desert beside his headquarters, 50 miles outside El Paso. He invited the pilot, Henry Wann, to share his lunch with him, telling him that he looked like a "damned grasshopper" as he bounced along the ground during the landing.

Forty-five minutes later a radio message arrived to inform the general that Mr. Wann's airplane

was being dispatched to assist him and was then leaving Biggs Field. The general sent Wann with his aide back to Biggs Field to get some fresh hams for the headquarters mess. Meanwhile, angered at the delays in getting radio messages through, General Swift decided to send for Mr. Wann and the Cub and told an officer to send a message, "SEND GRASSHOPPER. SWIFT." When the officer asked, "What's a grasshopper?" the general replied, "They'll know when you tell them." They did, and the nickname was born.

Members of the squadron quickly fashioned a Grasshopper emblem which they painted on the sides of their ubiquitous little airplanes. Mr. Morgan sent a Grasshopper lapel pin to Secretary Lovett.

The biggest desert operations yet undertaken by the Army took place in temperatures up to 115 degrees and at elevations from 4,000 to 6,000 feet. Dry lakebeds were used as landing fields. In one instance, three Cubs landed on an unprepared field where the first two damaged their landing gear. They radioed for repair parts and both were flying again within 80 minutes. On the other hand, the Air Corps' O-49 aircraft crashlanded so often that orders finally were issued that no Air Corps airplanes were to use a newly prepared airfield until the Grasshopper Squadron had used it for 48 hours. Damaged Air Corps aircraft had to be trucked 50 miles or more to Biggs Field to be repaired.

Louisiana Maneuvers. The Grasshopper Squadron flew to Ft. Beauregard for the Second Army maneuvers from 11 to 30 August 1941. On the way, Mr. Case stopped off at Camp Bowie to brief Captain Watson and Brigadier General Whiteaker on the results of the Ft. Bliss Maneuvers. Meanwhile, General Danford, enthusiastic over the performance of the light aircraft in the summer maneuvers, had flown to the United Kingdom to visit the Royal Artillery School at Larkhill. Impressed with the British use of light spotter airplanes with their Artillery, he requested War Department permission to officially test organic light aviation.

The Grasshopper Squadron flew 12 to 14 hours a day during August. Secretary Lovett wrote to Mr. Morgan, then at Third Army headquarters, Camp Polk, LA, that the Third Army had requested the use of the Squadron in the combined Second and Third Army maneuvers scheduled for the same area in September. Secretary Lovett suggested that the Third Army rent the airplanes. Up until this time the airplane companies were paying their expenses and providing the airplanes free of charge.

Colonel Eisenhower. Back in April 1941, Henry Wann, in his capacity as western district sales manager for the Piper company, was trying to drum up some business with the Army. He telephoned Ft. Lewis, WA, where, being unfamiliar with Army organization, he talked with various desk sergeants and junior officers. Finally he was put in touch with a lieutenant colonel. The officer was pleasant and told Mr. Wann that he himself had a pilot's license,

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General Eisenhower (then a junior officer) had served on General Douglas MacArthur's staff in the Phillippine Islands during the mid-1930s. As they worked to build up an indigenous army, they realized the need for a small "air force" to reach their 90 training camps. They needed light airplanes that could takeoff and land on short airstrips in order to reach the camps, since the 7,100 islands of the Phillippine archipelago had only a primitive roadnet, except for the island of Luzon.

An airfield was informally established outside Manila in 1936 and Colonel Eisenhower, at age 46, began pilot instruction. He passed his license examination on 19 July 1939. By the time of the Louisiana Maneuvers he had logged more than 600 hours in light airplanes.

General George C. Marshall, Army Chief of Staff, was so pleased by Colonel Eisenhower's work in the Louisiana Maneuvers that he promoted him to brigadier general in late September. On 26 July 1942, General Eisenhower replied to a letter from Brigadier General Ralph W. Coane, commanding the 41st Infantry Division's Artillery in Australia. General Eisenhower knew General Coane from Ft. Lewis and had been a student of the 41st Division's commander, Major General Horace H. Fuller, in 1926 at the Command and General Staff College, Ft. Leavenworth, KS. He asked, "By the way, he (Fuller) and I were always interested in getting some little puddle-jumper airplanes for each Infantry division — to be flown and maintained by the division organization itself, entirely separate from the Air Corps. The idea was that they were merely flying motorcycles and were to be for command, liaison and limited observation missions. The use of the plane was to be limited strictly to the divisional area and to the rear." General Eisenhower wanted to know if the 41st Division had ever received any.

but that Ft. Lewis had no authority to purchase any airplanes.

The officer that Henry Wann talked with was Dwight David Eisenhower, who soon was promoted to colonel and was chief of staff to Lieutenant General Walter Krueger, commander of the Third Army. While the Grasshopper Squadron was participating in maneuvers with the Third Army in Louisiana, Colonel Eisenhower came to inspect them with the chief of the Third Army Air Corps, Lieutenant Colonel Sam Davis. Colonel Eisenhower later returned to the football field which the Grasshoppers were using as an airstrip and flew with one of the Grasshopper pilots.

Secretary Lovett's suggestion to General Krueger that the Third Army rent the Grasshoppers was turned over to Colonel Eisenhower to implement as chief of staff. The colonel was on the friendliest of terms with members of the squadron since he often went out to their field and borrowed an airplane to escape the heat of the hot, humid August evenings, with J.M. Helbert of Piper. Colonel Eisenhower told Mr. Morgan to get a figure. Mr. Morgan talked with W.T. Piper who had just arrived for the maneuvers and who told Mr. Morgan, "If we don't get it, let's not get hasty and pull out our planes. The Army needs the planes more than we need the money."

Colonel Eisenhower gave Mr. Morgan a "maneuver order" for $24,000 and sent him to the quartermaster general, Major General Edmund B. Gregory, who told him to "draw up a contract" and "make it short and simple." Mr. Morgan already had telephoned Secretary Lovett and his Army Ground Forces counterpart, John J. McCloy. Mr. Morgan drew up the contract and General Gregory signed it. Mr. Morgan had drawn up the contract with no authority whatsoever from either the Piper, Aeronca or Taylorcraft companies. It was never questioned and the Army promptly paid the bills upon presentation.

Grasshoppers' Indian Summer. Following the monthlong maneuvers in Louisiana with the Second and Third Armies, the volunteer Grasshopper Squadron flew to the Carolinas. There it participated during October and into November in First Army maneuvers. Two airplanes each from the Rearwin and Interstate aircraft companies joined the Grasshopper Squadron for these maneuvers.

Through the summer the Grasshopper Squadron flew more than 400,000 miles and completed more

Another Armored Force officer who appreciated light aviation's potential was George S. Patton Jr., then acting and later commanding general of the 2d Armored Division. During 1940, he incorporated light planes in all his exercises, using them to transmit orders to subordinates in the field, to locate and identify units, and to fly himself and his staff officers quickly to their destinations. He experimented with light airplanes that could use open fields unsuitable for other military aircraft and came to prefer the Piper Cub.

On 12 December 1940, General Patton sent the 2d Armored Division on a 400-mile round trip from Columbus, GA, to Panama City, FL. The 4-day trip, the longest march yet undertaken by an American Armored division, used light airplanes to control the columns composed of 1,100 vehicles.

General Patton wrote to his friend, Lieutenant Colonel W. C. Crane, then on General Leslie McNair's staff at Army General Headquarters, in the spring of 1941: "I am personally getting so air-minded that I own an aeroplane and expect shortly to have a pilot's license. Next time you come down here (Ft. Benning), I may be able to take you for a ride if you have sufficient insurance."

The 2d Armored Division moved West in early 1942 to test tank doctrine and train for desert warfare. In a report to General McNair on 20 May 1942, General Patton wrote, "...since it is the first time to my knowledge that a fairly large group of Armored vehicles were successfully commanded from the air by voice radio, the report may be of interest...." When he wrote the lessons learned in "Notes On Tactics And Techniques Of Desert Warfare (Provisional), 30 July 1942," General Patton concluded that the commander should exercise command from the liaison plane by two-way radio until contact was made with the enemy. Then a staff officer should replace the commander in the airplane while the latter leads the attack from the ground.

The officers and men of the 2d Armored Division never knew when or where General Patton would show up to witness their progress. He used jeeps, sedans, tanks, halftracks and light airplanes to move about among his dispersed units. General Patton nearly lost his life while landing his Cub near his headquarters, narrowly missing some nearby telephone poles. Upon their initiative, his troops cut down the offending poles and buried the wires underground.

than 3,000 missions. Not one airplane was lost in the line of duty. There were not any engine failures or aircraft grounded for more than 24 hours for repairs. During the same period, the Air Corps had to write off 11 O-49s at a cost of $25,419 each (the Cub, with radio, cost $2,432).

The O-49 was three times heavier than the Piper Cub, and its 55-foot wingspan was 20 feet longer. It took 6,000 manhours to build and, unlike the Cub – which took 300 manhours and could land on the highway and taxi up to the local filling station – it required 100 octane aviation fuel. On 12 September, Third Army Air Operations showed nine O-49s in service and 12 out of commission, while all 11 Grasshoppers were available. One Cub used as a spare was lost when a sudden wind squall at Camp Polk tossed an O-49 up in the air and dropped it on top of the Cub.

The Grasshoppers proved to be indispensable wherever they went. Even General Krueger used a Cub to untangle an Armored column enmeshed in a huge traffic jam. Flying at 200 feet, the general used a megaphone and straightened out the mess in 20 minutes.

The Air Corps' problems were not due simply to the superiority of the Grasshoppers to the O-49s. As with other components of the Army, it was having difficulties reorganizing and mobilizing for a wartime footing. Major General Lewis H. Brereton, commander of the Third Air Force, had set up and operated the two Air Corps maintenance commands for the opposing armies in the east Texas and Louisiana maneuvers. He found that he lacked sufficient trained staff to handle the maze of organization and detail. "We simply could not put supplies in the places where they should be and in the quantities required," he said.

Tanks, Horses and Cubs. The Armored Force was established on 10 July 1940. Brigadier General Adna R. Chaffee was assigned as chief of the Armored Forces and commander of the I Armored Corps. General Chaffee was aware of the implications of airpower to Armored warfare. The Nazi blitzkrieg, unleashed against France in May 1940, married the dive bomber to the fast moving German Panzer units. This led to the rapid collapse of what most people considered the finest army in the world.

General Chaffee telephoned William Piper Sr., on 9 February 1941, and asked if he would send an airplane to the U.S. Army Armor School, Ft. Knox, KY. The general wanted to test his ideas on directing Armored columns and methods of adjusting tank gunfire from the air. He believed that light aviation should be organic to all branches of the combat arms. Mr. Piper agreed and Tom Case flew the now veteran (Cub), still without a radio, to Ft. Knox. He worked closely with General Chaffee and his staff from 10 to 15 February.

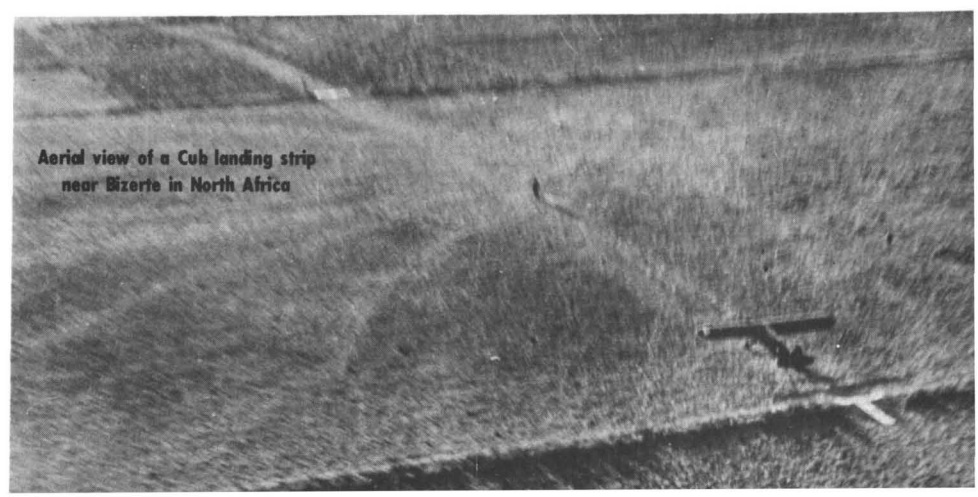
After further tests at Camp Bowie, Mr. Case flew to Lock Haven, PA, where the Piper factory installed a standard radio. Although not designed for the aircraft, the radio did provide adequate two-way, air-ground voice communications. Four days later (on 23 April) Mr. Case returned to Ft. Knox to continue the tests.

Ft. Riley Demonstrations. A Piper Cub demonstrated the advantages of light aviation to Cavalry officers from 12 to 14 June 1941, at Ft. Riley, KS. Convinced that light airplanes and horses were compatible, the enthusiastic officers arranged for a more extensive demonstration. This took place from 1 to 8 July 1941 when four pilots, with a mechanic, returned in Piper Cubs. They directed Cavalry operations while living in the field with the troopers. Official reports evaluating the success of these experiments were forwarded to Washington.

Organic Aviation Becomes A Reality. Eleven Air Corps and 21 federalized National Guard squadrons were assigned in 1940 to the ground units. They were subject to periodic withdrawal for Air Corps training. When this system proved unsatisfactory, General McNair (General George C. Marshall's chief of staff and in charge of all field training) ordered field exercises for the observation squadrons in conjunction with the field force maneuvers in July and August 1941.

Air Corps ground support aviation was reorganized on 25 June 1941 into five air support commands, one for each of the four field armies and one for the Armored Force. They included pursuit, bombardment, dive bomber and observation squadrons. The last included a mixture of reconnaissance, observation and liaison airplanes.

General Danford made another official request (the first had been in July 1940) for organic aviation manned and maintained by the Field Artillery. This again was rejected by G3, War Department



Aerial view of a Cub landing strip near Bizerte in North Africa

General Staff. General McNair concurred in the rejection because he wanted to give the new air support commands a chance for a fair trial.

The new commands, however, failed to provide adequate support during the test period. General Danford renewed his request for organic aviation on 8 October 1941, stating, "The only uniformly satisfactory report of air observation during the recent maneuvers comes from those Artillery units where...light commercial airplanes (Piper Cubs), operated by civilian pilots, were used."

In again rejecting General Danford's proposal, General McNair replied on 21 October 1941, "There is a grave question in my mind whether it is feasible or desirable that a ground arm attempt to operate aviation. The ground arms can and must learn to cooperate with aviation, and the process may as well begin with observation."

General McNair's refusal was based upon an unresolved dilemma between centralization and decentralization of aviation assets. He agreed with the Army Air Forces' planners because the battlefield reports indicated that ground support aviation worked best when it was flexible enough to be promptly concentrated at the decisive points. Decentralization, on the other hand, led to misemployment, ineffectiveness, and violated the principle of economy of force. Both the British and French found that observation aviation could not survive without control of the air.

Confusion In Doctrine. Much of the confusion resulted from a failure in the prewar period to establish a doctrine on air-ground support that conformed to modern war. Observation aviation, which was only a part of air-ground support, was divided into three functions: (1) reconnaissance, (2) observation and (3) liaison. A major part of the problem was the result of trying to develop a single airplane to perform all three functions.

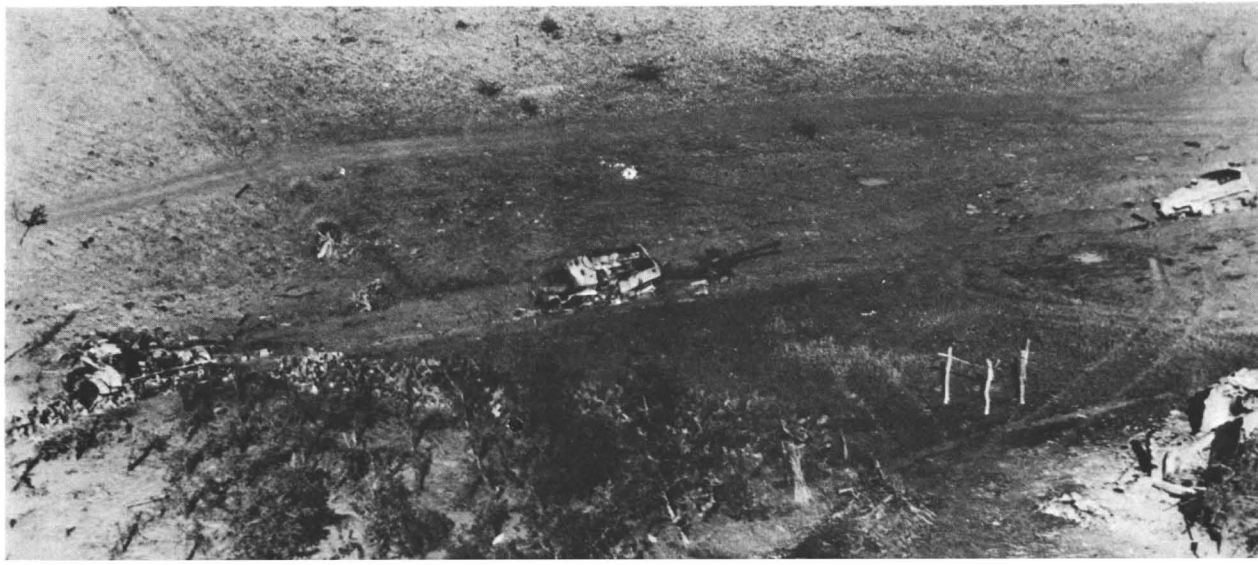
Battlefield experience showed combat air reconnaissance more related to the Army Air Forces than the Army Ground Forces. Concerned with the deep penetration of enemy territory, survival depended upon using fast fighter and bomber aircraft equipped for the purpose with special cameras. Observation was concerned with the battlezone and the enemy's immediate rear areas. It needed fast fighter aircraft armed with cameras. Liaison was conducted in friendly rear areas up to the battleline.

Although the Grasshoppers flew into enemy territory during maneuvers (umpires counted them destroyed if they saw them) and later in battle, they did so when friendly air superiority was achieved. The functional differential between observation and liaison made the selection of a single type of aircraft almost impossible.

The 1941 maneuvers revealed commercial light airplanes to be superior in many ways to the O-49 airplane. The confusion evaporated and the O(bservation designation was changed to L(iaison) for the commercial light airplane types by War Department directive in April 1941.

Those in the Army Air Forces were strained to the limit in 1941. They were trying to build an air force of 3,000,000 with 90,000 aircraft and to establish a production rate of 3,000 airplanes a month. (The Army and Navy together purchased only 921 aircraft in 1939.) Thus it became apparent that the Army Air Forces could not provide the support needed by the Field Artillery. General McNair recognized this and reluctantly ordered a test of General Danford's twice rejected proposal. Delayed by the confusion following the Japanese attack on Pearl Harbor, the test was re-

The remains of a German armored column 4 miles inland from the Fifth Army beachhead and 5 miles south of Salerno. The column, enroute to the beach to help thwart the initial Allied landing, was spotted by a Cub and subsequently stopped and destroyed by Allied artillery fire



scheduled for March 1942.

The favorable results of the tests caused the Army Ground Forces to recommend that "the program be expanded without delay to include all Field Artillery units." The War Department, acting in General McNair's absence to meet a deadline, approved the recommendation. At the same time it was made clear that Army Air Forces observation units still were to share responsibility for adjusting Artillery fire. General McNair did not think the tests were conclusive, but he soon became convinced of the program's value. Thereafter he gave it his full support.

The Class Before One. The War Department authorized the Chief of Field Artillery to organize and equip the Artillery components of one Infantry division and one corps Artillery brigade with airplanes, pilot-mechanics and maintenance crews. The purpose was to test the concept of organic air observation for Field Artillery.

General Danford appointed Lieutenant Colonel W.W. Ford, who while a major authored "Wings For Santa Barbara," to command the training. The Army Air Forces loaned Colonel Ford 24 YO-59s, its designation for the [L-4] Piper Cubs it had purchased after the Ft. Bliss maneuvers. Mr. Henry Wann and Thomas F. "Tony" Piper, W.T. Piper's son, were among the nine civilian instructors. A couple of first lieutenants, both with civil pilot licenses, who had been working on behalf of the program for a year, together with a reserve major named Gordon J. Wolf, aided Colonel Ford in setting up the program at Ft. Sill. The lieutenants were Robert R. Williams and Delbert L. Bristol, both destined to play key and continuing roles in the development of Army aviation. The Class Before One was composed of 14 officers and 21 enlisted men with civilian pilot licenses – all from Field Artillery. Training was at Ft. Sill from 15 January to 28 February 1942. Twenty members of this unique class were graduated.

The Class Before One was divided in Flights A and B. Flight A joined the 13th Field Artillery Brigade at Ft. Bragg, NC. Flight B was assigned to the 2d Infantry Division at Ft. Sam Houston. Each group contained 10 pilot-mechanics, an engineering officer and three mechanics.

From 1 March to 16 April the 10 L-4s with the 2d Division logged 607 hours. Nearly every one of their 3,400 takeoffs and landings were on dirt roads and open fields. Even in the rocky, wooded hills of the Leon Springs Military Reservation, suitable landing areas always were found. Despite difficult terrain, there were no injuries, aircraft damage or engine failures. In fact, the engines were found after the tests to be in superior condition.

The series of tests included: (1) adjustment of Artillery fire; (2) general and road reconnaissance; (3) column control; (4) selection of possible battalion areas; (5) location of enemy batteries; (6) spotting of targets on the map for prearranged fires; (7) surveillance of fire; and (8) battery camouflage checks. The slow speed of the L-4s allowed the pilots to read messages off a blackboard without difficulty.

Some limited tests were conducted in competition with an Army Air Forces observation airplane stationed at nearby Brooks Field. The Army Air Forces airplane averaged 30 minutes to receive and complete a fire mission while the L-4 averaged 10 minutes.

The L-4s did not fare as well in a 2-day "survival" exercise, when several were "destroyed" in the air and one on the ground by the camera guns of P-40s. But unofficial Army Air Forces observers were of the opinion that the P-40s, flying at treetop level, would have themselves been destroyed by ground fire. An Army Air Forces pilot from the 22d Observation Squadron remarked in his report that, due to its maneuverability and in the presence of friendly antiaircraft support, the L-4 was safer in the air than on the ground against the P-40.

Objective Achieved. The test board concluded that short-range air observation should be provided for all Field Artillery units without delay. Subsequently, on 6 June 1942, Army aviation was born! The War Department directed that a team of two liaison airplanes, with two pilots and a mechanic, be made organic to each Field Artillery battalion plus two in each brigade and corps Artillery headquarters. This meant 10 airplanes for each Infantry division and six, later eight, for each Armored division. The number for each Artillery brigade varied with the number of battalions it contained. The Army Air Forces were to buy the airplanes for the Field Artillery, as well as furnish spare parts, repair materials, auxiliary flying equipment, and provide basic flight training for the pilots.

The Grasshoppers went into action in North Africa in November 1942 and soon were flying in combat in every theater. The Army Air Forces made an attempt later in the war to regain control of the program. But General McNair would not allow it because the Army Air Forces could not perform the Army aviation duties it had relinquished by default.

During the war the L-4s became as useful as the jeep and within minutes could direct massive Artillery barrages on enemy positions. Indeed, they became indispensable to the Army Ground Forces. In a short while they proved the concept of Army aviation and laid the foundations of the U.S. Army's current airmobile/air assault doctrine.

EPMS-OFFICERS' ROADMAP

Continued from page 1

dier problems with the old enlisted personnel and education system. Clearly, a better system was needed if the Army hoped to maintain a volunteer Army of qualified, professional Soldiers. *A system that was not people oriented as well as mission oriented was just not going to do the job.*

The causes of much dissatisfaction and many problems were found in what is known as the personnel management subsystems. These subsystems (training, evaluation, classification and promotion) tended to operate independently and were not supporting one another. Soldiers were promoted to higher grades and then evaluated to determine their abilities to perform in those grades. In other instances, Soldiers, who had been performing well in jobs for several years, were sent to school to learn the same respective jobs. After reviewing situations like these the objectives of EPMS started to come into focus.

- Every Soldier needed logical job progression from grade E1 through grade E9.
- A system of career-long training that prepared the Soldier to assume duties at the next higher grade had to be developed.
- Fair and reasonable promotion opportunity had to be developed.
- Soldiers needed a meaningful, challenging job at every level of their careers.

In general, the attitude of the enlisted corps was that officers already had those elements built into their personnel system. *Why wasn't there the same concern for enlisted personnel?*

Getting There From Here. In 1972 the Army adopted a system to group military occupational specialties that were related, manageable from a personnel and manpower standpoint, and provided visable and logical progression from grade E1 to E9. These groupings are called career management fields (CMF).

It was a good step but only the first. The next move was to further refine the career management fields to achieve the objectives of EPMS and provide a total system for enlisted professional development. Understanding how this is done in each CMF will assist later in understanding why specific changes were made.

It usually takes at least a year to develop a prototype career management field. First, information found in the automated data banks and surveys filled out by Soldiers are studied. Tasks and duties performed at each grade in an MOS are analyzed. Soldiers who serve in the MOS are interviewed to gain further insight into the tasks they perform, their problems, attitudes and recommendations. Do meaningful jobs exist at each grade level? Should the MOS be consolidated with another MOS or merged with another at the grade where the problem exists? What effect will new equipment have on the Soldier's job? Is the reenlistment rate low? If so, why?

In this probing manner each MOS is carefully examined. This results in the development of several prototype career fields. The prototypes are then analyzed by career managers, trainers, doctrine developers and users. The most feasible receive further study: Logical job progression? MOS in the proper career field? Can it be supported with a realistic career-long training program? Job challenge? Are promotion opportunities reasonable?

Let's pause at this point to discuss promotion opportunity because promotions are a prime motivator in career development. Soldiers tend to avoid an MOS in which there is little chance for advancement. What causes promotion bottlenecks, and how can they be resolved? **MOS 67N,** Utility Helicopter Repairer, is a good example. Job progression was logical and visible (figure 1) but there was a promotion bottleneck going from grade E5 to E6. This caused many Soldiers to

MOS 67N Job Progression

E7—Aircraft Maintenance Senior Sergeant (67Z)

E6—Maintenance Supervisor/Technical Inspector

E5—Utility Helicopter Repairer/Crewchief

E4—Utility Helicopter Repairer

Figure 1

move to another MOS to get promoted. To see this clearly one had to look at the job positions found in the authorization modification table of organization/tables of distribution and allowances (MTOE/TDA) documents. The number of positions available (authorizations) impact on how many Soldiers can be promoted in a specific MOS.

The left column of figure 2 shows the worldwide profile of job positions at grades E1 through E6 within the MOS. There were not enough 67N positions at grade E1 through E4 to support adequate promotion opportunity within the MOS. The underlying cause was the basic organization of the aviation company.

Solving the problem involved reconfiguring company organization, evaluating job positions and realigning positions to allow for sufficient personnel in each grade to support promotion to the next higher grade. The MOS bottleneck was broken as shown in the right column of the chart. The advantage of being able to keep highly qualified utility helicopter repairers in their jobs rather than moving them for promotion purposes is obvious.

Now let's return to the development of a CMF. The prototype CMF is wargamed by a group of qualified Soldiers, experienced in the MOS involved. The end product of this process is the EPMS recommended career management field.

Each career management field then is formally coordinated with the training commands, major field commands and the Department of the Army (DA) staff. When that coordination is completed and disagreements have been resolved, the CMF is presented to a steering committee of general officers representing the DA staff, major field commands and TRADOC. The Sergeant Major of the Army also is a member of the committee. During this meeting any issues which may still exist within a CMF are ironed out, decisions are made and the CMF is approved or disapproved for implementation.

Developing a CMF is a lengthy, painstaking process involving a lot of highly qualified, conscientious people. This is what it takes for a Soldier to be able to say, "I can get there from here."

Consolidating several MOSs into one and merging others at a higher grade has been the source of much discussion. Some believe that this process causes a loss of expertise. Others argue that it provides the Soldier with greater challenge and more variety in assignments. Members of the EPMS task force had to come to grips with this problem when they began to examine the MOS structure. Some MOSs had few authorized spaces, were extremely limited in scope and offered little opportunity for advancement. A "quick fix" solution would have been to eliminate or consolidate any MOSs with fewer than 150 positions. This was ruled out because a lot of good Soldiers' careers would have been hurt.

Some MOSs had to be broadened at the entry level to provide both challenge and opportunity so that the Soldier would want to stay in the service. The reason was obvious. The Army cannot afford the cost involved in training new people to completely refill an MOS every 2 or 3 years. Further, it is the reenlistee who eventually provides the experience and expertise that every MOS needs to survive.

It has been asked if there is a conflict between more generalization under EPMS and increased specialization under the Officer Personnel Management System (OPMS). The answer lies in perspective. Before EPMS and OPMS, enlisted Soldiers and officers were at opposite ends of a spectrum. Some enlisted Soldiers were too specialized, and some officers were overly generalized. Under EPMS and OPMS, the two are now moving toward the center of this spectrum to provide a more balanced, responsive force. It should be noted that EPMS was not an outgrowth of OPMS. The systems were developed separately.

Slower Promotions? Since 1968 all of the Services have been under increasing pressure from Congress and Department of Defense to halt grade creep and

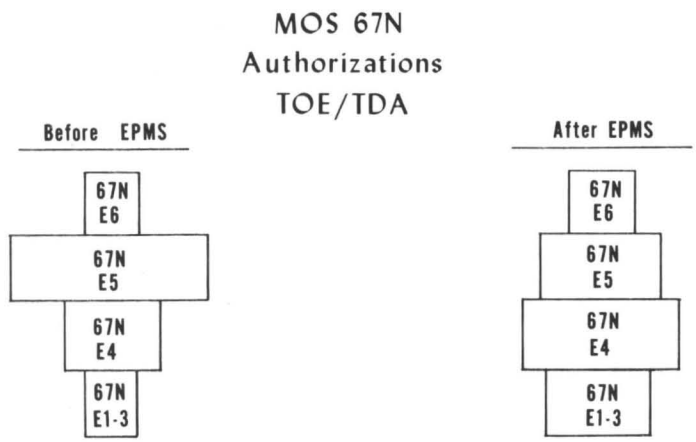


Figure 2

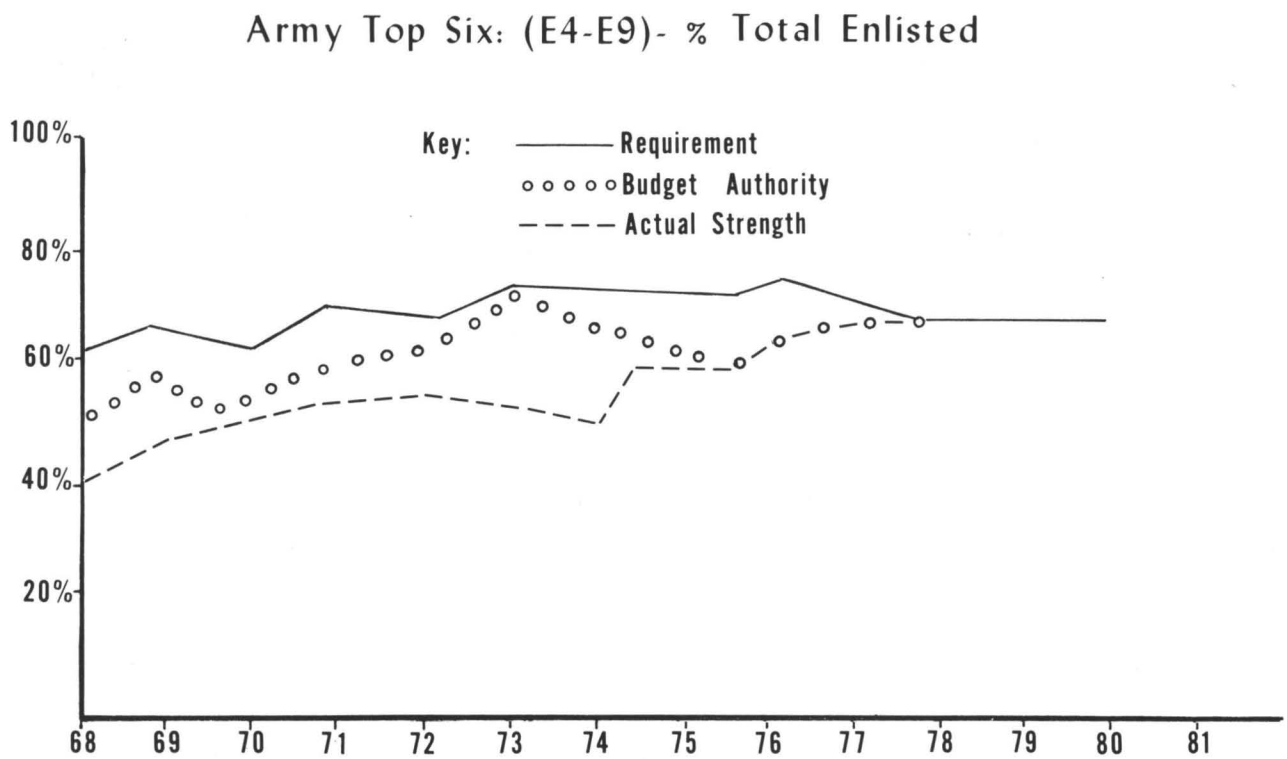


Figure 3

bring the grade structure into alignment with budgetary constraints. Some people interpret this as a forerunner to slower promotions and maybe even a promotion freeze. *This is not true.*

Grades E4 through E9 commonly are referred to as the "top six" of the enlisted grade structure. Figure 3 plots the top six as a percent of the total number of Soldiers. The solid line represents the Army's requirement for combat organization (total authorized enlisted strength as determined by totaling all of the TOE and TDA documents for the entire Army). This is called the required force.

The dotted line represents the congressional budgetary authorization for the top six. In other words, this is the number of top-six Soldiers for which Congress will pay. The dashed line represents the percentages of Soldiers who actually have one of the top six ranks on their sleeves.

When unit commanders look at their authorization documents (solid line), they perceive a Noncommissioned Officer (NCO) shortage. In reality the Army does not have the money to promote the number of Soldiers stated in these documents (dotted line). At first glance it would appear that this would cause a general slowdown or promotion freeze.

Prior to fiscal year (FY) 75 we rarely spent all of the money Congress authorized for promotion into the top six (dashed line). The EPMS task force was given the mission to relook at our grade structure and to bring what the Army says it needs down to a level that Congress will fund. At the same time EPMS is trying to adjust CMF and MOS so that every Soldier has a greater opportunity for promotion. By 1978 the Army expects these three lines to be in close alignment.

What does all this mean? To begin with, *no one is going to lose stripes.* On the contrary, as EPMS is fully implemented and promotion bottlenecks are reduced, more Soldiers will have better opportunities for promotion. Commanders may not be authorized a grade structure as high as before, but the Army will be better able to fill by grade what is authorized.

Perfection is not promised, but progress has been made. Commanders will have a more realistic picture of their organization and what they will have available to complete their mission. The days of promising champagne on a beer budget are coming to an end.

From what has been said it might appear that EPMS has

provided a means of ensuring that the Army will have a Soldier in the proper grade for each requirement. This is not entirely true. Other factors impact on promotions and hinder perfection. We said before that authorizations drive promotions. This is true, but authorizations don't stand still for very long. They are changed to meet requirements.

The authorization for a given MOS will go up or down as the Army's force structure is changed. A good example of this was the decision to go to a 16-division force. Adjustments had to be made in a larger number of MOSs to allow for this expansion. As a result of such change, commanders experienced grade shortages in some MOSs and overages in others. To correct this Soldiers were transferred from overage to shortage MOSs (reclassified).

Since the Army bases promotions on future projections, this will minimize the shortage problem. Keep in mind that *the success of this program is dependent upon the timely submission of document (force structure) changes. The personnel system must have time to react!*

EPMS — Leaders'/Commanders' Responsibilities. "He is one of my best NCOs, and I can't understand why he wasn't promoted." Usually we blame the system when a deserving Soldier is not promoted on time. Well, it will continue to happen until officers learn *how* to get their Soldiers promoted. They *must* understand EPMS and *assume* their roles in managing enlisted careers. EPMS places more emphasis on the commanders' roles in the professional development of their enlisted Soldiers.

Skill Level. Skill level, that's the *key*. It's the glue that holds EPMS together. There are five skill levels associated with MOSs. They are found in the fourth character of the enlisted MOS code – 11B20, 76Y30, 63C40. Figure 4 depicts the new relationship between grade and skill level that is standard for all MOSs.

Skill Levels

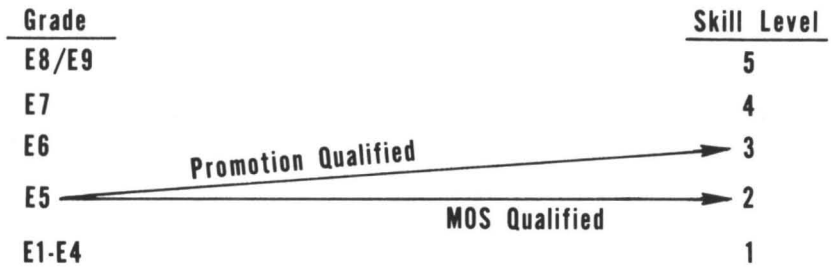


Figure 4

What is a skill level? Under EPMS it reflects the skills typically required for successful performance at the trade with which the skill level is associated.

What else must commanders know about the skill level? A Soldier must possess the skill level of the next higher grade in order to compete for promotion to that grade. As an example, a sergeant must hold skill level 3 – 67N30 – to compete for grade E6. This provides a stimulus for professional development and precludes Soldiers from being promoted beyond their current capabilities.

Getting The Skill Level — Training. There are two ways to complete the training requirements for the next higher skill level. The first is by learning the higher skills while serving on the job. It is called on-the-job experience (OJE). The second is to complete the designated school course (NCOES). They are equal. Completing the training requirement is what is important, not the route used. This subject is covered later.

Counseling — EPMS. Sergeant Bill Smith has arrived in his new unit. The first sergeant has obtained a printout of Sergeant Smith's record, and the commander is reviewing it: *Single. Second enlistment. Three years, two months of service. Grade E5. Promoted to current grade 6 months ago. Previous commander appointed him to specialist 4; filled an E5 slot. Must be a front runner. Nice to get good men. MOS 67N20. Whoa there! With maximum waivers on time in grade and time in service, Sergeant Smith could start competing for E6 in about 10 months. But first he needs the E6 skill level — 3. I'll discuss that with him:*

"Sergeant Smith," the commander says, near the end of the interview, "one more thing – your professional development. Since the start of EPMS this is one thing I personally monitor. Your record looks great, but you need that next higher skill level within 8 months. Here's what we can do to get you there.

"The first step is to locate you, grade E5, on the EPMS ladder (figure 5). This EPMS thing is like a track meet, and you have two hurdles to cross. First, complete either OJE or the basic NCO course. I just happen to have a quota for the basic course that starts next month, and you're going. Your basic course is taught over at the division NCO Academy, so there's no TDY problem.

"The second hurdle is the skill qualification test (SQT). You

have to get that higher passing on SQT 3 in order to be awarded skill level 3, and we have about 8 months to get you ready for the test. Do you have the "E6 Soldiers' Manual" that covers all the critical skills you must be able to do to pass the SQT? Good! I'll be getting reports on your progress through the chain of command. You're going to find that the unit training program will help you gain proficiency in some of those critical skills. In others it will take some effort on your part."

Training and Evaluation. Let's refer to figure 5 again and review the significant features of the EPMS ladder. AIT normally results in the award of skill level 1. The primary, basic, advance and senior courses teach the skills of the next higher grade level.

An SP4 attends the primary level to learn grade E5 duties; a sergeant E5 attends the basic level to learn grade E6 duties, and so on. Each Soldier is administered the SQT of the next higher level. The SP4 takes SQT 2; the sergeant takes SQT 3, and so on up the ladder.

When the training and SQT requirements are successfully completed, the higher skill level is awarded. The U.S. Army Sergeants Major Academy (USASMA) will continue to be the top level of NCO training. Note that under the old NCOES there were only basic and advanced levels and the USASMA. Under EPMS two additional levels, primary and senior, have been added. These successive levels of training are the cornerstones for maintaining and increasing the proficiency and expertise of the NCO corps. But don't forget, *OJE also is an equal and totally acceptable route to the development of professional qualifications.*

A number of new course names such as primary technical course, primary leadership course and basic technical course are entering our training vocabulary. What are they, and how do they fit into the NCOES under EPMS?

Essentially they are new, more descriptive names for the combat support NCOES course (figure 6). This figure does not mean that every support MOS will have a course available at every level of training. Availability will depend on the technical requirements of each job. For example, MOS 95B, Military Police will have both a primary and basic course at the lower levels and some type of course at the advanced and senior levels.

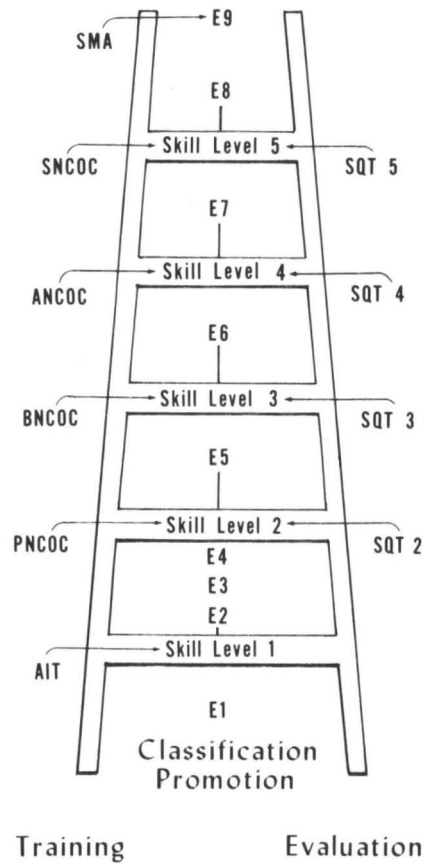
MOS 34H, ADMSE repairman, will have a primary course, some type of advanced and senior level course but no basic course. If a support MOS requires leadership duties at grades E5 or E6, a primary leadership course will be available as appropriate.

Our roadmap is almost complete. As mentioned, OJE is the route to a higher skill level when there is no school course at a level of training or if the Soldier does not attend the school course (figure 7).

Successful completion of OJE is judged by the commander. A minimum of 6 months service for award of skill levels 2 and 3 and 12 months service for award of skill levels 4 and 5 are the prerequisites. This service must be in a job calling for the Soldier's primary MOS at the current or next higher grade. OJE service does not have to be continuous. Part could be completed in one unit and the remainder in another.

To ensure that OJE and school courses are given equal weight, promotion boards will be given very specific guidance on this point. It is a recognized fact that the OJE route will require more individual application and initiative. At the same time Soldiers usually will contribute a full day to their unit. OJE will be given

Figure 5



due recognition under the EPMS promotion system.

On The Way. When all of this will happen can be an article by itself, but a broad brush overview is appropriate. Below is a chronological list of key events along the implementation trail:

- **CMF approved.**
- **Start EPMS NCOES.**
- **Convert Soldiers to new MOS.**
- **Convert TOE/TDA.**
- **Administer SQT.**
- **Start award of higher skill level (DA announcement).**
- **Start new promotion system (DA announcement).**

January 1979 is the scheduled date to start administering the first SQT to Soldiers in CMF 67, Aviation Maintenance. That pro-

Combat Support NCOES Course

Level Of Training	Combat Arms	Combat Support / Combat Service Support		
Senior	Senior NCO Course	Functional Course	or	CMF Course
Advanced	Advanced NCO Course	Advanced NCO Course	or	Functional Course
Basic	Basic NCO Course	Basic Technical Course	and/or	Primary Leadership Course
Primary	*Primary NCO Course	Primary Technical Course	and/or	Primary Leadership Course

*Will become mandatory for MOS 11B, 11C, 11D, 11E, 12B, 13B, 13E, 16P, 16R in late 1977.

Figure 6

vides a perspective as to where the overall implementation project stands. It is envisioned that award of the higher skill level will begin shortly after SQT is administered to all Soldiers in an MOS. Mid-1979 is the projected test completion date for CMF 67. Finally, according to the current schedule, all MOSs should be under the EPMS promotion system by late 1979.

Possible Mission. No one doubts the complexity of the personnel management business. This is especially true in the Army. In the past, many commanders were confused and somewhat mystified as to where they fit into the picture. Times have changed. The success of EPMS depends upon commanders' understanding and involvement in the system. Under EPMS the role of commanders has been well defined.

The key is knowing how to assist the Soldiers in obtaining the next higher skill level. For the Soldier this means greater proficiency, job satisfaction and promotion. For the commander this means a better Soldier, a better unit and increased combat readiness. That's what EPMS is all about.

Skill Level Progression

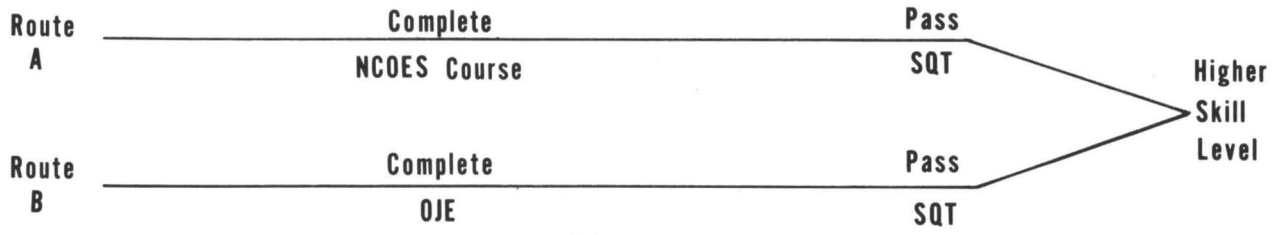
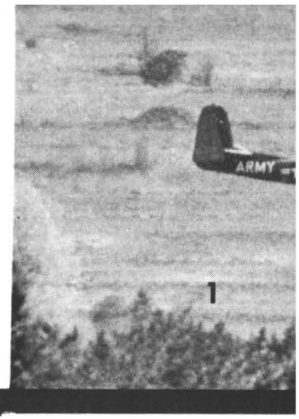


Figure 7



THIS IS THE FIRST in a series o
to familiarize readers with the U.
The series will include photos of th
and municipal fields in the Fort R
In addition, each article will cont
aircraft fleet.

Army Avi

At A

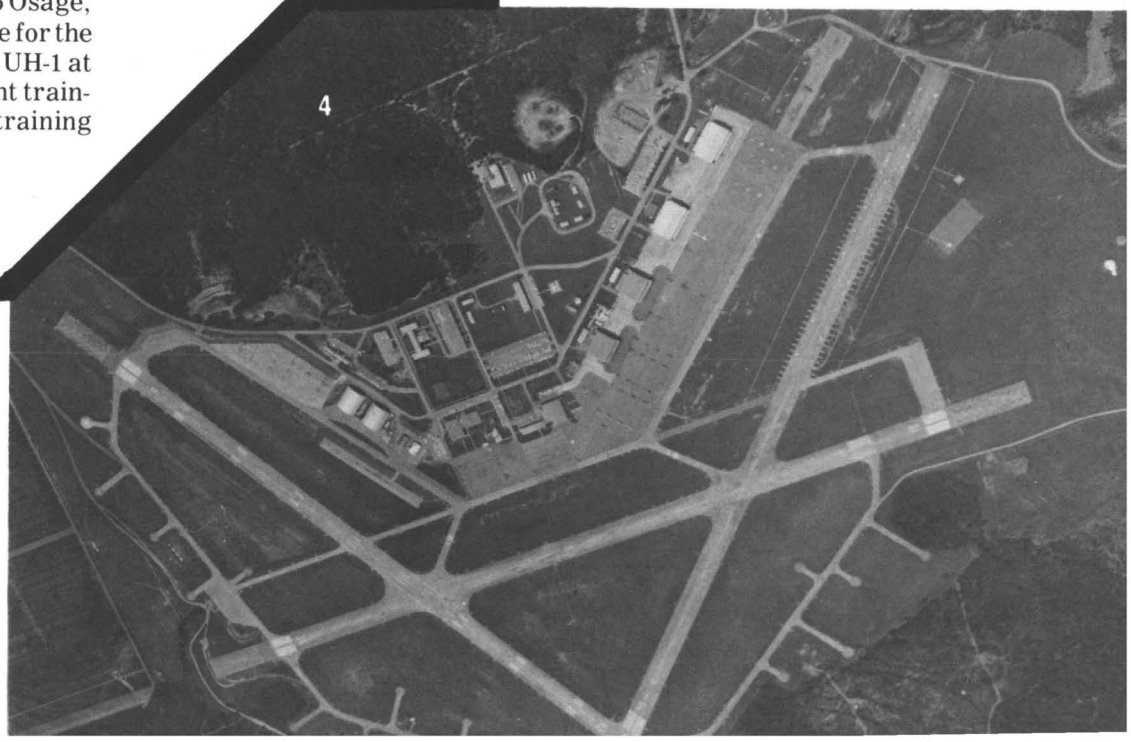
This month our Center "glance"
clockwise: The OV-1 Mohawk pr
airport – used by the aircraft flee
performing confined area approac
T-42s, OV-1s, U-8s, U-21s and for sc
NOE; (6) Bainbridge Municipal A
ing; (7) T-42 Baron out of Cairns;
sites for the TH-55.

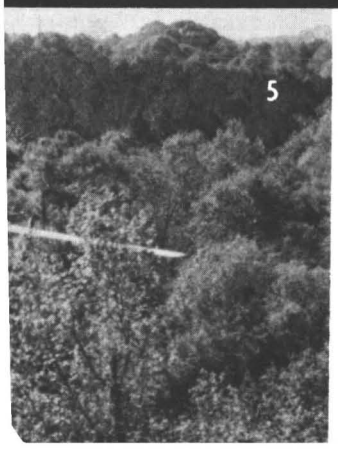
ɔrial articles the *DIGEST* will publish
ny Aviation Center, Fort Rucker, AL.
ıe fields, stage fields, tac sites, ranges
: flying area used for aviator training.
ıotos of the Aviation Center's current

tion Center

Glance

starting at the top (1) and proceeding
ng low level; (2) Dothan Municipal
ıstrument training; (3) TH-55 Osage,
Cairns Army Airfield – home for the
'the UH-1s; (5) the venerable UH-1 at
: – primarily fixed instrument train-
.llen stagefield – one of the training





EPMS CORNER

Enlisted Personnel Management System

SFC Douglas E. Allen
Aviation Career Advisor
U.S. Military Personnel Center
Alexandria, VA

YOU OWE IT To Yourself. Had a change of military occupational specialty (MOS) lately? Qualied for a skill qualification identifier (SQI) or additional skill identifier (ASI) which has not been awarded? Acquired some new stripes on your sleeve? How about that reenlistment or extension? What about that foreign service tour you recently completed? Maybe a higher security clearance?

If the answer to any of these questions is yes, you owe it to yourself to ensure proper entries are made on your Department of the Army (DA) Form 2 and DA Form 2-1. Additionally, proper documentation for several of these situations should be forwarded to the Enlisted Records Center, Ft. Benjamin Harrison, IN, for entry into your official military personnel file.

The importance of keeping your official file up to date cannot be overstressed. Your official file represents you when you are considered for promotion by a DA selection board. It also represents you for school selection and the qualitative management program.

That unposted SQI or ASI you may have qualified for could mean a wider range of assignment opportunities – perhaps a "choice" assignment you normally would not expect. Get it posted.

An incorrect date returned from overseas (DEROS) posted on your DA Form 2 or 2-1 could cause you to be selected for your next overseas assignment sooner than you should. It also could keep your commander from assigning you to a certain duty position you would like. Commanders look for continuity rather than constantly having a turnover in key personnel.

How about that correspondence course you just completed? Are you sure a copy of the course completion certificate was posted in your file? That additional training you took the initiative to complete possibly could place you in the lead when being considered for assignment to a special project or for additional formal schooling.

That incorrect or outdated Continental United States area of preference on your DA Form 2 may get you an assignment you don't want upon return from overseas. Wouldn't you be disappointed to learn an assignment was available at the location you've wanted since you came into the Army, but you got assigned to "Camp Swampy" because your DA Form 2 indicated that as your preference? In many cases your assignment manager at Military Personnel Center (MILPERCEN) has the opportunity to satisfy your needs and the needs of the Army as well. Unfortunately, the assignment manager isn't a mind reader.

The data reflected on your DA Form 2 is transmitted through the Standard Installation/Division Personnel System (SIDPERS) to MILPERCEN where it is entered in the enlisted master file. If your next DA Form 2 has incorrect data, ensure your personnel staff noncommissioned officer (NCO) is made aware of it.

Now that you better understand the relationship of DA Forms 2 and 2-1 to your official military personnel file at Ft. Benjamin Harrison, your career management individual file at MILPERCEN and your military personnel records file maintained at local level, you'll agree you owe it to yourself to keep them up to date.

Are You Maintaining Proficiency In Your MOS? Now that the MOS proficiency tests are history and the skill qualification tests for CMF 67 aren't projected to be administered until early 1979, you don't have to worry about failing a test.

Have you considered what you can do to maintain proficiency in your MOS? You may find it a real challenge to dig out some subcourses you completed a couple years ago and work the practice questions again.

Your maintenance officer or maintenance supervisor probably would be happy to compile an occasional quiz to be administered within the unit. They have been known to come up with some good ones.

How about a visit to the quality control office? You can listen in on some pretty interesting technical conversations. Most times you can even participate. They have a good technical library too!

When was the last time you read TM 38-750? How about those technical manuals for your aircraft? They may be a little dull but there is a lot of good information to be used to your advantage.

You might try conducting some group study sessions in the breakroom on a "weatherday" while you are waiting for the rain to stop or the fog to lift so you can launch your bird. Many are the cases of brown bottles that have been won in a friendly wager around the break table.

Those new modification work orders which were complied with last time your bird was in maintenance must be on your mind. Do you really understand why the changes were made? The troops over in the field maintenance shop probably would be glad to help you understand them.

An occasional visit with your unit aviation safety officer could prove to be very interesting. They have some good information to pass on to those who want to learn. And, from time to time you may be able to assist the unit safety officer.

Keep in mind, your brain is like a muscle – if it isn't used and kept in good condition it may get soft. Keep it in good condition and maintain your proficiency. Early 1979 is not as far away as it may seem.

Job Descriptions Under EPMS. Have you read your job description since EPMS was implemented? Some changes can be found in most jobs. Duties have been realigned by skill digit and in some cases duties have been transferred from one MOS to another.

The new descriptions are in Change 7 to AR 611-201. Your first sergeant may have a copy. If not, your personnel staff NCO or servicing military personnel office will have a copy available.

Continued from page 9

Officer Personnel Management System

OPMS CORNER

tinue to be a major concern to commissioned aviators. Specialty 71 is no exception. Specialty 71 officers are eligible for command of units at both the platoon and company level. At battalion level they are considered by the Combat Service Support Command Selection Board for command of both specialty 71 and any other designated specialty supported logistics unit. Additionally, if requested in writing, officers will be considered in their alternate specialty by other Central Command Selection (CCS) boards; however, if selected will command only one. Currently there are eight specialty 71 battalion level commands in the force structure. By type unit and location these units include the 70th, 205th and 394th AVIM Battalions in Europe; 194th Maintenance Battalion in Korea; 1st Student Battalion, Ft. Eustis; 5th Transportation Battalion, Ft. Campbell, KY; 34th Support Battalion, Ft.Hood, TX; and the 42d Transportation Battalion, Ft. Meade, MD.

Today's advancements in aviation technology have provided increased challenges for those personnel in logistical support roles. These challenges are being met by officers in the Aviation Materiel Management specialty. The wide range of responsibilities associated with specialty 71 positions require the highest degree of leadership, trust and managerial ability. Without question the Aviation Materiel Management specialty is one of the newest and most dynamic career fields within the U. S. Army. Questions regarding specialty 71 should be directed to the Combat Service Support Division, OPMD, ATTN: DAPC-OPG-T or AUTOVON 221-7504/7505.

AVIATION COMMANDS

DEPARTMENT OF the Army recently released the names of officers selected for battalion level command during fiscal year 1978. Selectees will be assigned to command positions beginning in October 1977. Twenty-nine lieutenant colonels or promotable majors were selected for aviation commands, while seven officers were selected for aviation maintenance units by the Logistics Troop Command Board. In addition, 14 aviators were selected for nonaviation commands.

Aviation Troop Commands
Callender, William
Dexter, Charles E.
Dolloff, Theodore J.
Golding, Willard
Hannon, Harold M.
Haselgrove, Leighton
Hennies, Clyde A.
Herrick, Curtis J.
Holcombe, Jerry V.
Karjala, Lawrence
Keating, David W.
Kimes, Kenneth
Lasch, John A.
Mayer, Frank H.
McQuestion, John R.
Miller, George R.
Morris, Jimmy
Ostovich, Rudolph I.
Owen, Dean M.
Pratt, James T.
Reilly, William F.
Robinson, John D.
Rosser, Terry N.
Rushatz, Alfred S.
Sheaffer, Phillip G.
Smith, Billy V.
Stiles, Howard
Turecek, Jack L.
Wilson, Donald E.

Logistics Troop Commands (Aviation Maintenance Units)
Archer, C.A.
Dunnington, Warren
Irby, Dewitt T.
Johnson, Benjamin F.
Pepe, Michael J.
Wade, Jerry F.
Woodson, William B.

Combat Arms Troop Commands
Bean, Roger Kent
Coleman, Ronald A.
Franklin, Forrest E.
Funk, Paul E.
Helms, Harold J.
Howe, Michael Bruce
Massey, Ronald F.
Newsome, Joseph D.
Noack, Richard R.
Peters, Donald L.
Rittenhouse, William
Schweitzer, William

Combat Support Arms Troop Commands
Burke, Paul F.
Simerly, Charles S.

AROUND THE WORLD
AROUND THE WORLD
AROUND THE WORLD
AROUND THE WORLD
AROUND THE WORLD
AROUND THE WORLD

Captain Brendan P. Blackwell
A Company, 5th Transportation Battalion
101st Airborne Division (Air Assault)
Fort Campbell, KY

NO HELICOPTER has ever circumnavigated the globe. Helicopter technology has advanced to the point where it is possible for several production models to accomplish this feat. It would be a world aviation first and, if flown to Federation Aeronautique Internationale Standards, would also establish a world helicopter speed record for an around-the-world (ATW) flight record.

The U.S. Army was first to fly airplanes around the world in 1924. It has demonstrated a willingness to undertake world record performance demonstrations when an acceptable risk is shown to exist as it will be below. No record now stands for this demonstration. Whatever average speed is demonstrated would become the world record. This condition permits a "low pressure" schedule and assurance that maximum attention is paid to safety considerations.

A history-making aviation first is waiting to be achieved by a select team following a well-planned and fully coordinated program of events. Presented here is a way to accomplish that feat.

Why would anyone want to fly a helicopter around the world? It is bound to be somewhat risky, fatiguing, not very stimulating and most importantly, it would cost money. An analyst might suggest that from a cost effectiveness point of view, "It only costs." But, there *are* potential payoffs both monetarily and in terms of public interest. Consider that:

- The feat has never been done.
- The U.S. Army would claim a history-making first and a world record.
- The world view of U.S. helicopter technology would be enhanced.
- The self development capability of helicopters would be demonstrated with an emphasis on peaceful applications.
- The reliability of helicopters and the emphasis placed by the U.S. Army on reliability and maintainability design would be demonstrated.
- Foreign sales of U.S. rotary wing aircraft would probably be stimulated and contribute to a favorable gold flow.

How then is it to be done? Which aircraft should be used? What is the route? How will the aircraft be supported, and what is the risk?

Many nations have the capability to be first to circumnavigate the globe in rotary wing aircraft. From among the candidate rotary wing systems, the OH-6 Cayuse is proposed for the mission because of its reliability, maintainability and demonstrated long-range capability. It will be referred to as the OH-6 (ATW).

The conceptual route shown in figure 1 is one of the 27 legs involving a total computed great circle distance of 20,350 nautical miles (NM) to be accomplished in 45 days in 225-flight hours per helicopter. The actual enroute distance will, of course, be somewhat greater and has yet to be determined. The critical leg is considered to be from the Northern Island of Japan to Shemya AFB in the Aleutian

Chain, a leg of 1,362 NM over the northern Pacific Ocean. The OH-6 (ATW) can accomplish the flight as outlined.

For example, the helicopter could start in mid-June from beneath the St. Louis Arch (Gateway to the West) and depart to the east to take advantage of prevailing westerly winds. The flight would terminate there in late July.

The route as outlined is greater than the distance around the earth at the Tropic of Cancer and Capricorn (19,816.006 NM) as is required for the flight to qualify as a circumnavigation of the globe for world record purposes. The route represents one that will allow the helicopters to land at major airfields (nearly all U.S.) on land and approach the minimum distance necessary to qualify as a record.

Figure 2 is a network showing in a gross overview, without a time line, the parallel efforts required to assure success.

After designation of the project, three immediate priorities would be established by the U.S. Army Aviation Center at Ft. Rucker, AL. A technical/performance study must be done to determine the aircraft configuration and airspeed/altitude profiles to optimize range. This also would include an assessment of risk. A long-range full tank would have to be designed and a long-range navigation capability would be selected/defined.

The second effort would be a detailed cost definition covering all aspects of the project.

The third study would be a route options and feasibility analysis. At this point a go/no-go decision would be made based on defined aircraft capabilities, an assessment of risk, a cost analysis of the project and the most feasible route. Upon approval of the project, many parallel activities would be "kicked off" in the execution of the preparation phase.

It is proposed that the Aviation Center modify/upgrade the aircraft except for the long-range tank and the navigation system which would be installed at cost by a contractor.

The pilots and maintenance team should be selected from the personnel who were members of the Silver Eagles flying team because of their demonstrated flying skills and experience in presenting a strongly positive image of the U.S. Army at public gatherings.

C-12 Huron aircraft would fly a refined support package (personnel and equipment) and assure adequate advance preparation at planned landing points. This aircraft has the capability to support the mission and permit the entire project to be solely a U.S. Army effort.

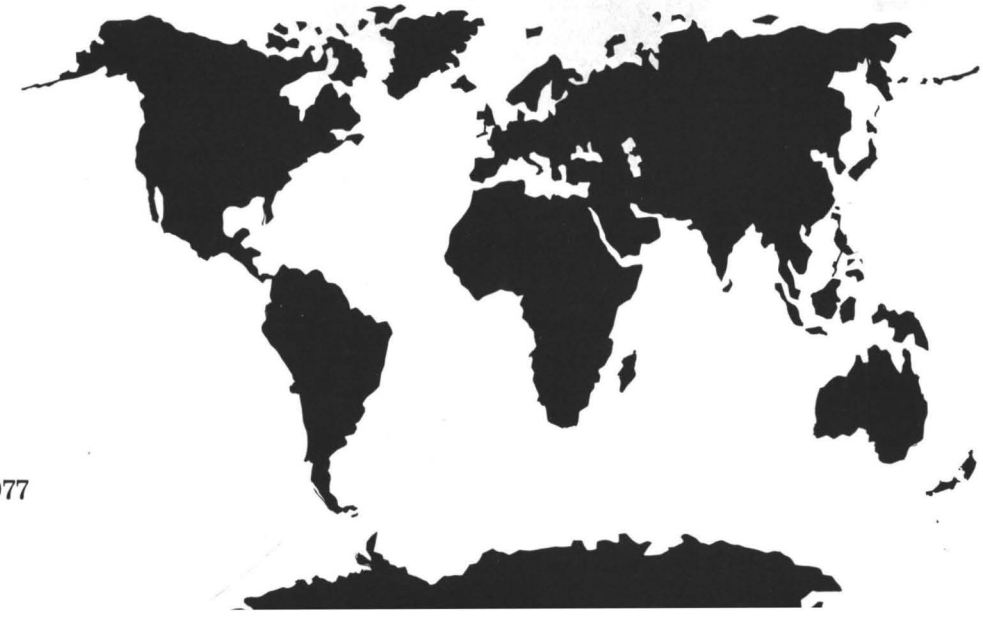
Other activities to accomplish would include the following:

- National Aeronautics Association/Federation

Figure 1

ATW ROUTE

Start: St. Louis	**USA**	**Tehran**	**Iran**	**Tokyo**	**Japan**
Loring	**USA**	**Karachi**	**Pakistan**	**Ashabiri***	**Japan**
Gander	**Canada**	**Calcutta**	**India**	**Shemya**	**USA**
Sondrestromfjord	**Greenland**	**Bangkok**	**Thailand**	**Adak**	**USA**
Keflavik	**Iceland**	**Singapore**	**Malaysia**	**Kodiak**	**USA**
Alconbury	**England**	**Brunei**	**Brunei (UK)**	**Juneau**	**USA**
Frankfurt	**Germany**	**Manila**	**Philippines**	**Seattle**	**USA**
Naples	**Italy**	**Taipei**	**Formosa**	**Salt Lake City**	**USA**
Ankara	**Turkey**	**Naha**	**Okinawa**	**End: St. Louis**	**USA**



Aeronautique International arrangements for certification of the record.

- Definition/validation of the route, to be followed by resolution of any international interface problems. Following definition, a navigation support package would be developed.
- Pilots would be selected and trained in aircraft performance, ditching and navigation to include IFR (instrument flight rules) flight as an emergency procedure.

The execution phase would be accomplished in 45 days and be followed by a phaseout which would include restoration of the aircraft to standard configuration and return of the aircraft to the sources from which they were drawn.

In 1966 Mr. Bob Ferry flew an OH-6 nonstop from Southern California to Florida and set a record, which still stands, for straight line distance. He flew a distance of 1,923 NM in 15 hours and 8 minutes, averaging (with a tailwind component) more than 125 knots. Gross weight (GW) at takeoff was in excess of 3,200 pounds (1,860 pounds of fuel) with a normal alternate gross weight for the OH-6 established at 2,700 pounds. During the same period of time, Mr. J. Schweibold flew the OH-6, under adverse wind conditions, a distance in a closed circuit of more than 1,500 NM. Both the best and the worst case exceed the minimum performance requirement for the ATW flight.

As a departure point, the performance/weights shown in figure 3 are determined to be achievable with the OH-6 (ATW).

For ATW purposes, 3,200 pounds (flight safety release required) is considered the upper limit for planning for the max gross weight which assures adequate survival equipment for extended overwater flights and/or comfort items to minimize adverse human factors impacts due to the extended flight times. One also retains the option of having two pilots on the critical leg. The rates of advance use can be achieved by flying suitable profiles considering wind components, aircraft GW with time, Vne (velocity never to exceed) as a function of altitude and gross weight, and fuel flow as it varies with altitude. Varying combinations of altitude and airspeed (Vne) can produce near optium long-range performance while considering topography.

Figure 4 shows the makeup of the support and flight team. The two C-12 aircraft can provide 1,200 pounds of lift each beyond the weight of the pilots and can surpass the range requirement of the critical leg. The makeup of the C-12/OH-6 ATW support package made up of men and equipment would be defined after determinations were made regarding the extent to which prepositioned supplies would be used and whether or not two pilots would fly the OH-6 ATWs on the critical leg. If it was determined that the critical leg is to be flown by a single pilot, space would be required to transport the OH-6 pilots not participating on the critical leg.

Figure 2

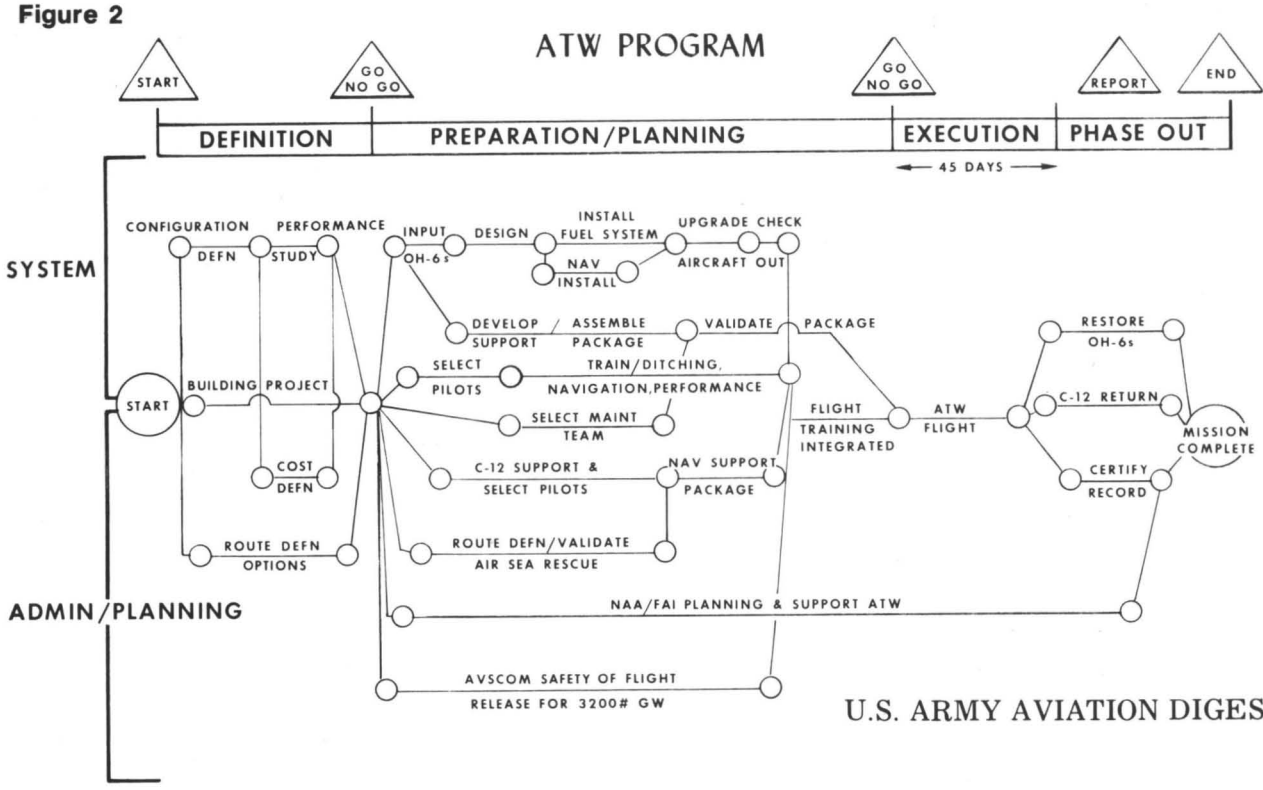


Figure 3

PERFORMANCE/WEIGHTS

Legs 1,100 NM		*Legs 1,100 NM* (Critical leg)
Basic Weight	= 1,200 pounds	= 1,200
Pilots (2)	= 350 pounds	Pilot (1) = 180
Fuel	= 1,350 pounds	= 1,620
GW/TO	≤ 2,900 pounds	= 3,000
Enroute Time	< 10 hours	≈ 12 hours
Reserve	> 2 hours	≈ 2 hours
ESTD Min rate of advance	120 knots	115 knots

Minimum Team Make Up

OH-6 ATW Pilots*	10
C-12 Pilots**	4
CE (OH-6 ATW)	2
Maintenance NCO	1
CE (C-12)	1
	18

* Two OH-6 ATW qualified in maintenance
** One pilot acts as advance

Five OH-6 ATW aircraft are shown here, but the number could be adjusted when the study of cost is completed and the initial go/no-go decision is made.

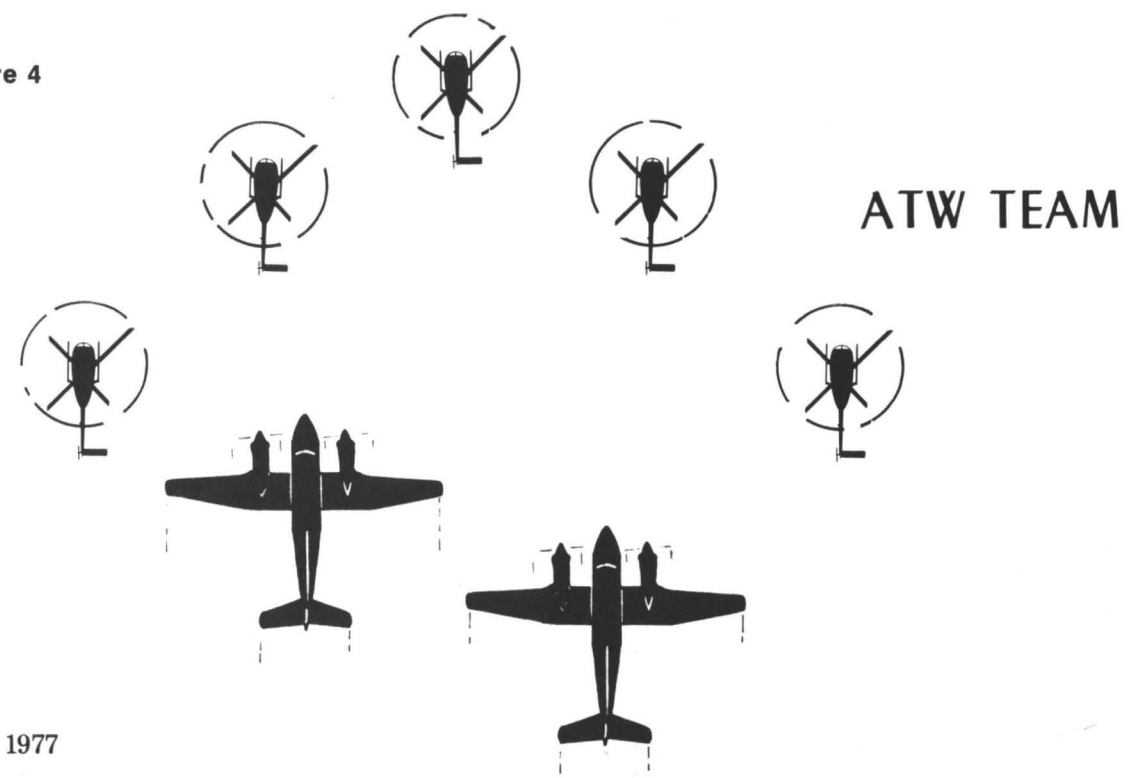
The risk associated with the ATW program is qualitatively assessed as acceptable. To start with, the aircraft have demonstrated a range capability of more than 1,900 NM and under adverse (worst case) wind conditions a range in excess of 1,500 NM. A lightweight, very low frequency navigation system is available. The OH-6 has an established track record of infrequent dynamic systems failures which would require a forced landing. Repair/replacement of components under austere conditions can readily be accomplished. The aircraft is expected to fly above its normal maximum gross weight limit for fewer than 15 flight hours and this can be further reduced by increasing the number of landing points.

It must be remembered that the whole flight is essentially steady state flying with relatively few high-low power cycles and virtually no maneuvering. About 32 percent of the flight is over water which is considered to be the greatest risk situation.

In total, the probability of completing 225 flight hours without a critical mishap is high considering the inherent aircraft reliability, the refined state of the aircraft at the start, the steady state flight conditions to which the aircraft will be subjected, the minimum hours flown outside the currently approved flight envelope, the relatively nonexistent pressure of schedule constraints and the favorable weather expected during the critical phases at the proposed June-July timeframe.

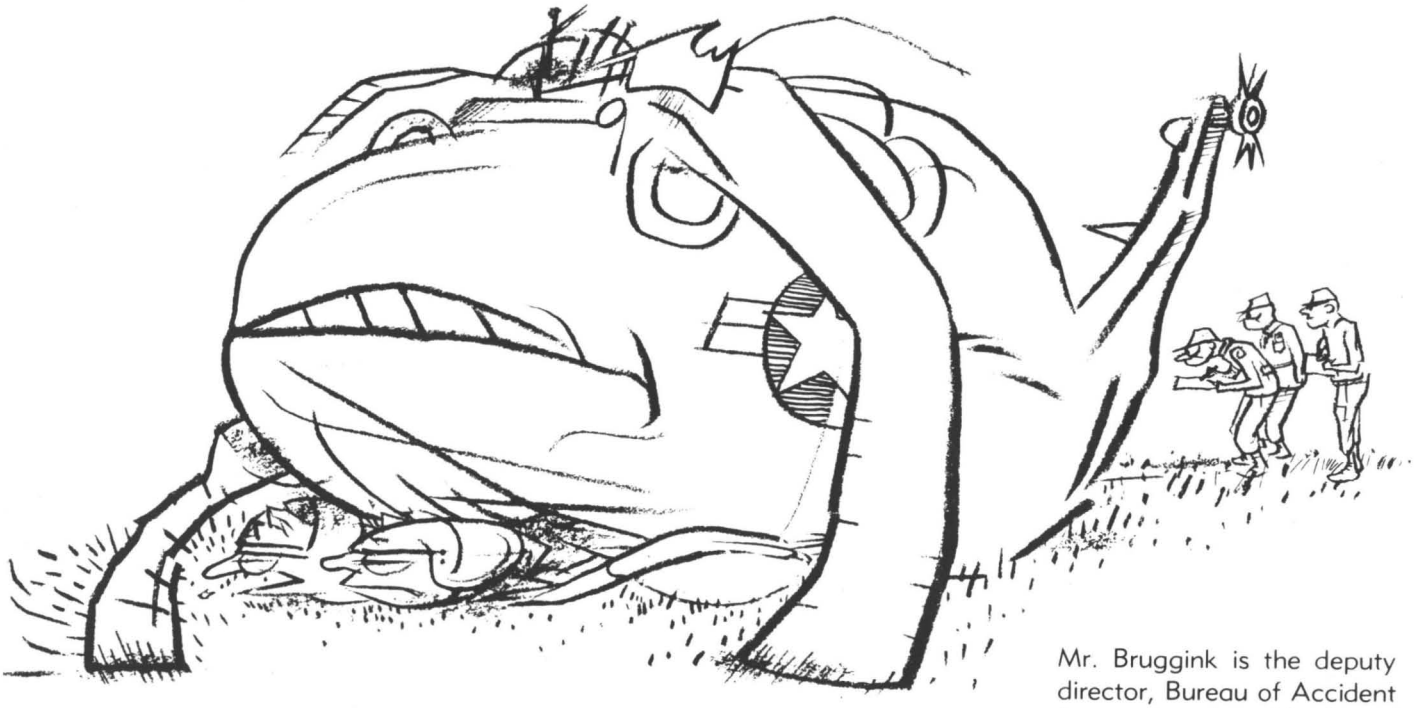
Completion of this world aviation first would add another chapter to U.S. Army aviation history. This feat will be accomplished by someone – there are few aviation firsts left. If the stage can be set, the U.S. Army should most appropriately claim this aviation *first* as its own.

Figure 4



HUMAN-ERROR ACCIDENTS

Aircraft accident investigators have been accused of dodging their duty with regard to cause determination by implicating the pilot without considering the underlying reasons for his actions or inaction.



Mr. Bruggink is the deputy director, Bureau of Accident Investigation, National Transportation Safety Board, Washington, DC. Before joining the NTSB in 1969, Mr. Bruggink was an air safety investigator with the U.S. Army Agency for Aviation Safety, Fort Rucker. The views expressed by the author do not necessarily reflect positions taken by the National Transportation Safety Board.

USAAAVS

Gerard M. Bruggink

& CHARACTER ASSURANCE

HUMAN ERROR and Technology. I believe that complaints about our lack of understanding of the why of human error are actually expressions of frustration about the inability to counteract every human shortcoming with technology. Although accident rates in all forms of flying made a nose-dive during the last 25 years, one elusive factor has remained relatively stable: the percentage of accidents attributed to the pilot.

On the surface, this observation suggests that little or nothing has been accomplished in the form of human error research, specifically with regard to the why of behavioral aspects. However, the fact that the pilot's statistical involvement remained the same seems to have a straightforward explanation: We never increased the pilot's margin for error. As soon as we improved cockpit instrumentation and instrument landing systems, we lowered the approach minimums. As soon as we developed weather radar and other aids we expected the pilot to fly approaches in weather that he might have avoided in another era. As soon as we improved the handling characteristics of tactical aircraft and associated instrumentation, we put the pilot at treetop level. And so on–

My point is this: As soon as we learned how to reduce the pilot's error potential we used this knowledge to increase his production, be it from the economical or military viewpoint. Consequently, his margin for error never changed; nor has the nature of his errors and his tendency to make errors changed. It appears that we are confronted with a residual accident rate that cannot be lowered unless we design the human element out of the system by automation. We may have reached the "last frontier" in the area of human reliability.

Will additional human error research help us to proceed beyond the last frontier? Specifically, will an understanding of the why of each error teach us anything we don't know already about the behavioral role in accident causation?

There are two possible answers to this question, depending on one's interpretation of the behavioral role. For reasons that will become evident, I make a distinction between innate, or true, human error and system-induced error.

With regard to the system's role, the answer to our question is: Yes. Continuing human-error research into the why of system-induced error is essential to ensure compatibility of man, the constantly changing technology, and the operational environment.

True Human Error. With regard to true human error, additional research will teach us little that we don't know already. From the moment man stopped using his legs as his sole means of transportation, he had an opportunity to observe the cause/effect relationship between less-than-desirable behavior and accidents. No adult with average reasoning powers can claim ignorance of the fact that emotions, distractions, fatigue, and a variety of other stresses

affect his performance. This acquired knowledge forms the basis for an individual's cautiousness and enables him to perform responsibly under duress. Unfortunately, our permissive society has adopted the popular notion that an identifiable stress factor not only serves to explain, but to exonerate, behavior harmful to the subject himself or to others. The next logical, and legally fashionable, step is to downplay individual responsibility because, in such a world, there are only victims. If such an attitude ever prevailed in aviation, it would no longer be a viable transportation or defense system.

One doesn't have to do something wrong to become involved in an accident. Often it is the arousal level of an individual's anticipatory awareness that determines whether or not he will recognize in time that something may be wrong. It is the sensitivity and stability of this triggering mechanism that differentiates the professional from the amateur.

Is the accident investigator being criticized because he does not pry deeply enough into a professional pilot's personal life, searching for exonerating, common stress factors? If that is the case, he is being blamed for not reinventing the wheel. What is the benefit of gaining retrospective insight in the effect of a promotion that did not materialize, or a girlfriend's rebuff, on the behavior of an accident-involved pilot when we don't take the trouble to find out why a pilot who suffered a truly traumatic loss performed well in an emergency situation?

Instead of spending our resources trying to categorize the countless deficiencies in human behavior that may invite accidents, we should identify and play up the human characteristics that lead to the timely recognition and defusing of potential accident situations. I realize that this is a very unscientific and unattractive thought because it assumes that people have a sense of responsibility and that one can appeal to it. However, the alternative is even less palatable: We would have to adjust our justifiable human performance expectations to the lowest common denominator.

Overemphasis on the role of human frailty in accident causation weakens the determination to counteract it. I suggest that we investigate the role of individual integrity, self-discipline, moral fibre, and innate intelligence in the avoidance of human-error accidents. This is not just a pious thought on my part. In his summary of the Human Factors Conference in Istanbul, Shaw* stated that we cannot expect accident rates to resume a downward trend until a breakthrough is made in the area of human reliability. He believes that the following qualities of character are "at the heart of the human reliability problem":

- A high level of responsibility for the welfare of others.
- A high level of personal integrity.
- A high level of self-discipline.

A recent flightcrew publication of one of our major air carriers contained an article on the role of attitudes in traffic accidents. It reiterated the established view that "we drive as we live" and amplified on it with the statement: "If we are a heel at home we will also be a heel at the wheel." Is there any reason to believe that being in a cockpit would change a man's nature?

Although the caliber of an individual's character plays a significant role in accident avoidance, it is no guarantee for error-free performance. Human error will persist.

Since accidents are rare occurrences, the identification of human error in the causal chain may create the unhealthy notion that no errors occur on routine flights. There is no other way to explain the slogan: "Safety = no accident." This is a false equation because it cannot be turned around. For example, a near-collision is not an accident but that certainly does not mean there was safety, or that everyone involved performed flawlessly. We use negative motivation when we stress correct behavior only to the extent that it will avoid an accident in a particular set of circumstances. It is for that reason that a well-run incident reporting system can be so effective in producing positive motivation for correct behavior under all circumstances.

Reducing Human Error Potential. The need for continuing human factors research to reduce the system-induced human-error potential has already been mentioned. A word of caution may be appropriate, however. We should use restraint in our attempts to design human error out of the system by applied technology. The design of certain warning systems has already prompted some researchers to wonder whether the cure may be worse than the disease. In addition, we have to remind ourselves not to trade off crew fallibility for maintenance error.

To reduce the true human error potential, I suggest serious consideration of what could be called a character assurance program. We seem to have exhausted all practical means to assure the

*R.R. Shaw, Assistant Director General-Technical, IATA: *The Last Frontier* — A summary of the 20th IATA Technical Conference.

quality of hardware, software, and training. Why not use the available expertise and experience to assure the quality of character?

Such a program is already functional to some degree in initial selection. However, in addition to the well-established disqualifiers, the desirable character traits should be used as criteria in the final selection process.

The assignment to specific flight duties should be guided by the same concept. The highest caliber individuals should be selected for the most demanding tasks.

Leadership and unit morale play a decisive role in the maintenance and further development of desirable character traits. Following are some of the ingredients for effective leadership and good morale:

- The behavioral standards of the commander must be above reproach.
- Stability and consistency in leadership.
- Progressive but controlled challenges, based on the unit's mission.
- Recognition through unit reputation, not through individual acts of showmanship. (Beware of daredevils, prima donnas, and good old boys.)
- Swift and firm treatment of serious breaches of behavioral standards, airborne as well as on the ground.
- An esprit de corps that supports an individual in his on-duty and off-duty activities.

Minimizing the Effect of Human Error. A prerequisite for minizing the effects of human error – system-induced as well as true human error – is the timely recognition of error, or an error-inducing situation. It might be well to exchange the worn-out term "safety awareness" for "error awareness." The pilot is at the receiving end of all the inadequacies in the system, including his own. He is the last line of defense in a system that is more fallible than we like to see it. He has to be trained and conditioned to recognize potential accident situations.

The fail-safe concept of a multiple crew is an excellent deterrent to human error, and its effects, if:

- Individual tasks are well-defined and standardized.
- All cockpit talent is involved in all critical phases of flight.
- The monitoring responsibility is expressed in active participation in the information-gathering and interpretation process.
- The pilot-in-command maintains an atmosphere of creative discontent; that is, every crewmember should feel free to air his misgivings about the safety of the flight in an appropriate manner.

From time to time, an accident focuses attention on a question for which there is no universal answer: When does the second-in-command override the pilot-in-command? Examples of situations where a second-in-command may be confronted with this question include: subtle incapacitation, visual illusions, target fixation, and reckless operation. One air carrier suggests to its pilots the following progression of actions: (1) advise, (2) warn, (3) take over. Although it is difficult to recommend a course of action for all contingencies, frank discussion of the critical nature of this issue will promote the behavioral response dictated by the circumstances.

To reduce the human error potential and to minimize the effects of persisting human error, we have to:

- Continue to make use of human engineering technology to design human error out of the system within the constraints of practicability and economy.
- Make a deliberate attempt to increase human reliability through character assurance.

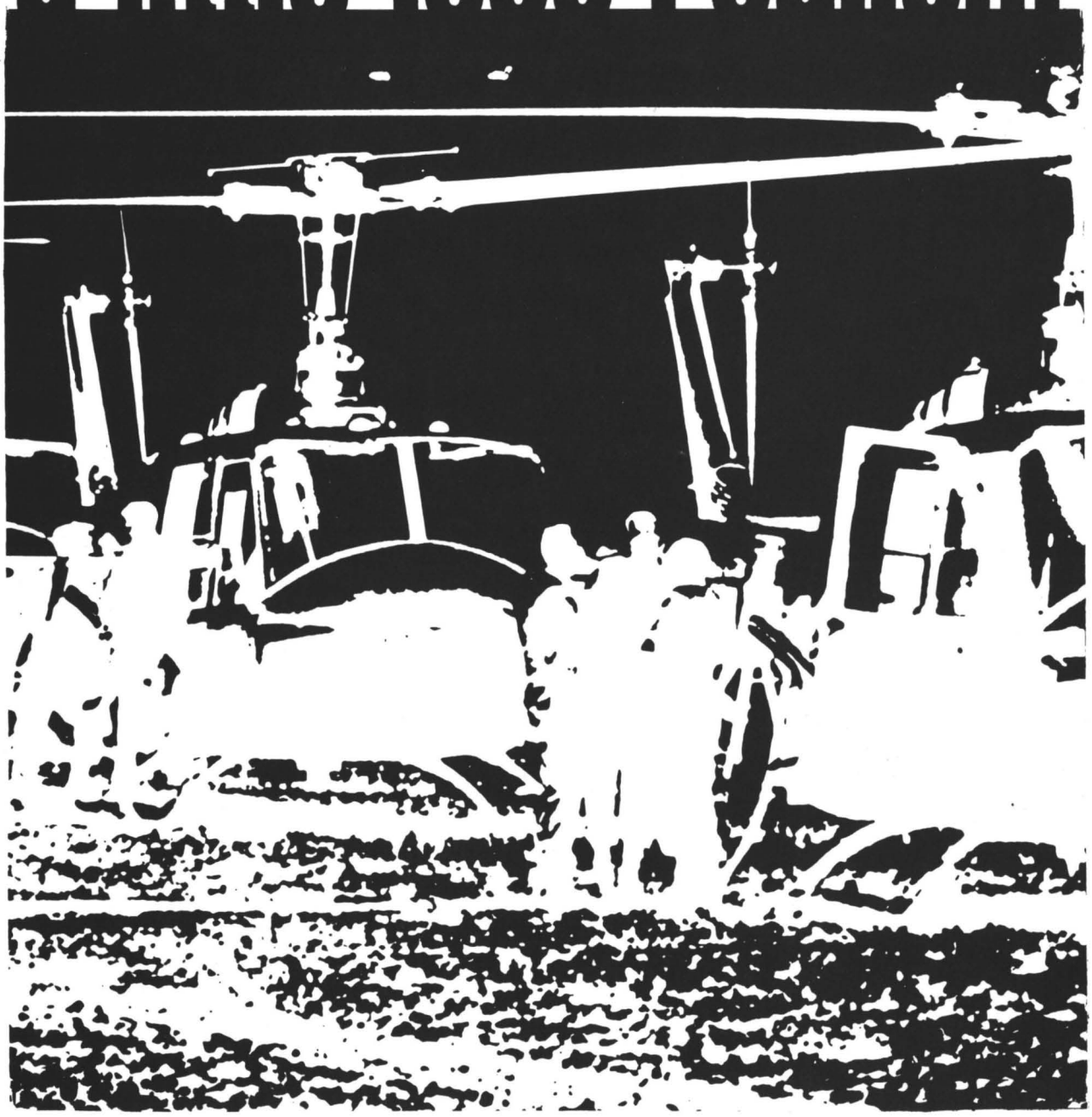
Before you conclude that this is just another revival talk, I submit these thoughts for your consideration:

- You cannot have two sets of safety philosophies, one for peacetime and one for combat.
- Whatever peacetime methods you develop to protect a man against his own errors and those of others should also protect him in combat.
- When all is said and done and the chips are down, the safety and survival of this nation are governed by individual character, not by collective wizardry.

Human error research into the why of system-induced error is essential to ensure compatibility of man, the constantly changing technology, and the operational environment.

Recent training accidents show the need for a lot more safety and...

a little less realism



WANT TO PUT realism into your unit's combat training? Well, then, select a night when it's raining and sound the alarm so there is no time to adequately brief the pilots, file a flight plan or crew/passenger manifest, or obtain a weather forecast. Then be sure to change the LZ several times before takeoff, ensuring that the final LZ selected is one unfamiliar to the pilots, some of whom do not even have tactical maps of the area. It goes without saying that no lights should be on the ground. That should do it! But, if you're a stickler for realism, you can add one more ingredient by stationing "enemy troops" on the ground to fire at the approaching aircraft – with live ammunition, of course.

Farfetched? Not really. Let's take a look at a recent accident which incorporated these ingredients.

Ten Hueys were to be used in a night combat assault training mission to insert troops into an unlighted landing zone which had been previously reconned. Just before takeoff, the mission was delayed due to a brief weather hold. At this time, there was also a change in the LZ. After a weather ship reported the weather looked good enough to go, the aircraft were run up and the LZ was again changed. Shortly after liftoff, the LZ was changed again.

The aircraft were flown at 3,000 feet msl in trail formation to the new, unreconned LZ. Nearing the LZ, the pilots descended to 2,000 feet and the flight leader made a steep approach to avoid wires. Due to the steepness and unknown tailwinds, a stackup developed and No. 4 and No. 5 aircraft had to make go-arounds. The pilot of No. 7 pulled pitch to prevent overflying the aircraft ahead of him. The pilot of No. 8 tried to move out of the formation to avoid a midair but could not move to the left or right because the two aircraft to his rear had moved up on each side of him. Rather than making a go-around, he dropped below the formation and decided to use an abrupt pitch-pull to terminate the approach. Pulling 59 pounds of torque, he could not stop the descent and the aircraft crashed.

Let's briefly look at the many deviations from sound safety principles which led to this major accident.

First, the flight commander, because of command pressure, inadequately planned the flight. Higher commanders convinced the flight leader that immediate departure was necessary if tactical training was to be conducted under the most realistic battle conditions possible. Therefore, no flight plan or crew/passenger manifest was filed and a valid weather forecast was not obtained. Crewmembers had not been properly briefed and some did not have maps of the LZ area. Since the LZ was changed several times immediately before takeoff, it had not been reconned for obstructions and other existing hazards and there were no lights on the ground. This alone was enough to cause apprehension among the pilots as they were flying over unfamiliar territory at night in rain. Due to this inadequate planning and a lack of weather information a steep, downwind approach was made to avoid possible wire strikes.

Second, because of command pressure, the pilot of No. 8 aircraft improperly monitored his copilot's performance while the copilot was at the controls. When the critical situation developed, the pilot allowed the copilot to continue the approach. This error was probably made because the pilot was subordinate in rank, years of aviation experience, and flight hours. This weighed heavily on the mind of the younger, relatively inexperienced pilot, causing him to hesitate in assuming authority for the technical operation of the aircraft.

Third, the copilot exercised poor judgment when the stackup developed. He was forced to move left and was unable to get back into formation because he was blocked by aircraft on both sides. Instead of making a go-around, he continued his approach which resulted in a high sink rate and insufficient power to terminate safely.

By now, you're probably wondering where the live ammunition ingredient came into play.

Fortunately, this accident did not involve the aircraft being fired upon. But a recent incident did occur during a simulated CBR attack training mission. While the pilot was making several passes over an area to disperse the simulated CBR agent, his helicopter was hit by live ammunition fired by ground personnel. One bullet entered the lower left side of the cabin area, passed through the left electrical compartment, and lodged in the doorframe. The ground soldier had failed to check the ammo before loading his weapon. In addition, supervisory error was a major factor due to lack of proper ammunition security procedures. But, you'll have to admit this incident is about as realistic as you can get to an actual combat situation.

Now let's get back to the first accident and the actions which could have aided in preventing this and similar accidents.

- Senior commanders should ensure that overly ambitious unit commanders do not use tactical exercises as an excuse to completely disregard flight regulations and sound aviation principles. Before tactical exercises, senior commanders should issue a directive to all subordinate units outlining the objective of the exercise and clearly stating that deviations from Army regulations and approved SOPs are not authorized. Any authorized deviation from FARs should be clearly stated as to the extent of the deviation and safety precautions necessary to ensure successful mission accomplishment. In addition, senior commanders should improve monitoring of the unit's activities.
- Unit commanders should upgrade or improve unit training to ensure that designated pilots-in-command (PiC) understand their responsibilties and authority for all aspects of the technical operation of the aircraft. This can be checked out by unit IPs as part of the oral examination on annual standardization rides.
- Unit commanders must ensure that the most experienced aviator aboard each aircraft is designated as PIC. Also, they must ensure that personnel are both physically and psychologically fit to perform the mission and observe those individuals who are prone to make errors in judgment.

Actually, this unit was fortunate in that only one aircraft was damaged and no lives were lost. Because of the environmental conditions and the type of approach required to get into the LZ, several pilots made go-arounds. However, the other pilots continued their approach and most reported an overtorque or near overtorque.

This accident clearly shows how commanders can become so involved in the tactical scenario they forget that the purpose of the mission is training. Some commanders seem to believe that successful mission accomplishment is inhibited by sound safety principles, so they throw away the book. True, we must conduct realistic training to maintain our combat readiness, but not to the extent of endangering our aviation resources through unnecessary risks. Any mission, whether in combat or tactical training, requires efficient planning and coordination by commanders, aviation safety officers, operations officers, and aviators. Consequently, approved operational procedures must be rigidly adhered to. While Army regulations and SOPs provide necessary guidance in the all-important area of safety, the myriad of accidents on record clearly shows that the policies advocated have not always been followed. Action must be taken by all commanders to change the attitude that "anything goes in a combat environment." Once this attitude is changed we'll find that safety equals efficiency which equals successful mission accomplishment.

For more information on unit training, contact CPT K. N. Graham, Directorate for Technical Research and Applications, USAAAVS, AUTOVON 558-3495/4812, commercial (205) 255-3493/4812.

BREAKTIME

ALL TENSED UP? Got a problem? Need to make some important decision? Why not take a breather and relax. While it won't be anything like spending a weekend at the lake, a few minutes devoted to solving this crossword puzzle could prove to be revitalizing. So have at it, and when you're through, check page 43.

ACROSS

1. Spinning airfoil
4. Weight unit abbr.
6. Letter in Greek alphabet
9. First engine event
12. Chemical symbol
13. Controls fluid flow
14. Open to view
17. Mark
19. Man's name
20. Packet
22. Lubricant
23. Enlisted person
24. Inspection
25. Used in drilling
27. Escape device
28. Wire
30. Abbr. for Military Police
32. That thing
33. Shelter for engine
36. To fill with pride
38. Officer who is not commissioned
39. Easily stretched
41. Abbr. for technical
42. Type of fitting
44. Barricade
46. Controls aircraft pitch
50. Place
51. Unsatisfactory Report
52. Opposite from tip
53. Article
54. Substance
57. Type of engine
58. Abbr. for unit of measure
59. Fled
60. Abbr. for southern state

DOWN

1. Abbr. for right
2. Path of rotating propeller
3. Used to assemble metal
4. Army officer
5. Chemical symbol
6. Type of gear
7. Bituminous liquid
8. Indicates height
10. Protective covering
11. Abbr. for knockout
15. Abbr. for editor
16. Tail section
18. High temperature
21. Carburetor adjustment
23. Egress
25. Type of bearing
26. Thought
29. Abbr. for electric
30. Gauge
31. Handtool
34. Abbr. for alternating current
35. Type of key
37. Abbr. for aircraft commander
40. Electromechanical device
43. Used in aircraft construction
44. Foot covering
45. That is
47. Short for grease
48. Branch of military service
49. Tailless amphibian
55. Chemical symbol
56. Within

FATIGUE

A CONSIDERATION IN MISSION PLANNING

FATIGUE HAS BECOME a word with vague, multiple, and often conflicting meanings. It has a wide range of definitions – from the discomfort we experience with relation to our inability to do work, to the inability of systems such as rotor blades to function normally.

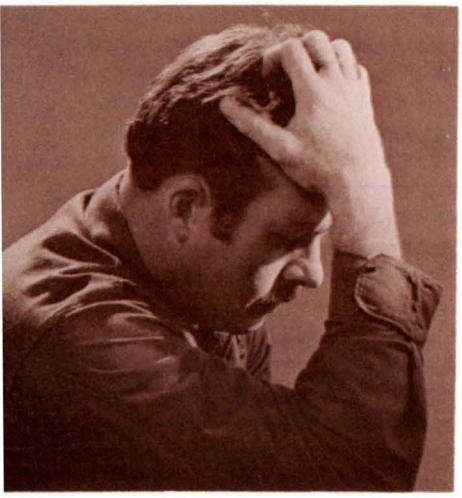
Let's consider fatigue as a self-recognized state of an individual. It is a condition directly felt by the individual which has an inferred connection between the way he feels and the amount of effort he will exert toward accomplishing a given series of tasks. It is not the amount of work being performed, but rather how the individual feels himself.

There are two basic types of fatigue – acute and chronic. Acute fatigue is caused by short-term stress. This type of stress lasts only minutes or hours but is usually quite intense. Chronic fatigue, on the other hand, is caused by long-term stress – the type of stress that lasts from days to years. Although not as intense as acute fatigue, chronic fatigue can be just as dangerous and just as much a safety hazard.

What then do we look for in our pilot population as signs of fatigue? Acute fatigue could show up as an increase in errors due to timing, with general loss of accuracy and control touch. The pilot will be distracted easily and will seem to neglect secondary tasks, such as performing a good cross-check of engine instruments while flying. Chronic fatigue will tend to manifest itself in the pilot as slower reaction times, poor judgment, irritability, and a general depression in attitude.

In the aviation business we often see good pilots overworked without ever considering that fatigue might be building up to the point of hampering their private lives or even their professional lives. We must pay more attention to the individual pilot and learn to manage his flight duties more effectively.

Up until now we have considered the operations officer's job as one of scheduling aircraft. But little emphasis is placed on scheduling the pilots. Aircraft are managed on a day-to-day basis from day one through each intermediate and periodic inspection. Aircraft are juggled and managed so that the "strongest" aircraft is used for NOE training, the high-hour air-



USAAAVS

Captain Ronald A. Huether

Captain Huether wrote this article while attending a recent USAAAVS Aviation Safety Officer Course

craft goes into periodic inspection, and so on.

But what about pilots? Does anyone look after them and put the "strongest" pilots on the high-risk missions? Is the "strongest" pilot always teamed with the weakest? Or is crew selection determined by whatever name comes up on a duty roster?

Many units look good on paper, with a duty roster here and a duty roster there. This type of management is usually inflexible at best and displays a lack of concern at worst. What consideration is given to stress and fatigue? How many managers are fully aware of stressful conditions in their pilot populations (such as deaths in the family, a pregnant wife, marital discord, depression, etc.) and continue to schedule their pilots like robots?

What about using the duty roster as a guide (as it was intended to be used) and manage the pilots to ensure that the least fatigued, least stressed pilots are flying the high-risk missions? I am talking about such cases as a pilot being sent on a mission in marginal weather after he has worked all day or had his sleep interrupted several times during the night by a sick child.

All too often a pilot is sent on the high-risk night missions simply because he is the most experienced. The most experienced pilot is not the best choice for the mission if he is suffering from fatigue.

There should be an attitude of concern in the unit so that individual pilots who recognize symptoms of fatigue know they can avoid additional stress by telling the operations officer or the commander. Unfortunately, this atmosphere, this attitude of concern, can not be generated in a day. Pilots are inherently reluctant when it comes to admitting a weakness in their nature. When was the last time you saw a pilot voluntarily ground himself because he was too tired or he had a bad cold and had taken some medication? Yes, it happens occasionally but not as often as it should.

Fatigue has often been listed as a factor in aircraft mishaps and many times it could have been detected if the commander had been alert. Here is just one such mishap:

An AH-1G pilot, hovering his aircraft into a confined area, misjudged his tail rotor clearance and the aircraft struck a tree. The pilot had taken a long automobile trip over the weekend, had mechanical problems, and did not get back home until 0300 hours. He had about 3 hours' sleep and no breakfast before reporting for the flight. He had been flying about 3 hours when the tail rotor strike occurred. FATIGUE was the cause. The irony is that the pilot would not ask to be relieved of the routine mission but while waiting for the mission briefing, he did tell the operations officer about his car problems and about what time he got back home. The operations officer's only comment was, "Sounds like some of the rotten luck I've had. It just spoils the whole weekend."

One study suggests that there are seven main situations which can cause fatigue: (1) the expenditure of energy, (2) paced performance, (3) prolonged activity, (4) frustrating situations, (5) limiting conditions, (6) too exacting a demand, and (7) conditions for chronic fatigue. Let's look at only those situations which are more applicable to the aviation environment.

FATIGUE—A CONSIDERATION IN MISSION PLANNING

Everyone knows anything requiring a considerable expenditure of energy is naturally fatiguing. In most cases, preparing for and conducting a flight does not require a great amount of energy. But the pilot and operations officer must stay alert to the problems of fatigue after a weekend in which a considerable amount of work was done followed by duty on Monday. The pilot's reaction time and judgment may not be up to his "normal" speed after such a weekend and this fact must be considered when scheduling high-risk missions.

What kinds of situations could produce "frustration"? The most likely would be a situation in which the pilot may find his way blocked regardless of which way he turns. He finds that what he is able to accomplish is slight and has no relation to the amount of effort he applies.

"Limiting conditions" are various external circumstances imposed on a pilot which make it difficult for him to function. An example would be dealing with temperature extremes. This can be fatiguing and may lead to decreased levels of performance.

A good example of "demand too exacting" is the fatigue caused by visual work because the demands focus primarily upon a particular body mechanism. For example, a pilot who has been doing a lot of office work and then goes out and flys may find himself fatigued from the mere exertion his eyes have been going through.

Finally, "chronic fatigue" is the type that crops up day after day. It may continue over long periods, perhaps involving little that can be put into terms as specific as mentioned previously. This is the type of fatigue that we deal with as a "way of life."

Chronic fatigue has as its chief symptom the feeling of inability, weakness, and tiredness. Short of changing the whole fundamental life philosophy of the individual, the remedy may lie in a simple change in the pilot's environment, job or work schedule.

Another major consideration when dealing with fatigue is demand. Demand can be placed upon the pilot in two ways. Demand from the environmental standpoint is the requirement placed upon the pilot by someone else. The second kind of demand is the requirement the pilot makes of himself. High degrees of demand, either from the pilot or from the environment, can easily mount up and cause fatigue.

To summarize, it may be said that instead of using fatigue as a single or loose catch-all term, we had better recognize the involvement of a group of quite distinguishable elements in the total situation. They are distraction, disorganization, discomfort, work decrement, and finally fatigue. Here are some ways to prevent, or at least minimize, fatigue:

- Adhere to established limitation on daily flying and working hours.
- Avoid scheduling the same pilots to all stressful missions.
- Avoid assigning stressful missions to a pilot who may be showing signs of fatigue.

Finally, all pilots must be given the opportunity for adequate rest and natural sleep. Natural sleep--sleep without the aid of medicine--is the best deterrent to fatigue.

The purpose of imposing limi-

tations on flying and working hours for aviation crewmembers will be defeated if the individual's off-duty time is not properly managed. It is the moral and military responsibility of each individual crewmember to get sufficient sleep and proper nourishment, and avoid off-duty activities which prevent him from reporting for duty physically sound and mentally alert. It is also the responsibility of each crewmember to inform his supervisor or commander when he has reached or is approaching the prescribed flight-time limits.

Pilots can be taught to recognize the symptoms and causes of fatigue and how to avoid it. Once the pilot is able to grasp the signs of fatigue he should be able to determine its source.

One authority sums it all up when he says "...the aim is to maintain the environment of the man and the task he has to perform within his known limits. Following this, all that can be done is to make sure that the man is capable of performing the task, that he is fully trained to carry it out with the highest efficiency, and that he will not suffer from fatigue at any crucial moment.

BREAKTIME *Continued from page 39*

Okay, so it was an easy puzzle; and if you had a problem to solve or some important decision to make, you still have that job. But, hopefully, you can now go about it in a more refreshed state of mind. Curiously, although this simple puzzle couldn't help you in the area of problem-solving or decision-making, it does have something important to say – important enough that it could possibly save your life.

Before you filled in the spaces, the puzzle was full of "holes" – empty. It was only after you inserted the correct combination of letters that it developed any meaning. What about your professional life as an aviator? Does it, too, contain any blank spaces that need to be filled? Are you now flying over mountains as opposed to familiar flat land or desert terrain? Or, perhaps, vice versa? Have you recently transitioned to a new type of aircraft or, maybe, to a different area of flying such as NOE? Do you know how to contend with such problems as gusty wind, blowing dust, and thunderstorms that may be ushered in by a change in seasons? What about ARs, SOPs, and emergency procedures? Are you thoroughly familiar with those that apply to you?

These are but a few of the questions we need to answer. However, the message is clear: Now is the time to check ourselves and fill in any "blank" spaces that relate to flying – before we run into some situation that could prove embarrassing, if not downright unhealthy. So, let's plan to take a break for safety right away, and in turn, give safety a break – our safety!

R	O	T	O	R		L	B		B	E	T	A
T		R		I	N	T	A	K	E		A	L
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	B			M	A	T	E	R	I	A	L	
J	E	T		Y	D		R	A	N		S	C

BEWARE OF THE SUMMER THUNDERBUMPER

Continued from page 7

When the cell reaches a point where rain is falling at ground level, it is considered as being in the mature stage. Cloud tops may be pushing through the tropopause and even up to a height of 60,000 feet, and it is in this stage that everything seems to be coming to a climax. Updrafts may achieve 6000 fpm, hailstones larger than 6 inches in diameter may be found at ground level, and there is frequent lightning and severe turbulence.

Aircraft flying as far as 5 miles from such monstrosities have been virtually beaten to the ground from hail tossed out of a cell's top. Clear-ice buildup is at the extreme, and prolonged flight for more than a few minutes between 0° C. and -15° C. may produce drastic results.

In the dissipating stage, the thunderstorm is a broken, dying creature. Consisting almost entirely of downdrafts, the whole structure is raining out and quickly turning into layers of stratiform clouds. Even these may soon disappear, or they may not form at all.

The summer thunderstorm is one of the awesome forces in nature, and the helicopter is more susceptible to thunderstorm punishment than fixed wing aircraft. Icing, hail, lightning, windsheers, and turbulence are all equally hazardous, and pilots should realize the disastrous consequences before committing themselves to such an encounter.

Helicopters are poor at taking on ice. In the summer thunderstorm, clear ice can rapidly build over the bubble or windshield. Ice can cause buffeting and vibration from rotor-blade buildup. With such a load, the aircraft could develop a lateral beat with retreating blade stall. If one blade throws ice before the others, the rotor blades then become unbalanced. Power may have to be increased to hold altitude and airspeed.

Hail presents mainly a structural problem. Damage will usually be more to one blade than another, and unbalanced rotor blades present critical problems. Lateral vibrations occur and the helicopter starts yawing; if not corrected, components become overstressed. As this condition progresses, a helicopter can beat itself to death. Buffeting, vibrations, loss of lift, increased drag, and the need for increased power to maintain altitude and airspeed are the main problems.

Hail seldom falls straight down; it falls at a slant because of the wind. If you're ever suddenly caught in a hail shower (shaft), you should turn in the direction of the hail fall and descend with it until clear.

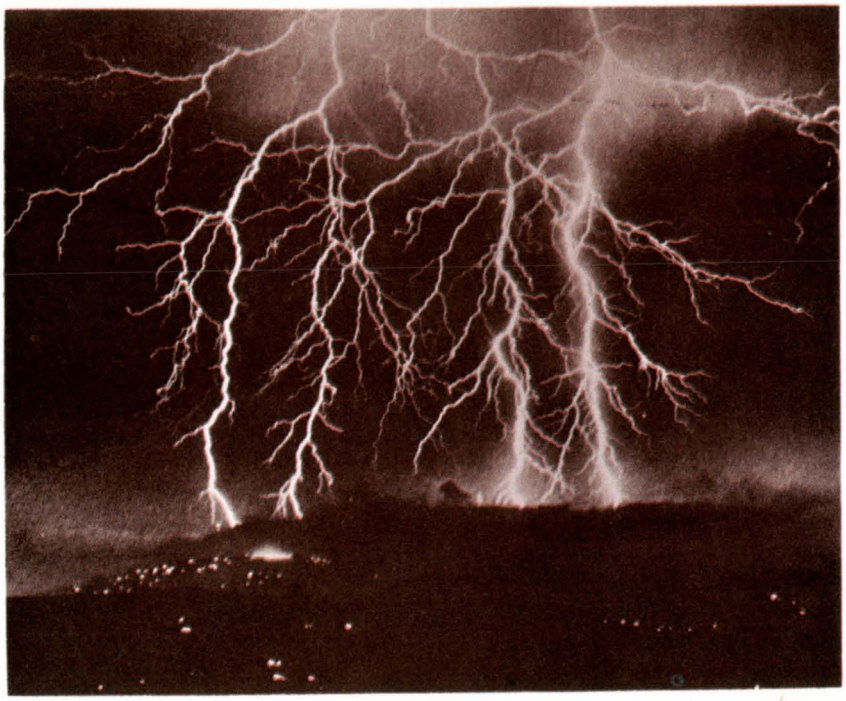
Lightning strikes on any part of a rotor blade can have drastic results. It is particularly rough to lose any part of a blade, which is a real possibility. Again, it will set up the vibration or beat and start to overstress (or disintegrate!) the aircraft completely. If lightning strikes a blade or spar, there is the potential of losing that section of blade or the whole blade itself. If it strikes the airframe, you may encounter a total electrical failure and have only a partial panel to work with. Throw in some turbulence and there goes even the partial panel.

As a general rule, most lightning is found in the upper cell regions, and almost all is from cloud to cloud. Operations should be confined to the lower one-third of the cloud, and if lightning is experienced, you should take the aircraft lower. If a lightning strike occurs, find the nearest field and completely check the helicopter over before resuming flight.

Windsheers and turbulence are generally synonymous and should be thought of as such. They can be encountered anywhere in or near a thunderstorm and can twist airframes, bend rotor blades and crack bubbles. The most severe turbulence is generally found in the upper one-third of the thunderstorm, reinforcing the lower one-third penetration idea.

When approaching a thunderstorm, you should be alert for the first evidence of buffeting at the outer fringes of more severe turbulence. You should also know what airspeed and rpm are recommended at your particular helicopter's weight to sustain the most Gs. If you're put in a position where penetration is inevitable, here are some things you can do to help make it a survivable experience:

1. Determine the minimum enroute altitude (MEA) for that particular area and try to fly as close to that altitude as possible. This will reduce the chance of icing,



hail, lightning, and turbulent conditions. If you're off the airways and have no MEA, choose an area, determine its highest point, then add 1,000 feet as a fudge factor.

2. Slow the helicopter to recommended turbulence speed and rpm. Secure all loose gear.

3. Keep a constant check on your position. Always know if a lower altitude can be flown to get out of the system or if a gain in altitude is possible to clear obstacles.

4. Make sure Center has radar contact or a position fix.

5. Penetrate, if you must, the storm cell as low as possible, taking a route that offers in-cloud flight of the shortest duration.

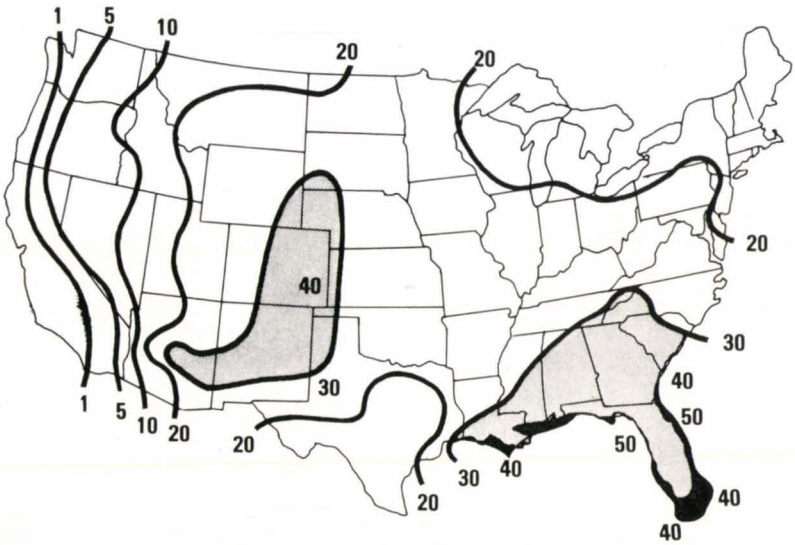
6. If you have a copilot, have him monitor your flying, watching for signs of vertigo. He can also relieve much of the radio and position-monitoring workload.

You may not know how large the system is. Lightning and turbulence may disable barometric instruments and navaids when they're needed most. You must decide to continue or to abort – whether to fly the aircraft down while controllable or wait until forced down.

Terrain can make a difference. If over mountains, it could be to your advantage to continue, in hopes of finding a hole and setting the helicopter down. If over flat land or water, you may choose to descend gradually, hoping the situation will improve. However, remember that descending below minimums in IFR conditions is just asking for more trouble.

You should always think about taking a little more time, even if it means an extra stop en route, to stay away from a summer thunderstorm. If faced with a single cell, you can usually go around, since single cells are rarely larger than 10 miles in diameter. Facing a line system in the building or late dissipating stage, you may decide to go under, given enough cloud-base-to-ground clearance.

By far the safest tactic is simply not to get into this position in the first place, even if it means sitting on the ground and watching it blow over. At least you'll be able to fly on after the battle has raged through.



Average number of days each area has thunderstorms during summer months.

LSE Program

The article by CW2 Laing entitled "Unit-Level Life Support Section," AVIATION DIGEST, June 1976, reports the solutions of an operational aviation unit to the lack of an adequate life support equipment maintenance program. The establishment of a life support equipment section modeled after the USAF system is to be commended. This action speaks highly of the professionalism in this aviation unit.

I must, however, provide the U.S. Army aviation community with insight into the critical underlying problem in life support equipment which this innovative aviation unit was able to overcome.

The Army aviation life support equipment program problem extends from the absence of a recognized enlisted MOS specialist and the unrecognized unit life support equipment maintenance and inspection needs to the absence of a viable centralized life support equipment effort. In spite of this unsupported life support equipment program, the primary components of life support equipment are in daily field use.

The comments of CW2 Laing in reference to the Army A-13A oxygen mask and the Air Force MBU-5/P oxygen mask must be

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

If you have a question about personal equipment or rescue/survival gear, write Pearl, USAAAVS, Ft. Rucker, AL 36362

*clarified. The U.S. Army Aeromedical Research Laboratory has evaluated the currently available oxygen masks. Each mask was evaluated in terms of fit, weight, and inspiratory and expiratory pressures required. The differences are minimal with each mask having specific desirable and undesirable features.**

The A-13A and the MBU-5/P are both simplistic devices but require preventive inspection and maintenance on a continuing basis. Spare parts must be provided to a trained technician for repair to insure a cost effective and lifesaving program. CW2 Laing's comments would imply the MBU-5/P mask is superior in all aspects to the A-13A. The MBU-5/P mask in the absence of a life support equipment program for maintenance and repair will perform as poorly as an A-13A mask when carried in a helmet bag without a protective cover, used without testing at a bench test stand, and not cleaned after each use.

The Army Aeromedical Research Laboratory and the Air Force are awaiting delivery of a prototype of a lightweight mask, the MBU-12/P, for field testing. If proven successful, this mask will be the type standard for both the Army and the Air Force. In the absence of a recognized life support equipment need for Army aviation, a standardized USA/USAF oxygen mask should insure spare parts and life support equipment maintenance assistance from the USAF.

LTC Frank S. Pettyjohn, M.D.
Chief, Cardiovascular Medicine Branch
U.S. Army Aeromedical Research Laboratory
Fort Rucker, AL

*Evaluation of the MBU-5/P attachment was conducted by USAARL to ensure the noise attenuation capabilities of the SPH-4 helmet were not decreased by the bayonet suspension. Comparison of weight comfort and function also was conducted. The findings were provided to AVSCOM to support the operational units' requests for use of the MBU-5/P. The MBU-5/P is considered to be an improvement in comfort compared to the A-13A mask.

Gremlins in the mail room managed to withhold from the anxiously awaiting aviation community your observations about the Army's aviation life support equipment program so beautifully worded in your letter to the editor dated 4 August 1976. Your words of wisdom are always appreciated.

MBU-5/P Oxygen Mask

HQ, USAAVSCOM, has advised USAAAVS that aircrewmembers who perform high altitude or ferry missions may requisition and use the MBU-5/P oxygen mask. The managing activity is the USAF, San Antonio Air Materiel Area, ATTN: SA-ALC/MMIRCB-Z, Kelley AFB, TX 78241. Requisitions should be submitted in accordance with USAF T.O. 13A1-1-1-1. Mask fitting and helmet attachment will be accomplished by a qualified USAF aviation life support technician trained for this purpose.

I will provide a "shopping" list on how to obtain the USAF technical order (TO) in next month's issue. Not sure that I can obtain a USAF aviation life support technician.

The MBU-5/P oxygen masks are available in four sizes. Unit of issue, NSN, manufacturer part number, and nomenclature are:

Unit	NSN	Mfg. Part No.	Nomenclature
1 Ea	1660-00-810-3223	P/N 450-91	Oxygen Mask, MBU-5/P Size Reg. Narrow
1 Ea	1660-00-794-0865	P/N 450-09A	Hardshell Reg. Narrow
1 Ea	1660-00-811-5259	P/N 450-192	Oxygen Mask, MBU-5/P Size Reg. Wide
1 Ea	1660-00-794-0869	P/N 450-10	Hardshell Reg. Wide
1 Ea	1660-00-810-3225	P/N 450-193	Oxygen Mask, MBU-5/P Size Long Narrow
1 Ea	1660-00-794-0870	P/N 450-11A	Hardshell Long Narrow
1 Ea	1660-00-810-3222	P/N 450-194	Oxygen Mask, MBU-5/P Size Short Narrow
1 Ea	1660-00-794-0871	P/N 450-12	Hardshell Short Narrow

The following components are required for each MBU-5/P:

1 Ea	8475-00-487-0903	P/N 450-195	Dust Cover
1 Ea	1660-00-076-9662	MIL-C-38271	Connector CRU-60/P
1 Ea	1660-00-137-5106	P/N 450-485	Suspension Harness 4-Point
2 Ea	1660-00-066-2077	63C4228	Bayonet Straight
2 Ea	1660-00-440-5553	P/N 60C4459	Receiver Assy Bayonet
1 Ea	5965-00-854-0658	MIL-M-27297	Microphone M100 A/C
1 Ea	5995-00-890-8614	CX-4434/U	Cord Microphone
1 Ea	5965-00-509-9889	P/N MT-1927/A/C	Mounting Bracket Boom Microphone

If additional information is required, contact Mr. A.B.C. Davis, USAAVSCOM, ATTN: DRSAV-WL, P.O. Box 209, St. Louis, MO 63166, AUTOVON 698-3241/3291.

A Comparison Of The AH-1S And The AAH

Captain Martin R. Karig
Directorate of Combat Developments
U.S. Army Aviation Center Fort Rucker, AL

ARMY DOCTRINE relies heavily upon the attack helicopter as an integral and important member of the combined arms team. To meet the Army's needs in this area Army aviation is developing the Advanced Attack Helicopter (AAH) while improving its existing fleet of AH-1 HueyCobra aircraft. Neither aircraft is foreseen as being independent of the other, nor is one intended to replace the other.

As a gunship in Southeast Asia the AH-1G did a commendable job of providing immediate and accurate fire support in a variety of missions. However, the Cobra was not designed for employment in a mid-intensity conflict. Consequently a comprehensive modernization program was undertaken to provide the Cobra with the firepower and survivability needed on the modern battlefield. These improvements generally fell into the following two areas:

- ICAP – the Improved Cobra Armament Program
- ICAM – the Improved Cobra Agility and Maneuverability Program

The ICAP provides the Cobra with a Helmet Mounted Sight System (HMSS) and the XM-65 TOW* Missile System (TMS).

The ICAM program increases the maximum gross weight of the Cobra from 9,500 to 10,000 pounds and adds an improved engine and drive train. In addition the Army is purchasing a glass composite improved main rotor blade which is ballistically tolerant to 23 mm hits and has an improved aerodynamic design providing an increase in lift.

*tube-launched, optically-tracked, wire-guided

The Cobra modernization program is being conducted in phases which can be simplified in a formula format:

AH-1G + ICAP = AH-1Q (Cobra TOW)
AH-1Q + ICAM = AH-1S (Improved Cobra TOW)

The final phase of the Cobra modernization is the Enhanced Cobra Armament Program which will provide the AH-1S with an improved fire control computer; an external armament stores management/remote set fuzing system for the new family of 70 mm (2.75 inch) rockets; and a universal turret capable of accepting either the 7.62,20 mm or 30 mm gun. Army plans are for the entire Cobra fleet to be in this "full-up S" configuration by fiscal year 1984.

While the Cobra modernization program is a milestone in providing the Army with an attack helicopter capable of employment on the modern battlefield, the AAH represents a major advancement in attack helicopter technology. The AAH has been designed with emphasis placed on flight performance, firepower, survivability and maintainability.

It is not the intent of this article to feature one system over another, but it is important to recognize that the AAH, because of its design features, represents a new generation of attack helicopter. While AH-1S features have largely been added on, the same features have been designed and built into the AAH.

In a Mideast environment, represented by a pressure altitude of 4,000 feet and a temperature of 95 degrees Fahrenheit, the AAH will be capable of

Comparison Of AH-1S And AAH, Hover Out Of Ground Effect Performance In European Environment 2,000 Feet Pressure Altitude/70 Degrees Fahrenheit

Characteristics	AH-1S	AAH
VROC, feet per minute	450	700
Airspeed	120	150
Payload:		
TOW	8	
HELLFIRE		16
30 mm	500	1,200
Endurance	2.4	2.5
MMH/FH	11/1	8/1
Availability	70 Percent	75 Percent
Night Capability	NVG[1]	PVNS[2]
Target Acquisition	ALT[3]; DVO[4]	ALT[3]; DVO[4] TV[5]; FLIR[6]

Figure 1

[1]NVG — Night Vision Goggles
[2]PNVS — Pilot's Night Vision System
[3]ALT — Airborne Laser Tracker
[4]DVO — Direct View Optics
[5]TV — Television Viewing System
[6]FLIR — Forward Looking Infrared

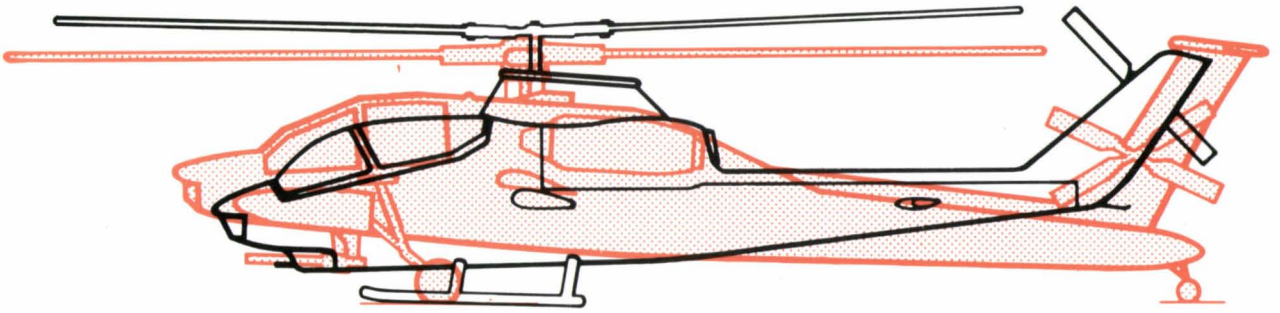


Figure 2

	YAH-64	AH-1S
Rotor Diameter	48 feet	44 feet
Overall Length (Rotor Turning)	57 feet 7 inches	52 feet 11 inches
Width	17 feet 2 inches	10 feet 8 inches
Height	12 feet 7 inches	13 feet 5 inches

AAH/AH-1S Size Comparison

carrying 8 HELLFIRE missiles, 320 rounds of 30 mm ordnance and sufficient fuel for 1.83 hours endurance. At that weight it still will be capable of achieving a 450-feet per minute vertical rate of climb from an out-of-ground-effect hover. For the Cobra to achieve the same endurance and vertical rate of climb, its armament load would be limited to eight TOW missiles. A more striking comparison of the two aircraft, in the European environment, can be seen in figure 1. Figure 2 provides a size comparison.

The AAH will be equipped with the HELLFIRE modular missile system, designed to accept a family of seeker warheads. Not limited by line of sight as is the Cobra/TOW system, the AAH will be capable of engaging targets at extended ranges by either direct or indirect fire.

The HELLFIRE laser guided missile and the AAH's Target Acquisition and Designation System (TADS) will be compatible with the triservices family of laser guided munitions. Thus, the AAH will be capable of engaging targets autonomously or firing at targets remotely designated by other ground or airborne laser designators.

The flight performance and standoff ranges of the AAH inherently provide it with a degree of survivability not achievable with the Cobra/TOW. Also the AAH has been engineered to provide 23 mm protection to the crew compartment and all vital components. Although several of the Cobra's components have been redesigned to withstand higher caliber hits, the AH-1S affords only limited 7.62 protection overall.

The AAH will have redundant flight controls and independent twin engines. It will have the space and power available to incorporate active electronic warfare (EW) countermeasures as well as having the passive countermeasures now installed on the AH-1S. The AAH's detectability also has been reduced by minimizing its visual, aural, infrared and radar signatures.

The visionics package aboard the AH-1S consists of direct view optics through the TOW telescopic sight unit. Night capability is achieved by the wear of night vision goggles by the pilot and gunner. The AAH will have an integrated Pilot's Night Vision System (PNVS) to provide it with a tactical, night-flight capability.

The PNVS, together with the components of the TADS-Forward Looking Infrared (FLIR), Television Viewing System, and Direct View Optics, will enable the AAH to operate in adverse conditions that would render the Cobra ineffective. Both aircraft have provisions for a laser rangefinder and an airborne laser tracker (ALT) target cueing system which will significantly reduce target acquisition time.

The AAH's modular design with easy access to components, combined with a 300-hour interval between periodic inspections, has increased its reliability, availability and maintainability when compared to the Cobra. Current estimates are that the AAH will have a maintenance manhour to flight hour (MMH/FH) ratio of 8 to 1 with an availability rate of 75 percent. Cobra figures indicate an MMH/FH of 11 to 1 with an availability rate of 70 percent.

The AAH will be able to carry more ordnance, farther and faster, and remain onstation longer than the AH-1S. It represents a significant increase in the capabilities of Army aviation to meet and defeat an enemy armor threat. The Cobra, with its improved armament and agility packages, remains a viable weapons system complementing the combined arms team on the battlefield. The two aircraft are interdependent, comprising Army aviation's Hi-Lo mix of attack helicopters through the 1980s.

ATC action line

UNITED STATES ARMY AIR TRAFFIC CONTROL ACTIVITY

VDP SEEMS TO BE going around in aviation circles. Could you shed some light on this subject?

Visual descent point (VDP) is a new term. It is a defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the minimum descent altitude (MDA) to the runway touchdown point may be commenced, provided the required visual reference is established. An approved navigational aid will be used to establish this point.

A normal 3-degree glidepath angle to the runway touchdown zone (TDZ) usually will result and special obstruction protection consideration is provided. Distance measuring equipment (DME) fixes will be used at the onset. As the system grows, crossing VHF omnidirectional range (VOR) radials and marker beacons may be used. The use of the fix is not mandatory but descent should not be commenced prior to the fix.

The VDP does not constitute the missed approach point in these procedures. The missed approach point will continue to be published in the same manner as before. Federal Aviation Administration (FAA) plans to install visual approach slope indicator (VASI) on those runways served by nonprecision approaches that incorporate a VDP. This will help assure visual reference at greater distance from the runway which is considered required for heavy/high performance aircraft. Normally this category aircraft would not be able to complete a landing if visual reference with the runway environment is not acquired at the VDP.

Army category aircraft should continue an approach at the MDA when visual reference to the runway is not acquired at the VDP. The VDP may be as much as 2 or 3 miles from the runway if the height above touchdown associated with an MDA is about 640 or 960 feet above the respective TDZ elevation.

What is Army Designated Airspace?

It is that portion of the airspace in the National Airspace System (NAS) that has been designated by FAA for Army use.

Does the Army have complete control of its designated airspace?

Only to the extent for which it was designated. When the airspace originally was requested, the purpose for which the request was made was stated. Should this purpose change significantly, then such changes must be cleared with FAA.

Why must I put a desired standard terminal arrival route (STAR) procedure in the route of flight section of the flight plan and then a note in the remarks?

This is a hang-on from the filing procedures used at the onset of the STAR program. There is no longer a need for the STAR note in the remarks section of a flight plan. General Planning instructions have been changed.

Readers are encouraged to send questions to:

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