UNITED STATES ARMY FEBRUARY 1979

AVIATION DIGEST

USAARL
SCI SUPPORT CENTER
P.O. BOX 620577
FORT RUCKER, AL 36362-0577

SUPPRESSION OF ENEMY AIR DEFENSE

UNITED STATES ARMY
AVIATION DIGEST
FEBRUARY 1979
VOLUME 25 NUMBER 2

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Richard K. Tierney
Editor

ABOUT THE COVER

Suppression of Enemy Air Defense, a joint Army—Air Force concept presented from the Air Force point of view, is this month's lead story and begins on page 2. Art by Fred Martin

The mission of the *U.S. Army Aviation Digest (USPS 415-350)* is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

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This publication has been approved by The Adjutant General, Headquarters, Department of the Army, 22 June 1978, in accordance with AR 310-1.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1. Complete DA Form 12-5 and send directly to CDR, AG Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220. For any change in distribution requirements, initiate a revised DA Form 12-5.

National Guard and Army Reserve units under pinpoint distribution also should submit DA Form 12-5. Other National Guard units should submit requests through their state adjutant general.

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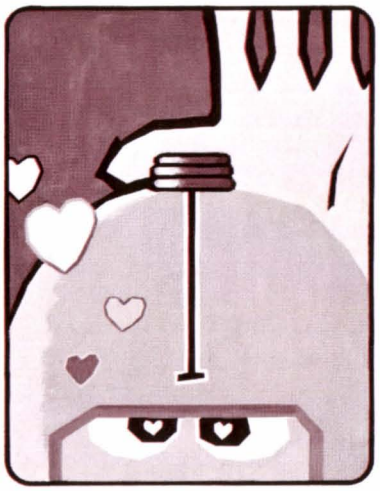
VIEWS FROM READERS



Editor:

I have been appointed as the first commander of the new 150th Aviation Battalion, 50th Armored Division, New Jersey ARNG, with units in New Jersey, Delaware, Maryland and Vermont. I would appreciate any help, advice or leads you can provide in bolstering our program to build esprit de corps and morale. Specifically I'm looking for photographs, posters, models and other memorabilia to Army aviation.

For example, I would like to have an 8 × 10 glossy photographic display of every aircraft Army aviation has had in its inventory. Perhaps you may know where they may be obtained, particularly some of the older, rarer types such as the L-17 Navion, the L-13, the L-4 and L-5, etc. Also, while safety posters will come to us as a matter of course you may be aware of other visual materials we can use. Also I would appreciate any help in locating hard-to-get models as well as any suggestions you may have.

While the 150th Avn Bn is brand new, it's not the first 150th Avn Bn. The first one existed from 1960 to 1968, so we have a tradition and of course I'll be canvasing ex-members for any contributions they may care to give. Please send them to the address below:

LTC Robert M. Dickinson
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Editor:

During the course of several years of military involvement in Vietnam, most veterans of that era had the occasion to observe many new aspects of Army aviation. Besides new tactics for the Army aviator to learn and employ in combat, new techniques had to be developed to protect the aviator in a combat environment. Various types of body armor, armored plates for the cockpit and several varieties of weapons systems were experimented with in actual combat. This experimentation gave rise to many methods employed by individual aviators in the hopes of increasing their chances of survival in the combat environment.

Personal weapons and the way body armor was worn or used was as varied as the ingredients in Irish stew. Personal preference as to types of weapons carried and the use of body armor seemed to reflect the personalities of almost every aviator.

One of the most common preferences was the "John Wayne" look. This consisted of a pistol being worn western style on the hip and with all the loops filled with bullets. Most pistols were the standard Army .38 caliber as well as the .45. Some individuals, however, had their own personal weapon such as a .44 or .357 Magnum. Although strictly unauthorized, weapons of types and calibers not issued by the Army could be found in any unit.

Besides the cowboys, there were plenty of individuals who believed in the old reliable shotgun. With just a little imagination, one could almost see Old Blue trotting beside these individuals as they walked out to the flight line carrying their shotgun as though they were going out after pheasant back home. Usually, an old claymore bag served as a pouch to carry several shells.

At the other end of the spectrum was the aviator who carried everything issued by the Army as well as several other items he managed to scrounge up on his own. This individual wore the chicken plate, or breast armor, along with the flak jacket. He also placed another flak jacket in the chin bubble of his helicopter on every mission. The aviators in this category usually carried the standard Army issue sidearm, as well as the rifle. Some, however, carried Thompson submachineguns, M-1 carbines, Swedish Ks, grease guns and various rifles captured from the enemy. Some even carried their own personal M-79 grenade launcher complete with various types of shells for it.

Of all the gear carried by the aviator, one thing was proved true in many instances. Whatever was carried or strapped on the person of the aviator was usually the only thing to come out of a downed aircraft with him. Considering the fact, it would be nice if research and development could come up with a personal weapon for the aviator that would combine the compactness of the pistol with the range of a rifle that could be carried or strapped to the person. At any rate, the lack of an adequate personal weapon that the aviator feels he can rely on in an emergency situation still exists. Until such a weapon has been produced, I believe variety will again be the name of the game in any future conflict.

CW2 Sherril A. Hannah
Dept of Flight Training
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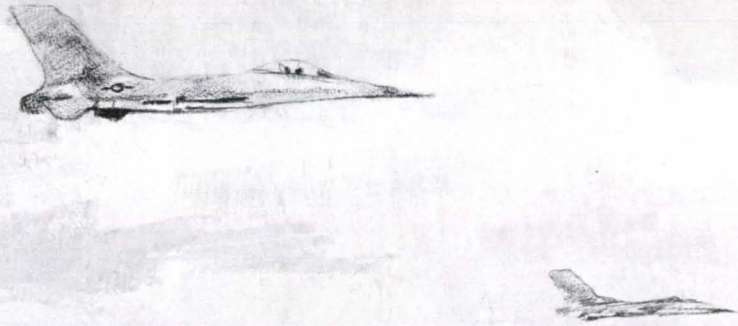

SUPPRESSION OF ENEMY AIR DEFENSE

This article briefly describes suppression of enemy air defenses as it applies to joint operations and to air anticipated problem areas. Concepts and procedures as written are not opposed or questioned, but rather, a charge is given the fighter pilots who will fly and require air defense suppression. The intent is to encourage pilots to develop tactics that will enhance the use of Army assets in dealing with enemy air defense systems. Procedures and principles that recognize the Army's suppression potential are now in effect; however, the weakest area appears in the direct integration of Army fire and tactical air missions. Fighter pilots of today are not planning use of the Army in their training. This must change if the Air Force intends to use Army capabilities as an aid in accomplishing the joint force mission

THE SUPPRESSION of enemy air defenses (SEAD) is a concept that all fighter pilots should consider in their mission planning. The Soviet Union has doubled its air defense capability since 1966 and now can seriously jeopardize friendly air operations.

Our recent preparation for this threat has included recognizing and learning about the characteristics of any new enemy equipment. Blue versus Red training also has been an important step; however, if we can use the assets of both the Army and Air Force to accomplish the joint mission our chances of success will increase. Recent studies and publications are developing the combined arms concept and responsibilities, but for SEAD the overall objective is to enhance aircraft survivability and aid in ultimately winning the air-land battle.

SEAD is defined as any action that destroys or neutralizes enemy air defenses for a period of time, thereby permitting more effective friendly air operations. It may be preplanned or on call, lethal or nonlethal, but the Air Force is responsible for its planning and conduct. The Army must lend maximum cooperation and assistance in all aspects of the campaign. Additionally, SEAD will use present weapons and tactics that can now be applied. The necessary coordination for such a concept is handled by the air-ground operations system.

In reality, it recognizes that Army

Continued on page 4

Captain William C. Hepler
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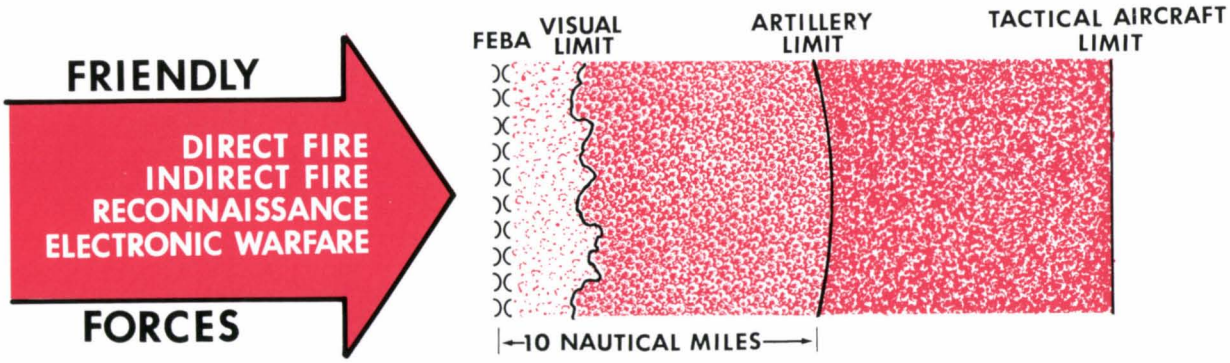


Battlefield areas covered by SEAD

assets possess greater capabilities close to friendly troops while Air Force assets normally are used for targets deeper in enemy territory. This joint concept also considers each Service's ability to support a particular area of the battlefield by fire or other neutralizing efforts. In other words, the ability to restrict enemy fire on friendly aircraft is based on the most effective use of our available means.

The division of the battlefield into three basic areas allows one to better apply and understand joint SEAD and the weapons available without the tendency to delineate areas of responsibility. Keep in mind, however, the objective is real cooperation and coordinated action, not lines on a map.

The first area is from the forward edge of the battle area (FEBA) to the limit of friendly visual observation. Terrain, weather or other obscurations obviously will impact on the depth of this area. It is here the Army can be of most benefit, where the threat of small arms, antiaircraft artillery (AAA) and infrared surface-to-air missiles (SAM) is the greatest. The Army, usually through an air-to-ground forward air controller (FAC) or forward observer (FO), can be requested to bring direct or indirect fire on any potential threat.

Most Army frontline weapons in a direct fire role or indirect fire weapons such as artillery and mortars can be used in lethal neutralization. Attack helicopters also are being considered as a SEAD contributor and could have considerable capability using missiles or the new family of 2.75 inch rockets. Unless visually acquired by the suppressor or accurately described an area fire weapon will be needed.

Ground-based electronic warfare equipment is an example of Army nonlethal assistance. What is available for SEAD in this area must be made known to the Air Force pilots to be incorporated in their premission planning. The pilot flying close air support (CAS) should then consider ways to use this equipment to compliment the tactics potential of the operation. It may add to mission effectiveness and increase the pilot's chance of survival. Because friendly troops are nearby, SEAD targets will require attack coordination similar to routine close air support operations.

Of course, the longer range threats that cover this area from beyond visual range also must be considered for neutralization if considered a significant threat. Development of counters to the radar, infrared and optical tracking systems will improve the nonlethal area.

The second area for SEAD reaches from the visual limit to the maximum range of friendly cannon artillery about 8 to 10 NM from the FEBA. It is here that AAA, infrared and radar SAMs present the greatest threat. This area also should be relatively target rich as it contains additional enemy first echelon units, supply vehicles and most of their artillery. The coordination effort will be less here because operations against enemy forces is less formally controlled. However, targeting for SEAD will be much more difficult.

The CAS pilot, and FAC if available, will be limited in joint SEAD by the effectiveness of friendly indirect fire and the ability to give accurate target location data. Current intelligence on enemy positions and rapid coordination procedures will be very important. Air Force nonlethal neutralization methods such as electronic countermeasures or the mere threat of antiradiation missiles probably will be used in this area because of the high threat level and less support available from the Army.

Preplanned air attacks supported by preplanned SEAD is the most probable option since loitering for target acquisition and coordination is unlikely. Pilots flying missions here must get all available intelligence on potential threats and coordinate a SEAD campaign (usually localized) through the Tactical Air Control System (TACS) for inclusion into the Army fire support plan. Tactics that use timing, evasion and

. . . The need for SEAD type operations has been recognized; the problem is how to get implementation underway. . . .

surprise—coupled with timely Army support—can multiply the chances of successful mission accomplishment.

Because of the enemy's movement doctrine, target information may have to be replotted quickly and then communicated to the indirect fire units. Preplanning will be necessary depending on the target defenses.

Obviously, Army support for SEAD must eventually begin to taper off. The average range forward of the FEBA for cannon artillery is about 10 NM; therefore, depending upon gun emplacement and the use of longer range Army missile systems such as non-nuclear LANCE, Army SEAD support will lessen with greater ranges. The third area starts at 10 NM and includes the capabilities of long-range cannon artillery (175 mm gun—range 32.5 km), non-nuclear LANCE ranges and USAF tactical aircraft. In this area, Air Force assets will be the primary means of neutralization.

The threat involves fewer automatic weapons but all classes of SAM may be present with large caliber AAA. Any SEAD attempt will be preplanned and involve much less coordination between the Services.

Joint SEAD does have a very important place, as is now evident, in the covering force area and main battle area. Here there will be higher concentrations of armored vehicles and air defense systems. If the CAS pilot is going to use SEAD anywhere however, there are consideraions before the mission begins.

First is the accuracy in locating the SEAD target. Warning systems are required to locate enemy air defense. The SEAD target must then be visually acquired, accurately located and verbally described for others to suppress. An additional problem with this is the responsiveness of the request for Army assistance. Data flow cannot always reach the suppressor quickly enough to deal with the enemy's highly mobile tactics.

Combining accurate target location and servicing responsiveness is essential in all SEAD efforts, particularly those requiring indirect fire support. Realizing these and other important requirements is only the beginning, training and experience is obviously necessary to reinforce the coordination actions and battlefield tactics.

In the past, little was done to integrate the efforts of the Army and Air Force in reducing valuable aircraft losses. Each Service went about its job without much concern for the principles of mutually supporting each other. Each Service was devoted solely to one environment. To correct this may require revision of doctrine or equipment, but certainly it will require fresh and imaginative thought in developing suitable tactics.

Specifically, our SEAD activities should be based on available equipment and sound tactics, not on developmental equipment and aged tactics. The "come as you are" war still applies. As new options become available, such as support from the Navy, they can be integrated. An example of possible equipment developments could be the pilot's "heads-up-display" and tactical computer in some Air Force aircraft that could give a standoff ability in determining geographic coordinates.

Common terminology for all the Services in passing requests and use of related equipment such as secure voice radio to pass target locations also is needed. Tactics that use Army capabilities such as smoke, ground and airborne electronic countermeasures and attack helicopters also are needed to enhance aircraft survival. The field is now open for all types of innovations that will aid in the conservation of aircraft. The need for SEAD type operations has been recognized; the problem is how to get implementation underway.

Since the Air Force is the responsible Service for SEAD, it is to the Air Force's benefit to pursue planning and coordinating efficiency. The Air Force must develop or revise tactics and equipment that work in accurately locating SEAD targets, then exploit the time period the enemy is neutralized. Except for the F4G Wild Weasel, new equipment cannot be counted on to help the situation in the immediate future.

We must work with what we have in hand. Use of Army suppression assets in training exercises and joint activities such as JAWS, Red Flag, Blue Flag, are a start. Fortunately, we are realizing the need to train the way we will fight. The fighter pilots above tomorrow's battlefield will need more than armor plating to survive a formidable air defense. By using a coordinated Army/Air Force effort to suppress enemy air defense systems, the effectiveness of tactical air in the first critical hours of combat may be enough to halt the war. If we have high aircraft losses initially, the enemy's determination will only be reinforced.

After all, the objective is accomplishment of the joint force mission.

Glossary

AAA	**antiaircraft artillery**
CAS	**close air support**
ECM	**electronic countermeasures**
FAC	**forward air controller**
FEBA	**forward edge of the battle area**
FO	**forward observer**
km	**kilometer**
NM	**nautical mile**
SAM	**surface-to-air missile**
SEAD	**suppression of enemy air defenses**
TACS	**Tactical Air Control System**
USAF	**U.S. Air Force**

MOS 68J Missile Systems Repair Course

SP4 Kathy Allison
Fort Eustis, VA

A WHITE LIGHT flashes on the troubleshooting panel, and the orange warning sign on the computer's video screen tells the Soldier that an error has been made. The Soldier grumbles, looks a little frustrated, and begins pouring over the training manual again, looking for the mistake.

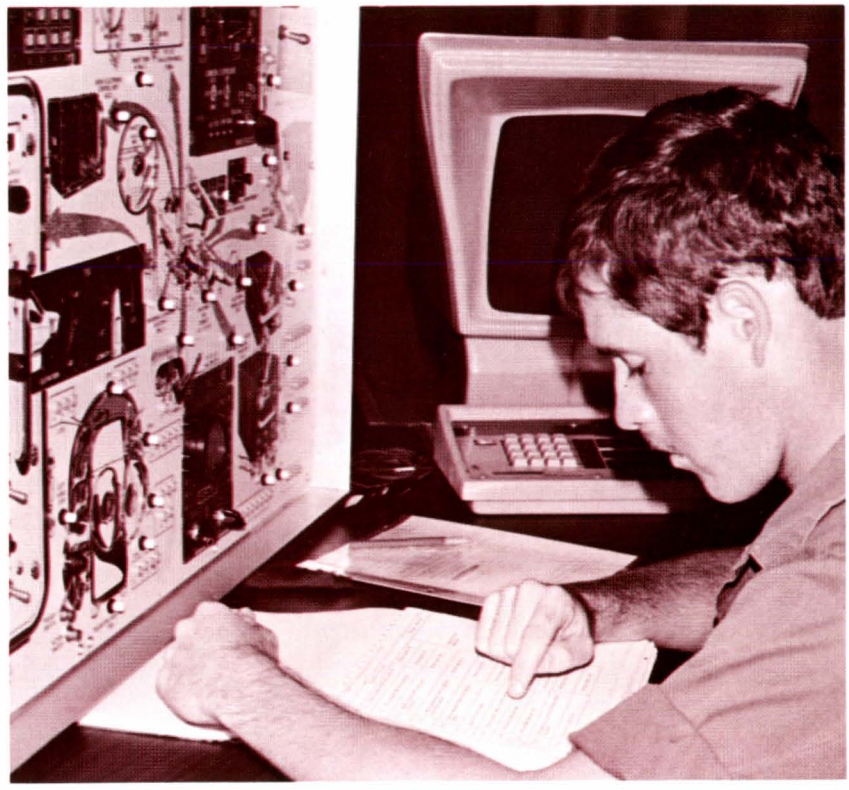
Since March 1978, Soldiers taking the military occupational specialty (MOS) 68J Missile System Repair course at Ft. Eustis, VA have been learning to troubleshoot electrical problems in the AH-1S Cobra armament system during the last 5 of the 20-week course with ECC-3 computers, made by the Educational Computer Corporation.

Just a few months ago, training Soldiers to troubleshoot the Cobra armament electrical system required that expensive, time and space consuming trainers be used through the entire course.

Since using the computers, instructors at the 68J course have found that use of the trainers can be cut down to simple familiarization. Once the student has learned to use and set up the standard test set used in the field, practical experience in finding problems, or "bugs," in the system using the ECC-3 can be obtained.

The computers have a base console with a video screen. The console is used by the instructors to program a lesson or a series of bugs for the student to find. The "bugs" show up on the panel, and the student must take corrective action. There are five different troubleshooting panels designed especially for the Cobra armament system. Each of the panels represents a standard electronic system with its test set, and several of the helicopter's components that normally would be tested in the field. The panels

PVT William Jones checks an answer against his training manual while working on the ECC-3 simulator



range from simple to quite complex, and more difficult "bugs" are encountered as the student progresses.

The student also learns to use the Cobra technical manual (TM) while using the computer because each of the computer's training manuals are taken directly from the TM.

The computer gives immediate feedback, indicating if the student is on the right track. Likewise, it indicates if an error has been made. The video screen on the console also provides the Soldier with photographs of the aircraft and the components being tested. If necessary, the computer also can keep track of how many attempts students need to locate a "bug." This helps the instructors to know who needs help or extra explanations.

The computer blocks of instruction in the 68J course are self-paced, and students work at their own speed. The panels are self-explanatory, and instructors monitor and verify the students' efforts. "Students learn at their own pace, and they aren't slowed down by other people, like they would be if this were a trainer group," said 68J instructor George R. Brown.

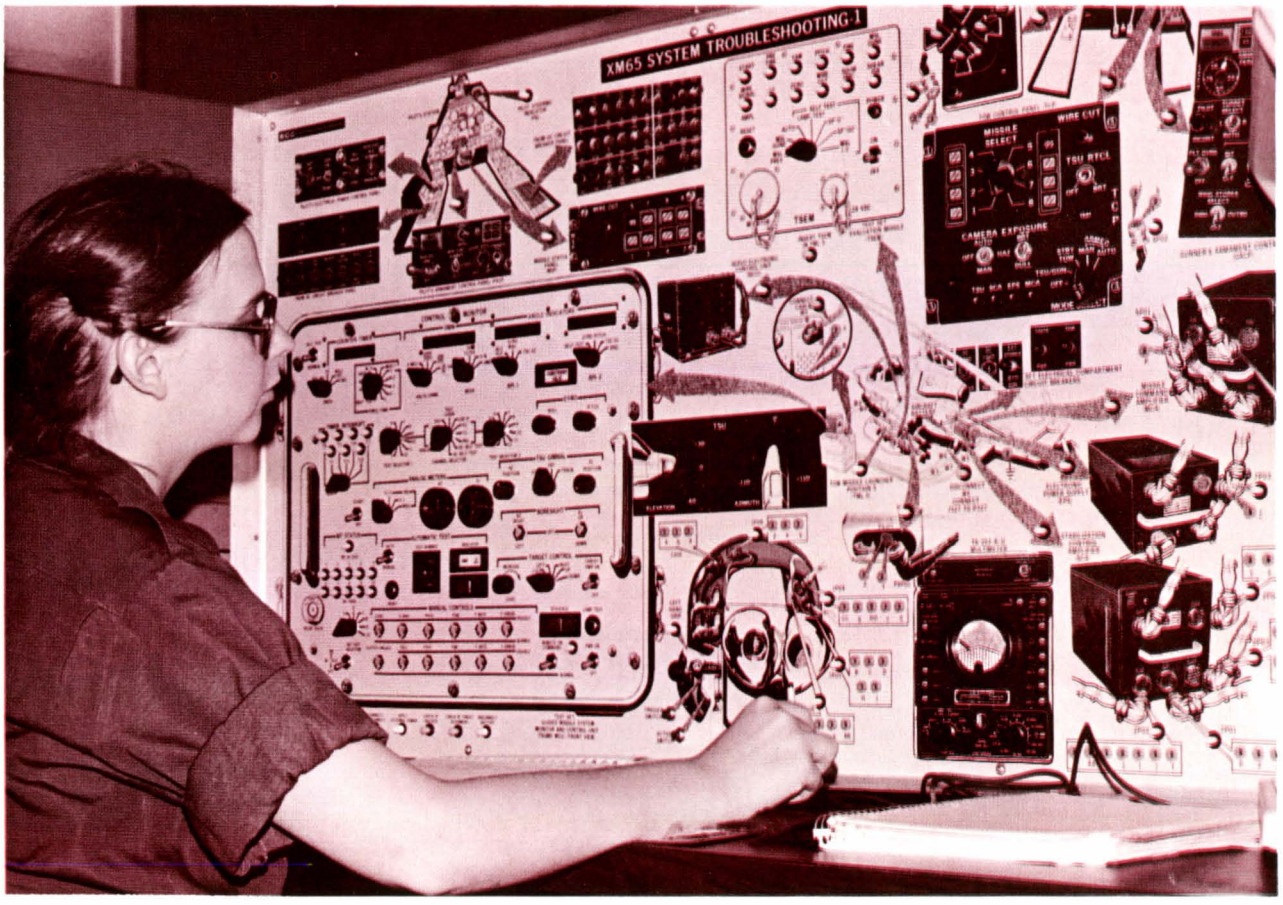
"Using the computers, our students gain confidence in their ability to read the TMs, and they can learn by their mistakes. There is no damage to life or the aircraft and the computer just shows them that they made an error," said Master Sergeant Richard G. Sheets, 68J division chief instructor.

"We only have three trainers," said 68J instructor Staff Sergeant Terry Pugh. "The computers cut down on the time needed to train these Soldiers. They also are better trained. You can't put six students on one trainer and expect them to learn anything."

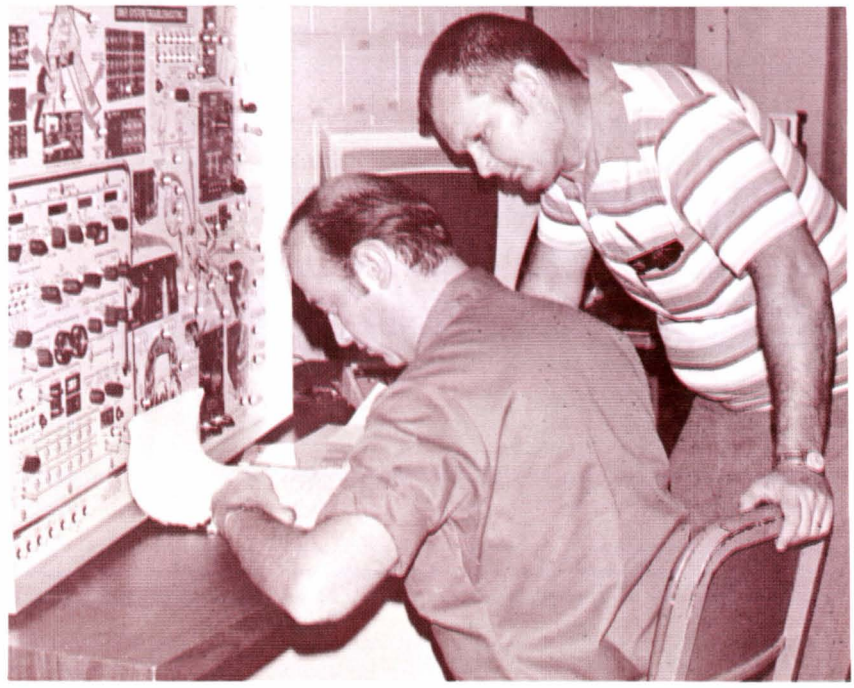
The 68J instructors agree that the practical experience students gain on the ECC-3s is more important than the work experience they get on the simulators. "The computers show that by using the technical manual, each student can repair the armament systems on this helicopter. The ECC-3s force the student to use the TM," said SSG Pugh. "The trainers create a lot of work. Test sets have to be set up and taken down. After students learn how to use the test set, repetition is a waste of time.

"I think that most of the Soldiers we train think of these com-

PVT Adrian Derby works out a "bug" on the first, and most simple, of the ECC-3 troubleshooting panels



Mr. George Brown, instructor in the 68J course, explains the use of the training manuals on the ECC-3 helicopter simulator to SGT Mike Gowen



puters as a real challenge. They try to beat the machine. It keeps them interested in the computer, and I think they learn a lot," said SSG Pugh.

"It's the best part of the course," said 68J student Private Mark Clay. "It's almost like working a puzzle. I have been working on the computers for almost 3 weeks now, and I haven't gotten bored yet. The bugs you run across are always different, and they are a challenge. It's me against the machine, and when I complete a difficult problem I'm pretty proud of myself.

"You can't go blasting through this block of instruction at 90 MPH," PVT Clay added. "You've got to take your time and learn or you don't find the bugs."

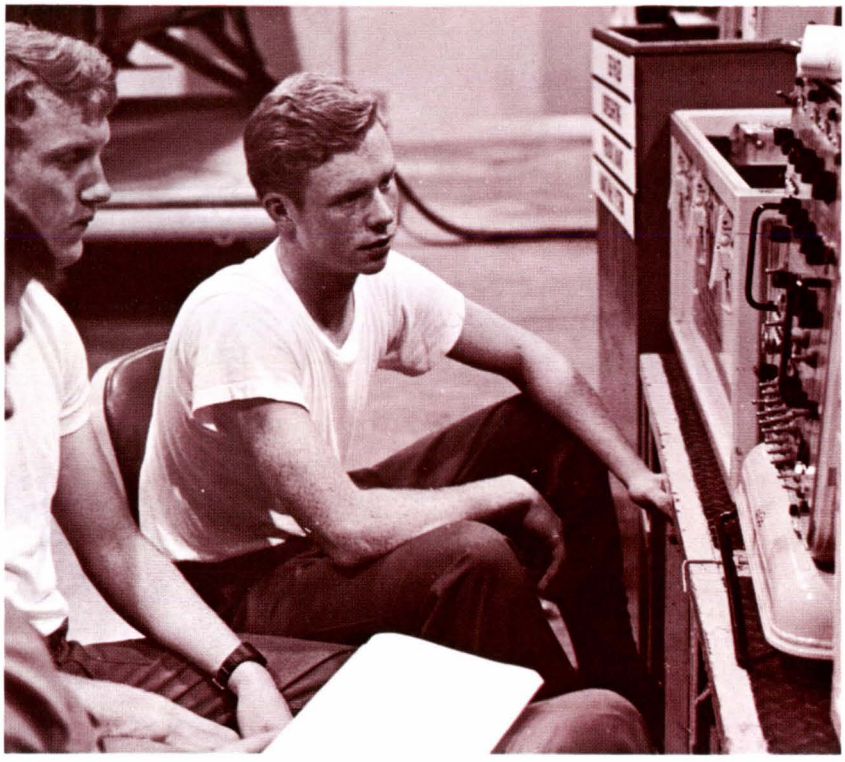
"The transition from the computer to the real thing isn't too difficult," said Mr. Brown. "All of the students get a chance to work on the trainers for a couple of weeks before they ever see the ECC-3. They get the practical experience they need at their own pace.

"The computers also provide immediate feedback," Mr. Brown added. "The computer indicates if a mistake has been made. This allows students to doublecheck their work. The trainers don't provide that kind of feedback."

During the 20-week course, each 68J student is required to attend blocks of instruction on the overall armament system. They study the mechanical breakdown, and a section on the compatibility of the weapons and the aircraft itself. The students learn which parts of the total system they will be responsible for in the field.

Future plans for the $24,000 ECC-3s already are being made at Ft. Eustis. An end-of-course 68J test is being developed for the computers. There is also a possibility that the computer training will be used for teaching in the Black Hawk courses at Ft. Eustis, according to Transportation School Director of Training, Sergeant Major Kenny Deskins.

(From left) SSGT William Foy tests Privates David Wittrock and Richard Grace on the use of the standard electrical test set as part of the initial familiarization before working on the ECC-3



Integration of Air & Ground OPERATIONS in the Cavalry Regiment

Colonel Harold R. Page
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An abbreviated form of this article appeared in the July 1978 issue of *Army Aviation* (AAAA) magazine. The following adapted and expanded version describes the tactics role with greater definition

AIR TROOP WITH ITS 21 attack helicopters and support troop with its M-56 mine dispensing platoon and scout platoon are the most responsive and lethal units in the Cavalry regiment. They are frequently the only assets which immediately can influence the outcome of a battle or correct a mistake in judgment during the course of a battle.

Over the past 2 years, aviation units of the 2d Armored Cavalry Regiment have earned a healthy, if begrudging, respect from the Regiment's ground troops. The once cynical view of ground cavalry that helicopters are out of their element in the European environment, and in the type of conflict which most probably would occur in Europe, has been replaced by a genuine acceptance of their contribution to the regiment's combat capability.

This transformation of attitudes has occurred because of an evolution in organization and tactics and a series of training exercises during which the air troops of the regiment proved conclusively to even the most skeptical that air units possess deadly antiarmor systems capable of rapid response and full integration into both offensive and defensive operations. The other air elements of the regiment such as the scouts and M-56 mine dispensing platoons have reinforced and enhanced this opinion.

In sum, ground cavalry troopers looked beside and above them and in the aircraft they found highly aggressive, capable and motivated cavalry people who thought, reacted and executed combat actions with the same intensity and spirit as they. And more important, the air cavalry acted a lot faster.

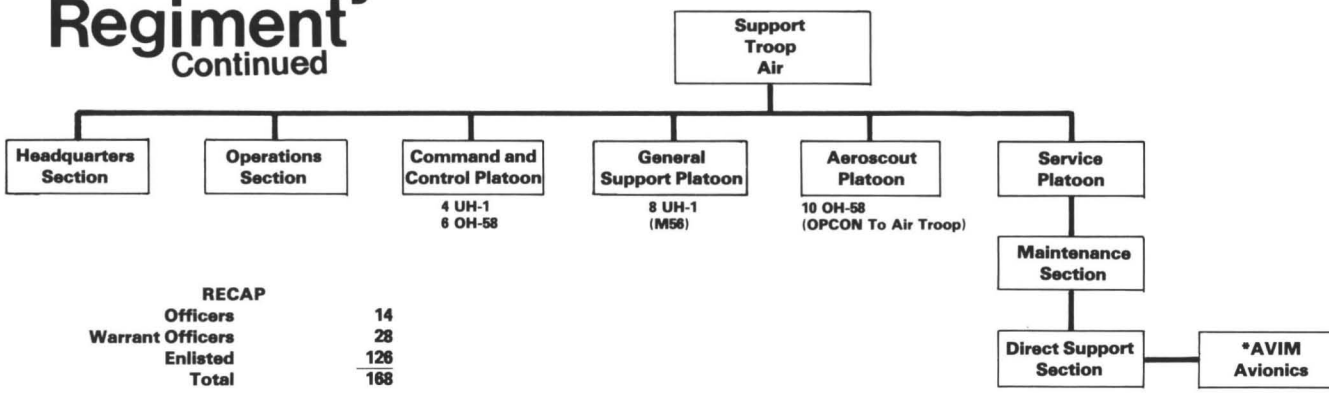
They found that when fighting vastly superior forces the cavalry in the air often meant the difference between victory and defeat. As scouts, this cavalry in helicopters quickly found the enemy, scouted them deftly from new angles and contributed importantly to the intelligence flow. As fighting cavalry, they moved quickly and aggressively to counter enemy progress with withering long-range fire into formations immobilized by helicopter-emplaced minefields.

Moreover, this was all done during the most marginal of weather conditions. Ultimately, ground cav-

Glossary

AVIM	aviation intermediate maintenance
DA	Department of the Army
ELINT	electronics intelligence
FEBA	forward edge of the battle area
FTX	field training exercise
MTOE	Modification Table of Organization and Equipment
NOE	nap-of-the-earth
SIGINT	signal intelligence
TOW	tube-launched, optically-tracked, wire-guided
USAREUR	U.S. Army, Europe

Cavalry Regiment Continued



RECAP	
Officers	14
Warrant Officers	28
Enlisted	126
Total	168

Figure 1
Support Troop Air

*Aviation Intermediate Maintenance

alrytroopers came to understand the significant combat capability possessed by the regimental air units, especially when fully integrated with the ground efforts.

Over the past 2 years the regiment practiced the full integration of regimental air and ground elements during its field training. These ranged from platoon and troop live fire exercises at major training areas to full regimental maneuvers. In all of these exercises, air and ground units focused on the same training objectives. This encouraged full integration of all combat capabilities, both ground and air. During platoon and troop/company live fire exercises, members of each element, ground and air, observed firsthand the full capability of the other.

Leaders of both ground and air units were challenged to find innovative, effective techniques of employment which combined their particular strengths to maximize the lethality of the cavalry force. All weapons systems — tank and Sheridan main guns, mortars and artillery — were directed in unison against varying arrays of simulated enemy formations. The combined effects were impressive.

These combined live fire exercises were followed by several free maneuver, opposing forces operations in which both ground and air units of the regiment were extended to their maximum against major opposing forces in simulated combat. Time-distance factors, logistical constraints, communications problems and heavy enemy pressure complicated operations considerably but never disrupted the cooperation of ground and air cavalry. Rather, the strengths of one type of unit often served to offset the weaknesses of the other.

Throughout the experience new lessons were learned and new techniques were developed to better capitalize on unique capabilities of each type unit. What evolved represents what I think is the most closely integrated air-ground team in Europe.

How did the regimental aviation troops develop into such a dynamic, lethal fighting force?

From the early 1960s when CH-34 Choctaw cargo helicopters were flying surveillance missions along the international border while using UH-1M Huey gunships with SS-11 (M-22) wire-guided missiles, to the early 1970s when the first five AH-1G Cobras were introduced into USAREUR, the regiment's concept for the effective blending of air cavalry with ground troops steadily was developed.

During Reforger 75, an Air Troop (Heavy) concept with a single commander and centralized maintenance (AVIM) was employed and for the first time in USAREUR a simulated TOW missile tank killing capability was tested. Concurrently, under the Aviation Reorganization Study, MTOEs were submitted to DA which subsequently resulted in the development of two Aviation Troops.

During the latter part of 1975 and early 1976 AH-1Q Cobras were received and immediately used in training exercises culminated by Reforger 76 when the regiment first integrated the TOW Cobra with ground units. Through trial and error the air cavalry adapted themselves and their machines to the harsh environment of the European theater. The potential for a well-rounded fighting force became obvious.

As the preconceived glaring vulnerabilities of combat helicopters were suppressed, unexpected potential emerged. Through the summer of 1977, the Air Troop continued to conduct air-ground integration exercises. During the same period, additional OH-58 Kiowa scouts were brought onboard to enhance the regi-

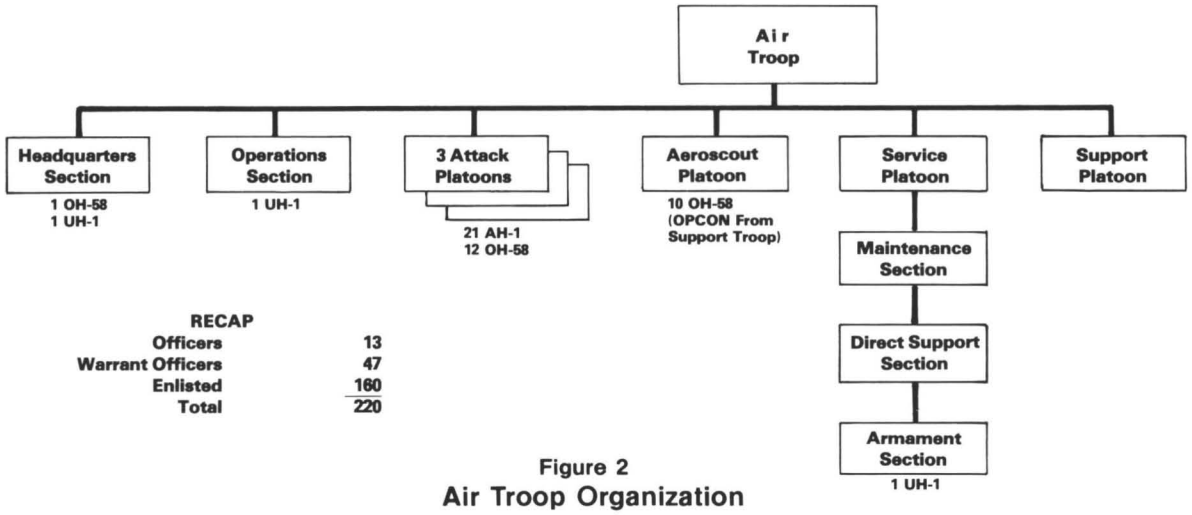


Figure 2
Air Troop Organization

ment's overall scouting capability. As Reforger 77 was approaching, the regiment received a big boost by the introduction of the M-56 mine laying capability.

During Reforger 77, for the first time, the regiment put it all together. Air attack, scout and mine laying systems were fully integrated with the regiment's awesome ground combat capabilities. The effect was dramatic. Each system supported and complemented the other. The result was an unbeatable combination.

The present organization of the Regiment's air assets is as shown in figures 1 and 2.

Regimental Concept Of Employment. The basic tactics used by the air cavalry of the 2d Air Cavalry Regiment differ very little from Army doctrine — aggressive, intensely studied NOE flight combined with a full grasp of mission requirements and a thorough knowledge of the terrain bring these basic skills to a rare pitch of perfection. What is unique to the regiment is the degree to which integration of air and ground units during tactical operations has been achieved. The doctrine and techniques of employment outlined in field manuals have been adopted and, in some cases, modified to fit the peculiarities of the European environment and the tactics of the regiment.

What has been fully accomplished from the ground scout through the regimental commander is a working knowledge of the capabilities and limitations of the various weapons systems found in the regiment and the tactics surrounding their employment and survival. As an example, every ground scout, armor crewmember and intermediate commander in the regiment knows that enemy air defense weapons must be located and neutralized before the full lethality of the attack helicopters can be brought to bear without undue risk. And in a fight, these ground cavalrytroops fully appreciate the decisive role that the attack helicopters can perform when integrated with ground systems.

It is not unusual for a ground cavalry unit leader, or even individual members of a ground platoon, to state bluntly that the number one priority target is not the enemy tank, but the enemy's most lethal forward air defense weapons system (which they each know and can identify). To identify and destroy these systems opens the way for a devastating combination of air and ground antitank fires to be brought on advancing enemy armor formations.

The integration of air and ground elements involves more than fighting intense engagements. Each contributes to a vital requirement of "seeing the battlefield" in the execution of the regiment's tactics of high risk delay and active defense.

Reports from ground units and aerial observers through unit channels and directly to squadron and regimental headquarters provide essential information on the location and movements of both enemy and friendly formations. The reports enable commanders at squadron and regimental level to better keep track of developing situations over an extended and cluttered battlefield. Decisions are more timely and invariably based on more valid information than normally is possible. And in an environment where time is a critical factor in the lateral movement of forces, this timely information is the difference in being able to execute successfully the high risk delay or active defense.

Several techniques of employment have been tried and evaluated by the regiment during several major exercises, including three successive Reforgers. Ini-

Cavalry Regiment
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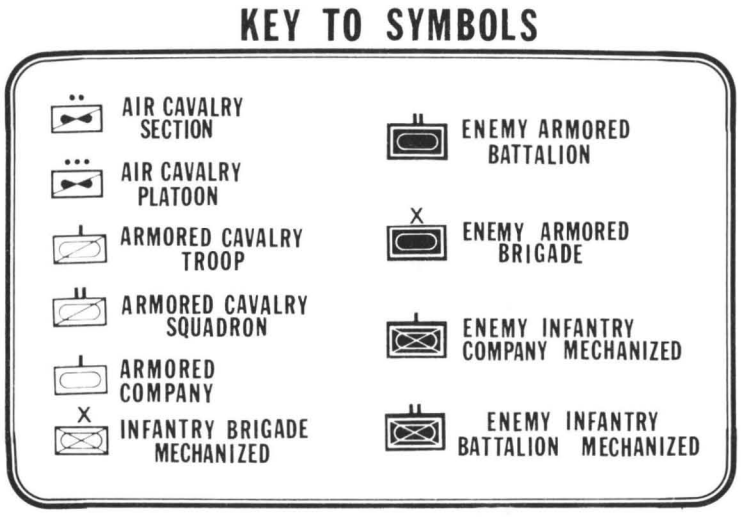

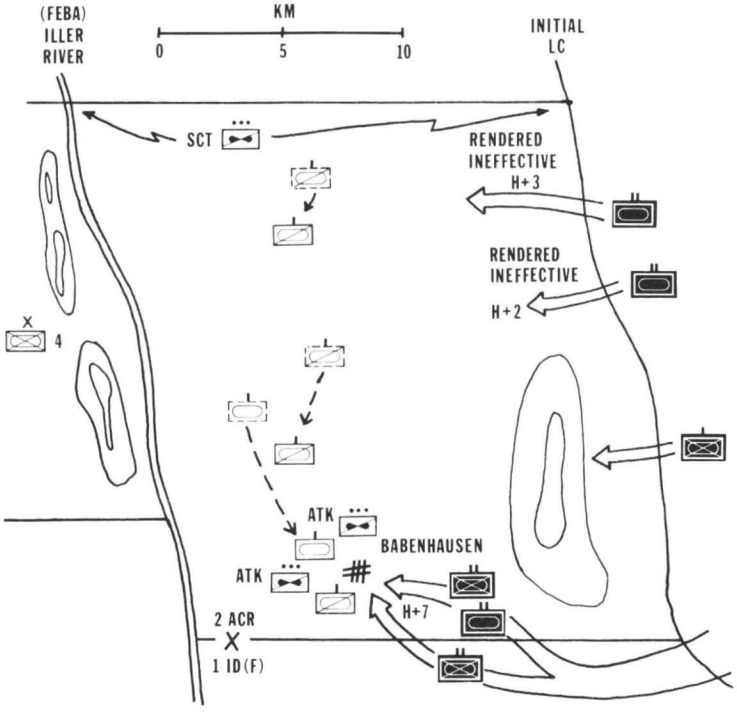

Figure 3

tially it was thought that because of the extended frontages over which the regiment operated the best method of employment was to place an attack helicopter platoon under the operational control of the deployed line squadrons with commitment authority reserved by the regimental commander. While this concept was good to the extent that attack helicopters were deployed well forward in areas of probable battle, it did not exploit fully the mobility and firepower of the attack troop. Massing of the dispersed platoons when needed was difficult and often untimely.

Experience led to the more effective employment of the troop as a unit, with its platoons employed singly, in pairs or all together according to the nature of the threat. This concept ensured that the maximum destructive power of the attack helicopters could be massed at the decisive places and times as the battle developed.

While employment of the attack helicopters by platoon was still a viable technique, it clearly was not the optimum. Techniques for command and control at the Air Troop had to be developed. Questions concerning the control of the attack helicopter platoons during their integration into the battle arose. During pre-Reforger 77 exercises, it was clearly established that the best technique was to pass control of the Air Troop to the squadron in which it was to be employed. The squadron could either employ the unit separately or further pass control to a ground troop commander for integration into the battle plan. While feasible, the practice of passing control of Air Troop or its platoons to a platoon leader or lower, normally would not be done.

The techniques of "passing off" control of the Air Troop to subordinate units was at first cumbersome, and eventually it was found necessary to dispatch the Air Troop commander or a senior representative of the troop to the gaining squadron command post to effect coordination and to assess the situation. Meanwhile, scouts followed by attack helicopters would be en route.

Pertinent information about enemy and friendly forces and the battle plan obtained by liaison officers was relayed to the attack force. If the air unit was to be passed to a ground troop, the coordination of fires and maneuvers between ground and air units at this level was the responsibility of the ground unit commander.

The Air Troop commander decided how best to employ the Air Troop—in mass or by rotating the platoon to keep freshly armed and fueled aircraft in the fight. On completion of the engagement, the Air Troop would exit the area to regroup or to move to another critical area of the battle. A great side benefit of employing the Air Troop in this fashion was the use of aerial scouts throughout the battlefield in the

collection and conveyance of vital battle information to the regimental staff aviation officer. Timely information on both enemy and friendly situations proved invaluable in assisting the regimental command elements to "see the battle" as it was developing.

While most attention naturally is focused on the Air Troop and its tank killing role, three other air elements of the regiment also have developed into critical members of the air-ground team. The M-56 mine dispensing platoon has evolved into a highly responsive unit of critical importance in Cavalry missions. For the first time antitank obstacles can be emplaced during the conduct of a battle at the times and places determined by a ground commander, in support of the maneuvering of ground and air units to counter already developing enemy actions. If it is not being used in that way, it can assist the engineer effort by rapidly emplacing portions of subsequent hasty barrier traces. The development of the M-56 system represents a major step forward in terrain enhancement and squadron commanders have been quick to grasp the value to their units.

The scout platoon, now attached to the Air Troop, has allowed other units of the regiment, both ground and air, to be employed in high threat areas while the scout platoon performs surveillance operations in an economy of force sector.

The command and control element of the Support Troop (Air) has converted its command console equipped helicopters into highly mobile, ground command posts (HELTAC) that can be moved rapidly about the battlefield transporting the command group, alternate command group or radio relay teams. This unit concept allows the command group to move quickly to decisive sectors or to positions where reliable communications can be established and maintained with all regimental, adjacent or higher units.

Some recent historical examples should help to clarify and give substance to the concepts discussed above.

The culmination of regimental aviation training and tactical development in 1977 was FTX Carbon Edge-Reforger. The 2d Armored Cavalry Regiment (ACR) as a blue force player deployed into a covering force mission with aeroscouts providing thorough, continuous reporting coverage of the simulated international boundary. When combined with SIGINT/ELINT information an ensuing attack was easily foreseen.

Aeroscouts using night vision goggles soon verified movement of large enemy armor columns moving to attack positions. The battle began and as daylight came a major penetration along the 2d ACR and 1st Infantry Division (Forward) boundary occurred. A mechanized enemy brigade was identified moving towards the town of Babenhausen which controlled a key avenue of approach to the FEBA. The regiment began to collapse its forces and the air assets moved forward. (See sketch, figure 3). First the M-56 aircraft laid a carpet of mines in front of the attacking forces.

Although one UH-1H was lost, enemy forces were slowed and losses incurred. The aeroscouts continued surveillance and called accurate artillery onto the approaching formations. As the enemy closed on the Babenhausen position, regiment passed control of the attack helicopters to the defending squadron. The squadron collapsed additional ground maneuver forces around Babenhausen and then proceeded to employ both ground and air assets to inflict maximum destruction on the enemy forces.

The result was a closely coordinated and highly successful integration of air and ground forces. The enemy force was stopped with severe losses. One enemy battalion was destroyed and a second battalion severely crippled. Friendly ground losses equated to two platoons. No friendly air attack elements were lost. With the much needed assistance of the air elements, the regiment dominated the battlefield and continued to successfully perform its covering force mission.

During the second phase of this same FTX, the regiment moved to an offensive role. At 0200 hours, the regiment attacked to secure crossings over the Danube River. The regiment easily penetrated the enemy's defenses, quickly drove 15 kilometers and secured crossings over the Danube. By daylight, it became apparent that company size enemy forces had been bypassed (see figure 4).

At this point, the air assets were pressed into action. Aerial scouts screened the regiment's exposed flanks and the area between the major advancing columns of the regiment's ground forces. Wooded areas and likely areas of enemy concentration were kept under careful observation by the air scouts.

As anticipated, the bypassed enemy forces soon attempted to break out and return to their lines. This movement was discovered quickly by the aerial scouts. The information was relayed rapidly to regimental headquarters and Air Troop platoons attacked the vulnerable and exposed enemy formations.

Ground force commanders were kept advised of the situation in the rear of their zones but were ordered to continue to advance and to focus their attention on the seizure and consolidation of the river crossings. Air Troop had a veritable "turkey shoot" in the bypassed area and all objectives were easily achieved.

On the following day, the regiment attacked again at 0200 hours. By daylight the leading ground forces had advanced 15 kilometers and were within sight of the Iller River. These forces were ordered to secure crossings (see figure 5).

Again enemy forces had been bypassed; however,

Cavalry Regiment
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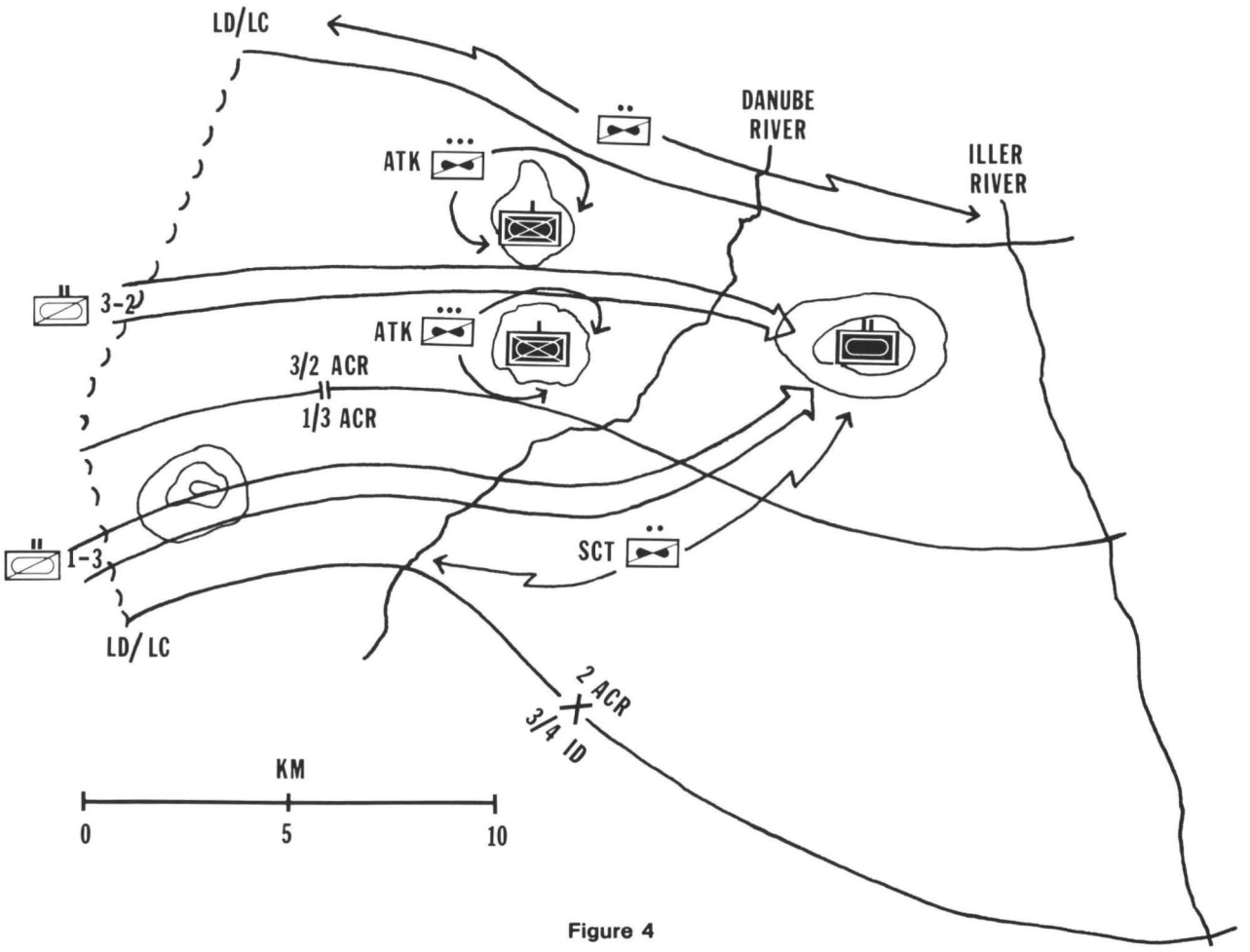

Figure 4

it soon became apparent that, this time, multiple enemy battalions had been isolated by the regiment's rapid advance. A further factor complicated the situation. The regiment had advanced much farther and faster than any other blue force elements and occupied an extremely vulnerable and exposed position deep in enemy territory. As with the prior day's operations, aerial scouts were launched at daylight. They again screened the flanks and the areas between the advancing squadrons' columns. Information regarding bypassed enemy formations were relayed to regimental headquarters. As soon as the enemy forces attempted to move from their wooded concealment they were attacked and destroyed by Air Troop attack helicopters. Meanwhile, the ground maneuver forces were greatly extended. Elements crossed the Iller River and secured a bridgehead at the town of Vohringen. Aerial scouts were called to establish a screen forward of the bridgehead.

It became apparent quickly that major enemy formations were moving towards the bridgehead in an attempt to drive the regiment back across the river. Aerial scouts kept the regiment accurately advised as to the location, size and movement of the enemy forces. In addition they called effective artillery fire on these formations. The M-56 platoon emplaced a series of hasty minefields in advance of the enemy movement and on all critical avenues of approach leading into Vohringen. Finally, attack platoons were employed against these advancing enemy columns.

During the day, the regiment withstood five separate attacks. Each attack came from a different direction

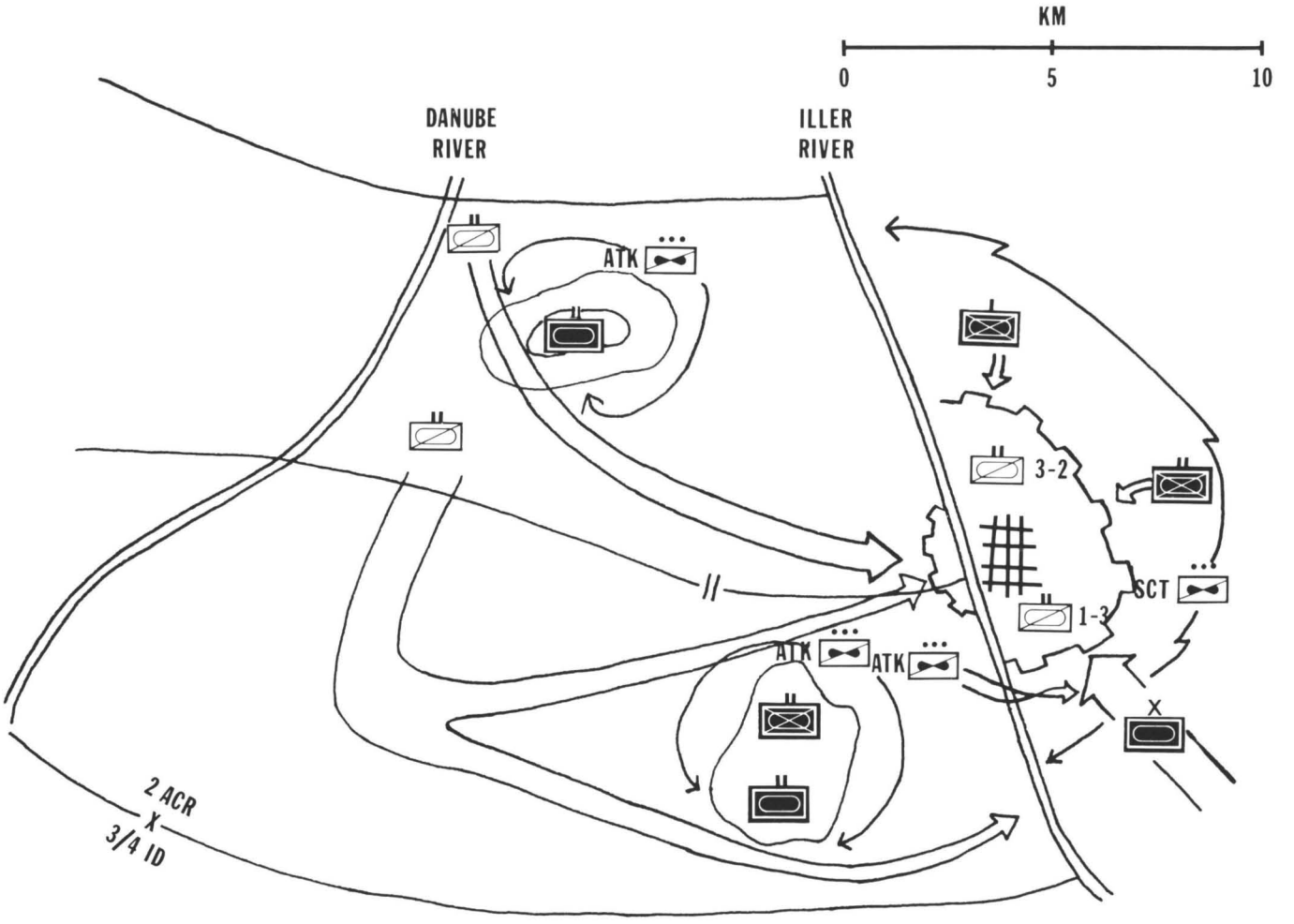

Figure 5

and each increased in intensity and size. Only through the rapid movement and refocusing of combat power —ground and air—was the regiment able to retain the bridgehead.

At the end of the day, additional blue forces arrived at the bridgehead and passed through to continue the advance. This Vohringen bridgehead was held due to timely intelligence, the hasty aerial emplacement of minefields and the persistence of defending forces, both ground and air. The operation was a classical example of the proper use and integration of all assets within an Armored Cavalry Regiment.

From the foregoing, it should be obvious that every element of the regiment is committed to the air-ground team effort. If it were possible, the ground commanders of the regiment would like to see every utility and observation helicopter in the regiment capable of shooting rockets (for suppression, illumination, smoke, etc.) or capable of mounting and employing the M-56 mine dispensing system. It is clear to those in the regiment that a significant, but currently unused, capability exists in Europe. Every helicopter should be convertible and capable of joining the battle against a numerically superior, heavily mechanized enemy.

The development of new tactics and techniques for integration of the Cavalry air-ground team is continuing in the regiment. The innovativeness and boldness of both air and ground unit commanders are the only limitations as new technologies are pushing the threshold of tank killing capabilities to extended heights and extending them to all hours.

TOUJOURS PRET!

A Tour Of Duty In Korea—

What An Army Aviator May Expect

Clark C. Bohannan

THE BIG JET rolls out for take-off, accelerates to lift-off speed and climbs swiftly into the clear sky of an autumn morning. You have just departed Yokota Air Base, Japan, on the last leg of a journey to your new assignment in Korea. A turn to the west and Mount Fuji stands stark and clear out your left window. Forested mountains slide beneath you for awhile, then a broken shoreline slips past and you are over the Sea of Japan (Koreans call it the East Sea) where you see only an occasional ship or a cluster of fishing boats far below.

There are more fishing boats and then a thin gray shoreline that soon changes to jagged mountains eases into view. A long curving peninsula cradles a sparking blue bay. Factory smoke and a cluster of buildings signal a town. "Pohang," announces an aviator passenger on the way to a second tour in Korea.

The remainder of the flight is over land. Out the window you see sere brown hills, serrated ridges and sharp-toothed peaks. Radomes sit on one of the taller mountains like fat white mushrooms. The valleys are filled with a thin haze or puddles of fog, tinged with gold in the morning sun. Streamers of smoke drift lazily up from towns and factories half hidden below. You remember then that Korea is called the "land of the morning calm." The name seems appropriate this morning.

After a gradual descent the plane approaches for a landing to the west of Osan Air Force Base. Coming in between low hills, across a busy four-lane highway you later learn is the Seoul/Pusan Freeway. there is a screech of tires at touchdown, a roar of reverse thrust to decelerate and a turn to the left at midfield. The big airplane taxis to a stop and the doors are opened. After a few words of instruction by a member of the permanent party, the passengers file down the steps and into a low building. All sit in rows and listen to more instructions and an incountry briefing. Everyone turns in copies of their orders and are released to retrieve their luggage and board buses for Seoul.

The trip to Seoul is a revelation. This is not the Korea you have heard about with rutted dirt roads and thatched houses. The broad freeway, crowded with fast traffic, passes by neat villages with brightly colored roofs. Here and there are pretentious houses that could belong only to the well-to-do of any country.

You see a number of factories, but the country charm is not gone. The rice has been harvested in some paddies, but still stands in others, the heads a dark golden brown in the sun. Orchards flash the crimson of ripening apples and the steep hills are yellow, red and brown, slashed with dark green pines. You will learn in the next few weeks that autumn in Korea is a pleasant time indeed.

Your astonishment grows as the bus nears Seoul. There are many blocks of tall, modern apartment buildings and more going up on every side. Some of these apartment complexes may house populations greater than that of your hometown in the U.S. Toward the city you see many towering buildings. A long green mountain which you are told is Namsan masks the center of the city.

Your bus leaves the freeway and crosses the Han River on a low bridge. To the right and the left are other bridges, busy with traffic. Your bus goes through an American military compound you learn is Yongsan, turns into another, Camp Coiner, and discharges its passengers at the 6th Personnel and Administration Battalion.

You turn in your records. Administrative details are completed and you are assigned, most likely, to the 2d Infantry Division or the 17th Aviation Group (Combat). Coordination with division or group assignment officers results in your being further assigned to a battalion. After an interview with the S-1 and the battalion commander, you get your final assignment to a company-size unit.

Chances are you will be assigned to a unit located somewhere north

of Seoul. You sign in, meet the commander and first sergeant, and are shown your bachelor officer quarters. A "hooch" mate shows you around, takes you to the club and introduces you. You are happy to learn of previous acquaintances in the unit and of other old friends in organizations not far away.

You will not be impressed when you first look at your home heliport and its facilities. "Austere" doesn't quite describe some of the airfields in Korea. Almost without exception they are overcrowded. Most were established during or soon after the Korean War to accommodate an aviation element supporting a division or corps headquarters with a few 0-1 Birddogs and U-6 Beavers and three or four OH-13 Sioux .

Most have been expanded since then, but the practical limit has been reached and space is still inadequate. Lateral clearance from the runway to fences or parked helicopters and the space between parking pads may be less than engineer manuals require. The heliport is restricted from nonstandard maneuvers and every landing and takeoff, in fact every aircraft movement, must be accomplished with extra caution because of the crowded conditions. In many cases approaches and departures will be over heavily built-up areas.

All the land which borders airfields and other military installations has commercial potential. And Koreans, like most other Asians tend to live close together to make use of every bit of available space.

The operations officer reviews your flight records to determine your previous experience and qualifications. You are handed a required reading file containing the Army regulations (ARs), supplements to the ARs, and local regulations that directly concern the operation of Army aircraft. You also are required to make a careful review of the company standing operating procedures.

You get a detailed map orientation, with particular attention to the demilitarized zone (DMZ), the adjacent buffer zone and the Seoul Prohibited Area (RK)P73. You learn that (RK)P73 consists of two concentric circles centered on the Blue House, the residence of President Park Chung Hee. (RK)P73A is 2 nautical miles (NM) in radius and (RK)P73B extends from there farther out to 3 1/2 NM.

Aircraft entering (RK)P73B may expect warning rounds from antiaircraft positions protecting the Blue House; those entering (RK)P73A will be shot down. Because one U.S. Army aircraft was shot down in 1974, Eighth Army has established a buffer area around (RK) P73B and outlined procedures to ensure the prohibited area is not violated.

Procedures to prevent DMZ overflights are very stringent. These include close adherence to flight plans, frequent position reports, radar coverage, warning broadcasts and headings for departing the area if the crew becomes disoriented.

Throughout your tour in Korea, the seriousness of a DMZ violation or an (RK)P73 violation will be emphasized repeatedly. Should you violate either, you almost certainly will be shot down. Should you survive, your story had better be a good one or your aviation career may be finished.

You are assigned to a unit instructor pilot (IP) who continues your map and oral orientation. You are scheduled for a checkride the next day where you will demonstrate your capabilities as a pilot, your strengths and your weaknesses. Deficiencies will be given extra attention to ensure you can do your part in performance of the unit mission with minimum risk of an accident.

You are informed emphatically that the standards established by the Directorate of Evaluation/Standardization at the U.S. Army Aviation Center at Ft. Rucker, AL are applied throughout Eighth Army. You are advised to study your −10 until you know it like you have never known it before.

Preflight starts at 0700. The crewchief is on hand and has the aircraft ready. The fall morning is pleasantly cool, but looking ahead 3 or 4 months you know that preflights will be done in the dark and bitter cold. You hope fervently that the winter flight jacket the supply sergeant promised arrives in time.

The checklist is called off item by item during preflight, startup and preparation for takeoff. The IP is meticulous and every maneuver from beginning to end is done by the book. In debriefing, the instructor explains that the objective is standardization and that in standardization lies safety and mission readiness. The IP points out your weak and strong areas and informs you that extra instruction in preparation for a later checkride may be in the offing. This ride will certify that you are cleared to fly operational missions.

The next few weeks are busy ones. You are required to demonstrate, to the satisfaction of your instructor, every flight maneuver in the UH-1 Huey curriculum. You are required to demonstrate your ability to circumnavigate the (RK)P73 Prohibited Area, knowing your exact position at all times. You become thoroughly familiar with the DMZ fence and the adjacent sectors of the buffer zone in the areas where

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you expect to operate. In the eastern part of the country, where you will not be buffer zone qualified but may operate in the adjacent tactical zone, you are required to show your ability to navigate along the southern boundary of the buffer zone.

The terrain is impressively rugged. A quick mental comparison of air travel versus surface level convinces you the helicopter is invaluable in the conduct of military operations in Korea. It becomes easy to understand why the true worth of the helicopter was first fully recognized in the Korean War.

Korea's terrain not only points up the importance of the helicopter in support of the military mission, it also makes Korea different from other parts of the world for helicopter operations. Air traffic tends to be channeled along the valleys, following rivers, roads and railroads. Ridges generate turbulence if the wind is blowing. Mountain passes sometimes become the focus of cloud formations and precipitation in periods of low weather. Pinnacle operations are an everyday requirement and frequently demand the utmost in pilot proficiency and performance.

Your introduction to pinnacle operations is an approach to a site 2,000 feet above the valley floor. The slopes drop off steeply and are studded with boulders and trees. The pad is adequate for a Huey but looks small against the backdrop of mountains on the other side of the valley. It takes two approaches to develop a sight picture that will give you a satisfactory angle of descent. The instructor points out that the site must be supplied by helicopter because there is no access road.

The instructor warns of sharply descending air currents on the downwind side of pinnacle landing areas. You repeatedly are told of the possible consequences of undershooting an approach. The IP stresses the advisability of terminating every pinnacle approach near the far side of the landing area to reduce the possibility of undershooting.

You finish your standardization training and pass your checkride on schedule. You now are qualified to fly as copilot. There are other incountry requirements to be met before you can fly as a pilot-in-command. You take these in stride and soon are a full-fledged member of the unit.

In the meantime, fall has given away to winter. The coldest weeks are those between Christmas and the end of January. Wind chill factors bring flightline conditions to below zero degrees Fahrenheit. Climbing onto a Huey on a cold dark morning you realize that cold can be a cause of accidents because of its effect on the human will. Feet feel like blocks of ice and fingers become stiff and lose their sense of touch. A thorough preflight demands a high degree of fortitude.

There is no doubt that maintenance personnel actually suffer from the cold. They earn your respect by maintaining high standards and aircraft readiness rates under these frigid conditions.

Early in the winter you become acquainted with a weather phenomenon which is perhaps the most serious visual flight rules (VFR) hazard in Korea during winter time: snow showers. A snow shower can move in with almost no warning and suddenly reduce ceiling and visibility to near zero/zero. They are localized and cannot be forecast with any accuracy. Being localized they usually can be circumnavigated, but a snow shower may block a valley or hide a destination landing field. You soon learn to regard snow showers very seriously.

Snow showers notwithstanding, winters in Korea are very dry and unprepared landing areas are likely to be dusty. A helicopter, or a formation, coming to a hover over an unprepared landing area may become enveloped in a cloud of dust. In the past pilots have become disoriented and major accidents have resulted. The dust also contributes to blade and engine erosion and foreign object damage. Determination and consideration of the condition of the landing areas is a requirement in all mission planning.

By the middle of February the coldest part of the winter is past. Spring is still a long way off and there are many cold weeks yet to come, but the worst is over. The days become windier and turbulence increases over the ridges and peaks. On a mission near the East Coast you discover that high level winds spilling over the ridges west of Sokcho generate clear air turbulence of awesome intensity. Some of the high passes are carefully avoided by pilots who are well acquainted with the area.

During April the days turn soft and warm, trees sprout a mantle of green and wild azaleas bloom, dotting the hillsides with a blaze of pink. Yellow forsythia brightens yards and parks and cherry blossoms fall in showers. Apple, pear, peach and plum orchards spread carpets beneath an overflying aircraft, each with its own color. It's so easy to daydream—and to take chances.

Once, along the Han River southwest of Chunchon, you are shown where a young aviator returning from a completed mission on a beautiful day in late April flew too low and struck a wire strung across the river. The helicopter crashed on the railroad track that parallels the river. The aviator died in the burning wreckage.

As in all times of the year, landing areas often are obscured by morning haze and fog. This has led to accidents when pilots, eager to complete their missions, attempted to proceed VFR when ceiling and visibility were below VFR minimums. The record shows that many such accidents have resulted in fatalities.

May is marvelous, with warm sunny weather which lasts almost to the end of June. This is the time for

transplanting rice, and in sheltered valleys the newly transplanted paddies gleam in the sun like swatches of pale green velvet. Since February, however, the prevailing winds have veered more and more from the southwest, resulting in a steady increase in humidity as more and more moisture is picked up by winds skimming the warm China Sea. Density altitude factors have increased with the increase in temperature and humidity and must be taken into account in flight planning, particularly for missions to resupply mountaintop sites.

This increase in airborne moisture culminates about the beginning of July with the arrival of the Polar Front over Korea. You are told that a major percentage of Korea's annual rainfall occurs in July. This becomes believable early in the month when the bottom seems to drop out of a rain-laden sky. The rain falls in torrents and continues for hours on end. Streams are swollen and roads become impassable as sections are washed out. Bridges go to, and in cities and towns retaining walls collapse and entire hillsides give way. People and houses are buried.

Country people attempt to stay with their possessions and are stranded. Helicopters are called into service to perform rescue duty. Sometimes aviators must go back for the same people when they return to their homes and farms. You and the other members of your unit perform your share of rescue missions.

August is rainy, but less so than July. Even on clear days the humidity is high, and the heat settles in as if to stay forever. Long-legged white cranes wade the rice paddies, searching for frogs in the growing rice. Rose-of-Sharon bushes in the company area display large purple blooms, Korea's national flower, and cicadas sing in the trees.

Climbing into the cockpit is like entering an oven. There develops a tendency to hurry the checklist in order to leave the shimmering heat of the flightline and ascend to the cooler levels.

Density altitude factors reach and sometimes exceed 3,000 feet, and get careful attention from aircrews figuring payloads. Unit IPs schedule practice autorotations for the cooler morning hours.

The advent of September brings no letup in the sultry weather. Labor Day is oppressively hot. There may yet be heavy rains as the Polar Front passes over on its way from north to south down the length of the Korean peninsula. North of the retreating Polar Front, however, the weather is abruptly cooler and drier and rice ripens under high azure skies. The lush summer greenery begins to fade and distant landscapes are tinged with a silvery haze. In the latter half of September the weather begins to show a perceptible change to autumn—Korea's golden autumn. This is the best time of the year in Korea, with weather to rival the best to be found at any time or any place in the world.

What a pleasure it is to fly. The rice paddies are changing from green to gold and a tinge of color shows first on the high forested ridges and creeps farther down the slopes day by day. The sun is warm and the air is smooth. Once again it takes an effort not to daydream, to pay full attention to the task of flying.

Now there is an added distraction —you are short. You have your stateside assignment and you expect your port call any day. Only a matter of weeks and you will be back with your family in the States. So easy it is to let your mind dwell on matters unrelated to the job at hand.

In time your port call comes. Your hail and farewell party is past and there is the last evening in the club with friends. Soon you are on your way to Osan to depart for the States.

On the road to Osan, you have time to reflect on the year you have spent flying in Korea. Mentally you summarize the hazards and problems you have encountered.

You have learned through your unit's safety education program that weather and wires are accident causes that have exacted a toll of aircraft and crewmembers in Korea—weather particularly in fatalities, with wire strikes accounting for the loss of some personnel and even more damaged aircraft. You know, however, that these are cause factors in aircraft accidents worldwide. The combination of weather, wires and terrain figured in some accidents.

Korea's rugged terrain has most assuredly figured in aircraft accidents. Terrain has had an even more pronounced effect on aircraft operations, forcing commanders, operations personnel and aircrews to consider terrain in planning missions and demanding that terrain be taken into account in formulating training programs and standardization policies.

Korea's terrain, you reflect, has not necessarily brought on an increase in aircraft accidents. But it has imposed a requirement for professionalism in aircraft operations of a higher order than that required in more level parts of the world. A dropoff in professionalism, a lapse into complacency and the accident potential goes up.

You reserve a special measure of admiration for the enlisted crewmembers and maintenance personnel in your unit. You realize they did their jobs under conditions that were much less than ideal. Hangars were crowded and inadequately heated, and flightlines often were scorchingly hot or bitterly cold. But operational reliability rates were not lower or failure rates higher because of these conditions. You have been part of a professional operation during the past 12 months and you are more of a professional because of it.

You process for your departure and board the aircraft. You make no effort to suppress a feeling of satisfaction as the big jet thunders down the runway, lifts its nose and climbs swiftly into the clear blue autumn sky.

THE TACTICAL MAP AND YOU...

CW2 Nile L. Harter Jr.

Because of repeated requests for copies of this article, the DIGEST is carrying it again. It originally was published in October 1970

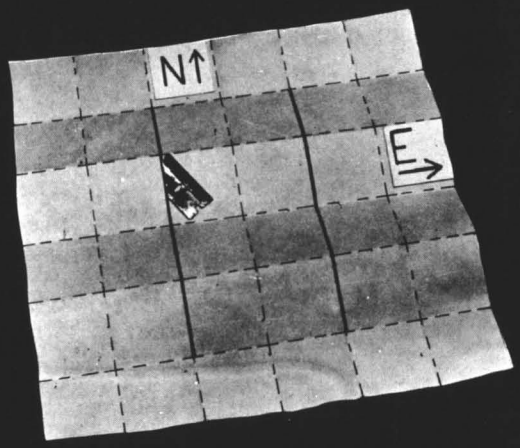
DURING MY LIMITED and somewhat trying career as an Army aviator, I've learned, like many before me, that the best source of information is the "grapevine," better known as the chain of command. Information flows from Senior aviator to student pilot and back again in a never-ending stream of knowledge. All aviators encounter and relate many problems daily, some of which are specifically related to a particular aircraft class and type, and others which pertain to aviation particulars that every pilot is likely to experience sometime during his career. Having been recently counseled and enlightened on one of those so-called common problems by a Senior aviator, I would like to share my findings with fellow aviators and make my contribution to that valuable grapevine.

Most publications used for instrument flight and radio navigation are not only designed for quick reference but are also physically small and easy to use in the cockpit. Most charts used for instrument flight come prefolded for systematic use in a limited-space compartment. But, what about visual flight publications and more specifically charts used in a tactical or less formal situation that an aviator might encounter while flying missions outside the continental United States?

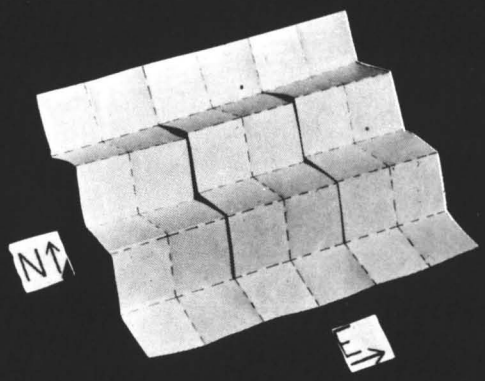
How about the aviator who must navigate by reference to a tactical or geographical type chart using the pilotage method? He must be, as they say, outside as well as inside the cockpit with his head on a good swivel using an unfolded 33 x 40 inch, 1:50,000 scale tactical chart wadded or stuffed in his lap in an already cluttered cockpit. How many ways do you know of folding a chart for quick and easy reference, small enough for storage in the pocket of your flight suit and efficient enough to provide an excellent tool for visual navigation?

#3 Open map face up, east at top . . .

fold in half turning top edge down to meet bottom edge and then repeat step #2

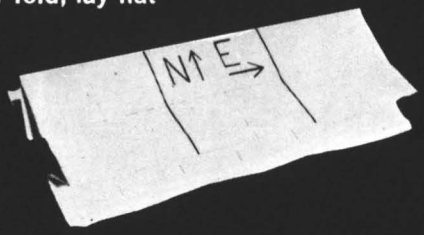


#4 Open map, lay flat north at top and with sharp blade neatly cut along heavy lines (dotted lines represent folds made)



#5 Disregarding cuts, using folds previously made, fold into parallel east and west sections

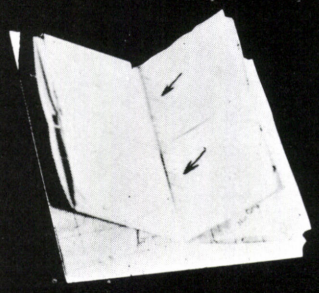
. . . open to center fold, lay flat



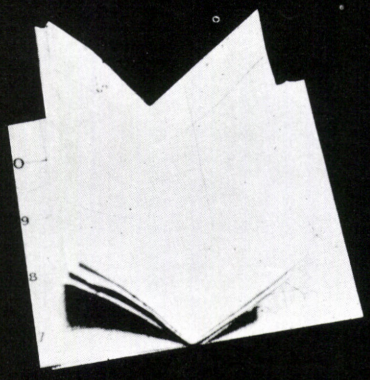
#6 Disregard cuts, using folds previously made, fold into parallel north and south sections

. . . open to center fold, lay flat

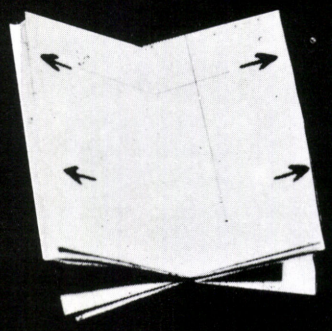
#7 Turn map over as it is now folded and using a single strip of tape form a binder (tape) as illustrated

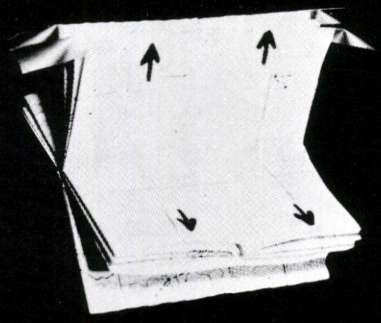


#8 Turn map over and using taped folds as a binder (step #7) you should now have a three-section, two-page book-map

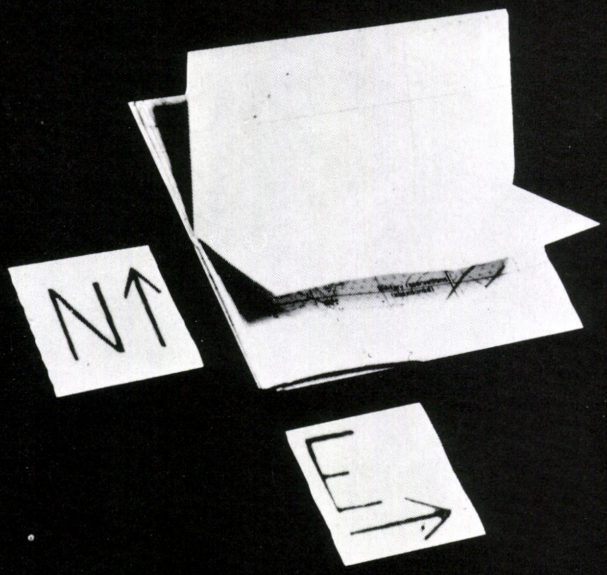


#9 To finish the book-map for use, tape or glue the eight places where the edges you have cut come together (two places at each arrow)





#10 If the map has been properly folded, cut and taped, you will find that there are not only three usable sections from east to west but each of those sections can be folded north or south as desired. There are three usable sections folding north and south within each usable section folding east and west



Following step #10 your book-map should be ready for use, however, the addition of cardboard covers and gluing down of loose corners will prolong service and add to the durability. With little practice one will be able to navigate with ease to any given point on the map by simply folding or turning sections north, south, east and west. Good luck

SQT

Portions of the following article were borrowed from an outstanding report which was written by Master Sergeant Bruce N. Bant as it appeared in the October 1977 *Soldier's* magazine

SFC Carl S. Harris
and
Perry L. Gary

Directorate of Training Developments
Fort Rucker, AL

THE SKILL qualification test (SQT) is more than just a testing program. It is also a training and a personnel management program. The SQT for your military occupational specialty (MOS) is an important part of the Enlisted Personnel Management System.

The basic feature of your SQT is that it is "task-oriented" and is divided into two parts or components. These are the written component and the performance certification component. Many hardworking men and women have expended a great deal of effort developing your SQT. The majority of the work was done by noncommissioned officers (NCO) who are experts in your MOS. These NCOs and education specialists analyzed each MOS and determined which tasks were critical for each skill level. This was done primarily by studying your Soldier's Manuals, conducting interviews and observing Soldiers at work.

To make sure that these lists of tasks (or task lists as we call them) were correct, visits were made to units in the U.S., Korea and Germany verifying and changing items as required. Because of this, the SQT tests your ability to perform those tasks which have been determined to be critical to your MOS and skill level.

Each part of the SQT is broken down into tasks—we call them scorable units. Each scorable unit presents you, the Soldier, with a real life situation that you might face in your job. For example, a typical scorable unit from the written component may require you to apply the four life-saving steps. You are told that you must answer six of eight questions to pass (or to receive a "Go" as we call it) that scorable unit. If you do not answer at least six of the eight questions, a "No-Go" (fail) is given. One point is given for each "Go." No points are awarded for "No-Go." Soldiers are scored only on the total number of scorable units tested.

Your SQT will have at least 40 scorable units. The total score is based on the number of "Go's" received divided by the number of scorable units. If a Soldier receives a "Go" on 30 scorable units out of the 40 given, then this Soldier would receive a score of 75 percent ($30 \div 40 = .75$). A score of at least 60 percent verifies a Soldier's current MOS. A score of 80 percent means that the Soldier has qualified for award of the next higher grade level. Of course you don't get promoted automatically since other considerations also enter into promotions. Time-in-grade, time-in-service, adequate promotion points and good duty performance also have to be met.

Responsibility for scoring and distributing the test results rests with personnel at U.S. Army Training and Doctrine Command, Ft. Monroe, VA.

The personnel of the Army Aviation Center, Ft. Rucker, AL wish to develop an SQT which is both valid and fair. Therefore, we are providing you with an opportunity to comment on the SQT after you have taken it. Let us know how we can improve your test by either writing directly to us or by filling out the following questionnaire. The address is CDR, USAAVNC, ATTN: ATZQ-TD-TAD-TD, Ft. Rucker, AL 36362. We will answer as many of the questions as possible in a subsequent issue of the *Aviation Digest.*

SQT QUESTIONNAIRE
FOR
71P, 93H and 93J

NAME (Optional) _____ UNIT _____
MOS _____ RANK _____ DUTY POSITION _____

1. Was the SQT a valid check of your knowledge in your MOS and skill level?
   _____Yes _____No (Please explain)

2. Are there more important tasks in your MOS and skill level that were not tested but should have been?
   _____Yes (Please explain) _____No

3. Were the questions and answers fair?
   _____Yes _____No (Please explain)

4. Did you have enough time to finish your SQT?
   _____Had too much time
   _____Needed more time
   _____Time was just about right
5. Were all the question topics covered in your Soldier's Manual?
   _____Yes _____No (Please explain)

6. How well did the SQT Test Notice help you in preparing for the SQT?
   _____Right on target
   _____Helped some (Please explain)

   _____Did not help (Please explain)

7. When did you receive your SQT Test Notice?
   _____At least 60 days before the testing period
   _____Less than 60 days before the testing period
   _____Did not receive at all
8. Name the one thing you disliked most about the SQT.

9. Name the one thing you liked best about the SQT.

10. If you had the authority, what is the one thing that you would change in the SQT?

Additional Comments:
Reference Question number _____.

Reference Question number _____.

Other:

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Officer Personnel Management System

OPMS CORNER

Aviation (Active Army) Warrant Officer Training Program

Reprint From *Focus*

CW4 Bob Wood
Warrant Officers Division
U.S. Army Military Personnel Center

THE AVIATION Warrant Officer Training Program is outlined in AR 611-85, "Selection of Enlisted Volunteers for Training as Aviation Warrant Officers." Training is conducted at the U.S. Army Aviation Center at Ft. Rucker, AL. Upon successful completion of training, personnel are appointed as warrant officers and are required to serve on active duty for 4 years with the opportunity to serve beyond the initial period under various retention programs. Currently, about 600 personnel are selected each fiscal year from all applicants to fill vacancies in classes starting every 2 weeks. The current training program affords 44 weeks of training in rotary wing aircraft (helicopter).

Eligibility Criteria. Current eligibility criteria for applicants to apply for acceptance into training are:

- Active Army enlisted member (both male and female).
- Have completed basic training.
- Have at least 2 years remaining before estimated time of separation when orders are issued to attend training. Personnel may request necessary extensions of service or reenlist to meet this requirement subsequent to application approval.
- Not currently serving on a stabilized assignment unless the period of stabilization is waived by the major commander for the purpose of applying for and attendance at training.
- Not be in receipt of alert for overseas assignment. Personnel so alerted may apply for training not earlier than 1 year prior to date eligible for return from overseas (DEROS) and should apply not later than 9 months prior to DEROS.
- Not be flagged under AR 600-31, "Suspension of Favorable Personnel Actions."
- Have no past record of court convictions or have been adjudged as a juvenile offender. In exceptional cases personnel may request waivers provided immediate commanders recommend approval of such waivers.
- Have not been eliminated or resigned from a course of military or military sponsored flight instruction for any reason.
- Possess a favorable National Agency Check (favorable Background Investigation is required for alien personnel). Personnel who do not possess the required favorable investigation still may apply provided the required investigation is initiated concurrently with submission of the application.
- Have completed 2 years or more of a college level civilian education. Personnel who have completed a high school or equivalent level of civilian education may still apply; however, preference will be afforded to the applicant who possesses the preferred level of civilian education.
- Have a recorded general technical (GT) score of 110 or more. Such score should have been attained on initial testing; however, personnel who have attained 110 or more on a subsequent retesting may request a waiver of the initial test achievement and may apply.
- Have attained a composite score of 300 or more on the Flight Aptitude Selection Test—Warrant Officer Battery (FAST-WOCB). Prospective applicants should be cautioned, prior to having the test administered, that failure to attain the required score of 300 will preclude application and that retesting to achieve the required score currently is not authorized.
- Successfully achieve Class I medical standards for flying under AR 40-501, "Standards of Medical Fitness."
- Must be between 64 and 76 inches in height.
- Must agree to accept appointment as a warrant officer, United States Army Reserve, and agree to serve on active duty for a period of at least 4 years upon successful completion of training.

Applicants should contact their commander and/or servicing military personnel office for details and necessary assistance in preparing an application. Interested personnel may contact Headquarters, Department of the Army at AUTOVON 221-7845.

U.S. ARMY

AVIATION STANDARDIZATION

Directorate of Evaluation/Standardization

REPORT TO THE FIELD

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362; or call us at AUTOVON 558-3617 or commercial 205—255-3617. After duty hours call AUTOVON 558-6487 or commercial 205—255-6487 and leave a message

UH-60A Black Hawk

A New Challenge To Army Aviation

IN HIS ARTICLE, "The Aviation Center Will Meet the Challenge," published in the January 1978 ***Army Aviation*** magazine, Major General James C. Smith, then commander, United States Army Aviation Center and Ft. Rucker, stated: "A comprehensive and innovative training program is mandated to maximize the increased combat effectiveness of the UH-60A." He also wrote about exportable training for this new aircraft.

For those in the Army aviation community charged with extracting maximum mileage from our training resources (personnel, machine and money), General Smith's comments mean that the aviation training and standardization people have a lot of work to do in integrating the UH-60A into the force structure. Much of this work is and has been ongoing for some time. Institutionally developed training programs are ready or nearing readiness at the Aviation Center for UH-60A aviator and instructor pilot qualification. Similiar work is ongoing at the U.S. Army Transportation School and Center, Ft. Eustis, VA for training maintenance personnel.

Although much work is ongoing at these two centers in preparing for the introduction of the Black Hawk to the field, it should be pointed out that the large work force of the Aviation Center and Transportation School/Center will not be available to unit trainers at their local unit sites. In lieu of traditional centralized school training for pilots and maintenance personnel, a new decentralized training methodology for new equipment training teams, instructor pilots and standardization instructor pilots to assume responsibility for ensuring that quality training is achieved in the UH-60A is envisioned.

To ensure success, key trainers must develop comprehensive *unit* training programs from the training and material they received at the appropriate schools. This methodology must ensure the capabilities of the UH-60A are fully realized. This will not be a simple task.

The Black Hawk is an advanced design helicopter, yet it has a relatively uncomplicated cockpit. Because of the innovative and advanc-

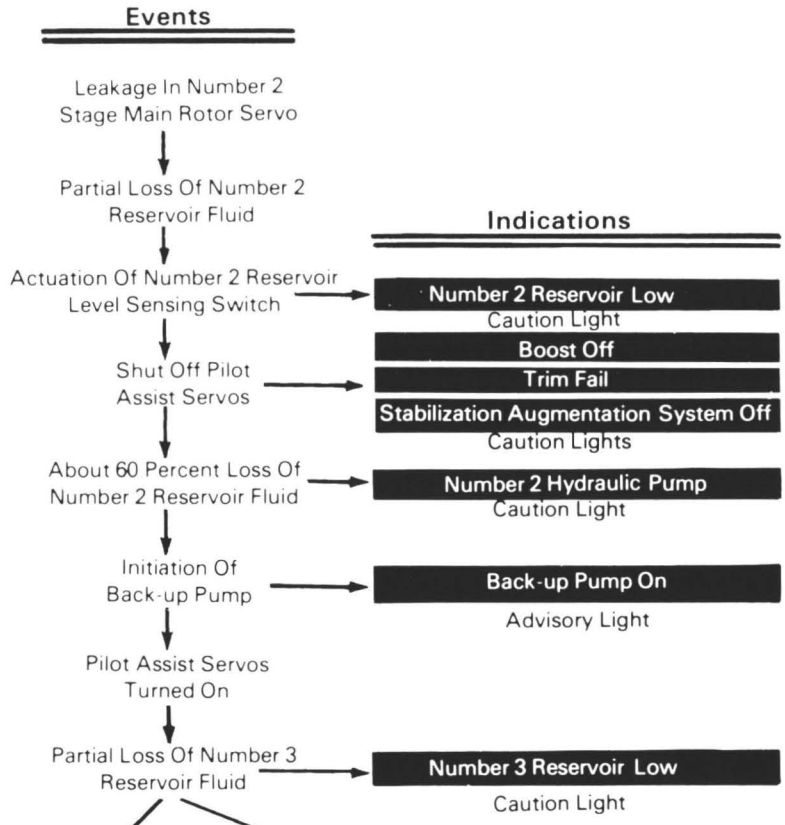
ed design of this aircraft's systems, performance, reliability and survivability are greatly improved over previous helicopters.

While the cockpit of the UH-60A is uncomplicated, this is true only for aviators who know the aircraft systems thoroughly, and who can use that knowledge to efficiently analyze the cockpit indicators.

Let's look at some of these indicators. The UH-60A has a systems failure indicator that is truly a credit to its designer. It uses all the usual lights for warning, caution and advisory of systems condition. It also has a fault isolation feature that identifies some systems failures in sequential display. For example, if a malfunction were to occur, the cockpit indicators would alert the aviator that a fault exists. If the fault continues to degrade the systems capability, additional indicators will appear in the cockpit, which allows the aviators to analyze the malfunction and its effect on aircraft performance. In many cases, with proper and timely actions, the aviator is able to limit the progression of an emergency and save the mission.

To illustrate the system failure indicator, the figure at the right is a hypothetical emergency situation as it might occur in the UH-60A and is typical.

The example points out that pilot actions determine the ultimate effect of this system fault. If the illustrated condition were allowed to degrade to failure of the systems listed under "No Pilot Actions Taken," the aircraft must be landed as soon as possible. Conversely, loss of the only no. 2 main rotor primary servo has no effect on aircraft capability. However, the crew must be aware that loss of the remaining no. 1 main rotor primary servo would result in the aircraft being uncontrollable. The teaching point is that the pilots taking proper corrective actions have the option to land or continue flying depending on the situation (combat versus training, for example).



It should be obvious that teaching aircraft systems will be a significant part of UH-60A aviator qualification training. Simply reading the operators manual and basic stick and pedal flight instruction will not be sufficient to qualify an aviator in the UH-60A.

Two of the UH-60A systems which will require emphasis by unit trainers are:

• Command instrument system, which is an integrated navigational system based on a central computer that processes signals from navigation; and

• Flight instrument systems which provide visible *steering commands* for the pilot and copilot. Note that

"steering commands" has been emphasized with italics. The crew must still fly the aircraft to achieve the desired results.

This advanced system, in conjunction with a Doppler navigation system, provides a new and improved approach to instrument and tactical flying for Army aviators and requires a high degree of proficiency for the aviators to fully use its capabilities. The task of teaching these two advanced systems should be simplified when the UH-60A flight simulator is delivered to the field in late 1982.

Another consideration in the UH-60A aircraft systems will be the management and use of two engines. There will be a requirement for single engine operation and proficiency for gross weight conditions up to 16,450 pounds. (Alternate gross weight is 20,250 pounds.)

Along with managing two engines, UH-60A pilots must be taught to fly as a team. The operators manual will list specific duties for pilot and copilot. Specific pilot and copilot duties will be new to most Army rotary wing pilots and probably will require training in both crewmember stations.

Interfacing the UH-60 with TC 1-135, "Utility Helicopter Aircrew Training Manual (ATM)," will be another important task for units assigned this new aircraft.

The UH-60A training requirements in the current ATM reflect, to some degree, "best estimates" based on limited training experience and may need to be changed to better serve the user. The need for changes will most likely surface in the field, which means the unit training and standardization members must be especially prompt in providing input to the Aviation Center to ensure the best possible training support is provided expeditiously.

One can readily see from the integration of the UH-60A into Army aviation units that the challenge to Army aviation training and standardization is clear. The best possible training programs must be developed and implemented to ensure that maximum mileage is gained in Army aviation combat effectiveness with the new Black Hawk helicopter.

This thought is left with the reader: As the UH-60A is issued to the field, it will provide the forum for aviators responsible for training and standardization to demonstrate that the decentralized aviation training concept can and will be highly efficient and standardized.

THE THREAT

TODAY THE emphasis is on a well-trained, well-educated Army aviator. The education process does not stop with graduation from flight school. On the contrary it is just the beginning. The aviator, just like any other professional person, must keep up with the ever-changing world.

THREAT is one of those ever-changing areas. Knowing your enemy and training to fight are necessary keys to survival on the modern battlefield. What you don't know will hurt you.

Where is all this threat information? The S-2 or unit threat officer is the point of contact that can supply you the most up-to-date information on threat. Your unit already may have a great deal of threat information on hand. Also check with the unit publications officer or noncommissioned officer to find out what is available in your unit library.

A list of unclassified training literature and how to order it is available by calling AUTOVON 558-3500/3512/4709 or commercial (205) 255-3500/3512/4709; or by writing Commander, ATTN: ATZQ-D-CS, Ft. Rucker, AL 36362.

Official Army policy on drinking and flying is contained in AR 40-8, "Temporary Flying Restrictions Due To Exogenous Factors." It restricts individuals from flying for 12 hours after the last drink is consumed and until no residual effects remain. Consumption of intoxicating amounts of alcohol may well result in individuals still having significant blood alcohol levels at 8 hours and/or suffering from a "hangover" far beyond 12 hours after the last drink. Either way, flying is restricted until *no residual effects* remain.

Office of the Surgeon General,
Headquarters, Department of the Army.

Flying The Morning After The Night Before

Dr. Leon M. Wise
Director, Aviation Psychology Laboratory
Heidelberg College
Tiffin, OH

THE AVIATION Psychology Laboratory at Heidelberg College experimented with alcohol as a variable in flight safety more than 10 years ago. We used a static single engine jet flight simulator and a .08 percent blood alcohol level (not considered an intoxicating level by many states). Almost without exception our subjects exhibited very serious errors of omission.

These errors, had the aircraft been real, frequently would have resulted in fatal mishaps, and at least would have resulted in placing the plane and its occupants in potentially dangerous attitudes and situations. The most interesting finding overall was that the effects of the alcohol were greatest on those "pilots" who, on nonalcohol flights, had shown themselves to be the smoothest, best coordinated, most flawless and coolest under pressure.

79 percent of all subjects under influence failed to correct at least one major error

If they were relaxed when they mounted the flight simulator, this condition was drastically changed by the alcohol and performance deteriorated accordingly.

Behaviors such as dumping fuel, inadvertently putting the landing gear down at high speeds, placing the aircraft in unrecoverable attitudes, and attempting to land at 10,780 feet rather than 780 feet, the local field elevation, are but a few examples. However, so that these findings could not be attributed to chance, we repeated the experiment using different subjects with basically the same results. A summary of these findings was published (*Tac Attack,* June 1973).

A follow-on study then examined the effects of alcohol on errors of omission, e.g., forgetting an important function or overlooking an important detail. For this study we used the same simulator but were interested in how accurately subjects could follow a preflight checklist. In the case of our simulator, 78 items comprised the checklist which each subject took on every flight. The task in this experiment was basically the same as that of any pilot: to begin with the first item and, sequentially, perform each function listed continuing systematically down the list until all items had been completed.

Prior to all flights, the experimenters, without the knowledge of the subjects, preset several errors:

- brakes *Off,*
- landing gear handle *Up,*
- altimeter mis-set by 1,000 feet.

Close adherence to the checklist should have caught all of the preset errors. Each subject "flew" two test flights, one without alcohol and about 1 month later, one with alcohol (.08 percent blood alcohol level). The results were as follows:

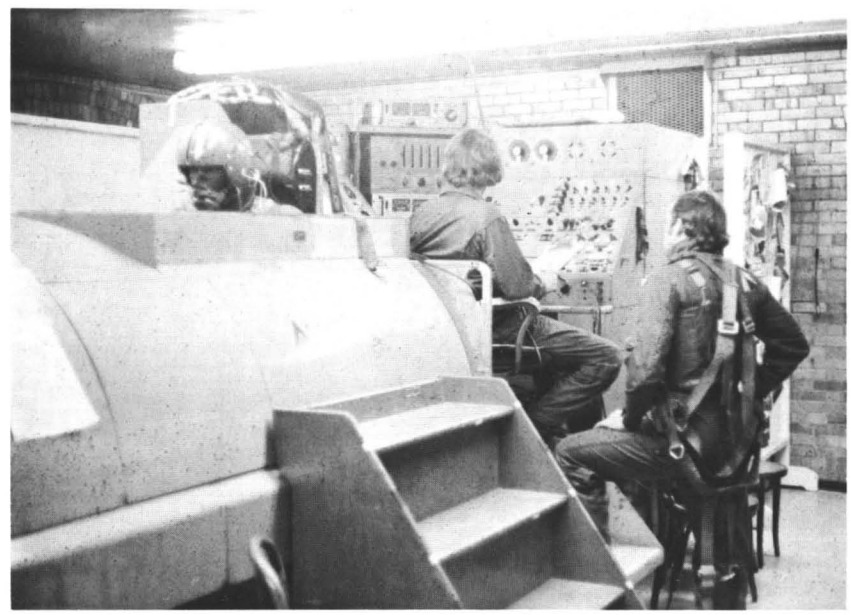
- Under the no-alcohol condition, 11 percent of all subjects failed to correct at least one major preset error.
- Under the influence of alcohol, 79 percent of all subjects failed to correct at least one major error.

These pilots, it should be remembered, were considered legally sober and capable of driving an automobile in most states. Some of these data were also published (*Allegheny Air Lines Quarterly,* November 1975).

Most of our experiments were conducted in the late afternoon or early evening. We noticed that some of our subjects complained in class

Subject scans instruments during test

the following morning that they still "felt lousy" due to the previous day's flight. A check of the literature showed that the amounts of alcohol ingested essentially should have metabolized easily within 10 hours after drinking. In addition, from perusal of airline publications and military aviation journals it also was noted that the general rule of thumb for social drinking recommended to pilots was to allow 8 to 12 hours between "bottle and throttle." It was our thinking at the time, that, although there was no longer any detectable alcohol in the blood, hangover effects might still produce



Simulator and control panel used in test

Technician presets errors in simulator prior to test

a decrease in performance of complex tasks such as the psychomotor responses required in flying. Our most recent study followed this line of reasoning and we set out to test the so-called "hangover" or residual effects of alcohol. It is presented in abbreviated form here.

The subjects were male and female undergraduates. The primary apparatus was a modified C-11C Jet Flight Instrument Trainer, a completely instrumented static single engine simulator formerly used in the instrument training of military pilots.

The subjects already were familiar with preflight, inflight, and postflight checklist responses and the basic of flying prior to the experiment proper. A 6 by 9 inch card containing a detailed checklist was given to each subject and all subjects were told to adhere to it religiously. This was followed by actual "hands on" simulated flight consisting of takeoff, climbout, leveling at altitude, and full stop landings. When the subjects reached the point where they could successfully handle these fully checklisted "flights" at least three times consecutively without the slightest error, the experiment proper was begun.

After this pretraining but before the first test flight (nonalcoholic), the following errors were preset by the experimenters:

- brakes were placed in the *Off* position,
- landing gear handle was put in the *Up* position,
- fuel select switch was placed on *Auxiliary Tanks,*
- dive flap switch was put in the *Down* or *Extended* position,
- wing flaps were set at 50 percent,
- altimeter was adjusted to 1,000 feet above local ground level.

At the preflight briefing each subject was told to takeoff, climb to 6,000 feet, and maintain that for 5 minutes. When requested to do so, the subject was to prepare for a landing and complete the landing at his discretion. The main data for the nonalcoholic flights consisted of the number of preset errors each subject failed to correct prior to takeoff.

The only essential difference between the above described flights and the second test flights (alcohol), was that 30 minutes before the alcohol flights, each subject was given enough 80 proof vodka to attain a blood alcohol level of .10 percent (the minimum legally intoxicating level in the State of Ohio and many other states) and mixed with an equal amount of ginger ale.

Finally, a third test flight was given 14 hours after the alcohol flight.

The results were interesting to say the least. During the first test flight (nonalcohol), 10 percent of all subjects overlooked at least one of the major preset errors. For the alcohol flight, 89 percent of all subjects made at least one oversight error. Fourteen hours after alcohol intake, 68 percent of all subjects still overlooked at least one preset error! It is apparent that performance 14 hours after alcohol intake was much more like that 30 minutes after intake than that of the first nonalcohol flight.

This evidence suggests that although most, if not all, of the alcohol had been processed through the body during the 14 hours following intake, the residual effects were contributing to this performance deterioration. I suggest all professional pilots be made aware of this residual effect and that they rethink and possibly recalculate the margin of safety implicit in the old rule of thumb, 8 to 12 hours between "bottle and throttle."

14 hours after alcohol intake 60 percent of subjects still overlooked at least one preset error

The Facts About ALSE

IN LATE 1966, USAAAVS (now the U.S. Army Safety Center) decided to take on the job of telling you everything you wanted to know—and probably some things you didn't—about aviation life support equipment (ALSE).

With Vietnam came speedy development of new and much needed survival gear and along with it an avalanche of questions on how to get it, wear it, maintain it, and use it. Since there was no single source for the field to turn to for answers—and realizing the safety payoff from the proper use of personal equipment—we created PEARL (an acronym for Personal Equipment and Rescue/Survival Lowdown) to be our chief advisor on *all* ALSE matters.

But in October 1977, all this changed. Realizing the multiplicity of problems associated with survival equipment, the Army established an ALSE office at DARCOM and appointed a project officer to deal specifically with these problems and to provide information and guidance to the field. Consequently, answers to questions concerning the Army's ALSE program, the establishment of an ALSE MOS, logistical support, and other problems *must* come from the DARCOM project officer.

Although we will continue to report to you regularly on the effectiveness of your ALSE from a safety standpoint through FLIGHTFAX, please bear in mind that we are not the proponent agency for survival equipment. Until ALSE problems are resolved, we offer the following suggestions:

- Establish a library containing the publications for inspecting and using ALSE effectively. Presently, there are two publications available which list all current ALSE publications and which can be obtained from the DARCOM ALSE project officer.
- Train your ALSE personnel. Both the Air Force and Navy have ALSE courses for officers and enlisted personnel which are available to the Army. Although Army personnel will be exposed to some equipment unique to these sister services, the courses provide a good background in ALSE and serve as a guide for establishing an adequate unit ALSE program for Army units. Courses range in length from 2 weeks and 3 days to 10 weeks and must be locally funded. Again, DARCOM can assist you with any additional information about these courses.
- Familiarize ALSE personnel with the Army sup-

UNIT-LEVEL LIFE

This article by CW2 Craig C. Laing, published by USAAAVS in a previous issue of the *Digest*, is being reprinted to show how one unit solved its problem in maintaining and repairing life support equipment.

U.S. ARMY SAFETY CENTER

Harness being sewn to ensure individual optimum fit

ply system. Since much of our ALSE is either Air Force or Navy equipment which has been adopted for Army use, it is imperative that supply personnel know how to properly procure the equipment. The Army Master Data File (AMDF) normally lists all items of equipment used by the Army. However, as the Army uses many items that are managed by the Air Force and Navy, some of this equipment may not be listed in the Army AMDF. But this doesn't mean that you can't get it or that the equipment is not available. It simply means that you must hand-process the requisition "off-line" to the Air Force or Navy managing activity of the equipment.

• Include a section in your unit SOP listing the required ALSE for your particular geographical area and how it should be used. For example, the Army's SRU-21/P is a universal survival vest, but its contents can be tailored to suit your particular operating environment. The contents of the vest should be evaluated to determine whether they are appropriate for your environment. Since most of these items are expendable, they can be procured with locally available supply funds and added to the vest.

• Identify and project separate funds for maintaining and replacing ALSE. Failure to allocate funds for this purpose places ALSE personnel in a situation in which they cannot possibly comply with serviceability and replacement standards.

• Designate an ALSE officer and an ALSE NCO who will be responsible for your ALSE program guidelines and equipment utilization and maintenance.

• Ensure that EIRs are submitted in accordance with TM 38-750 on equipment which does not provide adequate protection, perform as designed or fulfill your needs, or which hampers the user when performing his duties.

When initiating your unit ALSE program, you most likely will require additional information. Whether it pertains to this area, the status of the ALSE MOS, or supply, maintenance, or use of ALSE, you should address your queries to DARCOM, ATTN: DRCPO-ALSE, P.O. Box 209, St. Louis, MO 63166, or call Mr. A. B. C. Davis, AUTOVON 698-3241/3291. Mr. Davis is the DARCOM ALSE project officer and is responsible for providing the field with answers and guidance on problems encountered on a day-to-day basis. In addition, he serves as the DARCOM representative on the Army Life Support Equipment Management Steering Council, an organization which directs and guides the efforts of the Army's emerging ALSE program.

Meanwhile, don't forget us. Should you encounter problems with your ALSE equipment that affect safety, write the U.S. Army Safety Center, ATTN: PESC-AT, Fort Rucker, AL 36362, or call AUTOVON 558-4202/3913.

SUPPORT SECTION

THIS IS EAGLE 246. Request immediate descent to one two thousand, over."

"Eagle 246, are you experiencing any problems?"

"That's affirm; my oxygen mask has malfunctioned."

"Eagle 246, you are cleared to one two thousand feet; report reaching."

"Roger. We are leaving two one thousand; we'll call reaching twelve."

Early in 1975, a new aviation company was deployed to the central part of South Korea to conduct U-21 high altitude reconnaissance flights. Each mission required flight above 20,000 feet with only a pilot and copilot aboard. The crew wore the Army A-13 oxygen mask with the SPH-4 helmet for as much as 4 hours' duration.

Toward the end of the first month of flying, I was orbiting at 21,000 feet when I heard a slightly garbled transmission from another pilot at the same altitude. He was requesting an immediate descent to 12,000 feet because something was wrong with his oxygen mask. I imagined him experiencing some of the same symptoms I had encountered once on a high altitude flight in the States —lightheadiness, spots before my eyes, and worst of all, not being able to move or control myself as I normally would have.

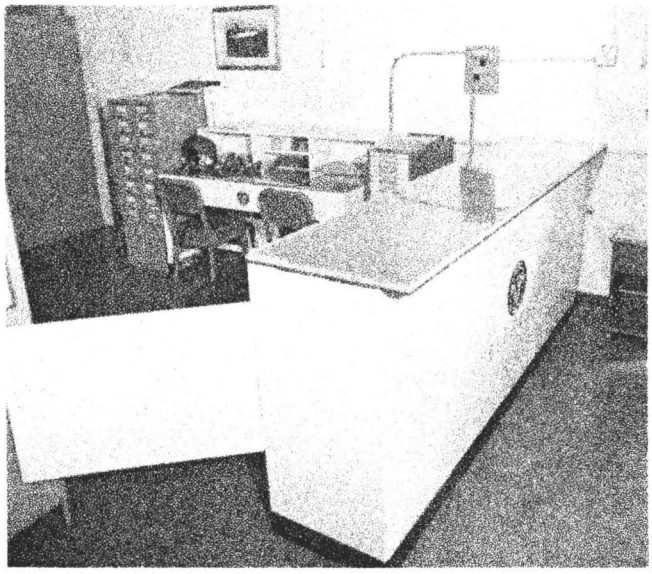
The following week another pilot's oxygen mask exhalation valve malfunctioned. By this time several pilots were beginning to complain about discomfort and fatigue associated with the A-13 mask when used with the SPH-4 helmet. In fact, they began to question how

much thought our higher command had given to essential life support equipment, such as masks and survival vests, and proper fit and comfort of the helmet.

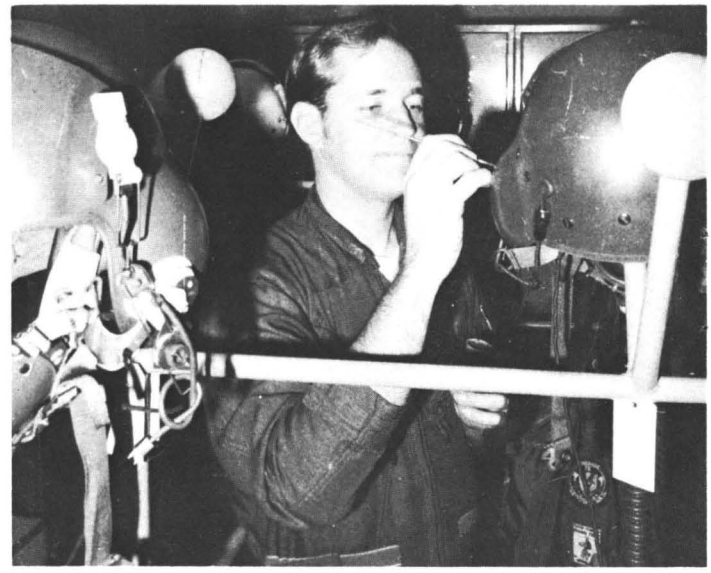
Like myself, a few of the pilots who had experienced similar problems in the States before being deployed to Korea had procured the MBU-5/P Air Force mask as we believed it was more comfortable and reliable than the A-13 Army oxygen mask during prolonged high altitude flights.

As complaints poured in from the pilots wearing the SPH-4 with the A-13 oxygen mask, the safety officer and I realized that something had to be done to prevent compromising flight safety. What we needed was a unit life support section and a specialist to properly maintain the pilot's life support equipment. Great idea! Only one problem—we had no established guidelines, Army regulations or experienced

Life support equipment racks



Flight planning and life support room



CW2 Laing touches up paint on helmet, which is part of the daily inspection

personnel to aid us in setting up such a section. So, we were on our own.

Fortunately, we heard that the Korean Air Force across the field used all American-made equipment and had a good life support shop. A visit to their shop confirmed this and also provided us with some information on how to set up our section. The first thing we needed was equipment racks for storing the helmets and masks when not in use. These racks would also allow for proper drying of the equipment after each mission. The Koreans accommodated us by making two storage racks from old waterpipe we informally procured from the facilities engineers. Within one week, the pipes were straightened, welded together, painted and placed in the flight planning room. The racks were labeled with the aviators' names and they were advised to store their helmets, masks and survival vests (which had been requisitioned) next to their name plates following each mission. This procedure was fully supported by our commander. However, this was just the beginning.

We next found ourselves in the helmet repair business, as maintenance at any level was not available in Korea and it seemed ridiculous to purchase a new SPH-4 just because of a cracked visor or a missing screw. Also, it was a waste of money when at that particular time the helmet cost $170 as compared to, for example, the mike boom assembly which cost only $32. To remedy this situation, we obtained some unserviceable helmets and used their various parts for repair and replacement. Next, we found ourselves cleaning visors, changing mike booms, tightening screws and adjusting the straps on the helmets to ensure a better fit.

Our next project was to informally procure enough properly fitted Air Force MBU-5/P oxygen masks for all our aviators. I spent a lot of time with an Air Force life support specialist to learn as much as possible about care and maintenance of the mask and helmet. Each mask had to be torn down and cleaned with alcohol and Phisohex every 30 days. This took almost half my duty time.

At this point, the commander decided we needed a life support officer. There is no regulation which requires such a position and I was informally assigned as one of the Army's first life support officers.

The next order of business was to requisition repair and replacement parts through Army channels to maintain the masks. Extensive coordination was required before we received these items. Within 2 months after requisition, we had a prescribed loads list of more than 40 line items.

I was then challenged with writing a unit level life support SOP. After studying every existing Air Force Technical Order on life support equipment and conducting personal interviews with Air Force life support equipment specialists, I came up with a workable SOP which I was satisfied could be implemented with the available resources in Korea. This SOP outlined the responsibilities and duties of the life support officer, life support technician and flight crewmembers; the physical layout of the equipment storage racks and life support room; the maintenance requirements of and precautions to be taken in the life support room; and the reference publications to be maintained.

I then drew up plans for a work bench and work counter/storage area, because by this time our work area needed expanding. I also installed four wall lockers to accommodate the growing inventory of supplies and equipment.

On receipt of the survival vests we had ordered, 3 days were required to assemble the vests and explain the use of each piece of equipment to all crewmembers. The survival radio is not a component of the vest and more orders were initiated. When this item arrived, test equipment was needed to check the batteries. We procured two surplus battery test sets (TS-2530/UR, TM 11-5820-800-12, radio set AN/PRC-90) from the Air Force which could be used to test the total charge in milliamps of both the strobe light (marker distress) and survival radio batteries. In addition, we initiated a 30-day inspection period for all vests, checking and testing each item as necessary to include a complete operational check of the AN/PRC-90 survival radio and strobe light. We inserted a card in one of the pockets to show the date of inspection, meter readings of each battery and the inspector's initials.

Presently, our Life Support Section is almost complete and our normal routine consists of cleaning masks monthly, inspecting and repairing helmets, inspecting survival vest components, presenting classes on a wide variety of subjects, indoctrinating new crewmembers on how to use life support equipment and finalizing the prescribed loads list.

Whenever I recall the problems involved in establishing this section, I take much pride in realizing that our unit is one of few which has a life support section. In fact, we have a saying in the unit that "when all else fails, you can depend on our life support equipment."

"I LIKE THE DESK SET..."

SOME TIME AGO, an English instructor tasked his students to draft a letter of complaint to a fictitious firm concerning some item of purchase. The idea was for each student to identify his order, state the problem, make any needed explanations, then close the letter on a cordial note. One student who, perhaps, had imbibed a wee bit too much (or for whatever his reason) wrote the following:

Sneers and Company
1313 Lostluck Avenue
Someplace, U.S.A.
Gentlemen:

The desk set (invoice 15062A) my wife recently ordered arrived intact. However, upon removing the packaged set from the shipping container, we noted it was sealed in cellophane, and therefore, did not open it to check the contents. Consequently, we failed to notice you had inadvertently shipped us an avocado green set instead of the wine colored one we ordered.

Normally, this would have posed no problem. However, this desk set was intended as a birthday present for my wife's mother who suffers from a somewhat peculiar malady that causes her to react adversely and uncontrollably to certain hues of the color spectrum. Avocado green happens to be one of them. Unaware of your error in shipment, we gift wrapped the package in anticipation of the gala event.

Everyone at the party was having a joyous time, especially after the second or third round of drinks, until it came time to sing "Happy Birthday" and have ice cream and cake. Well, we all managed to finish singing at approximately the same time and "Mama," as I affectionately call her, managed to blow out the candles without losing her teeth. But that was about all that went right. Unfortunately, our gift was the first one she picked, and I can still see the look on her face as she opened it. Her cheeks turned pale, her eyeballs caged, then suddenly, like switching off the lights, she zapped out—right into the punch bowl—head first.

Looking back, I admit the situation really wasn't very funny; and I admit if I hadn't been sneaking a few drinks on the side, I wouldn't have found it quite so amusing. I also admit if they hadn't pulled the old gal out, she might very well have drowned. But, at the time, seeing her with that peculiar expression, through the pink punch, with ice cubes, cherries and orange slices floating by, and all those bubbles rising to the top . . . well, I just thought if they'd hold off long enough, I could snap a picture or two with the camera I brought along for the occasion. You know, I figured it would be something we could all look back on and laugh at in the years to come. That was when my wife attacked me.

The verbal barrage she hurled at me wasn't painful at all; but the silver tray across my skull was. While I was busy fending off my wife, "Mama" came to life. It is utterly amazing how vicious a usually sweet, little 98-pound lady can become. Without hesitation, and spurred on by the wild cheers of the guests, she rushed in to reinforce her daughter who was doing all right on her own and didn't need to be reinforced.

What happened next was pure accident. I swear it. And that is exactly how the policeman wrote it in his report after he managed to push my wife aside and pull "Mama" off my chest. All I did was to throw my arm up to ward off what appeared to be a well directed karate chop to my neck when my knuckles accidentally caught my wife across her nose. Right away I knew something was wrong. Her nose appeared slanted towards one side of her face, giving her a rather odd expression, you know—as if she were pointed in one direction and headed in another. Anyway, to make a long story short, the plastic surgeon assures me her nose will look better than ever when he removes the bandages, and will be worth every penny of his $4,500 fee.

Fortunately, money is not a problem. During our 20 years of marriage, I have managed to accumulate a substantial amount of savings, stocks and bonds, and other securities, all of which the judge awarded my wife when he finalized our divorce. He also gave her the house, cars, camper, boat and custody of our children. I got the avocado green desk set.

But while it had an adverse effect on my mother-in-law, the color isn't really that bad. In fact, it enhances the decor of my jail cell nicely, lending a note of cheer to the otherwise drab battleship-gray walls and floor.

Please believe me, I am not a common criminal and have never been in jail before. It's just that the more I studied the judge's protruding teeth as he mouthed away all my belongings to my former wife—except, of course, the avocado green desk set—the greater was the urge to poke my fist into his fat face. I guess I am the impulsive type. Anyway, when I

could no longer resist the temptation, I laid one on him. I know I shouldn't have done it, and I really felt sorry afterwards. However, in time, I think he will not only forgive me but also thank me. I am certain when the orthodontist straightens the teeth I jarred loose and replaces the broken ones, he will look much better than he did with all those horrible buck teeth. Who knows, he may even drop the lawsuit he has initiated against me. Right now, however, I suppose I should concern myself with finding another job.

I don't hold a grudge against Vanderbolt, Robespiere and Morguatroit Associates for discharging me. After all, a highly respected firm such as theirs cannot afford to retain a senior vice president whose reputation has been somewhat tarnished. But I must admit, it will be difficult having to start at the bottom again. Fortunately, there is a bright side. Without the responsibilities of a house, cars, camper, boat and family, my needs are much less than before.

One good thing has come out of all this. I discovered I have a chronic back ailment I never knew I had. But after pacing back and forth across the concrete floor of my cell and sleeping on the irregularly-surfaced mattress provided me, my back trouble showed up. I can hardly sit or lie down, and when I do, any effort to change my position brings on excruciating pain. I am so glad I found out about this trouble.

Please don't think me a chronic griper. I am writing this letter only because I felt you might want to casually ask your shipping clerk to be a bit more careful when processing orders. Obviously, even a slight error, insignificant as it may seem, can sometimes cause a customer some degree of inconvenience, however small, as occurred in my case.

Personally, I like your avocado green desk set very much, and I thank you for your promptness in shipping it in time for the birthday party.

Yours very truly,
Don Haddit

Well, it's doubtful this student's letter satisfied the requirements the instructor had in mind; but it does embrace a point or two worth noting, and does have its parallel in Army aviation.

How many times has a "slight error" on the part of a mechanic caused "some degree of inconvenience" to the pilot? How many times has failure on the part of a technical inspector (TI) to verify the contents "packaged" by the mechanic caused a similar problem? And what about the pilots? How many times have they been "inconvenienced" because they didn't bother to check the "product" handed them? Every week we find examples in FLIGHTFAX. The following are typical:

- A CH-47 developed airframe vibration as a result of restricted fore and aft movement of the synch shaft splined adapter at the combining transmission. The adapter spline had not been lubricated.
- The No. 2 hydraulic system of an AH-1 failed on landing. The cause was an improperly torqued fitting at the lateral servo.
- Fluid was seen coming from the battery vent of a UH-1. Inspection revealed the voltage regulator was set too high.
- The pilot of an OH-58 felt the tail rotor pedals binding during takeoff. An avionics cannon plug for an uninstalled radio was found wedged between the center console and the tail rotor push-pull tubes.
- The pilot of a U-8 noted a drop in No. 2 engine rpm of approximately 800. Maintenance personnel had failed to safety the propeller link assembly during the previous maintenance inspection.
- A U-21 pilot noted fuel siphoning from the right nacelle tank following takeoff. Inspection of the filler neck revealed the lip was bent, preventing proper sealing. A similar problem on another aircraft occurred because the cap had not been properly installed. As a matter of fact, during a 13-month period, U-21 fuel and oil problems included seven improperly installed fuel caps, one loose filler cap, three bent cap wells and four improperly installed oil caps.
- An OH-58 ground accident occurred recently after the engine was started with the throttle left open. The engine accelerated rapidly and the pilot could not abort the start because N1 was binding in the open position. During maintenance, the N1 bolt was tightened excessively and no movement between the torque tube and the bellcrank was possible. Neither the mechanic, TI, nor the pilot ensured freedom of throttle movement during their respective checks.

In contrast to these examples, a test pilot did check his aircraft before flight and not only saved himself some embarrassment but also earned a WELL DONE. The aircraft, an OH-58, had been readied for flight following replacement of the main rotor hub grip seals. The work had been inspected and signed off by the TI. During his preflight inspection, the pilot noted the blades had been installed backwards.

Granted, because of our fallibility, any one of us can inadvertently make an error. That's why we have a set of checks and balances. But when we fail to follow stipulated procedures, we invalidate these checks and balances and lose our protection. This brings up the first point: Regardless who makes the error, it is usually the pilot who pays the penalty. The second point, then, becomes quite clear: Following by-the-book procedures in all areas of aviation offers the best protection possible. It's simple to do, extremely effective and the best possible way to ensure we don't get stuck with an avocado green desk set.

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

If you have a question about personal equipment or rescue/survival gear, write Pearl, DARCOM, ATTN: DRCPO-ALSE, POB 209, St. Louis, MO 63166

In The Dark

Normally you should find the compass, lensatic NSN 6605-00-151-5337 in your SRU-21/P survival vest. However, due to the shortage of this item, a substitute compass, NSN 6605-00-515-5637, is furnished instead.

The compass was intended to keep you on the straight and narrow road to survival, and the substitute compass will do just that in the daylight, but in the darkness you will find that you are really in the dark. The substitute compass *does not* have a luminescent dial or face that can be read in the dark. We are aware of the problem and will try to get some light (luminescent) back into the compass.

But what should you do, if you find yourself in a survival situation without a compass or a compass that you cannot see? Unless you can see the stars, and have confidence in obtaining your desired direction from them — or some landmark that you can follow in the darkness — stay put and sit it out for the night. You could break a leg, or severely injure yourself in the darkness, which may prevent you from walking or signalling the search party when daylight comes.

PPPPP

The Army is not blessed with having aviation life support equipment (ALSE) technicians, such as our sister services have. The Air Force and Navy have these technicians for one reason — an established requirement. We feel the Army also will recognize this requirement in the near future, and have trained specialists to assist our aircrews in completing every flight, and surviving those flights that are not completed.

In the meantime *you* are your best chance for survival. Be familiar with your ALSE, how to wear and use it. Many aircrewmembers buy personal items of ALSE that may not be found in your GI kits, such as extra dehydrated meats or foods, candy, matches, socks, tea, coffee, chapstick, first aid equipment, mirrors, etc. One aircrewmember sat on a vacuum packed sleeping bag all night, ignorant of its real use — the aircraft was down in Greenland!

Your chances of being rescued and surviving every survivable crash is very very good, but **P**rior **P**lanning **P**revents **P**oor **P**erformance.

Where To Wear It

Just to make sure that we all look like we are in the same Army, there is a prescribed way of wearing your insignia and nameplates on your flight clothing.

Army Regulation (AR) 670-1 will tell you where to wear nameplates and insignia on your clothing or flight uniforms.

This AR also advises that local commanders may authorize the wearing of solid color baseball caps, by the aircrewmembers and ground crewmembers. This means wearing of the baseball cap on the ground only. Your SPH-4 flight helmet always should be worn while testing your aircraft on the ground or leaving the ground.

Winter Sunburn

Sunburn is possible in very cold climates in the winter seasons. Winter air is often very clear with low humidity, which allows the sun rays to affect exposed skin in some instances, nearly as much as if you were on a tropical beach. So petroleum jelly (Vaseline), chapstick and sunburn preparations should be considered as part of your winter survival scheme.

The U.S. Army Medical Materiel Area (USAMMA) has advised that the GI sunburn preventative preparation cream, NSN 8510-00-162-5658, is not effective in the prevention of sunburn. USAMMA recommends that this item, manufactured by Hillcrest Labs, DSA contract 400-67-C-2971, and Octagon Process Inc, DSA contract 400-68-C-1732 be destroyed in accordance with paragraph 3-48A of AR 40-61 and paragraph 2-18 of AR 735-11.

Even though the above item does not do its job, there are commercial sunburn preparations that you should consider taking with you during the winter season.

Nettie Garth

Photo by
Tom Greene

Helicopter Flight Controls: Considerations For The Future

Colonel George W. Shallcross
TSM, Advanced Scout Helicopter
Fort Rucker, AL

A review is made of a typical Air Cavalry combat operation in which certain actions taken by the pilot required responses from the flight controls that were inadequate or never came. The deficiencies of the flight control systems are discussed along with considerations of what future requirements are needed to improve flight control. Hopefully they will enable Army aviation to operate effectively in a mid-intensity combat environment

DURING AIR CAVALRY operations in Vietnam, the most exciting and electrifying statements that broke through the silent and sometimes monotonous search for the enemy were the scout's exclamations: *Taking fire. Taking fire!*

Those comments triggered many actions—some immediate and some delayed. But the most expedient actions were those as the scouts simultaneously returned fire at the enemy and hurriedly exited the area:

- The gunships turned inbound and fired their rockets at the scout's previous location.
- And the air mission commander developed the situation or, if necessary, alerted ground troops for insertion.

This short, simplistic description of a tactical operation is not comprehensive and does not cover a multitude of tactical actions which continued. But it clearly reveals that the actions taken by the scout and attack helicopters *were immediate, hurried, rapid, exciting, and inputs to flight controls, excessive!*

Recognize also that the scouts and gunships probably were being flown in gross weight configurations exceeding the pilot's handbook and that the heat of battle plus the heat of the day placed additional restrictions on flight crews and machines.

If you were to place yourself in the scout's position knowing that you are eyeball to eyeball with an extremely unfriendly enemy with only the plexiglass of the windshield between you and death, I think your adrenalin would pump excessively. Additionally, if you were the gunship pilot and knew that the survivability of the scout depended upon your skill and rapid reaction time to bring *accurate* fire upon the enemy, I think your adrenalin would pump just as excessively.

The bottom line is that—

- the imponderables of the battlefield,
- the urgency for immediate responses,
- the reactions of unplanned and unrehearsed actions,
- the unknown, unanticipated responses of normally cool pilots's exceeding their and the aircraft's capabilities—

should tell you that the aircraft which had been designed to perform under one set of criteria or specifications may not, and probably will not, perform or be flown or handled in combat as one would expect.

Notwithstanding the unknown, if we return to the scenario of the opening paragraph, I feel you will be interested in the subject of flight control deficiencies and possibilities for correcting those deficiencies.

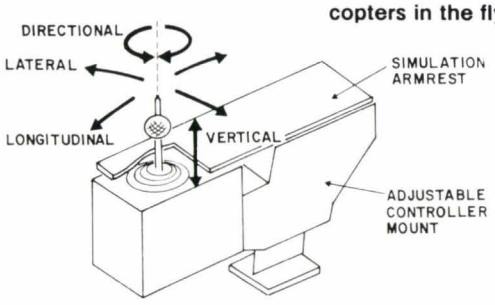
When the scout took fire and reacted, the collective pitch control lever quickly was tucked under the pilot's armpit and the cyclic control stick was abruptly relocated to some quadrant within the cockpit based upon the direction from which the fire was coming.

The beep, beep of the engine overtorque could be heard over the radio as the scout reported taking fire. The aircraft received moderate to severe vibrations from the extreme angle of the climbing turn, and the rotor revolutions per minute (RPM) were decreasing before the turn could be completed. Despite the scout's great agility, the flight controls could not accept the critical inputs, and the aircraft did not have inherent stability to permit such drastic maneuvers.

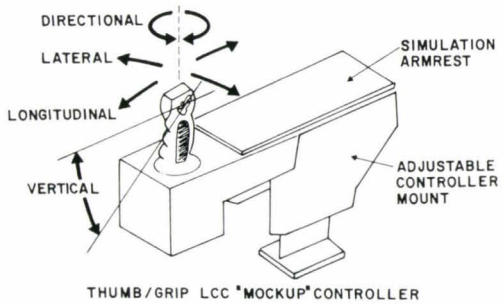
Many times when abrupt and rapid inputs were made to the flight control system one or more of the controls failed to respond or were difficult to move because *spent brass* from the observer's free swinging M-60 machinegun had become jammed between the collective, cyclic or antitorque control pedals and their mechanical connections. As a result some aircraft crashed, others became uncontrollable, and some were shot down because they could not respond to the input from the control system and lacked the agility and maneuverability to evade enemy fire. The same three conditions—uncontrollability, crashes and loses to enemy fire—also resulted from the lack of *adequate control response* and lack of adequate power of the aircraft. This prevented the scouts from departing the hostile area as quickly as possible. The capabilities of the aircraft could not meet the demands of the pilot.

The scouts control problem situation was similar in the gunships, although not as critical, because the gunships normally were flying at a higher altitude. Still, the quick reaction time required to place accurate fire on the enemy was para-

Side-arm control used in heavy lift helicopters in the fly-by-wire control system



FINGER/BALL LCC "PROTOTYPE" CONTROLLER



THUMB/GRIP LCC "MOCKUP" CONTROLLER

Helicopter Flight Controls
Considerations For The Future

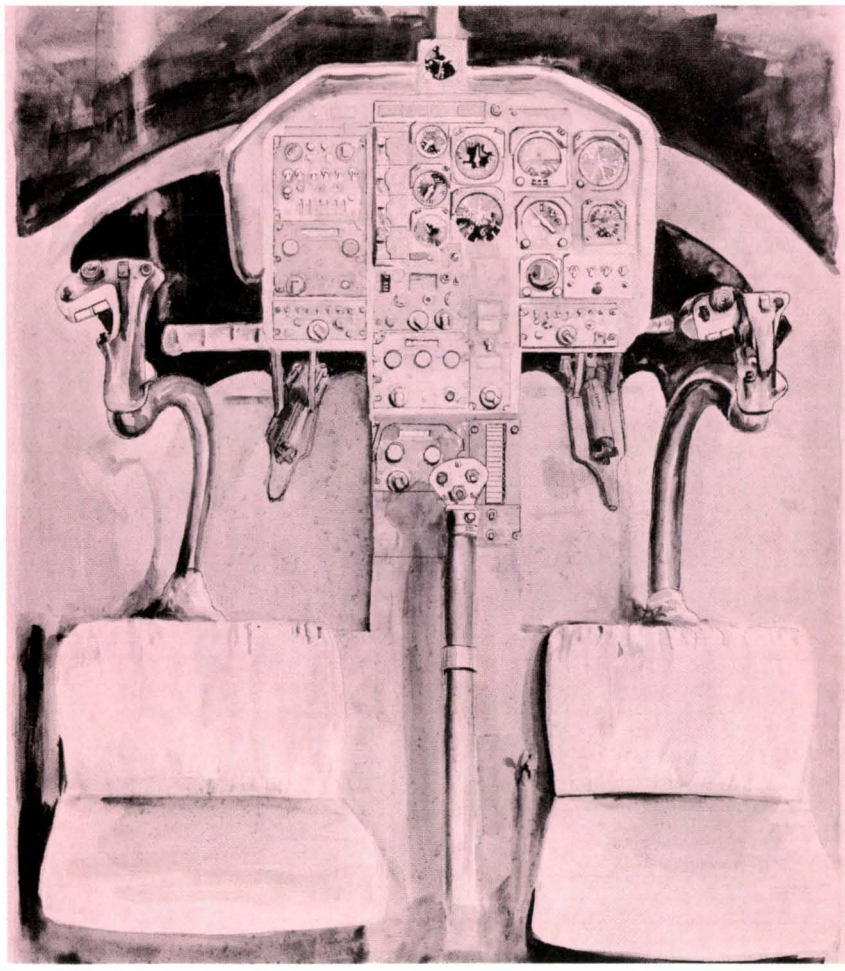
mount. To accomplish this, the gunships had to change direction by 90 degrees, stabilize and fire—all within seconds. This pedal turn required critical responses from the flight controls that could not be answered and required an extremely sensitive control touch for the pilot.

Indeed, not all gunship pilots could *master* a rapid cyclic pedal turn with the subsequent interaction this maneuver caused among all of the flight controls. In addition, the immediate stabilization and trim requirements to get accurate rocket firing were difficult to obtain. Anyone who has flown Vietnam vintage aircraft knows that extensive individual and unit training is a prerequisite to establishing a fighting team capable of performing and perfecting a human-machine interface that permits an organization such as the Air Cavalry to operate *successfully in combat.*

Formalized flight training prior to being committed to combat in Vietnam was comparatively long and had to continue during combat operations to compensate for equipment inadequacies, improper design and the seeming lack of design consideration for the true world of combat.

The threat array that faces Army aviators in the future will not again permit the luxury of extensive on-the-job training and learning the idiosyncrasies of each aircraft *in combat.* Designers and developers must plan for the rigors of combat which will be sustained over longer periods of time than before. They must compensate for the human factors of exhaustion, individual skills, and physiological limitations and capabilities. In other words, design the machine to exceed aviators' capabilities, not the reverse. Control output should be immediately responsive to control inputs. The aircraft should, within the laws of physics, do as the pilot demands quickly and precisely. The more severe the combat action, the greater those demands are on aviators and machines.

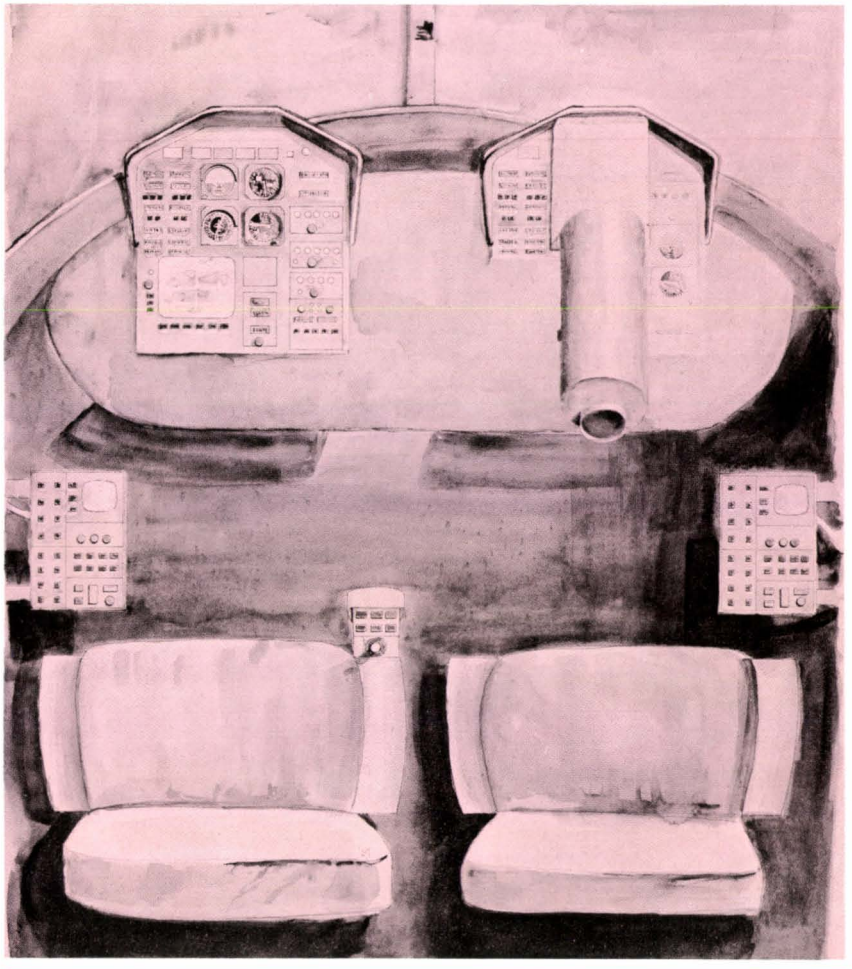
Flight Control Background. In reviewing the basic requirement for improved handling qualities—of which flight controls are a part—designers and developers too often do not take a realistic approach designing flight controls for use in combat by Army helicopters. For example, it is only just recently that the Army Research Institute has been provided funding to develop a flight training simulator to answer the important questions of the level of simulation fidelity, utilization and instructional system. These research and development efforts will allow exploration, development and verification of simulator and aircraft training techniques with definite payoffs in maximizing training efficiency and reducing the training time. Additionally, the Army Research and Technology Laboratory is just now getting into the early stages of codeveloping with National Aeronautics and Space Administration (NASA) a long overdue research handling qualities simulator. The need exists now, but unfortunately will come too late for the UH-60 Black Hawk and AH-64 at-



Present day crowded cockpit

tack helicopter which are nearing initial operational capability (IOC). The advanced scout helicopter program will be in engineering development before either research simulator is completed. With the results of the simulator research arriving late on the scene how will these results be integrated into the Army fleet? At what cost? In what time frame? In what air frame?

I am not saying that the Army has not had flight control research in the past. Significant programs were initiated before 1970, such as the Tactical Aircraft Guidance Systems (TAGS) which led to the technology for the heavy lift helicopter (HLH) and the fly by wire flight control system. The Army's fly by wire concepts were used in the lunar landing module during the moon landing. These certainly are noteworthy achievements. Also, the Army's Advanced Technology Laboratory's Advanced Flight Controls program has as its objectives improvements in survivability, reliability, maintainability and mission capability at reduced life cycle costs, with increasing pilot effectiveness through reduction of pilot task loading. I like this objective. I know that it is written in engineering language that engineers understand, but I would like it to be translated to terms answering the questions that relate to combat flying in the environment in which the pilots live and die.



Cockpit concept with improved flight controls

Today, except for the fly by wire backup system in the AH-64 and the partial electronic system in the UH-60, the primary control systems of the Army's newest aircraft *still* are mechanical with collective and cyclic control sticks.

Innovative Thinking. Army aircraft must be designed to fight and live in combat. Industry and Army must be more innovative in looking to future combat requirements. For example:

- What lateral agility do we really need to out pace a hypervelocity ballistic round or supersonic missile that can be employed by the threat force?
- Can you design the flight controls to permit aircraft to perform a .45G lateral maneuver capability?
- Is that agility adequate?
- What has to be considered in masking and unmasking maneuvers where immediate stability is required before firing an expensive antitank missile?
- How can the flight controls be integrated with a laser radar hover hold capability or other technical advances to stabilize the aircraft in a motionless attitude that will contribute to laser designation accuracies and ease of handling?
- How can we design the flight controls to provide the pilot the capability to evade taking fire by making a 180-degree left, diving downwind turn on a hot day and not crash?

These are real world questions that address tactics being used today in field exercises but without satisfactory answers.

Basic Requirements. There are certain basic needs that can be identified and synthesized for each category of aircraft. The needs described below are common to the scout, attack helicopter, utility and heavy lift helicopters. Recognizing that there are unique requirements for a particular aircraft such as precision placement of a cargo load for UH-60 Black Hawk and CH-47 Chinook helicopters, I shall address

Helicopter Flight Controls Considerations For The Future

these needs primarily for the scout and attack helicopters.

The requirements common to all of the aircraft mentioned above are:

- Precision hover hold to provide hands-off control capability.
- Automatic terrain avoidance.
- Preprogramed flight profile; i.e., for automatic autorotation and fast evasive maneuvers.
- Complete and immediate stabilization.
- Finger tip controls.
- Instant response to control inputs.
- Built-in safety restraints to prevent the aircraft from exceeding structural design limits.

These also are supplemental considerations:

- Minimum pilot workload.
- No individual cyclic or collective controls.
- Cyclic, collective and pedal control (if required) integrated into a common side-arm controller.
- Arm and hand pliable rests.
- Critical items on push button console.
- Cockpit architecture to accommodate pilot needs.
- Integration of fly by wire or fly by light microprocessors with target acquisition, avionics and navigation redundant control boxes.

Below is a scenario which envisions using the common needs of flight control improvements in an advanced technology helicopter fighting in the central battle of Europe.

Future Scenario Considerations. It is recognized that future improvements in flight controls cannot be as effective without increases in power and redesign of rotor systems to permit adaptation and integration of the improved controls.

The scout of tomorrow must have a high agility rotor coupled with twin engines that incorporates the capability to initiate automatic recovery during an engine failure at the hover. This survival capability will give the future scout greater confidence in terrain flying without concern of losing the aircraft in the event of engine failure. This scout also will be unique in that it will be the only twin engine helicopter in the world having single engine fly away capability from the hover.

Because of improvements in target detection and acquisition and a stand-off distance capability, the scout will not require the overwatch with which the Air Cavalry of Vietnam became comfortable. Many maneuvers will be used in the future and one of the important ones envisioned will be masking and unmasking. If the pilot has to unmask, the pilot's control touch would barely suggest a vertical motion. The response by the flight controls should be a swift reaction permitting a stable, solid platform to rise just high enough to observe the enemy and maintain a motionless hover. This could be accomplished through a precision hover-hold mechanism that ensures the aircraft hovers precisely over one spot regardless of weather conditions.

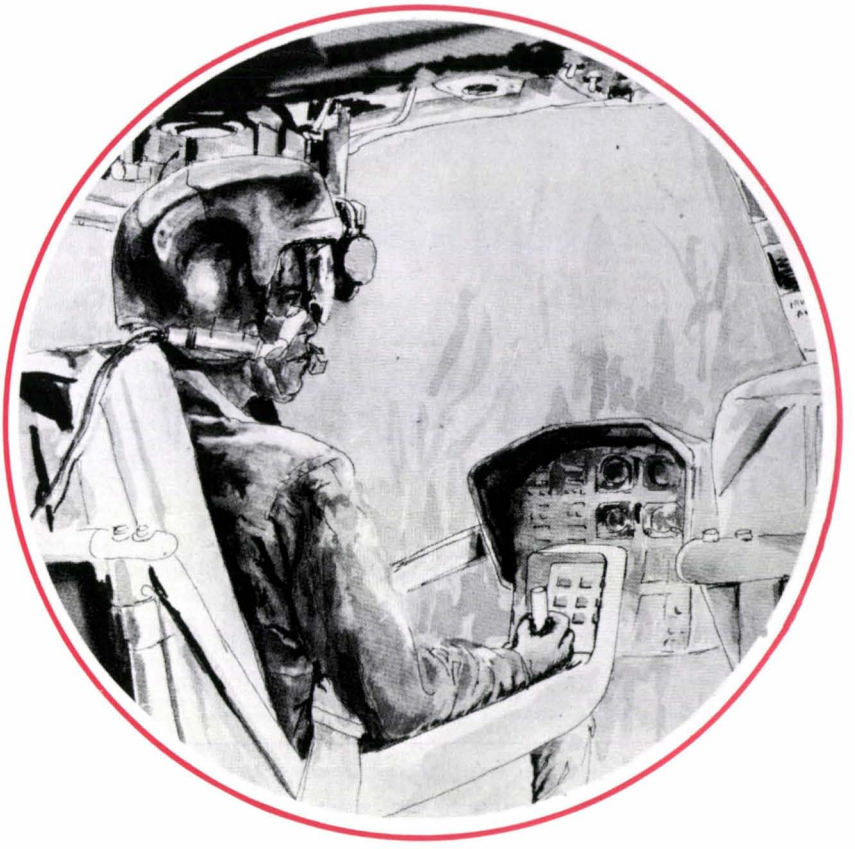
This improved stability also would contribute to the accuracies required for long-range laser designation and weapons firing. When an onboard weapons effects sensor package indicates initially that the scout is receiving fire from advanced threat weapons, the excited scout pilot, hastening to take evasive action, again would exert excessive input to a common side arm flight controller. But the preprogramed flight control system would only allow the necessary amount of control through the system required to perform the maneuver. There would be no loss of control, no over-torquing of the engine, and no rotor bleed-off.

It is in these type maneuvers that increased power pays off.

As the aircraft turns abruptly from the enemy diving toward the ground, the automatic terrain avoidance device reacting through a laser radar interface will ensure that there will be no crash as the flight controls automatically ease the aircraft through the open areas in the trees. When the scout returns to an alternate position and has the rotor level, the aircraft will become immediately stabilized. Although this would basically be an abrupt recovery, the built-in safety mechanism of the flight control microprocessor allows for a smooth transition by anticipating the maneuver. The microprocessor also will ensure that regardless of the severity of the initial inputs, the aircraft can never exceed the design limitations.

The pilot will fly this helicopter from the left seat with the common side-arm controller that integrates all flight control inputs within one small control handle located between the pilot and copilot. (The rearward facing cockpit controller on the Boeing 347 that had the prototype heavy lift helicopter flight control system installed had a similar control.) The pilot would control the aircraft with the right hand. Although somewhat awkward for the copilot/observer/gunner, this configuration would permit them to take control if necessary. Instead of a collective stick the left hand of the scout would have a slant board console with push button fingertip control capability incorporating the major items required during combat, i.e., radio frequency selection, laser designation, weapons selection, etc.

To further explain this concept envision the scout or attack pilot sitting in a comfortable environmentally controlled cockpit with pliable adjustable pillows under each arm. There would be no need during combat operations to lift



Side-arm Controller

the hands from the pillow or move the hands to change buttons, switches or controls. There would be no need to lock the cyclic between the knees to switch radios. All of this can be accomplished by push buttons.

The integrated common side-arm controller also could have a fingertip bar of push buttons that could control the target acquisition designation system (TADS) or firing buttons. The slant control console for the left hand could contain other push button requirements, all of which could be pre-set prior to takeoff.

A multiple redundant capability would negate the need to make changes except in emergencies. Changes could be made, however, by activation of an advanced automatic stabilization system that could fly the aircraft "hands off" at exact and precise altitudes and attitudes until the necessary changes have been made to the push button console.

If the pilot gets busy with the multitude of actions that must be accomplished in combat and gets shot down or the engine fails, one of the push buttons could activate the automatic preprogramed autorotation capability. Assume either losing the engine (in a single engine configuration) or fuel starvation causes both engines to fail in a twin engine configuration, the automated system could enter autorotation without pilot control input and also activate a pitch pull at the proper time by using an interface device with the precision laser/radar altitude readout.

The device also would be useful in the event the pilot was wounded and was flying with an unqualified observer rather than a copilot. This concept would use the same black box technology as the terrain avoidance capability, and it would also interface with the safety design that restricts the aircraft from being flown in attitudes that exceed its structural design limitations.

The integration of the flight control system with the various black box microprocessors of the avionics, visionics and TADS is an absolute must. It would be through this electronic redundancy that survivability would be enhanced. Additionally, the incorporation of the magic of the computer will, by an order of magnitude, simplify training; reduce training time; and decrease the logistical support required because less vibration means less wear on rotating components and thus fewer replacements. These last few items do not directly impact on flying in combat, but the related benefits would provide the combat commander more aircraft with which to fight. The scout of the 1985 timeframe will have the power to weight ratio designed into the airframe and rotor components so that the limitation of human frailties is the only restriction to aircraft performance.

A statement from Major General John G. Hill Jr. to Brigadier General (then Colonel) James H. Patterson really tells the story of the scouts. General Hill wrote, "The scout pilot doesn't fly his airplane, he *wears* it if he is to be successful." We would expand that statement to include attack helicopter pilots, particularly fighting the battle of the future when more time will be lived in the cockpit.

The challenge of improving flight control systems for helicopters is rooted in General Hill's statement. If Army pilots are to wear the aircraft, their designers and developers must tailor them to fit.

ATC ACTION LINE

UNITED STATES ARMY COMMUNICATIONS COMMAND

An Army aviator in my unit recently landed at a civil aerodrome with a "P" field designation per the flight information publication (FLIP) supplement entry. He was charged a landing fee. I've always assumed that "P" fields could be used without fee to military aircraft on official business to include cross-country proficiency flights. I further assumed that federal funds were involved in supporting the operating costs of these civil fields and, as a military member of the federal family, my use would or should be permitted on a nonfee basis. What's the story on this?

The "P" designation in FLIP supplement aerodrome text means "public" in the sense of being opposite to "private." The "P" assures unrestricted operation of facilities and landing rights at those locations where public money has been invested under various federally funded aviation development programs.

At most "P" fields there is an area provided for free parking of Government aircraft if the pilot requests it; however, there is no real guarantee that some fee will not be charged. As an example, at some of the major airports, if the pilot does not specifically ask for the Government Ramp (which is usually way out in the South 40) and "inadvertently" parks on one of the commercial areas leased to the fixed base operators (FBO), the pilot will be subject to fees unless a purchase is made. At many locations parking is free unless tie down is required or your stay will be longer than 1 or 2 hours.

Other conditions that may generate a landing or user fee to transients is the basing of five or more Government aircraft at an airport, or a quota system based either on movements (300 or more) or gross weight (movements X weights in excess of five million pounds) in a calendar month. The key to this type of limitation is usually the official business only, or prior permission required (PPR) note in the supplement data for joint civil/military fields. A list of 26 different categories of fees have been identified that may be charged to civil aircraft at so-called "public fields." Some of these may be levied on you if you don't ask for the designated official nonfee parking area.

To avoid problems with fees the following may be helpful:

- Check the Airman's Information Manual, parts 2 and 3 and FLIP for fee information while planning your flight. If in doubt, call in advance.
- Contact tower, flight service station or FBO (unicom) for information on public (free) parking after landing.
- At civil fields ascertain obligation prior to leaving aircraft unattended.
- If a fee is imposed, bill the landing or user fees to the Government. Reinbursement for cash payment may be difficult.

Readers are encouraged to send questions to:

Director
USAATCA Aeronautical Services Office
Cameron Station, Alexandria, VA 22314

How To Get The *Digest*

Active Army – Army Reserve – Army Guard

The *U.S. Army Aviation Digest* is an official Department of the Army publication for those having an interest in Army aviation. Official distribution of the magazine is handled by The Adjutant General.

Active Army, National Guard and Army Reserve units under pinpoint distribution should request both initial issue and revisions to accounts by submitting DA Form 12-5, "Requirements for Department of the Army Administrative Publications Other Than Regulations and Circulars." Detailed instructions for preparation of DA Form 12-5 and other pertinent information are on the back of the form.

The completed Form 12-5 should be submitted to:

Commanding Officer
USA AG Publications Center
2800 Eastern Boulevard
Baltimore, MD 21220

National Guard units that are not on pinpoint distribution should submit their request through their state adjutant general.

ARTEP Hotline Established

THE U.S. ARMY Aviation Center, Ft. Rucker, AL has established an Army Training and Evaluation Program "ARTEP" Hotline which can receive telephone calls from anywhere in the world 24 hours a day.

- Does your aviation unit ARTEP provide you with sufficient guidance?
- Does your aviation unit ARTEP contain all critical tasks actually performed?
- Does your aviation unit ARTEP identify all performance objectives required of your unit?

If your answer to any of these questions is *NO* then call the "ARTEP HOTLINE." You can help yourself, your unit and the Army to improve your unit's collective training tool. Feel free to call this "ARTEP HOTLINE" and give us your recommendation for aviation unit ARTEP improvement, and even your ARTEP problems.

The Training Analysis and Design Division (TADD), Directorate of Training Developments at the Aviation Center is responsible for development and management of proponent ARTEP and the review of all other aviation unit ARTEPs. To use the "ARTEP HOTLINE": Dial AUTOVON 558-3166/3167/3168 or commercial (205) 255-3166/3167/3168. When a tone is heard, give your name, telephone number, address, and state your message. If the tone increases in intensity, simply talk louder. Your message is recorded automatically and will be acted upon by an ARTEP developer who will provide you with an initial response the next duty day.

During duty hours call an ARTEP developer direct at AUTOVON 558-5318/5385/6989. An ARTEP developer will be eager to personally discuss ARTEP materials with you.

The key to developing effective, valid ARTEPs lies in field units where constructive feedback and criticism data from user members are generated. ARTEP developers at the Aviation Center strive to personally contact each aviation unit using Aviation Center developed ARTEPs, including both active Army units worldwide and Reserve component units.

Units are invitied to come upon the net by taking the initiative to call the Aviation Center. Use the new Aviation Center "ARTEP HOTLINE" or call the ARTEP developers direct, or write: Commander, U.S. Army Aviation Center, ATTN: ATZQ-TD-TAD-TD, Ft. Rucker, AL 36362.

Navy — How To Get The Digest — Marines

SECNAV INSTRUCTION 5605.1B and its enclosure (1) provide information for Navy activities concerning exchange and requisition of Army publications. Marine Corps activities should submit requirements in accordance with MCO P5600.31C.

Navy field activities may exchange reasonable quantities of unclassified publications locally with Army activities and such local transfer is encouraged. When the desired publication is not available locally, guidelines in enclosure (1) should be used for requisition.

I. General 1. The request must reflect the complete mailing address of the consignee. 2. The requisition must reflect the ordering number/form or publication number, if known, as it appears in the publications index of the source service. The title of the publication/form need not be given unless it is the only means of identifying the material. 3. If the publication is classified (or if the form is accountable) the requisition must be accompanied by a letter of justification, which will also certify the need-to-know, security clearance and classified storage capability of the intended consignee. 4. Request documents must be clearly annoted "NAVY REQUIREMENTS." 5. Requests submitted will be cancelled if the item cannot be supplied and activities originating the requisitions will be notified of the cancellation.

IV. Continuing/Follow-on Requirements. Submit a letter with detailed justification of the requirement via the appropriate chain of command to the Director, Navy Publications and Printing Service Management Office, Code SC, Bldg 157-3, Washington Navy Yard, Washington, DC, 20374.

HELLFIRE Air Launched

THE ARMY Missile Research and Development Command (MIRADCOM) at Redstone Arsenal, AL has air launched a laser-guided HELLFIRE (Helicopter Launched Fire and Forget) missile down a Redstone test range, successfully opening the Army's engineering development flight test program with the new armor killer.

Launched from a low-flying AH-1 Cobra helicopter, the missile "homed" on and hit a stationary target illuminated by MIRADCOM's Ground Laser Locator Designator (GLLD). Colonel Robert J. Feist, the Army's HELLFIRE Project Manager, said tests to prove out engineering development hardware will continue at Redstone and other locations for the next couple of years.

HELLFIRE will be field in the early 1980s. It is planned as the primary armament on the Army's new AH-64 advanced attack helicopter.

Rockwell International of Columbus, OH, HELLFIRE prime contractor, is conducting the flight test program at Redstone, supported by the Ground Laser Designators Project Office, and MIRADCOM's Engineering Laboratory, particularly the Test and Evaluation Directorate.

HELLFIRE will be fielded in the early 1980s. It is planned as the primary accommodate a family of terminal homing seekers on a common airframe to engage tanks and hardpoint targets. The initial configuration uses semiactive laser guidance.

During advanced development, MIRADCOM demonstrated HELLFIRE accuracy and versatility by hitting stationary and moving targets while firing from the ground and helicopters, in both the direct and indirect modes.

HELLFIRE will be a highly survivable system because of its standoff range, indirect fire capability and shorter time of flight.