UNITED STATES ARMY

OCTOBER 1980

AVIATION DIGEST

The Transportation Center

page 2

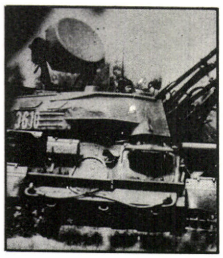
OCTOBER 1980 • VOLUME 26 • NUMBER 10

★

Brigadier General Richard D. Kenyon
Army Aviation Officer
ODCSOPS, Headquarters,
Department of the Army

★

Brigadier General Carl H. McNair Jr.
Commander
U.S. Army Aviation Center
Fort Rucker, Alabama



page 8

page 30

2 **The Transportation Center,** MG Harold I. Small
6 **Altitude Planning—A Critical Edge,** CPT Frame J. Bowers III
8 **THREAT: SAM/AAA?—You Bet Your Life,** MAJ Forrest D. Williams
12 **Reporting Final**
16 **The Real Thing,** Ronald R. Simmons
19 **AH-1FS: One Step Closer To Reality,** CW2 Ronald E. Burgess
22 **DES Report To The Field: Army Flight Standardization Program; What Is Your Gunnery IQ?**
24 **Recognition Quiz**
26 **Costly, Bothersome, Senseless**
30 **On A Clear Day You Can See . . .,** CPT Eric Hinson and CW2 Clifford S. Berg
34 **Chemical Protective Clothing,** CPT Dee Dodson Morris
36 **PEARL'S**
38 **Views From Readers**
41 **Company C,** SP4 Steve Valentine
42 **15th Military Intelligence Aerial Exploitation Battalion,** Richard P. Fulton
46 **16th Air Traffic Control Battalion,** MAJ James E. Dooley III

Inside Back Cover: **ATC Action Line: Controlled Firing Areas**
Back Cover: **Hot Line**

page 34

page 42

page 46

***Cover:* The U.S. Army Transportation Center is proponent for Army Aviation maintenance (featured on the cover) and aviation maintenance training. These and other major areas of interest are reviewed in the article by MG Harold I. Small beginning on page 2**

Richard K. Tierney
Editor

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.

The ***Digest*** is an official Department of the Army periodical published monthly under the supervision of the Commanding General, U.S. Army Aviation Center. Views expressed herein are not necessarily those of the Department of the Army nor the U.S. Army Aviation Center. Photos are U.S. Army unless otherwise specified. Use of the masculine pronoun is intended to include both genders unless otherwise stated. Material may be reprinted provided credit is given to the ***Digest*** and to the author, unless otherwise indicated.

Articles, photos and items of interest on Army Aviation are invited. Direct communication is authorized to: Editor, ***U.S. Army Aviation Digest,*** P.O. Drawer P, Fort Rucker, AL 36362. Manuscripts returned upon request.

This publication has been approved by The Adjutant General, Headquarters, Department of the Army, 25 April 1980, in accordance with Army Regulation 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.

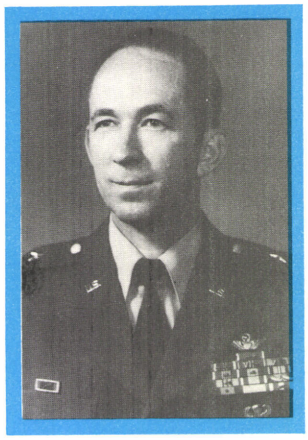
Those not eligible for official distribution or who desire personal copies of the ***Digest*** can order the magazine from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Annual subscription rates are $17.00 domestic and $21.25 overseas.

By virtue of its very role of being totally integrated into all facets of our Army, Army Aviation requires the know-how, support and contributions of many sources to maintain its vitality and viability. The Transportation Center and School at Fort Eustis, VA, is one of those contributors, and Major General Harold I. Small, commanding general of this key aviation support activity, tells us about some of the important aviation work being done there in this month's lead article. He states that the Center is "the proponent for all Army Aviation maintenance training." Read on and you will gain a full appreciation as to why the contributions from people at Fort Eustis are of primary value to all of us.

When one imagines the fire and fury of the future battlefield, it would be far easier but not at all comfortable for us to play ostrich and ignore the threat posed to Army Aviation by Soviet antiaircraft artillery and surface-to-air missiles. To understand that threat better and how we will cope, you should read and absorb the message contained in Major Forrest Williams' article, "SAM/AAA? . . . You Bet Your Life!" The information he conveys may save your life and the lives of others in Army Aviation because you read and retain—not finesse and forget. Emulate the hawk who flies above and sees all, friend and enemy alike—and know the difference between the two; do not personify the ostrich whose feathers may end up on someone else's bonnet.

Further evidence of the vision of Army Aviation and our refusal to bury our heads is the acceptance of flight simulators for an expanded role in today's training scenario. Without them, today's training would be more costly and less efficient, but how much so, few people realize. In "AH-1FS: One Step Closer to Reality," Chief Warrant Officer Ronald E. Burgess describes the Army's newest addition to its simulator fleet. He tells you in detail how an aviator can receive instruction in almost every phase of Cobra operation, including gunnery and contact, and can do so in complete safety at a reduced cost. It is a revelation and an aviation success story we should share with others.

These are only a few of the interesting, thought provoking and stimulating articles you will find in the ***Digest*** this month. Read them all and pass your copy on to a crewmember friend or other Soldier. You will be better and more informed members of our aviation team for it—proud in our profession to be "Above the Best."



Brigadier General Carl H. McNair Jr.
Commander, U.S. Army Aviation Center
Fort Rucker, AL

The Transportation Center

Major General Harold I. Small

Its Area Of Interest In Army Aviation

Army aviation training, aircraft and doctrinal developments and standardization are among the areas of Transportation Center interests. These interests stem from the plain fact that one of our objectives is to ensure the maximum availability of safe, reliable and mission-capable Army aircraft. What we teach here is of vital significance to aircraft maintenance personnel in the active Army and Reserve Components.

Training

IT IS NO SECRET that today's aircraft and aviation systems are becoming increasingly more complex. This complexity poses challenges to the Transportation Center and the Transportation School as we provide the highest quality maintenance training possible in these days of inflation-reduced resources. As the proponent for all Army Aviation maintenance and aviation maintenance training, we are in a unique position to make positive contributions to the overall mission capability of Army Aviation systems. The key to this contribution is the type of training we provide to Soldiers, at all grades and levels of command, who do the job.

Recent advances in educational technology have been an important factor in resource management. We are seeking to reduce rigid class schedules with specific start and stop times. Many of the aircraft maintenance courses are self-paced, with a wide emphasis on simulators and performance-based instruction. We test the students throughout their instruction, to ensure they have the requisite skills for their MOS. We cannot hope to teach the students everything about an aircraft or its many subsystems, but we are able to illustrate and have the Soldiers perform basic skills they will need to know for many required tasks in the field.

An even more important emphasis is our effort to train the supervisor. Even if we were able to devote twice the time and resources to training the basic students, we would still not be able to give them the kind of education that can come only with actual experience doing the job. That's why an on-the-job training (OJT) program is so necessary. In the past, we have relied on an OJT program without much thought as to who would be supervising the students once they arrived at their assigned unit. Although there are certain advantages to this from the

school point of view, it is not as helpful to the unit commander as it should be, therefore we are paying closer attention to the task of educating supervisors.

Training the supervisors can be thought of as making them an extension of the school system. Because we teach the critical tasks only, we are relying on the supervisor to round out the advanced individual training (AIT) courses as they are now taught. We do not confine this training only to the first-line supervisor, i.e., the E5 and E6. The supervision provided by senior NCOs, warrant officers and commissioned officers is also vital in assuring the highest quality aircraft maintenance effort attainable. We are especially concerned that we provide the highest quality commissioned maintenance officer to the unit commanders that is possible. We are also offering, early in fiscal year 1981, a new course for aircraft armament technicians which will enable warrant officers to increase their knowledge in that highly critical field.

Skilled supervision is the true key to a successful maintenance program. A good maintenance officer always is evident by the quality of the unit maintenance program and the higher availability of aircraft. It is our job to make sure that the maintenance officer has the skills and intellectual tools necessary to do the job right. Our Aviation Maintenance Officer and Repair Technician Course is a demanding course of more than 3 months' duration that gives the students a thorough grounding in all phases of aircraft maintenance as well as shop management techniques. Graduates of that course are able to fit into any shop situation and get the job done.

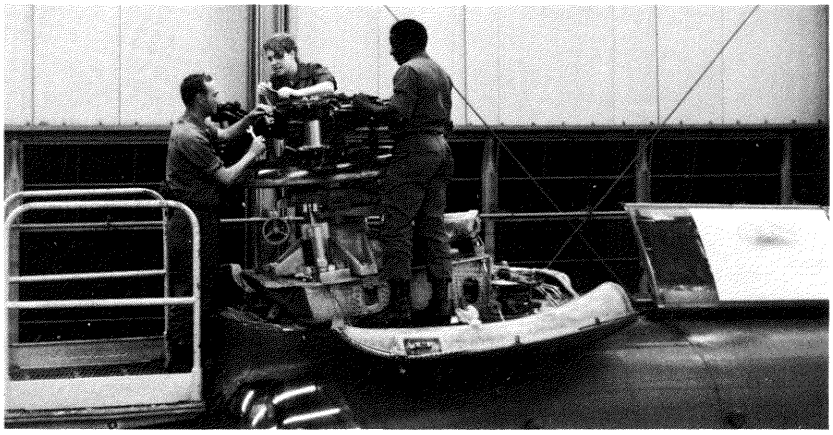
Although we are doing the job the best we know how, we are under no delusion that the Transportation School is the source of all knowledge. We are vitally interested in getting unit commanders and maintenance officers to tell us how we can do the job better. Feedback from field units is one important way we can ensure that our training efforts are truly geared toward the current needs of the Army. As a matter of policy, we eagerly solicit and welcome comments from the field. The value and credibility of our training programs are to a large extent directly related to the quantity and quality of that feedback. We have established a good dialogue with the units in the field and are dedicated to providing them with the best trained Soldiers possible.

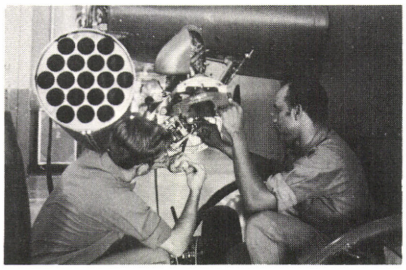
We do not limit ourselves to general inquiries, however. We are constantly attempting to improve the quality of our courses by feedback from the students themselves. As mentioned earlier, students are tested throughout the conduct of a course. If the students display adequate competence, they are "graduated" to the next phase; if not they do it over again until they get it right. A newer approach is our attempt to see how our graduates are doing once they reach their unit of assignment. We have prepared surveys that go to the graduates' supervisors to try to get an idea how well they perform in their MOS in the unit. Finally, we interview and survey all the students coming into the Transportation School to determine how their units use the training management system.

Another method we are using to obtain feedback from the units in the field is the Transportation Branch Training Team. This is a team of officers and NCOs from each directorate in the Transportation School who travel to various CONUS posts to conduct extensive interviews with unit commanders, supervisors and other personnel. We are trying to discover how our products, such as SQTs, ARTEPs, Soldier's manuals, commander's manuals (now called trainer's guide) and the like, are received and used by the units. Although the team has visited only three installations so far, we are beginning to find some problem areas that will need to be resolved. A thorough evaluation of their findings should result in clearer management objectives for our training mission.

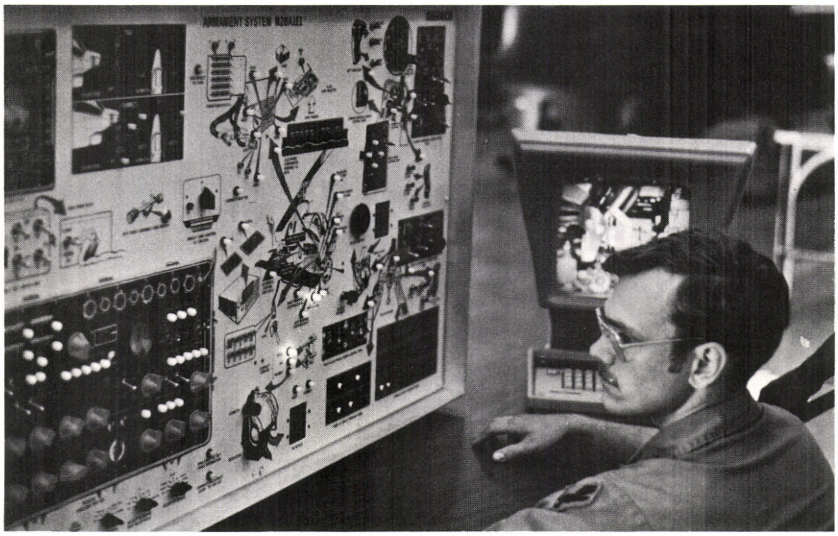
It is through such programs that we seek to expand the degree of participation of unit commanders and maintenance officers in our product development. The people in the field need to get more involved in the training base. We can no longer afford the luxury of living in isolation from each other. Maintenance training is a team effort with a primary objective: produce the most logistics-ready aircraft maintenance Soldiers in the world. There is a HOT LINE at the school for those personnel desiring to ask for or provide information. The number is AUTOVON 927-3571.

Student being instructed on repair of forward rotorhead and transmission (CH-47)





ABOVE: Performance-based instruction on M18A1 armament pod and M200A1 rocket pod (AH-1G)



RIGHT: Helicopter weapons system repairer using simulating device for discovering and eliminating system problems (M28A1 weapon system mounted on AH-1G)

Aircraft & Doctrinal Developments

The concept for aircraft maintenance in combat and how we will keep the maximum number of aircraft in the air during the early days of war is the basic foundation for recent developments in concepts and equipment. As doctrine now stands, ensuring a maximum availability of safe, reliable and mission-capable aircraft is accomplished by a three-level aircraft maintenance system, viz., AVUM, AVIM and depot. As a brief review, each company-size organization has an organic aviation unit maintenance (AVUM) capability to perform routine servicing and some "on aircraft" maintenance tasks required to return the aircraft to a serviceable condition. They are backed up by aviation intermediate maintenance (AVIM) units in the division, corps and theater as necessary. Depot maintenance is accomplished primarily at CONUS sites.

This basic three-level system is retained in the "Army Studies 86" effort. In the air cavalry attack brigade, AVUM is accomplished by the headquarters and service company of the attack helicopter battalions and the service platoons of the support organizations. AVIM is accomplished by the transportation aircraft maintenance company which was beefed up through manpower authorization criteria (MACRIT) application and by some restructuring of subelements of the unit into functional work centers. In the corps, a new organization is the focal point for all aviation maintenance and supply matters. The aviation support battalion is assigned to the corps support command (COSCOM) and is a flexible organization which can be tailored to meet the specific needs of the supported force. The minimum requirement for a battalion operation is a structure consisting of a headquarters company, a supply company and one AVIM unit. It can function with up to six subordinate units, depending on the density of aircraft to be supported.

Army 86 aircraft maintenance also includes the ideas of "Project Depot Roundout" to augment the existing depot capability through the mobilization of USARNG transportation aircraft repair shops. Two aviation classification repair activity depots (AVCRAD) would be established in theater with pre-positioned equipment in England and on the Continent. They would interface with the aviation support battalion and the theater materiel management center. This concept should allow a much quicker return of serviceable components, avionics, armament systems and related support equipment to the theater.

As with any other concept, there are certain areas in which problems of a "not-yet occurred, but probably will" nature are recognized. One such problem concerns an anticipated shortage of repair parts and replacement aircraft after the first few days of intense conflict. Near-term alternatives to the problem are displayed in figure 1, along with some future solutions.

FIGURE 1

PROBLEM: Anticipated shortage of repair parts and replacement aircraft

SOLUTION: (Near-term alternatives)
- Aircraft recovery
- Cannibalization
- Repair part cross-leveling among aviation units

FUTURE SOLUTIONS:
- War reserve spares kit
- Forward stockage based on combat requirements
- Pre-position mission-capable aircraft
- Project depot roundout
- Host nation support

Aircraft recovery concepts are being examined with the idea of increasing the AVUM capability to recover its own aircraft for quick repair. War reserve spares kits similar to those in use by the USAF could be assembled and positioned with the unit. Each kit would be tailored to the type and density of aircraft in the unit and be based on expected combat requirements.

Another problem is one of not having available man-hours to support a surge flying hour rate in the first days of a conflict. Action has been taken to ease this problem with the recent introduction of the phased maintenance system. Much of the peacetime man-hour requirement consists of scheduled maintenance action which also reduces weapons system readiness. The phased maintenance system was implemented to reduce this downtime. This system is based on the premise of an "on-condition" maintenance concept. Studies revealed that current Army aircraft require less frequent inspections than called for by the intermediate and periodic inspection systems. Also, new aircraft such as the CH-47D have extended these phases and eliminated time change components, thus saving both man-hours and spare parts. Other actions in response to this problem in combat are shown in figure 2.

Of particular interest to aircraft maintenance personnel is the quick fix repairs solution. Actually, quick fix is not a recognized term in research laboratories; rather, we refer to helicopter battle damage repair (HBDR). Today's combat operational and maintenance environment will be vastly different from what we have experienced in previous combat operations. Soviet antiaircraft weaponry is accurate and lethal; a potential for sustaining combat damage will be high. Studies indicate that attack and scout helicopters should expect to fly 130 hours during the first 15 days of intense combat. Also, the Army has expended considerable effort to reduce the overall vulnerability of its systems in order to better counter the increased threat. Efforts are underway for developing HBDR support kits. These kits will be unique in that they will provide necessary special tools and equipment to permit a greater and more rapid repair and cannibalization capability at AVUM and AVIM levels. This capability will result in reduced maintenance downtime and will increase aircraft availability during intensive combat operations. At Ft. Eustis, VA, the Applied Technology Laboratory (AVRADCOM) has initiated an exploratory development program with an objective of developing inspection criteria, repair techniques, maintenance support concepts and design methodologies that will permit greater repairability/deferability of combat damage. One contractual effort in this program will determine the feasibility of using shape memory alloys (SMA) to repair fluid lines, tail rotor drive shafts and control tubes, while other contracts deal with structural repairs. As these ideas are tested and proven, we plan on incorporating them into our training program at the school and providing some type of straight-forward "combat maintenance handbook" for use in the forward field locations.

FIGURE 2

PROBLEM: Lack of available man-hours to support a surge flying hour rate
SOLUTION:
- Defer maintenance
- AVIM forward support teams
- Quick fix repairs
- Improved combat damage inspection procedures

Associated with aircraft maintenance is the matter of ground support equipment (GSE). Materiel systems development personnel at the Transportation School have provided the necessary requirements documentation for 12 major items of GSE. Our present GSE inventory consists of materiel designed for hardstand use, much of which is bulky and difficult to maintain. The new family of GSE is designed for use in the field; it is lightweight and transportable by the service platoon using organic transportation (2½-ton truck and trailer). During the next 2 fiscal years, the GSE inventory will include the following items:

- 10 kw, 28V generator.
- Nicad battery charger.
- Swaging (pronounced sway-jing) tool for repair of pneudraulic and hydraulic lines in place.
- Self-propelled crane aircraft maintenance position (SCAMP).
- Self-propelled elevating maintenance stand for the CH-47/54.

As a logistician vitally concerned with air transportability of supplies and equipment and proponent for medium and heavy-lift cargo helicopters, I hope to see a time when we can afford a complete logistic air system tailored to effectively support all sections of the battlefield. We have come a long way toward meeting our surge and increased consumption requirements with the development of the UH-60 and the modernization of the CH-47. Yet, we must continue to look at the air logistic voids in container operations, denial of ports and support of the rapid deployment force in unimproved areas.

Standardization

Management, in the Army of the 80s, is undergoing refinement at all levels of command and in all segments of the force structure. A part of this refinement process concerns the way the Army provides job/task direction, advice, guidance and instruction to its personnel. The entire concept embodies a principle of standardization. The bottom line to the standardization effort is to

continued on page 15

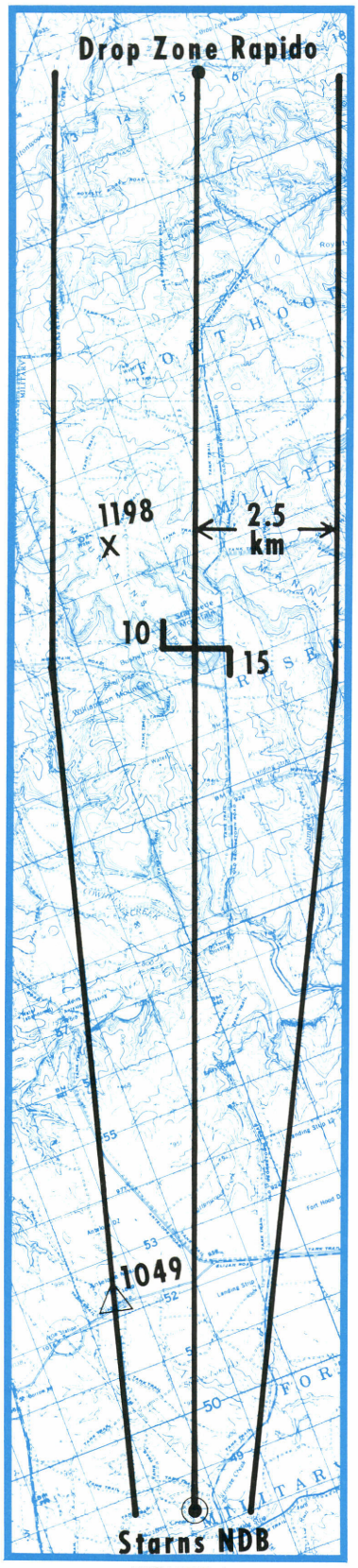


FIGURE 1

Altitude Planning

a critical edge

The author has predicated his article on the assumption that suitable charts will be available in sufficient quantities, that there will be adequate time for the detailed evaluation of the terrain, and that the sections responsible for maintaining and placing the radio beacons will be able to keep up with the rapidly changing geographic movement of the battle area

Captain Frame J. Bowers III
U.S. Army Aviation Engineering Flight Activity
Edwards Air Force Base, CA

ON THE MODERN battlefield, helicopters must hide to survive. Consequently, nap-of-the-earth and tactical instrument flight have received increased emphasis in recent years. By staying as close to the ground as possible, today's aviator attempts to get all the protection possible from masking terrain.

Unfortunately, the equipment and pilot limitations of tactical instrument flight often dictate a higher flight altitude than is necessary over portions of a given route. This altitude can be deadly, as it increasingly exposes the aviator to enemy air defense artillery (ADA) acquisition and engagement. However, by the use of dead reckoning or the judicious alteration of an obvious route, these en route altitudes can be safely reduced.

Take as an example a flight from Drop Zone (DZ) Rapido (PK 155 719) to STARNS nondirectional beacon (NDB) (figure 1). The route is 25 kilometers (km) long, requiring a safety zone 3 km on each side of the airway to a point 15 km from the beacon. From that point, the safety zone narrows to a zone 1 km on either side of the beacon.

This zone contains a maximum elevation of 1,198 feet (located north of Cowhouse Creek on Shell Mountain at PK 111647). Using this elevation, the minimum en route altitude (MEA) on this leg of the flight would be 1,598 feet (400 feet higher than the highest elevation in the safety zone).

However, the terrain south of the Shell Mountain-Manning Mountain complex is considerably lower—the maximum elevation in this portion of the zone is 1,049 feet at Antelope Mound Bench Mark (PK 067525). The MEA in this part of the route would thus be only 1,449 feet—almost 150 feet lower than that required in the north. In a tactical environment, 150 feet is an unaffordable luxury.

Assuming another beacon exists to one side of the course, the simple solution is to construct an intersection at which the MEA is reduced. However, what can be done if an additional beacon does not exist?

In a combat environment there are risks, and the principal one is of being blown out of the sky. Consequently, a certain amount of risk

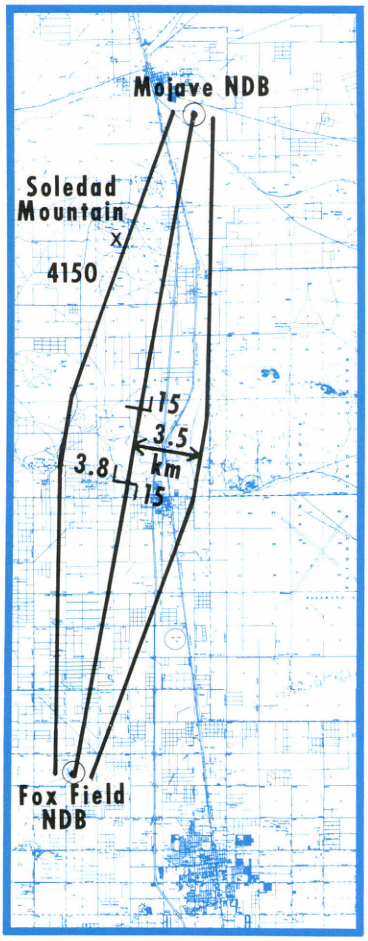


FIGURE 2

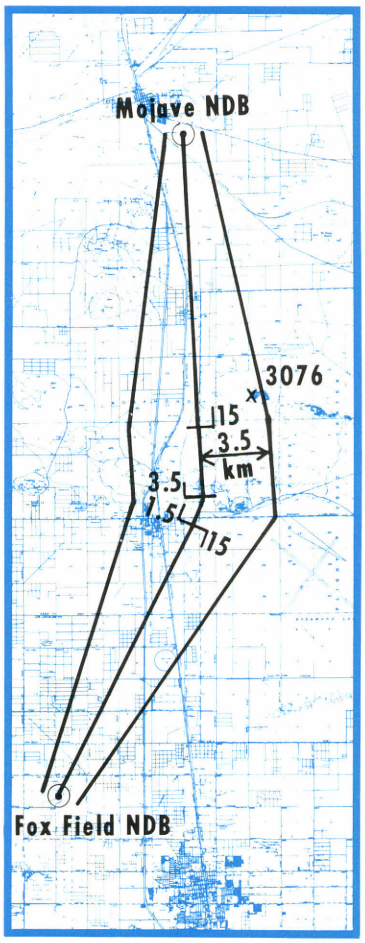


FIGURE 3

The ideas presented in this article are the author's and are not necessarily those of the Department of the Army or any of its agencies

can be assumed in other areas to reduce exposure to that principal risk. Here is just such a case: By using dead reckoning (distance divided by airspeed to get time en route) and applying a safety factor for adverse winds, an aircraft's arrival at a position south of Shell and Manning Mountains can be determined. The aviator can then descend to the lower MEA. A certain risk (that the safety factor did not sufficiently compensate for adverse winds, and he/she consequently descends before clearing the terrain) is being accepted to lessen another risk (acquisition and engagement by enemy ADA due to excessive altitude). Through judgment and careful flight planning, the risk of premature descent can almost be eliminated.

In this example, the distance from Rapido DZ to a line south of Manning Mountain is 13 km; south of this line an MEA of 1,449 feet is acceptable. Using an indicated airspeed of 90 knots, the en route altitude of 1,600 feet (1,598 rounded up), and the outside air temperatures (in this case 20 degrees C), true airspeed is 93 knots (172 km/hr). In a no-wind condition, this would give a time en route of 4 minutes, 30 seconds, while a 20-knot headwind would mean an en route time of 5 minutes and 50 seconds. By allowing 6 minutes for the flight in a no-wind condition, a suitable safety margin exists, yet still allows descent to the new MEA. That is not as satisfactory a solution as an intersection to establish the descent point but is substantially better than flying the entire leg at the higher MEA.

A second means of reducing that all important MEA is by judicious selection of routes. In the situation in figure 2, two beacons provide for a flight from Fox Field to Mojave. The obvious course would be between the two beacons. However, when this course is used, the safety zone includes the single large peak at Soledad Mountain (4,150 feet) and the MEA is 4,550 feet, despite the fact that the surrounding prevailing high terrain is only about 3,000 feet. Consequently, by using the obvious route, the aviator is more than 1,000 feet higher than required by the terrain and is unnecessarily exposed to the enemy ADA threat.

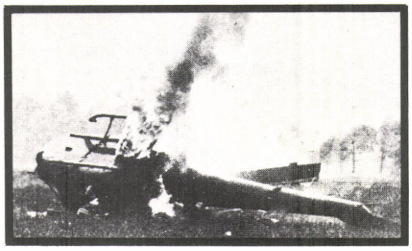
Instead of the foregoing, the course should be offset to the east (figure 3). In that way, the aviator can still plot the course legs of less than 30 km (distance for reliable reception range of a beacon and dead reckoning for each leg), yet the tallest obstacle now becomes a hill northeast of Rosamond (3,076 feet). The MEA of 4,550 has been reduced to 3,476 by simply changing the route slightly.

On the modern battlefield, excessive altitude is a killer. By using common sense and pre-mission planning to take advantage of the terrain, altitude can be reduced in tactical instrument flight. This altitude reduction can give the aviator a critical edge in accomplishing the mission while staying alive.

THREAT

Major Forrest D. Williams
Threat Branch
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

SAM/AAA? You Bet Your Life!



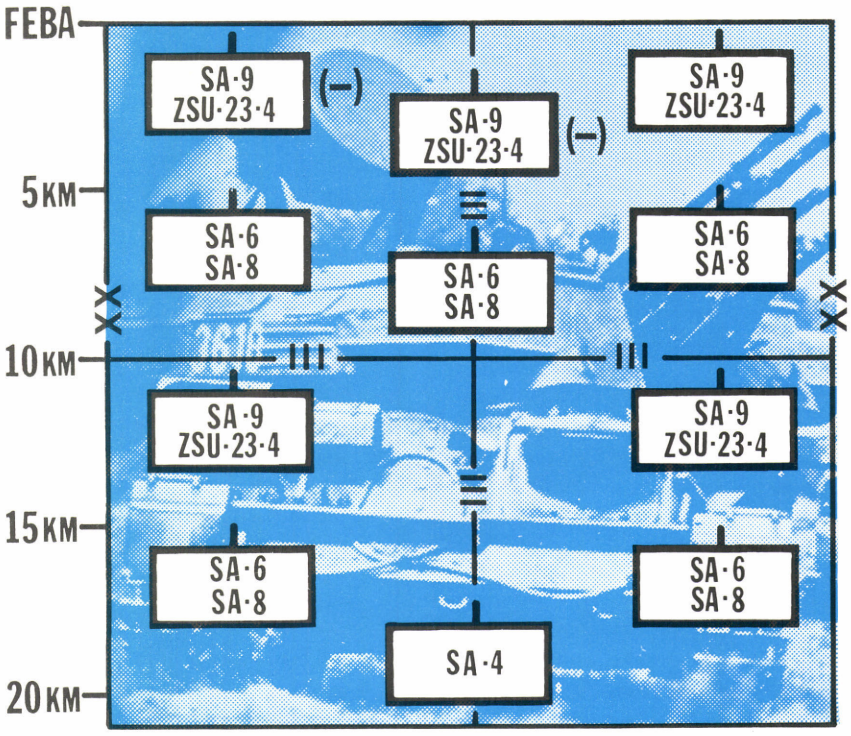
MUCH HAS BEEN written about the various threats to U.S. Army aircraft involved in combat operations. These threats include everything from small arms fire to main tank guns, as well as a host of others. Perhaps no threat is as great, however, as the weapons designed to specifically deal with enemy aircraft—antiaircraft artillery (AAA) and surface-to-air missiles (SAM). You have heard a great deal about these weapons, I'm sure, but recent gains in this area dramatically affect us as Army aviators. Thus, we all have compelling reasons to understand and know how to counter these weapons.

Today's U.S. Army aviator will face the most formidable AAA and SAM threat ever fielded. This is due to not only the enormous quantities of these weapons on the battlefield, but also to recent gains in their technological developments, making them increasingly more lethal and accurate. Another major factor is the method of employment—Soviet doctrine calls for extensive overlapping of air defense coverage from the forward edge of the battle area (FEBA) back to *front* level, and involves tactical fighter aircraft, helicopters and electronic warfare, as well as AAA and SAM. All of these systems combine together to form, in effect, an air defense "umbrella" over the attacking forces.

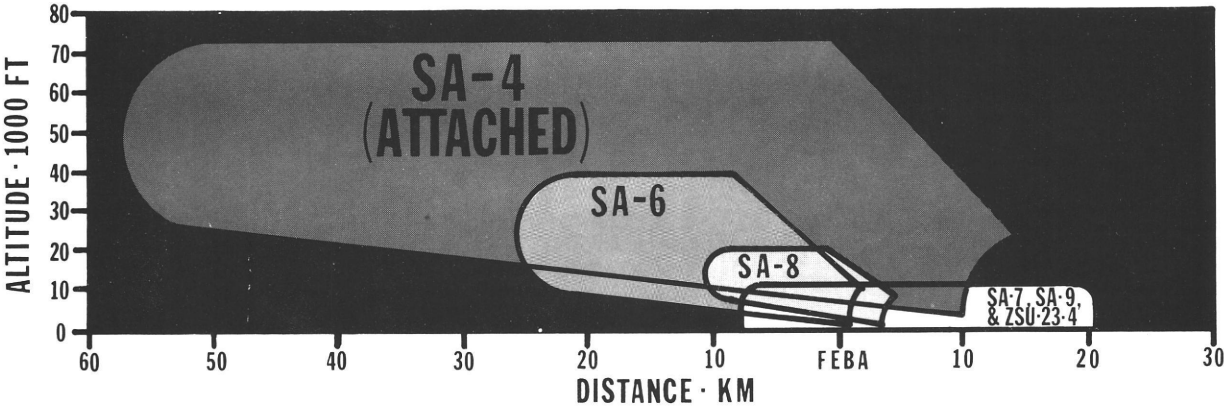
More pertinent to U.S. Army aviators, though, are divisional SAM and AAA forces. As stated above, these weapons also reflect the doctrine of overlapping coverage. These organic systems cover airspace from ground level to more than 50,000 feet and have ranges out to more than 30 kilometers. In fact, so heavily do the Soviets believe in air defense, that Army aviators become vulnerable to Soviet air defense systems several kilometers behind our FEBA—even down to ground level! This fact is reflected on the Soviet Air Defense Profile and typical deploy-

Soviet Motorized Rifle Division Air Defense Employment

NOTE: About 135 grip stocks for SA-7 are deployed throughout the divisional area



Divisional Soviet Air Defense Profile



ments of these systems in a Soviet Motorized Rifle Division (MRD) as described on the following pages.

When looking at Soviet air defense deployment from the FEBA toward their rear areas, we first encounter the SA-7 GRAIL. This shoulder-fired, heat-seeking missile is much like the U.S. Redeye and is abundantly found throughout the Soviet division down to company level. In fact, there are about 135 firing grips (grip stocks) within the division with 3 to 5 missiles per grip stock. This computes to about 600 SA-7s in one Soviet division! With the prime mission of this system being slow-flying aircraft and helicopters, it presents a very formidable threat to Army Aviation. The range of the GRAIL is about 5 to 6 kilometers, and it is effective from 150 to about 10,000 feet. Minimum altitude is dependent on infrared (IR) energy,

△ SA-7 GRAIL

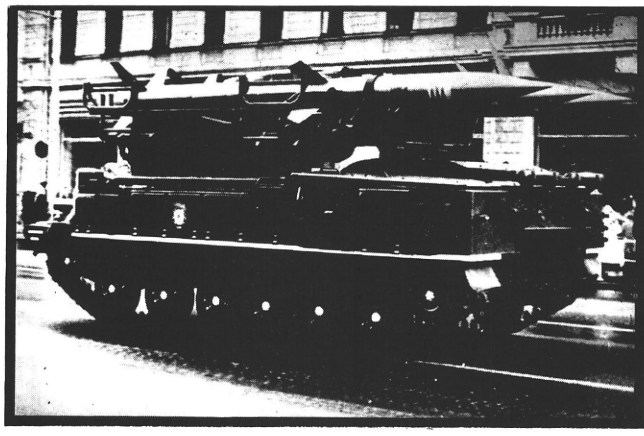
but it is possible for it to go to ground level.

The next two systems form the regimental air defense battery, the lowest level of organic air defense. This battery is composed of four ZSU-23-4s and four SA-9s, as well as support equipment. These highly mobile systems are designed to keep pace with fast-moving armored forces and provide the supported regiment with air cover. Normally, they are deployed in composite platoons of two ZSU-23-4s and two SA-9s for mutually supporting fires, and are found with lead battalions. You would first encounter them in the reconnaissance units, only a few hundred meters behind the FEBA, and later, more of them dispersed within the followon elements, a few kilometers further behind the FEBA.

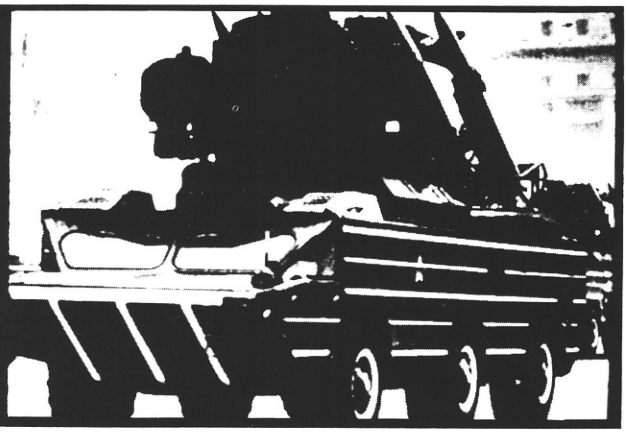
The technical characteristics of these systems make them a deadly threat to Army Aviation, especially to helicopters operating on or near the FEBA. Much has been written on the ZSU-23-4 including its evidenced lethality during the 1973 Mideast War. The system has four 23 mm barrels mounted on a modified PT-76 tank chassis that provide a maximum rate of fire of up to 4,000 rounds per minute out to a

▽ ZSU-23-4

▽ SA-9 GASKIN



△ SA-8 GECKO



△ SA-6 GAINFUL

range of 3,000 meters. Fire control is provided by the Gun Dish radar which gives the weapon its high degree of accuracy. An optical sighting device provides backup.

The SA-9 GASKIN possesses increased range and altitude capability, but is still employed primarily for close-in air defense. The system consists of four missiles mounted in cannisters on a modified amphibious BRDM-2 scout car. It has a range out to 8 kilometers, and, like the SA-7 GRAIL, has a seeker which homes on infrared energy from your engine exhaust. Acquisition on this system is optical, but we can expect the air defense radars from division and higher to provide advance warning of location and heading of incoming enemy aircraft through the air warning net. Like the ZSU-23-4, there are 16 of these systems per division.

Moving farther rearward, an aviator will encounter elements of the next level of air defense—the divisional air defense regiment. This unit consists of five batteries of either the SA-6 GAINFUL or SA-8 GECKO missile system, and represents the backbone of divisional air defense. Each battery has four transporter-erector-launchers (TEL) for a total of 20 per division. Deployment is normally at the rear of regiments as shown, providing in-depth SAM coverage over the division area and adjacent units. Both of these systems were designed to replace the obsolete S-60 antiaircraft gun at division level.

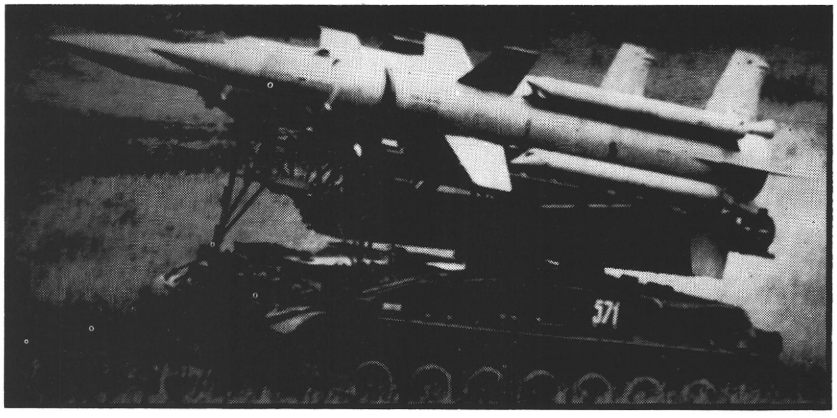
The SA-6 GAINFUL system consists of three missiles mounted on a tracked vehicle. Guidance is provided by radars on a separate tank chassis, using radio commands in the initial stages of flight, with the missile homing on reflected radar energy at the terminal portion of flight. The missile, with its 2.5 mach speed, can reach up to 40,000 feet and a slant range out to about 30 kilometers. It can also reach as low as 300 feet at its minimum range of about 3 kilometers.

The division also could have the SA-8 SAM deployed in lieu of the SA-6. This newer system is mounted on a six-wheeled amphibious vehicle which carries four missiles and all associated acquisition and tracking radars. It also has a low light television camera for use in optical tracking. Maximum range of the missile is about 12 kilometers, and it can reach up to about 20,000 feet. It also has the capability to reach as low as 150 feet.

Of significant note for this system is its target tracking ability. Due to the radars being integrated on each TEL, an SA-8 battery, consisting of four TELs, can track and engage four targets simultaneously. The SA-6, having only one set of radars per battery, can only track a single target. We can therefore assume that any followon SAM systems may address this deficiency.

The final SAM system that we will address is not actually organic to division. However, it often will

▽ SA-4 GANEF



Divisional Soviet Air Defense Systems

Performance	SA-7 GRAIL	ZSU-23-4	SA-9 GASKIN	SA-6 GAINFUL	SA-8 GECKO	SA-4** GANEF
Effective Range (km)						
Maximum:	5 to 6	3.0	7.9	30	12	70-80
Minimum:	0	N/A	0	5	3	10
Effective Altitude (ft)						
Maximum:	10,000	10,000	10,500	40,000	20,000	75,000
Minimum:	0***	0	0***	300	150	2,000
Speed (Mach):	1.5	N/A	1.5	2.5	2.5	2.5
Guidance						
Acquisition	Optical*	Radar/Optical	Optical*	Radar	Radar/Optical	Radar
Track	N/A	N/A	N/A	Radar	Radar	Radar
Homing	IR	N/A	IR	Radar	Radar	Radar
Launch Platform	Man-Portable	PT-76 (Mod)	BRDM-2 (Mod)	Tracked TEL	6-Wheel TEL	Tracked TEL

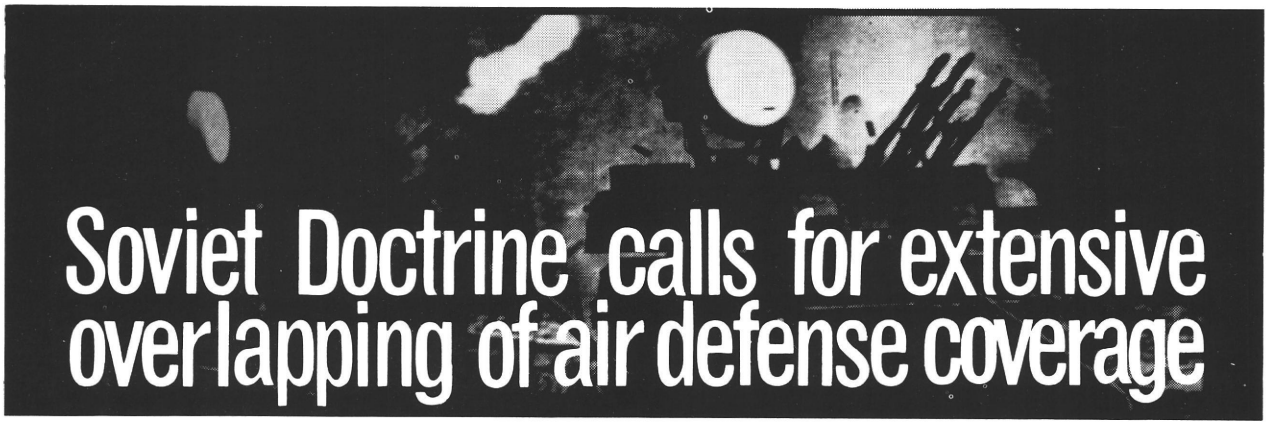
*May receive advance notice through air warning net.
**Nonorganic—May be attached from Army.
***IR energy dependent.

be attached to divisions from Army level to provide longer range coverage. It therefore becomes a significant threat to our special electronic mission aircraft (SEMA), such as SOTAS, Guard Rail, Quick Look and others. The system is the SA-4 GANEF and has two missiles mounted on a tracked TEL. It would most probably be found at the rear of the division, several kilometers behind the FEBA.

There is some speculation as to whether this medium to high altitude missile would pose a threat to SEMA operating at standoff distances behind our forces. However, with its maximum range of 70 to 80 kilometers and due to the high value of SEMA mission results, we feel that the Soviets would not hesitate to use a longer range missile, such as the SA-4 or SA-6, to engage SEMA when given the opportunity.

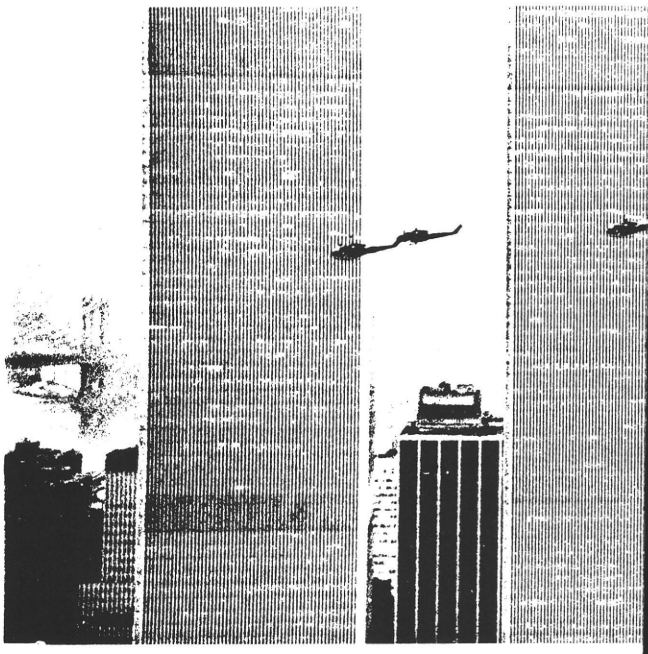
These, then, are the divisional SAM and AAA systems that pose the highest threat to U.S. Army Aviation. They can attack targets high and low—and can penetrate much of the airspace over our friendly forces. Their coverage is continuous, overlapping and integrated into a cohesive unit to protect divisional forces. Only by understanding the capabilities and limitations of these systems and concurrently applying sound nap-of-the-earth or standoff techniques to our modes of flight can we survive as Army aviators against this formidable threat. Without doing so, you would, in fact, bet your life!

I have designed the graphics of this article in such a manner that they may be used as graphic aids for training or general information. If needed, they can be reproduced or removed from the magazine for this purpose. Any questions or comments may be addressed to Directorate of Combat Developments, ATTN: ATZQ-D-CT, Ft. Rucker, AL 36362; AUTOVON 558-5671/3506.



REPORTING FINAL

Late News From Army Aviation Activities



FROM WASHINGTON

New column to Start in January. The DA ODCSOPs Army Aviation Officer will initiate a quarterly article beginning with the January 1981 issue of the *Aviation Digest.* Its purpose will be to provide current information to the field related to events, personnel actions and materiel developments in Army Aviation. Individuals can provide suggested topics for this article by telephone, AUTOVON 227-9666 or by message to HQ DAMO-RQD.

(ODCSOP)

HSM Approved. Personnel who directly participated in the Mount St. Helens Volcano Operation during the period 18 May 1980 through termination date to be determined later are eligible for award of the Humanitarian Service Medal (HSM), according to MILPO Message No. 80-226, 221715Z Aug 80. For further information, see MILPO Message No. 80-178, 241524 June 80, or call AUTOVON 221-8698/8699.

(MILPERCEN)

FROM FORT RUCKER

New Museum Displays. The Army Aviation Museum has received four additions to its inventory of vintage aircraft.

They are the 1942 model C-45 H, the 1943 model UC-45J (Super Line Beech H-18), the 1955 model U-4A (Aero Commander 560-A) and the Bell King Cobra (an experimental helicopter the Army never procured). These were accepted in August and September by the museum's curator, Mr. Tom J. Sabiston.

Donating agencies, respectively, are the Army Armament Materiel Command, Moline, IL; the Aviation Classification Repair Activity Depot (1109th), Groton, CT; the Ft. Campbell, KY, Flying Club; and Bell Helicopter Textron, Fort Worth, TX.

The desired and deserved protection from the elements for these aircraft, and many others in the museum's inventory, will be acquired, Mr. Sabiston noted, when they can be moved to inside the new museum building which is the goal of a current $2 million fund drive.

Aviators Are Important. That aviators are members of the "very important combined arms team" was stressed during a recent flight graduation speech by BG Howard G. Crowell Jr., deputy chief of staff for training, Army Training and Doctrine Command, Ft. Monroe, VA.

He told the 74 new helicopter pilots that Army aviators have a major part in combat operations by supporting the ground forces, and that both collective and individual aviation contributions are important. **(USAAVNC-PAO)**

FROM FORT EUSTIS

ATSC Bulletin Available. The U. S. Army Training Support Center has a limited number of ATSC Bulletin No. 80-1 (April 1980) available for distribution. It is a 40-page booklet with factual information about the Army Training Extension Course (TEC). Subjects covered include: Establishing TEC Accounts, Adjusting TEC Accounts, Organizing a TEC Library, Managing a TEC Library, Training With TEC, Developing a TEC Training Program and Conducting TEC Training. The bulletin was originally produced and distributed by the Office for Operations to explain how to obtain a TEC account and/or what to do with TEC materials and lessons when they are received. Copies of the bulletin can be obtained by calling AUTOVON 927-3728 or 2141, or commercial (804) 878-2141/3728 or writing to: Commander, U. S. Army Training Support Center, ATTN: ATIC-AET-TP, Ft. Eustis, VA 23604.

West Point Airlift. **With the New York City skyline in the background, a formation of helicopters from Company B, 150th Aviation Battalion, Delaware National Guard, heads toward West Point and a day of orientation/flights for 1,440 plebe cadets**

Top Flight Surgeon. CPT Jim Cockrell, a flight surgeon at the Army Transportation Center, was recognized as the Flight Surgeon of the Year at the annual meeting of the Aerial Medicine Medical Association in Anahiem, CA. His selection was made by a committee of flight surgeons from the Army Aviation Center, Ft. Rucker, AL.

A Professional Statement for Maintenance Technicians. SSG Robert P. Bertrand, an instructor in structural aviation maintenance at the Army Transportation School, has written these principles for maintenance technicians:

"I know I am a professional because I've been taught by those who will accept nothing less.

"I have been given the fundamentals and by using these correctly, I will become more proficient as time goes on. But even now, I am a professional.

"When working on aircraft, I will always know when I am right because I have the integrity and the honesty to admit when I don't know something and to seek out the correct manuals for the answers.

"Yes, I am a professional; and I will remain one as long as I work on aircraft because I know that I am partly responsible to every crewmember who will fly on that aircraft.

"As a professional, I have pride in my work and a satisfaction in knowing that my skill is an important and integral part of Army Aviation." **(USATC-PAO)**

FROM PANAMA

Chinook Lifts Tank. In response to a request from Panama's Guardia Nacional, a CH-47 Chinook helicopter of the 193d Infantry Brigade (Panama) recently moved a 10,000-gallon fuel tank from Coclesito to Penonome, Republic of Panama. This was done as part of a series of civic action projects Army aviators have completed in the past year.

Similar tanks were moved into Coclesito 2 years ago by crews from the Chinook Platoon, 352d Aviation Company, 210th Aviation Battalion.

Moving the bulky tank over 30 miles of rough terrain would have taken several workers a couple of days, if it could have been done at all. The Chinook crew, thanks to some good weather and excellent assistance from supporting elements, accomplished the mission in less than half a day.

(*SSG C. Drake;* 193d Infantry Brigade PAO)

FROM DELAWARE

West Point Airlift. Company B, 150th Aviation Battalion, Delaware National Guard, spends 1 day a year giving the plebe class of the U.S. Army Military Academy, West Point, NY, an introduction to the UH-1H Huey helicopter. This includes orientation and safety briefings and a 15-minute flight for the new cadets.

This year's flight was the biggest ever undertaken by the unit. Using 16 helicopters, they airlifted 1,440 cadets and 300 cadre personnel, pumped more than 13,000 gallons of fuel and logged 189 flight hours.

The helicopters began lifting the students at 0730 hours and with the exception of a half-hour for lunch, were operational until the unit returned to Delaware 11 hours later. **(DEANG-PAO)**

FROM FORT BLISS

Army Assists FAA. There are no roads to the Federal Aviation Administration's site on South Franklin Peak in El Paso; so when a building there burned in March, a UH-1 helicopter and crew from Ft. Bliss were called on to airlift material for the rebuilding.

CPT Kenneth Becker, pilot in command; CWO John Chiri, pilot; SP4 David Files, ground guide; and SP4 Scott Lisle, crewchief, flew 11 sling loads up the mountain and 11 down, all in about 4 hours. **(PAO)**

Governor's Recognition. **MAJ Lucius Wright accepts letter of appreciation from Utah Governor Scott M. Matheson for Michael Army Airfield support of emergency civilian rescue missions**

FROM UTAH

Governor's Recognition. Governor Scott M. Matheson has officially honored the aircrews and medical personnel from Dugway Proving Ground for their work in two recent missions—a mine rescue and assistance to victims of a civilian plane crash.

Individuals presented personal letters of appreciation were CPT Edward H. Gore Jr., CWO Fernando Kanauka, CWO Edward Helquist, SGT Barry K. Farquhar, SP5 Donald Halsey, SP4 Carlos Macias, PFC Kenneth L. Stout, and Emergency Medical Technicians Robert D. Pagnani and Jeffrey D. Flores.

MAJ Burt W. Wilde, Army Health Clinic administrator, and MAJ Lucius Wright, Michael Army Airfield commander, accepted letters from the governor on behalf of their units.

Dugway's medevac unit performs any rescue or medical evacuation it is called upon to handle in west central Utah for the civilian population. Support for such missions comes not only from the crews but also the maintenance and tower personnel and all employees of the health clinic, both military and civilian. **(USADPG-PAO)**

FROM FORT HUACHUCA

Award of Honor. The Army Air Traffic Control Activity has received a DA Aviation Accident Prevention Award of Honor for 3 years of accident free flying (1976 to 1979).

MAJ Deward Rice, Evaluation Division, ATCA, received the award from MG Gerd S. Grombacher, commander of the Army Communications Command. ATCA is a subelement of ACC.

ATC Tests Changed. Relief is on the way to reduce the frequency of testing of air traffic control (ATC) personnel.

A recent trip to the field by MG Gerd S. Grombacher, commander, U.S. Army Communications Command (USACC), revealed that personnel in military occupational specialty (MOS) 93H (ATC tower operator) and MOS 93J (ATC radar operator) were dissatisfied with the redundancy of testing used to measure their performance ability. Currently, the ATC operator is tested semiannually in the form of qualification tests, required to maintain Federal Aviation Administration (FAA) facility certification and the annual skill qualification test (SQT).

The testing frequency was discussed between MG Grombacher and MG James H. Merryman, who at the time was commander, U.S. Army Aviation Center, Ft. Rucker, AL. A meeting of representatives from both commands took place at Ft. Huachuca last June to explore the ways to meld the SQT and FAA certification/qualification process. The solution developed at the meeting resulted in the consolidation of one qualification test with the SQT. This means instead of being tested three times a year, the ATC operator will be tested twice.

A restructuring effort of current Soldiers' Manuals and SQT job site components has been undertaken by the USACC Air Traffic Control Activity, proponent for all ATC matters, and the Aviation Center to put into the field the new SQT that encompasses the requirements of one of the previous qualification tests.

Although this effort will take 2 to 3 years to become a reality, the final result should benefit the ATC operator in both the tactical and fixed environment. **(USACC-PAO)**

The Transportation Center

continued from page 5

Hands-on training in nondestructive testing using liquid penetrant method

stabilize the effects of turbulence caused by turnover of personnel between commands. Areas of interest are:

- Gunnery procedures.
- Crew drills.
- Driver training.
- Aviation ground support equipment.
- Aviation maintenance test flight.

It is that last area of interest to which I draw your attention. Although maintenance test-flight checklists have existed for years, no manual has been published that outlines maneuver tasks, conditions, standards and descriptions for conducting these flights. Personnel managing the U.S. Army Aviation flight standardization program at the U.S. Army Aviation Center, Ft. Rucker, AL desired the evaluation of maintenance test pilots and the U.S. Army Transportation School had the test flight expertise. Close coordination between these two headquarters has produced Field Manual 55-44, "Standardized Maintenance Test-Flight Procedures," to be published during the third quarter, FY 81. The manual will provide:

- Commanders a guide from which they can maintain a standardized maintenance test-flight program.
- Standardized aviation maintenance test-flight procedures, task descriptions and requirements in conjunction with the aircrew training manual program.
- Aviation maintenance officer evaluation requirements and procedures in concert with the Directorate of Evaluation and Standardization, the Army Aviation Center.

The publication will indicate that its contents concern maintenance test-flight evaluations and not tasks associated with aircrew training. This rationale permits the manual to be published separate from the aircrew training manual, thus reducing the risk of fielding a bulky document that would tend to discourage active reading interest in both programs.

There are particular areas of interest in the U.S. Army Aviation maintenance structure; namely, training, aircraft and doctrinal developments, and standardization because they reflect significant target areas in the development and implementation of training, materiel and management technologies.

The complexity of Army Aviation systems demands our training be scientifically formulated and translated into a dialogue that can be understood by the repairers and their supervisors. Doctrinal developments will provide the Army with modern techniques for keeping a maximum number of aircraft in the air. Institutionalizing the tried-and-true methodologies used to perform a multitude of jobs and tasks will standardize acceptable procedures.

Training Soldiers and leaders is the most important thing we have to do. Without good people, the best maintenance program in the world will not work. Through team effort and hard work, coupled with active participation from the units in the field, we will continue to give the unit commander the best available. All of our efforts—whether training the Soldiers, selecting and testing new equipment, or designing new and more efficient procedures—are aimed toward the same goal: keep our Army Aviation the best in the world.

General Small entered military service in 1950. He attended OCS and after commissioning served as a rifle platoon leader, company commander, executive officer and assistant battalion S-3 and during the latter part of his Korean tour, as Army liaison officer with an Air Force squadron. On return from Korea, General Small attended aviation flight training and later was Combat Support Flight Leader with the 101st Airborne Division. He completed the Infantry Officer Advanced Course and subsequently transferred to the Transportation Corps. Later he commanded a fixed wing aviation company and served as battalion executive officer of various aviation and maintenance units. He was assigned to ODCSLOG, HQDA, commanded an assault helicopter company in Vietnam and later was in the Aviation Directorate, Office of the Assistant Chief of Staff, Force Development, HQDA. General Small attended the Army War College and then became Deputy Commandant for Training and Education at the U.S. Army Transportation School, Ft. Eustis, VA. He returned to the 101st as Commander of Division Support Command then came back to the Transportation School as Assistant Commandant. Next he was Director of Logistics, J4, HQ, U.S. Readiness Command and then returned to assume command of Ft. Eustis.

MONTHLY WRITING AWARD

"The Real Thing"

Ronald R. Simmons
Research Psychologist
U.S. Army Aeromedical Research Laboratory
Fort Rucker, AL

IT IS DIFFICULT to teach old dogs and seasoned pilots new tricks" isn't an adage or proverb yet, but it should be. Both animals seem to have select stimuli to which they respond and any new "trick" has to be proven highly beneficial before they accept it as their own.

A rubber or rawhide object may [redacted] for Rover's teeth, but [redacted] look, smell and taste like the real thing, try explaining to him the benefits of "chewing for practice." It's like trying to sell some senior or master aviator on the merits of "flying for practice" in a device that does not look, feel or control like the real machine.

Before the early 1970s growling and "gnashing of teeth" resulted from attempts to simulate helicopter instrument flight in the famous "blue canoe." This simulator was initially designed to train airplane drivers in instrument flight procedures but had been converted for helicopter instrument flight. Though it tilted and whirled, many felt it definitely was not a helicopter.

Pilots who trained in the blue canoe developed a tremendous distaste for any simulation program and preferred their training be completed in a real helicopter. Those pilots are now senior and master aviators in operational units or instructors training new aviators to fly. Both positions offer these seasoned aviators the opportunity to pass on any personal biases they have.

In 1972 the U.S. Army replaced the blue canoe with the UH-1 flight simulator (UH-1FS), see photo. This system duplicated the flight, engine and system characteristics of the UH-1 helicopter. The simulator's interior was configured identically to its aircraft counterpart in appearance, feel and function.

The bad experiences were kept alive through the "war stories" of the seasoned aviators although technology had indeed advanced. In fact, articles have been written for the ***Aviation Digest*** since 1972, attempting to dispel these rumors. I suppose this article could be viewed as number 12 in that series.

However, my primary purpose here is to use results from visual performance comparisons, collected in both the UH-1H helicopter and the UH-1 flight simulator, to convince even the hard core "simulator haters" of the unique advantages of simulated flight.

Research was conducted in both vehicles to determine if data collected in the simulator would, to some degree, generalize to the real helicopter.

Six recent graduates of the Initial Entry Rotary Wing Course and six instrument instructor pilots were flown in both the UH-1FS and the U.S. Army Aeromedical Research Laboratory's JUH-1H helicopter. Measures of visual performance, pilot control inputs and aircraft responses were taken

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

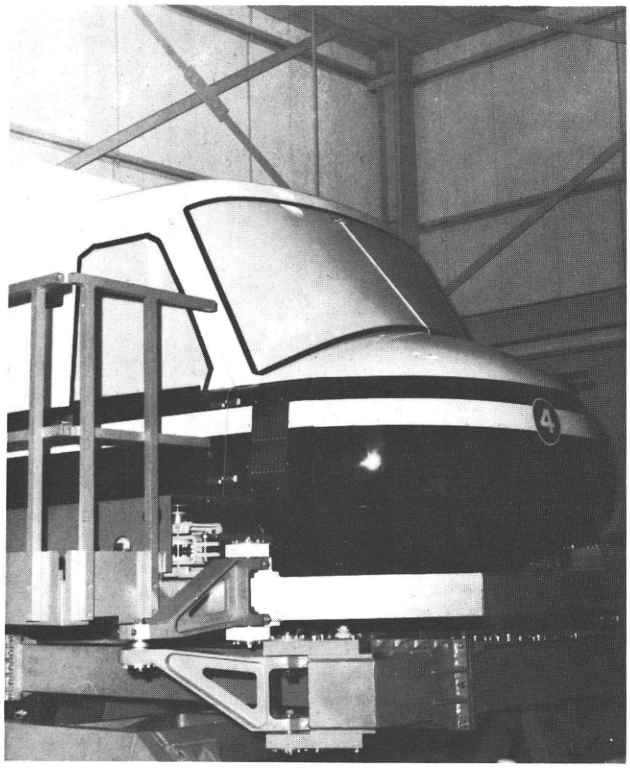
in both the simulator and the aircraft to compare pilots' workload during identical instrument flight maneuvers. The flight profile consisted of an instrument takeoff from Cairns Army Airfield, a 30-minute composite of basic instrument flight maneuvers, and finally an instrument approach back to Cairns.

Final analyses supported the fact that the aviators were proficient in the simulator and the aircraft. Although they maintained slightly better performance in the UH-1 helicopter, neither pilot control inputs nor flight performance appeared significantly different. The measurement of the pilots' visual workload, however, did reflect that to maintain the same flight parameters the aviators required a higher visual workload while flying the UH-1FS than while flying the UH-1H.

The figure shown (page 18) is a summary graph of the data which demonstrates this difference. Percentages of CF (cost factor) plotted on the left side are translated as visual workload. The basic instrument flight maneuvers are plotted on the bottom axis. (The theory which was used to develop this visual workload graph was discussed in the August 1980 ***Aviation Digest***.) Zone 1 (Z_1) represents the total visual workload spent to maintain basic aircraft stability. Zone 2 (Z_2) is the pilots' total visual workload allocated to maintain more precise control on such factors as airspeed and altitude. The last area, Zone 3 (Z_3), includes the visual activity dedicated to the aircraft status and navigational instrumentation.

That flying the UH-1FS required more visual workload was inferred from the level of visual performance differences on the Z_1 instruments. Since the Z_1 area includes all instruments which provide basic stability information to the pilot, this obviously becomes the area of highest priority to be monitored. As the figure shows, the Z_1 visual activity of pilots in the simulator was about 5 percent above that experienced in the UH-1 helicopter. This higher workload to maintain stability afforded the pilots in the simulator less time to monitor the more precise flight

UH-1FS Flight Simulator



JUH-1H Helicopter

information in Z_2, and this lack of attention to the more precise instruments theoretically accounts for the slightly worse performance seen in the UH-1FS.

A further breakdown of the data indicated that the flight axis (pitch, roll and yaw) which required the most significant visual workload shift was the yaw axis of the simulator—as was reflected by the pilots' visual activity on the radio magnetic compass and the turn-and-slip indicator. Additionally, pilots in the UH-1 spent 100 to 200 milliseconds longer looking at each instrument than when they were flying the simulator. This difference was attributed to the vibration differences of the two vehicles. The simulator attempts to reproduce helicopter rhythm by vibrating only the pilot's seat. The UH-1 has vibration in the seat but it also has additional vibration compounded in the instrument panel.

What is the significance of the visual workload being markedly higher in the UH-1FS? To the research community such findings demonstrate that research conducted under simulated flight conditions would require adjustment of these differences before attempting to generalize to the real aircraft. However, to aviators who train in the UH-1FS such data reflect that simulated flight has the same general visual workload curve (figure 1) as the UH-1 helicopter. (Incidentally, this general helicopter curve is significantly different from pilots' visual plots in more stable aircraft.) The fact that the visual workload in the UH-1FS is higher tends to suggest that the simulator is a more challenging training environment and should better prepare pilots to handle the real helicopter.

We hope these findings will compel disbelievers to reevaluate their distrust of their valuable training time in the simulator. Once the basic credibility question is resolved, the pilot has the opportunity to open a totally new chapter in personal professionalism.

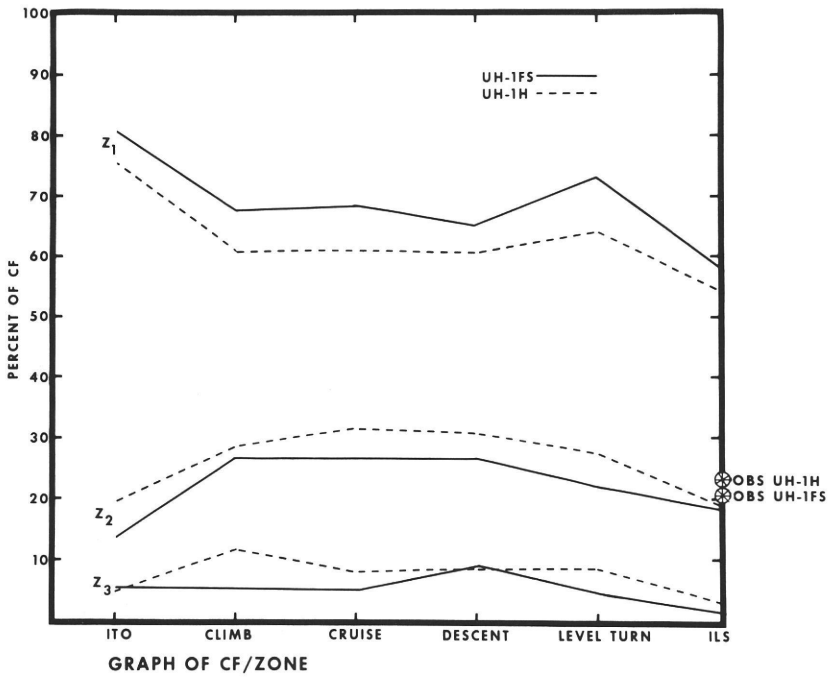
In the article, "Come Fly With Me" in September's *Digest,* It was indicated that aviators' flight experience and currency in a given situation could mean the difference between a successful performance and an accident. In fact, reports show a lack of such proficiency has accounted for many helicopter accidents. Obviously, pilots do not practice instrument flights in actual turbulence or icing conditions; but they can do so on simulator flights.

Carrying this thought one step further, the "100 plus" emergency conditions which can be practiced in the simulator world are safer and easier to practice there than in the real world. Rehearse losing a tail rotor component in the UH-1FS, or wait until it happens at 1,000 feet in a UH-1. If you can survive the latter, you can consider yourself current in handling that particular emergency (at least for 1 or 2 months).

Considering the current phase of technology, it seems a justifiable request to ask aviators to accept simulated instrument flight for what it is—a reasonable facsimile of the "real thing" and a viable solution to remaining current in adverse weather or when an aircraft malfunction occurs.

The title to this article would indicate that credibility has caught up with the technology of the UH-1 flight simulator. However, since technology has again leaped forward, howling, growling and gnashing of teeth can be heard from those seasoned aviators now being told that simulated visual scenes projected on windows of simulators are close to "the real thing."

Summary Graph of Collected Data



Just 10 years ago, an article I wrote appeared in the May 1970 *Aviation Digest;* its title, "It'll Never Get Off The Ground." It was about this super thing we were about to have installed at the Aviation Center called the 2B24 (UH-1FS) synthetic flight training system (SFTS). JP-4 cost 18¢ a gallon, and we were training about 5,700 pilots a year. The bingo prize at the Officers' Club was a Winnebago Chieftan; every trailer court within a 50-mile radius was packed to overflowing; and the Lake Lodge was the swingiest place this side of Atlanta. The point is, there was plenty of gas, plenty of aviators and plenty of money. Inflation was less than 5 percent per year. Not so anymore. With an inflation rate of 16 percent plus, and JP-4 costing $1.18 a gallon (a 560-percent increase in 10 years), training Army aviators is an expensive process indeed. The saving graces in all this are our synthetic flight training systems—they allow us to train without regard to the constraints of maneuver space, ammunition, weather or fuel. It tickles me we did something right more than 10 years ago; it pleases me CW2 Ron Burgess reinforces this and brings us up to date on the SFTS. His article is important now, and I recommend that all Army aviators read it—because 10 years from now, *it will be even more important.*

Lieutenant Colonel George Coutoumanos
Chief, Concept and Studies Division
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

AH-1FS: One Step Closer To Reality

CW2 Ronald E. Burgess
Directorate of Training and Doctrine
Department of Flight Training
Hanchey Division
U.S. Army Aviation Center
Fort Rucker, AL

NEARLY ALL ARMY aviators at sometime in their flying career have had to face the unavoidable flight simulator. In years past the simulator has been referred to as the "Link," "Blue Canoe," the "Idiot Box," and probably other names best omitted. Now, it is called the "SFTS" and the latest on the Army Aviation scene is the AH-1FS prototype in use at the Army Aviation Center, Ft. Rucker, AL. The AH-1FS boasts an interesting and impressive ancestry which has been well covered in the ***Aviation Digest.*** (A list of the magazine's synthetic flight training articles is on page 21. Copies are available upon request.)

At the U.S. Army Aviation Center, the AH-1 simulator's prototype is being used to train students in the aircraft qualification course and the TOW (tube-launched, optically-tracked, wire-guided) qualification course. An invaluable tool in procedural training, it has a vast potential yet to be realized. The AH-1 flight simulator is separated into three sections: terrain boards, computers and cockpits. (Each of these three sections has its own support equipment.)

The central component of the operation is the computer bank. The bank is made up of three PDP 11/45 general purpose digital computers, each with its own individual program stored on disks. The first computer, called Computer Program Unit "A" or CPU "A," controls aerodynamic characteristics of the Cobra. The second, CPU "B," is responsible for controlling demonstrations of maneuvers; and the third, CPU "C," controls visibility and weapons' configurations. Although each computer has its own program, all three are tied into each other for operation of the simulator.

Two terrain boards are the source of the visual capabilities of the simulator. Both are identical and represent typical terrain associated with southeast Alabama. The boards are built on a scale of 1:1,500 and include a stagefield, a confined area, a pinnacle, a range with 10 targets and 16 other scattered targets. Also on the board is an NOE flying area with terrain

AH-1FS:

One Step Closer To Reality

ranging from mountainous desert terrain (without the dust) to heavily wooded hill country.

Each terrain board has visual extenders or mirrors to give the illusion of a more distant horizon in the cockpits. The boards represent a range of about 16 nautical miles north-south by 6 nautical miles east-west. The boards measure 24 by 64 feet and are mounted vertically for ease of access by the cameras.

Camera equipment used in transmitting the visual "windows" is located on probes mounted on computer operated gantries (movable platforms). The probes contain mirrors which are maneuvered to reflect light into the cameras at the angles that the aircraft might be situated. Large banks of flood lamps, equal in size to the terrain boards, provide the illumination. Varying the number of lamps illuminated can give the illusion of day, dusk or night in the cockpit.

The most familiar section of the simulator is the cockpit area. There are two cockpits or trainer stations —one for the pilot's compartment and one for the gunner's compartment. Each cockpit can accommodate three occupants—a student, an instructor and an observer. The student occupies the simulated aircraft cockpit with the instructor seated behind the student. The instructor's station, officially called the instructor operator's station or IOS, has a CRT for graphic displays of the aircraft's position, condition, weapons configuration, target position and firing results.

Cockpits are mounted on platforms with six hydraulic legs which give the cockpits a 6-degree freedom of motion that can provide a feel of lateral, longitudinal, yaw, pitch, roll and vertical movements in flight. Each leg can extend 48 inches, but to the occupants enclosed in the trainer's station it seems to be a lot more.

Inside the cockpits each student has a forward visual screen, or window, giving about a 48-degree horizontal and 36-degree vertical field of view. In the pilot's trainer a left side window is available for an additional view to that side. The visual display, like the cockpits, can be operated in either integrated or independent modes.

The value of the simulator is in its uses and capabilities, limited only to time available and the operator's imagination. The simulator's capabilities equal that of the aircraft in most cases and exceed limitations we place on the aircraft for safety reasons. For instance, would you go out and intentionally disable both hydraulic systems inflight? Such a situation can be flown without endangering life or limb in the simulator.

How many of us have any idea what a tail rotor gearbox separation looks or feels like, or have experienced a dual hydraulic failure? Very few I'm sure. With the aid of the simulator, you can do those maneuvers. The simulator is programed for any defect from a single circuit breaker failure up to a runaway weapon system. There are only a few situations the simulator cannot duplicate. These include fuselage fire, rain and hail, and thermal runaway battery.

Another feature of the simulator is the ability to change weather conditions. The ceiling can be altered from ground level up to 3,000 feet with a cloud thickness varied from zero to 20,000 feet. Visibility is controlled by a rheostat and can range from zero-zero to greater than 7 miles. Winds can be from any point of the compass and up to 50 knots. Other weather available includes turbulence level from zero to nine, barometric pressure from 27.00 to 32.99 inches of mercury, and free air temperature up to 50 degrees C. The time of day can be varied from night to dusk to day.

With this in mind, vertical instrument helicopter recovery procedures can be tested to the fullest. The student can be shown the need for training in transitioning from VMC to instrument flight. The simulator is programed for GCAs with 33 ADF stations in a 256 by 256-nautical mile gaming area. Also available are VOR and ILS transmitters.

The training device also provides a means for aviators to receive precise and objective gunnery practice while saving the Government about $20 million a year over the cost of live ammunition. The AH-1FS (prototype) weapons system simulation includes the M-28 turret system (7.62 mm minigun and the 40 mm grenade launcher), 2.75 mm folding fin aerial rocket launchers, M-18 wing-mounted machinegun, M-35 20 mm cannon, and TOW missile.

Another feature of the simulator is the provision for FM homing. Using this feature as well as the NDB stations, an aviator can plan and fly a tactical instrument approach. Once a student has broken out into VMC, the flight continues using terrain flight procedures, into a firing position, engagement of an enemy target, and egress. In the field, how often can we perform such training?

During both gunnery and contact training, a lot of time is saved with the simulator. A pilot can be placed on final for certain maneuvers, such as autorotations,

GLOSSARY

ADF	automatic direction finder
CRT	cathode ray tube
FM	frequency modulated
GCA	ground controlled approach
ILS	instrument landing system
NDB	nondirectional radio beacon
NOE	nap-of-the-earth
TOW	tube-launched, optically-tracked, wire-guided
VMC	visual meteorological conditions
VOR	very high frequency omnidirectional range

and then released for the maneuver rather than flying a full traffic pattern. During gunnery, it takes less than 5 seconds to reload or change a loading configuration, as well as fuel loading to maintain weight and center of gravity. One of the simulator's most serious limitations is that it cannot provide students the time they need flying the aircraft in exercises, training and range firing.

Another major limiting factor (at the present) is the first reaction to the visuals of someone who is unfamiliar with the simulator. The pilot's cockpit has only a forward and left side visual presentation. The left side visual does not fully extend to the 9 o'clock position unless the pilot leans forward slightly. While the "aircraft" is on the ground the pilot has the sensation of being at a hover. After a period of time, however, a pilot can adapt.

Other limitations include the large amount of space needed for the equipment. (Remember, terrain boards are 24 feet high and 64 feet wide.) Also, the banks of lights require year-round cooling to prevent heat damage of the circuitry of the camera probes. The computers are stored in a separate room from that of the terrain board for the same reason.

To prevent the camera probe from flying into the terrain boards, the computer is programed with a software protect mode. This allows the probe to descend to a set height above the board and then stops the descent, except at the stagefield, the gunnery range and at a confined area. In the NOE area, the probe is free to descend to the board but no protection exists. Therefore, in the event of an engine failure or other need for immediate descents to the ground, all maneuvers are terminated visually at a predetermined altitude.

The AH-1FS prototype simulator at Ft. Rucker is designed with the cockpit of an AH-1Q. Future production simulators will be in the AH-1S (modernized) configuration. Simulation will include aircraft performance, navigation and weapons systems. The Doppler navigation system, fire control computer, rocket management system, laser rangefinder, heads-up display and aircraft survivability equipment also will be simulated.

Production models are expected to be available in fiscal year 1983. At present, five AH-1FSs are planned for the field: two for Germany (at Hanau and at Giebelstadt), and one each going to Ft. Campbell, KY; Ft. Hood, TX; and Ft. Ord, CA.

With the fielding of those simulators, Army Aviation will increase its combat effectiveness through improved training and will achieve significant dollar savings in the process.

The following *Aviation Digest* articles about synthetic flight trainers are available upon request by writing Editor, *U.S. Army Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362:

- "The Missing Link," January 1961
- "Synthetic Flight Trainer," July 1967
- "It'll Never Get Off The Ground," May 1970
- "SFTS," September 1972
- "Flight Simulator Acceptance," April 1976 (Introduction contains new designations for simulators)
- "SFTS: The Shape Of Things To Come," April 1976
- "Tactical Training In The SFTS," April 1976
- "The Professional And The Simulator," October 1976
- "Training Developments At Fort Rucker," March 1978 (Flight Simulators and Simulator Requirements Study)
- "Flight Simulator Reflections," August 1979
- "Hi, I'm A Distraught Flight Simulator," October 1979
- "The Real Thing," October 1980

The flight simulator provides a means for aviators to receive precise and objective gunnery practice while saving the Government about $20 million a year over the cost of live ammunition

Army Flight Standardization Program Areas of Interest For Fiscal Year 1981

THE FOLLOWING information is provided to highlight the primary areas of interest for Department of the Army Flight Standardization Evaluation/Assistance Team Visits, worldwide, in fiscal year (FY) 1981. The information is offered to assist aviation unit commanders and individual aviators in their training programs.

The goals of the Army Flight Standardization Program are reduction of needless human and materiel losses and enhancement of unit readiness, aviation safety and individual aviator professionalism. Additionally, the program seeks to eliminate wasted time spent teaching aviators and aircrewmembers local modifications of basic tasks that can and should conform to the same standards in like units Armywide. Therefore, the focus of the program during FY 1981 will be on the identification and elimination of some of the frustrating distractors that "waste valuable training time" and degrade essential mission preparedness. The following will receive special attention:

- The quality and effectiveness of assistance provided to aviation units/activities/individuals by local flight standardization committees.
- Standardization instructor pilot (SIP)—instructor pilot (IP) ability to conduct appropriate unit mission and emergency procedure training tasks in each aircraft system in which the SIP/IP maintains instructor ratings.
- Individual aviator's ability to plan for and conduct, during day or night, a mission for his/her primary aircraft, when given a tactical scenario, to include the threat.
- Aviator ability to safely recover from inadvertent instrument flight conditions. Flight will be conducted in the aviator's primary aircraft.
- Use of available training hours and tactical training scenarios by the synthetic flight training system facility.

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 558-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hot Line, AUTOVON 558-6487 or 205-255-6487 and leave a message

What Is Your Gunnery IQ?

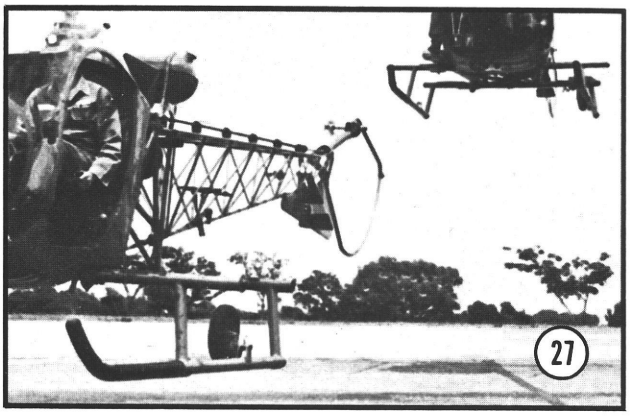
AS AN ATTACK helicopter pilot, your ability to perform your mission is directly proportional to your knowledge of gunnery procedures. The following quiz has been formulated to enable you to conduct a self-evaluation of your attack helicopter gunnery knowledge. **This test has been based on the AH-1S (Production).**

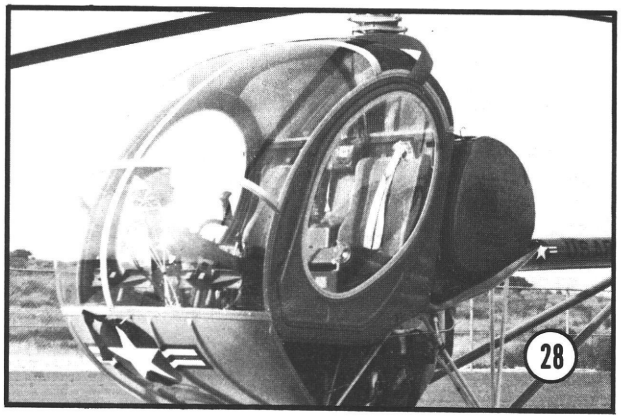
Answers on page 39

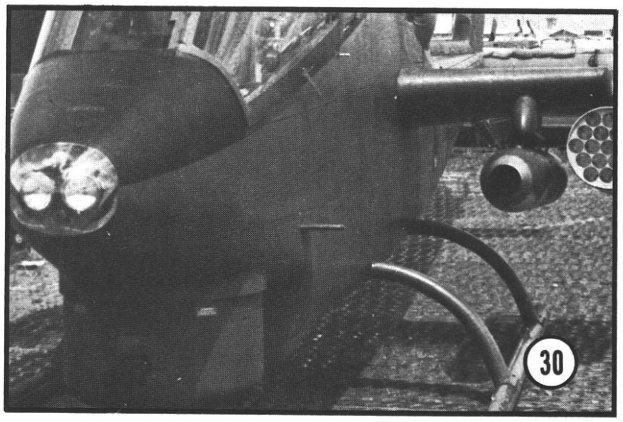
1. Bullet drift causes the strike of the round to be _____ of the aiming point. How is bullet drift compensated for?
2. When firing with the turret slewed to the right during forward flight, bullet jump causes the rounds to move _____.
3. What switch automatically compensates for trajectory shift?
4. If a rocket lands 100 meters short when the pilot is establishing a ballistic correction factor, what is the proper correction on the M73 sight?
5. While firing rockets using terrain flight firing techniques, the size of the beaten zone will _____ as range increases.
6. Is it more accurate to fire rockets in or out of ground effect?
7. What is the proper wind correction when firing rockets, from a hover, with a right crosswind?
8. When firing rockets in the indirect mode, a 1-degree heading change causes the impact to move _____M per 1,000 M of range.
9. When firing rockets in the indirect mode, a 1-degree pitch attitude change causes the impact to move _____M in range.
10. What is the tracer burnout range for 7.62 mm ammunition?
11. How does the pilot apply super elevation to the turret when firing in the fixed mode?
12. What switches must the pilot activate to fire the M134 when the TCP is in TOW mode?
13. With the TCP in TSU/guns, what switch determines if the turret will follow the TSU or the HSS when the LHG action bar is pressed?
14. What switch activates the gunner's cyclic action and trigger switches?
15. What are the pre- and post-launch constraints for the TOW system?
16. To get the attack flag displayed in the TSU, the gunner must activate which switches?
17. With the TSU in HI-MAG position, what is the distance from the center of the reticle to the first tick mark on either side in mils?
18. What formula can the gunner use to determine range to the target if the width of the target in mils and meters is known? Engaging a T-72 tank (width about 7 meters), the gunner sees that the tank displaces two mils in the reticle of the TSU. What is the range to the target?
19. What is the time of flight for a TOW missile to its maximum effective range?
20. How does the crew determine that a TOW misfire has occurred?

RECOGNITION QUIZ

Monthly Hints for October: One is foreign; one's an "Angel"; another is a trainer. The other three should be easy to guess.

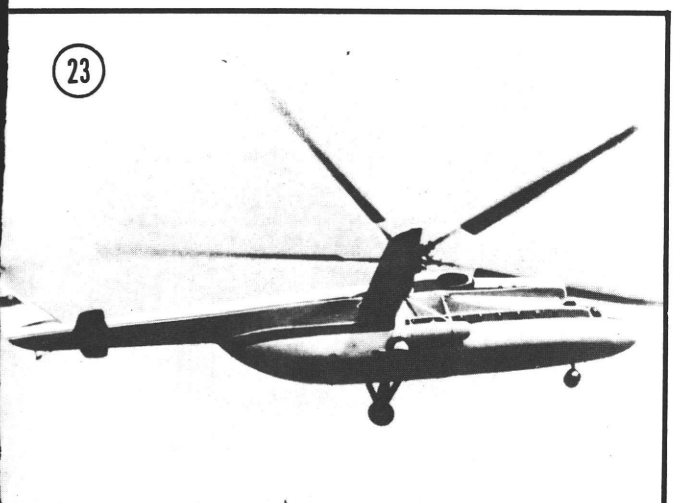






SEPTEMBER 1980 RECOGNITION QUIZ ANSWERS

19 C-141 Starlifter. Air Force transport.
20 OV-1B Mohawk with the side looking airborne radar (SLAR) system.
21 IL-76 Candid. Soviet turbojet.
22 Gazelle. French multipurpose helicopter that will replace the Alouette II.
23 Mi-6 HOOK. Soviet heavy transport helicopter.
24 Alouette III. French medium, seven-passenger/cargo helicopter manufactured in France.



Costly, bothersome, and senseless

U.S. ARMY SAFETY CENTER

More than 30 years ago, the driver of a weapons carrier backed his vehicle to an aircraft to load some equipment. In his zeal, he backed up too fast and applied the brakes too late. The weapons carrier rammed the fuselage, causing extensive damage to the aircraft.

About 20 years ago, a mechanic stood on the hood of his jeep to inspect the propeller hub of an aircraft. When he finished his inspection, he climbed into his vehicle, started the engine, and began to back away. Only the jeep didn't back up. Instead, it lunged forward into the aircraft, damaging the engine cowling. In his haste, the mechanic neglected to put the jeep in reverse.

Recently, another mechanic parked his tug a couple of feet away from a UH-1 so he could use the vehicle as a workstand. When he completed his work, he tried to move the tug. However, when he placed the shifting lever of the automatic transmission in reverse and released the brake, the vehicle would not move. The transmission remained in neutral. He then recycled the shifting lever three times to the reverse position. Without warning, the tug lurched forward and hit the aircraft, causing damage to the aircraft that cost nearly $800 to repair. The tug transmission linkage was out of adjustment.

So what's new?

Over the years, equipment has changed and personnel have been replaced, but ground mishaps have remained basically the same. A look at some of these mishaps shows most stem from inattention, carelessness, disregard for established procedures and regulations, or simply from a lack of knowledge.

Movement of aircraft

One of the greatest problem areas concerning ground mishaps is associated with the towing or repositioning of aircraft. During this phase of operation, vehicles or towing equipment either strike and damage aircraft or aircraft hit some object, sustaining various degrees of damage. Cause factors are numerous and varied.

- A driver was backing a tractor to a tow bar attached to a UH-1. When he applied the brakes, the tractor did not immediately respond. The operator became excited and frantically pumped the brakes four or five times. In the process, his foot struck the accelerator twice. The tractor hit the aircraft, causing $1,475 in damages.

Unfamiliarity with the towing equipment being used was instrumental in causing this mishap. Although the driver was accustomed to operating a tractor, the one he was using had been borrowed from another unit, and he was not familiar with its braking action. The brakes were functioning properly.

- A tug driver was positioning his vehicle to attach a tow bar to it. His foot slipped off the brake pedal and hit the accelerator. The tug then crashed into the nose of an aircraft, causing $12,000 in damages.

- A forklift was being used to position a CH-47 in a hangar. As the forklift eased the aircraft into the hangar, the aft blade hit the hangar door and was damaged beyond repair. The cost: more than $35,000.

Although this mishap appears to stem from a simple case of carelessness or inattention, actually several cause factors combined to cause it. A forklift was being used because the unit's tug was not operational. And while the operator was

licensed to tow aircraft with a forklift, the one being used did not permit ample visibility. Also, the doors on the side of the hangar being used could not be fully opened, restricting the entrance way. Further, the ground guides were not using proper hand signals, and the forklift operator could not hear any voice commands because of the required hearing protection he was wearing.

Other ground handling mishaps have resulted because personnel failed to follow standard procedures.

• The crew was moving an OH-58 into a hangar. They misjudged the door opening, allowing the horizontal stabilizer to hit the door edge. As a result, the stabilizer had to be replaced. This error in judgment occurred because a minimum crew of three, as required, was not being used to reposition the aircraft.

Finally, external conditions can combine with other factors to cause ground mishaps.

• A driver was using a ¼-ton vehicle with side curtains installed to tow an OH-58 into a hangar. As the aircraft neared the hangar doors, the ground guide positioned at the tail of the aircraft saw the aircraft was going to strike the hangar. However, before he could warn the driver, he slipped on a layer of ice and fell. Since the vehicle operator could not see him, the ground guide began yelling for the driver to stop. However, the vehicle noise drowned out his warning and the driver did not stop until he felt the aircraft strike the hangar. The cost to repair the OH-58 was nearly $6,000.

The prime cause factor in this mishap was failure to insure that the ground guides were always within the vehicle operator's field of vision. Even though cold weather prevailed, the side curtains on the vehicle should have been removed before towing operations were begun.

While collisions are the main hazards associated with the movement of aircraft, they are not the only ones.

• Recently, ground crewmen were preparing to move a CH-47 from the flight line to the hangar. In the process, they untied five of the rotor blades but overlooked the sixth one. When the aircraft was moved, the blade tied down sustained extensive damage. Costs for repair: $34,000.

Since this mishap, the unit involved has developed a CH-47 ground handling checklist, and crews have been briefed on the procedures they are to follow.

Tools and equipment

But aircraft do not have to be moved to be damaged. They are often inadvertently

challenged by a variety of tools and equipment right where they stand, whether on the flight line, ramp, or in the hangar.

• Personnel placed a portable light set between two helicopters parked on a PSP ramp. The ramp sloped downward toward the aircraft. After positioning the light stand, personnel set the brakes. However, they did not chock the wheels. High winds, gusting to 25 knots, coupled with the rotorwash of an operating helicopter nearby caused the light stand to move about 20 feet into one of the parked helicopters. Damage to the pilot's chin bubble exceeded $1,400.

• A mechanic was positioning a maintenance workstand beside the tail boom of an AH-1. The stand hit the right spiral antenna of the radar signal detecting system. The cost for replacement: $830.

Inexperience and a desire to please combined to produce this mishap. The mechanic had just completed MOS training and was working at his first job assignment.

Cobra vs shovel

Another Cobra fared even worse. This proud AH-1, capable of obliterating enemy personnel in its path, demolishing convoys, and knocking out tanks and artillery, found itself in the embarrassing position of being temporarily KO'd by an EM armed with a shovel. It happened like this: The EM was standing near the aft section of the aircraft when he was handed a shovel and nonchalantly swung it over his shoulder. You guessed it! The shovel struck a tail rotor blade, damaging it beyond acceptable limits. The cost to replace the blade: $1,761. An expensive shovel!

Whether a result of carelessness, negligence, or inexperience, failure to

properly handle equipment around aircraft can be depended on to produce damage. It's merely a question of how much and how soon.

Aircraft on jacks

Ironically, some ground mishaps are caused by the very safety aids intended to prevent them. Aircraft damage occurring during jacking operations is a prime example.

• Mechanics preparing to jack an AH-1 roped off the area and leaned an "Aircraft on Jacks" sign against the nose of the aircraft. As the aircraft was raised, the sign slipped under the nose. When the aircraft was lowered, the sign punctured a hole in the skin under the nose. Damage cost: $250.

• A mechanic was placing "Aircraft on Jacks" signs around a fixed wing aircraft when one sign tipped over and knocked a hole in the chin bubble of an adjacent UH-1. Damage cost: $994.

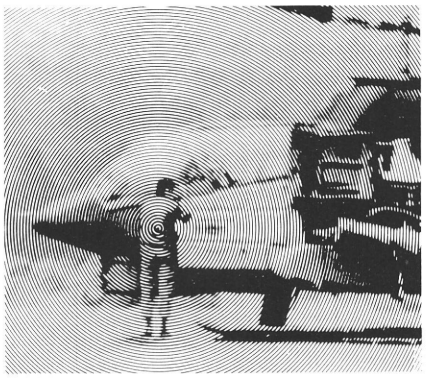
In the first case, a free-standing sign was not used. In the second one, the sign was of a free-standing design but was unstable. New signs to be used by this unit will be constructed along the lines of sawhorses to insure stability. However, while in both instances the signs were not completely suitable, indifference and inattention on the part of maintenance personnel contributed to these mishaps.

This mishap associated with jacking operations is typical of the mishaps that can occur when available safety devices are not used. The left side of a UH-1 was jacked up to replace the skid tube. After the old skid was removed, the aircraft fell off the jack stands and landed on the cross tubes and belly. The cost for repairs exceeded $9,000.

This aircraft was raised on a frozen, icy surface, and no secondary restraining devices were used.

Egress

While most ground mishaps do not pose a serious threat to the safety of personnel, some can be extremely hazardous to both personnel and equipment. Mishaps that involve explosive egress systems obviously fall in this categroy. Following is one example which, fortunately, did not produce any serious injuries. But it could have.



• A sheet metal worker was to make repairs in the pilot's station of an AH-1G. Not being familiar with how to open the pilot's canopy, he made no attempt to gain entrance but returned to the hangar for instructions. After receiving instructions, he went back to the aircraft and tried to follow them. However, he was still unsure as to how the canopy was to be opened, and his attempt was unsuccessful. He did not seek other instructions. Instead, after noting some wires extending from the jettison handle in the gunner's station, he assumed this was the red door handle. He then proceeded to pull the pin and then the handle, "blowing" the canopy. The cost: nearly $11,000.

The worker was experienced in his job, but he was not familiar with the aircraft on which he was to perform maintenance. All maintenance personnel should be thoroughly briefed on systems that affect their safety as well as the integrity of aircraft. Supervisors have a prime responsibility in this vital area of safety.

Costly mishaps

Ground mishaps are not only a constant source of irritation but are also costly in terms of materiel resources, time, and dollars. For example, the dollar cost for 20 randomly selected ground mishaps amounted to nearly $ ¼ million, for an average cost of about $11,000 per mishap. Of this randomly selected group, the most costly mishap required $55,000 for repairs and the least costly, $250.

But even when we disregard repair costs, damages inflicted on aircraft during ground handling produce other, more far-reaching effects. A damaged rotor blade of a CH-54B, for example, means the temporary loss of a $3 million aircraft—and its capabilities. Similarly, a damaged elevator or aileron on an OV-1D means that a $2 ½ million aircraft, along with its capabilities, has been removed from the inventory just as effectively as if a hostile shell had done the job. The same can be said about our other aircraft—our $3 million CH-47C, or our new $2 ¼ million Black Hawk.

The consistency of aviation ground mishaps indicates that these mishaps have somehow come to be something expected and accepted. Yet, considering the high cost of modern aircraft, their capabilities, the need to be in a constant state of readiness, the time required to make needed repairs, the added workload placed on skilled mechanics, plus the cost for these repairs, no one has to be hit over the head to realize it is high time to put a stop to these mishaps. And the beauty of it is that of all types of aircraft mishaps, ground mishaps are probably the most easily preventable. The cure lies in three key areas: knowledge, responsibility, and supervision.

Knowledge

Obviously, the first requirement is for ground handling personnel to be

thoroughly familiar with both the equipment they will be using and the aircraft they will be handling. They must also be proficient in the use of such equipment. Among other things, this means experienced drivers to operate tugs or other towing vehicles and trained personnel who know the cautions and warnings associated with the types of aircraft they will be handling. Ground handling crews must be fully aware of the hazards associated with egress and other aircraft systems that can produce injuries as well as damage.

In addition, personnel must know the procedures to be followed to safely accomplish each type of task they may be called on to do. This includes any safety precautions associated with each individual job.

Responsibility

While knowledge of equipment and its use is a definite must, personnel must also insure that all equipment to be used is functional and suitable for use.

Recently, a refueler preparing to service a UH-1 set the emergency brake of the tanker and started to walk to the rear of the vehicle to chock the wheels. However, the vehicle began to roll toward the aircraft. The driver immediately ran to the cab and applied the brakes, but not in time to prevent the tanker from hitting the right elevator. Granted, the tanker was improperly parked or it would not have rolled into the aircraft. Nevertheless, if the emergency brake had been functioning properly, the vehicle would not have rolled in the first place.

But it doesn't matter whether the equipment is a vehicle, an APU, a tow bar, jacks or whatever, it is the responsibility of the using personnel to insure it is operational and suitable for the job to be done.

Similarly, it is one thing to know the correct procedures and cautions to be observed when doing a job, and another to follow these procedures and observe all the cautions. Again, this is the responsibility of the ground crews. But how do you insure that ground crews have the necessary knowledge and experience and are exercising their responsibilities? That's where the third element comes in.

Supervision

It is a function of supervision to make sure ground personnel receive the necessary training and gain any needed experience before being assigned jobs. Supervisors must further insure these personnel are thoroughly familiar with the aircraft they will be handling and know what safety precautions must be followed. Other supervisory responsibilities include the development of SOPs and checklists, if needed, relevant to ground handling of aircraft and the enforcement of all approved procedures and policies.

Since equipment and personnel change periodically, an ongoing OJT program is essential. This training should relate to day-to-day routine job assignments as well as to emergency procedures to be implemented in time of need. For example, where and how are aircraft to be secured for maximum protection in the event severe weather prevents their timely evacuation?

In short, all functions related to training, experience, job skills, issuance of directives, establishment of policies and the enforcement of such directives and policies are the responsibilities of supervision.

To all this, perhaps we can add a word of advice. Anticipate the unexpected. Even though everything appears to be in order, always be on the lookout for any possible loopholes in your aviation ground safety program. Sometimes, the darndest things can happen to foul up even the best laid plans.

Take, for example, the aviation unit that received a timely weather warning, indicating they could expect heavy rain, a decrease in temperature, and high winds. Personnel immediately went to work, securing aircraft, loose equipment, etc.—all by the book. To insure compliance with SOPs, the unit commander drove his POV to the flight line, parked it in an authorized area, and set the parking brake before conducting an inspection of the facilities. Everything was in order. Nothing was left undone.

As predicted, the rain came, the temperature dropped, and the wind blew. As a matter of fact, it blew the commander's car a distance of approximately 125 feet—right into a parked UH-1.

Because of the low temperature and precipitation, a layer of ice had formed on the ground, allowing the high winds to move the vehicle onto the flight line.

Maybe we can borrow a bit of philosophy from an old story concerning an 85-year-old man who appeared before a judge, seeking a divorce from his wife of more than 65 years. Skeptically, the judge studied the elderly gentleman, then curiously inquired: "Why in the world do you want a divorce at this stage of your life after having lived with your wife all these many years?"

Without a moment's hesitation, the elderly man replied, "Well, your honor, enough's enough!"

Costly and senseless ground mishaps have gone on far too long. But the fact is they don't have to keep going on any longer. It's time to adopt the old man's philosophy and decide once and for all that as far as ground mishaps are concerned, enough is, indeed, enough. ■

The Interim-Interim (I^2) SOTAS assigned to the 1st Armored Division, and described in the article, is an advanced developmental research model. It consists of existing military and commercial hardware built to demonstrate the operational feasibility of the SOTAS system with troops in the European environment. COL Wayne B. Davis, SOTAS project manager, said this major Department of Defense weapons system is currently in an accelerated engineering developmental phase. The resulting production model will contain significant improvements over the I^2 system, including a highly advanced radar designed to operate in the threat environment of 1985 and beyond, integrated onto an EH-60 helicopter. This Black Hawk derivative gives SOTAS a near all-weather capability. The system also will include SOTAS secondary ground stations at brigade level, as suggested by the authors, and at division artillery and division jump tactical operation centers as well. See the May 1980 issue of *Aviation Digest* for a more complete description of the SOTAS.

on a clear day you can see...

Captain Eric Hinson and **CW2 Clifford S. Berg**
501st Aviation Battalion (Combat)
1st Armored Division
APO New York 09140

AN AIRBORNE WARNING and control system for the Army? Why not? Can the Standoff Target Acquisition System (SOTAS) fill the bill? Place yourself in a scout helicopter and follow along.

"Get above the trees, and let's take another look at the kill zone."

"OK; coming up."

Not more than 2 minutes ago, the helicopter scout team moved into observation position and was monitoring enemy activity in an assigned kill zone. Its primary function was to spot zone penetration and hand-off targets to the attack helicopter platoon battle captain, housed in the Cobra TOW (tube-launched, optically-tracked, wire-guided) missile equipped helicopter.

"The zone's filled with smoke! I can't see any movement in there at all!"

"I wonder if it's a decoy. I don't know if we should wait here to see if anything comes out."

The scout team leader (STL) was perplexed. A decision had to be made now, and he knew it had to be right.

"Well sir, I think if anything comes out of the smoke now it'll be too close for TOW engagements; and the smoke is drifting our way."

With this thought in mind, the team leader knew he had only two choices. One would be to fall back into secondary positions. The other would entail a movement to search for the targets.

"We can't go searching for them now. We might overfly their lead elements. I guess we better fall back and hope they push forward."

Unknown to the STL, the enemy had deployed the smoke as a decoy and intended to move laterally away from the smoked area and plunge deep into unsuspecting friendly forces.

Without additional information the attack teams fell back and awaited further instructions. The enemy turned and the onslaught began. Within hours the enemy force penetrated several miles and spread havoc, fear and disorganization among troops who were unlucky enough to be in their destructive path.

We suppose by now you want to get out of the helicopter. Well, hang on a bit and let's take a look at

BLACK HAWK SOTAS EH-60
Illustration by A. Whyte

yet another, more refreshing point of view with an additional friendly asset. We refer you to the point in time when the scout leader determined there were only two choices: fall back or search. "Search" is the idea we wish to explore.

Certainly we agree that overflying the enemy is not a good way to find him, but falling back is not always the best alternative either. With the capabilities of the Army's new Standoff Target Acquisition System, the situation could have developed like this:

"I can't see a thing through the smoke; maybe SOTAS can see something."

The scout leader quickly checked his CEOI (Communications-Electronics Operation Instructions) extract, identifying the frequency and call sign for the SOTAS operations. With a flick of the wrist the radio was tuned, and the call for help went out . . .

"D3F26 this is S4R37, over."

"This is F26, over."

"Have you got any movement in the vicinity of grid PN 425958?"

"Standby."

"This is F26, I have movement of about 40 vehicles heading north out of the grid area. Estimated speed is about 25 miles per hour."

"This is R37, roger, out."

With this added wealth of information, the scout team set up in another area. Within minutes the enemy armored vehicles came into view as anticipated. An attack plan was quickly formulated and passed to the attack helicopter platoon leader, who in turn maneuvered his element into battle positions.

A moment later the enemy penetrated the new kill zone. The attack order went out and unmasked Cobras delivered TOW missiles downrange and placed deadly steel on target. Almost immediately, great towers of black smoke marked the point of annihilation.

The havoc, fear and disorganization now belonged to the foe. Indirect artillery, directed by the STL, fell on the surprised and soon to be annihilated enemy.

History has shown that the military force which can gain intelligence information first and use it to the utmost will be the victor. SOTAS can provide this intelligence data, fresh from the battle area and quickly pass it to the ground force commander (GFC).

1ST Armored Division battalion level ARTEP (Army Training and Evaluation Program) exercises in the Hohenfels Training Area, Federal Republic of Germany last year gave new meaning to "fresh intelligence" as SOTAS was put through its initial paces as an active participant in the various iterations of ARTEP '79. Never before, under simulated battle conditions (within the scope of ARTEP), had such an intricate system been used to *warn* the ground commander of the estimated size, estimated speed and direction of movement of impending forces. A scout, air or ground, could only hope to be as good.

The concept of the operation should be discussed in detail at this point.

Company C (Atk), 501st Aviation Battalion (Combat) was tasked to provide attack helicopter support for battalion task forces during ARTEP '79 with the primary mission of blocking and/or stopping major enemy penetrations. The consistent composition of the attack helicopter team was one scout control aircraft/team leader (OH-58), two scout aircraft (OH-58) and five attack helicopters (AH-1S). The authors were the team leaders throughout the exercise, and

Captain Persign (SOTAS officer-in-charge (OIC)) was the point of contact at SOTAS operations. The scout control aircraft had the additional mission of providing the interface between SOTAS and the task force commander.

Each mission was approached in a specific sequence of events from start to finish. In preparation for the daily mission, the STL performed a thorough map reconnaissance of the area of operation. Then, at a predetermined time, the STL departed the assembly area to meet face-to-face with the GFC to discuss the upcoming operation. This discussion included the concept of the operation, tactical overlays and communications procedures. Although all are necessary, the communications procedures, particularly the antijamming procedures, proved to be the most important. Without the antijamming plan the STL would soon become lost in the maze of frequencies of the frequency modulated (FM) band, thus rendering him useless to the ground commander. When this occurred the only alternative was to quickly reestablish face-to-face contact.

Upon completion of the tactical briefing, the STL joined with the SOTAS OIC to pass phase lines, checkpoints, concept of the operation and communications procedures. After this was accomplished, all that remained was to execute.

At the designated time, the STL came onstation in support of the ground forces. If the SOTAS had been operational prior to that station time, they passed a complete update to the STL. The update and subsequent battlefield intelligence was evaluated and passed, if appropriate, to the GFC in the normal spot report format with SOTAS being identified as the observer. All monitored spot reports from the ground forces that had been reported previously or verified by SOTAS were reported as such. The capabilities of SOTAS, which had been explained to the GFC, were oftentimes able to beef-up and verify any visual sightings from the ground elements.

SOTAS battle data fell into two categories, general and specific target information.

General target information was relayed to the STL without request. This information usually related to targets which were identified as enemy solely based on their location relative to the last known front-line trace. Upon receipt of this data pertinent information was extracted for use by the STL, and then the data was passed to the GFC in the form of a spot report. The GFC was aware that I² SOTAS could not observe type of vehicle or identify friend or foe. General target data consisted of size, location, movement, direction and speed. With this information the GFC could "see" enemy assembly areas, supply routes and main attacks. Based on timely receipt, usually less than 2 minutes from time of observation, this general target data relay proved quite useful to the ground commander. The STL was better able to assist the GFC by recommending specific attack helicopter deployment in the form of blocking or covering force operations.

Even during times when communications with the ground forces were reduced or destroyed, the STL was still able to see the battlefield by means of the SOTAS data and pick out the major attack routes and roughly determine the size of the element on each route. We were able to assist in countering all enemy penetrations because of this system.

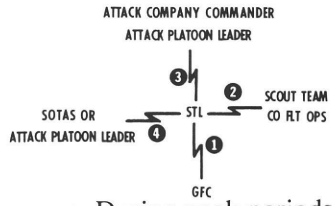
Specific target information was rendered to the STL upon request. This type of information was used whenever attack helicopter assets were deployed as directed by the GFC. On occasion the STL was tasked to provide a blocking force on the major avenue of approach in sector. The attack helicopters moved to a holding area, while the scout elements observed the kill zone and proposed battle positions for the Cobras. Preplanned artillery fires were coordinated through the GFC. The Cobras were called forward and held short of their battle positions. While SOTAS continued to monitor activity near the kill zone, the scout aircraft provided area security. When SOTAS observed kill-zone penetration, the STL was notified. The attack helicopters occupied their firing positions and waited for the attack order. The STL observed the kill and called for the preplanned artillery fires. As soon as rounds were on the ground, the engagement authority was given and the battle captain ordered "attack at will." Each attack helicopter acquired and engaged targets within the kill zone according to predetermined fire distribution plans. The scouts continued to secure the attack position and adjust indirect fire.

On two occasions the enemy force used a smoke screen to avoid detection and acquisition. This rendered the attack helicopters useless. The STL notified SOTAS and requested specific information of a secondary battle position to the flanks of the opposing force. SOTAS observed no movement in those areas. (Note that SOTAS identifies its targets through radar scanning which detects moving objects.)

The STL notified the GFC and requested permission to occupy a secondary position on a flank of the opposing force. Approval was received and the scout element moved into the new position. While observing enemy targets Cobras were directed to the attack position and engaged the penetrating force from its flank. Thus, the ability to communicate with SOTAS is the key to the success of the operation.

The STL has four communication radios. The radios contribute to successful control and coordination of the attack mission. In fact, it was found that the listening duties had to be divided in the cockpit of the STL's aircraft due to the density of traffic during the height of the battle. The pilot and the STL monitored two radios each: the STL with SOTAS and the GFC; the pilot with the scout team/company flight operations and the attack helicopter battle captain. The link between the two was provided through the intercommunications system of the aircraft. The figure at right describes the STL radio assignments.

RADIO ❶ : FM WITH SECURE, HOMING, AND RETRANS
RADIO ❷ : UHF
RADIO ❸ : VHF
RADIO ❹ : FM WITH RETRANS



Radar identification of scout and attack helicopters was also an item of exploration during this ARTEP period. A portable radio beacon, which could be interrogated by SOTAS radar, was used onboard the aircraft. The beacon was active only when interrogated. SOTAS personnel had a display of the STL position on their request, thereby eliminating position reports during the mission. With the aid of the beacon, SOTAS would send target information in relation to the aircraft position. The pilot was merely required to make a pedal turn, unmask and without fail there would be a target as observed by SOTAS. Sometimes the target was friendly, but more times than not, it was enemy. The STL had the most current information of the front-line trace and could, therefore, determine friend or foe. Upon verification of foe, a spot report was sent to the GFC.

No system is without problem areas and a few were encountered in these exercises. They are as follows:

- Communication is the key to this operation. Simply stated: if the STL and SOTAS cannot communicate, the operation is a no-go.
- No matter what battlefield intelligence is passed from SOTAS, the STL must still receive permission from the GFC to move about his battlefield or engage targets. SOTAS and helicopters cannot work independently of ground forces unless the division G-2 and G-3 join heads and establish precision type coordination. Should this type of operation ever happen, reporting of friendly front-line trace and other dispositions must be accurate and passed immediately to SOTAS. This data will have to remain accurate throughout the mission.
- Because it is impossible for I^2 SOTAS to positively identify friend or foe, all target locations are assumed friendly. This requires that spot report transmissions from SOTAS be either sent secure or encoded. The scout team leader has only one FM radio with secure capability, and it must remain on the GFC net. Encoding with the KAL 61 would be sufficient if target data from SOTAS were sparse. During peak periods it is completely impractical to use the KAL 61 because of the volume of target data. If the STL had an additional secure radio, this problem would not exist.

During the exercise SOTAS and the STL used a method to pass information which was relatively secure, easy to understand and required much less time to send than encoding and decoding a six-digit coordinate. The method is commonly referred to as a shift from a known point. Checkpoints should be changed often.

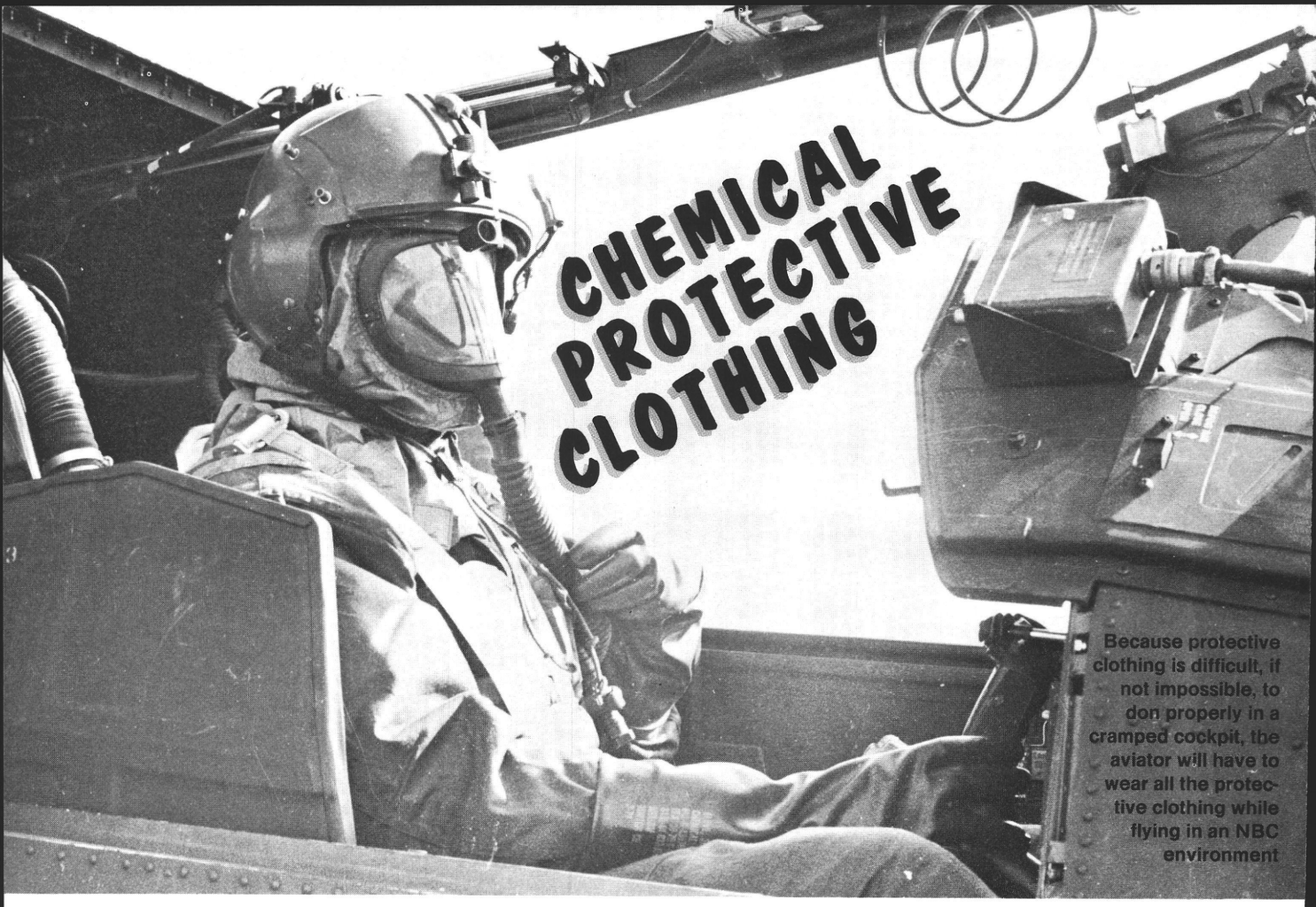
Target locations were identified in relation to any one of a number of preselected checkpoints labeled with two letters, i.e., "BG." As the tactical situation became more fluid, STL spot reports of suspected enemy positions were sent in the clear. After a target had been identified by SOTAS, a specific target number (agreeable to the STL and SOTAS) was assigned for subsequent references to that target.

Based on our experiences in the exercises, the following recommendations are suggested for future study:

- SOTAS be equipped to interrogate the IFF (identification friend or foe) transponder mode currently installed in the aircraft.
- Commanders be made fully aware of the SOTAS capability and know how to convert its information into useful intelligence.
- A SOTAS radar scope and personnel be provided down to brigade level to improve intelligence gathering and dissemination to the battalion task force level.
- Attack helicopter companies usually perform under operational control to brigades and direct support to battalions. SOTAS information could be fed through the intelligence net in the present structure without having to open a new net between SOTAS and the STL. Having the information "right there" would eliminate the need for the STL/SOTAS liaison team.

I^2 SOTAS is a good system, but as in any advanced developmental system, refinements must be made to gain the workable asset. This is a large step in allowing the ground force commander to "see" more of his battlefield.

On a clear day, you can see forever. With SOTAS you can see on any day.



CHEMICAL PROTECTIVE CLOTHING

Because protective clothing is difficult, if not impossible, to don properly in a cramped cockpit, the aviator will have to wear all the protective clothing while flying in an NBC environment

Captain Dee Dodson Morris

All reviewers of this article agreed that its value was worth noting, but that it does not answer all questions on the subject. No one article could do that, and it is believed Captain Morris has accomplished her purpose of presenting some thought-provoking observations

SHORTLY AFTER World War I General "Black Jack" Pershing described chemical warfare as "a cruel and unnatural use of science." He went on to say, however, that any individual who ignored its possibilities, or its hazards, was a fool. Unfortunately the U.S. Army, while not totally ignoring the possibilities of chemical warfare, has relegated protection from its hazards to a relatively low training and development priority. This action is most acutely felt in the area of protective clothing, especially in aviation units.

Chemical protective clothing for Army aviators currently includes the M-24 protective mask with M-7 hood, a two-piece chemical protective overgarment, chemical protective gloves and chemical protective footwear covers. The latter three items were designed to be worn by ground personnel.

The nuclear, biological, chemical (NBC) threat for aviators is such that they generally will only need the full protective ensemble when they are on the ground (although there could be some danger from chemical vapors on low level flights). At any rate, because protective clothing is difficult, if not impossible, to don properly in a cramped cockpit, aviators will have to wear all of their protective clothing while flying in an NBC environment. This way they will have it on if they have to land in a contaminated area. Herein lies a large problem!

A great deal of research effort was expended in the development of the Nomex flightsuit, and many aviators have been saved from serious flesh burns by its wear. However, current policy for the wear of the protective overgarment may defeat the purpose of the flightsuit. The protective overgarment is intended to be worn over the flightsuit, but its charcoal lining and cotton twill outer layer make it extremely

Proper use of night vision goggles, helmet sighting system and the TOW sighting unit is extremely difficult with the M-24 mask

combustible in a flash fire situation. A question that needs to be answered is: If the Nomex flightsuit is necessary to aviator safety, shouldn't there be a policy established so aviators can wear the overgarment under the flightsuit? The Air Force's chemical defense ensemble provides for this.

Another flash fire hazard is the rubber in chemical protective gloves, footwear covers and M-7 hood. Current policy prescribes that the gloves be worn over the Nomex flight gloves and the footwear covers over leather boots. However, until the state-of-the-art dramatically improves, the butyl rubber coated hood will most likely remain a problem the aviator will have to learn to live with. A question to be answered is: Why not adopt the Air Force's concept of neoprene gloves under the Nomex flight gloves and plastic tube socks worn over regular socks and under the boots with slip-on plastic covers for going to and from the aircraft?

The last major problem with the protective ensemble is the M-24 mask. The mask has a major visual distortion problem and seriously degrades the aviator's vision, especially at night. Hopefully, both of these problems will be solved by the introduction of the XM-30 multipurpose protective mask, currently scheduled for the 1981 to 1982 timeframe. Proper use of night vision goggles, the helmet sighting system and the TOW (tube-launched, optically-tracked, wire-guided) sighting unit is extremely difficult with the M-24 mask. Preliminary data indicate varying degrees of successful interface between these equipment items and the XM-30 mask. Further testing is necessary before conclusive findings can be reached.

Problems presented by the chemical protective ensemble being bulky and hot have not been solved but are being addressed. However, it seems that the questions of bulk and heat stress can at least be partially answered by additional emphasis on training.

Well-dressed aviators in an NBC environment will have difficulty moving inside the cockpit. They may not be able to move their heads from side to side as much as they need to because the hood restricts this movement. Further, they may not be able to reach behind themselves as far as needed because of the bulk of the overgarment. The mask may completely destroy their depth perception and their night vision. Heat stress will pose its own problems. These are limitations that they must be aware of before they have to fly in combat.

Protection of the aviator in an NBC environment is a unique researchable and developmental problem, but it is also a fundamental problem of training. All the protective equipment in the world, regardless of whether it is what we have today or hope to have in the future, will not ensure the survivability of the aviator who does not know how to use it. Who is able to foresee exactly when or where it will be needed? NBC training is not harassment. It is very necessary because those who learn, survive.

Captain Dee Dodson Morris received a B.S. in textile chemistry from Virginia Polytechnic Institute in 1976 as the first woman commissioned into the Army from a military school. Currently assigned as brigade chemical officer of the 6th Cavalry Brigade (Air Combat), Fort Hood, TX, her previous assignments have included the U.S. Army Technical Escort Unit at Edgewood Arsenal, MD

Chemical protective clothing for Army aviators currently includes the M-24 protective mask with M-7 hood, a two-piece chemical protective overgarment, chemical protective gloves and chemical protective footwear covers

PEARL'S

Personal Equipment And Rescue/survival Lowdown

ALSE Activities

The Aviation Life Support Equipment (ALSE) Management Steering Council held its quarterly meeting 27 to 28 August 1980 in Atlanta, GA. Attending were representatives of The Surgeon General, Training and Doctrine Command, Forces Command, Materiel Development and Readiness Command, U.S. Army Safety Center and the Army National Guard. Agenda items reviewed/discussed included: ALSE requirements, documents, additional skill identifier for ALSE personnel, ALSE training literature, AN/PRC-90 and AN/PRC-112 survival radio update, flight requirements for ALSE, use of unauthorized flight helmets, antiexposure suits for helicopter aircrews, aircrew flight clothing and equipment survey, NBC (nuclear, biological, chemical) update, CH-47 crashworthy seat and ALSE guidance.

Fifth U.S. Army held its latest "hands-on" ALSE workshop during the period 8 to 12 September 1980 at Ft. Campbell, KY. About 100 Army Reserve, Army National Guard and active Army personnel were given instruction in such subject areas as establishment of a unit life support shop; ALSE publications; inspection and maintenance of the life preserver, first aid kit, individual survival kits, flight clothing, flight helmet, survival vest and survival radio; ALSE maintenance forms and records; and the ALSE retrieval program. In addition, the workshop included a practical exercise in water survival and a field trip to Scott AFB, IL for a tour of the U.S. Air Force Air Rescue Coordination Center and a visit to the 102d USARCOM Aviation Support Facility life support shop.

Post And Screw

Problems have been encountered obtaining the replacement post and screw which is used to affix the chinstrap National Stock Number (NSN) 8415-01-057-3502 to the earcup retainer assembly on the SPH-4 helmet. The post and screw have been assigned NSN 8415-01-092-5290 and should now be available through the supply system. If problems do arise, however, these may still be ordered individually from the manufacturer under PN 78A4085-1 (post) and PN 75A3093-9 (screw), using MFG Code 97427. For further information contact Marie Kilz, U.S. Army Troop Support and Aviation Materiel Readiness Command, AUTOVON 693-2614.

SRU-21/P Survival Vest

The SRU-21/P survival vest (NSN 8465-00-177-4819) has among its components the survival kit, individual, tropical (first aid kit), NSN 6545-00-782-6412, which contains an item classified as a controlled substance under the Comprehensive Drug Abuse Prevention and Control Act of 1970, Public Law 95-513. Consequently, the first aid kit is not supplied with the vest and must be ordered separately. Authorized Army activities, designated to receive controlled substances by the Surgeon General, may submit requisitions for this item directly to: Defense Personnel Support Center, ATTN: Director of Medical Materiel, 2800 South 20th Street, Philadelphia, PA 19101. All other Army elements, including the Army Reserve and Army National Guard, must contact their post hospital or nearest medical support unit to ascertain the procedures they must follow to obtain the first aid kit.

Keep Up With The Changes

Just about all ALSE personnel use Air Force technical orders (TOs) and/or Naval Air Systems Command (NAVAIR) manuals, as well as Army technical manuals (TMs), for the inspection and maintenance of their equipment. Consequently, it is of the utmost importance that responsible personnel post the changes to these publications as quickly as possible after they are received. The Air Force publishes regular changes to its TOs, as well as operational supplements and safety supplements. The latter will be issued if the information contained therein is of such a nature that it would prevent injury to personnel or serious damage to equipment. It is also especially important to make sure that these changes are posted to those publications issued jointly by the Air Force and the Army, such as TO 14S-1-102/TM 5-4220-202-14, "USAF Flotation Equipment." Although the Army may also publish changes to these types of publications, the Air Force usually does so more expeditiously. The Navy publishes regular changes and rapid action changes to its manuals; the latter are similar to the Air Force's safety supplements. If you have Air Force and/or Navy manuals, make sure you are receiving and posting the changes.

If you have a question about personal equipment or rescue/survival gear, write PEARL, DARCOM, ATTN: DRCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120 or call AUTOVON 693-3307 or Commercial 314-263-3307

OCONUS Ferry Flights

There is a continual problem getting aviation life support equipment for OCONUS (outside continental United States) ferry flights of Army aircraft. In the past equipment has been borrowed from the other services, but this is now becoming extremely difficult, primarily because some Army flight crews have failed to turn in the equipment made available to them. Action is now being planned to identify an ALSE central issue facility (CIF) in Europe, as well as one in CONUS on the east coast, but this will not happen overnight. Changes are now being incorporated into AR 95-1 which will identify the specific needs of ferry flight crews with regard to ALSE and the requirements of aviation unit commanders to provide this equipment.

Hyperventilation And Hypoxia

Recent reports from the U.S. Air Force have identified hyperventilation and hypoxia as dangerous areas that each of us should become aware of. As usual, oxygen regulators that fail at least one portion of the field test were most frequently implicated. Also included were another case of mask hose/CRU-60 disconnect, and an improperly fitted (i.e., leaking) mask. Four out of five problems reported caused hypoxia. In a fifth case, a restriction to breathing resulted in hyperventilation. Loss of consciousness occurred on three of the five occasions. Army Aviation personnel using oxygen equipment must ensure that their equipment is properly inspected and maintained, to include the correct fit of their oxygen masks.

Questions And Answers

My question concerns the wear of the jacket, fliers, lightweight, Nomex. We have been issued the one-piece flight suit, and I understand that no patches are to be sewn on this suit since it has hook and loop fasteners installed for affixing the removable name tag. But the jacket has no such hook and loop fasteners, and it doesn't seem right wearing a jacket with sewn-on name tags and patches over a flight suit with the hook and loop fasteners. Is there a new type jacket being developed which will incorporate the hook and loop fasteners such as are incorporated on the one-piece suit? (Sergeant Edward C. Farrar, 159th Med Det (HA), APO New York)

At the moment there is no new flight jacket being developed. However, the Natick Army Research and Development Command (NARADCOM) is currently evaluating the Air Force sage green (CWU-45/P) flight jacket for possible adoption by the Army, and this jacket is equipped with the hook and loop fasteners. You also may be interested to know that Change 1 to AR 670-1, "Wear and Appearance of Army Uniforms and Insignia," is forthcoming and will authorize attachment of the hook and loop fasteners to the present flight jacket, at the discretion of the local commander.

Debbie Fuentes
Photo by Tom Greene

VIEWS FROM READERS

Editor:

The undersigned is a technical representative of the U.S. Army Science and Technology Center Far East Office (USASTCFEO) at Yokota Air Base, Japan. Although not an aviator, I am responsible for the aviation collection requirements assigned for action to STCFEO.

Request you forward a copy of the AH-1S Modernization booklet if still available. This booklet/articles as well as the *Aviation Digest* are of great assistance when holding discussions with the aviation branch of the ground staff office of the Japanese Ground Self Defense Force.

Thank you in advance for your consideration and assistance.

MAJ Ronald G. Mikeworth
Technical Representative
USASTCFEO
APO SF 96328

• **Your copies of the AH-1S articles are in the mail. Others may obtain a copy by writing Editor, *U.S. Army Aviation Digest,* P.O. Drawer P, Ft. Rucker, AL 36362.**

Editor:

The letters of COL Waldron (February 1980 *U.S. Army Aviation Digest*) and CW4 Hess (May 1980 *U.S. Army Aviation Digest*) bring a question to my mind. When was the last time your unit instructor pilot, standardization instructor pilot, instrument flight examiner, unit trainer or maintenance test pilot received any *formal* training for that position?

Having worked for a USAR aviation support facility for more than 5 years, it has been frequently observed that a requirement to fill one of the above positions is quickly and conveniently accomplished by training at the unit level . . . . The years that have elapsed since last performance in such a position do not seem to be taken into account. The first priority always seems to be "filling that position."

With the advances and changes in technology of Army Aviation, it would seem far more practical to require formal training prior to exposing these personnel to the aviation environment. If a commander or supervisor does not feel this training is beneficial directly to him, all he needs to do is take a look at the article on the "Analysis of Army Aviation Accidents FY 79" (May 1980 *U.S. Army Aviation Digest*).

Formal or DA approved courses of instruction may not be required in all cases, but where an individual has not performed those duties for 5 or more years, then it would certainly be essential. As CW4 Hess expressed it, the requirement to "shift gears" is just as prevalent in a USAR environment as a National Guard or active Army one, so why not allow the training necessary to prepare these individuals to meet the situations they will be confronting?

James W. Halley Jr.
Military Technician
121st ARCOM
Ft. Rucker/ASF (157)
P.O. Drawer I
Ft. Rucker, AL 36362

Editor:

I would like a copy of "Tips For Instrument Flight Planning," which appeared in your February 1980 issue. Your help will be deeply appreciated.

SFC James E. Wilson
HHT 1st Sqdn, 1st Cav
1st Armored Div
APO NY 09142

• **A copy is in the mail. Others may obtain copies of this article by writing: Editor, *U.S. Army Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362.**

Editor:

CPT Carlson's article in the May edition titled, "Helicopters in Urban Combat, An Unanswered Question," was interesting reading. While the Army's experience in the use of helicopters in combat is without question the most extensive of any service in the world, it is true that our experience in urban combat is limited. Just how effective helicopters will be and just how extensively they would be used in a major urban area remains to be seen. Certainly they will be used in the movement of troops and supplies and with the normal amount of ingenuity they should play a key role in support of or as part of the combined arms team.

This brings me to my main reason for writing this letter. The account of the helicopter's role in the battle of An Loc has been less than accurate in several articles—this one being the most recent. As a former commander of the 229th Assault Helicopter Battalion during the battle of An Loc, I have retained a copy of the 3d Brigade, 1st Cavalry Division (Airmobile) and Task Force Gray Owen S-3 Journal along with other historical documents. The idea that helicopters stopped flying in the face of enemy antiaircraft is not supported by the facts. Essential missions continued to be flown by the Army and by the VNAF.

The introduction of the SA-7 during early May along with the heavy antiaircraft that surrounded An Loc caused us to revise our tactics but the statement that the air defense became so dense that it was impenetrable for helicopters is just not true. During the period 5 April to 7 July Army Aviation did operate in and around An Loc on a daily basis. The fixed wing close air support mentioned in the article was often limited due to the cloud conditions over An Loc. This factor along with the close proximity of opposing troops made the Cobras, A-1Es and A-37s, in that order, the most valuable assets in striking close-in targets. The C-130s were making paradrops into An Loc's 1 kilometer parameter but the enemy was benefiting more than the friendlies. On one memorable occasion, the C-130s dropped bundles from 10,000 feet with

no prior warning just as a flight of UH-1s loaded with the troops was approaching the LZ. It was exciting—to say the least!

The statement that the seige was lifted in June is news for the people in An Loc and for those who were supporting the operation. It is true that forces entered An Loc in June but it was all by helicopter because the Vietnamese were unable to reopen Highway 13. In fact, a major exchange of forces began on 21 June when the Vietnamese 1st Airborne Brigade that had played a key role in holding the city of An Loc was extracted so it could join the rest of the airborne division which was being moved north. It was decided that the airborne brigade would fight its way south on Highway 13 to the vicinity of Tan Canh which was about 3 km from An Loc. The airborne brigade was a tough, well-seasoned outfit but it took it more than 2 days with a lot of air support to get to the LZ.

Following the extraction of the Vietnamese airborne brigade, 1st Cav helicopters with some help from the VNAF continued an exchange of troops in An Loc until July 7th. According to the records there were 11,153 personnel transported by UH-1 between Lai Khe and An Loc in this relief operation. While CH-47s were available and would have greatly expedited the lift, we did not wish to present such big lucrative targets to enemy gunners. However, the CH-47s did make a major contribution by hauling supplies to the base of operations at Lai Khe and in recovery of aircraft in areas where we could provide security.

I think the main point of this experience is that Army Aviation will find a way to get the job done. Even when the antiaircraft fire around An Loc was at its highest level, Army Aviation found a way to support the ground elements. Therefore, I am confident that Army Aviation will play a key role in urban combat.

COL Lewis J. McConnell
U.S. Army Aviation Engineering Flight Activity
Edwards Air Force Base, CA 93523

• Editor's Note: The 229th Assault Helicopter Battalion was awarded the Presidential Unit Citation for the period 5 April to 7 July 1972 by Department of the Army General Order 19, dated 18 June 1974.

ANSWERS TO GUNNERY IQ QUIZ (from page 23)

1. Right; harmonizing
2. Down
3. Compensation switch
4. +5 mils
5. Decrease
6. Out-of-ground effect
7. Aim left of the target
8. 20 meters
9. 350 meters
10. 900 meters
11. With the range potentiometer on the M73 sight
12. Master arm switch-arm; turret switch-right; HSS on target; action switch and trigger depress
13. Acquisition/Track/Stow switch
14. Pilot override
15. Prelaunch constraints/post launch constraints

±2.5° heading	±110° heading
±6.0° elevation	30° up/60° down elevation
±5.0° roll	30° roll

16. TCP-armed mod; HI-MAG; action switch-depressed; acquisition/track/stow switch-track
17. 1 mil
18. $R = \frac{W}{M} \times 1{,}000$ meters; R = Range (meters); W = Known turret width (meters); M = Mil value of turret width (meters); 3,500 meters
19. 21.5 seconds
20. If smoke emerges from the launcher and the missile does not exit the launcher within 1.5 seconds after trigger pull

GRADING SCALE

NUMBER CORRECT	=	SCORE
18-20	=	KILLER
15-17	=	ACE
12-14	=	GUNNY
9-11	=	MIA
0-8	=	DEAD

MORE ON FOD

Editor:

Reference the April issue of the *Aviation Digest*, the inside rear cover concerning FOD, I would like to make a suggestion.

As a possible caption: "Stand Tall, Somewhere Else—FOD Prevention is Everyone's Job." I trust the foregoing may be of some use to you.

CW2 Wayne P. Johnson
117th Avn Co (AH)
APO SF 96208

Editor:

Here are some captions for the FOD poster on page 49 of the April 1980 *Aviation Digest:*

- Look closely and you will see where you shouldn't be, causing FOD.
- I think I just heard a screen.
- This man needs some BOOT training.
- Don't Defeet your purpose.
- Watch where you stand or you'll cause "FOREIGN OBJECT DAMAGE."
- Watch where you're walking down there, so as not to cause havoc in the air.
- This Kid is foot-loose and FODs are free.
- This can be dangerous to its health.
- If you step on forbidden territory, you cause FOD boy.
- It's plane to see his feet shouldn't be.
- He hasn't got a leg to stand on when it comes to FOD-ing around.
- I think I just made a BOO-FOD.

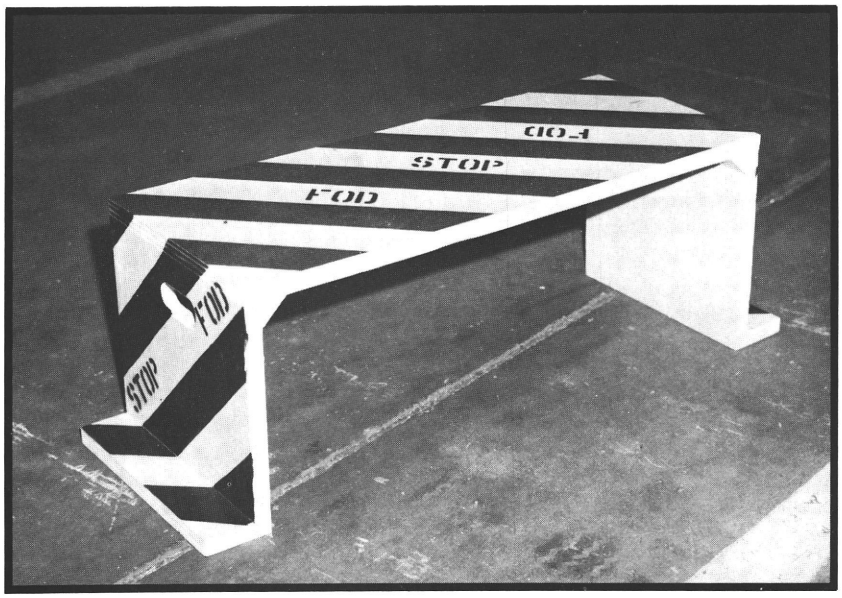
Dale T. Stewart
TSARCOM
Technical Illustration Section
4300 Goodfellow Blvd
St. Louis, MO 63120

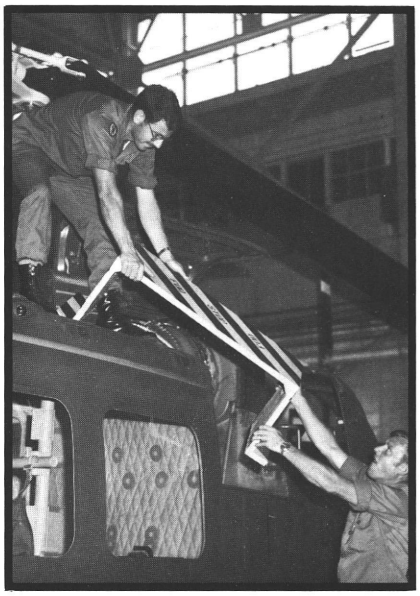
Editor:

Here are a couple of suggested FOD captions:

- Big Foot is back.
- Big Foot is alive and well.

CW2 John L. Hopkins
63d ARCOM
Los Angeles, CA





MORE ON FOD

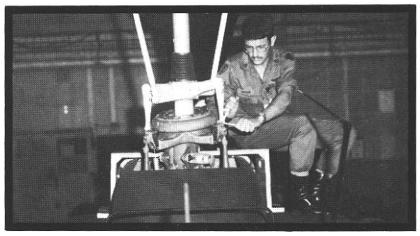
Editor:

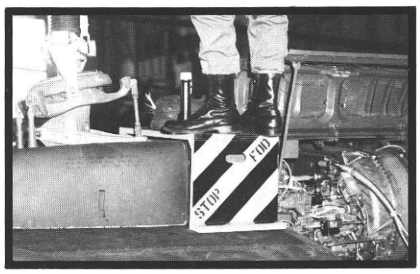
Enclosed is a pictorial response to the (FOD) article in April 1980 *Aviation Digest* (inside back cover).

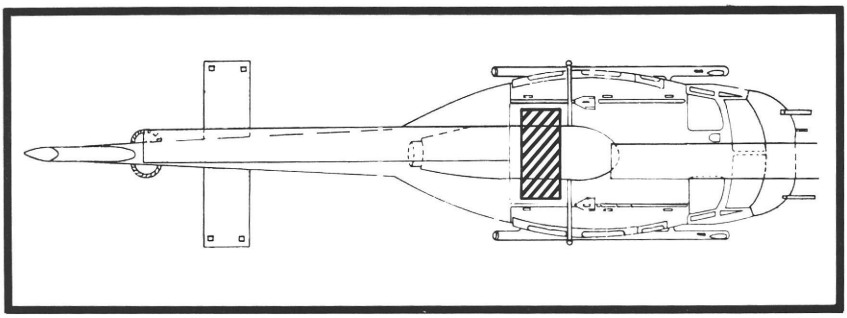
I found this to be a problem in my last unit and I corrected it by supplying the mechanic with a platform. It is designed for use during extensive maintenance, but many crewchiefs and pilots use it during daily and preflight inspections.

I hope you will consider this for one of your safety articles. I built this one and it is used here at the depot.

SFC Lawrence J. Simone
Corpus Christi Army Depot
Corpus Christi, TX 78419







COMPANY C

Specialist Four Steve Valentine
Public Affairs Office
III Corps
Fort Hood, TX

COMBAT INTELLIGENCE is necessary to win wars. Without it, commanders cannot be certain of the enemy's intentions or potential. To ensure a measure of success, various intelligence gathering techniques are used. Among these are aviation aerial exploitation units like Company C, 15th Military Intelligence Aerial Exploitation Battalion.

Using six modified U-21A Ute administrative aircraft—four RU-21D "Laughing Eagles" and two JU-21A "Left-Jabs"—its mission is to provide comment and airborne and radio direction finding for III Corps, according to Captain Michael Reynolds, flight operations officer for Company C.

"Commanders are going to depend on us in either a mid-intensity or a high threat environment to provide them with real-time information," Captain Reynolds said. "They need us—their eyes and ears—on the battlefield to give indications of what the enemy is going to do."

To accomplish the mission Company C aircraft skirt the battlefield monitoring enemy communications. Two pilots and three linguists intercept voice transmissions, radio relays and any other signals they can receive from the enemy.

"The three linguists operate the radios and do the actual formulation of intelligence," explained Captain Reynolds. "While two of the linguists monitor and intercept transmissions, the third takes 'tip-offs' and determines the interest of the communication. He actually forms our product and transfers it from the aircraft to ground command."

The aircraft, regardless of type, can accurately locate the source of transmission employing its inertial navigation system and universal transverse mercator. "This enables us to provide an accurate baseline to inform commanders where we were when we intercepted the signals," Captain Reynolds said. With this information the enemy's capabilities and intentions can be interpreted.

Although the Left-Jab and Laughing Eagle are adequate for the mission, new technology has been introduced extending the capabilities of units like Company C.

Already deployed to Korea and Europe, the new Guardrail 5 system uses the most modern computerization and an improved U-21 airframe. This system is the most advanced aircraft of its kind in the world. It is automated and can provide the commander with needed information within seconds. According to Captain Reynolds, the Left-Jab and Laughing Eagle are crude compared to the Guardrail 5.

Although it is uncertain if Company C will receive the Guardrail 5 system, Captain Reynolds remarked that if and when they do get it, the company already possesses some of the most experienced—and best—pilots in the Army. "With rare exception most of the aviators here are highly experienced. Some of the warrant officers have up to 4,000 hours of flying time," he said, "and they have intelligence; intelligence being our key product."

15th Military Intelligence Aerial Exploitation Battalion (15th MI AEB)

SOME CYNICS HAVE contended for years that military intelligence is mostly hot air. And in one area of intelligence gathering that observation is correct—though in a way that the "doubting Thomases" would never appreciate.

Since the very inception of aerial surveillance during the Civil War, hot air has indeed played an important role in that effort. Back then it was hot air that filled the observation balloons that were fast replacing scouts posted in trees as the most reliable way of seeing what the enemy was up to. Today the hot air in aerial surveillance is supplied by the twin turboprop engines of the Army's OV-1 Mohawk, one of the most sophisticated aircraft ever designed solely for the role of intelligence gathering.

The need for detailed intelligence and the emergence of highly technical aircraft to supply it have dictated that unique military organizations be formed to meet that challenge. One such unit is the 15th Military Intelligence Aerial Exploitation Battalion (MI AEB) stationed at Ft. Hood, TX.

The 15th MI AEB was organized in April 1978 as the first unit of its kind in the Army. Its initial mission was to test the aerial exploitation battalion concept. It grouped all corps level fixed wing intelligence platform aviation assets in the same battalion to assist in standardizing production results, flight operations, maintenance, safety and other considerations. The concept was proven valid and similar organizations have since been activated in Germany and the Republic of Korea.

The mission of any unit like the 15th MI AEB, according to Major Duane Briggs, battalion operations officer, is to provide aerial reconnaissance and surveillance in the corps area of operations. This includes imagery interpretation of Army, Air Force and national-level-generated security products that are of primary interest to the corps. This also includes providing a signals collection capability.

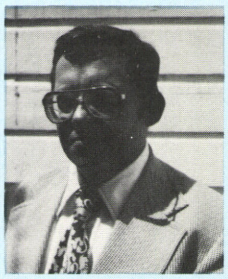
The 15th MI AEB is based at Robert Gray Army Airfield on West Ft. Hood and is comprised of four companies, one of which is stationed for training at Ft. Bliss, TX. Each of the companies has missions which are fairly unique in Army Aviation.

Assistant operations officer Captain Michael Tindall explains that in addition to the battalion staff usually found there, the *Headquarters and Headquarters Company* of the 15th MI AEB also contains several "speciality teams." One is an air traffic control section which has the capability to operate a corps level airfield in conjunction with the Army Communications Command. There is also a life support equipment shop because the 15th MI AEB is the only Army unit in the continental United States which has a continuous high altitude mission to support. The battalion also has a complete aviation medical section which includes a flight surgeon.

Captain Tindall noted that the Mohawks' engines pose a considerable noise hazard for the battalion's flight crews and that hearing conservation and protection is a major responsibility of the unit's medical section.

He pointed out that the life support equipment shop is particularly critical to the 15th MI AEB's mission accomplishment. The Mohawks often fly at altitudes high enough to allow them line-of-sight observation into the enemy's second echelon, sometimes as far as 150 kilometers behind the forward edge of the battle area. In order to accomplish this high altitude flight while standing off from the battle area,

Silhouetted against the desert haze of Death Valley, a 15th MI AEB Mohawk is poised on the end of the runway at Ft. Irwin, CA during tactical operations last summer



Richard P. Fulton
Managing Editor, *Sentinel*
Fort Hood, TX

there is a need for onboard life support systems similar to those used by the Air Force. And it is to the Air Force, particularly at Bergstrom AFB (a few miles south of Ft. Hood) that this section turns for coordination and assistance. Personnel assigned to the life support equipment section are trained at Air Force technical schools.

The section has the ongoing responsibility for repair, maintenance and inspection of oxygen equipment on the unit's aircraft, as well as survival equipment, form-poured helmets and the Army's only aircraft parachute ejection seat escape system.

Company A is the imagery interpretation company and is divided into three platoons. One of these is the III Corps imagery interpretation platoon that deploys to the corps headquarters in tactical situations and acts as liaison with the command.

Company A's second platoon deals with preparing mission plans, crew debriefing, imagery interpretation and product reporting tasks.

The company's third platoon would be stationed with an Air Force tactical reconnaissance squadron as a liaison for the corps headquarters in the event of a tactical situation arising. This concept is in recognition of the capability of Air Force reconnaissance aircraft to fly in greater depth over enemy territory, at faster speeds and higher altitudes than can be achieved by Army fixed wing assets. This platoon would pass on corps mission requirements, obtain film after reconnaissance sorties have been flown and assist in debriefing Air Force crews flying missions in support of Army requirements.

The actual flying for the 15th MI AEB is done by *Company B*. Its mission is to provide combat surveillance and reconnaissance capability to the corps headquarters. The company provides both flight and ground crews to keep the 18 OV-1Ds ready for use either in training or combat.

The mission of *Company C* is aerial direction finding and signals collection. It is stationed at Ft. Bliss in support of the training mission there for artillery and air defense assets. See the article on Company C, page 41.

The OV-1Ds used by Company B carry three sensor systems and are flown by a crew of two: a pilot, who is either a commissioned or a warrant officer, and an enlisted technical observer who operates the sensor systems.

The sensor systems include regular aerial photography (with each aircraft mounting cameras at three different locations on the fuselage), side looking airborne radar (SLAR) and infrared detection devices.

The aircraft's photo capabilities are engineered to provide maximum exposure of target areas under observation. There is a 180-degree pan capability on both the vertical and oblique from the nose and from a position midway back on the Mohawk's fuselage, and also wingtip to wingtip coverage from a bubble under the aircraft. In addition to this extensive photo capability, the aircraft's infrared system looks for heat differences which

Last minute preflight checks are performed by CW4 Theron O. Clark, an OV-1D Mohawk pilot assigned to Co. B, 15th MI AEB at Ft. Hood, TX

LEFT: CW4 Theron O. Clark, Co B, does a last minute check on Mohawk's ejection seat. The OV-1D is the only Army aircraft with ejection capability and it poses unique training and maintenance efforts for the outfit at Ft. Hood

ABOVE: On their return from operations at Ft. Irwin, CA, last summer, each of Co B's aircraft was carefully inspected for damage resulting from sustained operations in the harsh climate of Death Valley. Here CW4 Theron O. Clark checks his Mohawk's engine for trapped dust or debris

are not detectable to the naked eye. But both these sensor systems require direct overflight of the area being observed. Thus more than half of all Mohawk missions depend on SLAR to achieve the desired results.

Moving targets can be detected by this side looking photo-radar system at a range of up to 100 kilometers. So a Mohawk, flying at 200 knots on the friendly side of the battlefield, can scan large tracts of ground behind enemy lines, searching for tactical elements and activity. As an added bonus, SLAR reports can be generated with minimum interpretation delay.

With their bird's-eye view of the battlefield, the OV-1 flight crew also can make visual sightings and immediate radio reports. However, they would not participate in directly influencing the ground action in the sense of correcting artillery fire or placing fire on targets themselves. Their mission is to detect targets and to pass the information to ground and air elements better able to deal with the tactical situation.

Talking about direct participation in combat obviously strikes a chord within the battalion's pilots. "Everyone criticizes the OV-1 because it has no guns," Captain Tindall observed. "But guns aren't our job—intelligence gathering is. To do that mission,

ABOVE: The city of Copperas Cove appears to be filled with toy houses from the point of view of a 15th MI AEB pilot. The residential community, about 7 miles west of Ft. Hood, TX, was overflown during a recent side look radar (SLAR) training mission

we have to have air parity so we can operate.

"A key question is the survivability of our unarmed aircraft in a modern combat environment. However, we are most definitely different from other Army Aviation assets because we do our job between 10,000 and 20,000 feet in a stand-off position from the actual battle."

Captain Tindall sees that stand-off distance as providing ample defense for the Mohawks against the enemy's front line antiaircraft assets. "The primary threat we face," he said, "is air interception, not weapons systems like the ZSU-23-4. No, it's that lone Mig jockey coming back from a hard day who still has some cannon rounds onboard that we have to watch out for—the guy who is just going to make a couple of passes.

"That's why our planes have the gray paint scheme instead of being done in camouflage—to blend with the sky and thus be harder for other aircraft to spot. With this paint scheme there is a 65 percent visibility reduction, which becomes a major problem in training sometimes. Because of this, in training here at Ft. Hood and other locations, we always fly under an IFR (instrument flight rules) flight plan, as well as under positive control by radar."

Despite the very real dangers involved, the 15th MI AEB's flight crews are proud of their mission and aircraft. The technical observers are quick to join pilots in singing the praises of the Mohawks.

"This aircraft has been in the Army inventory for more than 16 years," Sergeant First Class Coy Phillips, Company B's surveillance platoon sergeant said. "But it hasn't become outdated because its surveillance systems have steadily improved.

"The infrared and photographic equipment would get a little scary in a hostile environment," Sergeant Phillips admitted, "because it requires you to fly over enemy occupied territory. But the SLAR allows you to fly behind our front lines and detect movement in the hostile area behind enemy lines." The sergeant has previously flown with Mohawks in Korea and his confidence in the aircraft is based on long familiarity.

As training noncommissioned officer for the surveillance platoon, Staff Sergeant Richard J. Lemmon appreciates the OV-1's flexibility. "We have both day and night photo capabilities," he pointed out, "and we fly eight to nine missions a day. If we don't have a specific tasking, then we set up mock missions to maintain our proficiency."

Staff Sergeant Mark G. Dvorak laughed when he recalled that some of the routine training missions use the OV-1's infrared detection capabilities to assist Ft. Hood's energy conservation effort. "During the winter months," he said, "we can fly over the post and tell which buildings have the thermostats set too high and those which are experiencing a heat loss. In a conflict we could use that same ability to detect camouflaged troops in foxholes and to detect concealed vehicles."

The unique capabilities of its aircraft puts Company B in great demand throughout the southwestern portion of the United States, and its heavy mission load has built a rare sense of kinship among those who are assigned to the unit.

"Our people are probably the most experienced in the Army," according to Major Jimmy A. Watt, Company B commander. "They have flown border surveillance in Germany and Korea in the past, which differs little from their mission in a hostile environment. While here at Ft. Hood, we're constantly tasked with tactical missions like supporting the 2d Armored Division at Ft. Irwin, CA last summer. In fact, while we were at Ft. Irwin, the unit also had an ongoing mission at Ft. Polk, LA.

"Our mission accomplishments are due to the dedicated work of our communications and electronics people, our aircraft maintenance and POL (petroleum, oil and lubricants) sections and of course our flight and operations personnel."

It's obvious from the actions of the 15th MI AEB that aerial intelligence gathering has come far since the days of balloon observers during the Civil War. Its "bug-eyed" Mohawks are the forward eyes and ears of a dynamic, highly sophisticated, multimedia intelligence system which provides detailed information to commanders at all levels. And that's a lot more than hot air.

16th Air Traffic Control

THE 'NEW' KID ON the block is 1 year old this month. We didn't have time to learn how to crawl or walk, we had to hit the street running!"

Those words were spoken by Lieutenant Colonel Vard Freeman, commander of the 16th Air Traffic Control Battalion at Ft. Hood, TX.

"When we formed the battalion on the first of October last year with our headquarters at Ft. Hood," he continued, "we assumed the tactical air traffic control (ATC) mission for each division west of the Mississippi River.

"Essentially, the mission is to install, operate and maintain all air traffic control functions in a tactical environment, both for the respective divisions and also in support of all Joint Readiness Command missions in our area of responsibility, including Alaska and Hawaii."

LTC Freeman went on, "The unit consists of a battalion headquarters at Ft. Hood; two company headquarters, one at Ft. Sill, OK and one at Ft. Lewis, WA; and 10 separate platoons in support of various divisions. That gives the battalion 13 organizations at nine military installations—those mentioned plus Ft. Ord, CA; Ft. Carson, CO; Ft. Polk, LA; Ft. Riley, KS; Alaska; and Hawaii. We log a lot of TDY time," he said.

What the battalion inherited when it was organized was really the ATC section of each aviation battalion that supported its own division. There were equipment problems to be overcome, such as with radar units which hadn't been touched in 3 or 4 years, and control towers that had received little or no attention.

Personnel problems also had to be overcome. Air traffic controllers were working all over post, some in S-2 positions, while others were driving or acting as clerks. The battalion's immediate task was to bring everybody back from their places of duty and also to put emphasis on the equipment by getting things back in order. The first priority was placed on ATC assemblages, generators and trucks, getting this equipment in shape to do the job. Then training of the controllers in the field began.

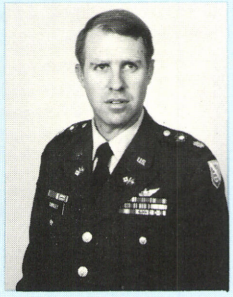
Air traffic controllers basically support divisions with five elements making up the ATC job. *First* is the control tower, AN/TSQ-70A, which is installed at the division airfield to visually keep the aircraft safely flying by using proper spacing between aircraft. This mission is performed by the 93H series MOS (military occupational specialty) personnel.

The *second* service performed is that of operating a radar unit for approach into the airfield when weather conditions are

AN/TSQ-70A

Battalion

Major James E. Dooley III
Major Dooley was the 16th ATC Battalion executive officer when he wrote this article



marginal. Series 93J personnel perform this mission and are trained on the AN/TSQ-71A radar facility. The TSQ-71A is completely tactical in nature and goes anywhere the division's vehicles go—as does all of the battalion's ATC equipment.

The *third* most critical function is the location of the AN/TRN-30 radio beacons so the pilots can navigate to and from the battle zone. Strategically placed throughout the area, they are completely transportable and able to be emplaced in a matter of a few minutes. Frequently, during an exercise, all equipment including the beacons will be displaced as the tactical situation changes.

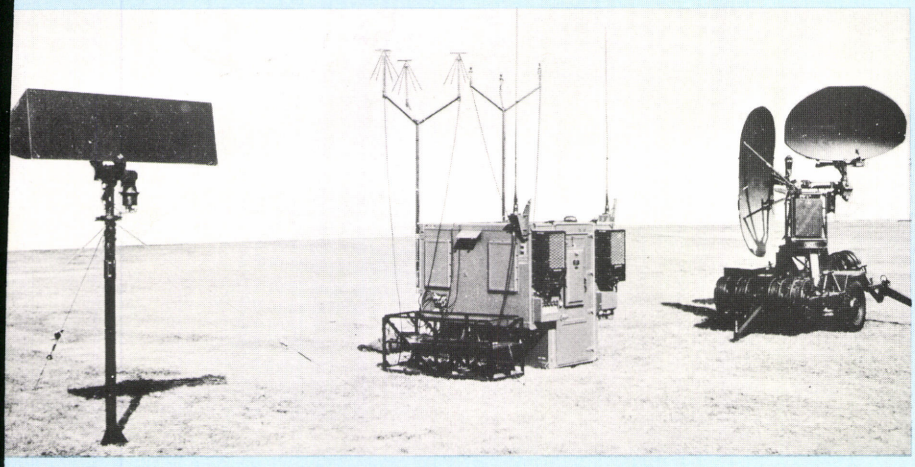
As the *fourth* element, an AN/TSC-61B flight following center is deployed in support of the aviation battalion so that the pilots will have someone with whom to communicate and receive information from about the battle zone. It also has the responsibility of providing "deconfliction" which is the separation of the Army's helicopters from the Air Force's high performance aircraft. This section is the largest section in the platoon and receives the most traffic count due to the nature of the information dispersed.

The *fifth* function which the air traffic controllers perform is that of being able to "jump" with the aviation battalion's forward element and establish a forward airfield with an AN/TSQ-97 man-portable set of radios which would establish this forward landing zone. Since the TSQ-97 is still in basic production, the battalion is awaiting the first models for use in the field. Until then, the AN/PRC-77 is the basic tool; but it is restricted to FM (frequency modulated) while the TSQ-97 has FM, UHF (ultra high frequency) and VHF (very high frequency) for communications with the aircraft.

"Establishing a battalion from scratch has been the real challenge," LTC Freeman continued. "We were tasked to find our own building, design our unit crest, come up with our own motto and request our guidon. It has been that basic."

Captain Paul White, platoon

AN/TSQ-71A



AN/TRN-30(V)

leader for the Second Platoon, 68th Air Traffic Control Company, said, "We'd been organized on paper for 3 days when, on October 4th, the 2d Armored Division moved out to field locations and asked us to provide ATC support. That was quite a mission and firmly established where the training of my platoon would be directed. Within 2 months we had all the equipment on hand in ready condition. The troops had received good equipment training, and they were well on their way to becoming veterans of the tactical mission."

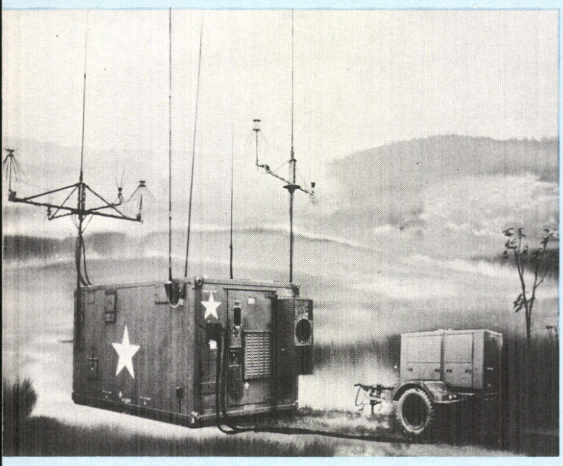
The largest exercise for the battalion headquarters and two of its platoons was the Joint Readiness Exercise Brave Shield 80 at Ft. Polk in August 1979. Major Wade Young, the battalion S-3, explained, "Readiness Command people have come to know the capabilities of the Army's tactical ATC mission since our sister battalion, the 58th ATC Battalion at Ft. Bragg, has been supporting them for the past 4 years as the 72d Aviation Unit. They've always done a super job and have established a high standard for us to follow."

The Readiness Command mission is in addition to the normal support of the combat divisions which continued to be provided during the same timeframe.

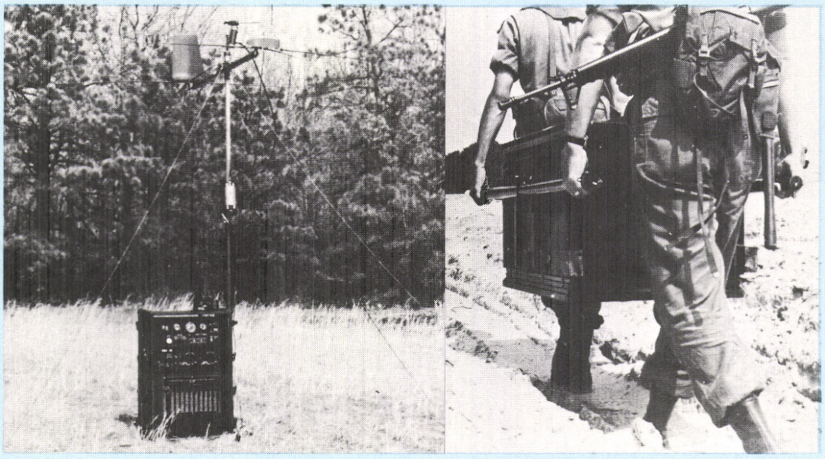
The last bit of "running" that the battalion does is to support missions for National Guard, Reserve and other units which ask for support. Last summer the 16th had personnel and equipment at Camp McCoy, WI; Ft. Irwin, CA; Camp Robert, CA; and Ft. Chaffee, AR, just to name a few.

LTC Freeman summed it up by saying, "With our dispersion of units, the leadership of the platoons becomes paramount. I can't see each and everyone of them as often as I'd like due to the expense in traveling to all nine locations. I must have top quality people in whom I have confidence. We've got good people and they are doing a terrific job. In the year that we have been alive, we've come from being the new kid on the block to a well-respected member of the team which has its roots in both the aviation and the signal communities."

AN/TSC-61B



AN/TSQ-97



☆U.S. GOVERNMENT PRINTING OFFICE: 1980—640-221/7

U.S. Army Communications Command
ATC ACTION LINE

Controlled Firing Areas

ARMY AVIATORS ARE confronted with many kinds of controlled airspace on a day-to-day basis: airport traffic areas, control zones, positive control areas, standard instrument approach areas, etc. One type that is especially important to military aviators is "Special Use Airspace" which is required for the accomplishment of military training missions. Most aviators have a working knowledge of restricted areas, alert areas, military operations areas and the like because they are charted and used on a regular basis. However, there is one category of special use airspace which is not charted and many aviators, both military and civilian, have no knowledge of it. This is a Controlled Firing Area (CFA).

Even though this airspace is specifically designed *not* to have a deterring impact on the aviation public, it is still classified as special use airspace and aviators should have a general knowledge of what a CFA is, what it is designed for and what impact it has on the aviator.

CFAs are established to contain activities which, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft in flight. This in itself sounds like a restricted area; however, a CFA will only be considered for those activities which are either of short duration or of such a nature that they can and will be immediately suspended on notice that there may be danger to nonparticipating aircraft. Examples of such activities are:

- Firing of missiles, rockets, antiaircraft artillery and field artillery. Many Army National Guard facilities have established CFAs at facilities for the firing of the 14.5 mm artillery simulator.
- Static testing of large rocket motors.
- Blasting.
- Ordnance disposal.
- Chemical disposal.

The above cited activities are only a few of the many which might or might not require the establishment of a CFA. Special guidelines for the Army are outlined in AR 385-63 which states that "prior to firing any weapon under conditions in which the maximum ordinate of fire will exceed 45 meters above ground level, the responsible commander will follow the procedures prescribed in AR 95-50 to establish the area as a permanent or temporary restricted area or as a CFA."

It should be noted that the 45 meters above ground level does not include ricochets. Ricochets have been considered in the past and the decision was made not to include them in the requirement for CFAs or Restricted Areas. Usually, if the activity warrants the establishment of some type of special use airspace, it is much easier to get a CFA approved due to the lower impact of the activity on the general aviation public. In many locations CFAs have been established around the boundaries of restricted areas. This allows for weapon systems to be exercised outside the complex by firing into the impact area. Flying over these CFAs is not prohibited and the burden for safety is on the using agency who should cease fire when an aircraft approaches.

Since CFAs are not charted, it is recommended that all aviators continually review the special use airspace for those areas in which they normally operate plus any new areas in which missions may be assigned. Information concerning CFA boundaries at a military installation can be obtained from the post/installation air traffic and airspace officer or from the Department of the Army Regional Representative (DARR) to the Federal Aviation Administration (FAA). A list of the DARRs can be found in AR 95-50 or in TB AVN 1-xxxx, "Army Aviation Flight Information Bulletin."

In addition, for those units which may not be in the vicinity of a military installation nor have ready access to the DARR, contact with the local FAA flight service station should provide any information concerning CFAs. Obtaining this type information is just another measure of the professional aviator and could prevent an embarrassing situation.

Readers are encouraged to address matters concerning air traffic control to:

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

HOT LINE

The following Hot Line numbers can be called on official business after duty hours. They will be updated and reprinted here periodically for your convenience. If your agency has a Hot Line it would like included, please send it to the *Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362.

	AUTOVON	Commercial
Aviation		
Ft. Rucker, AL	558-6487	205-255-6487
Engineer		
Ft. Belvoir, VA	354-3646	703-664-3646
Field Artillery		
Ft. Sill, OK ARTEP	639-2064	405-351-5004
Redleg	639-4020	405-351-4020
Infantry		
Ft. Benning, GA	835-4487	404-545-4487
ARTEP	835-4759	404-545-4759
Intelligence		
Ft. Huachuca, AZ Training	879-3609	602-538-3609
Missile & Munitions		
Redstone Arsenal, AL	746-6627	205-876-6627
Ordnance		
Aberdeen Proving Gnd, MD	283-5542	301-278-5542
Quartermaster		
Ft. Lee, VA	687-3767	804-734-3767
Signal		
Ft. Gordon, GA	780-7777	404-791-7777
Transportation		
Ft. Eustis, VA	927-3571	804-878-3571