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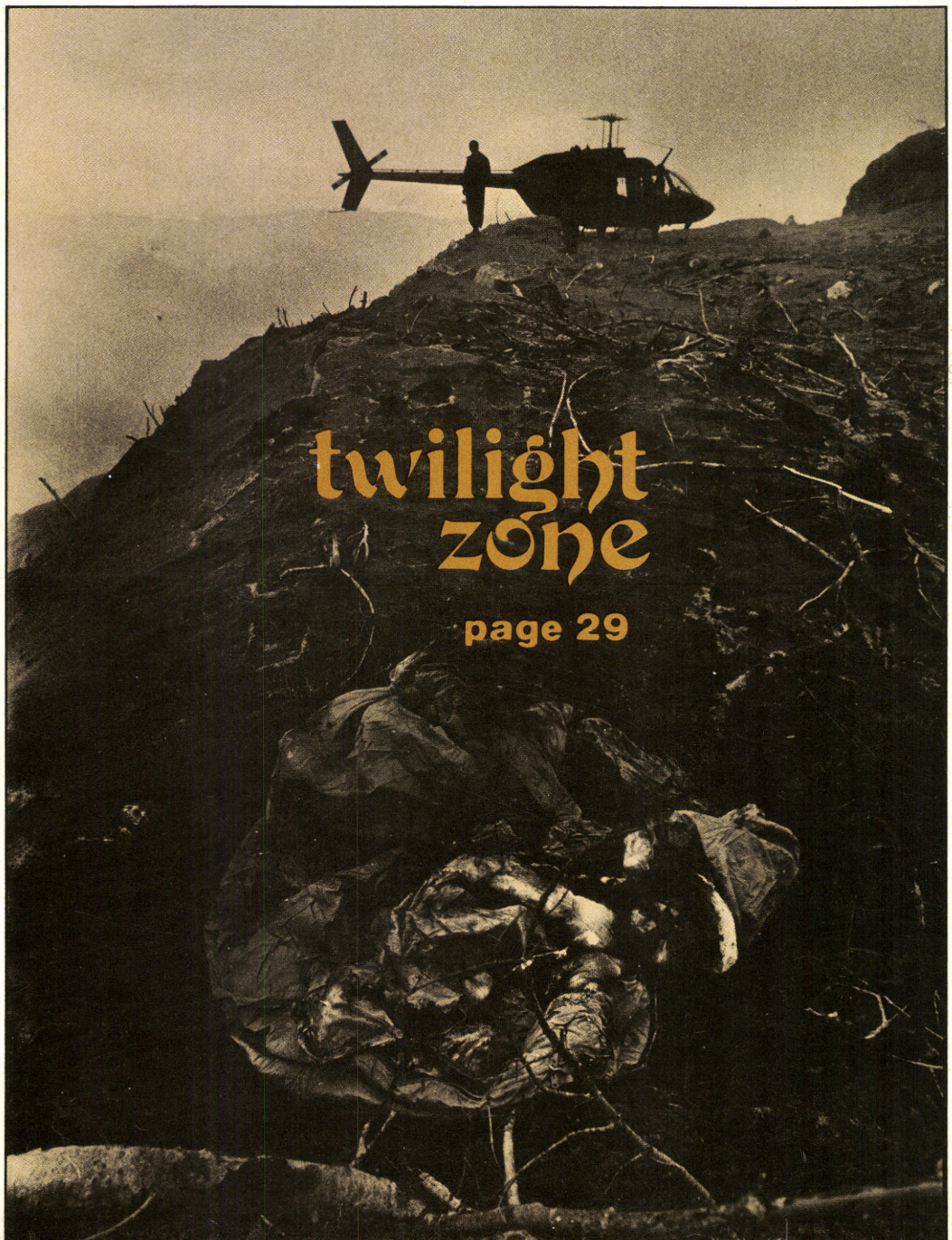
SEPTEMBER 1980

AVIATION DIGEST



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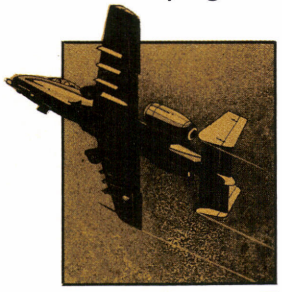

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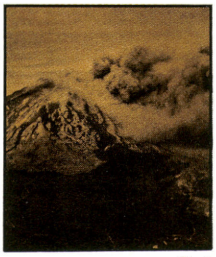

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Richard K. Tierney
Editor

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.

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WE WHO SERVE our Army and our Nation can ill afford to become complacent with the status quo. We must continually seek to improve our tactics, techniques, organizations, training and equipment to better accomplish the critical mission before us. Army Aviation has long been known for just such innovation and improvement—on all fronts. As you read through this issue of the *Army Aviation Digest,* you can gain a true appreciation for the breadth and scope of the initiatives that sustain aviation at the forefront of our Army, ready today for whatever faces us tomorrow.

In the training area, the aircrew training manuals are a bold step forward in enhancing the readiness of our crewmembers while optimizing the return on our critical flying hour resources. The lead article describes how these manuals come together at the Army Aviation Center and what they can do to enhance training of our units throughout the force.

While our daily training mission is critical to overall readiness, we also have a higher calling—that of daily service—worldwide. An outstanding example of that service is evidenced by Army Aviation's support of relief and survey operations around Mount St. Helens. The volcano's eruption was not a totally unexpected event. But neither was the fact that Army Aviation equipment and personnel were among the first on the scene to assist in the search and rescue efforts. Active Army and Reserve Component units alike were called to assist, and assist they did in many ways. Read about the contributions of these fine aviation crewmembers and units in Washington and Oregon who served so valiantly in that emergency. We at the Army Aviation Center salute them for a job well done.

While the fallout from Mount St. Helens may also have an impact on the ranges at the Yakima Firing Center and the aerial gunnery training normally conducted there, this issue features splendid articles by CW4 George H. Stokes and SGT Robert Rosenburg about the firing ranges and how other units can build such facilities.

The great strides made in Army Aviation over the years can be attributed to the foresight and vision of those who have gone before. Much of that same flavor and spirit is shared by the authors in this issue. We hope you will enjoy their work and that it will stimulate your thoughts as well.

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

Another Milestone—

ATM AIRCREW TRAINING MANUALS

TC 1-134, Commander's Guide for Utilization of the ATM's
TC 1-135, ATM, Utility Helicopter
TC 1-135-1, ATM Utility Helicopter (UH-60) Draft
TC 1-136, ATM Attack Helicopter
TC 1-137, ATM Observation Helicopter; Scout Helicopter
TC 1-139, ATM Cargo Helicopter
TC 1-144, ATM Surveillance Airplane
TC 1-145, ATM Utility Airplane

Major Ronald K. Lovejoy and **William N. Presley, DAC**
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AFTER 4 YEARS of coordination, draft publications, errata sheets and in-process reviews, the aircrew training manuals (ATMs) are in the final stages of production. The manuals are scheduled to be fielded in Department of the Army (DA) print through pinpoint distribution by mid-fiscal year (FY) 1981. Before launching into a brief summary of the ATMs, it may be helpful to discuss their historical development.

• With the introduction of the Aviation Career Incentive Act of 1974, Congress and the General Accounting Office made it clear that only through well-planned justification would the Army's flying hour program funding be acceptable. In June 1976 the Comptroller General of the United States submitted a report to Congress entitled "Flying Hour Programs of the Military Services: Opportunities for Improved Management." The Army received the most criticism because it was unable to defend its flying hour program as well as the other services, who were able to show a definitive program that carried the aviator through qualification, mission and continuation training with specific tasks being required in each phase of training. The Army, on the other hand, could only point to a flying hour program that required 80 hours for each aviator and could not satisfactorily explain how and to what benefit these hours were being used. As if to reinforce that report, the Army's flying hour program budget was cut in 1976 and again in 1977.

• As a result of the Comptroller General's report, the Vice Chief of Staff of the Army directed the formation of a task force to develop a flying hour program structured around readiness. A task force from the Army Training and Doctrine Command was created in late 1976 to formulate and write the first draft aircrew training manuals. The initial philosophy was that individual aviators should be given that amount of training required to bring them to a predetermined level of readiness and then to sustain them at that level—no more, no less. With the philosophy established, the task force set out to:

✓ establish specific annual training criteria;

✓ establish tasks for individual aviators by type aircraft; and

✓ define annual training requirements and relate each to flying hours.

• The first draft aircrew training manuals, effective October 1977, became the basic training documents for Army aviators. These manuals identified tasks, conditions and standards for the training and evaluation of the aviator force. They also were to be used in conjunction with the Army Training and Evaluation Program (ARTEP) and unit collective training programs as a systematic training management tool for the commander.

• Although readiness was addressed in the first edition of the ATMs, no method was established to quantify readiness and equate it to a unit readiness rating. To correct this serious shortcoming, the next draft edition, effective in October 1978, included a definite method for equating individual aviator training with aviation unit readiness. By assessing the training

status of all aviators assigned to their units, commanders could apply a formula to compute both the aviator's and unit's combat readiness rating.

The readiness of aviators to engage in battle depends largely on their self-confidence and faith in their comrades. This confidence can only be gained through realistic training. For instance, an aviator sitting at the controls of an aircraft for a given number of hours only to meet an hour requirement provides very little in terms of training value and aviator readiness. It is vital that aviators train like they fight and fight like they train. This realistic training in pursuit of an established training goal can enhance aviation readiness. Aviation is expensive, and it is therefore imperative for the Army to show where and why aviation training dollars are being spent. The ATMs attempt to achieve the best of both worlds—combat-ready aviators at the lowest cost—by mandating flying hour requirements, tasks to be practiced and the required frequency of task iteration. While portions of the program are mandated, sufficient flexibility to permit commanders to develop training programs tailored to their units' specific needs has been incorporated.

The current family of ATMs consists of the following publications:

TC 1-134, "Commander's Guide for Utilization of the Aircrew Training Manuals"

TC 1-135, "ATM, Utility Helicopter"

TC 1-135-1, "ATM Utility Helicopter (UH-60) (draft)"

TC 1-136, "ATM Attack Helicopter"

TC 1-137, "ATM Observation Helicopter; Scout Helicopter"

TC 1-139, "ATM Cargo Helicopter"

TC 1-144, "ATM Surveillance Airplane"

TC 1-145, "ATM Utility Airplane"

The final version of the ATMs has been revised to address many of the unanswered questions from the draft publications. For example, if an aviator is assigned duties in both a rotary and fixed wing aircraft, what are the flight requirements in each aircraft? What are the requirements (hours and iterations) for aviators in refresher or mission training? What happens if an aviator does not complete the semiannual flight hour requirements but does complete the task list? By having a one-source document at their disposal which addresses these problems, much of the frustration commanders and aviators have experienced should be eliminated. Together the individual aircraft ATMs and Commander's Guide for Utilization of ATMs form a solid basis for a complete system of training in which the maintenance of individual proficiency is the foundation, focus and driving force.

Specific requirements have been established within the ATMs for the qualification, refresher, mission and continuation training phases. Time constraints for progression of the individual aviator between the training phases are 90 days for active Army aviators while Reserve Component aviators are given 1 year. Recognizing that unusual circumstances may preclude meeting established time limits, waiver authority is given the major Army commands (MACOM) to adjust the requirements on a case-by-case basis. Specific task and flight hour requirements are also established for each phase of training. The program is given impact by the fact that unit readiness reporting for training is tied to the number of aviators who have completed the required training and are maintaining proficiency in the continuation phase of training. In this phase, specific semiannual tasks, flight hours and iterations of tasks are established. The performance of these tasks is recorded on the ATM training record which is maintained as a basis for the commander's certification that the individual aviator has completed the required training and evaluations. The evaluation requirements of the Aviator Annual Proficiency and Readiness Test (AAPART) constitute in effect an SQT (skill qualification test) for aviators. The AAPART includes a written examination, physical examination and hands-on performance test administered by the unit's instrument flight examiner (IFE), standardization instructor pilot (SIP) or instructor pilot (IP), and a commander's certification. Because of the presence of the IFE, SIP/IP in the unit, the AAPART is administered at the unit level. Mandatory evaluation tasks are established by the ATM; however, commanders are encouraged to select additional tasks for evaluation from the task list appropriate for their units. Because the program is administered at the unit level, it allows for local variations in terrain, weather, geographical location and unit mission. Successful completion of the AAPART is required by Army regulation for the aviator to retain flight status.

Because of the diversity of aviation unit missions and individual aviator duty positions throughout the Army, training requirements were further defined by Flight Activity Category (FAC) which defines the duty position. FAC 1 aviators perform combat, combat support or combat service support missions. FAC 2 aviators are maintaining basic flight skills. The continuation training program for the individual aviator is predicated on the FAC, which in turn establishes the flight hours and task requirements.

The adverse effects that personnel turbulence has on training are reduced by the Armywide standardization in the ATM program. Aviators trained to the same standard on identical tasks are more capable of moving from one command to another with minimal adjustment in skills. Standardization and quality assurance are provided by the unit's school training and/or certified instructor pilots monitoring the training and conducting flight evaluations. Standardization and quality assurance are further enhanced by the Army Aviation Center's Directorate of Evaluation and Standardization (DES) through its conduct of evaluation/assistance visits to MACOMs and subordinate commands. Many times these visits are in support of the

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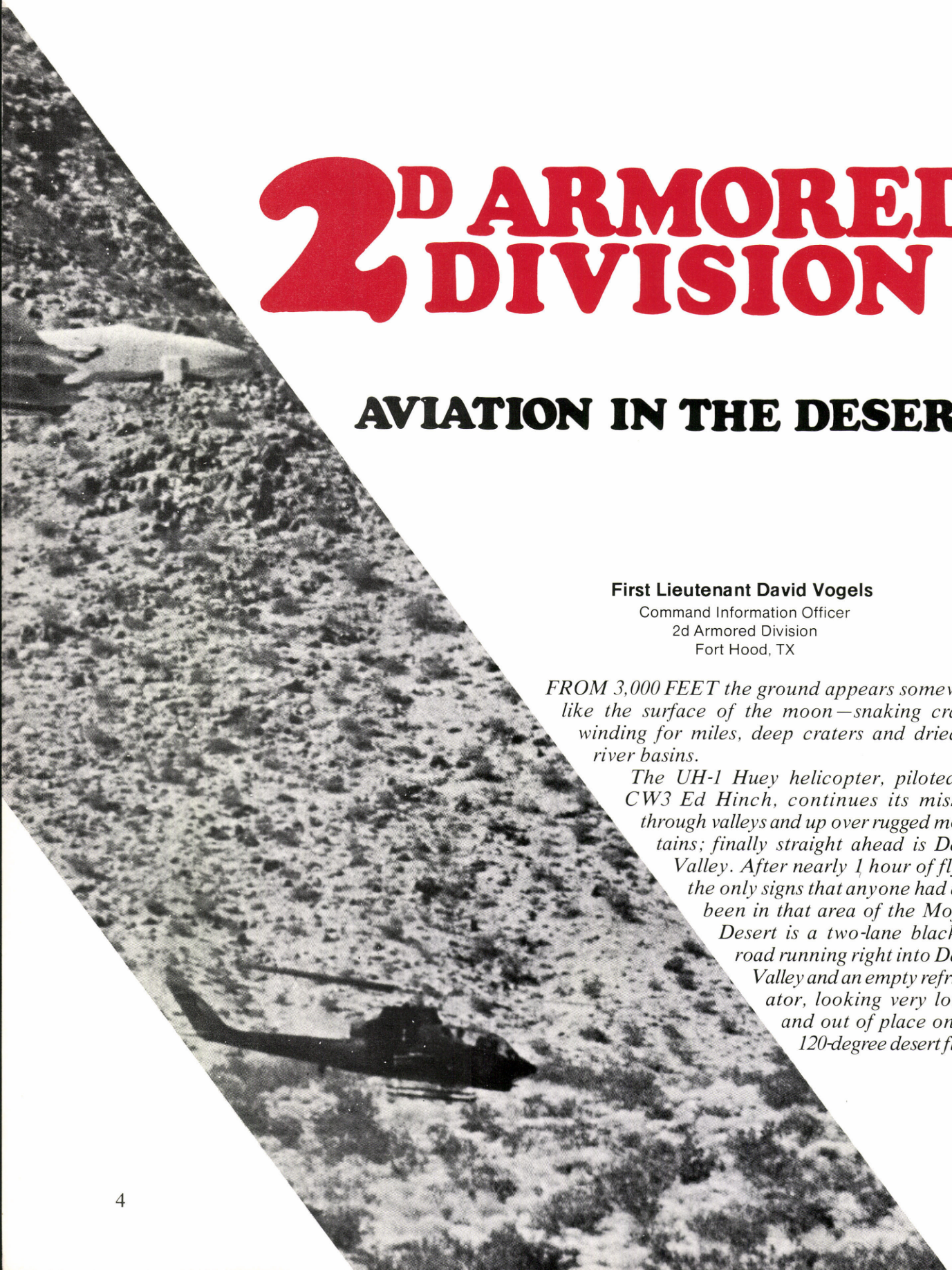


2D ARMORED DIVISION

AVIATION IN THE DESERT

First Lieutenant David Vogels
Command Information Officer
2d Armored Division
Fort Hood, TX

FROM 3,000 FEET the ground appears somewhat like the surface of the moon—snaking cracks winding for miles, deep craters and dried-up river basins.

The UH-1 Huey helicopter, piloted by CW3 Ed Hinch, continues its mission through valleys and up over rugged mountains; finally straight ahead is Death Valley. After nearly 1 hour of flying the only signs that anyone had ever been in that area of the Mojave Desert is a two-lane blacktop road running right into Death Valley and an empty refrigerator, looking very lonely and out of place on the 120-degree desert floor.

MR. Hinch was only one of 2,600 troops from the 2d Armored Division who went to California to participate in Task Force Irwin III. The operation was the first brigade-sized emergency deployment readiness exercise ever conducted with Ft. Hood units. The troops of the 2d Brigade, 2d Armored Division, deployed to Ft. Irwin over a 4-day period in a coordinated effort with the Air Force.

For Mr. Hinch's unit (D Troop, 2d Squadron, 1st Cavalry) Task Force Irwin III began on 20 July 1979 when 12 of its helicopters lifted from Hood Army Airfield, en route to Ft. Irwin.

"We flew a total of 11 cross-country hours," recalls Captain Dusty Anderson, maintenance officer for D Troop. "We all made it safely without incident."

For their efforts the pilots were rewarded by a vista of almost unimaginable desolation. Ft. Irwin and its surrounding area could best be described as a golfer's nightmare—thousands of miles of sand traps and roughs. But the seemingly endless sunbaked terrain, which rises from valleys near sea level to mountains which stretch magnificently toward the sun, provides all the elbow room that an armor force could want.

It may not sound like paradise, but for the troopers and helicopter pilots of D Troop Ft. Irwin offered realistic training and conditions never experienced at Ft. Hood.

This exercise was anything but usual for the D Troop aviators. In addition to their routine mission of close air support, they were also gaining experience in using the joint air attack team (JAAT) concept. JAAT calls for Air Force fighter aircraft to be used in coordinated operations with Army helicopters to provide close air support, air cover for aerial resupply and air defense interdiction, all tasks which fall within the unique province of airpower.

During the month-long exercise, D Troop flew missions in support of both friendly and enemy forces committed to Task Force Irwin III. Their operations were closely coordinated with some 209 combat sorties flown by the Air Force, using aircraft ranging from the tank busting A-10s to B-52 Stratofortresses.

Their already difficult tasks were complicated by the ever-present challenge of the desert itself. Problems of weather, temperature extremes, maintenance difficulties, visibility and range estimation were all factors that D Troop pilots had to adjust to in order to accomplish their missions.

The D Troop contingent committed to the exercise consisted of five UH-1s, five AH-1G Cobra gunships, two OH-58 Kiowa scouts, support and maintenance personnel and the troop's "Blue" (ground scout) platoon. According to Major Franklin Hartline, the squadron executive officer: "Despite the difficulties, morale was high and the Soldiers enjoyed the training."

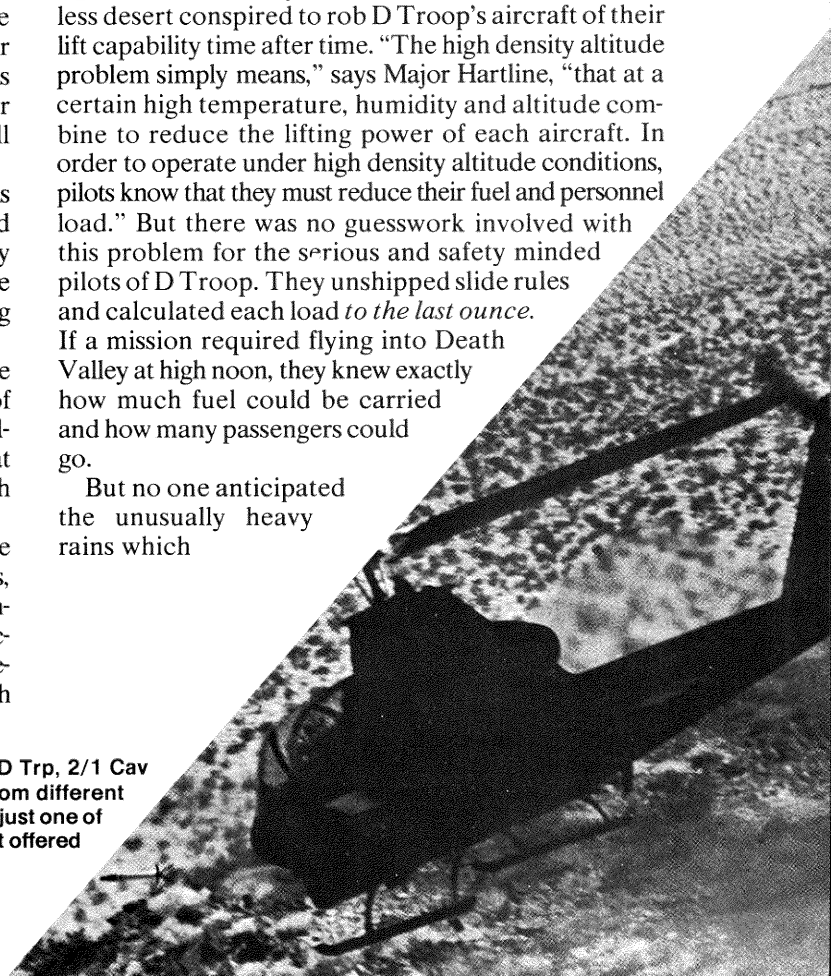
The difficulties in working in Irwin's environment were considerable. The 120-degree temperature on the desert floor posed the expected maintenance problem by making the skin of aircraft too hot to touch and edging cabin temperatures on the ground to more than 140 degrees in direct sunlight. To compensate, the maintenance crews made maximum use of available shade and flexible maintenance schedules to conduct much of their work after sundown.

The heat demanded that equal attention be paid to personal maintenance. In the Mojave Desert an average person can easily drink several gallons of water a day just to preserve body fluids. Water tanks were carted to D Troop's staging field in an unending stream and twice-daily safety briefings emphasized the importance of constant water intake to prevent heat injuries.

Mr. Hinch's flight into the heart of desolation continues, with the helicopter sometimes drifting effortlessly along the desert floor, other times reluctantly climbing over barren peaks. Mr. Hinch dismisses the aircraft's struggling efforts with a fatalistic shrug: "Density altitude strikes again," he mutters with a tight, knowing grin and a weary shake of his head.

On the ground those in operations weren't the only ones affected by the harsh environment. The merciless desert conspired to rob D Troop's aircraft of their lift capability time after time. "The high density altitude problem simply means," says Major Hartline, "that at a certain high temperature, humidity and altitude combine to reduce the lifting power of each aircraft. In order to operate under high density altitude conditions, pilots know that they must reduce their fuel and personnel load." But there was no guesswork involved with this problem for the serious and safety minded pilots of D Troop. They unshipped slide rules and calculated each load *to the last ounce.* If a mission required flying into Death Valley at high noon, they knew exactly how much fuel could be carried and how many passengers could go.

But no one anticipated the unusually heavy rains which



Follow The Leader —(Opposite page) A Cobra gunship from D Trp, 2/1 Cav and an Air Force A-10 "tank buster" check out a desert valley from different levels. Close coordination with Air Force assets like this A-10 was just one of many unusual training opportunities which the Ft. Irwin deployment offered for D Trp. An AH-1 Cobra (right) fires a 2.75 rocket

Photos by SP4 Jorge Ramirez, 2d Armored Div PAO

The Cobra Strikes —A Cobra gunship from D Trp, 2/1 Cav, 2d Armd Div, salvos its clusters of 2.75 rockets against a target during desert operations conducted at Ft. Irwin, CA. Live fire missions for all aviation assets participating in Task Force Irwin III provide very realistic training

curtailed flight operations shortly after their arrival at Ft. Irwin. The normally arid region has an annual rainfall of 1.54 inches, yet the downpour closed the D Troop airstrip at Bicycle Lake until the area dried out.

Mr. Hinch makes a steep, banking turn with his Huey about 10 miles into Death Valley and heads southwest to Leach Lake. There are many lakes in the vicinity of Ft. Irwin—Bicycle, Leach, East and West Conesed—but despite the heavy rains that greeted D Troop's arrival, none of the lakes have any water. Leach Lake is an impact area with old Air Force planes on the ground, a mock Hawk air defense artillery site and a motorpool with 12 old Army trucks which look as if they have seen better days.

The on and off visibility also caused the aviators some problems. The slightest disturbance of the desert floor caused vast clouds of dust, so the helicopters flying low left a definite signature which was visible for miles. Dust and smoke over the battlefield also restricted the pilots' acquisition of targets at long range during the tactical play of the problem. The sparsity of reference points along the flat desert floor also made it relatively difficult to judge distance when acquiring targets. Thus D Troop pilots had to consciously resist engaging targets which appeared close at hand but were really out of range of their rockets and antitank missiles.

That long-range observation assisted D Troop on some occasions however. "Delta Troop's 'Blues' platoon played an important role as combat outpost observers on the mountain peaks," Major Hartline remembers. "During our ARTEP (Army Training and Evaluation Program), they earned their money spotting an enemy armor column which, had it not been for the Blues, would have caught us off-guard."

About 2 miles from Leach Lake the Huey passes over the wreckage of an Air Force C-130 Hercules, which had crashed several years earlier on a joint military exercise, killing the entire crew. It serves as mute testimony to the unforgiving nature of the desert sky.

We learned that desert flying is extremely dangerous," Captain Anderson observed, "particularly at night and when the dust and sand kicks up during the landings. Even during the day there are times when the sun is just right, so that it's difficult to separate the sky from the ground."

But the D Troop aviators were able to adjust to the desert environment, performing their missions and gaining valuable experience for future operations.

JAAT

The Joint Air Attack Team Lives!

Major Thomas A. Green
Commander
D Trp, 1st Sqdn, 9th Cav, 1st Cav Div
Fort Hood, TX

and

Major Michael V. Sullivan
Executive Officer
1st Sqdn, 9th Cav, 1st Cav Div
Fort Hood, TX

THE JOINT AIR ATTACK TEAM (JAAT)—conceived in Army Training and Doctrine Command (TRADOC) Training Text 17-50-3 and based on the OH-58 Kiowa, the AH-1S Cobra and the Air Force A-10—is a living, evolving combat system that the 66th Fighter Weapon Squadron (FWS) of Nellis Air Force Base, NV, is keeping alive and well.

A recent joint exercise at Ft. Hood, TX, involving the 66th FWS and D Troop, 1st Squadron, 9th Cavalry, 1st Cavalry Division, illustrated both the viability of the JAAT concept and the value of subjecting this concept to an intense field review on a regular basis.

Illustration by David Deitrick

Planning for the joint exercise began in July 1979 after a draft copy of the JAAT field manual was forwarded by the commander, TRADOC, General Donn A. Starry, to the commander of the 1st Cavalry Division, Major General Paul S. Williams Jr. Along with the text came indications, through Air Force liaison officer channels, that the 66th FWS, the center of Air Force A-10 tactics and training, would be available for participation in a joint training exercise. Given this level of interest and expertise, the plan-

ning effort soon became a fast moving train!

By early September an exercise scenario had been developed, coordinated and published that involved ground maneuver, field artillery and air defense elements and a signal security analysis detachment. The scenario covered a 10-day period and included 3 days of JAAT, field artillery and mortar (from the 1st Squadron, 9th Cavalry ground troops) live fire. Ample time was provided in the scenario for review of each day's activities and revisions (if necessary) of plans and procedures for subsequent events. Finally, a detailed briefing was prepared that would ensure that safety and control measures were clearly understood by all participants before the exercise began.

When the 66th FWS arrived at Ft. Hood on 22 September, the Army learned its first lesson—the Air Force does not travel light. The nine A-10s that were to participate in the exercise required support by a team of 50 people and associated equipment that filled a C-130 from the Military Airlift Command. Many more lessons were yet to be learned, but this one is very significant—that the forward airfield the A-10 can operate from is going to be very crowded with both people and equipment.

The early hours of the actual exercise, begun on 23 September, were very enlightening and the source of several more lessons. Handoff techniques, use of forward air controllers (FAC), communications procedures and even target engagement/disengagement methods all proved to be major problems when each had been assumed to be standard.

Communications procedures problems became apparent almost immediately. The simple fact is that Air Force and Army flight crews use entirely different tactical jargon and have a very difficult time exchanging information in a timely manner.

According to Captain Austin Omlie, platoon leader for the AH-1S (Production) Cobras, the Air Force and the Army eventually may have to standardize their terminology. "For cooperation between the Air Force and the Army we will have to have some sort of mutual communications. The A-10s are moving fast and don't have time for such things as CEOI (Communications Electronics Operation Instructions)," said Captain Omlie. "They are definitely efficient in their radio procedures, using short terms where we use more elaborate commo procedures."

Additional problems were confronted during target engagement.

The Air Force FAC had difficulty in functioning effectively as a JAAT target designator. Providing a continuous flow of attacking aircraft in the battle theater required maximum effort by all participants, and this flow was coordinated by the airborne FAC. Target designation was accomplished via direct communication between the scout helicopter or gunship helicopter pilot and the A-10, according to Captain Omlie.

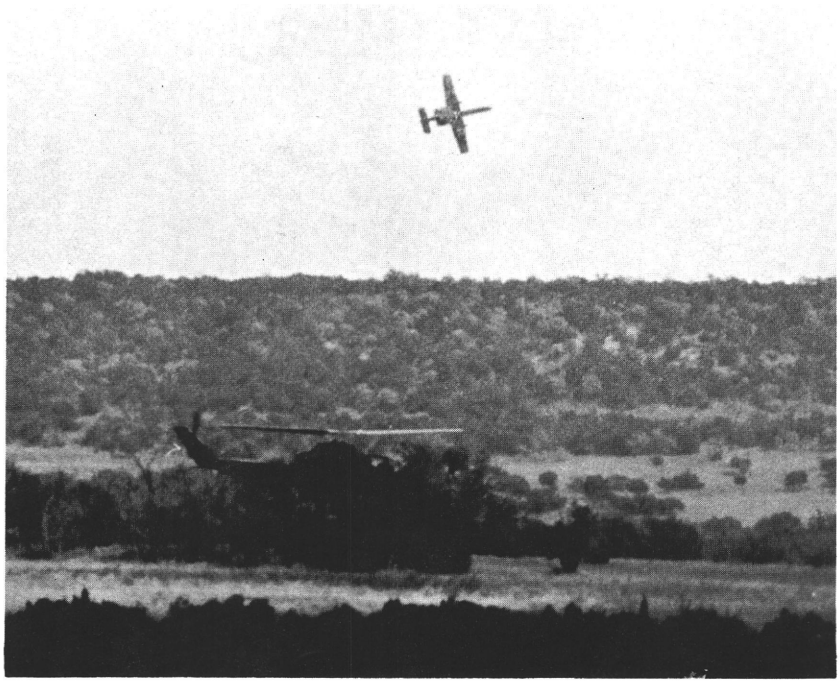
As often as not targets were designated by Cobras, according to CW3 Jerry Gray, AH-1S pilot. "With the A-10 at 15 seconds out from the target, we would mark it with rockets or miniguns which the A-10 would follow to the target," said Mr. Gray. "Rockets seemed to work well to identify the target. Once the A-10 got into the area there was no problem."

Several additional days of joint training followed, all of which surfaced additional problems with existing JAAT concepts and doctrine or with the coordination of a particular JAAT operation. Again, solutions to these problems were readily apparent and easily applied. The fortunate aspect of this process, of course, was the fact that the right people were learning the lessons!

As these lessons are passed to the field, more leaders will be given the opportunity to use the JAAT in a "battlefield" or FTX (field training exercise) situation. Thus, the major lesson of the exercise is that JAAT is a highly effective member of the combined arms team which must be both properly used and efficiently protected. Videotape replays of A-10 flight techniques taken from camouflaged air defense artillery positions indicated that new attack techniques should be considered.

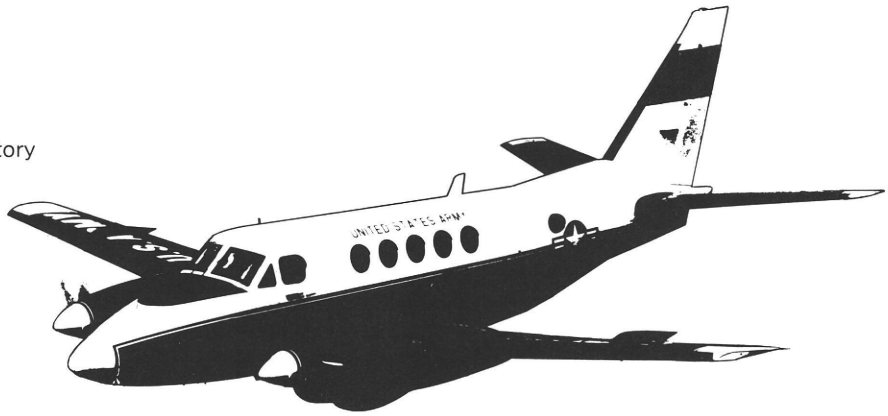
Combat leaders with JAAT assets will have to be fully aware of all the capabilities and liabilities of the systems at their disposal. Moreover, they must be able to plan for the use of the JAAT and refine their plans as the team is used. Artillery preparation, direct fire engagement and air defense suppression must be closely orchestrated as the team works. A failure of any of the three will negate the team's effectiveness. Combat leaders must organize their assets to keep a constant volume of fire on the JAAT target area.

All indications during this particular exercise were that the broad concept is sound, as is the equipment on which it is built. If the JAAT is to keep its rightful place on the battlefield, the 66th FWS and Army Aviation will need to continue practicing their teamwork as they give the doctrine the crucial test of "doing it in the dirt."



An Air Force A-10 works with Army AH-1 Cobras during JAAT maneuvers

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



come fly with me

AUTHORS NEVER like to have to "eat their words," but I must at least chew on some of mine a bit by admitting that the articles I wrote in July and August in this series for the *Aviation Digest* did not tell the whole story.

The July article ("Do You Remember The Saying, 'What You See Is What You Get'"?) emphasized that visual information is critical to pilots and ended with the observation that "what you see is what you get." The August article ("The Bucking Bronco Syndrome") showed that under high stress or workload, pilots look at instruments or outside visual cues but lack sufficient time to process what was seen in order to make appropriate aircraft control inputs—leading to the deduction that what you see is not *always* what you get!

That is because visual workload and processing capabilities appear to be the real villains during critical high stress or work situations. Training stimulates visual workload and processing capabilities to operate more effectively, but a person, like any system, has limitations. The sensing and processing limitation of any system is affected by both external and internal variables. For pilots, external variables affecting visual workload and processing capabilities include aircraft aerodynamic stability (or lack of stability), mission requirements, aircraft flight display arrangement and secondary flight tasks.

The internal workload variables are harder to define. Some such as mental attitude, personal fatigue and nutrition, have been addressed in previous issues of the *Aviation Digest*. Two other variables which must affect pilot workload capability are total flight experience and combat flight proficiency. These variables have been investigated by the U.S. Army Aeromedical Research Laboratory (USAARL).

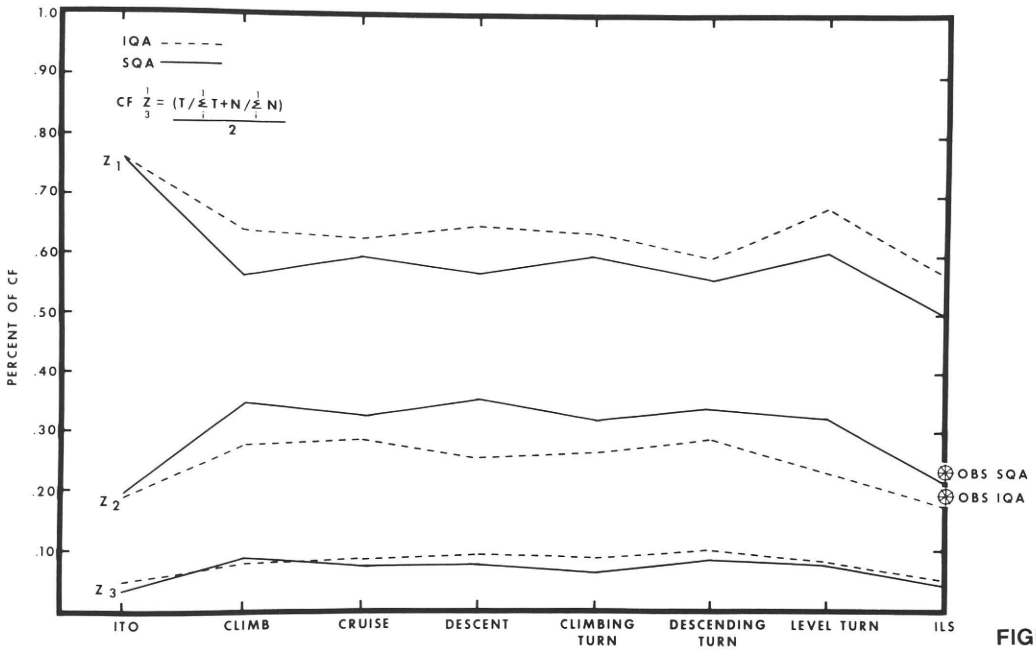
Combat proficiency for military pilots is measured by annual completion of the Aviator Annual Proficiency and Readiness Test (AAPART). Pilots who can complete ATM requirements and standardization rides are quite capable of meeting the Army's demands under most normal flight conditions. However, from USAARL's visual workload data base, levels of combat proficiency which would not be flagged by either the ATM program or standardization rides and which become critical under high stress and workload situations have been discovered.

The discovery of those obscure proficiency levels in military pilots evolved from a series of laboratory research studies. The first research flights measured visual workload strategy of six UH-1 Huey instrument flight instructors as compared with six recent graduates of the Initial Entry Rotary Wing (IERW) Qualification Course at the Army Aviation Center, Ft. Rucker, AL. The most obvious characteristic difference between these two groups of pilots was 2,000 hours of flight experience.

The technique of collecting the data, the standard IFR (instrument flight rules) flight profile flown, and the methods for defining visual workload have been described in the July and August articles. (Perhaps the interested reader will want to review these articles to fully appreciate some of the following discussion. Copies are available by writing Editor, *Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362.)

The visual workload encountered by the two groups of pilots is presented in figure 1. The different IFR flight maneuvers are plotted along the bottom; the percentage of workload (cost factor—CF) is plotted along the left side of the graph. IQA represents the instructor qualified aviators. SQA defines the student qualified aviators. As previously described, Z_1, Z_2 and Z_3 are three zones (basic stability, precise information and vehicle status) into which the aircraft instrument panel was divided. Finally, the OBS (omnibearing selector) plotted on the right side is each group's single visual workload cost factor on the course deviation indicator during the instrument landing system (ILS) approach.

You should remember two other points. First, Zone 1 (basic stability) is designated as the major factor to



GRAPH OF CF/ZONE

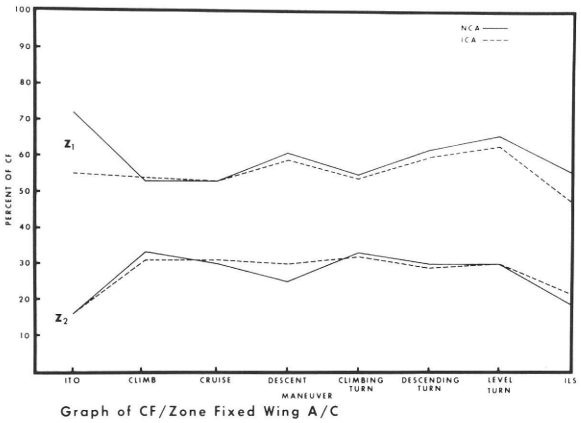
FIGURE 1

define and measure visual and processing workload. Second, all data presented are statistically significant.*

We initially established this research project to measure visual workload differences as a function of experience. Of course, we assumed that more experience would be demonstrated by lower workload. You can imagine the surprise when we reviewed these data in figure 1. The instructor pilots demonstrated higher visual workload and more aircraft control inputs while maintaining the same (or worse) flight parameters than the student pilots.

One possible rationale could be that while the instructors were more experienced, this current job required sitting in the copilot's seat and verbally directing student pilots how to fly. Therefore, while the instructors were not afforded time for proficiency practice, the students had just completed 50 hours of constant hands-on training.

FIGURE 2



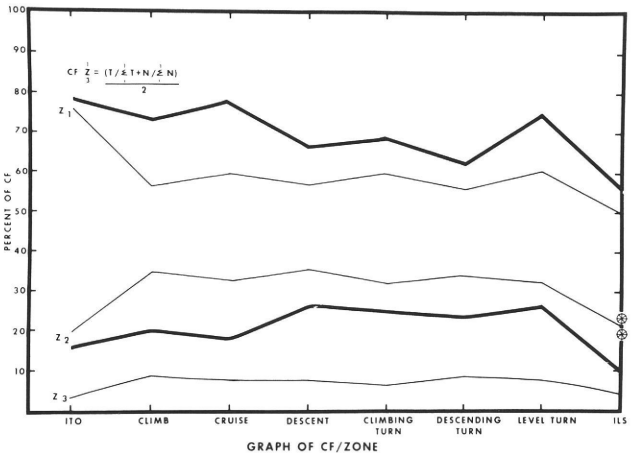
Graph of CF/Zone Fixed Wing A/C

At the time this conclusion was reached we were involved in another study to develop a pilot visual workload data base in the U-21 Ute airplane for comparison with that previously collected in the UH-1 helicopter. If the conclusion reached concerning SQA and IQA differences was valid, we felt it could be duplicated in the U-21. Therefore, six volunteer pilots were located who were qualified in the U-21 but who had not flown the airplane for at least 2 years.

Results of the current U-21 pilots to the noncurrent pilots are presented in figure 2. The organization of the data is identical to figure 1 with the exception that ICA pilots refer to the *instructor current aviators* flown in the U-21 and NCA represents the *noncurrent aviators.* As was expected the NCA pilots required more visual workload to monitor aircraft basic stability to fly the same IFR flight. However, the final data were not as conclusive as we had hoped. While the NCA pilots did demonstrate higher visual workload, their visual strategies and scan patterns were more similar to UH-1 helicopter pilots' than to U-21 fixed wing pilots'. We finally decided the data were confounded because the six NCA pilots were assigned to jobs requiring

*Hartman, Bryce O. and McKenzie, Richard E. 1979. *Survey of Methods to Assess Workload.* London: Technical Editing and Reproduction Ltd. AGARDograph No. 246.

FIGURE 3



GRAPH OF CF/ZONE

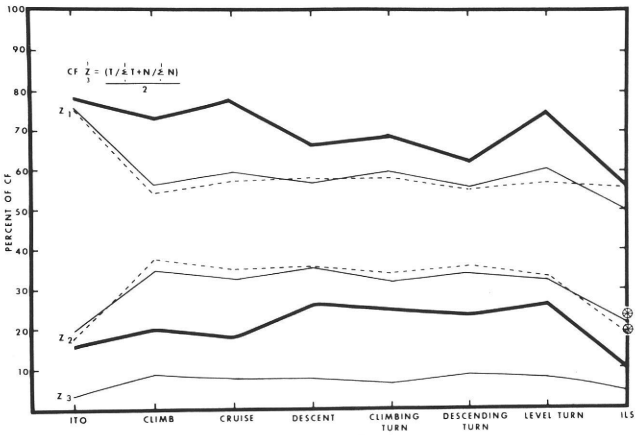
them to remain current in the UH-1. Since both aircraft contained the same military standard "T" flight display arrangement, the NCA pilots obviously used some positive transfer of training and were able to complete the U-21 IFR flight which we had predicted they would not.

Frustrated, we tried again. We located a pilot with more than 2,000 hours of flight experience in the UH-1. He had been out of the Army for more than 3 years and had gained no flight experience during his civilian occupation. He rejoined the Army and was scheduled to enter the Army's helicopter refresher course. Figure 3 is the result of his visual workload during his first instrument flight in 3 years.

The broader, dark line is this pilot's visual activity while the other line is the average combat proficient UH-1 pilot's workload. This nonproficient pilot's activity demonstrated higher workload and less organized scan behavior.

The single pilot's performance and progress were monitored through 14 hours of refresher training and the results are shown by the dotted line in figure 4. The

FIGURE 4



GRAPH OF CF/ZONE

training had decreased his visual workload by about 15 percent which enabled him to be considered combat proficient.

From these series of investigations we are convinced that the initial difference between IERW pilots and instructor pilots reflects differing "hands-on" proficiency. You must remember that both groups of pilots (SQA and IQA) were current by military standards and under normal low stress flights would probably perform quite satisfactorily. Under high stress or workload one group would fail sooner.

Ironically, the workload difference estimated to exist between high time instructor pilots and IERW graduates as well as the failure prediction is vividly demonstrated by the "Analysis of Army Aviation Accidents FY 79" presented in the May 1980 issue of the *Aviation Digest:* "There was at least one surprise revealed by the data. Contrary to most prognoses, it has not been the young, inexperienced aviator or instructor pilot (IP) who caused the majority of accidents. The average aviator involved in an accident was 32.5 years old and had 2,747.1 flying hours."

This same problem was earlier proclaimed in Views From Readers, February 1980, *Aviation Digest:* "During the 5-year period from fiscal year 1975 through 1979, Army aviators were involved in a total of 468 aircraft accidents . . . the Army's IP/SIP (instructor pilot/standardization instructor pilot) community has been a significant contributor to this accident record and crew error problem. Instructor pilots were involved in 134 or 28 percent of the total 468 accidents. In fiscal year 1979, IPs were at fault in 50 percent of all fixed wing accidents."

A fair question to ask then is: How does a pilot remain currently proficient? Federal Aviation Regulations require pilots to practice select maneuvers within a 90-day period for civilian proficiency. Under the Army's ATM guidelines, maneuvers are required to be practiced within a 6-month period for combat proficiency. Under both programs each required maneuver must be practiced a preset number of times (i.e., three takeoffs and landings or three ILS approaches) which can be completed during a single training session. This situation permits aviators to practice all night ATM requirements in one night. In theory these maneuvers would then not have to be repeated until 6 months later. After a lapse of flying nights for 4 or 5 months, how would pilots react to sudden stressful emergencies during their night operations?

It becomes obvious that organizers have a difficult task of establishing appropriate regulations to guarantee high combat proficiency for military pilots. Until that is done, combat proficiency is an individual task. Aviators should challenge themselves to have a habitual program of practicing maneuvers during day, night and IFR conditions. With such a healthy program the aviator can take unusually high stress situations in stride. This type of program does have a name—it's called professionalism.

Before you ask others to come fly with you—would you fly with you?

continued from page 3

MACOMs' aviation resources management survey team visits.

As costs of flying today's complex aircraft rise, it becomes more important to ensure each training dollar is invested wisely. To this end, the ATMs require units to achieve a high degree of integration of collective and individual training. In fact, all individual training required by the ATM, except those high risk emergency procedures, can be accomplished during collective training and mission support flying.

Flying Hour Program. The ATM also serves as the basic document for developing the Army's Flying Hour Program (FHP). It is developed annually starting at the aviation unit level and progresses through each succeeding command to Headquarters DA. The FHP consists of the number of hours necessary for each aviator and type aircraft in the Army inventory. These hours are related to operational and maintenance costs and are used by the DA staff in preparing budget and logistical estimates.

Each unit commander possessing aircraft must formulate a workable flying hour program necessary to accomplish training and mission support. As commanders begin the initial preparation of the FHP, they consider the following:

- Average number of aviators authorized/assigned.
- Annual aviator personnel turnover.
- Aviation mission support their units will be expected to provide.
- Number of hours necessary for maintenance.

Actual computations of flying hours required for training are relative to the number of assigned aviators. The total number of training hours required for each aviator, based on each phase of training, is listed in the specific ATM related to the aircraft mission.

In units where a synthetic flight training system (SFTS) is available for training, commanders must substitute the SFTS hours for aircraft flying hours.

The ATMs also recognize that not all aviators require equal amounts of training to maintain proficiency. Experienced aviators may require fewer hours to maintain proficiency than aviators with limited experience. They also may be able to achieve acceptable proficiency in the required tasks more quickly. Therefore, the commander may on a case-by-case basis adjust the mandatory flying hour requirements by reducing up to 15 percent for experienced FAC 1 aviators and transferring those hours to other aviation training or mission support requirements. The ATMs do not provide guidelines here; criteria for these adjustments are the commander's prerogative. However, the task iteration levels are not proportionally reduced; and the unit's flying hour program will remain unchanged.

While another milestone in the development of the ATMs has been met, new developments in hardware, training and employment doctrine will necessitate future revisions, all with the aim to make the ATMs the best training publications available. To accomplish this, users' comments and recommendations are not only welcomed, they are essential. Those can be forwarded to Commander, U.S. Army Aviation Center, ATTN: ATZQ-TD-TL-DS, Ft. Rucker, AL 36362.

Administrative Note. Pinpoint distribution of the revised ATMs is scheduled to be completed by the end of FY 1981(2Q). TCs 1-134, 1-139, 1-144 and 1-145 should be distributed during FY 1981(1Q) and TCs 1-135, 1-136 and 1-137 during FY 1981(2Q). Units should take immediate steps to ensure sufficient copies of the new ATMs are received. Specifically, update DA Form 12-11A, Requirements for Army Doctrinal Publications, Quantity Requirement Block 8.

As previously noted, TC 1-134, "The Commander's Guide," is scheduled to be distributed prior to revised TCs 1-135, 1-136 and 1-137. As such, the administrative instructions in the revised TC 1-134 will effectively supersede like instructions in the second draft TCs 1-135, 1-136 and 1-137.

"Opening the Doors to PROMOTION"

. . . is the title of a fine article written by SGM Bruce N. Bant, Enlisted Editor, in the December 1979 issue of *Soldiers* magazine. Here are some worthy quotations from his article:

"You can influence those making the selections by making sure you're ready when the promotion opportunity presents itself."

"A Soldier's qualifications and ability to perform duty at the next higher grade are the most important factors influencing a Soldier's promotion potential. Your input comes in the form of making sure you're the best qualified and the best at performing your job."

"Your efforts to improve your military and civilian education through correspondence courses and off-duty courses also improve your chances for promotion."

"No promotion in the Army is automatic, and the higher you go the tougher the competition. Preparation should begin the day you enter the Army and continue until the day you leave."

"When opportunity knocks on that promotion door, it's up to you to make sure you have the right keys to open it. The keys that work best are knowledge, ability, demonstrated performance and potential."

. . . one of the best ways to improve job skills and prepare for promotions is:

Low, fast, and in the dark

The title just about sums up the three conditions usually present in most tree strikes. And the number of tree strikes is becoming a cause for concern. During the first two quarters of FY 1980, Army helicopters were involved in 23 tree strikes, for an average rate of about four per month. Low altitude, high airspeed, and reduced visibility are the obvious ingredients in these mishaps, but the underlying causes are not always readily apparent.

Case 1. One recent tree strike involved a UH-60A with a crew of three. This was the lead aircraft in a two-aircraft flight on a night tactical mission. Light haze and a moonless night combined to limit visibility as the pilot headed his aircraft toward an LZ marked by a single strobe.

On final approach, the pilot switched on his landing light in time to see the nose of the aircraft entering the upper branches of a tree. As the aircraft passed through the branches, the pilot applied power, climbed, hovered forward, and landed in the intended LZ. Repair costs for damages from the tree strike exceeded $36,000.

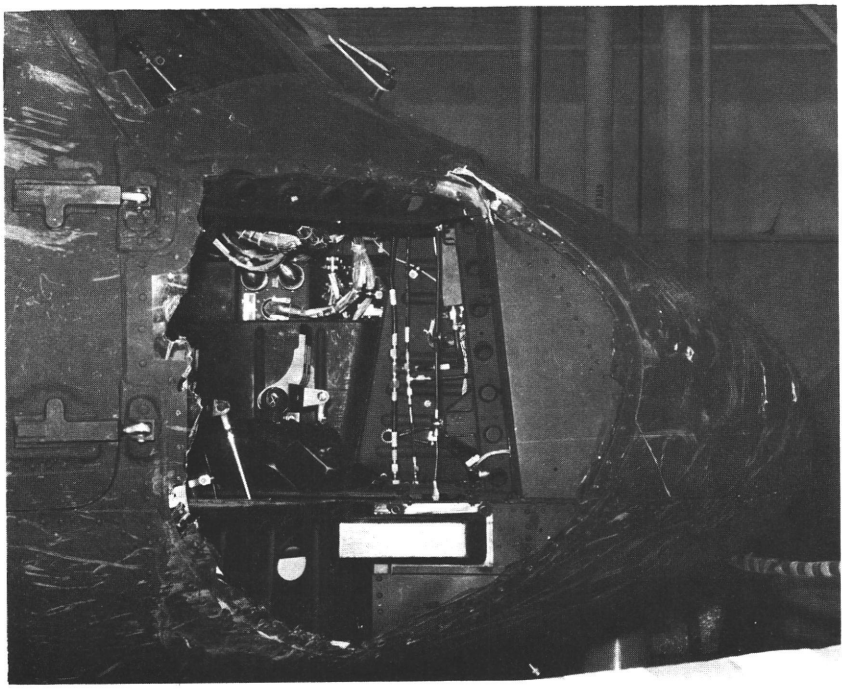
A stroke of fate? Bad luck? No way! Neither fate nor luck had anything to do wih it. But a lot of people did.

To begin with, the pilot did not make an adequate map study to determine obstacle clearance. Excluding the height of obstacles, the highest elevation in the general area was 710 feet msl. Without telling his copilot or the crew of the second aircraft that they were on short final, the pilot initiated his approach from an altitude of 720-750 feet msl. The approach was shallow and fast. The indicated airspeed of the aircraft when it hit the tree was 45 to 50 knots. Since the copilot was not aware the aircraft was on final, he was busy checking his map to fix their location when the tree strike occurred.

No night tactical training program to train and verify mission proficiency of newly qualified UH-60 aviators had been established. Further, the supported infantry commander did not insure the LZ was properly set up with the necessary marking lights in accordance with instructions in appropriate handbooks.

Case 2. A second tree strike surfaced other problem areas. In this instance, a flight of six UH-1H aircraft was assigned a night mission of inserting rangers into a DZ and later extracting them. The insertion portion of the mission was completed without incident. However, during extraction, the fifth aircraft in the flight hit the top of a large tree. Both chin bubbles were broken and the windshield was covered with sap, obstructing the pilot's vision. When the pilot tried to turn on his landing light, he discovered it had been broken during the tree strike and was inoperable. The pilot of the No. 2 aircraft broke out of the flight, switched on his searchlight, and led No. 5 to a safe landing area.

Another unfortunate break? The facts say otherwise. To begin with, the flight leader did not specify a particular altitude at which the flight would be conducted—even though diverging opinions had been expressed concerning



Broken bubble and skin damage shown are part of $36,000 damage this UH-60A sustained in night encounter with tree.

the altitude at which the insertion portion of the mission had been flown. Further, the unit favored realistic training, and the crew was overly motivated. As a result, the pilot of the aircraft involved in the tree strike allowed his copilot to fly 20 to 25 feet above the trees at about 70 knots. This was to try to keep up with the flight leader who was flying at an altitude of 75 to 100 feet above the trees and an airspeed of 80 to 85 knots.

When a pine tree, taller than the surrounding ones, suddenly appeared in their flight path, the crew could not avoid it. The aircraft hit the tree at an airspeed of about 60 to 70 knots. It is also noteworthy that both the pilot and the copilot had been awake 19 hours and 20 minutes at the time of the tree strike.

Solution. As a result of these mishaps, the following actions are recommended:

- It should be emphasized to flight crews that they are to be thorough and detailed in planning all tactical missions in accordance with guidance contained in FM 1-51, Rotary Wing Flight.
- Flight crews should be reminded that it is their responsibility to obtain all information that is critical to safe operations and safe mission completion.
- All flight crews should be made aware that crew coordination and division of crew duties is essential to safety. If information is not to be transmitted by radio, appropriate light signals to be used should be incorporated into the tactical SOP.
- Increased emphasis should be placed on developing the skills of the individual aviator through the implementation of a viable training program. This program should include all aspects of the unit's mission and stress that the pilot-in-command checkride should evaluate mission proficiency (day/night) in each type, design, and series aircraft.
- Missions flown at terrain flight altitudes during the day and night should be flown at an airspeed slow enough to permit pilots to see and avoid obstacles.
- Aircrewmembers scheduled for day and night missions should use crew rest time **for crew rest.**
- All preflight briefings should include specific altitudes for each portion of the flight.

Free cruise

In addition to these actions, the term "free cruise" needs to be mentioned and, perhaps, clarified. One pilot involved in a tree strike defined free cruise as " . . . You can vary your position and altitude in the formation to pick your own individual route over the terrain." If this definition coincides with your thoughts on the subject, then clarification is in order, and you'd better check chapter 9, FM 1-51.

"Free cruise" allows the pilot the freedom to operate his aircraft laterally as deemed necessary to perform his mission effectively. It does not give him the right to arbitrarily fly at higher speeds or lower altitudes as may be dictated by his desires.

One final word of caution. It has been noted that some pilots are not using their clear visors when flying at night. While use of the clear visor will not prevent a mishap, it does serve as a protective device. In the event of a shattered windshield, the clear visor can save your eyesight. Use it. ■

Abbreviated call for papers

The Fifth International System Safety Conference will be held in Denver, Colorado, 27-31 July 1981. The theme of the Conference is "System Safety Application Throughout System Life."

A call for papers has been issued for persons or groups desiring to present papers concerning system safety application throughout system life or to participate in special workshops on related issues. Questions concerning the conference technical program may be directed to Craig (Brad) Bradbury, 145 E. Costilla, Littleton, CO 80122, telephone (303) 977-1649.

U.S. ARMY

AVIATION STANDARDIZATION

Directorate of Evaluation/Standardization

REPORT TO THE FIELD

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

The Mission Of The Peacetime Army—

TRAINING OR SURVIVAL?

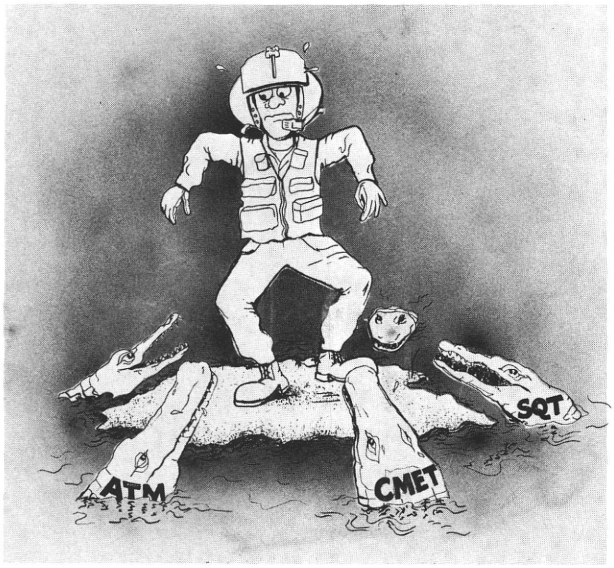
SINCE OUR FIRST "Report to the Field" column appeared in the May 1978 ***Aviation Digest***, it has been our sincere attempt to keep you in touch with selected issues of current concern. Given the Directorate of Evaluation/Standardization (DES) mission, technical issues unique to the Army Aviation business have provided the primary source of topics. Through the months we also have attempted to enlighten you as to the organizational structure and missions of the directorate. We are very proud with recent accomplishments within the Evaluation Division. In the February 1980 issue of the ***Aviation Digest***, we presented a light treatment about our external evaluation mission and introduced the collection initiatives which are in action. Information gathered about the aviation and air traffic control unit environment, with specific focus on what we at the U.S. Army Aviation Center, Ft. Rucker, AL, are doing to help or hinder your unit's mission accomplishment, indicates to us a need to address, in this article, a subject common to all units—not just aviation. Therefore, departing from a purely aviation topic, we want to present a light treatment of a subject which influences in critical ways your ability to train.

Aviation Center Training Analysis and Assistance Team visits (DES Report, February 1980, ***Aviation Digest***) have found that aviation units are inundated with a multitude of diverse training disrupters. "Training" seems to often take the backseat to "survival" in some units. While it is sometimes necessary to subordinate some training activities to "short fuze," ought that not be the exception instead of the rule? Meaningful and productive training does not just happen; rather, it results from the accomplishment of a well-prepared, appropriately resourced and timely executed training plan. If your unit is suffering from the *survival* rather than the *mission syndrome,* please take the time to continue reading this article. Colonel, Major, Captain, Lieutenant, Warrant Officer, Sergeant, Soldiers—let's all take the time to regain the perspectives about issues which contribute to a mission-oriented training environment.

Gaining Perspective. What training systems exist in the aviation unit? We see three individual level training systems. Every unit has skill qualification training for enlisted Soldiers and common military education and training for all personnel. The aviation unit also has the aircrew training program. Each of these training systems is ongoing currently and demands resource support. The principle resource is ***time;*** classrooms and other training support aids are also needed, but they do exist in limited quantity, which requires rationing. Early on, it is easy to recognize the need for the thorough planning of training if all the resources are to be at the right place at the right time for the right training activity. The challenge to training managers becomes more intense when the many collective training events are added to the picture. By maintaining perspective, each training "system" can be controlled with the results being meaningful and productive training achievements.

By-The-Book. Get a copy of Training Circular (TC) 21-5-7, "Training Management in Battalions," right now. *Don't* exempt yourself by thinking that you aren't a training manager; aren't working at the battalion level; aren't in a battalion at all; or that "the book" doesn't apply to aviation units. Just pull out the book. The title of the TC is a little misleading because it states "in battalions"; however, this document contains the guidance you need to do your job—training. The best thing you can do *right now* to improve your unit's training posture is to spend a few minutes scanning, if not studying, TC 21-5-7 regardless of the type of unit to which you're assigned.

Many of you who are still reading this article are probably in units that are effectively employing the training principles outlined in the TC; however, just as many of you may be in *survival* units that are experiencing frustrations in the training arena. Regardless of your personal situations, do look at the first



few pages of the TC. Chapters 1 and 2 tell the active component unit about sound training management principles. If you are having problems integrating individual skills into ARTEP (Army Training and Evaluation Program) task performance, perhaps a closer look at Chapter 2 will help. Reserve Component units—Chapter 3 is for you.

In all, perhaps the single most outstanding feature of TC 21-5-7 is found in Appendix B, "Training Management Administration." How important is the Inspector General to you? We recommend you take a very close look at the 33 training management tasks.

Army leaders at all echelons should also examine the realities set forth below.

The Mission Of The Peacetime Army. "The Army's need to prepare for battle overrides every other aspect of unit mission." FM 100-5, "Operations (How To Fight)."

The Unit Environment. We must train effectively to prepare for battle. To train effectively we must have perspectives in training supported by the sound management principles of TC 21-5-7. We also must have an operational environment that is conducive to training. Much can be said about the environment.

An environment conducive to training is difficult to achieve in many aviation units. The pressures in our business seem to focus on "mission support." The aviation unit commander, just like his counterpart in combat support and combat service support units, is challenged by the demands of the *support* environment. Given imagination, ingenuity, a lot of energy and the book, a good training environment can be created.

Mission Chores vs Training Opportunities. To provide mission support is training. The distinction between support and training exists only in the aircrews' approach to the mission. Prior planning which considers aircrew training manual tasks, aircrewmember proficiency or section/platoon needs should place the right crew into the mission support situation. Surely, there are many extenuating factors which might prevent such alignment on occasion, but the bottom line is simply—*TRY.* Try to view mission taskings as training opportunities.

Sheltering—A Command Responsibility. Every echelon of leadership, command or staff, is obligated to its subordinates to provide a good training environment. Realistically, certain types of training require a "no-mission" environment. If uninterrupted training time is to exist at the section or platoon level, it is because someone at company level sheltered the unit from taskings. If a company needs time to train in an uninterrupted environment, the battalion must provide the shelter by diverting missions to other units. Generally, the aviation battalion is the only aviation asset in the division and is tasked daily with mission support. In spite of the necessity to provide the support, the battalion commander must search for the occasional opportunity to have an uninterrupted training environment; admittedly, these times will seldom occur at battalion level. Finally, the principle of sheltering must not only be talked about at brigade, division and corps level, it must be implemented.

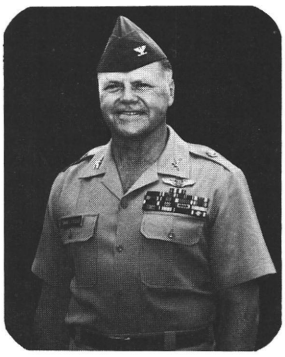
The Black-White-Red, or X-Y-Z, training concepts (pure training, training & support, pure support/administrative) within divisions are sound sheltering concepts which are too often paid lip-service. It is imperative to providing good training environments that commanders at every level tighten up their staffs to ensure that every possible consideration is given to providing a work flow which is conducive to unit training in subordinate elements. General to noncommissioned officer, each of our responsibilities is outlined on pages 20 and 21 of TC 21-5-7. If our training strategies are to succeed, all individuals in the chain of training command must fully understand their obligations to influencing the training environment of those who serve at lower levels. Adherence to the principles presented in TC 21-5-7 is training "by the book" and there's not much wrong in doing it that-a-way.

Reporting Final

Late News From Army Aviation Activities

FROM FORT RUCKER

Pilot Retires. Colonel George W. Shallcross, one of Army Aviation's three active duty Liaison Pilots, ended his 33-year military career in July. At the retirement ceremony he was presented the Legion of Merit (first Oak Leaf Cluster), recognizing his outstanding service since June 1977 as TRADOC Systems Manager for the ASH.



He was graduated from Liaison Pilot training at San Marcos, TX in 1951.

The other Army Aviation Liaison Pilots who are known to be still on active duty are Major General James C. Smith, director of training, Office of the Deputy Chief of Staff for Operations, Headquarters, Department of the Army, and Major General James F. Hamlet, Deputy, The Inspector General, Headquarters , Department of the Army. **(AD)**

Record Breakers. The 38 candidates in Warrant Officer Rotary Wing Aviator Class 80-33 at the Army Aviation Center have qualified to solo in the TH-55 helicopter under a record-breaking 12 hours of instruction. Warrant Officer Candidate Geraldine A. Siegle is the first woman in Aviation Center history to solo first in a class. Candidate Siegle is the only woman in her class. She soloed after completing only 10 hours of instruction.

Graduation Speech Notes.

• *Major General Charles W. Dyke,* guest speaker at the graduation of Officer, Warrant Officer and NATO/European Rotary Wing Aviator Classes, stressed the importance of Army Aviation. General Dyke, vice director, Joint Staff, Organization of the Joint Chiefs of Staff, Washington, DC, told the graduates of the importance of the air arm, speaking of the unique ability of aviation to be hauled anywhere in the world and be set up to meet any possible threat.

"I know of no element of the armed forces that will be called on the first few days of combat more than aviation," said General Dyke.

"You've got to work 10 to 12 hours a day to maintain a force to keep from going to war," he added, in speaking of the future for the new aviators.

• *Major General Jack V. Mackmull,* speaking to members of the Officer and Warrant Officer Rotary Wing Aviator Classes at the Army Aviation Center, stressed the importance of Army Aviation now and in the future. The commanding general of the 101st Airborne Division (Air Assault) outlined the growing importance of Army Aviation. He explained to the aviators what his plans are for his particular unit in a wartime situation.

Likening the 101st Division's strength to that of a boxer, General Mackmull explained that the right hand delivers the telling blows, while the left is used to set up the opponent. "I'm going to use my infantry, my artillery, my cavalry to set them up. Then I'll use my attack helicopters, not in squads or platoons, but we'll have 30 to 40 Cobras (AH-1s) up in the air."

"That ought to make an (enemy) armor commander's eyeballs blink a few times," General Mackmull asserted.

The West Point graduate explained how the helicopter came to be a weapon with strike potential through years of research, effort and trials, conducted both at the Army Aviation Center and in the field.

When the Vietnam conflict flared up, the first major combat units sent to the Southeast Asian Republic were Army Aviation units where, according to General Mackmull, they demonstrated their ability, "I had some doubts," he said, "of the effectiveness of helicopters in combat, but, by gosh, it worked and it worked well." He also added that one of the Army's greatest success stories was the training at the Aviation Center of more than 10 times the 2,000 aviation warrant officers in the military before the Vietnam conflict.

"We have to look now at the next war, and aviation is going to be a big part of it," he told the audience.

• *Major General Jerry R. Curry,* deputy assistant secretary for public affairs, Office of the Secretary of Defense, Washington, DC, told 68 graduating members of the Officer and Warrant Officer Rotary Wing Aviator Classes on 11 August, "The cream of the Army crop are wearing wings. The Army skimmed off the best they had and made them aviators."

The general, who is also a qualified Army aviator, told the new pilots that their wings carry a great deal of responsibility, too.

"If we go to war, you'll see more combat than the others; in times of peace, you are required to maintain a higher level of proficiency than the others," he said.

He added that they are better physically and mentally than most Soldiers, and that the courses they take are more demanding than the rest.

Cadets Complete Training. Fifty-one United States Military Academy cadets from West Point, NY, last month completed a 4-week flight orientation course at the Army Aviation Center.

The course consisted of about 15 hours training in a TH-55 helicopter and attendance in selected academic courses.

The cadets receive this training during the summer before their junior year only after satisfying all requirements for flight school. These cadets were chosen from among 200 who were qualified in all aspects.

Cadets attending this year's flight orientation course are members of the Class of 1982. (A POI has been developed to provide a similar flight orientation course for the Army ROTC in 1982.)

Captain Michael A. Antonelli, left, tells U.S. Military Academic Cadet Mike Centers what to look for on the tail rotor of a TH-55 helicopter while performing a preflight check at the Army Aviation Center.

(USAAVNC-PAO)

FROM ALASKA

Aviation Detachment Leaving. The Alaskan Brigade will be losing an 80-person aviation detachment from Ft. Wainwright, near Fairbanks, this month.

The commanding general, 172d Infantry Brigade (Alaska), announced a U. S. Army Forces Command decision to transfer the 172d Military Intelligence Detachment (Aerial Surveillance) (MI Det (AS)) to Hunter Army Airfield, near Savannah, GA.

At Hunter the MI Det (AS) will be expanded into a company sized unit and attached to a newly formed aerial exploration battalion.

Also making the move will be the detachment's six OV-1D (Mohawk) fixed wing aircraft with their special sensory equipment. The MI Det (AS) has been a component of the 222d Aviation Battalion at Ft. Wainwright since November 1977.

Need a Lift? The Cranes are back! Actually, only one Crane came back to Ft. Wainwright this year, but who is counting?

Veteran Wainwrighters may remember the familiar sight. It still resembles a rather large praying mantis in flight, and more often than not it'll have something dangling underneath it.

Yep, the Crane is back and it's just as ugly as ever. But ugly is beautiful this summer, because it's here to help our Soldiers fight "The Scourge of 1980," the Blair Lakes training area fire.

No strangers to smokey operations, the Cranes flew hundreds of hours during the 1970s in support of fire fighting efforts.

Today, according to its pilot, Chief Warrant Officer, CW3, Roger Showers, it's the only aircraft in Alaska that's capable of doing what it came here to do—to transport the heavy D-5 and D-7 model bulldozers needed to construct fire breaks around the blaze.

History tells us that the CH-54B Flying Cranes were formerly assigned to the 343d Aviation Detachment of the 222d Aviation Battalion. Deactivated in late September last year, the four Cranes were reassigned to the Alaska National Guard's 207th Arctic Recon Group in Anchorage.

Their primary mission was, and still is, to provide combat support to the 172d Infantry Brigade (Alaska).

For the benefit of those who may not know, one CH-54B Crane broke all existing weight records at Unalakleet, AK, when it successfully lifted a gross weight of 56,000 pounds (9,000 pounds more than the normal gross lift maximum allowed for the aircraft). This feat was accomplished when a 22,000-pound bulldozer was needed at Moses Point on Norton Sound, a distance of 60 miles from Unalakleet. The CH-54 not only lifted the excess weight, it also flew the distance bucking a strong head wind. That same Crane broke its own record the same day by transporting another dozer—this one weighing 25,000 pounds—over the exact same route.

As of June last year the Crane also held the CH-54B altitude record when it topped off at 36,000 feet—about 6.8 miles—and set a time-to-climb record by reaching an altitude of 10,000 feet in 1 minute and 25 seconds.

(172d Infantry Brigade PAO)

MAKE AERIAL GUNNERY TRAINING HIGH QUALITY TRAINING

Is your aerial gunnery program misfiring? You may be able to zero it in with the help of some innovative ideas from the 9th Infantry Division where they have progressed well beyond shooting up rusting piles of junk

CW4 George H. Stokes

CW4 Stokes was assigned to 3d Squadron, 5th Cavalry, Fort Lewis, WA, when he wrote this article

DOES YOUR AERIAL gunnery program consist of completing ATM requirements by loading up the aircraft, picking a target and shooting in its general direction? Are you tired of shooting up car bodies, burned out trucks and rusted piles of metal? Does your gunnery program challenge scout pilots as well as attack helicopter pilots? Do you find it difficult to tell the difference between the present gunnery and the last gunnery?

If you answered "yes" to one or more of these questions, read this article. It presents six steps that will help you to develop a more realistic and challenging aerial gunnery program.

Step 1. Remove all junk, car bodies and other extraneous piles of metal from your aerial gunnery ranges. This task might prove to be formidable if undertaken at one time. During each successive gunnery cycle, however, more junk can be removed until your range is completely cleared.

Step 2. Use full-size, actual scale silhouettes for targets. The silhouettes are inexpensive, easy to build and will challenge the skills of both the scout and attack helicopter pilots. The basic idea consists of a frame (we used iron rails) that has a slot which allows a plywood silhouette of any enemy vehicle to be slipped firmly into place. All silhouettes are painted olive drab and are cut to actual size in sections that will fit into the cargo compartment of a UH-1 Huey. For example, a Soviet T-62 tank silhouette requires three sheets of one-half inch plywood. We started with 10 frames and now use twice that number. This idea was developed by James Hoffman, range control officer at Yakima Firing Center, Yakima, WA.

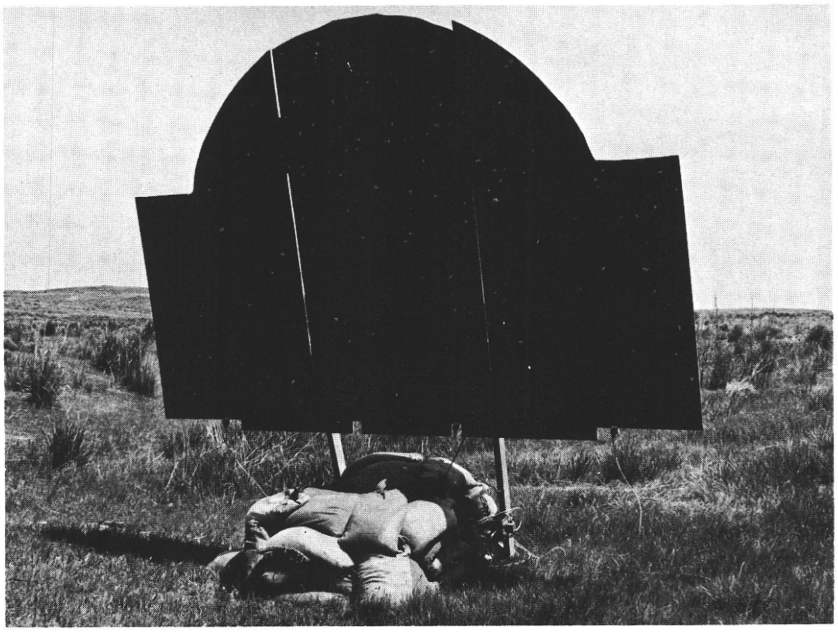
Step 3. Build Jim Hoffman's pop-up target system (see "A New Twist for Aerial Gunnery" by Sergeant Bob Rosenburgh on page 22 of this issue).

Step 4. Analyze your range facilities for additions to your gunnery program, such as moving targets, unique equipment, etc.

Step 5. Remember the basics and use the building block learning process—proceed from the simple to the complex. Challenge pilot skills; don't make it easy; establish realistic goals. The individual qualification cycle should proceed as follows:

Use frame/silhouettes of common enemy vehicles (T-62, BRDM, BMP, PT-76 and ZSU-23-4) placed in open areas. At known ranges add pop-up targets. Fire from well defined positions, from accurately measured distances and with designated weapons sytems.

In the ATTS SAAB system the raised target presents an enemy tank silhouette for Army Aviation gunnery practice



Photos by Charles Reno

Scout and attack helicopter pilots will learn vehicle identification and range estimations because all targets are full-size and will appear in their proper perspectives depending upon the range and tactical environment in which they are encountered. Use the requirements of FM 17-40 (Draft), "Attack Helicopter Gunnery," May 1978, and the ATM during individual qualification.

Crew, team and unit cycles also use FM 17-40 and the ATM, but these cycles should progress from the simple to the complex until crews are presented with a realistic battlefield target array. *If possible, every effort should be made to acquire and use the Automatic Tank Target System (ATTS) SAAB system 45016-69/AF79, available through installation training aids. This system is outstanding when adapted to aerial gunnery training. Using this system, the "scoring" aircraft can control the target display by allowing the scorer to raise and lower the targets* ***from the aircraft.*** *This allows the platoon leader or IP the freedom necessary to tailor the engagements to the individual pilot's skill and to increase the difficulty as proficiency is gained.*

The scoring aircraft can have the targets engage the attacking aircraft (flash and smoke) if not observed and taken under fire within specified time limits. When hit, the targets fall down automatically. The SAAB system incorporates a sensitivity selection capability so that the target must be hit with the proper system to record a hit. If the target should be engaged with a TOW missile to record a kill it can be hit with 7.62 mm, 40 mm or 20 mm and will not fall down.

Move the enemy silhouettes into more realistic positions. Don't underestimate the enemy, who also wants to survive. If you had to cross the terrain the enemy is crossing, where would you go? Ask that question as you place the enemy into position. Use multiple targets and mix friendly vehicles with enemy vehicles to test pilot skills.

- Example No. 1: Given a T-62 and an M60A2 300 meters apart, the scout/attack helicopter team should locate and identify the friendly and enemy tanks and engage the proper target.
- Example No. 2: Given a ZSU-23-4 and a BRDM, the scout/attack helicopter team should be able to locate and identify the greatest threat and, depending upon the range, engage in the correct sequence with the proper subsystem.

A note of caution at this point: As difficulty increases, scout and attack helicopter pilots must be required to make more terrain and tactical decisions. This will, by necessity, require more freedom to "see the battlefield," select firing positions and the sequence in which targets are engaged. Also, the proper weapons subsystem for each engagement must be selected. *Safety must be a primary concern.* This free play will require more planning and must be monitored closely to assure safe operation, especially ensuring that range constraints are not exceeded.

Step 6. As pilot skills progress, so should the challenges. Add the requirements of nonverbal communication, operation in an NBC environment, the use of night vision goggles and various types of battlefield illumination. Smoke the battlefield with smoke pots or UH-1 smokeships to restrict scout and attack helicopter visibility. Create enemy artillery attacks during gunnery tables (use detonation cord or simulators to add battle noise).

In short, add anything that will increase realism and that requires scout and attack helicopter pilots to make combat decisions under realistic combat situations.

Set your standards high, challenge pilot skills and train them to reach the established goals. Dissect each decision made under stress, both pro and con, and teach the pilots how to think and act when the pressure is on. Allocate resources to allow additional training for substandard performance.

When hit during gunnery training, the plywood target will fall down automatically

Gunnery must prepare Army aviators to face the hazards of a modern battlefield, to accomplish the mission and to survive. It has been said, "To die in combat is a tragedy, but to die for a lack of proper training is murder."

Don't be complacent with a gunnery program that only fulfills requirements. Develop a program that fulfills needs.

More information about this article can be obtained by writing to CW4 George Stokes at: 63d Company, 6th Battalion, 1st Aviation Brigade, Ft. Rucker, AL 36362

GLOSSARY

ATM	aircrew training manual
BMP	infantry combat vehicle
BRDM	armored reconnaissance vehicle
FM	field manual
IP	instructor pilot
M60A2	main battle tank
mm	millimeter
NBC	nuclear, biological, chemical
PT-76	reconnaissance amphibious tank
SAAB	(automobile manufacturer)
T-62	Soviet tank
TOW	tube-launched, optically-tracked, wire-guided
ZSU-23-4	antiaircraft weapons system

A NEW TWIST FOR AERIAL GUNNERY

Here is a realistic aerial gunnery range that anyone with a few craft skills can build

Sergeant Robert Rosenburgh
HHC 1st Battalion, 7th Infantry
APO New York 09162

THE SCOUT-WEAPONS team works its way along a ridge while performing a zone reconnaissance mission. The scout pilot (in an OH-58 Kiowa) searches the terrain ahead while the AH-1 Cobra crew, about 500 meters behind the scout, watches carefully from its overwatch position. Suddenly, 300 meters ahead and to the right, an enemy Infantry squad jumps from cover and opens fire on the two aircraft. The Cobra instantly pours suppressive fire on the enemy.

Then, 800 meters to the left, a second enemy squad fires at the scout. It, too, is quickly quieted. The recon continues.

Smoke conceals the ravine ahead and the scout calls for artillery to soften up the area. The attack helicopter moves into an attack position. When the smoke clears a T-62 and ZSU-23-4 about 200 meters apart come into view. It is determined that in this encounter the ZSU-23-4 is the greatest threat. The attack helicopter crew brings all of its weapons to bear on it, smothering it in a fusillade of fire. The Cobra quickly swings around to engage the T-62 while the scouts call for artillery. The "one-two" punch soon neutralizes the tank.

Radio Controls The Pop-ups. This combat-like scenario is typical of those used by the 3rd Squadron, 5th Cavalry of the 9th Infantry Division during aerial gunnery exercises at the Yakima Firing Center, Yakima, WA. Realism was heightened by use of new techniques and pop-up targets developed there (see "Make Aerial Gunnery Training High Quality Training," by CW4 George H. Stokes, on page 20 of this issue).

Mr. James H. Hoffman, range control officer at the firing center, originated the idea of using radio control to actuate pop-up targets at Yakima ranges. With the support of the firing center commander and staff, he kept development cost low by using remote control model airplane servos, transmitters and other available components to make his prototype targets (see accompanying figure).

"The best thing about these targets," Mr. Hoffman said, "is that they're simple to construct and maintain. Anyone with a few craft skills can build them. Those now in use cost about $500, mostly for the remote control components which are used over and over."

CW4 George H. Stokes, then standardization officer with the 3/5th, worked closely with Mr. Hoffman on the project. Mr. Stokes said, "I believe these targets can be of great use to Armor, Infantry, Aviation and during any direct fire training," then he added, "9th Division units have successfully used this device."

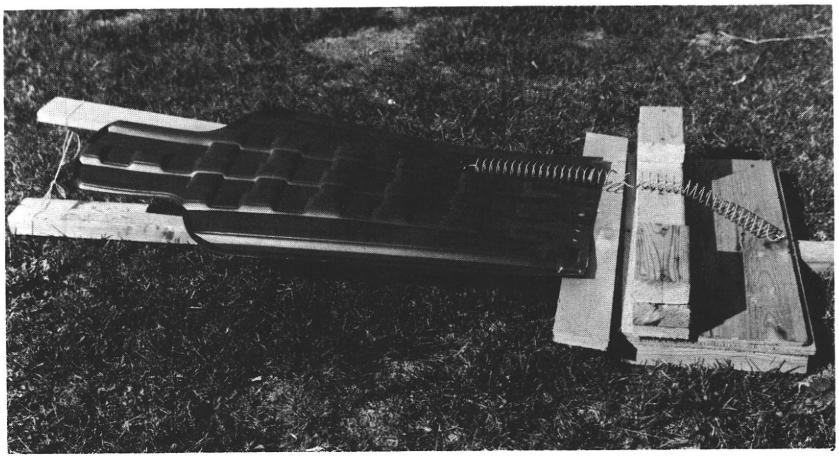
No Wires, Easy Movement. "The major advantages," Mr. Stokes said, "are that wires are not strung all over leading to each target and giving its position away. The targets are radio controlled and moved easily to new locations so that firers can't memorize a range. An element of surprise is necessary and these targets provide it. The control transmitter has eight channels for as many target groups. We also can set up boobytraps, detonation pits and smoke screens for added realism. Use of the system is limited only to the imagination of the users."

The targets can be controlled by a platoon leader, scorer, unit training cadre or exercise controllers in aircraft, vehicles, towers or on foot. Mr. Stokes noted that the pop-up silhouettes can be of troops, tanks, trucks or whatever targets meet the training scenario.

Mr. Stokes demonstrated the system on the range. Simple profile targets are fastened to a board with a hinged base. A long spring from the top to the base provides the "pop-up" action. The targets, placed in a row, are held down by strings tied to a length of detonation cord.

The cord has a blasting cap on the end. A wire leads from the cap to an ammo can in a hole outside the im-

pop-up target device



photographs by Charles Reno

GLOSSARY—page 21

controls for pop-up target device

mediate target area. In the can are four D-cell batteries, a receiver and a servo. The servo closes the circuit that fires the blasting cap which in turn ignites the detonation cord, allowing the targets to spring up. Mr. Stokes said that the flash and smoke of the detonation cord provide a "visual signature" that looks like small arms fire. If desired smoke grenades and star clusters also can be fired.

Mr. Stokes and Mr. Hoffman have taken steps to make the system safe to use. When targets are reset for the next firers, a switch on the servo box (ammo can) deactivates the mechanism. A red light blinks off to confirm this and comes back on when the system is reenergized. The wire to the blasting cap is disconnected during rearming to provide an extra safety margin.

"Like any pyrotechnics," Mr. Hoffman said, "this system is absolutely safe when prescribed safety procedures and common sense are used. I believe it can add new dimensions to training realism."

You can develop unique techniques and pop-up targets for your aerial gunnery range. For more information write Mr. Jim Hoffman, Range Control Firing Officer, Yakima Firing Center, WA 98901; or call AUTOVON 355-8220 or 8221 (Commercial 509-575-8220 or 8221)

CONSTRUCTION COMPONENTS

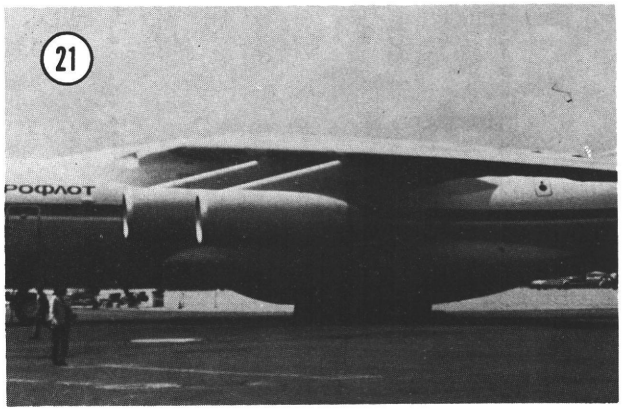
KP-5C kit which includes:
- one KPT-5C transmitter
- one KPR-5C receiver
- four servos
- one charger
- one switch harness

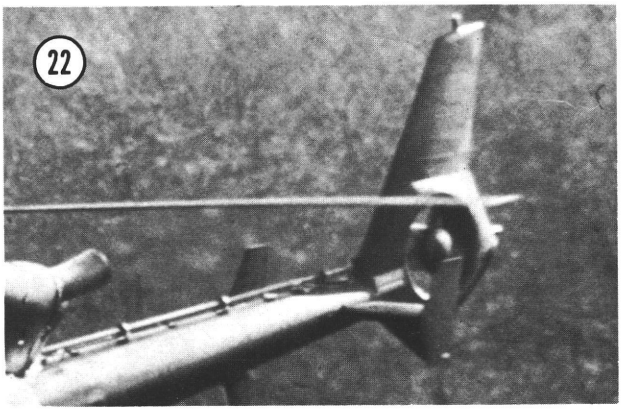
three KPR-5C receivers
three switch harnesses
four switches, 275-664
eight battery connectors
eight 3/32 collars
sixteen push-button bindings
sixteen GE4A Nicad batteries
four battery boxes
four clevises
four threaded rods

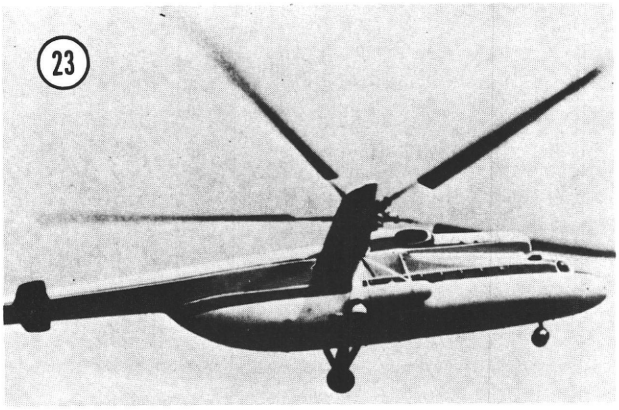
Kraft Systems, Inc.
P.O. Box 1268
450 W. California Ave.
Vista, California 92083

RECOGNITION QUIZ

Monthly Hints: Can you identify the following? Two are cargo; two are Soviet; one replaced the Alouette II; and one has SLAR. Answers will be in the October 1980 issue.







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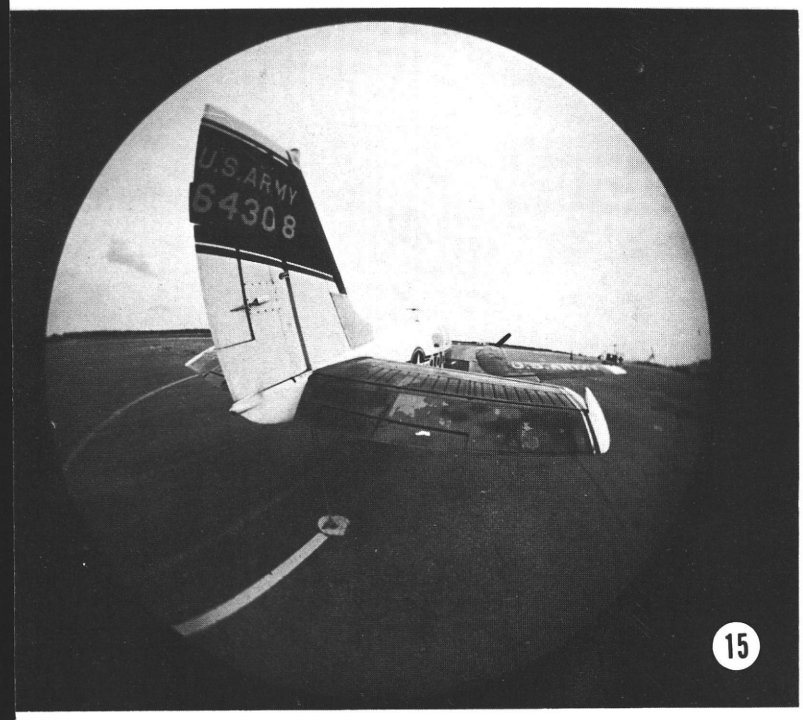

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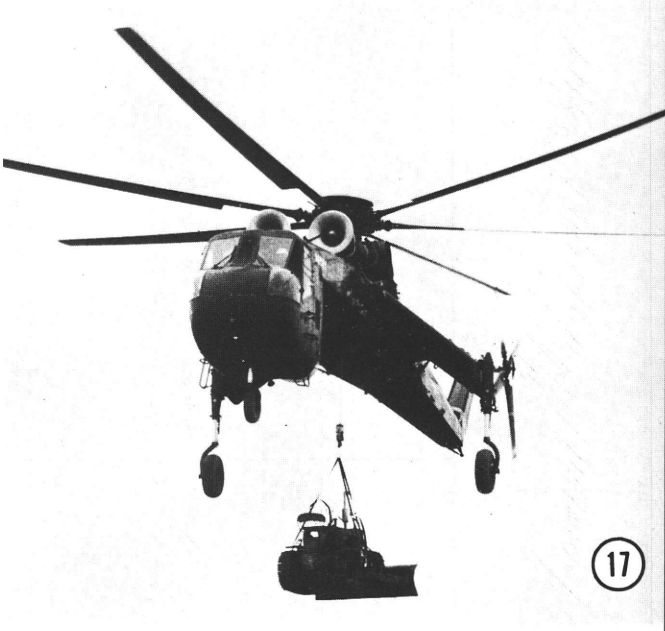

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AUGUST 1980 RECOGNITION QUIZ ANSWERS

13 U-21 Ute
14 A-10 Thunderbolt
15 T-42 Cochise
16 U-8 Seminole
17 CH-54 Tarhe
18 AH-64 Advanced Attack Helicopter

18

Helen Sutherland photographed by Don Decherd

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

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

ALSE Activities

The Army National Guard (ARNG) convened its third aviation life support equipment (ALSE) workshop 7 to 18 July 1980 at the National Guard Professional Education Center, North Little Rock, AR, and an educational time was had by all. As a separate but important aspect of the workshop, First Lieutenant Janet Gimblet conducted after duty hours classes on cardiopulmonary resuscitation. The next ARNG ALSE workshop is planned for February 1981.

Ft. Campbell, KY, has requested Fifth U.S. Army to hold the next U.S. Army Reserve ALSE workshop at that installation during the latter part of September. Mr. Al Cargen, safety officer, Headquarters Fifth U.S. Army, indicates that this is in the planning stage and that about 80 people will be in attendance. Information on quotas will be forthcoming from Fifth Army.

ALSE personnel of the California ARNG recently held their own workshop at the Stockton Army Aviation Support Facility. Personnel from facilities throughout the state attended for the purpose of discussing ALSE problems and formulating recommendations to bring about solutions. Among their recommendations were:

- Place more command emphasis on the ALSE program.
- Make adequate space at each facility for the storage and maintenance of ALSE.
- Establish a training program at each facility/unit to train individuals in the proper use and maintenance of ALSE.
- Get safety officers, both facility and unit, involved in the ALSE program.
- Conduct ALSE seminars and assistance visits a minimum of once a year.

SB 700-20

Beginning with the March 1981 issue, Supply Bulletin (SB) 700-20 will no longer be available in hardcopy and will be issued only on microfiche. Those who currently receive hardcopy SB 700-20 will automatically receive this publication on microfiche as of the above date. If you are already on distribution for microfiche there is no need to resubmit a request for this SB. Those requiring additional copies of the microfiche or who desire to be placed on distribution for the first time can do so by submitting DA Form 12-34 to:

Commander
U.S. AG Publications Center
1655 Woodson Road
St. Louis, MO 63114

Since we in the ALSE field depend on SB 700-20 for information, it is important that we have this publication readily available and current at all times. Consequently, in light of the above development, you will want to ensure that you have a microfiche viewer on hand prior to March 1981. For detailed information on available viewers, you can contact the Defense General Supply Center, Richmond, VA, at AUTOVON 695-4330/4613.

ALSE ASI Status

The latest information available indicates that the additional skill identifier (ASI) for aviation life support equipment personnel will be identified in Change 15 to AR 611-201, with an effective date of 1 March 1981. The ASI "Q2" will be awarded to certain designated military occupational specialties upon completion of the formal ASI producing course to be given at Ft. Eustis, VA. In addition, those ALSE personnel who have graduated from the formal U.S. Air Force and U.S. Navy life support schools will automatically be awarded the new ASI.

Space Blankets

Questions have come from the field regarding the use of the blanket, combat casualty (national stock number 7210-00-935-6667), affectionately known as the "space blanket." As is well recognized, this item is a valuable

PEARL'S

and versatile piece of survival gear having a multiplicity of uses in an emergency situation, some of which are:

- A protective ground cloth for sleeping and sitting. (Protects from wetness and dampness; some insulation is given if folded several times.)
- A shelter. (Is waterproof and protects from rain, snow, fog as well as sun. Can be spread over a framework constructed from natural materials. Is a fair windbreak if supported by framework.)
- A water collector. (Used in conjunction with a depression dug into the soil; depression is lined with blanket as waterproof water collector.)
- A signal panel. (Ground to air emergency signal.)
- A waterproof cover for injured. (Provides protection from becoming wet.)
- A protective cover for equipment.
- A heat conductor. (Used in conjunction with an open fire; blanket is supported on framework, and individual positions himself between the fire and the reflective surface of the blanket.)

(Thanks to CW4 Frank Heyle, Oregon ARNG, for this info.)

Seat Belt Hazard

A recent Preliminary Report of Aircraft Mishap indicated a potential hazard exists on OV-1/RV-1 aircraft due to the excess length of the aircraft seat belt. A precautionary landing resulted due to the free end of the pilot's lap belt being locked in the aircraft canopy and hanging outside. The lap belt in question is part of the pilot's parachute harness which he wears and which becomes part of the ejection seat when fastened. When the lap belt is pulled snug, surplus webbing several inches in length extends from the buckle. This length of belt, if locked in the canopy, may preclude successful ejection by twisting the seat on the rail, causing the occupant to strike an overhead structural member, or by reducing the seat velocity below that necessary to clear the aircraft. In an ejection sequence, the pull of the lapbelt end could cause severe injury by causing the belt to tighten across the abdomen with explosive violence. The aircraft canopy cannot be opened in flight; if attempted, the slipstream would rip the canopy from its hinges and throw it into the propeller. Thus, if a lapbelt is inadvertently locked in the canopy it cannot be freed in flight. It is recommended that ALSE personnel check the installation of the lapbelt in each harness to ensure that the belt length is appropriate for the crewmember—and then fold and tack-stitch the excess length to preclude any possibility of the belt getting caught in the canopy.

Questions and Answers

Army Regulation 95-1 requires OV-1 crewmembers and all persons aboard single engine aircraft to wear a "standard" constant wear antiexposure suit when the water temperature is 60 degrees Fahrenheit or less or it is forecast for any part of the route flown. The CWU-21/P is the only antiexposure suit listed in the Army Master Data File. Unfortunately, the complete assembly is not available and several components have to be ordered from the other services. The Navy has the CWU-33/P antiexposure suit available. Is this suit acceptable for Army use, and, if so, can it be procured and adopted as the Army standard? (CW4 Francis Boisseau, 222d Aviation Battalion (CBT), Ft. Wainwright, AK.)

We routed your question to Training and Doctrine Command (TRADOC) which is responsible for determining what equipment the Army adopts as standard. The response we received was as follows:

"It is the position of this headquarters that the CWU-33/P antiexposure suit not be adopted as the Army standard antiexposure suit.

"Research/coordination with the U.S. Air Force (ALSE), which is the item manager, Army research and development agencies, the U.S. Army Aviation Center, the U.S. Navy, and other Army agencies revealed the following data concerning preference for the CWU-21/P over the CWU-33/P.

"The CWU-21/P supersedes the CWU-33/P.

"The CWU-21/P is the preferred and current Air Force and Navy issue item.

"The CWU-21/P is lighter in weight and more ventilated than the CWU-33/P.

"The CWU-21/P is the only constant wear antiexposure suit being procured by the Air Force.

"The CWU-21/P assembly offers more versatility by offering components that can be tailored to local climatic needs.

"The CWU-33/P has a maximum toleration for wear of 1½ hours.

"Recognizing the immediate need for an antiexposure suit, coordination has been initiated with U.S. Army Troop Support and Aviation Materiel Readiness Command to make the entire assembly available in the Army inventory."

Hq TRADOC point of contact is MAJ James H. Foster, AUTOVON 680-3477.

New Personnel

In the May 1980 edition of PEARL, we introduced you to all the personnel in the DARCOM Project Office for Aviation Life Support Equipment (DRCPO-ALSE). This month we would like to introduce you to the newest member of our staff, Mrs. Vickie L. Kolb. Mrs. Kolb comes to us from the Reserve Component Personnel Administration Center here in St. Louis and is our new clerk typist and responsible for general administrative duties.

MONTHLY WRITING AWARD

FLIGHT IN THE twilight zone

CW3 Russell D. Capps

Photographs by: Tim Jewett and Bob Ellis
The Oregonian
Portland, OR

Rico Johnston
The Monitor
Ft. Bliss, TX

THE WINDSHIFT WASN'T noticed by Warrant Officer Jeff Brown; he was at high hover in his OH-58 Kiowa helicopter checking an overturned truck and trailer for possible survivors. Suddenly, the UH-1 Huey circling overhead was completely engulfed in thick, black ash; and its pilot, Captain Charles Campbell, squinted at the instruments and quickly started climbing. He passed a warning on to WO Brown, who was now enclosed in the Green River Valley. Finding a landing spot, the OH-58 settled through 10 feet of ash thrown skyward by the rotor system. "I'm on the ground," said WO Brown as CPT Campbell broke out on top at 6,000 feet. Safely back at the search and rescue (SAR) base the two aircraft were washed, engines were flushed and special oil samples were taken.

CPT Campbell and WO Brown were two of the first pilots onstation during the disaster relief operations at Mount St. Helens, WA. The once

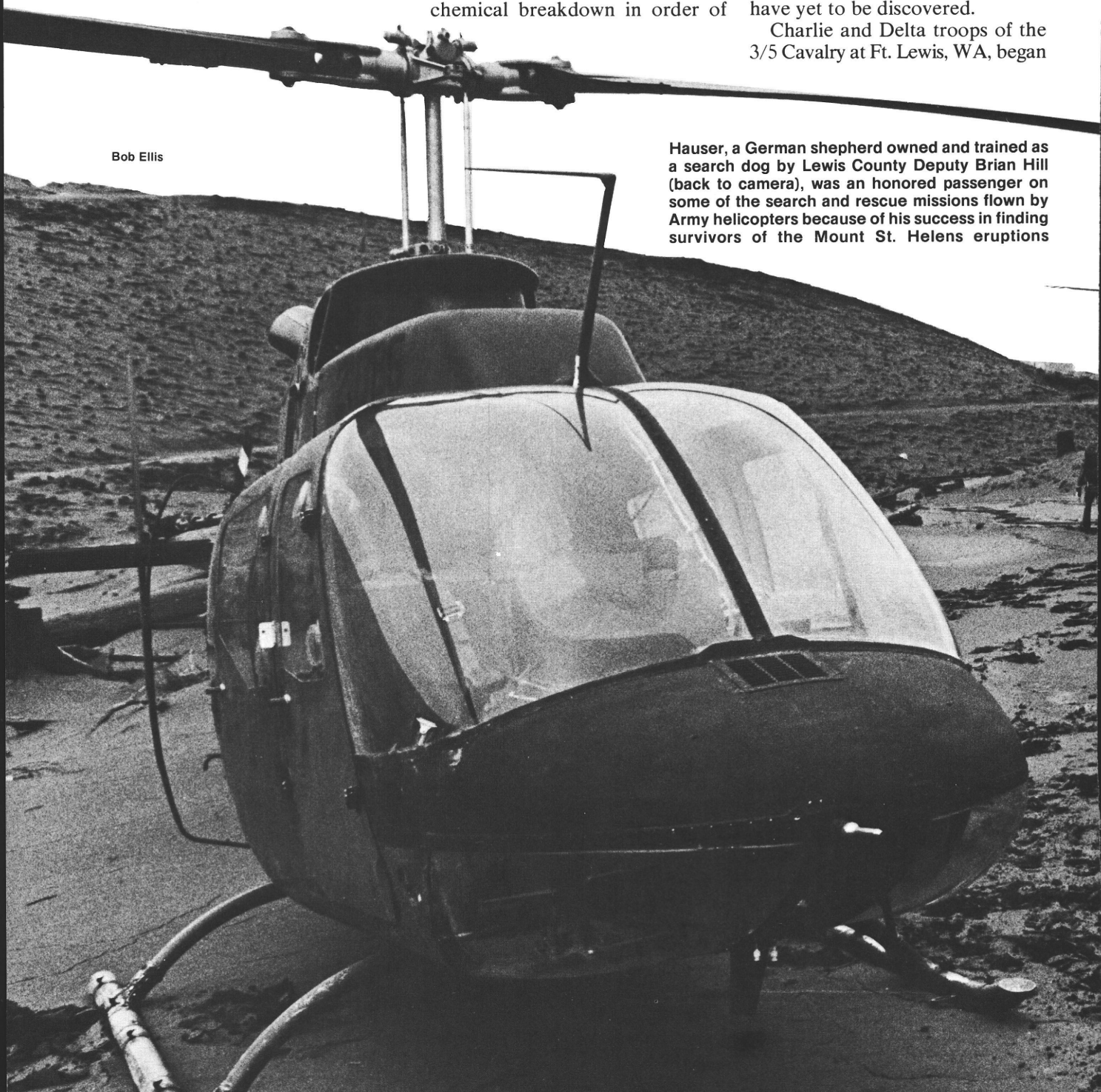
The stark beauty of this scene belies the lethality of the mud flows — Tim Jewett

majestic mountain had erupted Sunday, 18 May 1980, with a force estimated at between 10 and 25 kilotons. Death came quickly from the initial blast which caused heat estimated as high as 1,500 degrees Fahrenheit, 200-mile-per-hour winds, ash and smoke inhalation. Within minutes the ash obscured the Sunday morning sunrise as it reached to 60,000 feet. In an hour's time it had reached Montana and Idaho. The mountain, at 9,677 feet, was Washington's fifth largest. After the blast, which leveled 150 square miles, its ranking dropped to 30th, since it lost more than 1,300 feet.

Contamination of petroleum, oil, and lubricant products was an immediate concern for safety and maintenance technicians. A quick oil analysis showed the following chemical breakdown in order of parts per million: silicon 631; salt 184; iron 109; aluminum 44; magnesium 25; zinc 3; titanium 2; and tin, lead, nickel, copper, chromium and silver, each a fraction.

Short-term problems included scratched windshields and contamination of the vented cap gear boxes. The aircraft were washed and flushed daily with the help of local fire station volunteers. Long-term effects have yet to be discovered.

Charlie and Delta troops of the 3/5 Cavalry at Ft. Lewis, WA, began



Bob Ellis

Hauser, a German shepherd owned and trained as a search dog by Lewis County Deputy Brian Hill (back to camera), was an honored passenger on some of the search and rescue missions flown by Army helicopters because of his success in finding survivors of the Mount St. Helens eruptions

flying SAR missions on the morning of 19 May. Early reports, from pilots, printed a grim picture. The area was described as void, devastated and dead. The area of operation became known as the Twilight Zone. The eerie, monotonous gray exuded death that none had ever seen. Aviators who had survived the battles of Tet 68 and Lam Son 719 in Vietnam were shocked. The first night spent in the lazy Washington town of Salkum, about 28 miles from the mountain, was very quiet and somber.

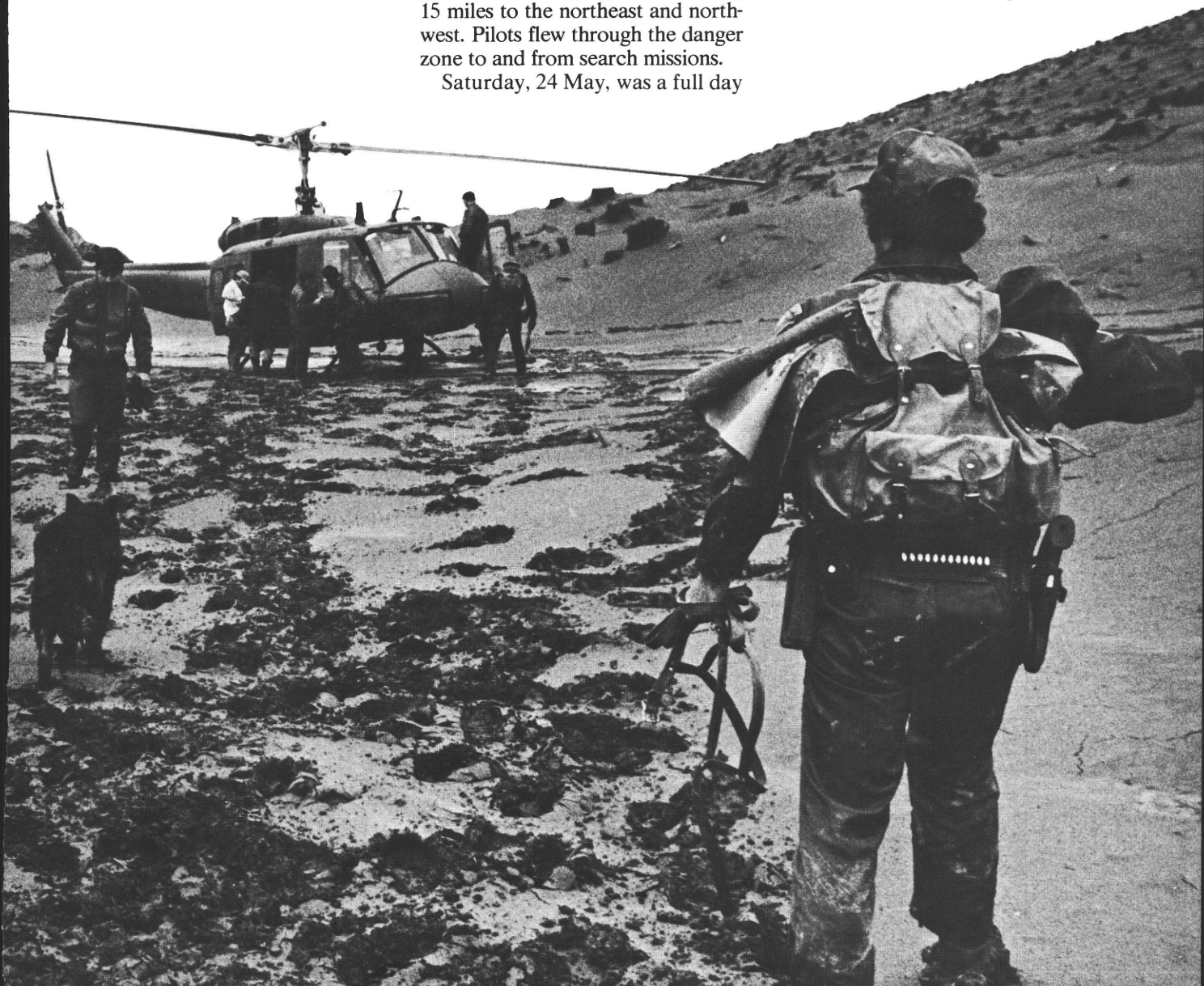
Tuesday morning OH-58 crews hovered next to burned and overturned cars as Lewis County deputies, flying as observers, sifted through ash inside the vehicles and made a preliminary search in the near vicinity. It was soon apparent that nothing survived. The once lush, green forests filled with magnificent elk and stately mule deer were gone.

The area was altered to such an extent that map reading and navigation became a serious problem. Rivers were rerouted, lakes had vanished, others appeared, mountains and hills changed size, the entire area was an unusual gray. The state placed a 20-mile restricted zone around the mountain because of the danger that still existed. Geologists drew a danger zone extending 15 miles to the northeast and northwest. Pilots flew through the danger zone to and from search missions.

Saturday, 24 May, was a full day for C Troop. Emphasis was now placed on finding and recovering victims. Search teams consisted of an OH-58 and a UH-1. Each Huey carried a ground team which was made up of Lewis County SAR volunteers and/or regular and reserve deputies and most importantly, trained search dogs. A deputy also rode on the OH-58s.

The first mission produced one victim, then three more. Then the pilot of a UH-1 found the only living thing seen in 6 days—an ant walking dazed in search of food and companionship.

Because of the unstable condition of the mountain, the OH-58 would stay airborne and monitor coordination center frequencies



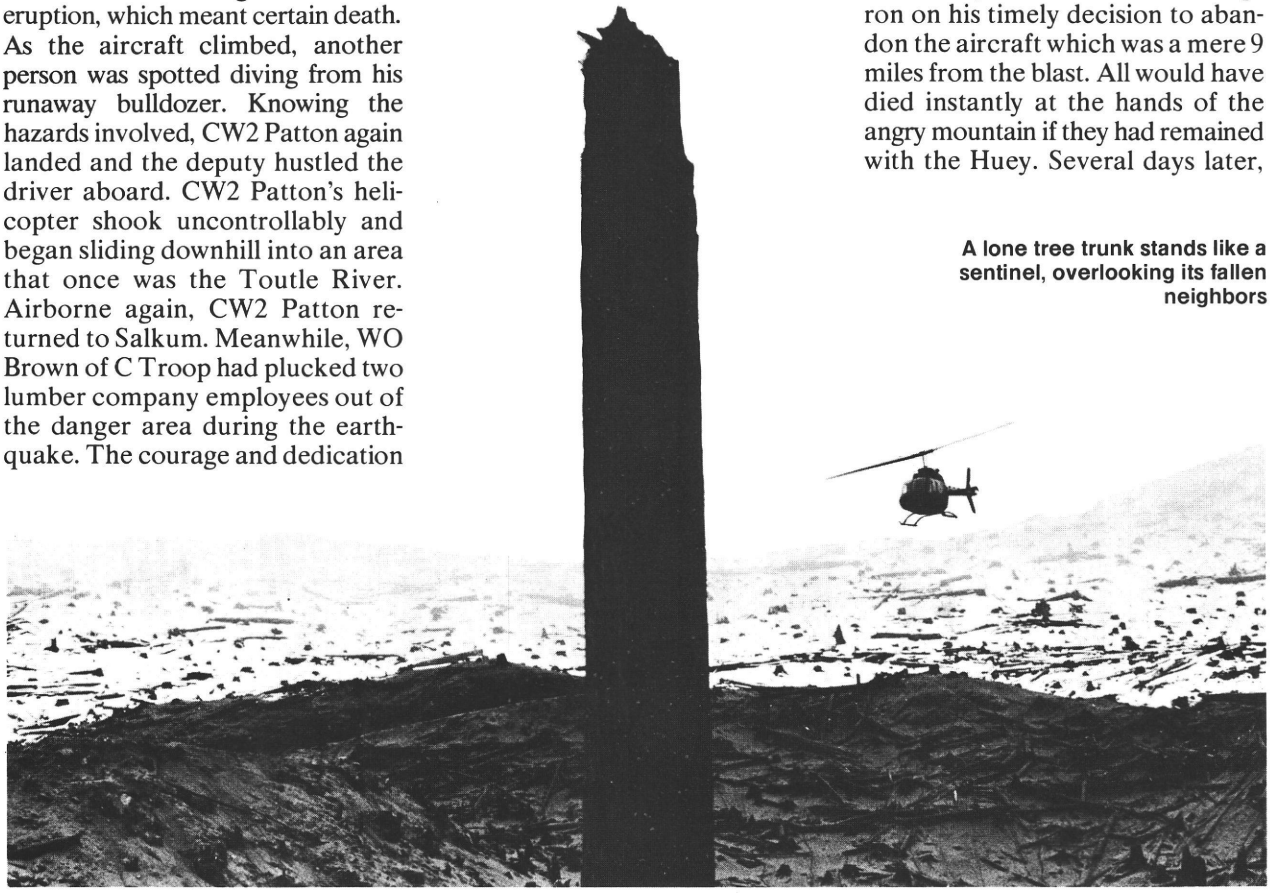
which an Air Force C-130, orbiting overhead, relayed from the federal emergency management system headquarters at Toledo, WA. One aviator devised a recall system for aircraft in the danger area using code words to warn of impending volcanic eruptions or adverse weather —weather was controlled by the mountain.

Two C Troop OH-58s were sent on a search for a lost civilian helicopter near the base of the mountain. One of the pilots, CW2 Frank Patton, spotted an unauthorized photographer in the danger zone, so he landed his aircraft just as an earthquake measuring more than 4.0 on the Richter scale occurred. CW2 Patton was unable to read the aircraft instruments or control the dancing Kiowa. It shook like it had landed on a bowl of jello. As Deputy Rick Jones and the photographer scrambled aboard, CW2 Patton lifted into the air with thoughts of another eruption, which meant certain death. As the aircraft climbed, another person was spotted diving from his runaway bulldozer. Knowing the hazards involved, CW2 Patton again landed and the deputy hustled the driver aboard. CW2 Patton's helicopter shook uncontrollably and began sliding downhill into an area that once was the Toutle River. Airborne again, CW2 Patton returned to Salkum. Meanwhile, WO Brown of C Troop had plucked two lumber company employees out of the danger area during the earthquake. The courage and dedication of these Army aviators saved the lives of four men.

Later in the day, as weather became increasingly worse, a UH-1 with crew and ground team suddenly became shrouded in fog so thick it could not take off from the 4,300-foot level on Elk Rock, less than 10 miles from the crater, where it had landed to recover a body. The pilot, CW3 Mike Capron of C Troop, made the decision to abandon the aircraft and walk to a lower point to be picked up by another helicopter. CW3 Capron and his crew covered the Huey with a cargo parachute that is normally used for camouflage. Rags and towels were used to cover other critical areas such as the blade grips.

As darkness approached, the hazardous walk down Elk Rock began. Constant contact was maintained by means of the PRC-90 survival radio. Trees lying like children's pick-up sticks hampered the descent, and mud and ash 3 to 4 feet deep often halted their progress. At times they would help dig each other out of the waist-deep muck. It took an hour and a half to descend the 1,800 feet.

Safely back at the base camp, CW3 Capron contemplated his decision to abandon the aircraft. An instrument takeoff into unknown, unstable weather, out of a tight landing zone, was out of the question. With an elderly county coroner and a Forest Service official to protect, staying with the aircraft was not a good choice. Criticized by some, CW3 Capron's decision turned out to be right. Less than 3 hours later the mountain exploded with the second major eruption in a week. Major James B. Neidig, commander of C Troop, commended CW3 Capron on his timely decision to abandon the aircraft which was a mere 9 miles from the blast. All would have died instantly at the hands of the angry mountain if they had remained with the Huey. Several days later,



A lone tree trunk stands like a sentinel, overlooking its fallen neighbors

Bob Ellis

CW3 Capron rescued his aircraft. He carried water to wash snow and ash from it and then flew the Huey out and returned it to mission status.

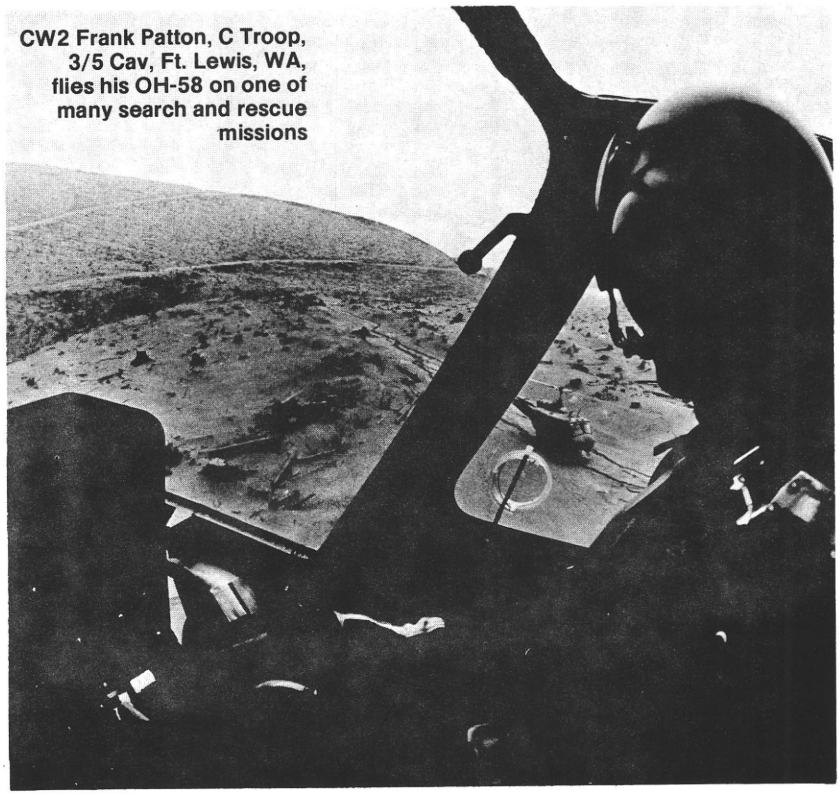
As the days passed more victims were recovered. Some, however, like the lush green countryside, are covered forever under 40 feet of fallen timber, mud and ash. The total effects on man and machine from flying in the ash laden recovery area is yet to be determined. The risks were taken, professionalism prevailed. Another chapter in Army Aviation history has been written.

Rico Johnston

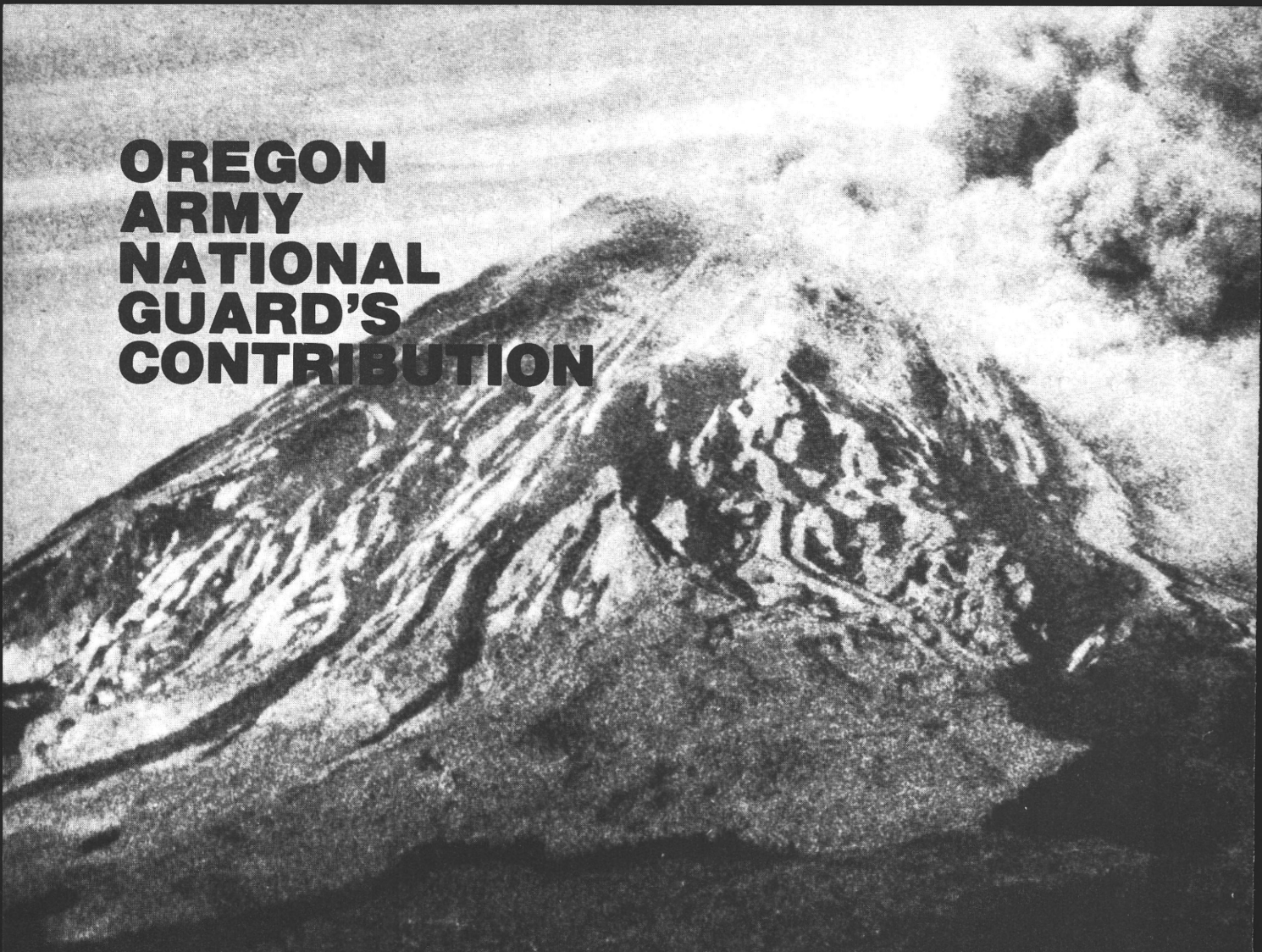
"Children's pick-up sticks" is the description one Army aviator gave to these trees, part of the loss the eruption of Mount St. Helens caused to Washington's timber crop which has been estimated in the billions of dollars

CW3 Capps was graduated from flight school February 1970. He was graduated from the University of Southern California Safety School in 1975 and attended the Crash Survival Investigators Course and Ground Safety Officers Course at Arizona State University in 1977. His assignments have included tours in Germany, Okinawa, Vietnam and Korea. His present assignment is C Troop, 3/5 Cav, Fort Lewis, WA.

CW2 Frank Patton, C Troop, 3/5 Cav, Ft. Lewis, WA, flies his OH-58 on one of many search and rescue missions



Bob Ellis



OREGON ARMY NATIONAL GUARD'S CONTRIBUTION

The following information is from Charles Rosenfeld, an assistant professor of geography at Oregon State University, Corvallis, OR, and a captain in the 1042d Military Intelligence Company, Oregon Army National Guard, Salem, OR. It comes from an interview conducted with Dr. Rosenfeld by Keith Fredrickson of the OSU Department of Information which was printed in the June issue of the school's paper, ***Oregon Stater.*** *As stated by Mr. Fredrickson, the doctor/captain's qualifications include "expertise in terrain analysis and alpine land-forming processes, and in photographic imagery interpretation."*

I COULDN'T HAVE been in a more appropriate position. It happened to be an Army National Guard drill weekend, and an aircraft (OV-1 Mohawk) of ours had flown over the mountain at 6:05 that morning and film from that mission was being processed. I was giving a general briefing to an aerial surveillance company on what had transpired at Mount St. Helens during the previous month.

We received the call the mountain had blown; and we were there with eight aircraft, all fueled, preflighted, ready to go. We jumped in the Mohawks and were one of the first on the scene. I wouldn't say we were the first—I don't know—but I didn't see any other aircraft in the area.

It (the plume) was coming up between stratus clouds, and from Portland we could see it was black and maybe sticking up 15,000 feet. At that time we had no idea it was up to 60,000 feet. But we got that impression real quick when we got to the mountain.

We took the aircraft down and tried to fly level with the break at the top, between 8,300 and 8,400 feet; and we estimated that the gash in the clouds was open in the valley down to about 4,500 feet. At that time I was taking pictures of the plume when it decided to collapse. It went into what is known as a "column collapse." It had so much ash in it that it literally collapsed upon itself and produced hot, glowing avalanches called "base surges."

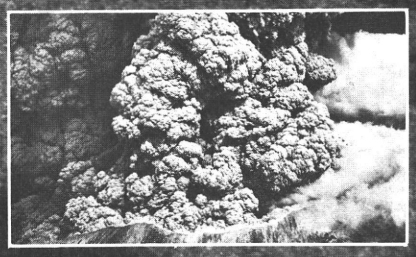
For the next 36 hours we maintained around-the-clock surveillance. We used photography and

Mount St. Helens on the morning of 18 May photographed from the cockpit of an OV-1 Mohawk by Captain Charles Rosenfeld

thermal infrared during the day to locate vehicles or humans at low levels. Then we tried to use radar at night, not only to detect moving vehicles but also the movement of mud flow and debris down the rivers. We wanted to make sure when one of those things broke loose that we could quickly send a message to emergency services because, by that time, the dust and everything was so thick they couldn't see the valleys.

We worked throughout the night on through late Tuesday on initial interpretation. Straight through. It was hell, but it was just one of those things. I managed some catnaps between the nine mission runs the Guard made the first 2 days. But mainly my job was not so much the sensor operator on these mission runs but to get in there and say, "OK, I can see a problem here; this is something where our imagery can be of service." Then I would design missions to accommodate surveillance of that problem area. For instance, we kept track of forest fires, the spread of mud flows, location of moving vehicles on the ground, roads that were open and those that were closed, direction of the plume and density of the ash that was falling out of the plume—all by radar and thermal infrared. And we were all they had to go by at night because, besides the Guard's OV-1 Mohawk aircraft, there was only one Forest Service plane operating at night.

We recognized the damage was extremely extensive, and we had a lot of burden on our shoulders the first 48 hours. Since that time, of course, we've provided all sorts of information, including photography and sequential photography.



Work done by CPT Rosenfeld and other Guard members during the recent eruptions of Mount St. Helens was recognized by Oregon Governor Vic Atiyeh when he said (as quoted in the *Oregon Stater* by Mr. Fredrickson), "This is another good example of the kind of contribution the Oregon National Guard is making in this state."

COMING SOON:

WIRE STRIKE PROTECTION FOR HELICOPTERS

LeRoy T. Burrows

WIRE STRIKE PROTECTION for Army helicopters and their crews is on the way. Unfortunately, too late for some; but fortunately, in time for many.

To the uninitiated this may not seem like a very big deal. The average citizen views communications and power cables as an unobtrusive necessity, but to the helicopter pilot these wires are dangerous obstacles to the completion of a mission. In-flight wire strikes are a serious threat during all-weather daytime and nighttime helicopter operations such as terrain flight (nap-of-the-earth, low level, contour), inclosed area takeoff/landing and confined area maneuver. The U.S. Army's growing emphasis on these operations is a major reason for the recent increased experience in wire strikes.

In the 19 March 1980 *Flightfax,* the U.S. Army Safety Center, Ft. Rucker, AL, reported that in the first 4 months of fiscal year 1980, four lives were lost in wire strike mishaps and four helicopters were destroyed.

Despite peacetime training emphasis on avoiding wire strikes, the Army Safety Center reports that in the period 1 January 1974 to 1 January 1980, wire strikes accounted for:

- 8 percent of total Army aircraft damage
- 6 percent of total Army aircraft injuries
- 16 percent of total Army aircraft fatalities

The loss of people and materiel in peacetime due to wire strikes is a serious problem that may be greatly amplified in a combat situation, adversely affecting mission effectiveness. Typically, in a hostile environment we can expect the enemy to string wires as an intrusion countermeasure. Since Army Aviation operations require most tactical flights to be close to the ground during varying degrees of visibility, the hazards presented by wires cannot be eliminated. However, the effects of these hazards can be considerably reduced *by configuring the helicopter system to withstand wire strikes.* Increasing helicopter survivability to the wire strike threat will result in fewer mishaps and, therefore, increased aircraft availability, decreased maintenance, reduced casualties and improved mission effectiveness.

The Applied Technology Laboratory (ATL) of the U.S. Army Research and Technology Laboratories (AVRADCOM), located at Ft. Eustis, VA, has been active in analyzing the wire strike problem and defining concepts that will make a helicopter more tolerant to this threat. In 1978 I visited the Canadian National Defence Headquarters (NDHQ) to review the design of a wire strike protection concept conceived by Bristol Aerospace Limited (BAL) under NDHQ sponsorship. Ironically, their concept was almost

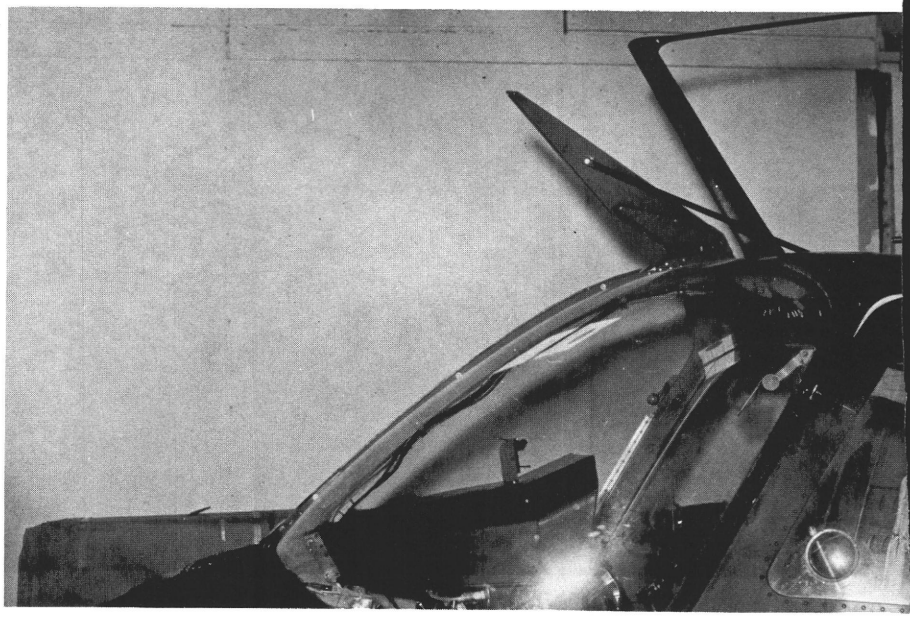


Figure 1. OH-58 Kiowa equipped with the Wire Strike Protection System (WSPS) —a cutter/deflector system with an upper cutter to protect the main rotor controls

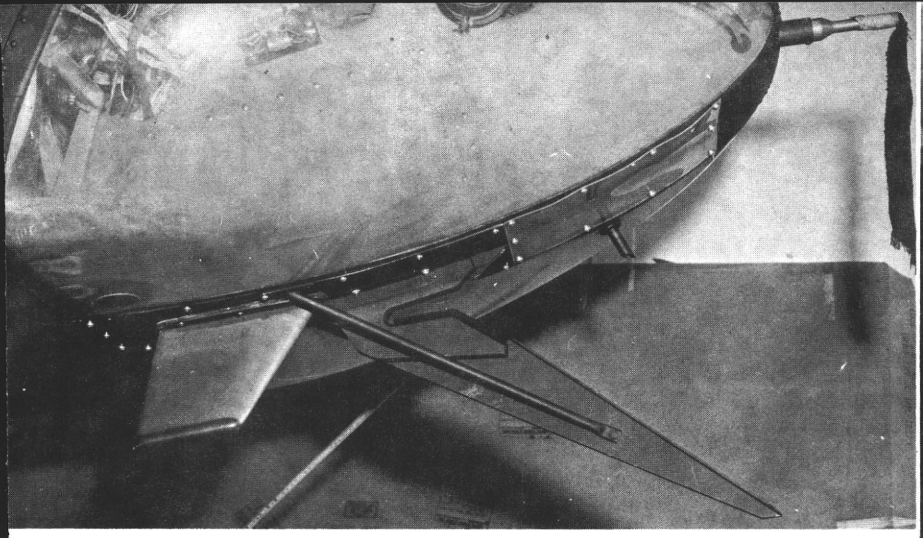


Figure 2 above. OH-58 with the WSPS—showing the lower cutter which protects the skid gear

Figure 3 right. OH-58 with WSPS—windscreen centerpost deflector with serrated cutting edge insert to deflect wire to upper cutter, to cut copper and aluminum wires

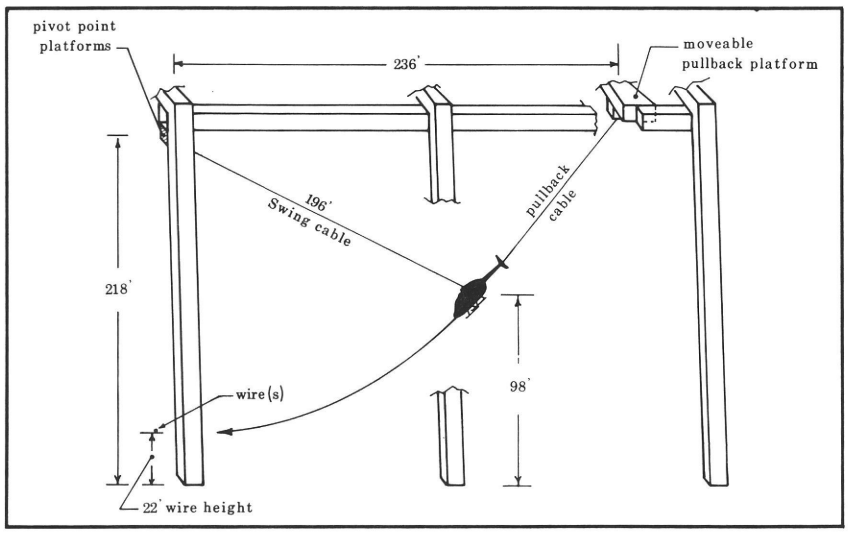
identical to one for which ATL was formulating a development effort—except that the ATL concept included skid gear protection. It was pointed out that U.S. Army wire strike mishap statistics strongly supported the need for skid gear protection from wire snags and that this would be a worthwhile addition to the Canadian design.

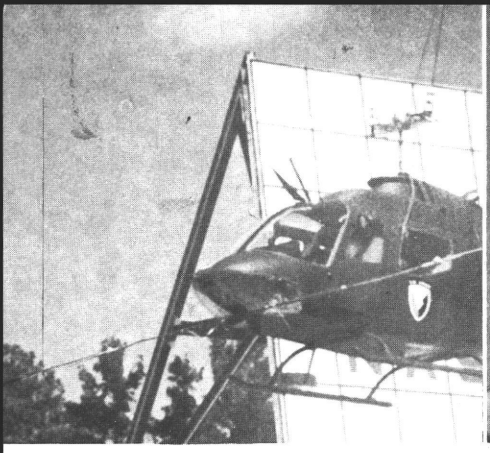
BAL redesigned its concept to include skid gear protection and named it the Wire Strike Protection System (WSPS), resulting in a design that is consistent with U.S. Army goals of simplicity, lightweight, retrofit suitability, low cost and high effectiveness for any wire strike protection concept.

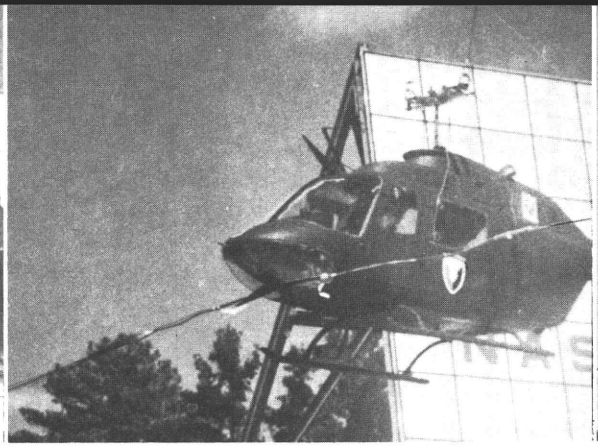
The WSPS is a cutter/deflector system with an upper cutter (figure 1) to protect the main rotor controls; a lower cutter (figure 2) to protect the skid gear; and a windscreen centerpost deflector (figure 3) with a serrated cutting edge insert to deflect wires to the upper cutter, to cut cooper and aluminum wires, and to enhance the centerpost structure. The WSPS is a passive system, having no moving parts. Upon wire impact the helicopter momentum deflects the wire/cable into the upper or lower wedge shaped cutter where it is notched to the extent required for easy breakage in tension. The total OH-58A Kiowa WSPS weight is 16.3 pounds, including all supporting structure and the mounting plates.

In May 1979 the Canadian WSPS was qualified for Canadian Kiowa helicopter (OH-58A) application. BAL conducted (at a Gimili, Manitoba, Canada site) a series of 52 wire cutting tests by mounting a deflector and upper cutter on a wrecked Kiowa fuselage, rigidly securing this to the flatbed of a truck, and driving the truck into various wires. Test variables included speed (15 to 60 miles per hour), yaw angle (0 to 45 degrees) and strike location (nose to top of cutter). The author arranged for a U.S. Army Materiel Development and Readiness Command/U.S. Army Training and Doctrine Command safety center team to witness part of this test series. Concurrently, the Canadian Aerospace Engineering Test Establishment conducted a flying qualities qualification of the OH-58A with the WSPS installed (no wires were cut in these tests). All wire cutting tests were successful and no significant effects upon aircraft performance were noted.

Figure 4. Illustration of the helicopter WSPS pendulum swing tests performed at the NASA Langley Research Center's Crash Impact Dynamics Research Facility, Hampton, VA. When cable at right is released, helicopter descends in arc to the wires at left







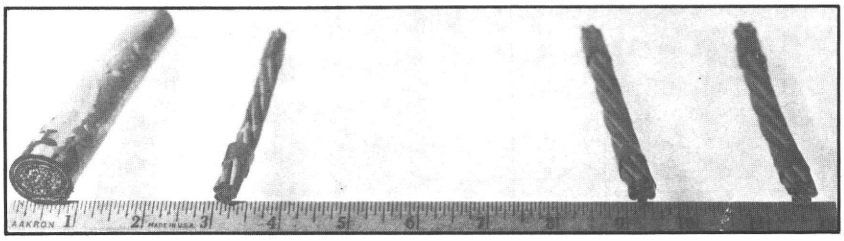


Figure 6. Left to right, 50-pair communication cables, 10M messenger (11,100-pound tensile strength) and .419-inch-diameter copper high voltage power transmission cables (5,928-pound tensile stength) used in the WSPS tests

The wire cutting test method employed by BAL validated upper cutter and deflector design objectives but did not test the lower cutter. Also, because the aircraft was rigidly fixed to the truck bed, it did not answer questions regarding aircraft pitch and yaw changes and deceleration loads during the wire impact and cutting sequence, and their potential effects upon the crew, aircraft control and blade flapping.

To answer these questions, and thereby determine suitability of a WSPS for U.S. Army aircraft application, ATL acquired WSPS components from Canada under a standardization loan agreement to conduct a series of tests in the United States. Inasmuch as a manned flight through wires posed an unacceptable risk, a test approach was selected that would nearly duplicate free flight condition. The tests were performed at the National Aeronautics and Space Administration Langley Research Center's Crash Impact Dynamics Research Facility, Hampton, VA, which uniquely permits helicopter pendulum swing tests (figure 4). In these tests the aircraft was supported only by the rotor mast, as it would be in normal flight. The Army's test specimen was an OH-58A that had been retired from service and was being used for maintenance training by the Transportation School. It was fully equipped, less avionic equipment. The aircraft was prepared for testing at ATL, to include installation of the Canadian OH-58A Helicopter Wire Strike Protection System. Successful cuts of a 10M steel 3/8-inch-diameter cable carrying a 50-pair communications cable were made, each with the upper and lower cutter. This was the first test of the lower cutter (figure 5). As a final test, two .419-inch-diameter copper high voltage power transmission cables were strung above a 10M messenger and a 50-pair commo cable (figure 6). These multiple wires were cut with ease, deflecting into the upper and lower cutters simultaneously (figure 7). In these tests the aircraft velocity at impact was 40 knots and the yaw angle was 15 degrees. The attitude changes and aircraft loads recorded were analyzed and found to be insignificant for all tests.

In addition, ATL fabricated an adapter kit to fit the OH-58A WSPS on an OH-58C. This hardware was shipped to the U.S. Army Aviation Engineering Flight Activity, Edwards AFB, CA, where it was installed on an OH-58C and underwent flying qualities tests. No adverse effects on the lateral stability of this aircraft were noted (no wire cutting attempted). Also, ATL arranged for the Canadians to loan to the U.S. Army the second WSPS production unit so that it could be installed on an OH-58A at the Army Aviation Center at Ft. Rucker, AL, to serve as a display and to permit operational evaluation (not to include wire cutting). The Army Aviation Development Test Activity at Ft. Rucker performed this installation.

The Canadians initiated retrofit

Figure 5. First tests of the helicopter WSPS lower cutter. Left to right: initial contact, tension, wire snapping and wire free of the helicopter

of their OH-58 Kiowas last April. In this country, Product Improvement Programs (PIPs) have now been submitted for the OH-58, UH-1 and AH-1 series helicopters, in that priority, and plans for retrofitting all Army helicopters have been formulated by AVRADCOM and TSARCOM (U.S. Army Troop Support and Aviation Materiel Readiness Command).

As a result of the ATL and Canadian tests and the alarming wire strike mishap statistics disseminated by the Army Safety Center, the major "users" took a supporting stand for the WSPS. U.S. Army, Europe stated an urgent requirement for a WSPS and requested that action be initiated to obtain WSPS equipment for Europe in the earliest possible time frame.

Eighth Army stated that the WSPS is considered to be of critical importance to aviation safety and asked what assistance can be provided to ensure early initiation of the OH-58, UH-1 Huey and AH-1 Cobra PIPs. U.S. Army Forces Command stated there is an urgent requirement now for wire strike protection for Army helicopters and urges that WSPS PIPs receive high priority.

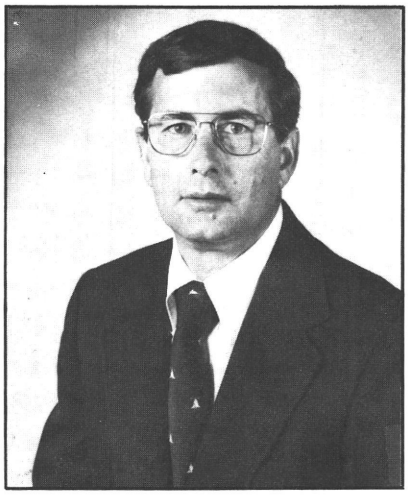
No further development is required for the OH-58A; however, for all other systems the basic WSPS concept will require configuration adaptation and basic handling qualities evaluation. BAL has designed a UH-1 WSPS configuration under contract to the Canadian NDHQ that also will be available to the U.S. Army for retrofit initiation for this aircraft in fiscal year 1981.

The AH-1S will require developmental efforts to adapt the basic WSPS concept to this more complex weapons system. It is important to point out that during the competitive procurement process another wire protection system, other than the one described herein, could be selected. This would more than likely affect the retrofit schedules stated above.

Though not a panacea, the Wire Strike Protection System is considered to be critical survivability equipment for Army helicopters. The U.S. Army has qualified the WSPS which now is ready for OH-58A retrofit.

Based upon mishap data it can be deduced that the WSPS will be at least 70 percent effective in preventing wire strike accidents. Therefore, it can be postulated that for peacetime operations the WSPS will reduce Army Aviation damage by 5.6 percent, aviation injuries by 4.2 percent and aviation fatalities by 11 percent. In a combat situation, the WSPS can be expected to be even more prolific in preventing accidents and casualties because of the increased threat (quantity of wires placed by the enemy).

The approval and funding of the wire strike protection PIPs are another indication that flight safety is high on the list of Army Aviation priorities.



LeRoy T. Burrows is an aerospace engineer assigned to the Aeronautical System Division, Applied Technology Laboratory, U.S. Army Research and Technology Laboratories (AVRADCOM), Ft. Eustis, VA. He is responsible for planning, organizing and conducting specific R&D projects related to helicopter flight safety and crashworthiness.

Mr. Burrows holds a BS degree from the Virginia Polytechnic Institute, and a graduate diploma in fluid dynamics from the Von Karman Institute, Brussels, Belgium. Also, the author is a major in the U.S. Army Reserves and a graduate of the Army Command and General Staff College.

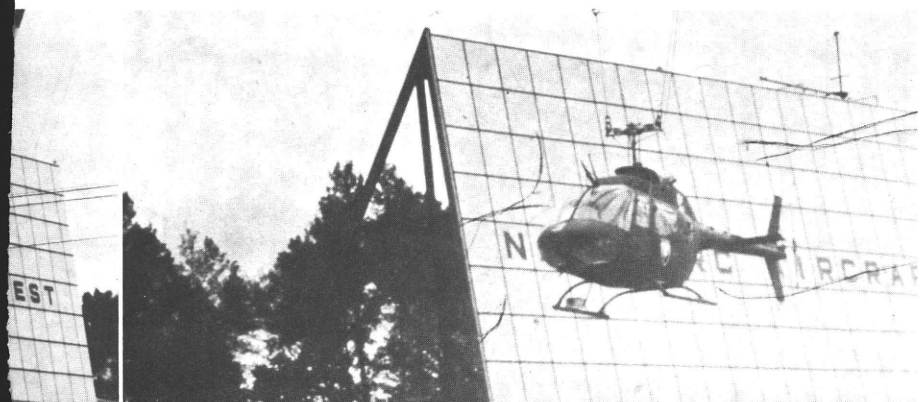


Figure 7. Test sequence of the Kiowa equipped with the WSPS cutting the multiple wires by deflecting them into the upper and lower cutters simultaneously

OPMS CORNER Officer Personnel Management System

Lieutenant Colonel Joe D. Carothers
Chief, Aviation Plans/Programs Branch
Officer Personnel Management Directorate
U.S. Army Military Personnel Center

AVIATION PERSONNEL UPDATE

Key Personnel Changes. MILPERCEN (Military Personnel Center) has announced major personnel changes which should be of interest to all Officer Personnel Management Directorate (OPMD) managed officers. In June, Brigadier General Charles W. Bagnal became the director of officer personnel management after a tour of duty as Deputy Superintendent, United States Military Academy. A Master Army Aviator with extensive aviation experience, BG Bagnal has served as assistant division commander, 101st Airborne Division (Air Assault); commander, 101st Aviation Group; and commander, 52d Combat Aviation Battalion in Vietnam.

Colonel Nathan A. Offield, formerly chief, Plans, Programs and Analysis Division, is now chief of staff, MILPERCEN. He has been replaced as division chief by Colonel Arthur D. Bills, who was chief of the Warrant Officer Division. Colonel George A. Morgan, formerly chief, Aviation Management Branch, is now chief, Warrant Officer Division. Lieutenant Colonel Paul J. Wenzel is the new chief, Aviation Management Branch in Combat Arms Division.

OPMD Reorganization. Phase III of the reorganization of the Officer Personnel Management Directorate, scheduled in four phases during 19 months, is nearly complete. In phase III, all majors' files will be moved from Majors Division to Combat Arms, Combat Support Arms and Combat Service Support Arms Divisions as appropriate. Commissioned aviators with Specialty Code 15 will be managed by Combat Arms Division and those with Specialty Code 71 by Combat Service Support Division in grades lieutenant to major; lieutenant colonels will be integrated into appropriate divisions upon completion of phase IV in early 1981. Colonels Division and Warrant Officer Division will remain unchanged. In most instances officers will continue to communicate with same assignment and professional development officers as in the past.

Pilot, Gunnery Codes Deleted. Many aviators and personnel officers contact Aviation Plans/Programs Branch to request correction or updating of pilot status or aircraft gunnery qualification codes. Fifteen pilot status codes contained in the Officer Record Brief (ORB) code descriptions on the reverse of DA Form 4037 have been deleted, as have all gunnery system codes. Information reflected in previous codes is either no longer necessary for personnel management purposes or is contained elsewhere. For example, advanced aeronautical ratings are reflected in Section VIII, Awards and Decorations, by award of Senior and Master Army Aviator badges. A separate record of gunnery qualification is no longer required. Basic qualification in gunnery systems/subsystems is automatically indicated by qualification in AH-1G/1S aircraft. "Currency" of gunnery qualification/requalification is a function of the aircrew training manual program. The new codes listed below went into use on the ORB in late 1979 and will be included in a forthcoming change to AR 680-29:

PILOT STATUS CODES	TITLE
1	Army Aviator
2	Indefinite Suspension—Medical
3	Indefinite Suspension—Nonmedical

Aviation Warrant Officer Retention. As part of MILPERCEN's efforts to improve aviation warrant officer retention, the Army Research Institute (ARI) has been tasked to identify those personal and professional considerations which influence aviation warrant officers to remain in or leave Army service. A panel of aviation warrant officers has been selected from the students at the Warrant Officer Career College to assist ARI in its efforts. Participants and their area of study include:

CW3 Bennie Bacle	Formal training vs actual field duty
CW3 Homer Bentley	Officer Evaluation Report system/grading of warrant officer positions
CW3 Donald Curtis	Career tracking
CW3 Joseph Licina	Direct commission/limited duty officer
CW3 Gary Pruyne	Career tracking
CW3 Leroy Sweet	W5/W6 grades
CW3 Carroll Vaughn	Pay
CW3 Jeffrey Gibson	Additional duties

Red Lights Can Mean Trouble

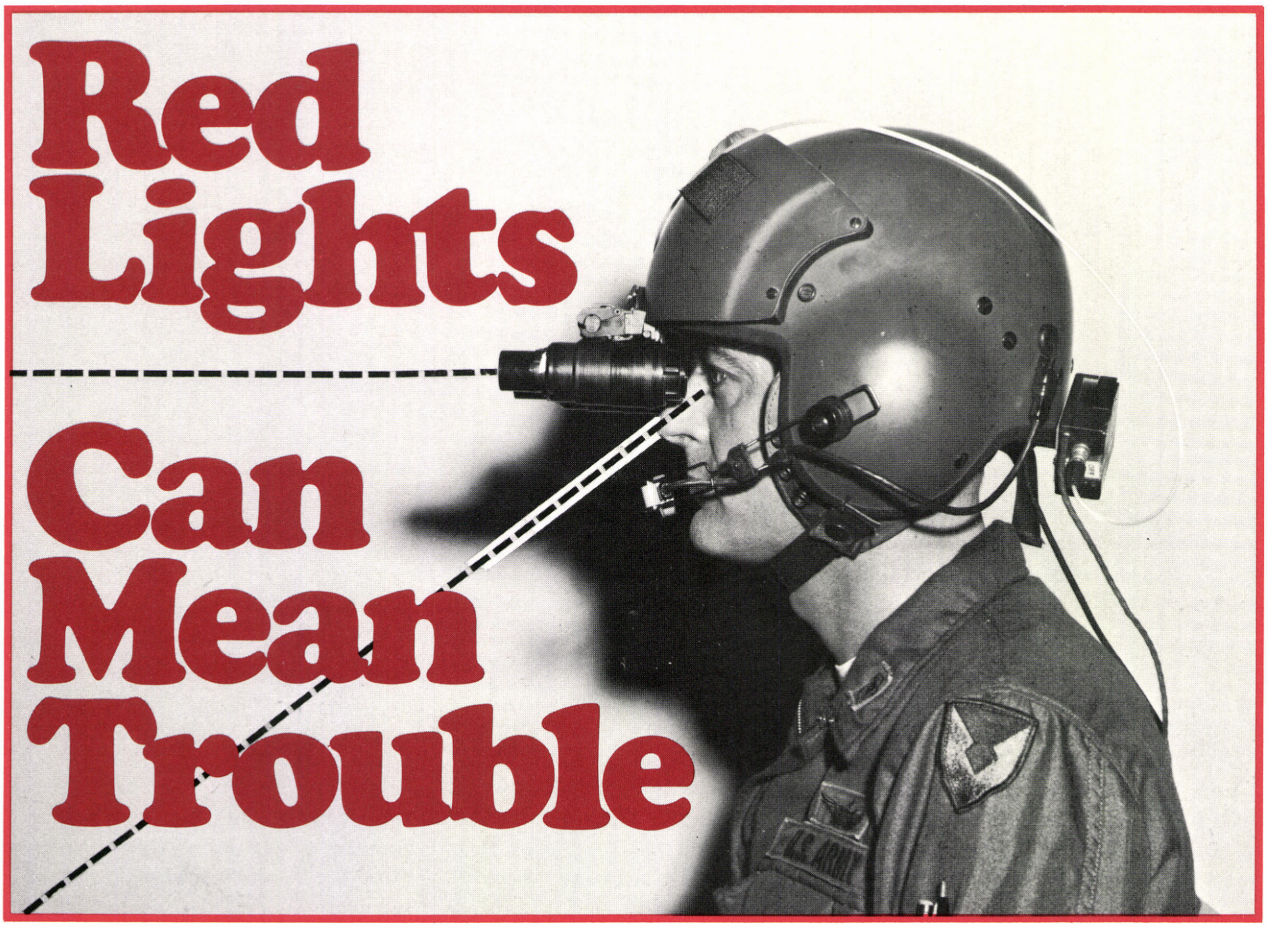


FIGURE 1: ANVIS (Top dotted line represents normal NVG line of sight; the bottom dotted line is the instrument panel unaided eye line of sight)

In the 1970s the Army adopted red instruments and cockpit lighting for all of its aircraft to improve the ability of its crewmembers to see at night. But now the introduction of night vision goggles and other night vision devices requires a re-evaluation of the color approach to cockpit lighting

Silas G. Garrett
Aerospace Engineer
U.S. Army Research and Development Command
St. Louis, MO

IT IS AN ACCEPTED fact that helicopters will not quit flying when the sun goes down on future battles. The crews will conduct operations just as in the past except that they will continue around-the-clock, taking maximum available advantage of darkness and adverse weather.

It is well-known that nighttime missions place a tremendous visual responsibility on pilots; and since nature did not equip them with eyes capable of seeing in the dark to any great extent, the efficient use of night vision goggles (NVG) is of paramount importance. The NVG provide aircrews with a better capability to operate effectively in the darkness, even when they're flying nap-of-the-earth or terrain flight missions.

The value of NVG is enough to inspire the removal of any obstacle standing in the way of developing their full potential. The current incompatibility of the NVG and the lighting now used to display data in the aircraft's cockpit pose a significant obstacle to getting the full potential from the goggles.

To understand that problem, a review of the second and third generation NVG systems is helpful. These are identified in this discussion as PVS-5 and ANVIS (aviation night vision imaging system).

Background. The second generation NVG, PVS-5 was originally designed *closed faced* for ground troop use. They weigh about 31 ounces, all of which cantilevers (creates a downward moment) in front of the face. For simplicity in

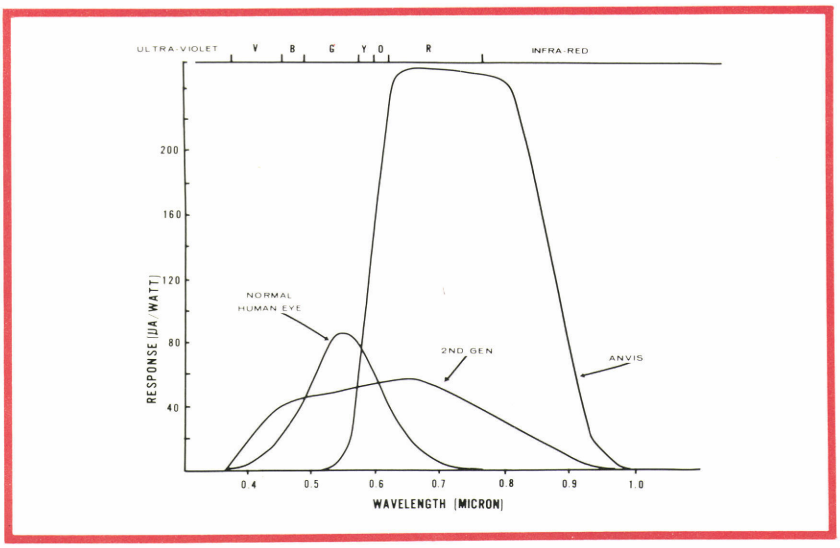


FIGURE 2: Relative response through the visible and IR spectrum

this discussion, as a rule of thumb it is assumed these devices are capable of amplifying available light about 1,000 times.

The ANVIS (using third generation tubes and still in an engineering development phase) uses an improved means of amplifying available light. The goggle barrels are mounted in an *open faced* configuration (figure 1) with a lightweight mounting fixture, giving a total weight of about 16 ounces and a cantilevered moment of about 7 ounces instead of the PVS-5's 31 ounces. An improved distribution of the weight is accomplished by mounting the power pack on the back of the helmet. The barrel design is basically the same as the PVS-5, but amplification is increased.

Both the PVS-5 and the ANVIS require manual focusing of each barrel. An original effort was aimed at reading the instrument displays and simultaneously retaining infinity visual capability. This created a problem because in order to read the instruments after focusing at infinity, the focus had to be repeatedly recycled between closeup and infinity. This has been determined to be unrealistic if not impossible.

The current and more realistic concept for using ANVIS is to keep the goggles focused at infinity. The open faced configuration then permits the oeprator to look under the goggles to read the instruments with the unaided eye. Another feature of ANVIS allows the operator to pop the goggles to an "up" position if sustained view of the instrument panel or a map, for instance, is necessary. For this concept to be functional, the complete visual display system in the aircraft has to be illuminated by a source and to an intensity level compatible with unaided eye readability.

Lighting Problems. That brings us to the red lighting problem and the culprit source of our current lighting. Figure 2 shows relative responses of the human eye and the two NVG systems. The visible spectrum is shown at the top of the chart, separated into the color bands represented by V, B, G, Y, O and R.

It can be seen that the PVS-5 and ANVIS have peak sensitivities in the red and infrared (IR) regions. Much of the sensitivity of the ANVIS lies in the IR region, which means that the incandescent lighting in the cockpit, whether direct or reflective, adversely affects goggles sensitivity. The automatic gain control inherent in the goggles reacts to the red and IR and significantly reduces the gain. That is based on the same principle which causes the aperture of the eye to become smaller in a bright light and larger when the light is less bright. The NVG response sensitivity is thus degraded and the capability for outside viewing is correspondingly degraded. This is highly undesirable since a maximum sensitivity to the outside environment is the primary objective of NVG use.

As stated, Army aircraft cockpits are incandescently red-lighted. Incandescent lighting is the light produced when a metal filament is heated by an electric current until it glows. Since any incandescent source is an IR emitter, it follows that an abundance of IR is present in the cockpit irrespective of the intensity. Moreover, an additional energy input is required as the result of about 80 percent light loss in red filters. Therefore, the intensity of the filament heat has to be increased to ensure that the unaided eye can perceive the necessary instrument information. To date, all attempts to dim, filter or uniformly distribute incandescent lighting for NVG compatibility have been unsuccessful. The NVG are thus not as effective nor efficient as they should be.

Reference has been made to non-IR emitting sources of lighting. One such source could be electroluminescent (EL) lighting to meet the requirement. Light is produced from this source by electrical *excitation* of encapsulated phosphors. Unlike incandescent lighting, filament heating is not required although a minute amount of heat is produced by the excitation process. Further, EL lighting can be shaped as desired and is characteristically uniform, even through the dimming process. This is quite advantageous over incandescent lighting which can never be made uniform and is unpredictable, with respect to dimming capability. Figure 3 indicates the comparative color characteristics of typical

EL lighting and its desirable uniform dimming capability. Figure 3 also indicates electrical power requirements necessary to achieve various color brightness levels. The significance of this is that (as shown) any required level of green viewing can be achieved with a relative low power input as compared to red for instance. This lessens the signature output even more. EL thus provides a very interesting potential source of cockpit lighting which would be NVG compatible.

Now consider the superimposed normal eye response curve of figure 2, revealing that the eye is relatively insensitive in the red region. When the pilot has to look at the red lighted instruments under NVG flight conditions with the unaided eye, the visual perception and responsiveness are severely restricted. That restriction is increased by the rapid adaptation necessitated by the eye having to move back and forth from the red instrument lighting to the green hue in the NVG.

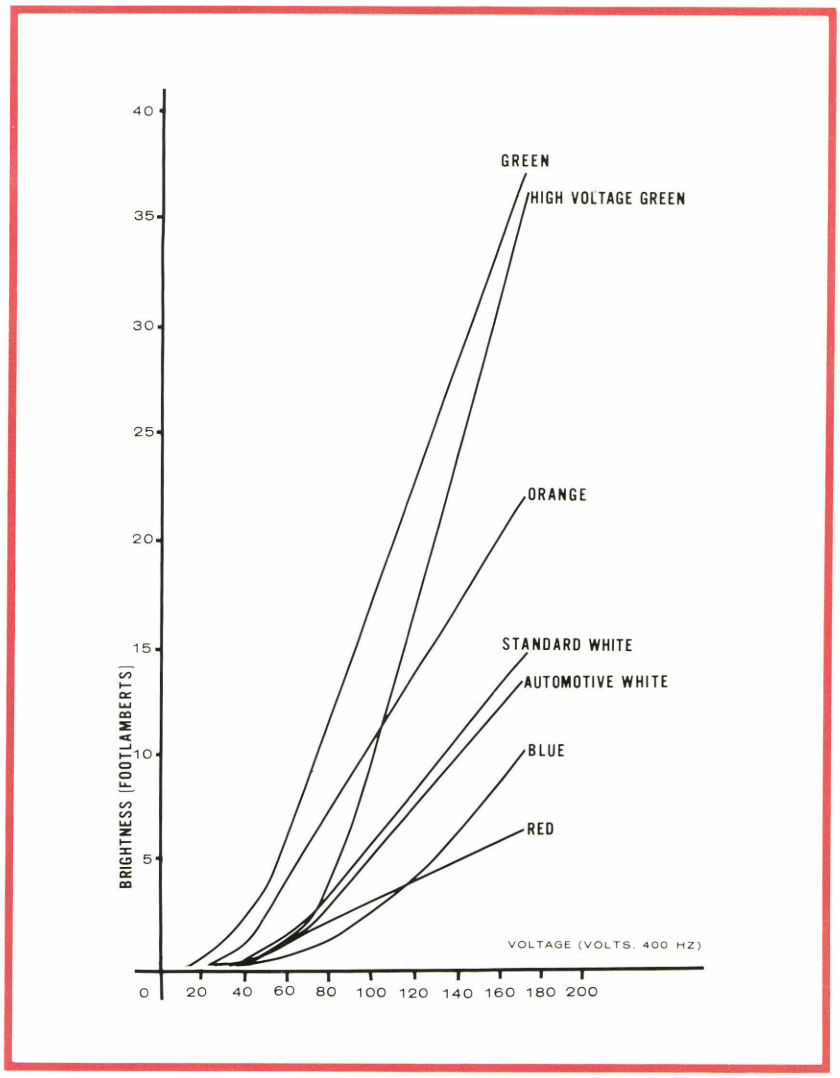
As shown in figure 2, visual incompatibility is applicable to both generations of NVG, although more so with the ANVIS. Again, refer to figure 2. If illumination of instruments, displays and other cockpit lighting is shifted to a narrow spectral band in the blue to blue-green region centered at about 0.475 micron* (with falloff to 0.435 and 0.575 micron), "interference" of the cockpit lighting with the ANVIS sensitivity is significantly decreased. At the same time, unaided eye instrument viewing capability is greatly increased. The color shift would mean that instruments could be illuminated at a lower intensity level. The aircraft light signature is reduced and the pilot's ability to use the NVG in a hostile environment is improved.

Caution/warning/advisory (C/W/A) lighting needs to attract attention when it is activated, so it could be shifted to the yellow-orange region where the NVG sensitivity would be used but the visual responsiveness would not be compromised significantly. The degree of compromise necessary can be compensated for by increasing the intensity of the C/W/A systems to the level needed to attract attention, as well as be readable with the unaided eye.

The incompatibility of our cockpit lighting and the NVG is a problem that urgently needs solving. Hopefully, this article will help to develop a case for changing to an illuminating color other than red and light sources of little or no IR emission in order to improve operations with both PVS-5 and ANVIS NVG and enhance the probability of mission success, the ultimate tactical objective.

*A unit of measure equal to one thousandth of a millimeter.

FIGURE 3: Electroluminescent lighting, intensity vs voltage input



THREAT

Captain Carl E. Daschke
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

"We are achieving with detente what our predecessors have been unable to achieve with the mailed fist.

Trust us, comrades, for by 1985, as a consequence . . . we will have achieved most of our objectives in Western Europe. We will have consolidated our position, and a decisive shift in the balance of forces will be such that come 1985, we will be able to exert our (national) will wherever we need to."

Leonid Brezhnev
Communist Party Congress
Prague 1973

the SOVIET 70'S Revisited

AS WE ENTER THIS new decade of the 1980s, I feel that it is most appropriate to look back and review some of the major combat systems advancements which occurred within the Soviet Union military during the past 10 years.

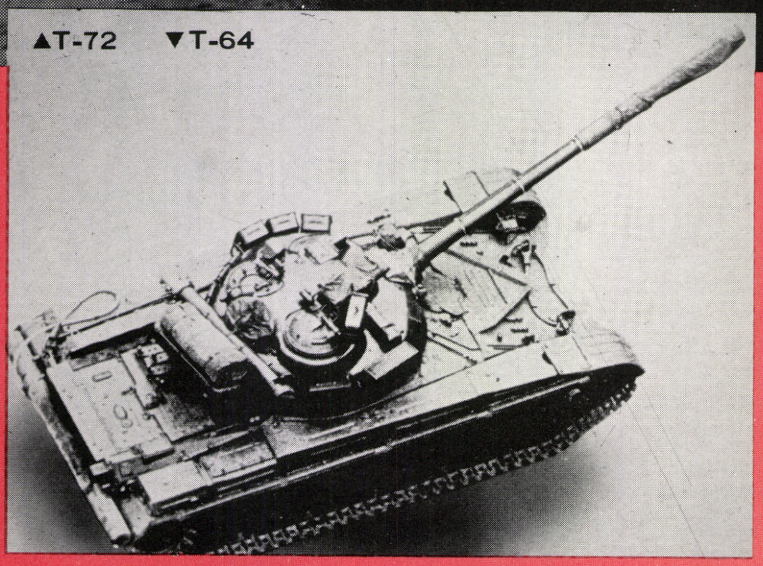
Brezhnev's 1973 statement was, no doubt, considered to be a very bold projection of Soviet intentions. After all, the United States had just disengaged itself from a lengthy involvement in Vietnam, a commitment which allowed the U.S. to develop, test and field numerous major ground and air combat systems and concepts. During the 1960s the U.S. maintained the lead in many weapons technology areas—everyone knew that we enjoyed a qualitative advantage over our Soviet counterparts (tanks, attack helicopters, tactical aviation—just to name a few). But as we entered the '70s, things began to change. The national mood and will did an abrupt turnaround within the United States. Expenditure for new military equipment was no longer in vogue. We had achieved detente. We were in control, or at least agreement with the USSR—or were we?

Let's review briefly what the Soviet Union was able to accomplish during those calm years of detente.

Because the scope of the Soviet military is so broad, I will confine my analysis to the tactical combat systems which directly affect you as an Army aviator. These include Soviet armor, armored personnel carriers, field artillery, divisional air defense and attack helicopters. Before we begin, a basic understanding of the weapons acquisition cycle, which provides the Army with its combat systems, is necessary. Simply stated, for a weapon system to begin the cycle (in both the U.S. and the USSR), a need must be identified. This need can be the result of a shortcoming in the existing structure, a need to counter a new piece of equipment fielded by a potential adversary or technological advances which dictate the development of a weapon to maintain a particular superiority. Once the need is identified, designs are submitted, prototypes are produced and tested, then prototypes are improved (which tends to cause greater delays) and eventually a new weapon is fielded. Although this explanation is very simplistic, the weapons acquisition cycle is in fact complicated, plagued with bottlenecks and the result is that anywhere from 8 or more years are required to field the new system. This means that a weapon fielded in 1965 generally incorporates technology of the 1950s. The process ensures that a new system seldom possesses the most current weapons state-of-the-art available.

With the built-in time lag of weapons development in mind, let's briefly review some of the major Soviet accomplishments which occurred during the 1970s in the fielding of tactical combat systems.

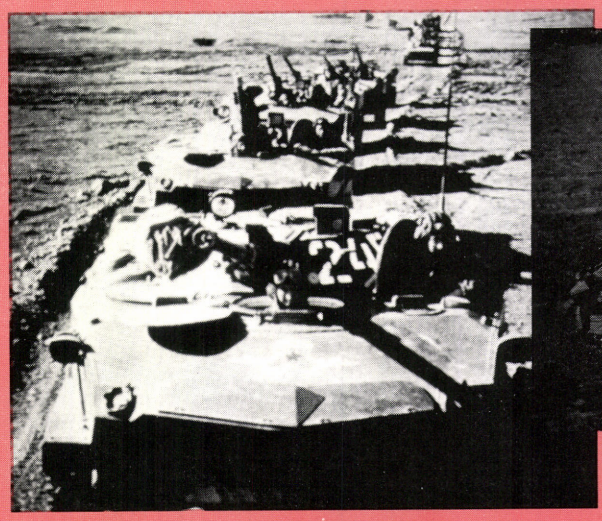
During the 1970s the Soviet military fielded an impressive number of new tactical systems in an effort to overcome the qualitative advantages in tactical systems enjoyed by the U.S. and its NATO allies into the early '70s.

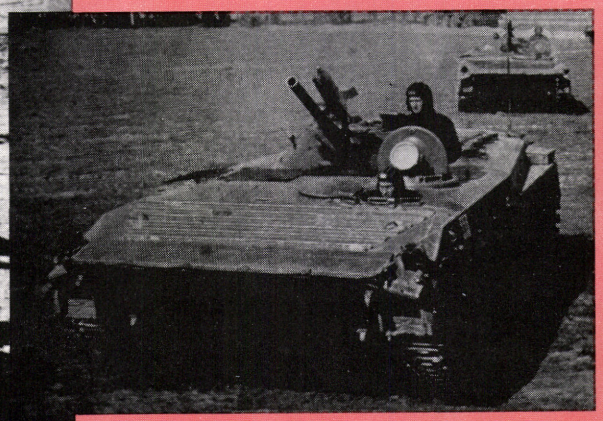


▲T-72 ▼T-64

ARMOR The tank has historically been regarded as the mainstay of the Soviet tactical offense. During the 1970s we saw both the T-64 and T-72 fielded as replacements for older T-54 and T-55 main battle tanks. Both the 64 and 72 are excellent examples of Soviet tank design philosophy, which stresses the need to outgun and outmaneuver potential opponents. Currently, the new main battle tanks are considered to be on par or superior to presently fielded NATO main battle tanks. According to *International Defense Review,* ". . . at least 9,900 T-64/T-72s have been deployed . . . ." Additionally, during the '70s, a new tank—the T-80 was developed and tested.

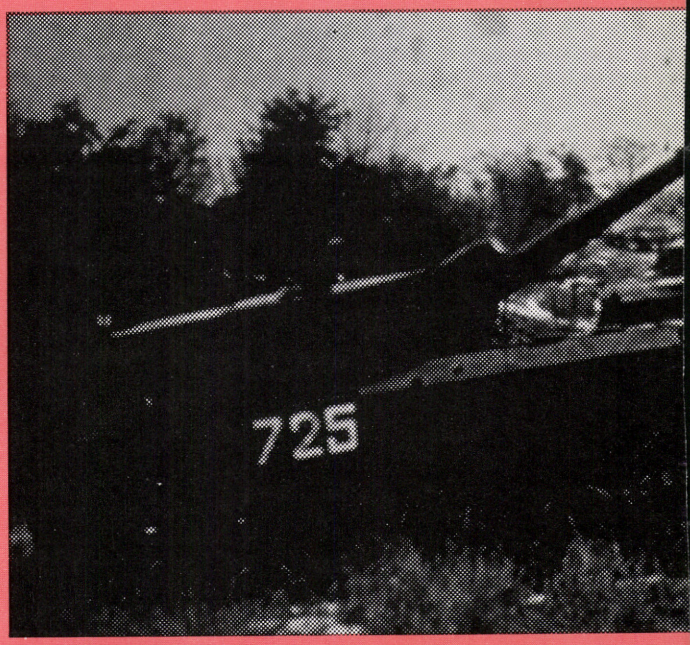
ARMORED PERSONNEL CARRIERS To enable the infantry forces to keep pace with the armor formations, an area in which the Soviets had been deficient, the Soviet military planners developed their prototypes of the infantry combat fighting vehicle—the BMP and BMD armored personnel carriers. Both personnel carriers are designed to provide mobility and firepower to combat infantry forces. In recent congressional testimony, Dr. Percy Pierre, Assistant Secretary of the Army for Research, Development and Acquisition, stated that our M113 is "... at least a generation behind (the Soviet BMP) in firepower, mobility and overall design." Many analysts consider the BMP and its counterpart in airborne units, the BMD, to be the most advanced infantry fighting vehicles in the world.





◀BMD ▲BMP

ARTILLERY In support of the high speed maneuver and shock action of the infantry and armor forces, the Soviets have devoted a significant effort to upgrading the divisional artillery assets of their forces. Prior to the '70s division artillery relied solely upon towed 152 and 122 mm howitzers. However, in 1973, the self-propelled versions of the 152, and in 1974, the self-propelled 122mm howitzer, were issued to the ground forces. In addition to the improvement of artillery systems, great improvements have been made in the types and quality of artillery ammunition, fire control and communications.



◀Mi-8 HIP-E ▲Mi-24 HIND-D

ATTACK HELICOPTERS Not to be ignored was the development of the Mi-24 HIND, the Soviet's first attack helicopter. The HIND was first seen in East Germany during 1972. This helicopter represented a significant departure from past rotary wing efforts in that it was, from its inception, an integrated weapons platform. Prior to 1972 the Soviets relied on "strap-on" armaments to arm their helicopters much in the same manner as our old "Charlie" model Hueys.

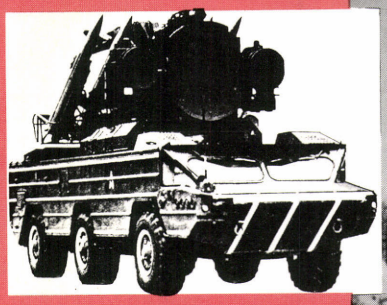
The HIND was considered by some to be a startling and momentous achievement for it placed the Soviet military in an arena in which the U.S. had pioneered and enjoyed almost exclusive membership—heliborne firepower.

Follow-on versions of the HIND were supplied to Soviet assault regiments beginning in 1976. Each new HIND model exhibited further improvements in firepower and helicopter technology over its predecessor.

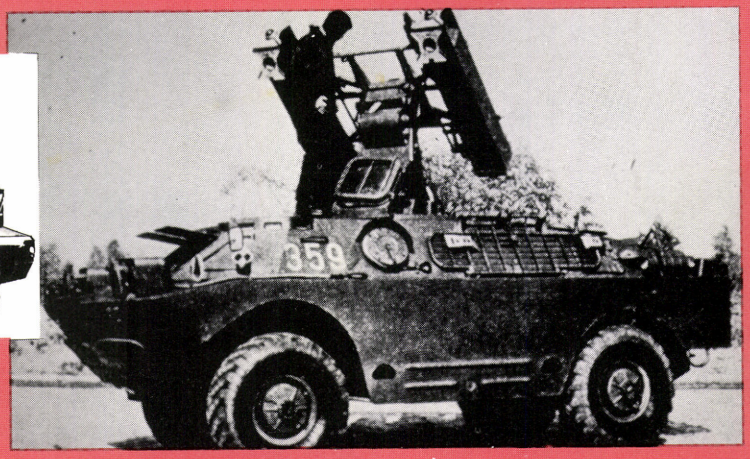
Additionally, although not a new system, the older Mi-8 HIP was converted from a utility helicopter to become an attack helicopter with —in the words of Dr. Pierre, "... the largest ordnance capacity in the world."

◀self-propelled 122mm ▲self-propelled 152mm

AIR DEFENSE Besides the impressive strides made in the area of ground maneuver systems, equally noteworthy progress was made in providing the attacking formations with highly technical, flexible and mobile air defenses. During the '70s two new surface-to-air missile (SAM) systems were developed and assigned to the Soviet divisions. In 1974 the SA-9 infrared seeking SAM was introduced. Its mission was to reinforce the close-in air defense already provided by the AAA (antiaircraft artillery) ZSU-23-4. Later in 1975 a new radar-directed SAM—the SA-8—began to replace the older S-60 antiaircraft artillery gun in some divisional air defense regiments. Both new SAMs reflect the Soviet's goal of fielding a totally new generation of SAMs which are self-contained, highly mobile and effective against low level fixed or rotary wing aircraft.



▲SA-8



SA-9▶

"... the one who succeeds is the one who has the greatest technology, organization, discipline and best machines."

Lenin

The development and fielding of a particular major weapon system during the decade of the '70s is not overly impressive. However, when one views them collectively and integrates these advances with the developments which were also made in high performance aviation and strategic systems, they provide an accurate insight toward the goals and national will of the Soviet Union. Never before have so many military advances been made by one country during a period of relative world calm and agreement. Unfortunately, we tend to focus our attention and concern on the one or two new combat systems which pose the greatest direct threat to our particular field (i.e., armor—T-64/T-72; aviation—SA-8/SA-9). This inclination to tunnel vision causes us to develop a distorted view or to completely ignore the total impact of Soviet weaponry achievements.

Previous articles on the major combat systems of the Soviet Union:

- "The SA-9 Gaskin," August 1978
- "Mi-8," November 1978
- "Mi-24 HIND," April 1979
- "Air-To-Air . . . Fact or Fiction," October 1979
- "The Artillery Threat," November 1979
- "The HIND Myths And Facts," December 1979
- "So You Want To Buy A New Armored Infantry Combat Vehicle," April 1980
- "The Claw Of The Bear," March 1980

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ATC ACTION LINE
UNITED STATES ARMY COMMUNICATIONS COMMAND

WEATHER BRIEFING

WEATHER BRIEFINGS! PIREPs! SIGMETs! Do these mean the same to the air traffic controller as they do to the weather briefer and the pilot?

Admittedly, most Army weather briefings are made face-to-face with the Air Force weather pros and the required information flows back and forth with a good understanding of each other's needs. However, there are other times when pilots must call for a briefing, or when they are airborne (hopefully not wishing they were on the ground) needing some vital weather information. In such cases it becomes imperative for all concerned to know what the other person needs in order to make the best decision. Each item of weather data provides an important aid to safety. The air traffic controller's part in weather reporting is a vital contribution to flying safety because the controller is often the catalytic agent between the briefer and the pilot that makes the system work. The air traffic controller must understand what each pilot needs to do on his or her job.

A pilot seeking a weather briefing may be compared to a buyer shopping for goods or services. Buyers who can clearly identify and state their needs are more easily and adequately served. If the seller can understand and assist in solving a buyer's specific problems, that seller will gain a satisfied and steady customer. So it is in a pilot briefing. Pilots must define their needs—not simply, "How's the weather eastbound"—but "WHEN" (ETD & ETA)—"WHERE" (destination and route)—and "HOW" (VFR or IFR). The weather briefer in turn must speak in terms of weather elements that will affect the flight.

When the weather briefing is done by telephone, or in the air through an intermediary, there is an added burden imposed on effective communication. It is essential that each person has a good idea of what he or she—and also the other person—really needs to know. A weather briefing, not received in person, creates a situation which requires considerable initiative on the part of the pilot to obtain the necessary information. The following items are considered essential, and this list should be kept well in mind by all concerned.

What Do Briefers Need To Know?

WHO? Aircraft identification or pilot's name. (Briefers need this information for their logs.)

WHEN? Estimated time of departure. Estimated time en route (or estimated time of arrival).

WHERE? Destination. Route. Altitude.

HOW? Type of flight plan (VFR or IFR). Type of aircraft (nonturbocharged, turboprop or jet).

Pilots should provide this information promptly in a brief and well-organized manner.

What Do Pilots Need To Know?

- Present weather conditions at destination and along the proposed route of flight.
- Trend and forecast at destination—also at the alternate, if required.
- Trend and forecast of weather conditions along the proposed route of flight.
- Freezing level, icing conditions and turbulence.
- Present and forecast thunderstorm activity.
- Winds aloft at appropriate altitudes.
- Escape routes—areas of good and/or improving weather.
- NOTAMs and AIRADs

These items provide a basis for a picture of flight conditions and should enable the pilot to make suitable decisions.

If you are seeking weather information through FAA channels, 14 of the 20 air route traffic control centers have forecasters available 12 to 16 hours per day, and the other 6 are scheduled to be staffed by the end of the year. Flight service stations do not have forecasters but many provide an en route flight advisory service and 13 of them have radar which will provide a picture of present local weather.

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

Director
USAATCA Aeronautical Services Office
Cameron Station
Alexandria, VA 22314

GLOSSARY

AIRADs	airmen advisories
ETA	estimated time of arrival
ETD	estimated time of departure
FAA	Federal Aviation Administration
IFR	instrument flight rules
NOTAMs	notices to airmen
PIREPs	pilot weather reports
SIGMETs	significant meteorological information
VFR	visual flight rules

Major Frank E. Babiasz, left, and Captain Carl E. Daschke, know almost as much about military equipment bearing the red star insignia of the Soviet Union as they do about that with the U.S. Army's markings. They used that knowledge to describe the threat of Soviet tanks against American helicopters in "The Claw of the Bear," which won the *Aviation Digest's* March Monthly Writing Award.

The authors, who are standing beside a 1954 model of a Mi-4 Soviet helicopter at the Army Aviation Museum, Ft. Rucker, AL, are intelligence analysts with the Aviation Center's Directorate of Combat Developments. Captain Daschke's area of expertise in the Threat Branch is combat vehicles, antiaircraft weapons, air-to-air and air-to-surface missiles, and tactical aviation, while Major Babiasz specializes in tactics and chemical, biological and radiological warfare. Captain Daschke also won the writing award in December 1979 and January 1980.

General E. C. Meyer, U.S. Army Chief of Staff, recently urged Soldiers to help stimulate creative thinking, especially in the areas of long-range planning, strategy and innovative tactics. He encouraged putting these ideas in print in the Army's professional journals. The *Aviation Digest* is anxious to receive such articles. Each one that is published is entered in the monthly competiton, and from those 12 winners a first, second and third place article is selected annually. Judges at Ft. Rucker review the manuscripts without bylines and choose the best based on accuracy, completeness, originality, readability, soundness, substance and overall merit. Authors should include pictures, diagrams or charts necessary to illustrate the manuscripts and send them to the Editor, *U.S. Army Aviation Digest,* P.O. Drawer P, Ft. Rucker, AL 36362.