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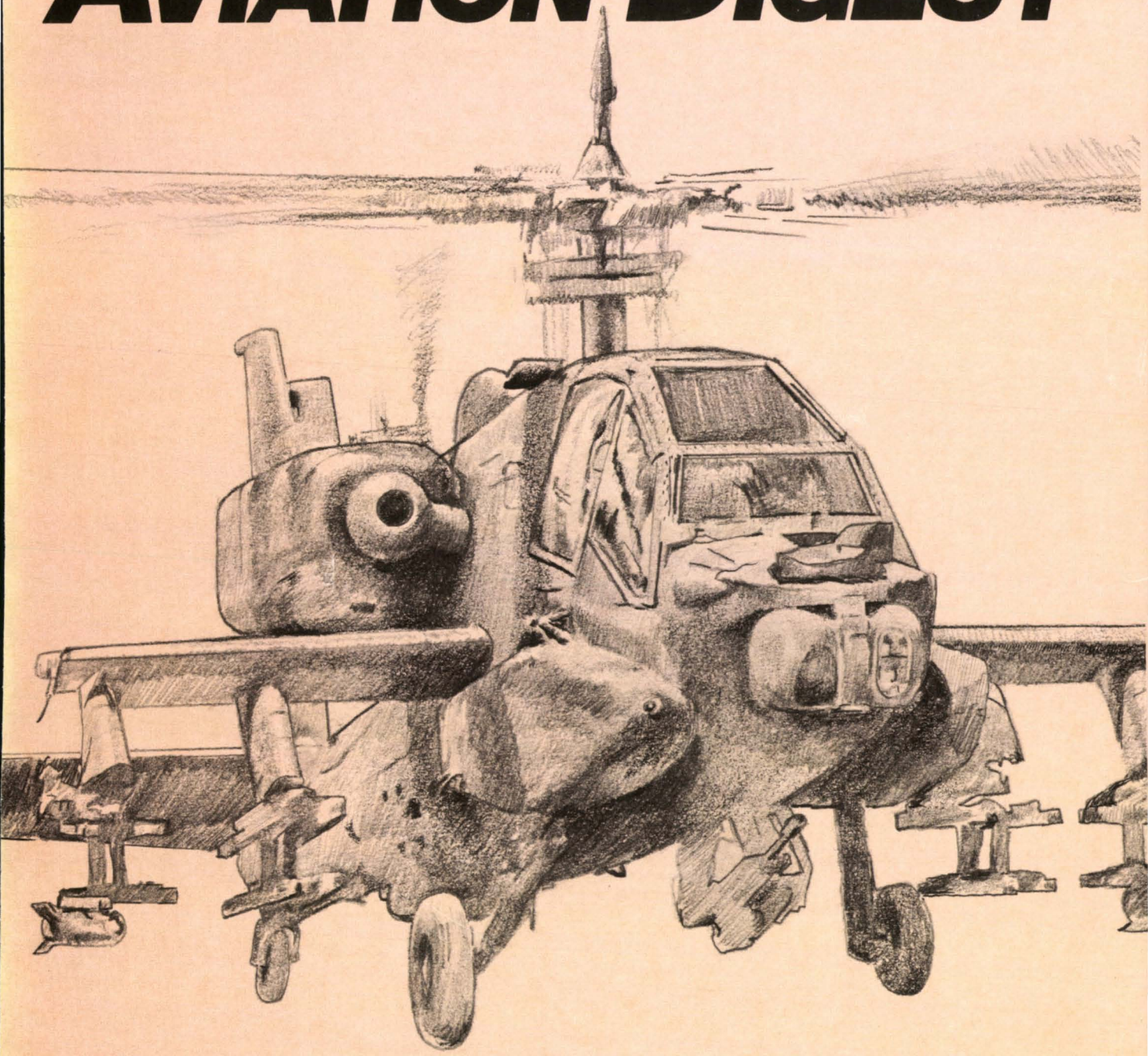
SEPTEMBER 1984

AVIATION DIGEST



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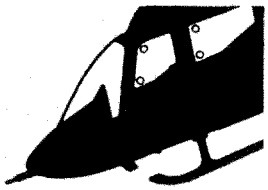

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The mission of the *U.S. Army Aviation Digest* (USPS 415-350) is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, Aviation medicine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

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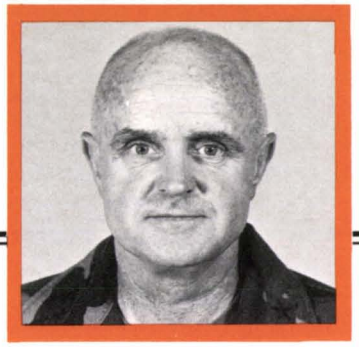
Major General Bobby J. Maddox
Chief, Army Aviation Branch



Army Aviation Policy Committee

In 1971, Army Aviation began a unique standardization experiment that has since become the guide for other Branches to use in their efforts to establish similar programs. In February of that year, Department of the Army (DA) directed the Continental Army Command to make the U.S. Army Aviation School responsible for developing and implementing a comprehensive worldwide Aviation standardization program. In July 1971, the proposed program was submitted to the Continental Army Command for approval. This is indicative of how Army Aviation has operated for as long as it has existed; take a good idea, develop and implement it quickly to the fullest. That's responsiveness.

Since that time there have been many changes to the organization, but the original intent of the program has been realized. A very important part of the original program was the provision for a governing body—one responsive to the constant changes of Army Aviation by recommending general policies to the program. The U.S. Army Aviation Policy Committee is the organization that fulfills this requirement.

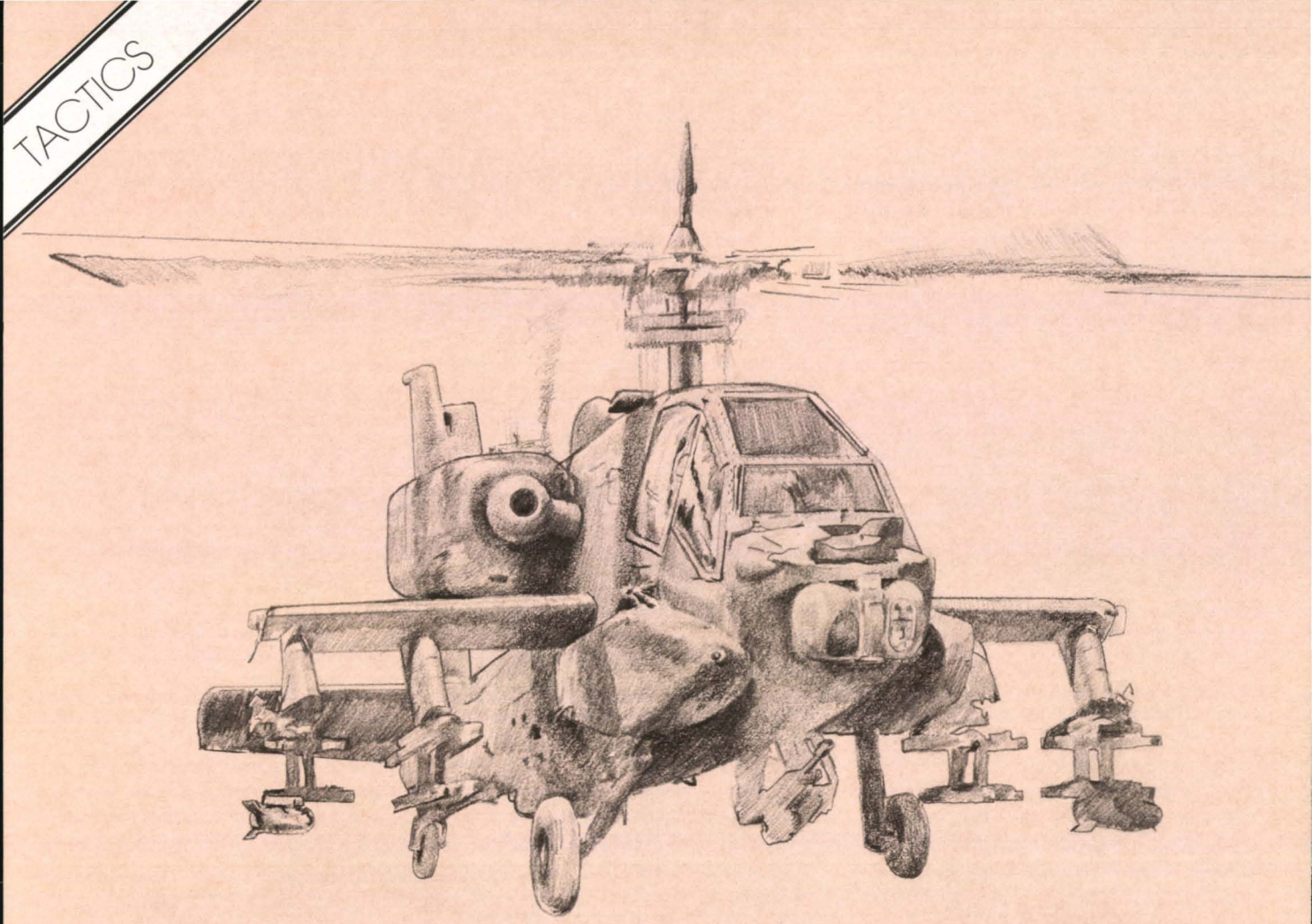
Each year the Policy Committee meets in formal session at the Army Aviation Center at Ft. Rucker, AL, to review issues submitted by major Army commands (MACOMs). This may sound as if this meeting is a level far above the aviator in the field, but let me assure you that this group is tuned to the needs of individual aviators regardless of their assignments. Every opportunity is given to aviators through their local standardization committees to present problems that need solving or recommendations for improving Army Aviation training and operations. If an issue has application beyond the local standardization committee, it is forwarded to the MACOM standardization committee for consideration. Issues that are applicable to the entire Army are forwarded to the DA Aviation Policy Committee by MACOMs.

This year the Policy Committee will meet 3 to 7 December. Four work groups, made up of representatives from the MACOMs (safety officers, standardization instructor pilots, instrument flight examiners, etc.) review all issues prior to making formal recommendations to the entire Policy Committee. The Policy Committee then acts on the recommendations by directing changes to publications, procedures and policies or, if the solution is beyond the capability of the committee, recommending actions by the Department of the Army Staff or MACOMs. This may seem to some to be a rather involved and complex process; however, I believe that it is extremely responsive. Last year, for example, changes to flight training were made within 1 month of the meeting by an Armywide message terminating touchdown emergency procedures. Similar changes to aircrew training manuals were made at the same time.

The Policy Committee is not just a once-a-year shot at standardization. The process continues throughout the year as a result of actions taken by the Army Staff and the Directorate of Evaluation and Standardization, U.S. Army Aviation Center.

These comments about a meeting that will occur in December may appear to be somewhat premature; however, I am taking this opportunity to point out the importance of all of Army Aviation making adequate preparations for the event. If individual aviators take the time to develop their ideas and present them to their local standardization committees, we can expect some valuable ideas and innovation to be put forth at this year's committee meeting.

I see the Policy Committee as a representative of the entire Army Aviation team—not just the 27 voting members who participate in the formal meeting each year. But, this can only be true if ideas and needs flow through the standardization chain.



AVIATION EMPLOYMENT
in
Special Purpose Operations

This is the first in a series of articles the *Aviation Digest* will publish examining offensive, defensive and special purpose operations and employment relative to Army Aviation. Discussed in this issue are five *special purpose* offensive operations; subsequent articles will cover the five *basic* offensive operations and four defensive operations.

Captain Ron Klein
Combined Arms Division
Department of Combined Arms Tactics
U.S. Army Aviation Center
Fort Rucker, AL

A GREAT DEAL of emphasis has been placed on the dramatic changes taking place in Army Aviation. Concurrently, it is certainly appropriate to look forward to our potential contributions with combat Aviation brigades, AH-64s and across the forward line of own troops (FLOT) deep attacks. However, the most frequent employment of Army Aviation will continue to be in conjunction with Armor and Infantry operations. Considering this, it is imperative that every aviator be familiar with the specific ground missions, the peculiarities of *each* operation, and the conduct of each if we are to:

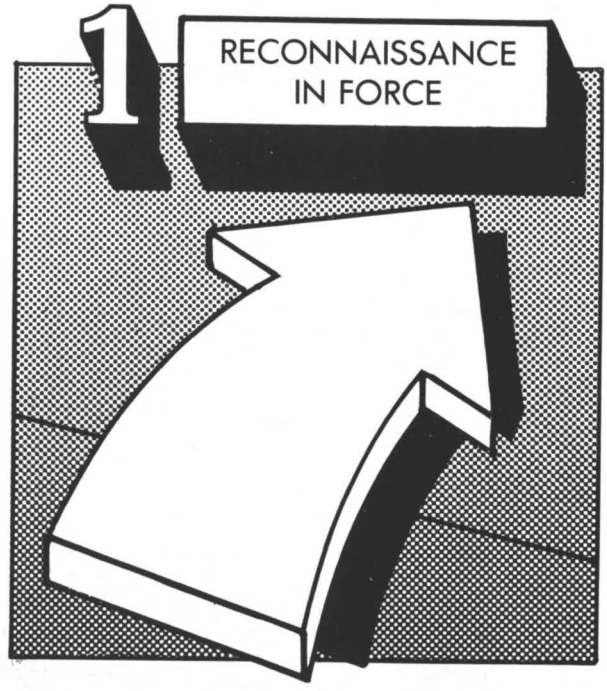
- fight outnumbered and win
- survive
- contribute in the most complementary manner, and
- establish the Aviation Branch as a full partner in the combined arms team.

Our professionalism mandates that everyone who may serve as a commander, operations officer or liaison officer be fully competent to advise the ground commander on the best manner to incorporate Army Aviation.

There are 14 operations covered in FM 100-5, "Operations." These include the following special purpose offensive operations:

- Reconnaissance in force
- Raids
- Feints
- Demonstrations
- Relief to continue the attack.

This article examines special purposes operations emphasizing Army Aviation's role in each. There will be followup articles discussing offensive and defensive operations in subsequent issues.



RECONNAISSANCE IN FORCE

A reconnaissance in force is a limited-objective operation by a considerable force that obtains information and locates and tests the enemy dispositions, strengths and reactions.[1]

Although a commander normally has access to many information and intelligence sources (patrols, side looking airborne radar, refugees, prisoners of war (PWs), reconnaissance aircraft, etc.) there will be occasions when very little is available (due to strong enemy defensive posi-

[1] FM 100-5, page 9-2.

tions, abundant enemy air defense artillery, sparsely populated areas, etc.). In this type of situation the commander may elect to attack and thereby determine the enemy's responsiveness, morale, type of weapons on hand, etc. During the decisionmaking process the commander and his staff weigh the expected losses to determine if the potential gain in information justifies the risk of this attack.

The attacking force will normally be a tank heavy[2] battalion sized task force (TF)[3] but it may be a brigade or an armored cavalry regiment.[4] The commander begins an attack across the FLOT and moves toward a terrain objective to force a major enemy reaction. The TF will pull back into friendly territory if met with an overwhelming force. As a result of this attack the TF commander will not only capture PWs and some enemy equipment but more importantly will also have achieved his primary goal of determining what the enemy's defensive positions are, the size of the reaction force and the ability of the enemy to respond to such an attack. Even if the attacking force is unsuccessful at penetrating the FLOT it will still have obtained important information on the enemy's defense. The operation will be similar to a deliberate attack except that normal intelligence preparation will be sparse.

Because prior intelligence is so limited the chances are good that the enemy's strength and resilience will have been seriously miscalculated. For this reason unusually large reserves are an integral aspect of reconnaissance in force operations. If the enemy is unable to react quickly or forcibly to the attack, the opportunity is ripe to capitalize on the unexpected success and immediately reinforce the attack. On the other hand, if the enemy reacts much quicker and stronger than anticipated the situation may deteriorate rapidly for the outnumbered attacking force. The attacking force will need immediate assistance in extricating itself. The reserve force must be ready to perform either mission. As with all reserve force missions, the timing of employment is crucial; too early or too late (or worse yet, not at all) will mean that a strong available asset was not used at the decisive time and place to affect the battle outcome.

Army Aviation in the Reconnaissance in Force

There is no force on the battlefield more responsive than Army Aviation. Regardless of swamps, minefields, forests or mountains, helicopters can be at the desired location within minutes of a request. In this particular operation the reserve force is an ideal mission for helicopters.

If the call comes to reinforce and continue the attack, assault helicopters can place troops on flanks to keep the penetration gap open and reinforce the leading elements. Attack helicopters can locate the lead ground units in contact and make a significant contribution to momentum. The attack helicopter can also stop, delay or impede enemy reinforcements after the air and ground cavalry forces have located them.

If the request is made to assist in extricating the attacking force, assault helicopters can be used to pull back dismounted troops, soldiers from disabled vehicles, and personnel slowed by captured PWs or enemy equipment and weapons. Under some circumstances, assault helicopters may be able to move troops from one delay position back to the next. Attack helicopters will be particularly useful in providing overwatch suppressive fires to allow for an orderly disengagement and the repositioning of armor and infantry units in a delay. Attack helicopters may also be used to delay enemy reinforcements from arriving before friendly forces have pulled back across the FLOT.

[2] FM 71-100, page 4-38.

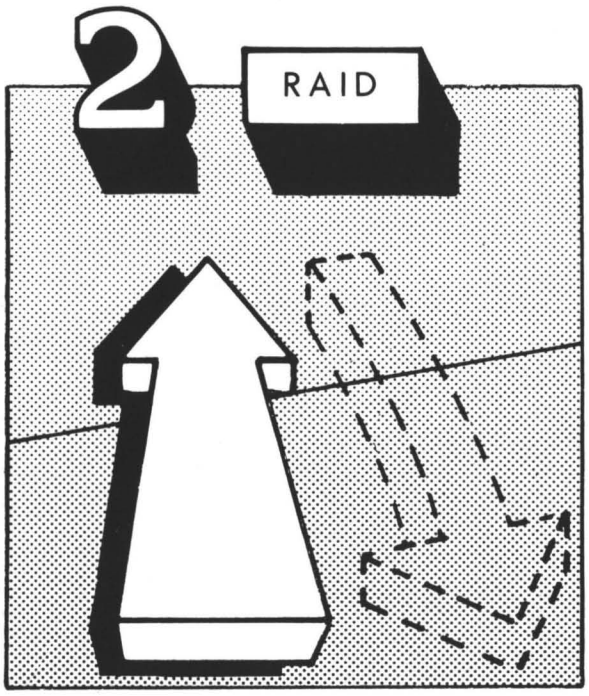
[3] FM 71-3, page 3-31 and FM 71-101, page 4-19.

[4] FM 17-95 (draft), page 3-38.

[5] FM 100-5, page 9-3.

[6] If the raid mission is to destroy enemy materiel or some installation in enemy held territory, Air Force assets should be considered. The Air Force has some extremely capable, all weather, precise and survivable weapons systems like the F-111 that should normally be the first choice for such a mission.

[7] FM 71-3, page 3-32.



RAIDS

A raid is an attack into enemy-held territory for a specific purpose other than gaining or holding terrain.[5] The raiding force must accomplish its mission and withdraw before the enemy can effectively react.

The most common raid missions are to:

- Capture prisoners or enemy materiel.
- Rescue friendly personnel.
- Obtain specific information.
- Deceive or harass enemy forces.
- Destroy enemy materiel or installations.[6]

The most apparent difference between raids and reconnaissance in force operations is intelligence preparation. Raids require current intelligence and are often rehearsed on sand tables or mock-ups in detail prior to execution. Raids may be conducted by ground forces, helicopters, airlift assets or a combination. Due to the absolute need for surprise they will normally be conducted during periods of limited visibility. In addition to the detailed planning required of any attack, these operations must plan for the withdrawal phase in the same detail. Although the planning is very detailed and therefore quite centralized, the execution should be decentralized to permit flexibility.[7]

As in any attack, the fire support plan must be planned, coordinated and conducted with precision. Although field artillery may be able to suppress and destroy enemy weapons systems in the initial crossing of the FLOT and may be able to provide suppression of enemy air defenses for aircraft in the early portions of the route, it is unlikely that field artillery will be able to reach the objective; suppression of the objective may be in the form of close air support (CAS) or attack helicopters. Often the objective will not be fired upon in preparation due to the requirement for surprise. A feint or demonstration may be planned to occur simultaneously elsewhere on the battlefield to divert attention (and consequently rapid counterattacks) away from the raiding force.

Army Aviation in Support of a Ground Force Conducting the Raid

When ground forces conduct raids they will normally be battalion sized task forces. The force will move rapidly, conduct the mission and withdraw by a different route. The raiding force depends on stealth, speed and precise timing for survivability. The planning and execution of the mission will take into account the fact that the raiding force will not have the necessary firepower to defend or delay against anything larger than the enemy's security force.

It would be unusual for Aviation assets to move with such a ground force (due to mobility differences) but they may often be employed to meet the ground force at the objective to make a major addition to firepower. Attack helicopters could aid in destruction, confusion, create diversions and prevent enemy reinforcements while the ground force completes its mission. In different terrain, assault helicopters with TOW (tube-launched, optically-tracked, wire-guided) missile teams and dismounted infantry could do that.

In the event a major enemy reaction occurs during the raid, helicopters will be needed to assist in the withdrawal or emergency extraction of the ground force. As with the reconnaissance in force mission, the responsive addition of firepower may hold off the enemy reaction force long enough for the ground force to withdraw. Attack helicopters could also contribute to a delay operation by suppressing enemy direct fire systems during the

ground force's bounds back to subsequent positions. If an emergency extraction of the ground force is necessitated, assault helicopters may well be the only means available due to time constraints and terrain limitations facing the ground force. Attack helicopters will simultaneously provide escort and possibly assist in the destruction of abandoned U.S. vehicles.

Army Aviation Conducting the Raid

The use of helicopters as the sole means to conduct the raid is a natural outgrowth of the technological development in helicopters and the changes in doctrine. The raiding force may be primarily made up of attack helicopters and/or assault helicopters. For example, a pure attack helicopter force could perform a mission to destroy a command post or a multiple launched rocket system battery. Due to the increasing tactical emphasis on cross-FLOT operations there will be a greater demand for attack helicopter raids.

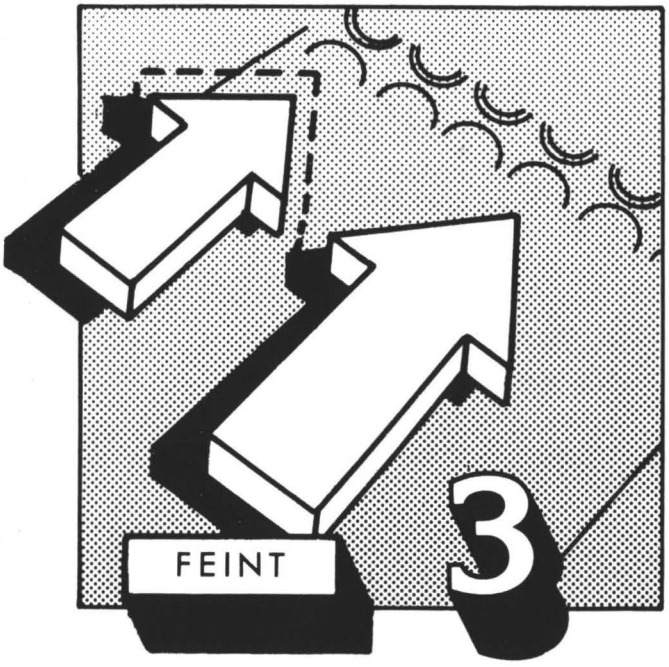
Raids conducted with assault helicopters may employ the helicopters as the only means of inserting and extracting the raiding force. On other occasions the lengthy time required for the force to be on the ground could mean that the waiting helicopters would be unnecessarily vulnerable to attack and the force needs to be inserted by other means (airdrop, amphibious landing), then extracted by helicopters. The Son Tay raid is perhaps the most famous example of a helicopter raid and is well worth reviewing to gain an appreciation for the detailed planning required.[8]

Like any air assault operation, a raid also has four basic steps; the ground tactical plan, the landing phase, the en route phase and finally the loading phase: The list at right is an example of planning considerations applicable to each.

A discussion of the complete operational planning considerations for the execution of helicopter raids would require far more detail. This discussion of helicopter raids is not intended to be all inclusive. An article on planning considerations, constraints and trade-offs for execution of the raid would be far more extensive than this. The only intention here is to review the appropriate use of helicopters in the tactical operations (not the specific execution).

RAID PHASES

Ground Tactical Phase	How many troops will be going in?
	What deception plans are part of the operation (CAS, joint air attack team, feints or demonstrations elsewhere)?
	What time of day (or night) will the landing occur?
	How long will the force be on the ground?
	What are the contingency plans if aircraft are lost en route or at the objective?
Landing Phase	Will landing be on or away from the objective?
	Does the commander want to use one or multiple landing zones (LZs)?
	Do you want to use attack helicopters or Air Force assets to prepare the LZs?
	Do you want to use pathfinders to assist in landing?
	How many aircraft can be diverted to make false insertions, or do you want to make a series of false insertions en route?
En Route Phase	What flight corridors will be established?
	Can you arrange for escort aircraft (Air Force or attack helicopters)?
	What are the refueling and rearming requirements en route or at the objective?
	How are smoke and chaff used to assist in deception?
	Where will passage points, pilot pickup points and air control points be established?
Loading Phase	How many pickup zones (PZs) are requested?
	Are the airmovement tables (to include the bump plan) complete?
	If the flight is larger than the PZ will permit at one time where will the aircraft meet for the initial point?



FEINTS

A feint is a limited objective attack designed to divert the enemy's attention. Most often feints are conducted prior to or during a main attack in an effort to deceive the enemy. This would cause a shift in enemy reserves and forces to meet the feint and consequently lessen the resistance the main attacking force would meet. Also, there may be occasions in the conduct of a dynamic defense (that includes several spoiling attacks) when feints will be used independently to keep the enemy moving and to disrupt his preparations for an attack. A series of feints may also be used to harass the enemy, confuse him, and in some cases, cause him to become careless.[9] Units conducting a feint must execute the attack violently to convince the enemy that the feint is the main effort. If the feint succeeds in penetrating the enemy's defensive system, the commander may exploit his unexpected success with follow-on forces or change the course of the main attack to follow the feint. Obviously, planning for such contingencies must be made well in advance. It is not necessary for the feint attack to penetrate the FLOT since a violently executed attack may still cause the enemy to shift his reserves and other main line forces to the apparent threatened sector.

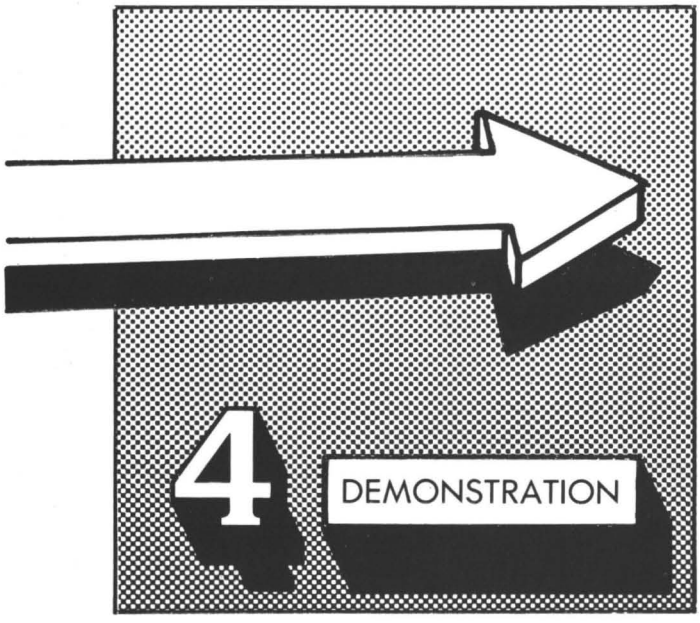
Army Aviation in Support of the Feint

In order to succeed, the feint must give the appearance of a serious attack. Therefore, the helicopters normally associated with an attack must be present. In addition, attack helicopters can attack flank positions to prevent enemy troops from moving to reinforce the threatened sector. After a breakthrough has occurred they can also make an invaluable contribution toward increasing the momentum of the attacking force by destroying enemy forces and containing bypassed pockets of resistance. Attack helicopters may also be used for the initial assault. However, in high intensity battles, special attention should be given to the expected volume of enemy indirect fires in the immediate area of available battle positions.

If the decision is made to reinforce an unexpected breakthrough with either deployment of the reserves or an alteration of the main attack route, helicopters would be particularly useful. In this case, it is critical that the momentum of the attack be maintained during the interim period required for reinforcements to arrive. Again, no force on the battlefield is more responsive than Army Aviation. Assault helicopters should be fully employed expediting the movement of dismounted troops and supplies to the lead unit in contact. Attack helicopters can impede, destroy or delay enemy reinforcements and assist the lead ground units in contact by increasing the rate of advance. Air cavalry forces can continue to screen flanks, report lateral movements of enemy forces and report critical information from all sectors.

[8] Benjamin F. Schemmer, *The Raid* (New York: Harper & Row, 1976).

[9] FM 90-2, page 2-3.



DEMONSTRATIONS

Demonstrations serve the same purpose as feints but differ in that no contact is made with the enemy. An example of this would be a few Indians on the other side of the hill mass dragging tree limbs to raise enough dust to convince the horse cavalry troopers there is a major force and consequently lure the troopers to the desired location. Although demonstrations lack the realism of the feint, the absence of physical contact with the enemy facilitates employment of the demonstration force elsewhere.[10] Like all deception operations, demonstrations require a thorough knowledge of the enemy and his collection sources as well as integration with friendly plans.

Army Aviation in the Demonstration

Under normal battlefield conditions the noise associated with helicopters is a real liability. In demonstrations, however, it is the noise that makes helicopters so useful. During limited visibility conditions the noise of moving helicopters combined with a soldier's natural tendency to exaggerate the enemy's numbers make helicopters an effective tool. Demonstrations vary so greatly in execution that it is difficult to specify Aviation's contribution in a "normal" demonstration. A better methodology may be to consider the following examples.

A few empty helicopters could make repeated landings and takeoffs from a likely location at night or during obscured weather conditions in an effort to convince the enemy that friendly forces are moving from one staging area to another. This should be combined with some vehicular noise at the same time. As enemy listening posts detect such noise and enemy radar catches momentary blips moving in the same direction, the enemy may well conclude that a large redeployment is taking place.

A second example might be helicopters planning an amphibious assault to an island or peninsula. Helicopters could be used to make repeated landings at one location and cause the enemy commander to draw some of his forces away from the true assault objective. In difficult terrain and a low or mid-intensity engagement such an assault would not be expected to make contact with the enemy (thereby qualifying as a demonstration).

Sling loading an artillery section into a flank position or a deep location is another example of helicopter use in the demonstration. On a nonlinear battlefield several scenarios may be feasible without resulting in direct engagement of the enemy. A few artillery pieces firing from a decisive sector would be located accurately by the enemy (via radar, crater analysis or sound sensing) and reflect a much greater activity taking place. The artillery section could be removed prior to an enemy attack and still have caused the enemy to move his combat forces off in a harmless direction.

[10] FM 90-2, page 2-3.

[11] FM 100-5, page 9-3.

RELIEF TO CONTINUE THE ATTACK

A relief to continue the attack is conducted to bring fresh troops forward to continue offensive operations. It will most often be a forward passage of lines or an area relief.[11] Reliefs to continue the attack are avoided if at all possible. Any pause in the attack to arrange passage points and signals, exchange intelligence information, fire support plans (A-10s due at 1410 on 34.60), the fire support coordinator and other liaison officers, will be detrimental since forward momentum is likely to be lost. In offensive operations momentum is paramount. Once advancing units have broken through the initial defensive belt, resistance is lighter and the damage done to the enemy's combat units, command and control, morale and logistics accelerates with every mile. If the momentum can be maintained the enemy will be unable to predict the route and speed of the attacking force with enough accuracy and responsiveness to establish blocking positions. Nevertheless situations will exist where the unit in contact is no longer combat effective and must be replaced. In this relief to continue the attack every minute is crucial. A successful forward passage of lines here probably will mean the difference between maintaining the attack or moving into the defense.

A forward passage of lines is similar to a relief in place except that speed is so critical in the former and concealment of intentions may be important in the latter. The key factor in planning and conducting the passage of lines for relief to continue the attack is the unrelenting need to maintain the momentum.

Army Aviation in the Relief to Continue the Attack

Assault helicopters should be employed to move the ground commander's staff to the lead unit in contact in order to make the necessary coordination prior to the arrival of their combat forces. The helicopters should probably stand by at a laager position to the rear to return the commander and staff to their unit on request. Assault assets could also bring dismounted troops forward to expedite the changeover.

Attack helicopters can serve a very important function by holding the enemy at bay while the relief takes place. If things go well, the attack helicopters may be able to mass enough firepower to keep the enemy withdrawing so that after the relief is complete the new ground unit can catch up to the attack helicopters and resume the advance. This may be an occasion when the commander would opt to employ all of his attack helicopters at once. Such a decision would, of course, make them unavailable for hours but employed at this critical time they would probably make the diffference between continuing the attack and going into defensive positions.

This discussion of the five special purpose offensive operations is certainly not intended to be limiting in any respect. There are few limits to the employment opportunities, particularly in the deception operations.

Like the other combat arms, we in Aviation have particular strengths and limitations. If we understand the basic operations of the ground commander we are in a much better position to advise him of the most effective manner to employ Army Aviation. All aviators have an inherent responsibility to fully understand AirLand Battle doctrine if we are to win on the next battlefield.

The thoroughness of an evaluation is shown in these three views of MSG William Staryk (at far left) as he checks the AH-1S Cobra armament system in C Company, 3d Aviation Battalion.

The UASSB

Watchdog for USAREUR Aviation

Major Paul E. Murtha
USAREUR Aviation Safety and Standardization Board
APO New York

IF YOU ASK any aviator who has been in Europe more than a month to describe the UASSB, he'll tell you they are the "AORSE people."

The U.S. Army, Europe (USAREUR) Aviation Safety and Standardization Board, better known as the UASSB, is often identified by the most visible of its many duties; the responsibility for USAREUR-level evaluations of Army Aviation units throughout Europe and the Middle East. A closer look at the 'Board" will more fully explain its mission and responsibilities.

Situated on a small Army post near Schwabisch Hall, Germany, the UASSB functions as the field agency for the USAREUR Aviation Office. A parallel agency to Directorate of Evaluation and Standardization (DES) located at Ft. Rucker, AL, the UASSB serves as an integral part of the Army Standardization Program. The unique aspect of the UASSB is that while its goals are supportive of those of DES, its function is exclusively in support of the USAREUR mission.

The UASSB began in 1955 as a small Aviation training detachment situated in Echterdigan, Germany,

designed to support 7th Army Aviation training. Its first mission, stated in General Order Number 20, was to keep the operational readiness of new pilots and mechanics at "top peak." As post-Korean War Army Aviation activities increased, so did the Board's duty requirements for training the European-unique aspects of flying. The detachment soon found itself as the 7th Army Trainer Board for new Aviation equipment and procedures.

As the scope of its mission broadened through the next 10 years so did the Board's assets. From an initial strength of 27 the Board's population reached, by late 1955, 290 men and 58 fixed and rotary wing aircraft. Unit missions included a formalized evaluation activity, instructor pilot/instrument flight examiner training, a USAREUR Aviation orientation course and a specific mission, in 1966, to train 100 initial entry pilots. This mission continued until 1971 when all Army initial entry training reverted to the continental United States. A year later, the unit was restructured and assumed a host of new USAREUR-peculiar missions, all designed to improve safety awareness and provide standardization of all facets of USAREUR Aviation. Since then, the Board has continued to increase its role in USAREUR and, with the establishment of the Aviation Operational Readiness and Safety Evaluation (AORSE) in 1975, stabilized itself as the action arm of the USAREUR Aviation officer.

The Board, commanded by a lieutenant colonel, is comprised of three primary branches and an operations section to bind the three together administratively.

The Evaluation Branch, headed by a major, provides evaluation support to 78 separate Aviation units in Europe and the Mideast and is completely self-contained. Evaluations cover Aviation training; flight operations; maintenance; armament; petroleum, oil and lubricants (POL); safety; and Aviation life support equipment. In addition, the UASSB reviews several special interest areas which allow evaluations to be tailored to a particular unit or situation.

The bread and butter of the Evaluation Branch is the AORSE. It is a complete periodic evaluation of an Aviation unit conducted on an 18-month cycle.

Because the European environment allows little flexibility in major training area time or gunnery range availability, it is imperative that the AORSE be scheduled well in advance. The Evaluation Branch chief will call on a unit commander 6 months before the opening of his 4-month "window" surrounding a period 18 months from the unit's previous AORSE. The unit commander will select the evaluation date himself and minimize lost training time. The actual conduct of the AORSE involves as much training as it does evaluating, and units often use this period to qualify potential instructor pilots or to receive instruction concerning new equipment and procedures.

The Evaluation Branch also provides qualification support for maintenance test pilots and maintenance test pilot evaluators. In addition it operates a mobile POL assistance team which travels throughout USAREUR instructing field and garrison dispensing techniques, storage, quality assurance and package products procedures.

The USAREUR Aviation life support equipment (ALSE) evaluator, another member of the Evaluation Branch, is responsible for providing ALSE evaluation support. However, when he is not combing through unit ALSE equipment rooms he is the primary instructor of a quarterly USAREUR-level 3-day course oriented toward unit ALSE technicians. The instruction reviews ALSE procedures, discusses USAREUR-unique ALSE supply problems, and provides a sounding board for ALSE technicians and officers in Europe.

Also located under the Evaluation Branch banner is the USAREUR Aviation safety evaluator. In addition to his primary duty of inspection, this officer provides USAREUR with its support for surveys of proposed and existing helipads and teaches a 4-day overwater survival

CW4 Mike Renfroe (at right) gives an oral evaluation to a pilot and an instructor pilot prior to flight evaluation in A Company, 3d Aviation Battalion.

CW4 Rick Davis in these two views on the step of an AH-1S Cobra, evaluates crash rescue procedures with German firemen.

course oriented toward units with missions that require extended overwater flight.

The second functional area of the UASSB is the Standardization Branch. Also headed by a major, it provides USAREUR with standardization instructor pilot and instructor flight examiner support and provides subject matter experts in all aspects of flight training, from new equipment introduction to combat flight techniques.

One of the newest aspects of the Standardization Branch is its battle scenario training team. During evaluations and unit assistance visits, standardization instructors will review a unit's ability to accomplish one or more of its assigned missions. All areas of the unit's combat operation from the commander's guidance to actions on contact are examined and comprehensive feedback is provided to the unit commander.

The Standardization Branch is also responsible for providing new USAREUR aviators with an initial look at European flying. This is accomplished by a 3-day orientation course conducted in a classroom environment. The training involves Europe-unique international regulations, special safety requirements, flight following procedures and all aspects of the Air Defense Identification Zone. The instruction provides standardized training for the new arrival and must be accomplished before the aviator can be designated as a pilot in command.

In addition to its other assets, the Board also lays claim to all synthetic flight training simulator (SFTS) facilities in USAREUR. The SFTS Branch, commanded by a captain, provides all rotary wing simulator support in Europe. From its original formal beginning as the air driven "blue canoe" of the 1950s, the SFTS activity has grown into multifunction computerized machines that represent the state of the art in electronics and visual simulation. The total value of simulator equipment in Europe currently exceeds $16.7 million and will rise to more than $182 million within the next 5 years. Through the CH-47 Chinook visual/instrument flight simulator at Mannheim, Germany, and its counterpart UH-1 Huey instrument facility at Hanau, Germany, the SFTS Branch provides support to more than 1,800 aviators in USAREUR. SFTS Branch current expansion activities include two AH-1 Cobra visual, instrument and weapons simulators; two UH-60 Black Hawk visual and instrument simulators; and a new AH-64 Apache combat mission simulator, all designed to be operational by fiscal year 1988. In addition to its normal functions the Branch also provides the UASSB commander with a single point at which he can virtually sample every aviator in USAREUR. The tool he uses for this is the "SAFE," an acronym for the Survey of Aviation Field Expertise. A 20 question test given to aviators as they periodically pass through SFTS facilities, the SAFE:

- Lasts less than 5 minutes.
- Can sample aviator knowledge in almost any area.
- Is often used to determine aviator awareness of new equipment, regulation changes or seasonal requirements.

No names are taken and units are never identified. After a represen-

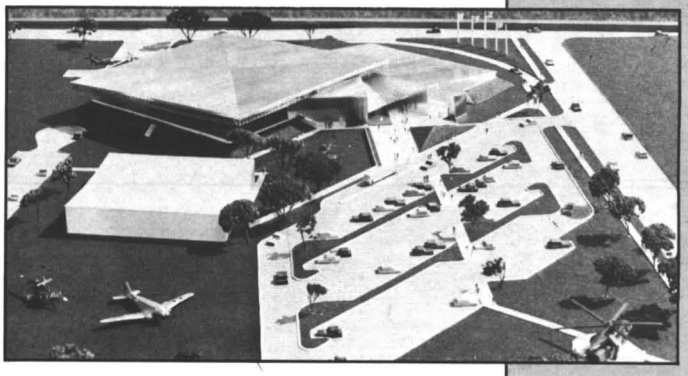
tative sampling has been assembled, feedback is provided to commanders, identifying trends and making training recommendations.

One of the most significant new additions to the UASSB repertoire of services is a Honeywell computer. When fully functional this year, it will provide a comprehensive data base to the USAREUR Aviation community for trend analysis, unit evaluation information, Aviation peculiar specialty densities and other information that will allow the UASSB to provide even more services to Aviation.

In addition to the activities of its branches, the UASSB also hosts the annual USAREUR Aviation Standardization Committee Meeting; a 3-day event involving more than 100 leaders of the USAREUR Aviation community. Issues decided upon at this meeting are carried forward for presentation at the annual U.S. Army Aviation Policy Committee Meeting (see page 1).

Through its interconnecting branches and multiple functions the UASSB provides USAREUR with its Aviation resource management activity. Its position in Europe as the focal point for innovative tactics and new equipment will ensure the Board's ability to provide a critical service to the USAREUR Aviation community and to maintain its status as an active partner in Army Aviation.

SSG Scott Lewis (center) evaluates OH-58 Kiowa maintenance.



MUSEUM PLEDGE

United Technologies' Sikorsky Aircraft has pledged $100,000 to the Army Aviation Museum Foundation to help construct a new museum building at Ft. Rucker, AL.

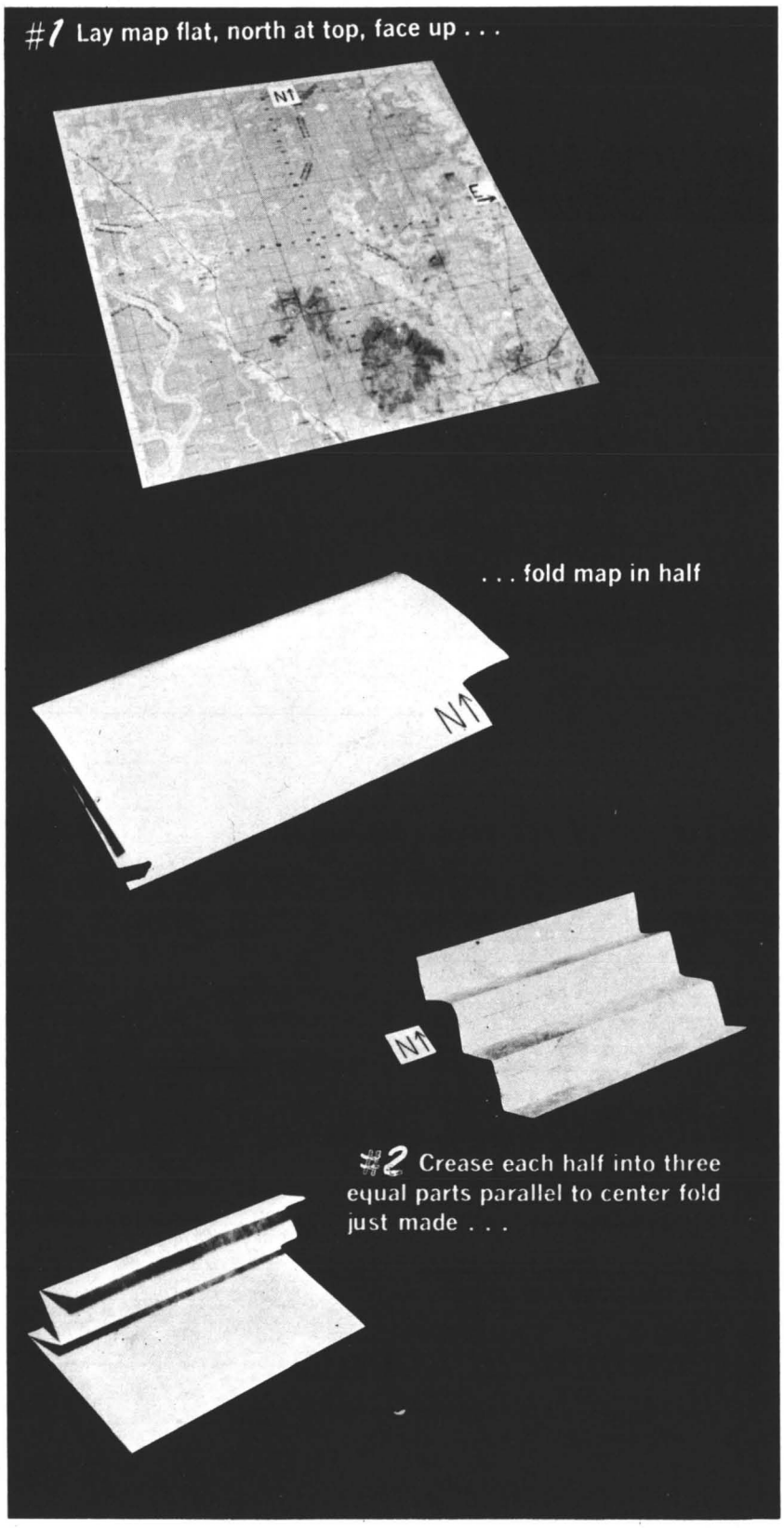
This pledge is expected to provide payments to the museum in equal installments over a 3-year period. With this pledge the museum development fund reached a total of $1,392,128.69.

Museum construction will begin as soon as the final plans are approved by the U.S. Chief of Engineers Office in Washington, DC.

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

The Tactical Map and You

CW2 Nile I. Harter Jr.



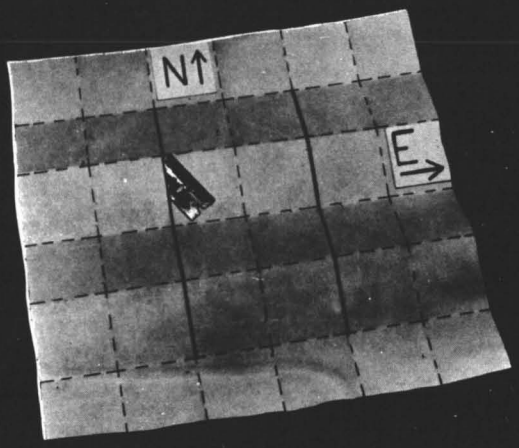
DURING MY LIMITED and somewhat trying career as an Army aviator, I've learned, like many before me, that the best source of information is the "grapevine," better known as the chain of command. Information flows from Senior aviator to student pilot and back again in a never-ending stream of knowledge.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

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

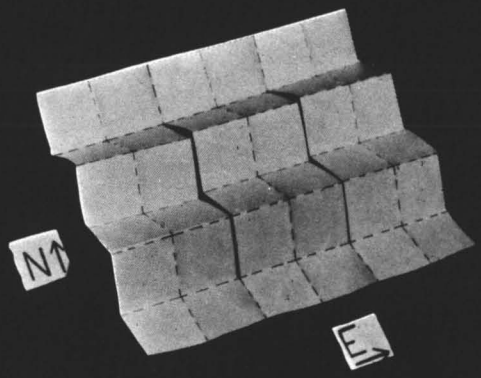
How about the aviator who must navigate by reference to a tactical or geographical type chart using the pilotage method? He must be, as they say, outside as well as inside the cockpit with his head on a good swivel using an unfolded 33 x 40 inch, 1:50,000 scale tactical chart wadded or stuffed in his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

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

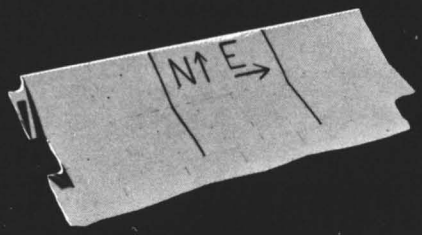
fold in half turning top edge down to meet bottom edge and then repeat step #2



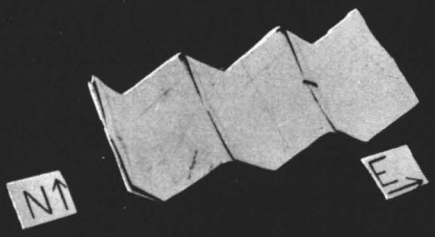
#4 Open map, lay flat north at top and with sharp blade neatly cut along heavy lines (dotted lines represent folds made)



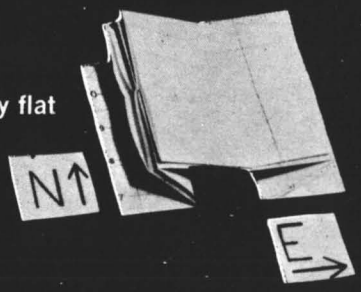
#5 Disregarding cuts, using folds previously made, fold into parallel east and west sections



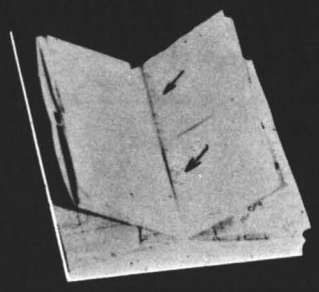
#6 Disregard cuts, using folds previously made, fold into parallel north and south sections



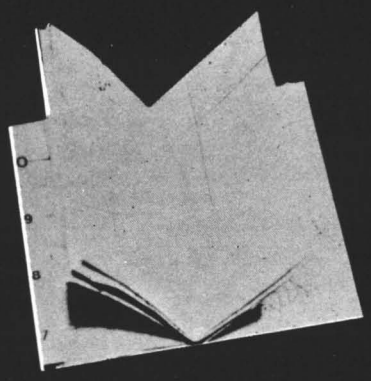
. . . open to center fold, lay flat



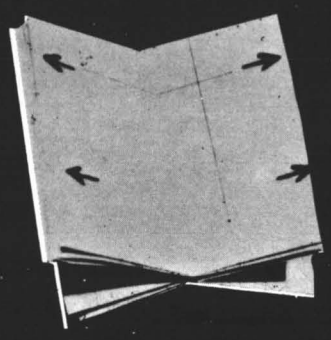
#7 Turn map over as it is now folded and using a single strip of tape form a binder (tape) as illustrated

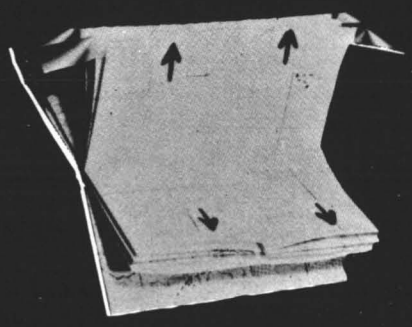


#8 Turn map over and using taped folds as a binder (step #7) you should now have a three-section, two-page book-map

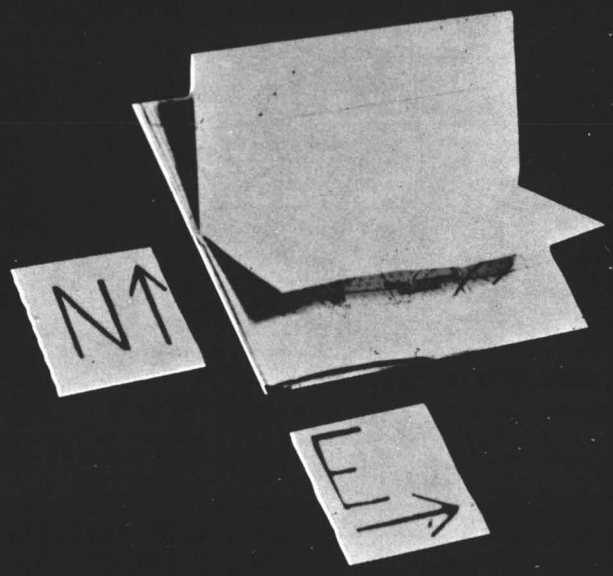


#9 To finish the book-map for use, tape or glue the eight places where the edges you have cut come together (two places at each arrow)





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



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

Wind shear can be sheer terror

U.S. ARMY SAFETY CENTER

PAN AM CLIPPER 759, a Boeing 727, took off at 4:07 p.m. on 9 July 1982 from Moisant International Airport in New Orleans. The airliner made what appeared to be a normal liftoff and initial climbout. Seconds later it had crashed into a residential area, killing all 145 people on board and 8 others on the ground.

The 45-year-old captain had logged 11,727 hours of flight time, almost all of it in the B-727. (His flight officer was similarly qualified on the aircraft.) He was aware that low-level wind shear alerts were occurring periodically around the airport but the National Transportation Safety Board (NTSB) concluded that his decision to take off was reasonable based on the weather information supplied by his company and air traffic control personnel.

What happened in the few minutes that elapsed between the time that decision was made and the large aircraft slowly came down as if a giant hand were pressing it out of the sky? Apparently at an altitude between 100 and 150 feet, Clipper 759 encountered a microburst-induced wind shear. The plane began its inexorable descent, struck a tree, and crashed.

Meteorologists have long understood the wind shear found in gust fronts, warm and cold air-mass fronts, mountain waves, low-level jet streams, gravity waves, terrain-induced turbulence, and seabreeze fronts. Such wind shears can be predicted—usually far enough in advance to diminish their hazard to aviation.

Much less understood and more difficult to predict are low-level wind shears of the type encountered at New Orleans. This same type of low-level wind shear figured in the crash of Eastern Airlines Flight 66 at JFK International Airport in New York City in 1975. The jet, which was preparing to land, encountered strong wind shear and crashed—killing 113 people. There had been no gust front preceding this wind shear and aircraft moving ahead of Flight 66 had encountered wind shear of less force or none at all.

Dr. Theodore Fujita, a prominent meteorologist at the University of Chicago, reconstructed the meteorological data from this accident. He concluded that some thunderstorms produce violent downbursts which may descend to within 300 feet of the surface or lower before they burst outwards into winds with velocity of 100 knots or more. Dr. Fujita coined the term "microburst" to describe the downburst and outbursts of these air currents which are normally of small size (1 to 3 miles laterally) and of short duration (5 minutes or less). The lateral wind shear produced by such a microburst could mean a switch from a headwind to a tailwind of as much as 50 knots.

Congressional concern following the Pan Am crash in New Orleans led to legislation providing for FAA to enter into an agreement with the National Academy of Sciences (NAS) to study and assess the hazards of low-altitude wind shear on aircraft during the critical takeoff and landing stages of flight. The National Research Council committee described wind shear as an "infrequent but highly significant hazard." The committee found that "Although the hazards of wind shear to helicopters could be large, there are insufficient statistics to determine the extent of the problem." The lack of reliable statistical data on frequency of occurrence of wind shear and related accidents and the differing interpretations and definitions of wind shear may contribute to a lack of appreciation among pilots,

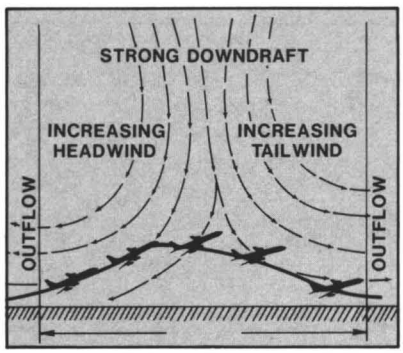


FIGURE 1: Schematic representation of takeoff accident in a microburst situation. The aircraft first encounters a headwind and experiences increasing performance. This is followed in short succession by a downdraft and a strong tailwind, both causing serious performance loss, possibly resulting in a crash.

air traffic controllers, and aircraft operations personnel of the seriousness of this hazard to safe flight operations.

When the FAA reviewed 59,000 NTSB reports of aircraft accidents or incidents, occurring from 1964 through 1975, 25 cases were identified involving large aircraft (12,500 pounds or more) in which low-altitude wind shear could have been a contributing factor. Of these 25 cases, 23 occurred during approach or landing. The remaining two occurred during takeoff.

In 27 accidents or incidents occurring in the United States from 1964 to 1982, attributed to low-altitude wind shear, 491 people died and 206 were injured.

The nature of the problem

Microbursts may develop during thunderstorms but they aren't always present even during an intense storm. Like thunderstorms they tend to happen most often between noon and midnight. They can occur beneath any convective cloud and they develop in families of two or more. There are two types of microbursts. In dryer atmospheres, virga (streaks of evaporating precipitation) may be seen. As precipitation falling from convective clouds evaporates, the downdraft is further cooled causing it to accelerate. Virga virtually assures that a fast-moving downdraft exists.

A wet microburst is often accompanied by heavy rainfall. While wind shear is apparently not related to rainfall intensity, more study is needed on the effects of heavy rain on aircraft aerodynamic characteristics.

Aircraft passing through the center of a microburst may experience an abrupt change in wind speed and/or direction. The rapid change from a head wind to a tail wind, which may also occur in a strong downdraft, affects lift and altitude and is particularly hazardous to an aircraft which is landing or taking off (figure 1).

The effect wind shear can have, particularly on large aircraft, is demonstrated by the fact that the one in New Orleans was rated as *medium intensity*. The strongest microburst documented occurred in August of 1983 at Andrews AFB, MD. It contained 84-knot winds followed by 130 plus knots on the opposite side—a total differential of more than 210 knots.

History of the phenomenon

Nearly 40 years ago thunderstorm outflow and the accompanying downdrafts which now may be referred to as downbursts or microbursts were identified by the Thunderstorm Project.

In 1971 FAA initiated a program to work on the problem of wind shear in coordination with other organizations working in the field. Analysis of winds encountered by Eastern Air Lines Flight 66 at JFK in 1975 resulted in more study of such violent downbursts and led to increased efforts toward detection and communication of warnings to pilots of this hazard. Both ground-based and airborne instrumentation detection were part of that effort.

A wind shear detection system called Low-Level Wind Shear Alert System (LLWSAS) (figure 2) was developed in 1976. LLWSAS ground-level sensors to measure wind velocity are already in use at 59 major airports with 51 additional units scheduled for installation by 1985 (table 1).

FAA, National Weather Service, National Science Foundation, and NASA have sponsored detailed research on the nature and characteristics of downbursts. Project NIMROD, conducted by the University of Chicago during 1978-79, and the Joint Airport Weather Studies (JAWS) project conducted in the Denver area in 1982 provided important information on the meteorological characteristics of wind shear. The Committee on Low-Altitude Wind Shear and Its Hazard to Aviation has recommended that an additional field research program to measure wind shear phenomena should be undertaken at a humid southeastern location to supplement research done in the semi-wet north-central midwestern United States and high, dry midwestern plains.

Detection

LLWSAS is the only operational means currently in use for detecting wind shear. It has several

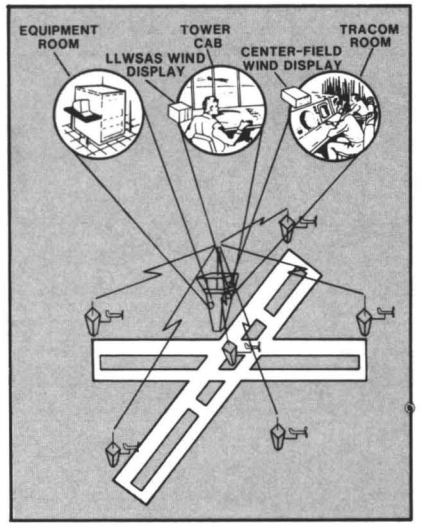


FIGURE 2: Low-Level Wind Shear Alert System

Source: FAA. 1983

limitations, including:

- The system cannot measure winds above the sensors on the ground. This may not be a big problem for gust fronts or sea breezes, but it limits the detection of wind shear that may not be present at the surface.
- There are temporal and spatial resolution indications that may present serious problems for detecting the smallest-scale events. Although LLWSAS sensors are located an average of about 2 miles between the centerfield and remote sites, the effective wind shear resolution is near 4 miles because of the long averaging period at the centerfield site. Likewise, the temporal resolution is compromised by the long averaging at the centerfield site; a brief high-wind encounter at centerfield would probably not be identified. This effectively eliminates the centerfield site as a high-resolution wind shear sensor.
- Surface wind events outside of the perimeter of the anemometer field would not be detected.
- Vertical wind motions are not sensed directly; only horizontal ones are detected, and these, of course, may have been initiated by downdrafts.
- Sensors do not directly measure wind along flight paths and are thus susceptible to reporting events that may not reflect wind shear (or lack of one) on an airplane's flight path.

Improvements to the LLWSAS are being made at Moisant. Risks from low-altitude wind shear can be reduced by improving the other existing systems. The improved LLWSAS should eventually be installed at all of the 153 high-density airports with terminal automation systems where there is a likelihood of occurrence of wind shears.

What the future holds

An appropriately-designed, pulsed Doppler radar can detect tornadoes, downbursts, microbursts, gust fronts, solitary waves, and sea-breeze fronts. The cost of such multiple Doppler radar systems, however, makes it unlikely that they will become operational at airports in the near future.

Utilization of highly automated, ground-based terminal Doppler radar offers considerable hope. A single Doppler radar located away from an airport can effectively detect and quantify many hazardous phenomena over the airport and would do much to detect all forms of wind shear and provide warning to pilots.

The FAA has proposed that an unmanned Doppler terminal radar be dedicated to the effective detection of hazards to aviation. The development of such a program, however, should not be allowed to interfere with development of Next Generation Radar (NEXRAD). One of the problems which will have to be solved before such a terminal radar can be effective is automation of information from the high scan rates necessary for microburst detection and notification.

NEXRAD

An advanced pulsed Doppler weather radar installation can provide weather information for ranges exceeding 200 miles and heights of 60,000 feet at a rate of once every 3.5 minutes. It will provide information on the location, severity and movement of such weather phenomena as tornadoes, severe thunderstorms, heavy precipitation, tropical cyclones, hail, high wind shears and severe turbulence.

Such radar require an unrestricted view for 200 miles and the height of their towers and antenna may eliminate any possibility for low-altitude coverage of terminal areas. Their scan rate is too slow to be of optimal use in detecting the fast-developing, fast-dissipating, microburst.

Warning

To be effective a warning system must be capable of sensing wind shear and computing such information as fields of velocity. One question that must be answered is what computations are needed to accomplish the desired result. Display must be in relatively simple and unambigious formats. Automated interpretations of data must be supplemented by meteorologists to resolve uncertainties and minimize false alarms while retaining accuracy in detection. Air traffic controllers and pilots must receive information needed to avoid hazardous conditions yet not be burdened with unneeded data.

Reporting

Meteorological forecasts and in-flight advisories can warn that conditions are conducive to generating downbursts and wind shear. LLWSAS can detect low-altitude wind shear near airports where they are installed, but it may be a report by a pilot (PIREP) that confirms wind shear actually exists.

Improvements need to be made in standardizing the format pilots use to report such weather information. FAA is revising the Airman's Information Manual and the handbook for controllers to include information on detection and warning of low-altitude wind shear.

FAA is considering a system to provide taped hazardous weather advisories, including low-altitude wind shear, to pilots by continuous broadcast on a discrete frequency. Automatic transmission of weather messages from Center Weather Station units will improve dissemination of information on fast-developing wind shear hazards to tower and control facilities.

More information is needed on how different aircraft respond to wind shear under various piloting techniques and guidance and control systems. This information

should lead to training for pilots to enable them to cope with wind shear encounters. Attention should be given to development of guidance and control aids to improve an aircraft's ability to recover from a wind shear encounter.

Avoidance of conditions where low-altitude wind shear is likely should be stressed to aviators. However, the nature of this weather phenomenon is such that it can exist beneath any convective cloud, whether thunderstorms are or are not present. Pilots should be trained to look for signs such as heavy rain, virga, turbulent and gusty conditions, roll clouds, or blowing dust and report such conditions or encounters with low-altitude wind shear quickly and accurately. Despite improvements in forecasting and detection equipment, it may be these pilot reports that prevent another aircraft from an encounter with *sheer terror.*

Sources:

LCDR Joseph F. Towers, "A Deadly Disturbance," *Approach,* Jun-Jul 1984. "Microbursts and Macrowinds," *FAA General Aviation News,* Nov-Dec 1983.

Report of the Committee on Low-Altitude Wind Shear and Its Hazard to Aviation, National Research Council, National Academy of Sciences, Sep 1983.

TABLE 1: Location of Low-Level Wind Shear Alert System (LLWSAS) Installations

IN OPERATION (59 UNITS)

Albuquerque, NM	Indianapolis (Int.), IN	Oklahoma City, OK
Atlanta, GA	Jackson, MS	Omaha, NE
Baltimore, MD	Jacksonville, FL	Orlando (Int.), FL
Birmingham, AL	Kansas City (Int.), MO	Philadelphia (Int.), PA
Boston, MA	Knoxville, TN	Phoenix, AZ
Buffalo, NY	Las Vegas, NV	Pittsburgh (Int.), PA
Charlotte, NC	Little Rock, AR	Raleigh-Durham, NC
Chicago (O'Hare), IL	Los Angeles, CA	Roanoke, VA
Cincinnati, OH	Louisville, KY	Rochester, NY
Cleveland (Hopkins), OH	Memphis (Int.), TN	St. Louis (Int.), MO
Columbus, OH	Miami, FL	Salt Lake City, UT
Dallas/Ft. Worth, TX	Milwaukee, WI	San Antonio, TX
Dayton, OH	Minneapolis (Int.), MN	San Juan, PR
Denver, CO	Mobile, AL	Sarasota, FL
Des Moines, IA	Nashville, TN	Tampa, FL
Detroit (Metro.), MI	New Orleans, LA	Tulsa, OK
Ft. Lauderdale (Int.), FL	New York (Kennedy) NY	Washington (Dulles), VA
Houston (Int.), TX	New York (LaGuardia) NY	Washington (National), VA
Houston, TX	Newark (Int.), NJ	W. Palm Beach, FL
	Norfolk, VA	Wichita, KS

TO BE INSTALLED (51 UNITS)

Albany, NY	Fayetteville, NC	Montgomery, AL
Asheville, NC	Fort Smith, AR	Pensacola, FL
Augusta, GA	Fort Myers, FL	Peoria, IL
Austin, TX	Grand Rapids, MI	Richmond, VA
Baton Rouge, LA	Green Bay, WI	Rochester, MN
Billings, MT	Greensboro, NC	San Francisco, CA
Bristol, TN	Greer, SC	Savannah, GA
Cedar Rapids, IA	Honolulu Oahu, HI	Shreveport, LA
Charleston, SC	Huntsville, AL	Sioux City, IA
Charleston, WV	Lansing, MI	Sioux Falls, SD
Chattanooga, TN	Lexington, KY	Springfield (Capitol), IL
Colo Spgs, CO	Lincoln, NE	Springfield, MO
Columbia, SC	Lubbock, TX	Syracuse, NY
Columbus, GA	Madison, WI	Tallahassee, FL
Dallas-Love, TX	Midland, TX	Toledo, OH
Daytona Beach, FL	Moline, IL	Tucson, AZ
El Paso, TX	Monroe, LA	Windsor Locks, CT

Source: FAA 1983

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Marty Phillipo photo by SFC Edward Baggett

Firestarter, Aviation Survival, Magnesium

This item, national stock number (NSN) 1680-01-160-5618, is now in the supply system and requisitions are being filled.

As with all new items, familiarization and training need to be accomplished. Many good products have been termed "no good" and "a worthless piece of equipment" because the user of the product never had adequate training to learn how to properly use it.

The new firestarter comes packaged in a thermo sealed, clear plastic bag with instructions. The instruction sheet is unique because it is painted on synthetic paper and it is waterproof. Not only does it contain photographs with the instructions but it has "survival tips" on some items you have that are onboard the aircraft and are available for use as tinder or fuel. (NOTE: If the firestarter falls into a fire and remains there for 15 minutes it will glow and burn; it will not explode if left to burn out.)

The firestarter, very simply stated, is a bar of magnesium metal with a "sparking insert" glued and swedged into one edge. The opposite edge is called the "shaving edge." The upper corner has a hole in it with a ballchain through the hole.

To use it, take a pocket knife or other hard metal and on the shaving edge scrape the magnesium bar. Make a pile of shavings about the size of a quarter in the center of your tinder pile. The easiest way is to put the shavings onto a leaf and slide the leaf under your tinder. When this is completed turn the bar around to the sparking insert and scrape in a downward motion with your pocket knife blade or other hard metal to create sparks. The harder and faster you scrape the more sparks you get. Direct the sparks onto the pile of magnesium shavings that you have put into the center of your tinder. When the magnesium "catches" it will give a bright glow and your tinder will start to smoke and burn and "presto" you have fire. This will work even if you have damp (not soaking wet) materials.

If you read the instructions you will note they say "shavings." Chips of magnesium do not ignite as fast as shavings. So scrape the shaving edge of the magnesium bar. The sparking insert side will not produce sparks if you "whack it" with glancing blows, so scrape it, rapidly with downward motions, onto the magnesium shavings.

Remember the basics of fire building: tinder, kindling and fuel.

Tinder: Pocket lint, birds nest, paper (if you must use your instruction sheet remember to read it first, there will be no second chance).

Kindling: Small twigs, wood chips.

Fuel: Small branches, "squaw wood," these are the dead limbs still on the tree, high off the ground. These are usually dry and will burn fast and make good charcoal. A word of caution, if you are using aircraft fuel be extremely careful, particularly with gasoline, the fumes are extremely volatile. Jet fuel will ignite a lot slower, but be careful.

Building a fire from wood takes time, don't be impatient. Start small and work up to big. During damp, wet and snowy weather, it will take a longer time and more patience to build a fire. *Be patient!*

Inertia Reel Assembly

EXPEDITE ACTION: Subject inertia reel, NSN 1680-00-775-4182, is used as a part of the Aviation life support equipment (ALSE) on all types/models/series of AH-1, UH-1, CH-47 and OH-58 aircraft. It was determined in a Value Engineering Change Proposal that this inertia reel can be economically repaired at depot level. We need your assistance to establish a return program so that the reel repair program can be promptly started and sustained. This action will translate into an increased readiness position for you. As you remove and replace the inertia reel assemblies, please return the unserviceable reels to:

Commander
Sharpe Army Depot
Lathrop, CA 95330
RIC AQ5, W62G2T

Point of contact for this action is Margaret LaRue or James Alexander, DRSAV-SAIA, AUTOVON 693-3809.

ALSE Specialist/Technician Career Military Occupational Specialist

COBRO Corporation recently completed its report TR9-206, which identifies and supports the need for ALSE career field military occupational specialties. We will keep you apprised of developments in this area. We strongly support the need of ALSE military occupational specialties.

USAREUR ALSE Chief

CW2 Larry Robinson has replaced CW2 Charles "Chuck" Gibson as the U.S. Army, Europe (USAREUR) ALSE officer and focal point. Larry is going to have some awful big shoes to fill as did Chuck when he replaced Dave Klindt, but with all of us and the users giving him maximum support, his job will be made somewhat easier. Also, with the complete support of Lieutenant Colonel Blair K. Blacker, USAREUR Aviation safety and standardization officer, the task will continue to be given full attention and support. CW2 Robinson will continue in the shoes of Chuck Gibson during the Aviation safety and standardization and ALSE visits. If we can be of any assistance, please let us know. PEARL stands by ready to help wherever and whenever possible.

Screw-In Flares

I could not believe my ears when I was alerted to the fact that the *screw-in* type flares are still in some survival vests and are still being issued to users in the field. Action should be immediately taken to purge these from the inventory. We are in contact with the Armaments Command and have asked them to take appropriate action to make available only the proper model flare—NSN 1370-00-490-7362, L119 should be used. Reference is made to the PEARL article in the August 1983 issue of *Aviation Digest* and FLIGHTFAX, Volume 10, Number 14, 20 January 1982. Know the problems, and chances of creating other problems will diminish. Also be aware that you *should not* keep them in your car trunk. A recent incident (still being investigated) occurred when a flare went off in the trunk of an automobile. We feel that this was caused by slamming the trunk lid down on the survival vest, but WE ARE NOT SURE. Treat all ALSE as if your life depended on it. *Someday it might.*

PRC-90 Survival Radios

Actions required to "get well" and resolve the shortages of the PRC-90 survival radios have been addressed and we will all benefit by this action.

The Aviation Logistics School, Ft. Eustis, VA, has the proponency for Field Manual (FM) 55-405, "Aviation Life Support Equipment." These maintenance of ALSE FMs will be published in six volumes. Volume I will provide general information on management areas. Volumes II through VI will provide consolidated and updated information on configurations, applications, maintenance and packaging of all ALSE presently contained in numerous publications and directives. The coordinating draft for Volume I will be distributed worldwide in September 1985. Point of contact is Major Strazzini, AUTOVON 927-5880.

The ALSE system upgrade move is on. Become a part of it to ensure the Army's finest will have ALSE at its best.

If you have a question about personal equipment or rescue/survival gear, write PEARL, AMC Project Officer, ATTN: DRCPO-ALSE; 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-1218/9 or Commercial 314-263-1218/9.

Night Vision Goggles Training and Operations

CHANGES, CHANGES, changes, why? Night vision goggles (NVG) have been a part of training and standardization since 1977. The changes in policies and procedures may have appeared to be knee jerks from an unsatisfactory accident rate. True to a point, however, other factors also have contributed to change.

On close examination qualification training revealed serious shortfalls when related to combat employment of NVGs. Qualification training based on emergency procedures (low level autos) and airfield traffic patterns (90 knots/300 feet above ground level) did not prepare the aircrews to meet the demanding modes of terrain flight, a requirement for combat effectiveness. Studies revealed 80 percent of the training was conducted in the traffic pattern or runway environment. NVG mishaps, however, were occurring in the terrain flight mode 90 percent of the time. If aircrews are to survive in the fighting environment, we must train and qualify in that environment.

The U.S. Army Aviation Center, Ft. Rucker, AL, moved to correct this training shortcoming by redesigning qualification training for all resident courses with emphasis being placed on terrain flight tasks. All initial entry rotary wing night/NVG programs of instruction reflect this change.

Mishap rates and training deficiencies were not the only factors affecting change. Concern from command at all levels surfaced the need for a night vision goggles symposium to be held at the Aviation Center. The workshop was designed for major Army commands (MACOMs) to send a representative and the Directorate of Evaluation and Standardization (DES) would sponsor and chair the agenda. The goal of the workshop was to identify problem areas associated with NVG flight and jointly attempt to resolve them. The ultimate goal was to reduce the mishap rate associated with NVG flight. This workshop was planned to convene 6 to 10 February 1984.

During the interim something was needed to arrest the mishap rate. The U.S. Army Safety Center repeatedly noted during investigations of NVG mishaps that excessive speed for flight conditions was one of many contributing factors. Conditions that affected NVG flight were: ceiling and visibility, available ambient light, available contrast, aircrew proficiency, limited field of view, aircraft compatibility with NVG, artificial lighting, terrain over which flight is conducted, etc. Department of the Army (DA) with consideration of the Safety Center's findings, directed in

in December of 1983 that NVG flight would not be conducted unless ambient light levels were such that the moon was 30 degrees above the horizon and 23 percent illuminated or artificial lights (pink filters) were used. During January 1984 additional guidance and clarification was published by DA based on input from the Aviation Center's restricting airspeeds for various modes of flight. These were temporary measures to prevent night vision goggles mishaps, pending the NVG workshop and recommendations from that meeting. The ambient light and airspeed restrictions were an attempt to slow the aircrews down thus providing more time to avoid obstacles. Consideration also was given to the fact that moon elevation and percent illumination do not always mean good ambient light. However, it should be noted that technology hasn't provided us with a means of accurately measuring ambient light for all situations. Safety was the prime consideration at this point.

On 6 February 1984 the night vision goggles workshop convened. All MACOMs were represented and a host of problem areas became evident early on. During this week a multitude of problems and recommendations for solving them were discussed and rediscussed.

Subject areas ranged from aircraft modifications, NVG currency, unit trainers, available training areas, selected tasks iterations, pilot in command policy, NVG maintenance, cut-away modifications, aircrew training manual (ATM) guidance, day filter training, DA restrictive guidance, illumination tables, flying hour programs, mission training, supply channels, etc. Although many of the problem areas were above the level of correction possible by the workshop, outstanding suggestions and recommendations were prepared at the conclusion of the workshop. The training and standardization problems were assigned to DES to correct in the forthcoming ATM series. During the week that followed a message compiled of all the issues addressed and additional areas was submitted by the Aviation Center. This message was then disseminated Armywide for additional suggestions from all MACOMs.

DES, as an attempt to develop a centralized point of contact (POC) for NVG initiatives Armywide, formed an NVG cell with representatives for each aircraft (phone numbers, POCs, FLIGHTFAX, Volume 12, #28).

The first week of March 1984 all responses were received at DES, and the responses were compiled with consideration and compromises based on the MACOM responses and rational for their responses. This semifinal message with recommendations for conducting NVG flight was then forwarded to DA for consideration and Armywide distribution.

On 29 April 1984, a meeting with all MACOM representatives took place at the Pentagon to finalize policy and regulations associated with Army flight with night vision goggles. At the conclusion all areas had been readdressed and finalized with all MACOMs approving. Night vision goggles flight by this time was considered as both a mission enhancement capability and a safety of flight issue. Problem areas unresolved by the workshop received utmost attention, and positive steps were achieved at correcting them in the near future.

Aircraft compatibility with cut-away and AN/AVS-6 NVG is receiving a higher priority than in the past under the Product Improvement Program. Funds are now becoming available for correcting these problem areas.

NVG and mission-ready aircrews are now a factor in the unit readiness report, a must in figuring and justifying additional hours for the flying hour program. The DA message dated 25 June 1984 which superseded the message of 31 May 1984, is the overall sum of these efforts to reduce the mishap rate and balance safety with mission accomplishment. This message supersedes guidance from December 1983 and January 1984. During development of this guidance, all attempts were made to encourage user input, and careful consideration was granted to that input. Your cooperation in smoothly employing these changes goes a long way in further enhancing safety and combat readiness.

The door is never closed to your suggestions or ideas for improving safety or readiness. NVG terrain flight in an Army aircraft is still the most demanding mode of flight known. We, as Army aviators, will do it professionally or not at all!

NOTE: Future reports will address current updating and upgrading of aircraft modifications for NVG compatibility.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362-5000; or call us at AUTOVON 558-3504, FTS 533-3504 or Commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or 205-255-6487 and leave a message.

AVIATION PERSONNEL NOTES

Advanced Civil Schooling

The Combat Arms Division (CAD) has about 85 spaces for fully funded advanced civil schooling each year. These spaces do not include those officers with follow-on assignments at United States Military Academy. Officers selected for advanced schooling study in a civilian university in a discipline supporting either or both of the officer's specialties for a period of up to 18 months, receive a graduate degree, and are required to serve a 3-year Army Education Requirement Board (AERB) utilization assignment. Discipline allocations for fiscal year 1985 are in the additional specialties of 23, 25, 45, 46, 49, 51, 52, 53 and 54.

Mandatory prerequisites for officer attendance:

- Have an acceptable educational background and a demonstrated academic capacity to successfully complete the selected course of study.
- Have a military service performance record which indicates demonstrated abilities and potential for promotion and assignment to positions of increasing responsibilities. Have a manner of performance to support attendance.
- Have a demonstrated potential for graduate study as determined by satisfactory scores on the graduate record examination or the graduate management admissions test.
- Must normally have more than 5 and less than 13 years active federal service (AFS) when schooling begins. Selectees will not exceed a total of 17 years AFS.
- Must be primary service qualified (successful command and officer advanced course).
- Will have a three for one service obligation not to exceed 6 years.

The governing regulation for advanced civil schooling is AR 621-1. Officers may apply any time, through command channels. Applications should be sent to: DA, MILPERCEN, DAPC-OPE-PD ATTN: CPT Yingling, 200 Stovall Street, Alexandria, VA 22332-0400. For additional information call AUTOVON 221-7820.

Selection is based on a comparative evaluation of the overall military and academic records of officers who have applied. A validated AERB requirement in the discipline requested must exist for further consideration.

For professional development reasons officers must understand that upon completion of schooling, they will serve a 3-year AERB utilization tour. Your assignment officer can help you in constructing a time line. It is very important to ensure the officer allows sufficient time to return to troops as a major to remain competitive for battalion command.

Any university selected by the officer in accordance with the provisions of AR 621-1 and approved by CAD is acceptable so long as it offers a master's degree in the designated discipline. The university must be one that will grant the student instate tuition rates. Exceptions may be made on a case by case basis. The tuition is paid by DA and up to $600 per year for books and supplies is authorized. During the schooling period the officer student is assigned to the U.S. Army Officer Student Detachment, Ft. Benjamin Harrison, IN, for administration. The officer's progress is monitored by CAD through periodic grade reports.

Utilization assignments are served on various staffs and with research agencies in both CONUS and OCONUS commands/installations. Utilization assignments of 3 years are required and normally performed immediately following school.

Another program governed by AR 621-1 is training with industry. This program sends an officer usually for 1 year to an industry where the officer learns industrial management and procurement techniques. The individual then has a 3-year utilization tour. Prerequisites for attendance, qualifications and application procedures are similar to those for advanced civil schooling.

Personnel Changes/MILPERCEN

Change is a way of life in the military and during the past several months a considerable number of our aviators have moved on to new challenges. Shifting gears and heading off into new directions are the following aviators:

COL Tom Denney - Plans, Programs and Analysis Division to the U.S. Army Safety Center, Ft. Rucker, AL

COL Robert Wolf - Colonel's Assignments to the Office of the Inspector General at INSCOM

LTC (P) Ron Adams - Aviation Branch Chief to the National Defense University, Ft. McNair, Washington, DC

LTC Bob Vandel - Aviation Plans and Programs to the Federal Aviation Administration

MAJ (P) Joe Fucci - Lieutenant Colonel's Assignments to Ft. Stewart, GA

MAJ (P) Sam DeLoach - Aviation Plans and Programs to DCSLOG

MAJ Paul Whitaker - Captain's Assignments to the Armed Forces Staff College, Norfolk, VA

MAJ Steve Raho - Major's Assignments to the District Recruiting Battalion, Harrisburg, PA

MAJ Hank Hostetter - Aviation Logistician Assignments to the Command and General Staff College

CW4 Ted Hall - Warrant Officer Branch to the 101st Airborne Division (AASLT), Ft. Campbell, KY

The complexities of personnel management here at MILPERCEN can only be handled by individuals committed to doing the right thing for the officer and the Army. While the Aviation community here at MILPERCEN has lost a significant number of highly qualified Aviation administrators in recent months, we have seasoned replacements with new ideas and vigor.

Welcome aboard to the following aviators:

BG (P) Charles E. Teeter - Director, Officer Personnel Management

LTC (P) Moses Erkins - Chief, Aviation Branch

LTC Tom Garrett - Colonel's Assignments

MAJ (P) Jim Orahood - Chief, Aviation Plans and Programs

MAJ Pat Oler - Aviation Logistician Assignments, Aviation Branch

MAJ Dennis Schmidt - Major's Assignments, Aviation Branch

MAJ Bob Demers - Major's Assignments, Aviation Branch

CPT John Barton - Company Grade Assignments

CPT Stan Hinds - Aviation Plans and Programs

CPT Ray Nelson - Company Grade Assignments

CW4 Joe Hines - Professional Development, Warrant Officer Branch

CW4 Carl Heinze - Warrant Officers Assignments

New Army Experimental Test Pilots

On 8 June 1984, four Army officers successfully completed the rigorous 11-month Naval Test Pilot School at Patuxent River Naval Air Station, MD. Congratulations on a job well done to: MAJ Dennis W. Crowe, CPT John R. Martin, CPT Richard T. Savage and CPT Richard L. Vincent.

Those interested in applying for the Naval Test Pilot School, refer to DA Circular 351-82-5 for general information, prerequisites and application procedures.

Correction

The article entitled "Career Management Field (CMF) 67 Reclassification Update," which appeared on page 29 of the June 1984 issue of the *Aviation Digest,* was written by SFC Cary Roberts of the Enlisted Personnel Management Directorate of MILPERCEN. The *Digest* apologizes for the omission of SFC Roberts' byline.

THREAT BRANCH

Major Julius J. Zebehazy
Threat Branch
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

Second Generation Antitank Guided Missiles

Although it was initially believed that antitank guided missiles (ATGMs) did not pose any immediate threat to helicopters, recent indications are that the Soviets and Warsaw Pact countries are training with upgraded ATGMs for an antihelicopter role. This new development, second generation ATGMs, increases the possibility that helicopters are viable targets on the modern battlefield.

WITH THE advancement in ground and helicopter air-to-ground antitank weapons, a more effective and efficient means for countering threat armor has become a reality. The chilling realism however is two-sided, particularly since the advent of Soviet second generation antitank guided missiles (ATGM) such as the ground-launched AT-4/Spigot and AT-5/Spandrel and the air-launched AT-6/Spiral. As a pilot, you are probably asking yourself, "Why should such a great threat to armor or ground forces be that much of a concern to me?"

As an Army aviator, particularly a scout or attack pilot, you pose one of the most crucial threats to Warsaw Pact formations because of your ability to seek out, find, disrupt and destroy enemy forces well before any ground engagements. In turn, threat forces are well aware of your capabilities, and the modern battlefield will be filled with target acquisition means—from the human eye, to telescopic sites, to radar and forward looking infrared systems. (A typical Soviet army will have more than 300 acquisition radars.) Once acquisition has been made, you can expect to encounter every type of weapon system capable of reaching your position.

Now you are asking yourself another question, "Why should I worry about ATGMs?" Well, just as you have the benefit of extended range with your ATGM systems, so do the Soviets with their systems. But, you say, "I'll be moving nap-of-the-earth (NOE), and ATGMs are designed for air-to-ground or ground-to-ground use, so they shouldn't pose any danger to a hovering, hiding helicopter."

For some time the belief was, even by "the experts," that ATGMs were not of immediate concern to helicopters. Only recently, several indications have appeared where the Soviet and Warsaw Pact countries are training regularly with ATGMs in an antihelicopter role. Placards are being found in vehicles to assist in engaging helicopters; also, "home on helicopter" modes are found on newer non-ATGM systems. Let's take a closer look at the ATGMs that may be encountered and see if any questions or doubts about their usefulness or capabilities remain. The information in the figure is presented so you can make a comparison of the information currently available on the second generation systems.

It is common knowledge that the Soviets do not discard their old systems or equipment when newer follow-on developments are made. This simply means that the battlefield will be filled with every conceivable weapon they can devise. This does not suggest that newer, more efficient and more reliable weapons are not

Soviet Antitank Guided Missile Capabilities

	AT-4/Spigot	AT-5/Spandrel	AT-6/Spiral
Maximum range (meters)	2,000	4,000	5,000
Minimum range (meters)	70	100	500
Time of flight (sec)	11	20	Unconfirmed
Velocity (m/sec)	185	200	Unconfirmed
Warhead	Heat	Heat	Heat
Armor penetration (RHA)*	500-600	500-600	600-700
Guidance	SACLOS**/Wire	SACLOS/Wire	SACLOS/Radio Frequency
Launch platform	Manpack, BMP, BMD, BRDM-2	BRDM-2, BMP, BMD	Mi-8 Hip-E, Mi-24 Hind-E
First round hit probability	Greater than 90	Greater than 90	Greater than 90

*Rolled homogenous armor
**Semiautomatic command to line of sight

fielded as quickly as possible. In an earlier threat article (April 1982, *Aviation Digest),* ATGMs were addressed as both first and second generation. In just 2 short years, extensive modernization and upgrading of old ATGM systems has taken place.

The AT-4/Spigot is rapidly replacing the inaccurate, slower flying, and man-portable AT-3A/Sagger and is being used to supplement the AT-5/Spandrel on the BRDM-2. (A mix of AT-4 and AT-5 is possible with the BRDM-2 configuration.)

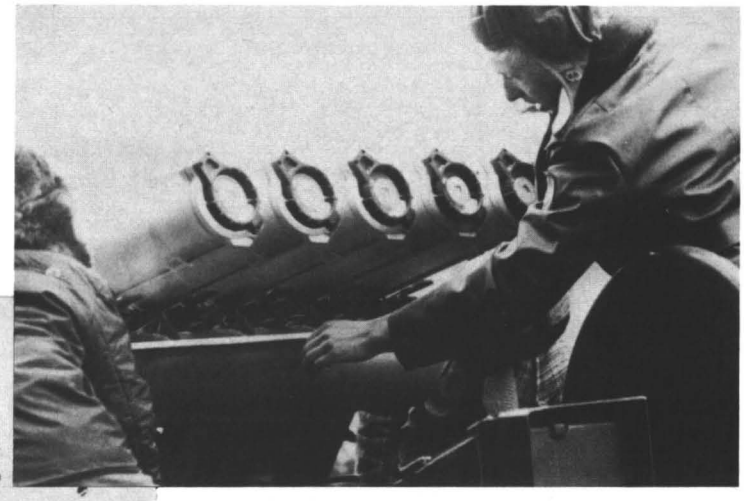
The AT-5 has largely replaced the singular and multiple vehicle-mounted AT-2/Swatter and AT-3/Sagger missile systems with frontline Soviet units. The AT-5 has been assessed as being equivalent to the U.S. TOW (tube-launched, optically-tracked, wire-guided) missile and is configured with five launch tubes with an internal vehicle rearm capability.

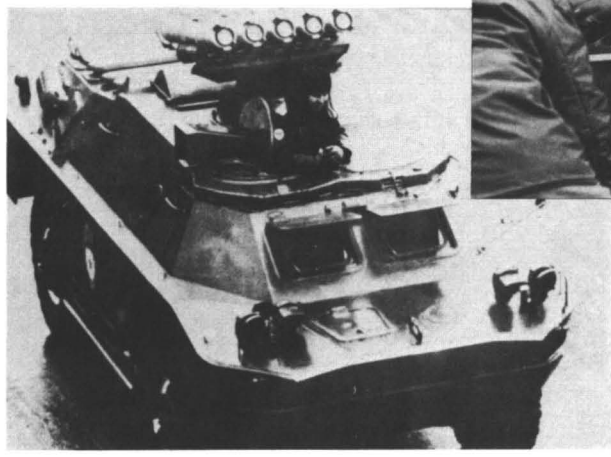
The AT-6 Spiral has been given a formidable launch platform—the Mi-8 Hip-E and the Mi-24 Hind-E. The AT-6 which replaces the AT-2C/Swatter on earlier Hip and Hind versions is the fastest known ATGM in the world (as fast as the SA-7 Grail). There also are strong beliefs that the Hind-E will carry more than four AT-6 missiles at one time (most common mix), since the aircraft does have the wing-mount capability for additional missiles.

As tanks and helicopters continue to improve, so too will the weapons for countering them. Second generation ATGMs are able to defeat any present day armor. You have read about a Soviet capability that will be found in great numbers on the modern battlefield, and it should be evident...*helicopters can become fair game to ATGM gunners.* One more important point to remember is you have to be seen to be targeted. Just as you may find difficulty in acquiring targets, threat gunners with their SACLOS systems also will have difficulty. The value of, and strict adherence to, NOE flight cannot be overemphasized. A first round hit probability of more than 90 percent does not allow much margin for error.

This article was meant to make you more aware of the Soviet threat. You should give a lot of thought to the tactical training needed to increase your effectiveness on the modern battlefield. There are means of defeating,

Second Generation Antitank Guided Missiles.





AT-5 Spandrel (left and above).

AT-4 Spigot.

countering and evading ATGMs as well as other anti-helicopter weapons; however, the level of training you allow yourself to achieve may be your only means of completing your mission. True, there are many more "threat" systems to be concerned with, such as air-to-air missiles and tank main guns that are capable of repeated hits on a fast-moving helicopter within the tank's maximum effective range. But remember, with a large number of vehicle- and air-mounted ATGMs and the likelihood that Soviet systems such as the Hind-E and BRDM-2 will have missions more in line with countering our armor and any system that may counter their tanks, the probability of being engaged by ATGMs is very high. Also, keep in mind one of the Soviet's common tactics—massing fires.

Second generation ATGMs are only one of the continuing developments from Soviet and Warsaw Pact countries. Much of the information within this article was obtained from data contained in the draft FM 100-2 series, "The Soviet Army" to be published this year, which should become part of every Aviation unit's *must read-and-know* file. The more knowledgeable you become about a probable enemy and his equipment, the more likely you *can* survive to become an Army asset capable of fighting (flying) another day.

OH-58 LOSS OF TAIL ROTOR EFFECTIVENESS

WHY IT OCCURS

A recent study to isolate the cause of loss of tail rotor effectiveness (LTE) and to recommend corrective actions was conducted by a Joint Special Study Group. The study revealed LTE is not synonymous with only OH-58 helicopters, but can occur in any single rotor helicopter. Specifically, LTE is produced by wind velocities, tail rotor thrust variations and tailwinds. This article identifies 15 maneuvers which can significantly increase the possibility of LTE and 3 product improvements with proven capabilities to avoid the occurrence of LTE.

Captain David M. Snellen
Office of TRADOC System Manager
for Scout Helicopters
U.S. Army Aviation Center
Fort Rucker, AL

THE OH-58 KIOWA aircraft and crew were engaged in a single ship aeroscout mission searching for an air defense artillery (ADA) site. The aircraft was being operated at 2,850 pounds and with a left crosswind of 5 knots. The pilot was hovering the aircraft along a narrow dirt road at an altitude about 10 feet above 50 foot trees. As the aircraft slowed below effective translational lift (ETL), the aircraft began a slow, uncommanded right yaw. The pilot immediately diagnosed the problem as loss of tail rotor effectiveness, even though he realized none of the normal conditions that produce this condition existed. He immediately removed some left pedal and maintained his collective. This caused the aircraft to yaw right at an increasing rate. As the aircraft continued its turn into a tailwind condition, the pilot applied right forward cylic and further reduced left pedal. This allowed the turn to accelerate into a nose low, rolling spin. The aircraft completed one turn after it accelerated into a spin, at which time the pilot closed the throttle and autorotated into a small clearing in the trees. During the descent, both main and tail rotor blades made contact with trees. The aircraft rolled to the left and impacted hard on its left side.

Why did this pilot crash? The pilot's preflight planning was by the book. He reacted with the published emergency procedure. The performance planning card indicated he should have sufficient left pedal. Just what is loss of tail rotor effectiveness (LTE)? The accident investigation team said the pilot was flying in an LTE "conducive" environment. What is an LTE conducive environment? Someone needs to find out what is going on.

The Department of the Army (DA) tasked Training and Doctrine Command (TRADOC) in May 1983 to establish a TRADOC/Army Materiel Development and Readiness Command (DARCOM—now called Army Materiel Command) OH-58 LTE Joint Special Study Group (JSSG). The JSSG was given the mission to conduct sufficient studies, tests and analyses to identify and isolate the LTE phenomenon, *and* to determine corrective actions. The purpose of this article is to explain what LTE is and why the OH-58 is subject to this phenomenon. A summary of the testing efforts and recommendations made to the DA staff are also included.

To understand LTE, the pilot must understand the function of the tail rotor. The tail rotor's function is to counteract the torque generated by the main rotor. On American made single rotor helicopters, the main rotor rotates counterclockwise. The torque produced by the main rotor causes the nose of the helicopter to turn right. The tail rotor counteracts this inherent right yaw with a thrust that pushes the nose left. Therefore, the tail rotor thrust provides directional control. Tail rotor thrust is the result of tail rotor blade pitch which is controlled by the pilot. If the tail rotor generates more thrust than is required to counter the main rotor torque, the helicopter will yaw to the left; yet, if less tail rotor thrust is generated, the aircraft will yaw to the right. By varying the thrust generated by the tail rotor, the pilot can control the heading of the helicopter.

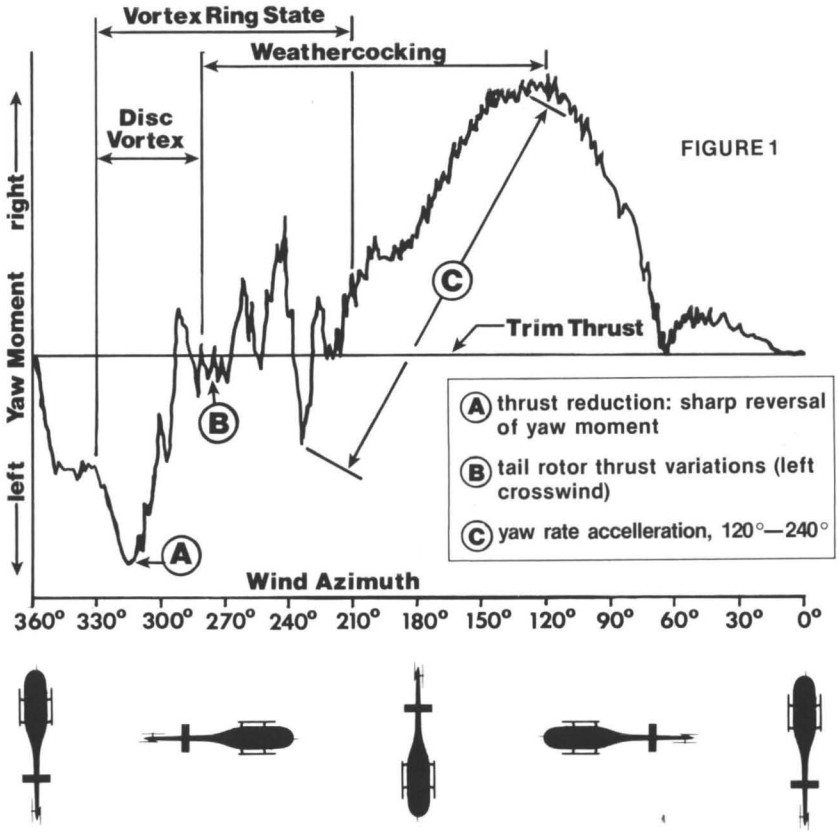
In a sterile, controlled environment, for a given main rotor torque setting, there is an exact amount of tail rotor thrust required to prevent the helicopter from yawing either left or right. This is known as tail rotor trim thrust. However, the environment in which Army scout pilots fly is neither sterile nor controlled. They are continuously subjected to constantly changing wind directions and velocities. The required tail rotor thrust in actual flight is modified by the effects of the wind. If an uncommanded right yaw occurs in flight, it may be because the wind reduced the tail rotor "effective" thrust. The wind can also *add* to the tail rotor thrust. In this case, the helicopter will react with an uncommanded left yaw. In other words, the winds can and will cause tail rotor thrust variations to occur. Certain relative wind directions are more likely to cause tail rotor thrust variations than others. These relative wind directions or regions form the LTE conducive environment.

The JSSG conducted extensive testing to identify the LTE conducive regions and the effect they have on the aircraft. Figure 1 will be used to explain these regions. The data contained in figure 1 was derived from wind tunnel tests of a model OH-58 and serves to illustrate the yaw moment (static stability (see Field Manual 1-203, paragraph 5-49)) characteristics of the OH-58 for variations of wind azimuth at a constant wind velocity. In layman's language, for the pilot to maintain a constant heading at a given relative wind direction, he must maintain the tail rotor thrust at a value equal to the trim thrust. Thus, if the trace is moving downward (positive stability), the pilot must decrease the left pedal input or the helicopter will yaw to the left. When the trace is moving upward (negative stability), the pilot must add left pedal or the aircraft will yaw to the right. The steepness of the slope indicates how fast the pilot must react with corrective pedal. The magnitude of the variation is an indicator of how much corrective pedal would have to be applied. The bottom axis is the direction of the wind relative to the nose of the aircraft. The main rotor was producing lift and the tail rotor was fixed at a constant pedal setting. So, any changes in the trace can be attributed to the effects of the wind.

Through flight and wind tunnel testing, the JSSG was able to identify three distinct relative wind regions that either singularly or in combination can create an LTE conducive environment. These wind regions are shown in figure 1.

First, winds at velocities of about 10 to 30 knots from the left front can blow the main rotor disc vortex into the tail rotor. This main rotor disc vortex is a circular, rotating column of air that can be deflected into the tail rotor by the relative wind. When the tail rotor comes into the presence of the main rotor disc vortex, the tail rotor can experience a reduction of thrust. The reduction in tail rotor thrust comes from the air flow changes experienced at the tail rotor as the main rotor disc vortex moves across the tail rotor disc. This thrust reduction will occur suddenly, as shown by the sharp reversal of the yaw moment at point A, figure 1. Under normal conditions, this can occur when the relative wind azimuth is between 280 and 330 degrees. LTE can occur if the pilot does not quickly react by applying additional left pedal. The helicopter will yaw to the right because of the reduced tail rotor thrust and resultant lack of trim. When operating within the vicinity of this region, the pilot must be aware that the reduction in tail rotor thrust can happen quite suddenly and he must be prepared to counter that reduction with additional left pedal input.

Second, a tail rotor vortex ring state does exist in a relative wind azimuth of 210 to 330 degrees (left crosswind). As the inflow passes through the tail rotor it creates a tail rotor wash to the left. A left cross-



wind will oppose this tail rotor wash. This causes the vortex ring state to form which causes a nonuniform, unsteady inflow into the tail rotor. The net effect of the unsteady inflow is an oscillation of tail rotor thrust about its trim value. This is why when the pilot is hovering in a left crosswind, he will be making rapid and continuous pedal movements. In actuality, the pilot is attempting to compensate for the rapid changes in tail rotor thrust. These tail rotor thrust variations can be seen at point B, figure 1. Because these tail rotor thrust variations do occur very rapidly, LTE can occur when the pilot overcontrols the aircraft. The pilot simply is not fast enough to react to each variation and he will be applying right pedal when he should be applying left pedal. Remember, when the thrust being generated is less then the thrust required, the helicopter will yaw to the right. When hovering in left crosswinds, the pilot must concentrate fully on flying the aircraft, and by smoothly coordinating his pedals, not allow an uncontrolled right yaw to develop.

Third, tailwinds from 120 to 240 degrees, like left crosswinds, will cause a high pilot workload. The most significant characteristic of tailwinds is that they are a yaw rate accelerator. The region of 120 to 240 degrees is actually an area of fuselage static instability. If the pilot allows a right yaw to develop and the tail of the helicopter moves into this region, the yaw rate can accelerate rapidly. This accelerative moment can be seen at point C, figure 1. It is imperative that the pilot maintain positive control of the yaw rate and devote his full attention to flying the aircraft when operating in a downwind condition.

Figure 2 summarizes the LTE conducive regions when viewed from above. Note that the regions do overlap and be aware that the most pronounced thrust variations can occur in the overlapping areas. Understand that these regions are not unique to the OH-58. To a varying degree, all single rotor helicopters can experience LTE.

It has been stressed repeatedly in this article and in the operator's manual that the pilot must concentrate fully on flying the aircraft. If the pilot fails to detect and correct the initial yawing rate, the situation can rapidly get worse. Two seconds may very well mean the difference between a successful mission or an accident.

The JSSG was able to disprove several myths associated with LTE. Important points to remember are:

- The tail rotor, even with yaw rates in excess of 115 degrees per second (DPS), does not stall.
- The tail rotor on a standard OH-58 can stop a yaw rate in excess of 115 DPS if forward cylic and full left pedal are applied and held.
- In no case will the application of left pedal aggravate the situation.
- The OH-58 can be flown safely in the terrain flight environment if the pilot will concentrate fully on flying the aircraft.

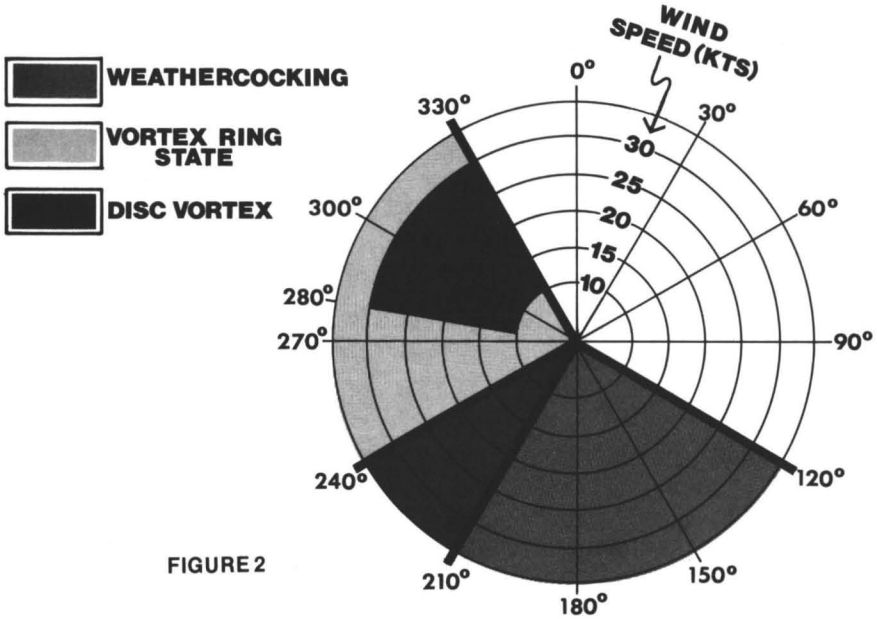


FIGURE 2

The JSSG membership included technical experts from the U.S. Army Aviation Center, the TRADOC System Manager for Scout Helicopters (TSM-SH), the Army Safety Center, the Readiness Project Office for Scout/Observation Helicopters, and the Army Aviation Research and Development Command (now U.S. Army Aviation Systems Command). Additionally, Bell Helicopter Textron (BHT) personnel, to include test pilots and engineers, participated in the study effort. Thus, individuals with a broad base of knowledge and expertise that extended from theoretical aerodynamic design and engineering to combat employment of the OH-58 were available to draw upon at all times.

The methodology for the study effort was designed to get good answers within a resonable time. The first order of business was to conduct a thorough review of OH-58 LTE accident data. Next was a review of all existing data that could be derived from past OH-58 flight tests and analyses. Additional tests and analyses were then initiated to better understand and document the phenomenon.

The final steps were to pull together and evaluate what was learned, to develop sound findings and recommendations, to brief decisionmakers and to publish a comprehensive report. The Army is now implementing the study group's recommendations. The remainder of this article will focus on the rationale for these recommendations.

A majority of the actual in-flight testing was conducted by BHT at its test facility in Ft. Worth, TX. The aircraft used was a fully instrumented OH-58C. Onboard recorders and a telemetry link to ground based sensors provided real-time traces of the control motion and aircraft response. By using this real-time output, engineers were able to quickly evaluate test results and direct new tests based on these results. It was using this method that the present emergency procedure contained in the OH-58 dash 10 was developed. All possible combinations of collective, cyclic and pedal inputs were evaluated to find which inputs were most effective in stopping an uncommanded right yaw.

The study group quickly determined that the emergency procedure in the dash 10 was incorrect. Any decrease of left pedal input caused a very rapid increase in the right yaw rate. Increasing collective would cause the aircraft to climb, but would increase the yaw rate. Lowering the collective would slow the yaw rate, but the resulting descent could require an excessive application of collective to arrest. Torque readings of 100 percent or higher and altitude losses of 30 to 40 feet were common. Right-forward cyclic would introduce a rolling moment to the right yaw. Aft cyclic would increase the yaw rate. Forward cyclic would slow the yaw rate.

The new emergency procedure contained in the OH-58 operator's manual was formulated upon review of this test data. The new procedure was tested repeatedly with right yaw rates in excess of 115 DPS. *Left pedal and forward cyclic always stopped the spin.* This was true with either the standard or the improved tail rotor.

The warning in the dash 10 about the use of collective was included for two reasons: An altitude loss of 30 to 40 feet can be disastrous when flying nap-of-the-earth (NOE); and, a rapid increase in collective to avoid striking obstacles could cause a main rotor bleedoff which would further aggravate the spin rate.

Numerous aircrew training manual (ATM) flight maneuvers were also flown using the instrumented aircraft. The intent was to determine why certain maneuvers are more likely to cause LTE than others. It was found that any maneuver which required the pilot to operate in a high power, low airspeed environment with a left cross or tailwind created an LTE conducive condition. Within the OH-58 ATM, there are 15 maneuvers or tasks which place the pilot in possible conditions conducive to LTE. They are:

2501 Normal Takeoff
2502 Simulated Maximum Performance Takeoff
3502 Normal Approach
3504 Shallow Approach

3505 Steep Approach
3509 High Reconnaissance
3510 Confined Area Operations
3512 Pinnacle/Ridgeline Operations
4501 Instrument Takeoff
4512 Tactical Instrument Takeoff
5005 NOE Flight
5006 Masking and Unmasking
5007 NOE Deceleration
5009 Terrain Flight Takeoff
5010 Terrain Flight Approach

The new OH-58 ATM will identify these tasks and include a note to warn the pilot of the hazards involved.

As a part of the DA tasking, the JSSG was to develop and recommend a product improvement program which would apply any required fixes to the aircraft. A number of product improvements were analyzed, but only three were found to have a proven capability to decrease the occurrence of LTE. The components of each along with the planned implementation schedule is as follows:

• *Power Droop Correction Kit.* This kit is a commercial Bell 206 fleet-developed fix designed to eliminate uncontrolled and uncommanded power reductions. Sufficient kits will be purchased in fiscal year 1984 (FY 84), 85 and 86 to retrofit the OH-58 fleet. Installation will begin in FY 85 with expected completion by 4th quarter FY 87.

• *Improved Tail Rotor.* This improvement replaces the complete tail rotor drive train and installs a larger diameter tail rotor on the aircraft. This will increase the amount of tail rotor thrust available to the pilot to arrest an uncommanded yaw. There will be 585 Cs and 582 As so modified. Expected completion date for the improved tail rotor is 4th quarter FY 86 for both models.

• *Stability Control Augmentation System (SCAS).* An SCAS incorporates pitch, roll and yaw stabilization into the aircraft's flight control system. It will reduce pilot workload and reduce over-controlling of the helicopter, particularly during crosswind and tailwind conditions. SCAS is scheduled for procurement in FY 86 with delivery in early FY 88. It also will be installed on the 585 Cs and 568 As mentioned above. Installation of the SCAS should be complete by 4th quarter FY 90.

Each improvement has been qualified and is available as an "off the shelf" product. However, time will be needed to produce and install the product improvement kits. The number of A models mentioned above is the projected number which will be performing an active scout role in the 1990s. This number includes National Guard and Reserve requirements. All OH-58C models are considered scouts and will receive the improvements. The dates mentioned above, of course, are dependent upon no subsequent cuts in funding.

By the time this article is published, most of the recommendations submitted by the JSSG will have already been implemented. A summary of the recommendations and the actions taken are as follows:

• Approve funding for the product improvement program. This recommendation is being implemented as explaned above.

• Disseminate the JSSG LTE findings to the field. The Aviation Center (TSM-SH and Directorate of Evaluation and Standardization (DES)) has been involved actively in disseminating the findings to the field. DES will continue to answer questions and present the findings during its units visits.

• Incorporate LTE cautions into the OH-58 ATM. The new OH-58 ATM will contain the LTE cautions as stated above.

• Develop and distribute a revised LTE videotape. The Aviation Center will develop and distribute an accurate LTE videotape. Unit distribution should begin in FY 84.

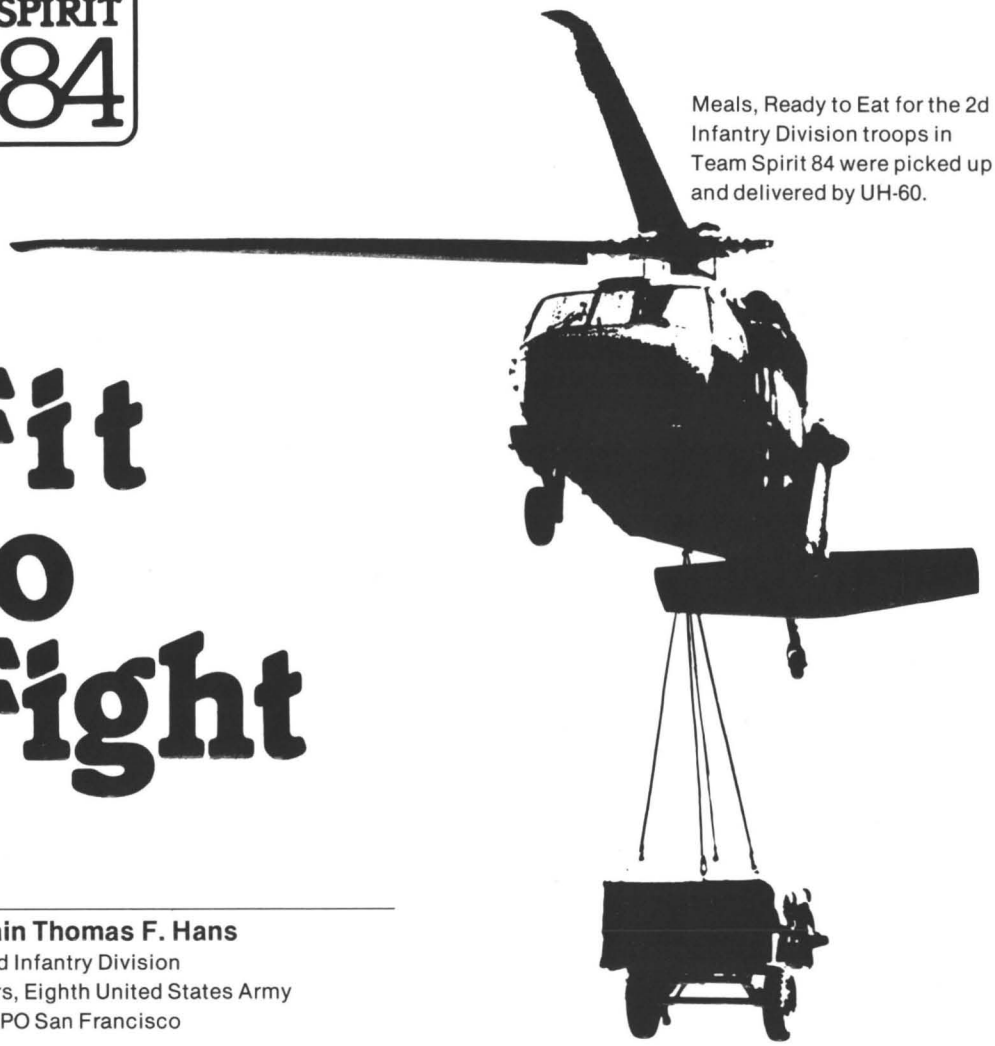
• Establish a program for continued LTE investigation. When compared to main rotors, relatively little research has been conducted to gain a full understanding of the engineering aspects of helicopter tail rotor aerodynamics. Army Materiel Command is responsible for establishing this program.

The OH-58 loss of tail rotor effectiveness phenomena is now much better understood and the operator's manual changes provide the information to avoid or react to LTE. For the long term, Army decisionmakers have developed a plan to incorporate hardware fixes to the aircraft. Meanwhile, by maintaining an acute awareness of wind and its effect upon the aircraft, you can significantly reduce LTE exposure.

Using the information presented here, the accident scenario that began this article would have read like this:

The OH-58 aircraft and crew were engaged in a single ship aeroscout mission searching for an ADA site. The pilot and copilot had discussed cockpit teamwork and it was agreed that the copilot would do the navigating and all radio communications except for flight following. The pilot would coordinate flight following and fly the aircraft. The aircraft was being operated at 2,850 pounds and with a left crosswind of 5 knots. The pilot was hovering the aircraft along a narrow dirt road at an altitude about 10 feet above 50 foot trees. As the aircraft slowed below ETL, the aircraft began a slow, uncommanded right yaw. The pilot immediately diagnosed the problem as the beginning stages of loss of tail rotor effectiveness. He immediately added additional left pedal to correct the yaw and applied forward cyclic to accelerate through ETL. The ADA site was located about 10 km further down the road. The copilot coordinated and adjusted the artillery fire and the target ADA site was destroyed. The crew returned to homebase without further incident and was debriefed by the operations officer. The crew was congratulated again on a job well done.

TEAM SPIRIT 84



Meals, Ready to Eat for the 2d Infantry Division troops in Team Spirit 84 were picked up and delivered by UH-60.

Fit to Fight

Captain Thomas F. Hans
2d Infantry Division
Headquarters, Eighth United States Army
APO San Francisco

WARRIOR CONTROL...this is Comanche 44, entering Corridor 20...over. This radio call occurs as an OH-58 Kiowa scout helicopter passes over Freedom Bridge en route to Camp Liberty Bell on the demilitarized zone separating North and South Korea. These calls are routine, as stringent control measures must be followed. North Korea is only a few kilometers away and war is a believable eventuality.

The mission belongs to the 2d Infantry Division. Its Aviation assets include the 2d Aviation Battalion and the 4th Squadron, 7th Cavalry—an air/ground cav unit. For Team Spirit 84, in which 2d Division elements served with the Blue Force, the assets were sliced to ensure that a potent real world punch remained in the division's operational areas that are the likely invasion routes leading from the demilitarized zone to Seoul.

During Team Spirit 84, the division relied heavily on these assets. One reason is that in the armor-restrictive, compartmentalized terrain of Korea, the agile helicopter often was the *only* thing bigger than a soldier that would fit the fight at hand. The primary reason is that Army Aviation is well established as a vital force in the Indianhead Division.

The 4/7th Cav went into the exercise with recently fielded UH-60 Black Hawk aircraft. The squadron completed the UH-1 Huey/UH-60 switch just 3 weeks prior to Team Spirit, which provided an almost *de facto* textbook setting for the new bird's debut. The Black

Hawk clearly established itself as a workhorse for the squadron. While in support of the close-in battle, the UH-60s inserted aeroreconnaissance squads and Republic of Korea commandos across the FLOT (forward line of own troops) and, in the main battle area and division rear, they provided the sustaining logistical support for the squadron.

During the first 4 days of the battle, while the Blue Forces were in a withdrawal and defensive role, 4/7th Cav aircraft were employed around-the-clock in critical reconnaissance-in-zone and security screen missions. During their turn at the offensive, a nonstandard mission was added to the squadron's normal reconnaissance and security role. It was task organized during brief periods to provide a provisional lift company, consisting of 11 UH-60s. This provisional unit gave the Indianhead Division the capability to move an extra rifle company in one lift. The cost was the "eyes and ears" capability; however, it proved to be a successful gamble. The additional assault forces were able to establish a bridgehead that cleared the way for the offensive crossing of the South Han River.

Unlike the 4/7th Cav, the 2d Aviation Battalion was in the middle of fielding its UH-60s during Team Spirit 84. Although the lift capability of the Combat Support Aviation Company was less than 30 percent of that required, its crews flew the equivalent air assault support for a full company. Bravo Company, the division's general support Aviation unit, provided a month's worth of normal garrison-level support during the 8-day field training exercise (FTX) phase of Team Spirit 84. The unit logged more than 500 hours while performing aerial observation, command and control support, logistical transport, air ambulance augmentation flights and electronic warfare support missions.

Significant missions carried out by the 2d Aviation included retrieving and distributing container delivery system (CDS) pallets of the new MRE (meals, ready to eat) combat ration that was provided to exercise forces for the first time in Team Spirit 84. Each day during the FTX, Air Force C-130s dropped 22 CDS pallets, containing the division's Class I resupply, into the rear area.

The battalion also positioned and resupplied the division's VHF (very high frequency) multichannel communications modes. Communications for the division during Team Spirit 84 were the best ever, despite the rugged mountainous terrain of the maneuver area. A good portion of this success is credited to the increased utility of the Black Hawks which, with both external and internal loads, provided support to the remote mountain sites.

A UH-1 command and control console aircraft from the 2d Aviation Battalion was employed as an airborne fire support planning and coordination platform. Aboard it were a fire support officer, air liaison officer (U.S. Air Force) and an attack helicopter battle captain. Code named FIRECAT, the aerial platform coordinated fire support of artillery, close air support and attack helicopters in selected critical battles.

Team Spirit 84 provided Indianhead Aviation units the opportunity to assimilate new equipment into their tactics as well as to conduct realistic training over the terrain that they may one day be called upon to defend.

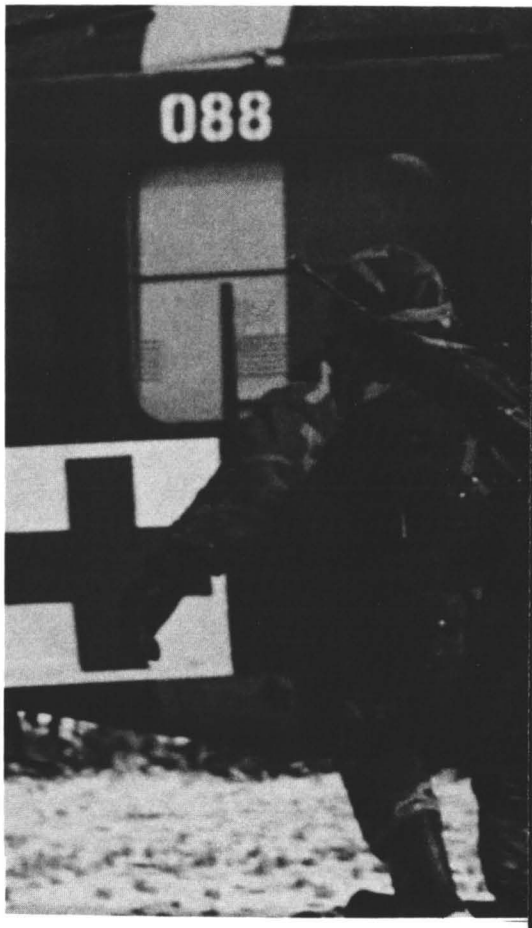
RIGHT: An AH-1S helicopter from the 2d Infantry Division hovers behind trees near an M198 towed howitzer to await the Orange Force attack in mountainous terrain north of Wonju.

BELOW: The curious got even more curious in Team Spirit 84. Children of Korean farmers gather at a laager site where 2d Infantry Division Black Hawks made their first appearance in the exercise.

MONTHLY WRITING AWARD

TEAM SPIRIT 84

Dustoff Does It Better



Captain Thomas Bailey
377th Medical Company (AA)
Headquarters, Eighth United States Army
APO San Francisco

HELICOPTER evacuation of wounded from the battlefield was born during the Korean War, matured into "Dustoff" in Vietnam, and, today, saves hundreds of lives around the world each year. In Korea, this tradition of selfless service is carried on by the men and women of the 377th Medical Company (Air Ambulance).

The lineage of the 377th goes back to the 57th Medical Detachment (Helicopter Ambulance), a unit that was once commanded by Major Charles L. Kelly—the man who was responsible for the Dustoff call sign and was the first Medical Service Corps (MSC) officer to be killed in Vietnam while performing medical evacuation (medevac) duty. Since the early 1950s the 377th has seen many changes. More are coming this year when its 18 UH-1V helicopters will be replaced by 25 UH-60s, making it the largest Black Hawk unit in Korea. The unit is an element of the 18th Medical Command and relies on Eighth U.S. Army Aviation standards for Aviation standardization guidance.

The primary mission of the unit is to provide aeromedical evacuation of critically ill or injured U.S. Forces personnel throughout the Republic of Korea (ROK). Secondary missions include moving medical personnel, equipment, supplies and "biologicals" such as blood, whenever or wherever needed.

Aeromedical evacuation support to the ROK and other allied forces is provided on a case-by-case basis with prior United Nations Command approval. In fiscal year 1983, the company—composed of 10 MSC officers, 29 warrant officers and 97 enlisted personnel—flew a total of 4,611 flight hours, including 1,143 hours of 537 medevac missions.

To facilitate mission accomplishment, the 377th is organized into six separate sections: company headquarters, flight operations, three air ambulance platoons and a service platoon. Headquarters, two flight platoons, and the service platoon are located at Seoul Air Base (K-16), just south of Seoul. Three other flight platoons operate on an area basis designed to minimize

A Dustoff helicopter from the 377th Medical Company (Air Ambulance) picks up simulated casualties at a rice paddy.

mission reaction time. Each platoon has unique requirements.

The 1st Platoon, or Dustoff North, operates out of the 2d Infantry Division's 2d Medical Battalion helipad located at Camp Casey, about 30 miles north of Seoul. Dustoff North is responsible for medevac missions originating north of Seoul to the 151-mile long demilitarized zone (DMZ) dividing North and South Korea. Missions in this area are roughly divided between medical treatment facility transfers and onsite injury pickups in support of the Indianhead Division's maneuver battalions. Mission demands are most difficult at Dustoff North because of the proximity of the DMZ and the frequency of training by the 2d Division in the rugged ranges of that area. This requires that the 377th commander be extremely selective in assigning pilots to the 1st Platoon. About one-half of the pilots there were first assigned to the 2d Platoon (Dustoff Central) and subsequently transferred north. Each 1st Platoon pilot must initially qualify and then requalify every 90 days to fly in the northern tactical zones, DMZ flight corridors, no-fly line, Joint Security Area (Panmunjom), and adjacent to the Seoul prohibited area.

Procedures to prevent overflights of the DMZ and other restricted zones are very stringent. They require close adherence to flight plans, radar coverage, frequent position reports, warning broadcasts and headings for departing the area if the crew becomes disoriented. In addition to qualifying as a pilot in command (PIC) for regular medevac missions, Dustoff North's PICs must be able to fly the DMZ flight corridors and no-fly line by memory, pass numerous written and verbal tests, and memorize the requirements set forth in Eighth Army regulations.

The 2d Platoon is located 40 miles south of Seoul at Osan Air Base. Its area of coverage extends from Seoul southward to about halfway between Osan and Taegu. Like Dustoff North, Dustoff Central is manned on a rotational basis. One crew, consisting of a pilot, copilot, medic and one crewchief, remains on standby duty from

Monday to Friday. On Friday, the crew is replaced by a new crew which stands duty until Monday when the process starts all over again.

The 3d Platoon, Dustoff South, is a geographically remote element permanently stationed at Taegu. It covers the remainder of the ROK. Due to the off-station time involved in flying to the 121st Evacuation Hospital in Seoul, most of Dustoff South's patients are transferred to a 2d Platoon aircraft at Camp Ames near Taejon for onward evacuation.

In all three platoons, when a medevac is requested, things happen quickly. Both pilots verify the location of the patient for accuracy and the PIC confers with the medic on the nature of the mission and any special equipment needed. Meanwhile, the copilot and crewchief prepare the aircraft for takeoff. The pilot checks the weather and files a flight plan—all of this usually in a matter of no more than 5 minutes from mission notification to takeoff.

The 377th is also tasked each year to provide medevac support for all Team Spirit participants. In 1984, the support plan was significantly revised. The 377th's commander, Major Stanley C. Marcieski, took the company into Team Spirit 84 as a totally deployed unit, rather than providing medevac crews at different field sites as was done in past exercises. The concept was to provide maximum medevac coverage of the maneuver area while taking advantage of the tactical training opportunity. In previous years, communications difficulties had caused some delays in Dustoff response times. This year, with the entire unit deployed to the heart of the exercise area and with firm communications established by its Operations Section, medevac service was significantly improved.

Because of its special mission, the 377th begins support of Team Spirit earlier and continues longer than other Eighth Army Aviation units. One month prior to the field training exercise (FTX) phase of Team Spirit 84, the 377th positioned medevac crews to field locations to support arriving augmentation forces, primarily the 2d Brigade, 25th Infantry Division, from Hawaii. One aircraft was sent to Camp Page; one was situated at Camp Long; and a third was located at Yechon at a later date to support U.S. Marines of a readily deployable "light" battalion that came from Okinawa to support Army forces during the Blue offensive.

One week before the FTX began, the 377th deployed from K-16 to Romeo-400, an old Korean airstrip located some 55 miles southeast of Seoul near the city of Wonju. The medevac crews on duty at Camps Long and Page were reunited with the rest of the company at R-400 for the remainder of the exercise. From its field location, the 377th supported Team Spirit 84 while still maintaining regular medevac standby coverage at Camp Casey, Osan Air Base and Taegu.

Missions during the exercise were many and varied. They ranged from acute appendicitis to broken bones and concussions caused by overturned vehicles. Pickup zones were just as varied, from rice paddies to confined areas and radar sites on 5,000-foot pinnacles. During the 8-day FTX phase of Team Spirit 84, pilots of the 377th flew more than 400 hours, encompassing 50 aeromedical evacuation missions and various other medical support flights.

A Dustoff helicopter from the 377th Medical Company (Air Ambulance) picks up simulated casualties at a rice paddy during Team Spirit 84. The 2d Infantry Division provided the "victims" and the 377th's pilots moved patients by air during the mass casualty exercise.

45th TRANSPORTATION COMPANY KEEPS 'EM FLYING

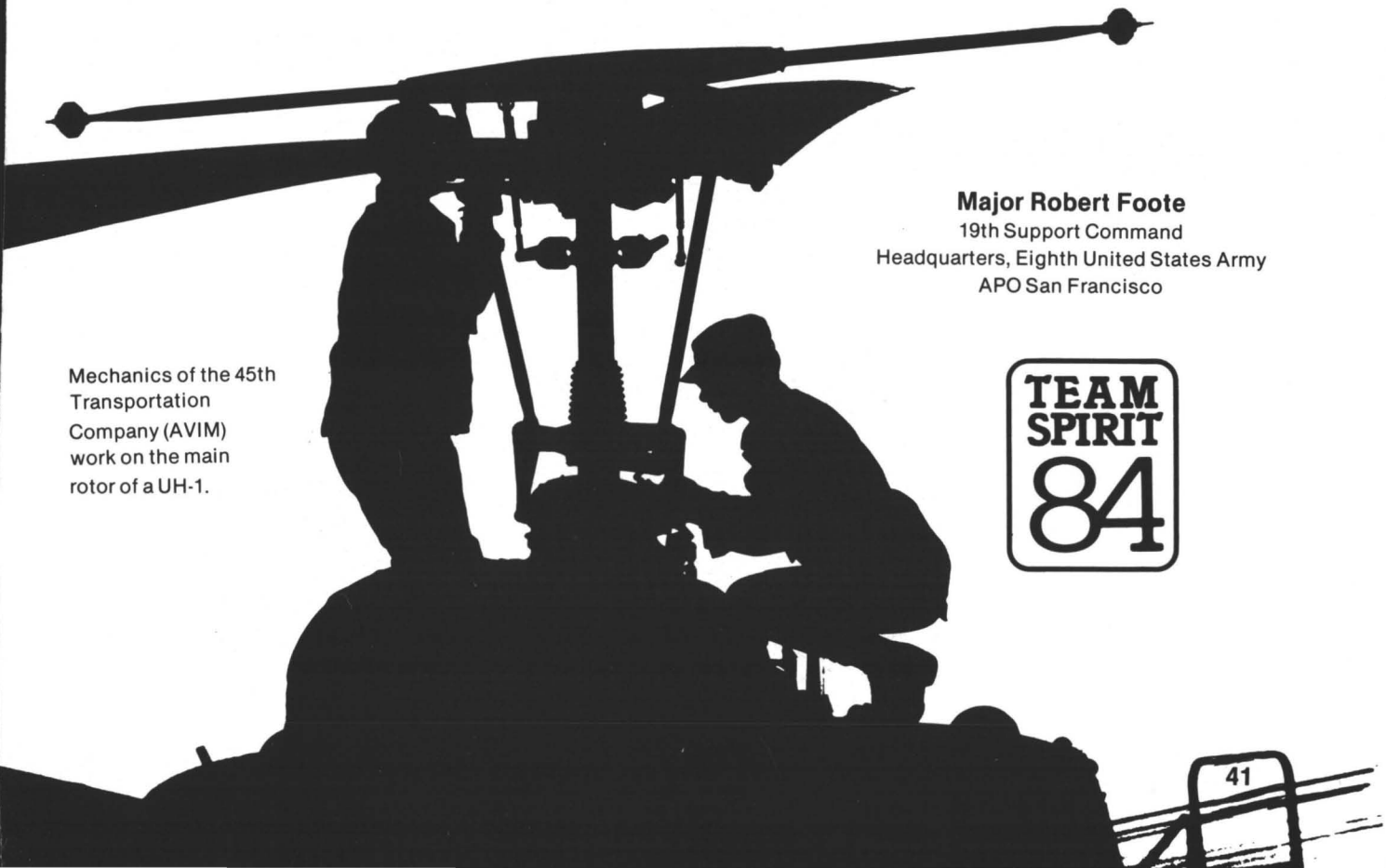
INTERMEDIATE level maintenance for nondivisional Army Aviation units is the province of the 45th Transportation Company (AVIM). The unit is part of the 194th Maintenance Battalion at Camp Humphreys, but its operations and capabilities can reach almost anywhere in the Republic of Korea where a bird needs help.

The unit designation, only the latest in an intermittent half century of Army life, describes very little the extent of the 45th Transportation's mission: In addition to providing intermediate maintenance support and repair parts supply for all nondivisional Army Aviation units in Korea, the company offers backup support to the U.S. 2d Infantry Division. In all, more than 300 aircraft of 7 types, both fixed and rotary wing, are supported for 16 separate unit customers.

One of its major 1984 missions, carried out even as the joint, combined exercise Team Spirit 84 got underway, has been the change in Army Aviation units from the UH-1 Huey to the UH-60 Black Hawk helicopter. These new utility aircraft are flown to Kunsan Air Base, Korea, by U.S. Air Force C-5 transport aircraft. There, a 45th Trans' maintenance contact team reassembles and readies the aircraft for flight upcountry and assignment to the gaining unit. Initially the Black Hawks have gone into either Eighth U.S. Army's 17th Aviation Group or the 2d Infantry Division; later this year, they will go also to the 377th Medical Company (Air Ambulance).

Putting together one of the U.S. Army's best combat multipliers is light-years away from the outfit that donned Army khaki as Company G, 2d Battalion, 49th

Major Robert Foote
19th Support Command
Headquarters, Eighth United States Army
APO San Francisco



Mechanics of the 45th Transportation Company (AVIM) work on the main rotor of a UH-1.

TEAM SPIRIT 84

45th TRANSPORTATION COMPANY

Quartermaster Regiment, on 10 February 1936. World War II service took the unit from Ft. Sill, OK, to Italy where in 1947 it was redesignated the 45th Transportation Corps Truck Company. Subsequently there was a series of unit activations and reorganizations. In 1960, the 45th Transportation Company (AVIM) set up shop in Korea under its present designation—a misnomer, say many, that is an anachronistic holdover from the fast-fading image of Army Aviation as merely a transport function.

Team Spirit 84 saw the 45th provide support from the port of Pusan in the south to an exercise zone that sprawled eastward from Seoul through rugged mountains, crossed the winding Namhan-gang (South Han River), and plunged through countless rice paddies and a few small towns and villages, to reach even more—and even more rugged—mountains. That, in a variety of weather, was the sandbox in which Orange and Blue Forces, the exercise opponents, alternated a variety of offensive and defensive operations—many highly dependent on Army Aviation.

The 45th's first job was to make sure that one of the major ground players—the Aviation assets of the Hawaii-based 25th Infantry Division deploying to Korea for its seventh Team Spirit exercise—would get into the fight. A 12-man maintenance contact team was located at Pusan port under the company's maintenance technician, CW3 Peter R. Fengl, to ensure the arriving

RIGHT: A team from the 45th Transportation Company (AVIM) at Camp Humphreys was at dockside in Pusan port when helicopters of the 25th Infantry Division arrived.

FAR RIGHT: Avionics specialists at the 45th Transportation Company check out the communications system in a UH-1.

BELOW: Company F, 25th Aviation Battalion, provided mechanics to work with the 45th Transportation Company (AVIM) in support of the 25th Infantry Division deployment.

aircraft were flight ready prior to deployment. Fengl said the experience had "tremendous training value" by giving his people "firsthand experience working on aircraft in a field environment." A total of 77 "Tropic Lightning" aircraft—CH-47 Chinooks, Hueys, AH-1 Cobras and OH-58 Kiowas—were brought by ship to Pier 8, reassembled and flown to the 25th's staging bases at Chunchon, Pyongtaek and Wonju.

The 45th also provided backup maintenance support to F Company, 25th Aviation Battalion, which maintains the divisional aircraft. Company F colocated and shared the 45th's facilities and equipment at Camp Humphreys. Major Michael A. Carothers, the AVIM unit commander, said the F Company personnel were fully integrated and worked alongside his own troops. "It was the ultra-example of teamwork," he commented, pointing out that one of the greatest training values of Team Spirit is that it provides a surge in work that realistically tests the unit's capabilities to support requirements in a near-combat situation.

During the exercise, support to regular customers continued, with more than 100 aircraft being serviced and component and avionics jobs numbering in excess of 1,000. CW3 Fengl explained that the regular unit customers were very helpful by scheduling their phased maintenance for completion prior to the exercise period. He said that doing so eliminated much of the routine work and allowed the 45th to take on the urgent jobs. Advanced planning also ensured adequate supply support; prepositioned stockage of repair parts was waiting for the 25th when its aircraft arrived.

The 45th Transportation Company's support of Team Spirit 84 ended right where it began, at dockside. CW3 Fengl's team went back to Pusan at the conclusion of the exercise to ensure that the redeployment of the 25th Division's aircraft went as well as their initial deployment several weeks earlier. And with all Team Spirit jobs completed, the company returned to its vital, fulltime employment: Keeping Eighth Army's aircraft flying.

"Hangar Talk" is a quiz containing questions based on publications applicable to Army Aviation. The answers are at the bottom of the page. If you did not do well, perhaps you should get out the publication and look it over.

FM 1-101

AIRCRAFT BATTLEFIELD COUNTER-MEASURES AND SURVIVABILITY

Captain Dale A. Hungerford
Department of Combined Arms Tactics
U.S. Army Aviation Center
Fort Rucker, AL

1. The ZSU-23-4 and S-60 are capable of which engagement modes?
a. Radar and optical
b. Radar and infrared
c. Optical and infrared
d. Radar and laser directive

2. Which of the following is *not* a passive radar countermeasure?
a. Use terrain flight techniques
b. Use an AN/APR 39 (V) 1 RWR
c. Use an AN/ALQ 136 radar jammer
d. Minimize the aircraft signature

3. When using the AN/APR 39 (V) 1 RWR, you may be receiving no warning indication but may still be tracked and engaged.
a. True
b. False

4. The SA-7 Grail is similar to the U.S. Redeye missile and is:
a. Radar-guided
b. Heat-seeking
c. Optically-guided
d. Radar, heat and optically-guided

5. The SA-9 Gaskin is employed in a complementary role in conjunction with the:
a. SA-8 Gecko
b. ZSU-23-4 Shilka
c. SA-3 Goa
d. SA-4 Ganef

6. To "stand-off" from the effective range of a known SA-7A Grail, an aviator *must* stay beyond:
a. 3.6 km
b. 4.8 km
c. 5 km
d. 12.5 km

7. Imitative and deceptive meaconing are the foremost deceptive threats to Army Aviation.
a. True
b. False

8. In order to plan for artillery coverage and to avoid flying into artillery coverage areas, you must know artillery:
a. Unit location
b. Type unit
c. Range capabilities
d. All of the above

9. The field of view for the AN/PVS-5 night vision goggles is:
a. 20 degrees
b. 30 degrees
c. 40 degrees
d. 60 degrees

10. The night vision goggles (AN/PVS-5) cannot be adjusted to compensate for individual:
a. Sight differences
b. Astigmatisms
c. Astigmatisms or sight differences

11. In an NBC environment what MOPP level must aviators be in when they begin their mission?
a. MOPP level 1
b. MOPP level 2
c. MOPP level 3
d. MOPP level 4

12. What four categories of nuclear effects are a danger to aircraft and aviators?
a. Pulmonary edema, cyanosis, electromagnetic pulse, miranda syndrome
b. Electromagnetic pulse, blast, nuclear radiation, thermal radiation
c. Nuclear radiation, gastroenteritis, malaise, blast
d. Dynamic overpressure, neurosis, cyanosis, thermal radiation

NOTE: If you have a question about aircraft survivability equipment write CDR, DCAT, ATTN: ATZQ-CAT-CA-M, CPT Hungerford, Ft. Rucker, AL 36362-5000 or call AUTOVON 558-6606/4882 or Commercial 205-255-6606/4882.

ANSWERS

1. a, page 2-8
2. c, page 2-8
3. a, page 2-10
4. b, page 2-26
5. b, page 2-22
6. a, Table 2-6, page 2-25
7. a, page 5-17
8. d, page 8-25
9. c, page 7-10
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11. d, page 6-33
12. b, page 6-9

U.S. Army Information Systems Command
ATC ACTION LINE

Pass the Weather Word

Thunderstorms

Thunderstorms can block off large portions of the airspace by erecting narrow barriers that extend for hundreds of miles in length, or by scattering individual cells over a large geographical area. They can stand alone, visible for many miles in all directions, or lay hidden in cloud cover. Aviators and air traffic controllers must have a working knowledge of thunderstorm dynamics to ensure Aviation safety.

FM 1-230, "Meteorology for Army Aviators," 30 September 1982, is a source of information for your review. Knowing the characteristics of thunderstorms and understanding the atmospheric forces that are responsible for their development enables aviators and controllers to apply current weather information to their respective missions.

Pilot Weather Reports

The Federal Aviation Administration, National Weather Service and several user group organizations are working on ways to improve weather information distribution and to increase the number and quality of pilot reports (PIREPs).

The source of these reports is the aircraft cockpit. No matter what other action we take in the air traffic system, the weather briefer is in the best position to alert the pilot of the *need* for PIREPs of weather conditions.

When the weather briefer says "we need PIREPs," ATC would appreciate a report of your climb-out conditions once you're on course. Contact the local weather station on the pilot to forecaster frequency, through the control tower or the local flight service station.

Pilot weather reporting doesn't end there. After receiving the PIREP, our ATC types and weather forecasters have to do their part. Input coding of the information is of prime importance. Many private weather services as well as government research and development groups are using the PIREP format parameters to index individual reports by grid location, altitude stratum and weather phenomena. Improper format input may cause the PIREP to be lost to these users. The ultimate purpose of the PIREP program is to ensure that the pilots are provided with the most timely and accurate weather information available.

Pass the Weather Word

In a continuing effort to improve Aviation safety, many procedures and weather products have been developed to assist us in observing, forecasting and disseminating hazardous weather information.

A new product available for use this season will be the *center weather advisory*. Prepared by a meteorologist at the air route traffic control center, these advisories will provide more timely and detailed information on significant weather activity and be immediately available for use by controllers.

Air traffic personnel should review the procedures for the handling and dissemination of weather advisories and other critical weather information, including PIREPs. Controllers, take a look at FAAH 7110.65, paragraph 41, to review these procedures.

For additional information or clarification, contact Mr. John McKeeman, AUTOVON 284-6304/7796.

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

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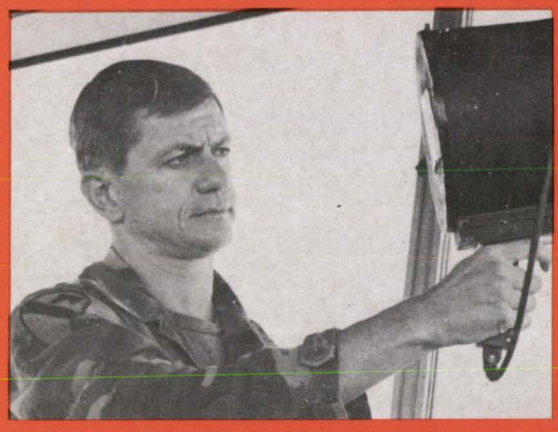
1984 ATC AWARDS

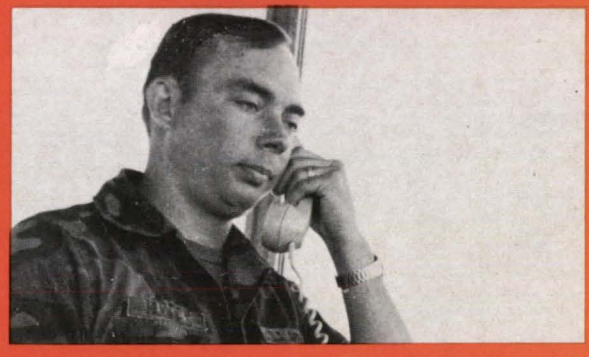
presented by the U.S. Army Information Systems Command, Fort Huachuca, AZ

Two Ft. Rucker, AL, soldiers recently were named Army Air Traffic Control Manager and Controller of the Year.



Army ATC Manager of the Year is CW2 Richard J. Wallach (above). As manager in charge of quality assurance for the Army Communications Command (now Army Information Systems Command) Signal Battalion at Ft. Rucker, he supervises a team of four controllers and one maintenance technician. They are responsible for the quality inspection of 27 air traffic control facilities. Mr. Wallach's managerial excellence goes well beyond the norm of ATC duties.

Army ATC Controller of the Year is SP5 William J. Hughes (below), shift supervisor for Ft. Rucker's Shell Tower. In addition to being named Army ATC Controller of the Year, Hughes recently received the Army Achievement Medal and was the first time recipient of the Aviation Safety Award. The award was presented for actions he took after observing a UH-60 Black Hawk helicopter in an abnormal operation. His swift reactions were responsible for getting rescue people in standby positions so that when the UH-60 crashed they were quickly able to bring medical attention to the Black Hawk crewmembers.



photos by SP4 Kelly Longbine