UNITED STATES ARMY

OCTOBER 1988

AVIATION DIGEST

Professional Bulletin 1-88-10

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PROFESSIONAL BULLETIN

1-88-10 • OCTOBER 1988

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Cover: **This month the *Aviation Digest's* theme is training; the lead article, "This Bandit's for You," begins on page 2. The author takes a realistic look at future air combat operations and sanctions *innovation* as the key to destroying enemy aircraft. Illustration courtesy of General Dynamics.**

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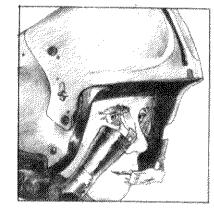

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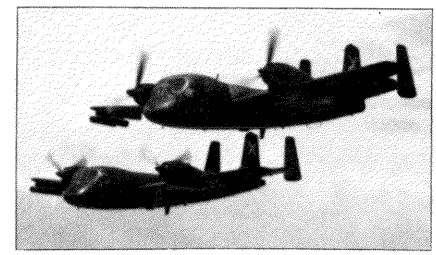

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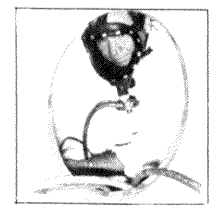

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Second class postage paid at Daleville, AL, and additional mailing offices.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-2. Complete DA Form 12-5-R and send directly to CDR, AG Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220. For any change in distribution requirements, initiate revised DA Form 12-5-R.

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

Those not eligible for official distribution or who desire personal copies of the *Digest* can order the magazine from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

POSTMASTER: Send address changes to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. ISSN 0004-2471

Major General Ellis D. Parker
Chief, Army Aviation Branch

TC 1-140 Update

WHEN TRAINING CIRCULAR (TC) 1-140, "Helicopter Gunnery," is distributed to the field next year, it will represent another milestone in our maturation as a branch. TC 1-140 is the latest product in a series of publications defining aerial gunnery dating back to the Armor Center's Field Manual (FM) 17-40.

The aerial gunnery tables presented in FM 17-40 were somewhat limited due to both the type of targets and the distance limitation of the ranges. A short-term solution to this problem appeared to be "flexible tables on flexible ranges" that allowed commanders to tailor their gunnery programs. This was accomplished in the fielding in March of 1985 of Field Circular (FC) 1-140.

FC 1-140 reflected the programs of the Standards in Training Commission manual, then Department of the Army (DA) Circular 350-85-4, which contains policies and procedures to plan, execute and resource training. It includes weapons qualification standards and requirements for the attainment and sustainment of crew proficiency. The tables written in FC 1-140 met the ammunition allocations anticipated from DA based historical data and on what we believed was needed to train and sustain crew proficiency. FC 1-140 was a good start point, but changes were needed to make it more definitive and prescriptive.

FM 1-140 was designed to give our commanders a minimum standard to train to based on each unit's mission and training resources and created separate tables for attack and cavalry aviation units. Although the mission of each type of unit is different, the same objective scoring standards are applied to ensure continuity among units. From input at the October 1985 gunnery conference, we found the flexible tables were not specific enough in stating the required task list for practice and qualification firing, thus leading to ambiguity in the application of scoring standards and confusion in ammunition requirements.

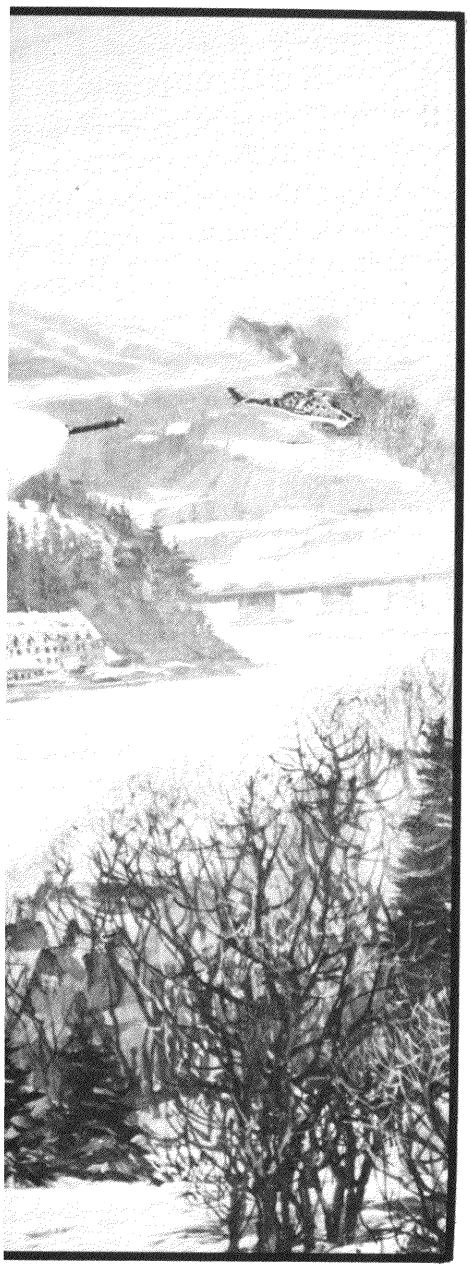
Given impetus from the DA Deputy Chief of Staff for Operations and Plans, Director of Training, and the input from the gunnery conference, I tasked the Directorate of Gunnery and Flight Systems to conduct a worldwide survey to determine the needs of Army Aviation in training and sustaining aviator gunnery skills. Ft. Rucker, AL, also hosted a user's conference to set standards for individual, crew and team tables and identify realistic ammunition training requirements. The data collected was used to justify ammunition requirements, compile an empirical data base for gunnery, and lay the groundwork for our procurement of additional targetry ranges and simulation devices. The major impact of TC 1-140 will be seen in several areas:

- Standardized/prescriptive tables.
- Tables above crew selected by mission requirements.
- Clearly identified and defined training requirements.
- Mandatory practice tables.
- Simulators/training devices incorporated into the gunnery training.

With minimum ammunition and a high degree of accuracy, aircrews must deliver first round hits that will destroy or neutralize the target. TC 1-140 emphasizes accuracy, efficiency and survivability and will be the total gunnery manual for all helicopter delivered air-to-ground munitions.

illustration courtesy of General Dynamics

THIS BANDIT'S



THE 217TH ATTACK Helicopter Battalion awakened early to respond to an unexpected enemy armored thrust through a thinly defended area. Bravo Company was out first on this cool, dark Bavarian morning. The shock of anticipated conflict had each man wound up like a spring. The combination of long hours, anticipated combat and unfamiliar terrain left each man numb but ready to kill tanks. "Lots of them" they had been promised by the commander. Moreover, there was a "this is payday" attitude about the mission. Six days of maneuvering had gone by without contact. Bad news and rumor surfaced by the buckets full. Now B Company had the chance to send a message of its own....

Four AH-1 Cobras on line with a pair of AH-64 Apaches from another unit and two OH-58D Kiowas with Stinger awaited the armored column. The Cobras had loaded all the ordnance they could carry and as little fuel as they could get by with. The operations officer had briefed the armor ambush thoroughly and the counterair plan almost as an afterthought. "Little likelihood of encounter," the intelligence officer had said. The counterair plan was pretty simple. Stingers and HELLFIREs would engage at greatest distance without any forewarning to the enemy. After commitment to the air battle, TOW would be used at 3,500 meters, flechettes at 2,500 meters and guns at 1,500 meters. Each pair of aircraft was assigned a zone of fire and, in theory, effective fire could thoroughly discourage anyone coming this way....

The scout platoon leader suddenly yelled over the radio, "Bandits, out of the north end (of the valley)...four...six... eight coming in staggered trail...6 kilometers! Holy %$-! Two Havocs on the ridge to the northwest, 3 kilometers!"

The Mi-24 Hinds seemed completely surprised, and lost two aircraft to Stingers almost immediately. The Mi-28 Havocs and Apaches saw each other at almost the same moment. A scout and an Apache exploded, followed by one Havoc. One pair of Cobras panicked and salvoed nails on the other Havoc. The remaining AH-64 fired a HELLFIRE on the Havoc, but not before it sent another Cobra into the trees without a tailboom. Without the Havocs to distract, the Hinds took a terrible beating. The TOWs took out two more, and another Stinger eliminated the fifth. Guns took out another Hind and damaged still another before the two survivors broke for cover. Our price: One OH-58 was destroyed, the crew was lost; one AH-64 was destroyed, the crew was lost; one AH-1 was destroyed, the crew was recovered with minor injury; and one AH-1 was damaged but remained mission capable. Charlie Company came up on the line as soon as they heard the fight was on but did not pursue because the bandits had departed before they could get there. The fight was over in less than 2 minutes.

FOR YOU

CW4 Clifford E. Whittum
CW4 E. Daniel Kingsley
Department of Gunnery and Flight Systems
U.S. Army Aviation Center
Fort Rucker, AL

THIS BANDIT'S FOR YOU

WE WON THIS one. If you are into air combat doctrine, you should know that you are supposed to be able to destroy enemy aircraft in an aerial engagement; however, no one has shown you how. I am referring to the fact that the Army has no air-to-air computers, very few Stingers and certainly no rocket on the shelf to kill aircraft. But we can destroy them. *There is a way to achieve these results that is realistic and possible with today's technology.* It will cost you nothing but training, Mr. Commander. It will cost you a little study, Mr. Pilot. This is the way I believe future air combat operations will be: One pass, with very few exceptions. The "weaponeering" training discussed in this article does not have all the answers, but it has more than the Army has taught me in 12 years. If we are serious about killing aircraft over the battlefield, *innovation* is the key. This article is about innovation at its best.

The Weapons and Gunnery Division of Department of Gunnery and Flight Systems (DGFS), Ft. Rucker, AL, was recently tasked to find a way for one moving platform to put effective fire on another. The problem seemed fairly simple on the surface, but it wasn't. The Army has worked on the problem of shooting down aircraft (other helicopters) since 1976 with little progress at the user level. It seems that, if someone could find a way to throw a nine-iron through a point in space at the same instant that a Hind occupied it, the Army would be willing to outfit its entire fleet with golf bags. So, using a World War II waist gunner's handbook, two friends worked out analog lead factors, applied the ballistic tables of current weapons to it and developed a simple and workable program to kill airplanes—a lesson plan showing how to kill one moving platform from another moving platform. *Did you get that?* This plan cannot be found anywhere else. Does it really work?

Believe it! A computer simulated engagement between an AH-64 at a hover and a bandit aircraft traveling at 140 to 150 knots indicated airspeed (Soviet doctrinal airspeed and employment) was conducted at a range of 1,500 meters. The bandit flew at a 90-degree aspect to the Apache, which is the most difficult type of engagement. (Aspect is defined as the range, direction, altitude and closure rate of one aircraft or formation in respect to another aircraft or formation.) The Apache killed the bandit with about 50 rounds (a 5-second burst, more or less) of 30 mm ammunition. Had it been a tail chase at 1,000 meters, the Apache would have killed the bandit in 25 rounds! What if the enemy had broken right or left during this tail chase? Well, I hope he packed a lunch. He was history in about 10 rounds. (The average was 5 rounds!)

Additionally, Teledyne Systems conducted a preliminary analysis, using this simulated engagement method, to determine the number of rockets that had to be fired and the range required to achieve the greatest percent of probability of hits. The results showed that three pairs of flechette rockets at 2,000 to 2,500 meters would have a very high probability of hit. This is a significant improvement over current capabilities with no new equipment and no new technology.

An outline of the seminar presentation follows. If you think this concept is valuable, inform your commander.

This concept of training requires a logical method of presentation. To manage this effort, first a review of the use of attack helicopter weapons and their effective capabilities is conducted. Figure 1 briefly shows how range factors may affect your selection of weapons.

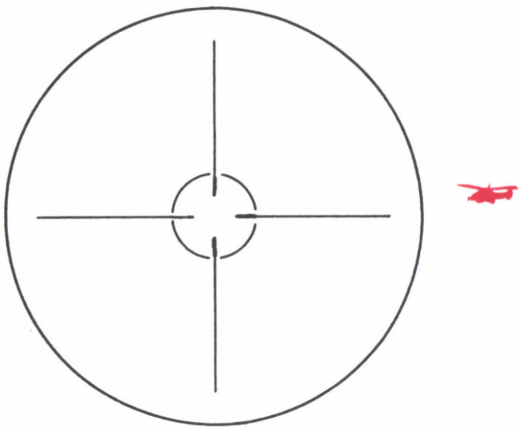
Next, standardized rules of "Kentucky windage" are developed. Considerable discussion is presented on the background behind these rules of thumb. Figure 2 summarizes these rules. Standard sights are shown with additional rings of measured mil value drawn onto the sight. Examples of sight pictures of enemy aircraft with common lead angles applied are also shown, first with, and then without, extra rings.

The objective of this part of the training is to give the pilot the ability to use "imaginary" rings when he is actually sighting a bandit and to instantly place the proper lead (in mils) on the target. The Kentucky windage rules teach the aviator to lead by a given number of mils and the classroom instruction shows him how to do this. Later in the instruction these rules are used to establish tables of engagement. The principle to be

FIGURE 1: Weapon selection.

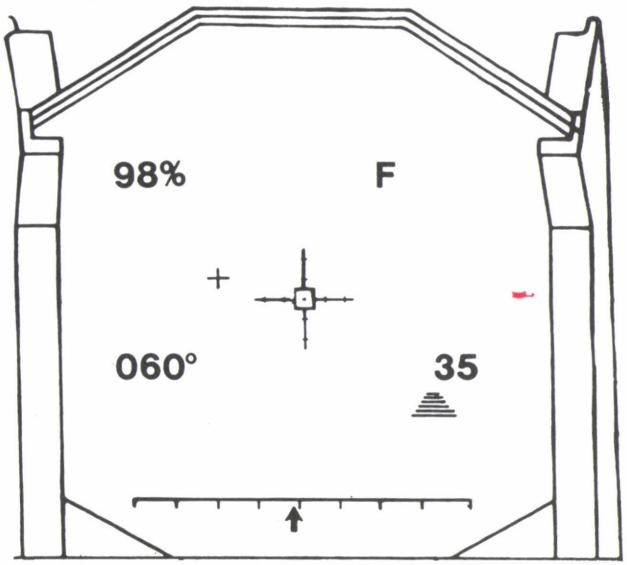
RANGE TO TARGET (METERS)	WEAPON SYSTEM
0 - 1,250	7.62 mm gun
0 - 1,500	20 mm/30 mm guns
700 - 2,500	2.75 inch rockets
2,000 - 3,750	TOW missile
2,000 - 8,000	HELLFIRE missile
1,000 - 8,000	Air-to-Air Stinger

Rule 1. *7.62 mm gun: "Lead the speed" of the target.* (If the bandit is going 140 knots, at a 90-degree aspect, lead it by 140 mils. If the bandit is going 140 knots, but is traveling only at a 45-degree azimuth, lead it by only half that or 70 mils.)



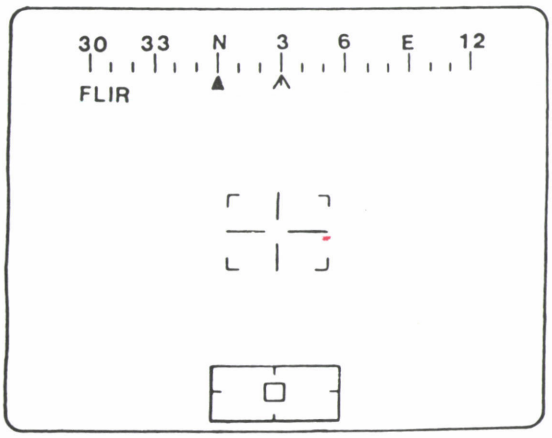
Mode of engagement—helmet sight system; bandit and speed—Hind, 140 knots; aspect = 45 degrees; range = 800 meters; (target measures 17 meters, or about 15 mils in the sight picture with this aspect); elevation = −4 mils; lead required = 70 mils (1/2 x 140 mils); range switch = short (1,000 meters).

Rule 2. *20 mm gun: "Lead the speed" of the target −20 percent.* (If the target is going 140 knots, lead 140 mils less 20 percent (28 mils). In other words, lead the target 112 mils.)



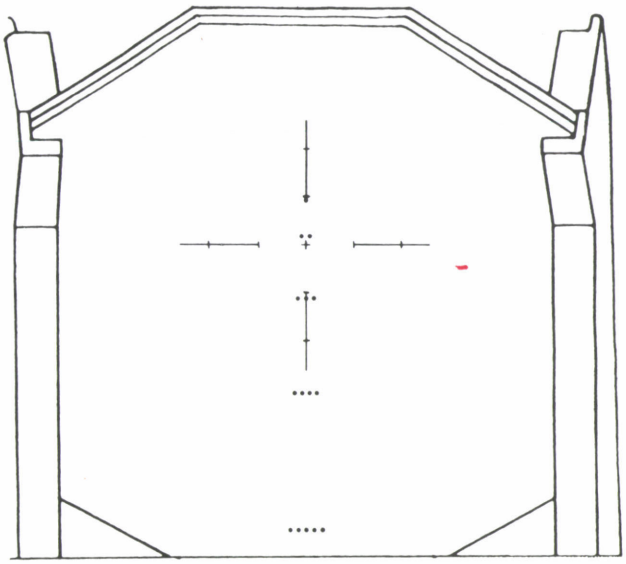
Mode of engagement—heads up display, fixed gun; bandit and speed—Hind, 140 knots; aspect = 90 degrees; range = 1,350 meters (target measures 17 meters, or about 12.6 mils in the sight); elevation = 0 mils; lead required = 112 mils (140 mils −28 mils).

Rule 3. *30 mm gun: "Lead the speed" of the target.*



Mode of engagement—forward looking infrared (FLIR) wide (AH-64), 30 mm normal; bandit and speed—Hind, 140 knots; aspect = 45 degrees; range = 1,200 meters (target measures 17 meters, or about 10 mils in the sight picture with this aspect); elevation = + 9.5 mils; lead required = 70 mils (1/2 x 140 mils).

Rule 4. *Rockets: "Lead the speed" of the target +10 percent.*



Mode of engagement—heads up display, rockets; bandit and speed—Hind, 140 knots; aspect = 45 degrees; range = 2,500 meters (target measures 17 meters, or about 4.5 mils in the sight); lead required = 77 mils (154 mils x 1/2).

FIGURE 2: Hovering rules of Kentucky windage.

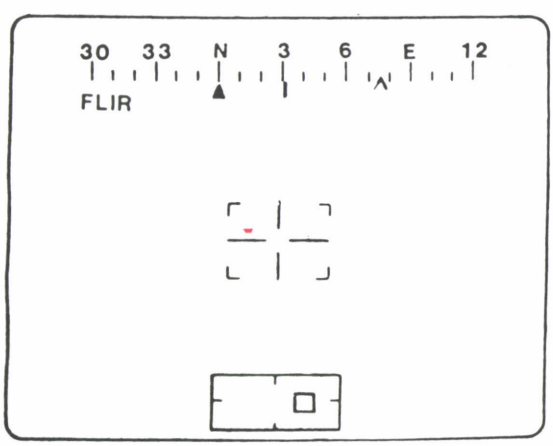
THIS BANDIT'S FOR YOU

AIRCRAFT	SPEED (knots)	LENGTH (meters)	LEAD (mils)			TOW MINIMUM RANGE CAPABILITY (90-degree aspect)
			20 mm	30 mm and 7.62 mm	2.75 inch rocket	
Mi-6 Hook	150	33	120	150	165	2,206
Mi-24 Hind D	140	17	112	140	154	2,058
Mi-8 Hip	130	18	104	130	143	1,912
Mi-4 Hound	113	16	90	113	124	1,662

FIGURE 3: Stationary engagement information.

Lead angles apply to an aircraft with a 90-degree aspect; i.e., your shot is a direct broadside shot. If the enemy is approaching with a 45-degree aspect (i.e., 1/2 the 90-degree aspect), you use 1/2 of the lead required for the 90-degree aspect.

ASPECT (degrees)	Range 500 meters	1,000 meters	1,500 meters
11.25	5	10	15
22.5	10	20	30
45.0	20	40	60
90.0	30	60	90
	Required deflection (mils)		



Example: Mode of engagement—FLIR wide, 30 mm normal; bandit and speed—Hind, 140 knots; aspect = 45 degrees; range = 1,000 meters' elevation + 0 mils; lead required = 40 mils. You are flying heading 030 degrees and are attacked from your 1:30 position. Place your (flex gun) reticle on the target and shift right (between the bandit and your tail) 40 mils, and ruin his day!

FIGURE 4: Rules of in-flight Kentucky windage.

learned is that an enemy will fly his aircraft as his doctrine dictates. By knowing your enemy, you may destroy him.

The type of target you can expect and the doctrinal envelope within which the target will operate is discussed thoroughly at this point. Figure 3, which was developed from the earlier rules of thumb, shows four different aircraft you may expect to encounter over the battlefield. In this figure, these aircraft are being engaged by *your* stationary weapons platform. The airspeed of potential adversaries and their doctrinal employment are assumed. The figure gives a snapshot of lead angles. TOW figures are only range limits. HELLFIRE and Stinger do not require lead angles, so they are not listed.

Now the instruction changes the rules to allow for the movement of both aircraft. The bandit airspeed now has virtually no effect on the amount of lead required to hit the target. His aspect is the primary consideration. As defined earlier, the range, direction, altitude and closure rate between you and the bandit is the "aspect." The term "required deflection" refers to the lead required to compensate for the enemy's aspect to you. When applying the required lead, always place

Rule 1. Choose a firing position wisely. Have a few points of reference picked at a known distance using each weapon system. If you do not have a laser range finder, known distances on the battlefield will help you estimate ranges and select a weapon quickly. Once the fight is on, rapid engagement and dispatch of the enemy is essential.

Rule 2. Control target motion. Proper control of the target motion in your sight is the single most important concept to understand and execute. Practice tracking a target with the proper lead angle for the time of flight (TOF) of the bullet. Without the skill to position the gun in the target's plane of motion, you are wasting time, fuel and bullets.

Rule 3. Choose the right weapon. Firing a weapon to its maximum range greatly increases its TOF and elevation correction. Unless the engagement affords you a better than 50-percent probability of kill, it would be wise to weigh the benefit of the engagement.

Rule 4. Make the shot count. Shoot bullets only when they have a reasonable chance of hitting the target. A successful gunshot requires that the gun barrels be pointed at a point in space that the target will occupy when the bullets get there. Remember, rounds not yet fired are the only ones over which the pilot has control.

FIGURE 5: Engagement rules of thumb.

the reticle between the bandit and the tail of your aircraft.

Figure 4 is most easily understood when a bandit is presumed to be attacking you. By his attempt to lead and shoot you down, he is drawn into a predictable flight path. It is assumed that any aircraft in flight could be engaged with the same rules if its path of flight could be predicted.

The last part of the instruction knits all parts of the presentation together with examples and some practical exercises. It discusses weapons aiming systems, specifically the sight, reticle and extra aiming rings, target engagement and the principles involved in an effective gunshot. Then figure 5 presents a few rules to be considered for an effective engagement.

Finally, if you don't believe in air combat, you need to check out the enemy's doctrine. The Soviets' newest aircraft are designed strictly for air combat, and they are coming for you. *YOU!*

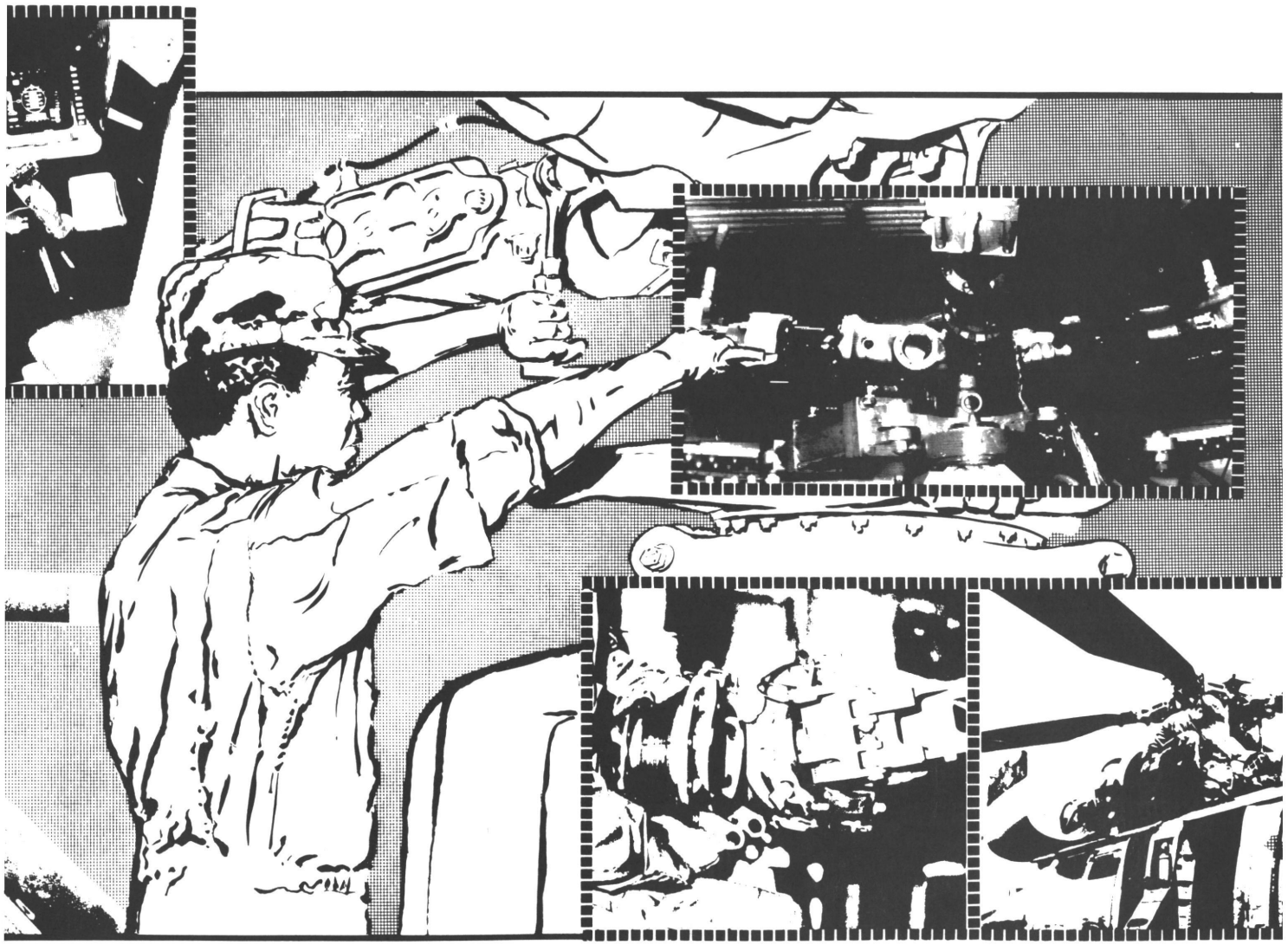
This article is intended to be a quick overview of the proposed weaponeering instruction. However, you should refer to the air combat exportable training package for the most current information. Also see "Air Combat Operations," March 1988 *Aviation Digest*. The technology is not available in the field to improve the method of weaponeering discussed here. If the Army wants to win in air combat this method is worthy of consideration. Nobody brings a knife to a gun fight; the days of waiting to see the "whites of the enemy's eyes" are gone forever. You want that bandit to feel your *cross-hairs* on his very soul the moment he comes onto the battlefield. Try it. "Reach out and touch someone!" This bandit's for you

The authors would like to acknowledge the invaluable contributions of Captain Jay Petree and Mr. Buzz Queen of Weapons and Gunnery Division, DGFS.

CHOPPERS GROUNDED

This concludes the 2-part series on "Choppers Grounded: The Supply-Demand Problem." Last month, in Part 1, the supply-demand problems were discussed. Part 2 addresses solutions to these problems.

This article is adapted from a national security essay published in February 1988, by the National Defense University. The *Aviation Digest* thanks the National Defense University and the author for permission to reprint this essay. The opinions expressed are those of the author and do not necessarily reflect the views of any Department of Defense agency.



Part 2: Solving the Problem

Colonel George Michael Mullen
Directorate of Standardization Coordination
U.S. Army Research, Development and Standardization Group — Canada
National Defense Headquarters

BECAUSE OF ITS procurement policies, the United States—the strongest economic power on earth—is destined to field a military force that cannot rely on the bulk of its potential economic and industrial strength. The United States has provided sophisticated weapon systems, but has neglected to ensure that resupply will be available throughout a conventional war. The country's inability to sustain the force will ensure a reduction in combat effectiveness—a reduction it can ill afford.

If we are to win, the best possible weapons must be available for the duration of the conflict.

A system that currently may not be sustainable in combat is the H-60 helicopter. Some methods are possible, however, for increasing the availability of this aircraft during an extended conflict. Interaction of low initial inventories, and a slow response of the production base of the H-60, are causes of the problem of short supply. With an already short supply, demand increases are manifested in wartime needs of U.S. Allies and in our own attrition from combat.

Thus the solutions suggested here are designed to increase initial inventories and to shorten the time required for industry to increase production.

Solutions cannot directly address the problems associated with U.S. Allies, as the problem is ill-defined and shortfalls are potentially huge.

CHOPPERS GROUNDED

Putting our own house in order and acknowledging our obligations to our Allies will, at least, start the process of preparing for a possible extended global conflict.

Preparation for sustained combat requires a combination of standing forces and industrial readiness. Industrial readiness always will be linked to the health of the U.S. industrial base. To enhance the short-term capability of the United States to sustain its forces, the defense industry should be funded to purchase complete sets of long-lead-time components, before these components actually will be used in the assembly of critical weapons, in this case H-60 helicopters.[1]

Initially requiring up-front money, this procedure represents a purchase early in the production run of all long-lead-time components, to be used later in the manufacturing process, and provides significant cost savings through the purchase of economical lots. This stockpile of components will ensure that, while the production line is operating at low rates, it can at least surge to produce already-contracted-for aircraft.

Additionally, as long as H-60s are in the military force structure, additional inventories of long-lead-time items should be purchased and maintained, to ensure a planned rapid-expansion capability, even if initial production has ceased. Eventually, these components would be used as repair parts, as the future replacement for the H-60 is phased into the U.S. Armed Forces. Benefiting from this early buy would be the subcontractors, who could get orders in sizable quantities to set up efficient production of larger orders and take advantage of the opportunity to increase profit without increases in cost to the Government.

Increased opportunity for profit will invite more competition and reduce the no-bid level on subcontracted items. Given the cyclic nature of the aerospace business in the 1970s and 1980s, planned early buys during times of slack commercial business would strengthen the industry. Along with the early purchase of long-lead-time components, the additional expense of not using the most economically efficient peacetime production schemes also must be accepted, and business must return to the concept of the single work shift for manufacturing.

This move will permit regaining the inherent surge capability available in allowing for the addition of manpower to operate existing tooling and production facilities, to increase production rates in times of emergency. This surge capability, coupled with available long-lead-time components, would provide a rapid increase in production rates. Planning for wartime production within the total helicopter industry also must include international production facilities.

If the capability to manufacture components for the H-60 exists, we should plan to use it. We should know the specific capability and, if possible, let premobilization contracts. If certain portions of the U.S. industrial base have gone overseas, particularly if foundries have found business conditions better in the Far East, the use of these facilities must be coordinated, as long as we are deficient. The use of allied facilities in the case of mobilization will require government-to-government cooperation and planning. Reduction of leadtime bottlenecks to production, especially for small air-transportable forgings, would greatly increase surge capabilities.

A time lag always will exist in surging production lines; therefore, the United States must have sufficient aircraft on hand to cover this interval. Providing additional aircraft to units is a method derived from the D-day to P-day concept designed to offset initial combat losses. Without additional aircraft, committed combat forces cannot be sustained. Any method that provides additional resources to field commanders contributes significantly to solving the problem of certain H-60 shortfalls after the first days of war.

Using substitute aircraft is an excellent method of adding to existing inventories.[2] Adding more H-60s to inventories is the best method, but it may not be affordable. To be effective, substitution must be done now to give commanders confidence in working with substitute aircraft.

Crews, maintenance personnel and supply systems should be combat ready and in place to support the surrogate. The middle of the war is not the time to introduce a substitute for the H-60; any aircraft used in combat also must be part of the training for combat. Given the alternative to substitution—that is, to do without—the idea of designating an aircraft to be issued in lieu of the H-60 has merit.

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1. The DOD recently designated the UH-60 as a critical weapon system that should be funded for multiyear procurement. Funding for more than 1 year greatly aids the prime contractor, subcontractors and suppliers in solving problems associated with long-lead-time items. In the case of the UH-60, multiyear procurement is for 2 years. The 2-year timeframe allows the manufacturers greater program stability, increases the immediate surge capacity for items under contract, and goes a long way toward buying time to order and receive additional equipment sets for future production. While this step is in the right direction, it does not, in the author's opinion, go far enough.

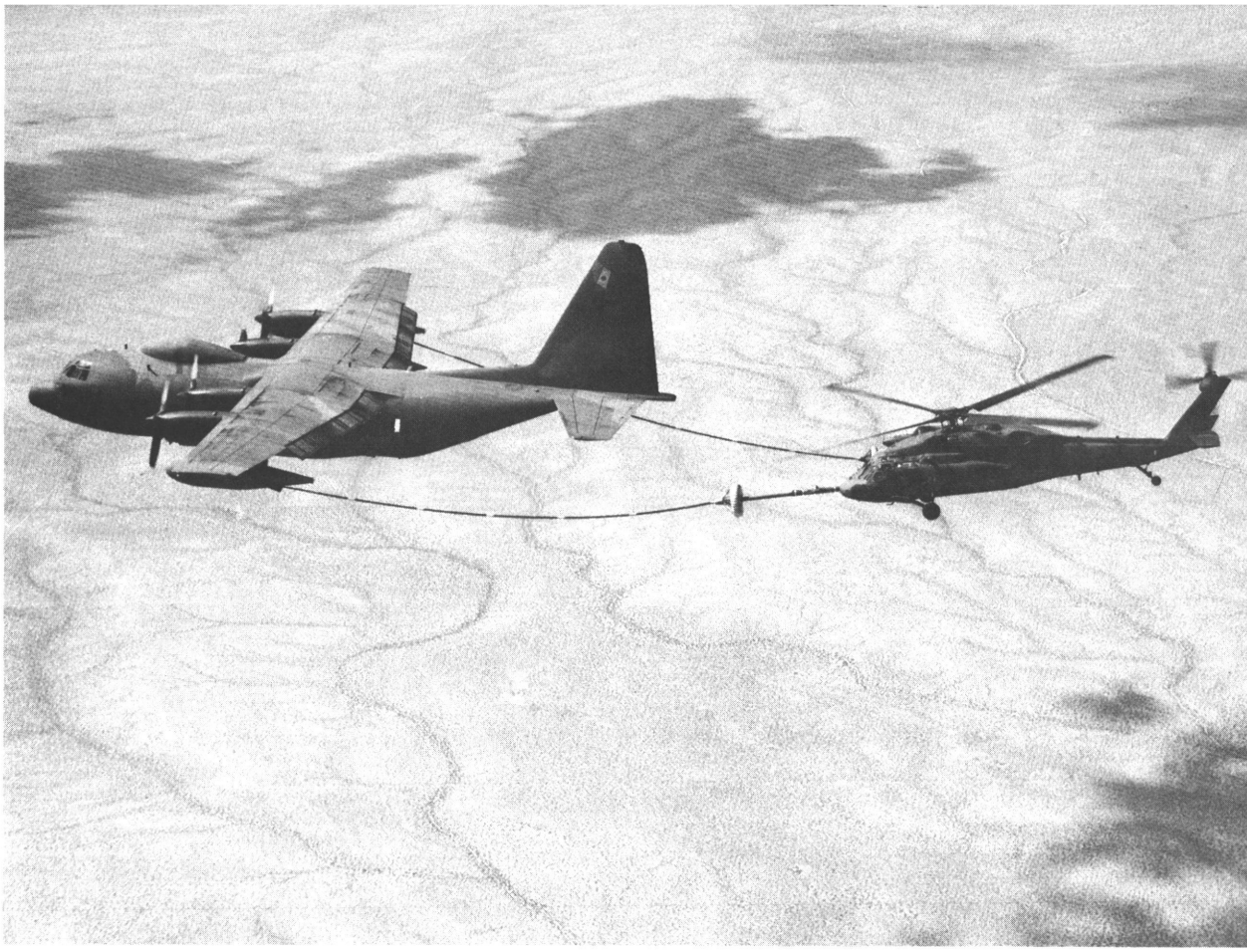

photo courtesy of Sikorsky Aircraft

A U.S. Air Force HH-60 Nighthawk being refueled in-flight by a C-130 Hercules.

Now is the time to substitute aircraft, and the aircraft should be the one that the H-60 is to augment or replace.

For the Army, it would be the UH-lH; for the Navy, it would be the SF-2 or HH-3; and for the Air Force, it would be the HH-3. These other aircraft are fully capable of performing a portion of the mission, although not with the lift performance or speed of the H-60. Fortunately, not all missions require all the performance of the H-60; the substitute could relieve the H-60 of all but the most demanding missions.

The Army requires a utility helicopter that is basically a good-weather vehicle for lifting troops and supplies. This mission has been performed by the UH-lH for years, although not to the degree and speed of the UH-60, and without its special survivability. Because of the increased lift performance of the Black Hawk, fewer UH-60As are required to perform the unit mission that had been performed by the UH-lH.

Essentially, the total mission to lift the assault elements of an infantry company in a single lift was given to l5 UH-60As, as opposed to 23 UH-lHs. Frontloading the combat aviation companies of Army units allows them to perform their assigned mission longer, so each company should retain an additional 20 percent UH-60A equivalent over its current full combat authorization. In the case of a combat aviation battalion's lift company, five additional UH-lHs would give the unit sustaining capability. Costs, however, are associated with this procedure, such as additional unit-level complexity and operational equipment incompatibilities of speed, load and operating envelope.

But similar-size units, with more complex maintenance and operational

2. *Army Aviation Mission Area (AAMA) Test Advisory Group Findings*, U.S. Army Aviation Center, Ft. Rucker, AL, 25 March 1985, p. 47. AAMA Deficiency Number 12 reads as follows:

> The absence of aircraft in war reserve stock/POMCUS (prepositioning of materiel configured to unit sets) and TAA (Trade Agreements Act) force structure. One of the recommended solutions to this deficiency is to partially modernize the fleet while retaining a substantial number of aging aircraft, in order to resource requirements.

loads, are found in the divisional cavalry squadron. Because UH-lHs will be assigned to the aviation battalion, these additional aircraft should give little maintenance problems at that level. The 20 percent increase should be applied to all combat and medical evacuation units. Authorization must be done now, to ensure that operations, maintenance, and supply personnel and systems have the benefit of training for combat.

Owing to shipboard constraints and the dispersion of SH-60Bs in small numbers throughout the fleet, the addition of SH-3s onboard aircraft carriers and destroyers may not be feasible. The Navy should retain the 20 percent SH-60 equivalents on shore and deploy these aircraft regularly. As with the Army, the additional complexities in training and maintenance inherent in using other types of aircraft will not overcome the benefits of having an aircraft to do the antisubmarine warfare mission. To provide a degree of combat sustainment, the Air Force also should be authorized an additional 20 percent of HH-60D substitutes.

U.S. Allies also must be equipped for combat, and, if their needs become known, older but still capable aircraft should be provided to fill their immediate requirements. U.S. policy decisions on fulfilling allied demands should be made early, to allow them to know the types of equipment they will receive. Foreign military sales, coproduction or total production overseas should be encouraged, to help U.S. Allies build their prewar inventories. Any shortfall, U.S. or allied, will degrade the total global war effort.

A program similar to the U.S. Air Force Civil Reserve Aircraft Fleet (CRAF) Program should be initiated. The CRAF Program essentially pays for modifying civilian carrier aircraft, to allow easy conversion to military

Because of its increased lift capability, the UH-60 is used to lift troops and supplies. photo by Ritch Zelner, Sikorsky Aircraft

use as cargo aircraft in the event of a national emergency. The Air Force also pays for the cost of operating the modified aircraft at the additional weight. This cooperative effort between public and private sectors is designed to provide the Air Force with a readily available airlift asset.[3]

The lack of success of the CRAF Program—few aircraft have been modified—does not detract from the concept. Following the Soviet example, the design of future aircraft should include civilian and military market considerations. Applying the CRAF concept to the UH-60 program would pay great dividends, in terms of existing UH-60 inventories at the beginning of a war. On one hand, Nighthawks and Seahawks are too complex to be easily converted from a stripped-down civilian model to their mission configuration.

On the other hand, the Army's Black Hawk has much in common with a civilian aircraft. The UH-60A, of course, does have purely military components that would not be necessary for a civilian operator. Armor plating, ballistic tolerant control tubes and redundant subsystems are not necessarily high on a civilian operator's list of desirable features. But the superior performance of the aircraft at high altitudes, and its speed, excellent internal and external lift capabilities, and wide cargo area have civilian application.

The Civil Reserve Helicopter Fleet (CRHF) Program should pay for the difference between the civilian and military versions of the Black Hawk. The CRHF Program also should allow the sale of civilian aircraft to U.S. commercial operators who, under the powers of the President after declaring a national emergency, would make the aircraft available to the Army. The reconversion of the aircraft for military service would require minimum effort, if necessary components for conversion were set aside.

Benefits from such programs go beyond the availability of additional aircraft and extend into logistical support for the whole aircraft fleet. A civilian operator flying an expensive helicopter must fly a great number of hours to get a reasonable return on his investment. The commercial operation usually logs up to 10 times more yearly flight hours than the Army. This acceleration of flying adds greatly to the reliability, availability and maintainability (RAM) data on the aircraft. RAM data will allow the Armed Services to better plan their wartime maintenance programs. More flying hours generate a greater demand for parts, which, in turn, are manufactured and stocked. Requests for parts provide additional data that can be used to make important decisions about repair-parts stock levels.[4]

The cost of the CRHF Program is high. But it appears to be an ideal way to have the private sector subsidize the Department of Defense (DOD) war reserve, and help increase overall force readiness.

Availability of parts and an efficient maintenance operation translate directly into additional mission-ready aircraft. For the commander, mission accomplishment is what ultimately matters. A mission not completed—whether it be for lack of maintenance, or shortage of parts—is still a mission not accomplished. Thus, the existing maintenance system must be made more efficient, particularly in the area of availability of repair parts and maintenance evacuation of helicopters. Repair parts become available as demand histories are built up, and parts are stocked to the levels necessary to meet future needs.

Establishing a sound base on which to make repair parts stocking decisions requires data reflecting parts needed for extended flying hours. Parts information generated from extended flight operations under the CRHF Program will benefit the information base, but only to the degree that the size of the CRHF fleet and the missions flown approximate the entire H-60 population. Military flying hours must be increased to increase the repair parts data base.[5]

Without a great deal of flying over an extended period, the United States will have a peacetime parts supply in a wartime situation. Thus, the military flying-hour program should at least double. Along with increased demand for parts, stored parts must become more visible to all maintenance levels.

Currently, the Army authorizes the lowest aviation company level to stock parts if demand warrants stockage and the company is authorized to do the work. Efforts must be made to increase the availability of parts by increasing the level of awareness as to which unit has which part. The information currently is available; but no procedures exist for rapidly exchang-

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3. Tim Wrixon, "SRA-1 Shows New Capabilities for Paris Air Show," *Jane's Defence Weekly*, 6 April 1985, pp. 592-593. This article describes the mutual benefit to civilian and military customers of using an off-the-shelf version of the Gulfstream III and configuring it to military use. The Gulfstream III is a large (80 feet long with a wingspan of 78 feet) twin-turbofan executive transport; it is built by Gulfstream Aerospace, a subsidiary since August 1985 of Chrysler Corporation. The Gulfstream III is operated by a crew of 2 or 3 and has standard seating for 19 passengers; its U.S. Air Force designation is the C-20.

4. Army Concepts Analysis Agency's *Aircraft Spare Stockage Methodology (aircraft spare parts study)—CAA SR 84-12* was performed in 1984 by the Department of the Army, Deputy Chief of Staff for Logistics. The principle finding of this special report was that the Army's spares forecasting methodologies are peacetime, steady state oriented.

5. *AAMA Advisory Group Findings*, p. 73. AAMA Deficiency Number 25 states:

> Department of the Army (DA) Flying Hour Program: The current DA wartime flying hour program does not meet battlefield requirements for all types of rotary wing aircraft...the wartime flying hour program must be increased.

ing parts information across unit lines. The use of computers for inventory control and data links between Service maintenance units and commands will increase the efficiency of the parts system; this system also will result in an increase of aircraft available for missions.

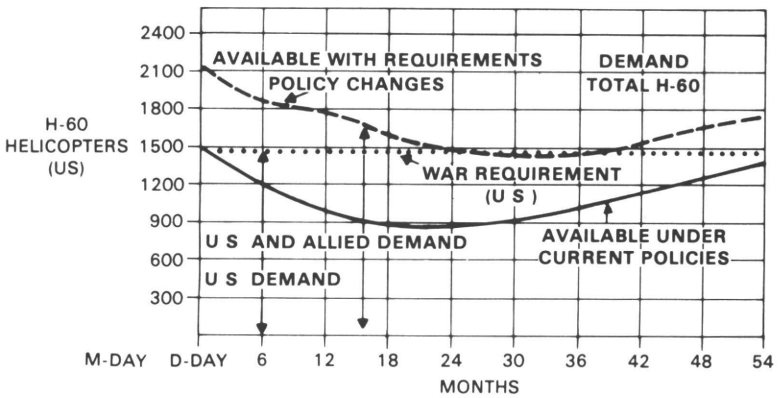
Some components are tracked from the factory to the unit because of their high cost; the information system described here would provide a like visibility to parts stored at the unit level, thereby increasing parts usage and operational readiness. Force sustainment can be greatly enhanced by increasing the efficiency of the military repair-and-rebuild system.[6]

One of the largest sources of repair parts and components is the aircraft in the fleet. Controlled substitution of repair parts and components from one aircraft to another is a time-honored method of increasing operational readiness of weapons. Damaged aircraft must be included in the substitution scheme; helicopters are rarely a total loss, but often are damaged to the point that they no longer are combat ready. To increase the efficiency of the repair-and-rebuild system, a method of assessing the degree of damage to a helicopter and its critical parts should be implemented. After damage assessment, the parts inventory control system would be used to help decide what to do with the aircraft. Critical parts that are determined to be airworthy would be transported to unit rebuild facilities or the industrial plant needing the parts to complete its work.

Close parts control, repair-and-rebuild coordination and damage assessment will require a relook at positioning and manning of maintenance units. Essential elements currently in the force structure potentially can make the greatest contribution to combat sustainability. Results of calculations for determining combat loss and resupply are shown in the figure. As indicated, a large increase in initial inventories, combined with an increase in maintenance capability and reduced industrial response time, can make a significant difference in the ability of the United States to sustain combat operations. Even with the incorporation of recommendations, several shortages are noted if demands of Allies are included.

Efforts to recover from the short-sighted view of conventional war will be expensive, but they will result in a commitment to sustained combat operations. In a short war of high attrition, the Soviets have the advantage because their equipment is onhand.[7]

Solutions provided for the H-60 series of helicopters will narrow the gap between wartime requirements and peacetime production for this particular equipment. Surely, similar principles apply more generally to the whole matter of improving sustainability by increasing surge capability, building up inventories and sharpening readiness.



H-60 SUPPLY AND DEMAND

- Even with a CRHF of 250 units, and an additional 20 percent increase in H-60 equivalent helicopters, an additional industrial surge would be necessary to allow production of 10 units per month at M-day plus 6 months.
- Factors used in the simplified attrition model were estimated by the author of this essay to illustrate the relative nature of the problem and the impact of suggested solutions.

6. Ibid., p. 103. AAMA Deficiency Number 25 also states:
Aircraft Damage Repair: Corrective action included developing aircraft availability under combat conditions.

7. *Surge Mobilization: The United States Versus the Soviet Union*, pp. 149-150.

Aviation Regiment Surpasses Old Safety Record

On 8 June 1988, members of the 1st Battalion, 212th Aviation Regiment, Aviation Training Brigade, Ft. Rucker, AL, celebrated 200,000 accident-free flight hours, achieved in only 18 months.

The 1st Battalion, 212th Aviation Regiment, Aviation Training Brigade, Ft. Rucker, AL, topped its own accomplishments 8 June 1988 by hitting the 200,000 mark for accident-free flying hours, surpassing its old safety record.

The battalion exceeded its 160,000 hours of accident-free flying record less than 6 months from it being attained in January. The battalion has not had a class A, B or C accident since 16 November 1986.

"What makes this record significant is not just the number of hours we've flown, but the time in which it was achieved," said Lieutenant Colonel (LTC) James A. Orahood, battalion commander.

"There are only three units Armywide who do non-standard maneuvers, and they are all here on Ft. Rucker. We are one of them," he said.

LTC Orahood's battalion is composed of six companies. Four of them conduct academic and flight instructions using night vision goggles devices in the UH-1 Huey. They also teach basic and advanced combat skills to initial entry rotary wing students. The other two companies are responsible for training the Huey instructor pilots and other support people.

Explaining that all other Army Aviation units have two rated aviators in the cockpit, LTC Orahood said the 1-212th only has one.

"When the students solo there are no rated aviators in the cockpit. We . . . haven't had any accidents within the last 2 years. This unit is creating all the new Army Aviation officers. What could be a better role model for them than for this unit to have achieved this record. Of course, we couldn't have flown 200,000 accident-free hours without our dedicated maintenance personnel," he said.

LTC Orahood attributed his unit's safety record to the unit's philosophy that all the instructors and the chain of command hold and practice every day.

"Our philosophy, simply put, is don't take any unnecessary risks. More than 300 instructors and hundreds of students have flown here. As they depart from the unit, they carry this philosophy with them. No one wants to have an accident, but the best way to prevent one is not to take a chance," he said.

The Huey with the three aviators aboard who maintained that philosophy to hit that 200,000-hour mark taxied toward the tower and landed at 1120 hours.

Emerging from the record setting aircraft were instructor pilot Chief Warrant Officer (CW2) Kirk P. Harrison and his students, Warrant Officer Candidate (WOC) Ronald L. Ireland and WOC Steven M. Felts.

"After I realized what was going on, it was pretty exciting," said CW2 Harrison, after admitting being a little confused when asked to taxi his aircraft toward the tower.

"It is a great honor being a member of this team, but it doesn't stop here—it must continue," he added.

WOC Felts said that it was a great achievement for the unit and that credit should go to all of the instructor pilots at Lowe Army Airfield for being able to teach and still maintain an accident-free flying record.

"The credit must go to the instructor pilots here, as well as the students who have helped to maintain this record. The instructors stress safety, and it rubs off on us," said WOC Ireland.

"There has been a lot of hard work put into this," he said, noting what a great feeling it was to have helped achieve this record.

U.S. ARMY SAFETY CENTER

Safe Flying Starts on the Ground

"WE HAVE A PROBLEM," the copilot told the pilot in command (PC) after the UH-1 Huey yawed. Although the instruments were reading normal, the crew had been discussing an unusual odor just moments before. As the PC took the controls, the UH-1 went into a spin and crashed into the ground.

While in cruise flight, the first section of the tail rotor driveshaft rubbed on the heat shield, causing the driveshaft to fail. Wear and tear on the shaft had been occurring over an extended time. The shaft finally snagged the insulation and pulled the shield onto the tail rotor driveshaft, severing the driveshaft. The contact happened because, at some point, maintenance personnel had exerted pressure on the top of the tail rotor driveshaft tunnel, deforming it. Perhaps a mechanic had stood on it while pulling maintenance in one of those hard to reach spots. Perhaps it had been used as a lever. However, the driveshaft tunnel was misused; careless maintenance destroyed a million dollar aircraft and injured four of the six people on board, two of them seriously.

This OH-58 Kiowa fell into trees after a pneumatic line failed. Maintenance personnel had used incorrect procedures to keep the lines from chafing.

The accident investigation also revealed that the K-flex engine-to-transmission driveshaft had been assembled incorrectly. Two washers were missing from the flex bars, and the bolts were excessively loose. Inspections should have caught the loose bolts. (Technical manuals require *daily* inspections of the bolts.) Although this particular problem didn't contribute to the accident, it does point to a pattern of careless maintenance.

Maintenance personnel are critical to safe flying. Their importance is such that even a small mistake can have big consequences. Shortcuts on repairs or unaccounted-for tools can cause as much damage as trees or wires. The bottom line is that the quality of maintenance greatly affects the quality of flight.

For example, a small screw recently cost the Army more than $102,000. It brought down a UH-1 in a fiery descent that could well have taken the lives of all on board and destroyed the aircraft.

The UH-1 had just completed an approach to a hover at the end of its mission when a spark from the starter-generator set fire to vaporized engine oil in the engine compartment. The oil, which had started to leak sometime before final approach, was being forced out under pressure from the seam where the oil pump attaches to the accessory gearbox. A loose screw allowed the oil pump to move about during flight. Movement of the oil pump wore down the O-rings and caused a slight separation between the oil pump and the gearbox.

Maintenance personnel or inspectors did not notice the substandard installation of the small screw, and it was not spotted by the aircrew during preflight. In fact, it went unnoticed by everyone until it caused a class B accident.

The quality of maintenance is directly related to the training and experience level of the mechanics, the effectiveness of the supervisors and discipline. Discipline

means doing the job by the book.

In another maintenance-related accident, an OH-58 Kiowa at cruise flight 50 feet above the trees suddenly lost engine power when a pneumatic line failed. The pilot was able to get the Kiowa down with only one minor injury, but the aircraft was destroyed.

The pneumatic line failed because of corrosion. Maintenance personnel had wrapped the lines with antichafing wrap instead of using antichafing clamps. Although this is an acceptable practice when space prohibits clamps, they were using the wrap even on lines that were not touching. The wrap was causing surface corrosion because of moisture retention.

Maintenance, to be both safe and effective, must be performed by the book. The book is used to ensure everything is done to standard. Failure to perform maintenance by the book, failure to account for tools and failure to conduct thorough inspections of work performed can kill crews and damage aircraft. Flight safety begins long before the flight.

For example, while a UH-1 was climbing during a maintenance test flight, its engine failed. The aircraft lost power because a mechanic failed to use proper procedures during installation of a fuel line and fuel line quick disconnect. The fuel line was twisted over itself, severely kinking the line. The fuel line quick disconnect had been improperly installed when it was attached to the fuel filter. When the pilot demanded maximum revolutions per minute (rpm), the increased fuel flow collapsed the fuel line and parted the quick disconnect. The engine failed. Two passengers were seriously injured and two more received minor injuries.

A thorough maintenance inspection could have turned up this problem.

In another instance, during a maintenance engine run to check for an oil leak on a UH-60 Black Hawk, one of the mechanics asked the other to hand him a shop rag so he could wipe up some oil. The rag was handed over in front of the engine. The intake suction pulled the rag out of their hands and into the engine. Engine rpm immediately decreased, and the maintenance test pilot completed an emergency shutdown. A carelessly passed piece of cloth resulted in almost $75,000 in repairs.

Not all foreign objects fly out of a mechanic's hands. Some of them are in hangars and on ramps, runways and landing pads. Foreign object damage (FOD) prevention is everyone's job, and it's an important one. It involves team discipline. FOD walks are an excellent example of working as a team to ensure the safety of all. FOD cans should be used when working on or around aircraft. Pilots, mechanics, inspectors and supervisors must all be involved in looking out for one another.

Just as a chain is only as strong as its weakest link, a helicopter is only as safe as its maintenance crews. Each individual in the aviation chain is personally responsible for the safety of aircraft and the people on board.

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours	Rate	Army Fatalities	Total Cost (in millions)
FY87 (through 15 September)	35	1,630,113	2.15	42	$87.0
FY88 (through 15 September)	31	1,645,528*	1.88	38	$62.5

*estimated

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Signal Kit Distress

The foliage penetrator signal kit, L119, national stock number (NSN) 1370-00-490-7362, a component of the SRU-21/P survival vest, is in short supply. The inventory manager has advised that procurement action has been initiated to expedite procurement of these signal kits, but delivery of kits is currently delayed. The supply manager continues to place urgent action for procurement. Aviation life support equipment (ALSE) message 87-4, dated 161700Z JAN 87, granted a waiver to use kit, L116, type 185, NSN 1370-00-319-7560. This waiver is authorized until the signal kit becomes available, but not to exceed 30 June 1989. The point of contact (POC) for this action is Mr. James Angelos, AUTOVON 693-3573, Commercial 314-263-3573.

ALSE Pamphlet 1984

Yes, this document is still usable as such, and we know it needs updating. We have had several queries and still have available copies. Should anybody want a copy please write to PEARL's at the address at the end of this article. "She" will send you a copy post haste. Also, personnel going through the ALSE courses at Ft. Eustis, VA, receive a copy. We will update this pamphlet as soon as possible within the constraints of our available personnel.

New Design MBU-5/P and MBU-12/P Oxygen Valves

New design subject oxygen valves will be received (NSNs 1660-00-226-5334LS and 1660-01-114-7208LS). When they are received old design Gentex inhalation and exhalation valves will be condemned and destroyed locally by crushing to prevent valves from reentering the Air Force inventory. For further information the POC is Mr. Joses S. Casas, AUTOVON 945-6831.

Correction

The author of "Egress Procedures," which appeared in the March 1988 issue of the *Aviation Digest*, is CW2 Eric Feldmanis. CW2 Feldmanis is attached to the Directorate of Plans, Training and Management, Aviation Division, Fort Knox, KY, as an Individual Ready Reserve aviator.

SIZE	NSN	Gentex PART NO.	USED WITH SPH-4 SIZES
Small/Regular	8415-01-281-5497	A7256-3	Regular, 8415-00-144-4981
Regular	-5498	A7256-1	Regular, 8415-00-144-4981
X-Large	-5499	A7256-2	X-Large, 8415-00-144-4985

FIGURE 1: SPH-4 helmet thermoplastic liner conversion kits.

SPH-4 Flyer's Helmet Thermoplastic Liner (TPL)

The TPL for the SPH-4 helmet conversion kit is now available (see "The Thermoplastic Liner—A Reality at Last," September 1988 *Aviation Digest*). The TPL conversion kit can be used to replace the suspension assembly with the TPL. The NSNs (figure 1) apply to the conversion kit.

The TPL conversion kit is a local purchase item. The estimated cost is $60.00. Continental United States customers can order the TPL from the kit using phone number 716-282-3550 or the following address: Gentex Corporation, P.O. Box 315, Carbondale, PA 18407.

Overseas customers should requisition through Defense Personnel Support Center (DPSC) (S9T), using the assigned NSNs. Support will be provided by DPSC's special purchase team. The TPL replaces the components of the SPH-4 helmet shown in figure 2.

The POC at DPSC is Mr. Mark Pecorini, AUTOVON 444-2583.

NSN	NOMENCLATURE
8415-00-490-1198	Front headband, Regular
-1199	Front headband, X-Large
-1200	Rear headband
-410-4664	Headband and suspension assembly, Regular
-411-0110	Headband and suspension assembly, X-Large
-117-4429	Liner, energy absorbing, X-large
-4428	Liner, energy absorbing, Regular
-122-1632	Crown pad

FIGURE 2: Parts replaced by the thermoplastic liner.

ALSE Updated Description

ALSE Description. ALSE description addresses those items of equipment used to sustain Army aircrew personnel and passengers throughout the flight profile and flight environment. Updated descriptions enhance mission performance, aircraft and aircrew survivability during operational missions, aircraft crashes and the postcrash period before rescue. The current ALSE program is a multi-item research, development and acquisition effort encompassing more than 12 separate advanced development, engineering development and procurement efforts. These programs involve a variety of technologies. These technologies range from "low tech" (survival kits, flotation devices) to "medium tech" (aircrew protective helmets, chemical protective masks, chemical decontamination) to "high tech" (nuclear and laser eye protection, thermoelectric coolers and remote detection of chemical agents) programs. These programs are oriented toward improving the capability of Army aircrew personnel to fight and survive on the integrated battlefield. When forced out of the flight environment by either hostile action or mechanical malfunction—*To survive to fight again!*

Specific programs include:

- M43 chemical/biological (CB) protective mask preplanned product improvement program (P31), the CB protective mask for all Army aircrew personnel.
- Aircrew integrated helmet system or HGU-56/P, the replacement helmet for the SPH-4.
- Laser eye protection for Army aircrew personnel, laser eye protection against friend and foe lasers.
- Aircrew microclimate cooling system, the aircraft cooling unit that provides cool air to aircrews operating in a CB warfare environment.
- Nuclear, biological and chemical (NBC) detection, point and remote, NBC filtration for aircraft cockpits.
- NBC contamination avoidance materials and techniques.
- Inflatable body and head restraint systems, airbag restraint systems to prevent serious head and upper torso injuries to front seat attack helicopter pilots.

Acquisition Strategies. Currently, approved acquisition strategies represent a wide variety of approaches, varying from sole source to full and open competition and including maximum use of in-house effort and other Government agencies. The general ALSE acquisition strategy is to use competition and option clauses, as much as possible, to obtain the best product at the best price for the soldier in a timely manner.

Current Listing of ALSE 1988 Messages

MESSAGE NUMBER DATE AND TIME	MESSAGE SUBJECT
88-1 081638Z JAN 88	Relocation of components for the SRU-21/P survival vest and standard individual kits
88-2 251330Z FEB 88	Cartridge, carbon dioxide, NSN 4220-00-543-6693 for LPU-2/P, -3/P and -10/P
88-3 011030Z JUL 88	Extension of potency expiration date
88-4 131500Z JUL 88	Signal kit distress, foliage penetrator (L-119), NSN 1370-00-490-7362, used in the SRU-21/P survival vest
88-5 261130Z JUL 88	Thermoplastic liner conversion kit for SPH-4 flyer's helmet

Water Purification Tablet Potency Expiration

The Food and Drug Administration (FDA) testing revealed that the following medical materiel is suitable for issue and use provided the unit has a good wax closure and shows no signs of physical deterioration; i.e., *rusting of metal caps*. NSN 6850-00-985-7166, nomenclature: water purification tablet, iodine, 8 mg, 50S manufacturer: Van Ben/Brode Industries, contract number DLA 120-83-C-0567, all lots manufactured in 1984. Activities will line through the old expiration date and remark with "retest July 1990." Cite DPSC project number M88216073 as authority.

Before applying the new expiration date, materiel should be visually examined according to Technical Bulletin 740-10 (DLA M 4155.5), quality control, appendix M, medical supplies, to ensure serviceability of stocks on hand. Materiel that does not pass all inspection criteria should be destroyed according to Army Regulation 40-61, paragraph 3-52, AR 735-11, paragraph 2-10, as unsuitable for issue and use. Reproduce this information and return to SGMMA-OC. Supported activities should report quantities to the supporting activity or center. Activities or centers should provide a consolidated report to USAMMA, ATTN: SGMMA-OC. Negative reports are required and may be submitted by phone. The POC is Ms. Teresa Bess, SGMMA-OC, AUTOVON 343-2045.

ALSE Articles Needed

We solicit your "PEARL" articles. Send them to "PEARL." The address is at the bottom of this page.

If you have a question about personal equipment or rescue/survival gear, write PEARL'S, AMC Product Management Office, ATTN: AMCPM-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-3573 or Commercial 314-263-3573.

AVIATION MEDICINE REPORT
Office of the Aviation Medicine Consultant

Captain Lester Caudle III, was recently named the Army's Flight Surgeon of the Year for 1988.

Flight Surgeon of the Year

Mr. Ruben Maestas
Public Affairs Office
82d Airborne Division
Fort Bragg, NC

Captain Lester C. Caudle III, flight surgeon for the 82d Airborne Division's Aviation Brigade, Ft. Bragg, NC, was chosen as the Army's top flight surgeon of the year this spring. He was selected from a field of 130 flight surgeons Armywide.

The Army's top flight surgeon was quick to give credit for his selection to a positive attitude and the satisfaction he receives from his job.

"I got nominated, not because I'm a great guy, but because I enjoy what I'm doing. My job is to keep the 82d Combat Aviation Brigade healthy and flying.

"I would have never gotten this award if not for the people working with me. I get a lot of support because when you take care of your people, they take care of you."

A major portion of the job is giving annual flight physicals to the brigade's aviators and conducting sick call at Troop Medical Clinic 22, at Simmons Army Airfield.

"The Army figures that if they're going to let you fly a $15 million helicopter, they want to make sure you are healthy. So these people take more physicals than almost anyone in the Army."

Since his first responsibility is to ensure the pilot's health and the crew's safety, CPT Caudle often has to temporarily ground pilots for medical reasons.

A Department of Defense policy states that pilots who are taking medication are restricted from flying. CPT Caudle decides whether the pilots will be allowed to fly or given medication and grounded.

"It's not like when you're sick and I can give you medication and you can go ahead and do your job. All these people can take is Tylenol. When I have to give them medication, they get grounded. Then they see me again later so I can put them back on flight status."

CPT Caudle's knowledge of the aviation way-of-life began in 1972 when he served a 3-year tour as a company clerk in the XVIII Airborne Corps, 18th Aviation Company.

Leaving the Army, he pursued his premedical training at Mars Hill College in North Carolina where he earned a bachelor of arts degree in biology. He then applied and was accepted to medical school at the Uniformed Services University of the Health Sciences at Bethesda, MD.

Reentering the Army, CPT Caudle served a family practice internship at Ft. Gordon, GA. Ft. Bragg drew the upcoming flight surgeon away from Georgia in 1985 when he was transferred to the 82d Combat Aviation Battalion. There he worked diligently and had his duties expanded when the battalion was expanded to the 82d Aviation Brigade.

Along with his normal flight surgeon duties, CPT Caudle is also the director, 57th Air Ambulance Medical. This job requires him to spend time on Ft. Bragg's drop zones caring for injured soldiers, transporting them to Womack Army Community Hospital and transferring the seriously injured or sick to Duke Medical Center at Chapel Hill, NC.

With that job he also checks medics flying on medical evacuation missions, ensuring they are qualified to handle the medical emergency and Dustoff missions.

"If a pilot is stressed out, then we should take him off flight status. If you're flying in the back of a helicopter, you want the pilot concentrating on what he is doing, not having his mind wondering about something else."

CPT Caudle said this type of caring about people helped him get the cooperation of both officers and enlisted people. He said his concern and understanding stem from his once being an enlisted man.

"An officer takes a different perspective of the Army. They sometimes don't understand problems with the first sergeant and I've seen both sides of the fence. You have to understand the job-related problems.

"You have to take care of the person as a whole and you can do that a lot better having experience and having been there."

With his caring for the soldiers, he has no trouble getting them to work extra hours or take on extra duties. This summer, the flight surgeon and several assistants gave flight physicals to pilots of the North Carolina National Guard so they could travel to Ft. Hood, TX, for AH-64 Apache transition.

They also support the Reserve Officer Training Corps by doing flight physicals for cadets interested in becoming Army aviators.

All this means long hours and additional time spent on the job. But CPT Caudle doesn't mind. He knows that he has the confidence of his commanders, fellow doctors and subordinates.

Captain Lester Caudle III, left, discusses a patient's medical report with SSG James Phillips at Troop Medical Clinic 22.

Anatomy of an Aeromedical Physician's Assistant

CW3 Robert Post

CW3 Post was attending the Army Flight Surgeon Primary Course, Class 87-3, Fort Rucker, AL, when he wrote this article.

Since 1981, the aeromedical physician's assistant (APA) has played a vital role in maintaining the fighting strength of Army Aviation. The APA also has assisted in bringing quality health care to the aviation community.

APAs have rapidly gained the respect of field commanders. Their previous field duty experience gives the APA the capacity to provide field medical advice to the commander. The average APA student has 14 years' military experience, about 11 of which are normally in line units. This gives the APA a large data base of experience in soldier skills, tactics, preventive medicine, leadership and basic "how to get things done." Also, as a physician's assistant (PA) student, he attends a warrant officer basic course that stresses leadership, soldier skills and field skills. He also completes the Army Medical Department (AMEDD) Officers Basic Course that introduces the student to operations, staff skills, mission and tactics of the various branches and the Army in general. Most APA students are also graduates of the AMEDD Officers Advanced Course where their staff skills and general knowledge are broadened and sharpened. Finally, PAs applying for APA training must have at least 3 years' experience as a line medical officer with a battalion in the field before applying.

By virtue of their academic medical training and practical experience, APAs provide quality field medical care at the unit level. They also provide the same caliber care to the families assigned to a garrison. To be an APA, one must first be a PA. The average PA candidate has 14.8 years of education. The didactic phase is 9 months long and roughly parallels a physician's general medical education. The second phase is 1-year long and is spent in a medical department activity where the student rotates through the various specialty clinics under the proctorship of a board certified physician. Most APA candidates have also completed the Advanced Cardiac Life Support Course and attended the Combat Casualty Care Course. By bringing these skills to the aviator in the field, the APA not only contributes to the combat readiness of the unit; but also injects invaluable doses of caring that keeps morale high and the individual soldier ready, confident and capable of performing his mission on the modern battlefield.

The U.S. Army has about 8,400 aircraft, 15,000 officers and 18,000 enlisted aviation personnel at nearly 100 locations around the world. Aviation medicine is a critical factor in the safe and effective use of these assets that are essential to the Army's mission. The APAs are skilled technicians who, working under the supervision of a flight surgeon, are uniquely qualified to provide medical support for the Army Aviation's mission.

The Aviation Medicine Report is a monthly report from the Aviation Medicine Consultant of TSG. Please forward subject matter of current aeromedical importance for editorial consideration to U.S. Army Aeromedical Center, ATTN: HSXY-ADJ, Ft. Rucker, AL 36362-5333.

Assembling a Logistics Package

First Lieutenant Andrew Baldwin
First Lieutenant Baldwin was assigned to the Aviation Officer Advanced Course, Fort Rucker, AL when he wrote this article.

AN AVIATION logistics package (LOGPAC) is assembled to support your field operations during the first week. It provides some ancillary items and repair parts needed to sustain field life in a comfortable manner.

With the LOGPAC I propose to you a simple method of collecting a box full of "go to war" items that are not normally resupplied as quickly as needed. These items include tentage repair parts, spare batteries and other expendable items designed to strengthen your field operations. Your LOGPAC supplies light at night, keeps field equipment in good repair and enhances the field environment using light and mobile items. The LOGPAC's importance targets the new Army of Excellence aviation companies that do not have a supply section or the task organized platoon comprised of crewchiefs and aviators.

To get started on your LOGPAC, first estimate how large it can be without interfering with your present loadplan. Consider whether it will be trucked or airlifted to your field site. After you've figured out the maximum size you can transport, check with your supply sergeant. He or she will be able to get you a crate from the division and help you with some of the things I'll be suggesting to you later. When you get your box, install a hinge, hasp and padlock to secure it.

Start filling your LOGPAC by inspecting your assigned tentage (heaters, cots and tents) and collect any spare parts for your box. If there are no spares, now is the time to order some and, if the technical manual is missing, order

Planning Missions in the Field	
Common Name of Item Last Seven Digits of National Stock Number	Aviation Unit's Uses
Case, Map Clear Plastic Envelope 287-2137/2140	Briefing and posting graphics
Table, Field Folding 269-9725	Briefing and planning
Easel, Portable 590-8404	Briefing, planning and posting schedules
Clock, Battery Operated 046-9848	Platoon/company time
Shears, Household 293-9199	Map assembly
Adhesive, Rubber, Photo & Artist 291-8625	Map assembly

Field Comfor	
Common Name of Item Last Seven Digits of National Stock Number	Aviation Unit's Uses
Lantern, Field (Coleman type) 170-0430 Repair parts: spare mantles 270-4060 burner generator 284-0554/55 repair kit 553-1090	Briefing tent
Light, Florescent, Battery Operated 901-7301	Briefing tent
Tent Pin, Steel 12 inches 823-7451	To replace bent aluminum ones
Bag, Water, Collapsible 485-3034	To augment your water cans
Chemsticks, Green 074-4230—30 minutes, high intensity 074-4229—12 hours	For lighted "Y"

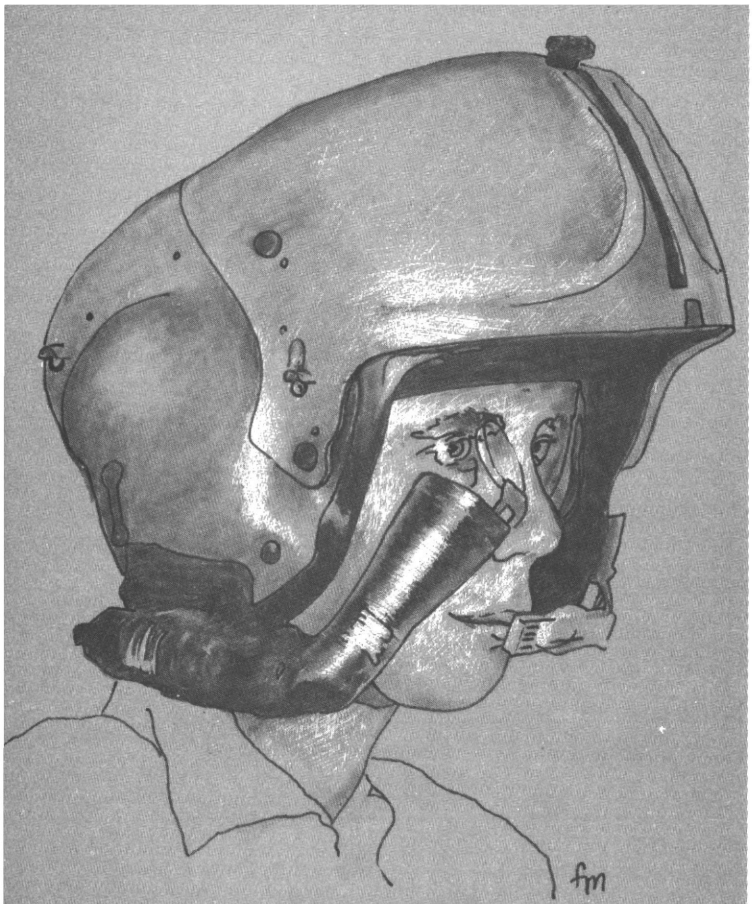
that also. Pay close attention to the fuel hose and the gravity flow adapter cap for your heaters; more often than not these two items will leak after being stored—get some extras and include them in your LOGPAC.

Look around the hangar to get some maintenance sustaining items. Pack away an extra spool of safety wire, logbook forms and a few cans of hydraulic fluid. Consider those maintenance items that battalion could run out of that could hamper the smooth operation of your field site and place one or two of them in your LOGPAC. Be careful—do not try to build up a supply of aircraft parts; these items are not for the individual units to have. Keep your list targeted toward expendable items such as shop towels and other user-level maintenance supplies or repair parts.

The three areas that your LOGPAC should attempt to improve is operations and maintenance, mission planning and field site comfort and safety. In filling the needs in these areas, your team can do their job better. The following list includes out-of-the-ordinary items as well as other suggestions for your future LOGPAC.

and Safety	
Common Name of Item Last Seven Digits of National Stock Number	Aviation Unit's Uses
Clipboard, Pilots 433-2073	To replace a lost item
Filter, Flashlight, Green 504-8341	Night vision goggles filter for flashlights
Adhesive, Liquid 266-0850	Tent patching
Adapter Kit, Gravity 360-0094	5-gallon can heater fuel hookup
Hose Assembly 274-9480	Heater fuel hose
Cream, Shaving 4-Ounce Tube 285-4960	Personal hygiene
Soap, Toilet Type, 3 1/2 Ounces 129-0803	Personal hygiene
Cloth, Cotton Duck 170-5114/5415	Tent patching

Operations and Maintenance	
Common Name of Item Last Seven Digits of National Stock Number	Aviation Unit's Uses
Flashlight, Miner's Type 643-3562	Night operations: Arming aircraft, Preflight and maintenance
Flashlight, Standard 270-5417	Replacing lost flashlights
Batteries, Dry 120-1020...D Cell 120-1030...AA Size	Flashlights
Cloth, Cheese 267-3015	Polishing windscreen
Chamois, Leather 965-1722	Drying plastic windscreen
Hood, Chemical Protective 999-0420	OH-58 T/R gearbox cover for damp environments
Windshield, Water Repellent 264-3876	Keeps windscreen clear
Headset, Aircraft, Black 128-1410	Passenger communications
Brush, Bench Bakery 240-6358	Cleans cockpit, removes snow
Cash Box, Steel 281-5931	Storage for small aircraft parts
Tool Chest, Gasoline Field 310-8544	Storage for small aircraft parts
Rope, Nylon ¼-Inch 928-3438	General purpose



The Commissioned Officer

Pilot or *Tactician?*

Captain Brian J. MacDonald
Captain MacDonald was assigned to Aviation Officer Advanced Course 88-2, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article.

He's down."

"Where?"

"I lost him."

A flash lit the dawn haze and the northern treeline spit a ball of fire high in the air. Somewhere within the grotesque mass of twisted metal on the ground the Alpha company commander breathed his last breath.

"Lieutenant, what now?"

"What?"

"Lieutenant, you're it! What next?"

"Standby, break, Dragon 6, this is...."

"Continue until 50 percent. Changes to plan follow: Priority to EA King. ITB approaching on AA3. Your CAS is German and inbound to IP4 in 10 minutes. Call 1st Brigade FSO for change to FASCAM to TRP BD1036...."

Too fast. What FASCAM? How do I call a German? What frequency? What radio? My map is blank. Why didn't Captain Rich brief this...?

"After forward passage, 3d Brigade will attack through Objective Jack to Objective Queen. RFL established on A7 on order. Questions?"

I didn't understand a word of that. I can't tell him that. Just tell me where to fly, man. Why can't he speak English? I should have listened! "...Roger,...out."

First Lieutenant Rock died with his company 30 minutes later in a confused melee 6 kilometers from their objective. Why?

GENERAL KARL von Clausewitz described the battlefield as a "swirling maelstrom" in which situations change with the speed of a bullet and violence of an explosion. Decisions are instantaneous, experience at a premium and lives at stake regardless of choice. The fog of war allows no one to form a clear picture of events. The advantage on today's battlefield goes to the tactician who assimilates the principles of war, the functions of land combat and tenets of AirLand Battle into his every thought.

Leaders meet their ultimate challenge in combat. Life or death for their soldiers lies in split-second decisions made without consulting higher headquarters or reference to written doctrine.

First Lieutenant Rock did not meet his challenge with success. What put him in this predicament? He had done so well in school. Flight school was so easy. He breezed through checkrides like he was born in the cockpit. He even scored a 94 on his advanced instrument ride. He was selected for the scout track and graduated in the top 5 percent of his class. His instructors praised his flying ability. His training was so complete, or was it?

Flight skill was not 1LT Rock's weakness. The instructor pilot in the right seat was piloting the aircraft. 1LT Rock was in the left seat running four radios and controlling the heavy team of his attack helicopter company. His weakness was lack of tactical and technical ability. Field Manual 22-100, "Military Leadership," defines tactical and technical proficiency as knowing one's job. 1LT Rock did not know his.

MONTHLY WRITING AWARD

GLOSSARY

EA	engagement area
ITB	independent tank battalion
AA3	avenue of approach
CAS	close air support
IP	inbound point
FSO	fire support officer
FASCAM	field artillery scatterable mines
TRP	target reference point
RFL	restrictive fire line
A7	Autobahn 7 (German)

Most aviation lieutenants do not clearly understand their mission as a commissioned officer. It is a systemic problem that, if it were a disease, might be named psychocentric myopia. We will call it PM. This disabling disease can attack a young aviator's nervous system, causing tunnel vision and mental myopia, and rendering him incapable of seeing beyond the cockpit and preventing him from achieving tactical and technical expertise. It can block his memory of the extensive tactical training integrated into his initial flight training. Symptoms include a distinct comfort within the aviator's own bubble of knowledge and an inability to learn nonflight related concepts.

To defeat this mind-numbing disease, leaders must live, eat and breath their profession. As a computer thinks in computer language, leaders must think in tactical language. Leaders must digest every tactical detail to understand its impact on operations at higher levels of command and across branch, service and even national boundaries.

This applies to the present-day Aviation Branch commissioned officers to the greatest degree. The demands of the profession transcend branch boundaries, spanning from deep to rear battle and from combat to combat service support operations. The commissioned officer must be the consummate combined arms expert to function within his branch. He cannot afford to succumb to PM.

Let us step back in time to find 2LT Rock at Ft. Rucker, AL. After a hard day of flight training and classes, he has retired to the gym. "Tell me 2LT Rock, you are finishing the scout tactics phase now. What do the terms tactical proficiency and technical proficiency mean to you?" He ponders a moment drying the sweat from behind his ears. "Well, tactical proficiency is knowing how to move, shoot and communicate, and technical proficiency is knowing everything about my aircraft." Though simplistic, his concept of tactical proficiency is arguably the foundation of the art of battle; however, he has barely scratched the surface of the definition of technical proficiency. 2LT Rock dries his ears again, dons his green hat emblazoned with the "cav" disk and gold bar, and struts away confident that he is prepared for command.

The fact is that the scope of technical discipline does not stop on the flight line. It is not merely confined to machines on an airstrip. Is a tank platoon leader technically proficient if he can operate and employ one tank? Does an engineer bridge platoon leader claim excellence after learning to install one Bailey bridge? No. True competence springs from the leader's ability to employ his platoon, using to the greatest extent possible all members of the combined arms team.

The leader must know the weapons systems and employment techniques of all arms of the service that may come to bear in his battle. He must know the enemy as well as his allies. He must know ground vehicle maintenance, administration, personnel and logistics. These are the technical mandates of the commissioned officer.

Before continuing, we must reach an understanding. At no time would I suggest that an aviator should not be proficient in the operation of his aircraft. As the operator of a combat vehicle, he must be able to start, fly and fight his aircraft in combat. As a rated aviator on flight status, he must maintain his proficiency, meet annual proficiency and readiness test requirements and be a productive crewmember. Anything less is unacceptable. However, flight training is only a small step in a commissioned officer's development.

In the crawl, walk, run theory of training, aircraft proficiency is on all fours. All soldiers can crawl. Any airborne soldier can jump from a C-130 Hercules. Any air assault soldier can rappel from the door of a UH-60 Black Hawk. Tankers can fire their main gun and artillerymen can pull lanyards. But officers are runners who must use these crawl skills to build units that sprint.

The battalion is the highest level of command that forms and fights as a cohesive unit. It is under the battalion com-

mander's hand that men will fight and live or die. Lieutenant Colonel (LTC) William Durbin, future commander of 1-123 Cavalry Squadron, 7th Infantry Division, now attending the Pre-Command Course, observes, "The job of the commissioned officer is not flying. He is a commander/leader of flyers and flying assets."

1LT Rock's eyes narrow. His skin reddens to contrast with his green hat resembling some bizarre holiday decoration. "Blasphemy! Does he really know what he is proposing?" Cut to graduation ceremony: "Ladies and gentlemen, we have just spent 9 months and $130,000 training you to fly, but...that's not your job."

Brace yourself 1LT Rock because being more than just a pilot is reality. Commissioned and warrant officers alike must understand that they are members of a large combined arms team that cannot contribute its best effort while locked inside of a cockpit. As John Donne said, "No man is an island...."

And what of flight proficiency and leadership by example? "Of course the aviator must be proficient in flying," responds LTC Durbin. "He must maintain credibility as a competent pilot. But his men will not live or die, nor will his mission succeed or fail, because he flies well or shoots well."

Until his indoctrination by fire, 1LT Rock's yardstick of credibility had been "stick time." Quantity was quality because, if he could fly, he could fight. This belief is a manifestation that still lingers in some cramped platoon rooms. The denizens of 1LT Rock's platoon room vectored the sickness through well-intended advice such as, "Concentrate on learning about your aircraft. That is what can kill you." His commander guided him, "This is your best chance to fly. Get as much flight time as you can." Aviators will not have the chance to reconsider their commander's advice.

The solution to the problem lies at three different levels. Since PM is a systemic problem, the solution must begin with the system that trains aviators. The schoolhouse must continue to provide responsible instruction oriented toward producing an aerial tactician. Students are learning through a demanding combined arms oriented Aviation Officer Basic Course. The course provides a base of leadership, tactics and doctrine of all branches of the Army. The simple fact that the Aviation Branch is teaching this course lends credibility that improves the learning process.

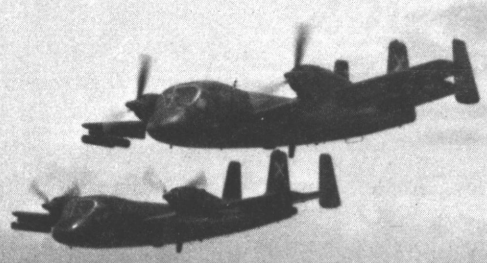
Students continue to the Initial Entry Rotary Wing Course with the proper framework upon which to build their skills. They know where Army Aviation fits into the AirLand Battle and can learn flight and tactical skills to support this role.

The commander completes this development of the junior officer as his mentor. The commander takes a fresh lieutenant and thrusts him into a demanding training environment that makes him learn those tactical and technical aspects that are critical to survival. He allows the lieutenant the opportunity to sink or swim in a torrent of demands and information. When the lieutenant can operate at the company level, the commander challenges him to learn battalion- and brigade-level operations. The commander must fully test his subordinate's mettle to do justice to the lieutenant and the Army.

Perhaps the most important element in the solution to this problem is the individual. He must be aware that he is much more than just another pilot. He must aggressively seek knowledge and open-mindedly accept new ideas. He has to be willing to lead by setting the example throughout the full spectrum of his responsibilities. Finally, he must rise above his situation in the cockpit to see the big picture and not give way to any condition that limits his desire to learn.

The Aviation Branch is making great strides in these areas so that tomorrow's aviator leaders will be more qualified than ever before. Aviators must seek the technical knowledge that prepares them for the intense challenges of the AirLand Battlefield.

photo by SSG Howard C. Breedlove



BATTLE BASICS

A Set of Guidelines for Your Individual Psychological Combat Survival Kit

William A. Rux
Headquarters
641st Military Intelligence Battalion
Salem, OR

As he came to the end of the Aviation Officer Advanced Course, this Master Army Aviator with combat experience in Vietnam reflected on the many excellent hours of tactics instruction he and his fellow classmates were given. For him it was a unique experience since, as a civilian and a part-time aviator in the National Guard, he had been out of the tactics game for more than 20 years.

IN VIETNAM during 1966 to 1967, I was an OV-1 Mohawk aviator and then resigned my commission to enter the civilian world. At that time it was not fashionable to talk about Vietnam. So, like many of my contemporaries, I completely shut out the Vietnam experience from my life. Thus, it wasn't until now, some 20 years later, that I finally began to review my own experiences in Vietnam and to reflect upon them in light of what we have been taught here at the Aviation Officer Advanced Course.

From my combat perspective, the tactics that are being taught are sound; however, what has been left out is how you should approach combat from an individual perspective for, in the final analysis, combat is an individual experience. With this in mind, I have gleaned from my own experiences in Vietnam several "battle basics" that you can review and, if you feel they are worthy, can put away in your own psychological combat survival kit.

Like most of you I had never experienced any sort of conflict situation before my Vietnam assignment. So picture with me my introduction to Vietnam. I was about your age, fully trained in the aircraft I was assigned to fly. I was loaded aboard a civilian charter jet to be flown to Vietnam in

BATTLE BASICS

style, complete with in-flight meals and the jovial attention of a pretty stewardess. Upon arrival in Saigon, I was told that there was a mixup in my assignment and that I would have to stay over at Saigon until it was cleared up. That night the barracks where I was assigned were shelled by mortar fire with several people wounded. After a mad scramble under my bunk, I realized that I had survived this indoctrination into combat by sheer luck. Thus, my first item for you to place in your survival kit: *No one can prepare you mentally for combat except yourself!*

Needless to say, I wasn't mentally prepared for the rigors of combat that require both mental toughness as well as mental evaluation of the risks and precautions necessary for every act undertaken, be it an actual combat mission or simply "bedding down" in a secure area like Saigon. In future scenarios of combat, you won't have time to get mentally "in-the-groove"; you will have to be ready at the outset, or your chances of becoming an immediate casualty greatly increase. The bottom line is that no one can prepare you except yourself. So beware of the lull before the battle and use it wisely.

After I got my "war-legs," the technique I used to prepare myself was to evaluate all potential problems and events beforehand and try to think of viable solutions so that, if I got into that situation, I would at least have a starting point from which to operate.

As an OV-1 aviator in Vietnam, I was in an unusual unit in that all of our missions were out-of-country. As a result, if we were ever wounded in flight, it would be a considerable distance before we received any assistance. Therefore, I reasoned, I had better take along a tourniquet to stop any bleeding from becoming a major blood loss. Thus, I always took a tourniquet as a part of my survival gear.

As a member of the visual reconnaissance (VR) platoon, I flew daily missions along the Ho Chi Minh trail with another aviator in armed OV-1 aircraft. One day, as the trail aircraft in a flight of two, my copilot (CP) and I heard a loud crack, and we both looked around to see what had happened. My CP raised up his arm, and it was all covered with blood and still bleeding. A round had entered the aircraft from his side and had gone through the fleshy part of his arm. He was already in shock so I ordered him to take my tourniquet and stop the bleeding while I proceeded to a friendly airport. After landing, he was immediately evacuated. He later returned to our unit proudly wearing his Purple Heart as a souvenir! After the medics had taken care of my CP, I searched the aircraft to see where the round had left the aircraft and could find no departure hole. On return to our base, we found a flattened round embedded in the survival vest that he had left behind when he departed with the medics!

Needless to say, my CP was very lucky, and I'm sure anyone with any combat experience has his share of these war stories that he can tell. But the moral to this story is *be prepared. You need to use your head at all times for your own survivability.*

This story about my wounded CP also brings out another point about aviation units. The people that risk their necks are the aircrews, and most of the aircrews are officers. As a result the guys that are killed or wounded or become missing in action are your buddies and your friends. Your actions and decisions will directly affect the people that you live with and work with on a day-to-day basis. You can't insulate yourself from the results of your decisions or from the knowledge that the next flight that you go on may be your last.

Again, using my Vietnam unit as an example, we flew out-of-country missions that were classified so we couldn't write home about what we were doing. We knew that our chances of being picked up if we were downed were extremely slim because of the remote areas where we flew. Add to this the fact that, in our unit, the risk of not returning was relatively high (while I was there we lost 6 aircraft out of a total complement of 18), and you have an emotionally dangerous situation. Add to this the unwritten law that nobody ever talks about his fears, and you have all the ingredients of battle stress that we almost lightheartedly talked about in class. But, believe me, the actual situation is disastrous and extremely difficult to face. And to top it off, none of us had ever faced a situation like this before.

My point is that these psychological pressures are real enemies and are extremely high in aviation units. You need to address how you will handle these pressures before you get into the combat situation where they may overpower you—it did in my unit where one aviator had to be physically restrained and removed from the unit because the pressures got to him. How you handle this issue is personal. For me, I survived simply by placing my trust in God and letting him determine my fate. That worked for me only because I had a strong belief system before going to Vietnam. Again, my point is that you need to be aware of these pressures and how you personally will deal with them before you get into a combat situation and your buddy "buys the farm."

Another item of importance that I can relate to a personal mission is *always follow the guidelines of your tactical doctrine*. In my case, as a VR pilot our tactical doctrine was first, only fire when fired upon; and second, only fire from a definite downhill release position, then pullup immediately to minimize the effects of ground fire.

However, since we flew daily into the same area, each of us knew what was dangerous territory and what was relatively safe ground. This caused us to "loosen up" and develop bad habits in the areas that we thought were safe.

One of our safe areas was a winding river that roughly paralleled the Ho Chi Minh trail. One day, one of our pilots discovered a 55-gallon drum floating down this river. We soon found out that "Charlie" was floating fuel for his trucks down this river as his pipeline. Many of the drums would get stuck in the eddies, so the river was patrolled by guides who would fetch the wayward drums out of the eddies and back into the current. One day as the flight leader in a flight of two, I passed by one of the guides at work in the middle of the stream all by himself in a small canoe. Even though I was at a low altitude, I decided to go-for-him. After making a turn back toward him, he had seen me and started paddling madly for the shore. As I was about to roll in on him, he had reached the shore and began to run up the open beach toward cover. When I opened fire with my two, wing-mounted, 50 caliber machineguns, I was so close to him that the rounds knocked up sand on both sides of him. For some reason, I became so mesmerized by this sight that I didn't even try to adjust. But suddenly we were too close and had to stop firing and ended up flying directly over our target at about a 50-foot altitude. Just as we flew over our target, I looked down and saw him roll onto his back and start firing up at us with his rifle.

Immediately the cockpit filled with smoke and my CP became hysterical shouting "We're hit! We're hit!" repeatedly into the microphone. In the space of about 5 seconds, I had gone from being the aggressor to trying to deal with an emergency situation that could have become a disaster. And all because I had completely ignored all the tactical doctrine that I had been taught. In this case, I was the lucky one because the situation was easy to deal with. The smoke was caused by a loss of hydraulics (which is a minor problem in the OV-1 and one we had to deal with commonly in combat). Once the smoke cleared, the CP calmed down by himself. But the situation could easily have been much worse and illustrates my point: *Don't get complacent! And always follow the tenets of your tactical doctrine.*

But the other side of that rule is equally important: *Always look for ways to innovate*. Again an illustration from my days in Vietnam. One of our intelligence gathering assets was a side looking airborne radar (SLAR) system that was designed to pick up moving vehicle traffic. It could be used day or night to determine the location of moving traffic within about 3 minutes of the actual sighting. While I was in Vietnam, we had been using the system only in Laos along the Ho Chi Minh trail. One day, I was in the intelligence area as one of the analysts was reading a report about how the Air Force was having limited success in the North Vietnam lowlands just north of the demilitarized zone (DMZ). The Air Force knew that there was a lot of traffic at night moving equipment south toward the DMZ, but they didn't know how to spot this traffic. They had been using C-130 gunships dropping flares to visually look for the moving traffic. Needless to say, Charlie simply drove the trucks into the trees at the first flare light, and the C-130s never could spot them.

As a dumb VR jockey, I casually said, "Well, why not fly one of our SLAR birds up there offshore to first find the traffic, then let the C-130s go to work on them. Our guys could stay out in the water where it would be safe from ground fire and also be out of the way of the Air Force types." That sounded like a workable strategy, so it was sent to Saigon for approval. Within a week, we had our first bird into North Vietnam territory to help out our counterparts in the Air Force. That first mission became an immediate success and the new tactic was expanded to other areas of operation. In fact, it became so successful that 3 years later 21 aircraft were dedicated solely to that type of mission.

So, always obey your doctrinal ground rules, but at the same time, always be looking for ways to innovate and be more successful at applying the greatest firepower at the critical point on the battlefield.

Your training as a leader has just begun. This Aviation Officer Advanced Course was designed to teach you the basics of sound operational tactics. At the same time, the instructors tried to get you to look at the why and how to get your minds to thinking. You have begun to grow, but don't let it stop here; instead, use this training as a stepping stone. And with that in mind, I hope that these few battle basics I have presented from my own experience will assist you should you ever be called on to exercise your profession.

USAASO SEZ

Mapping, Charting and Geodesy and Associated Issues

Mr. Thomas A. Callahan Jr.
U.S. Army Aeronautical Services Office
Cameron Station, Alexandria, VA

THE U.S. ARMY Aeronautical Services Office (USAASO), is currently working the following mapping and charting issues of interest to all Army aviators:

Visual flight rules (VFR) helicopter route charts

The production of helicopter route charts made to Interagency Air Cartographic Committee specifications continues. Currently, charts are published for the cities and surrounding areas of Chicago, IL; Los Angeles, CA; New York, NY; and Washington, DC. A new chart for Boston, MA, and a revised chart for Los Angeles are scheduled for production with an effective date of 12 January 1989. Helicopter route chart production is based on the number of aircraft movements and how they affect airport traffic in high-density areas. At some locations, the number of individual Letters of Agreement between the airport authorities and route users identify the airport or that area as a possible candidate for a VFR helicopter chart. The depiction of the route and associated written procedures establishes standardized procedures on an easily readable chart. As in the past, USAASO will request that Army units in the area of chart coverage, which includes those units within 250 nautical miles of the area of coverage, receive the VFR helicopter route charts through automatic flight information publication (FLIP) distribution.

Large and medium scale map design review

The USAASO conducted an Army Aviation review of the Defense Mapping Agency (DMA) prototype standard topographic maps (1:50,000 through 1:250,000 scale.) Included in the review was the 1:100,000-scale topographic map requested by Army Aviation and validated by this office. This scale map provides the Army aviator with an in-the-cockpit standard map. This map is used in place of a number of 1:50,000-scale map sheets taped together, and simultaneously provides the map detail not found on a 1:250,000-scale joint operations graphic map. Prototype maps were evaluated by Army Aviation personnel at the major Army commands and their subelements. The comments were consolidated by this office and forwarded to the office of the Deputy Chief of Staff for Intelligence and then to DMA.

The DMA Map Design Committee is reviewing the comments submitted by the tri-Services. Army Aviation comments addressed blue-green lighting compatibility; the depiction of obstruction symbology; and labeling, road symbology and elevation tinting.

In August of 1988 we briefed the U.S. Army Aviation Center's Map Committee, Ft. Rucker, AL, on the status of the map design review. A second series of prototype topographic maps (1:50,000 through the 1:250,000-scale) were provided to committee members for further study. This office will recommend that Army Aviation interests and comments be addressed before making a final decision on changes to the map specifications. The Army aviator will see changes to standard topographic products upon the completion of this review and approval of the changes to specification. The DMA will not reprint existing map stocks to the new specification. However, updated and revised map sheets and new map sheets will reflect the approved changes.

High-intensity radio transmission areas (HIRTA)

Possible electromagnetic interference to the Army's newer type aircraft has led to a review of known HIRTA locations, their power intensity and avoidance distances. This information is gathered by the Department of Defense (DOD) Electromagnetic Compatibility Analysis Center for the U.S. Army Aviation Systems Command (AVSCOM). Presently, AVSCOM is reviewing this information and will provide a listing to this office and Army Aviation units worldwide.

Currently, the only chart depicting this information is the British produced transit flying chart (low level) that is used in Europe. HIRTA information that might affect users of this chart is updated in the Allied Air Forces Central Europe, chart amendment low flying. We recently concurred with a proposed draft amendment to North Atlantic Treaty Organization (NATO) standardization agreement 3675 IGEO—Symbols on Land Maps, Aeronautical Charts and Special Naval Charts. If adopted this proposal requires the depiction of a HIRTA symbol on the appropriate NATO maps and charts. As part of our effort to ensure that HIRTA information is more readily available to the aviation community, we are recommending that HIRTA symbology and other additional information be provided on DOD charts, civil charts, chart updating manuals and supplements.

International map and chart database (IMCDB) prototype review

The DMA has changed the name of the IMCDB to the digital chart of the world (DCW). This name more accurately describes the product. The DCW will consist of worldwide coverage (none for Antarctica) at 1:1,000,000-scale with the same detail associated with the paper operational navigational chart. Total database storage is about 5 to 10 gigabytes. The distribution media is compact disk-read only memory. The data structure is attributed vector format, topologically structured. Presently, the procurement of software and hardware is the responsibility of the requester; however, the DMA may provide some software support. The prototype evaluation is scheduled for July 1989 through December 1989.

Army Aviation requirement forecast for digital topographic data (DTD)

The Office of the Deputy Chief of Staff for Intelligence assigned USAASO and the U.S. Army Topographic Laboratory, Concepts and Analysis Division, the task of reviewing current and future DTD requirements. This review will determine how DTD will support existing development of technology base, next generation and national aviation systems. In addition, the review and subsequent report will detail the product requirements for DTD as they relate to the system's operational use, mission planning, mission rehearsal and training functions. Last, the review is essential to aid developers in addressing DTD requirements early in the development cycle and to preclude costly revisions and unique data requirements that could delay fielding of a system because of lack of DTD.

A questionnaire has been designed to provide ETL with system related information used to identify DTD requirements for various Army and Army Aviation tactical systems. This includes describing the functional characteristics and providing an efficient, concise means of assessing the known or anticipated DTD needs to support or enhance system functions. This questionnaire is currently being distributed. We estimate that the review will be completed by early February 1989.

For your information

Technical Manual (TM) 5-105, "Topographic Operations," supersedes Field Manual (FM) 5-146, "Engineer Topographic Units" and FM 21-23, "Topographic Support." TM 5-105 provides information on the functions of topographic operations as they relate to the extended AirLand Battlefield. This manual also provides examples and descriptions of some of the mapping, charting and geodesy products available to the tactical commander. TM 5-105 provides additional information on the DMA and the user community, and information of the operations topographic annex to contingency plans, operations plans and operations orders at brigade level and higher commands. Aviation personnel, especially those responsible for ordering DOD FLIPs, may find this manual helpful in understanding the what, how, when and why of topographic operations and topographic support.

USAASO invites your questions and comments and may be contacted at AUTOVON 284-7773.

New Aircraft/Old Flight Techniques Reduce Noise Level

Mr. Wilburn James
Literature Review Branch
Directorate of Evaluation and Standardization
U.S. Army Aviation Center
Fort Rucker, AL

WITH THE INTRODUCTION of the RC-12K aircraft, Beech Aerospace Corporation has proposed a test plan that will provide new performance data. These data will require a takeoff technique that is new to the Army but is as old as the first flight at Kitty Hawk.

Federal Aviation Regulation Part 25, "Flight Test," specifies that performance charts for transport category takeoff technique be provided for the following flight technique: "After liftoff, the aircraft climbs at a pitch attitude with both engines operating normally as it would if it were climbing on one engine."

Beech Aerospace Corporation recommends this type of takeoff and climb as the safest under all flight conditions.

U.S. Army Aviation Systems Command Engineering Division supports Beech in this plan of test and the subsequent takeoff and climb technique.

The following is a direct quote from Beech Aerospace:

Part 25 Takeoff Procedure

This takeoff technique is recommended by Beech for the RC-12K. It assumes each takeoff will have an engine failure and the flight must be determined to clear all obstacles. The pilot determines airplane gross weight and ambient conditions and goes to the takeoff speed charts and obtains V_1, V_R, V_2 and V_{50} speeds. The technique used to generate the data is also used for each takeoff operationally. In position, the brakes are held and takeoff power set as before. The brakes are released and the takeoff commenced.

Beech feels the advantages of the Part 25 procedures are as follows:

- Every takeoff is planned as a one-engine takeoff. If the engine does not fail, do the same thing, just quicker.
- Every takeoff rotates to the *same* pitch attitude.
- The typical spread between V_R and V_2 is 0 to 4 knots depending on gross weight. V_2 is attained by rotating to and maintaining a specific pitch attitude.
- There is less chance of blowing it in an actual emergency situation since the procedure is performed during every takeoff. Also there is less pilot workload.
- This procedure is consistent over the weight and thrust range of the airplane.

Field Circular (FC) 1-218 "Aircrew Training Manual (ATM), Utility Airplane," presently only addresses the Vy, best rate of climb speed, and Vx, the best angle of climb speed. FC 1-218 is being revised to reflect the transport category takeoff technique.

In keeping with Army Aviation's "Fly Neighborly" policy, this takeoff technique will greatly reduce the noise level generated by an aircraft during takeoff. For example, one takeoff technique outlined in the ATM requires the use of takeoff power to climb at Vy until reaching at least 500 feet above ground level (AGL) and then accelerate to cruise-climb airspeed. The takeoff technique described below has other distinct advantages as well as one that will greatly reduce the length of time high-noise levels are generated by the aircraft during takeoff.

This takeoff technique allows the aircraft to accelerate to cruise-climb airspeed in a more shallow climb and, thereby attaining cruise-climb airspeed much sooner, usually well below 500 feet AGL. When cruise-climb airspeed is attained, the power required to climb reduces the noise level considerably, usually while the aircraft is still within the airfield boundary and not over the adjoining residential area.

Another factor to consider in noise reduction is that the same aircraft at takeoff power below 500 feet AGL within the airfield boundary generates less noise to the surrounding area than it does at 500 feet over the surrounding area.

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 36362-5208; or call us at AUTOVON 558-3504 or Commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or Commercial 205-255-6487 and leave a message.

AVIATION PERSONNEL NOTES

Aviation Life Support Equipment (ALSE) Technician Course

The ALSE Specialist Course and the ALSE Supervisor Course have been combined into one course titled the Aviation Life Support Technician Course. The first class began on 3 March 1988.

The combination of the two courses resulted from the need to provide ALSE supervisors (both senior noncommissioned officers and officers) with an understanding of the complete range of technical training provided to ALSE specialists. ALSE supervisors will now gain that understanding by completing identical hands-on and practical exercise training formerly reserved only for ALSE specialists. The additional training will lengthen the course for supervisors about 1 1/2 weeks and is a major step in enhancing the competence level of the entire ALSE community.

Maintenance Manager/Maintenance Test Pilot (MM/MTP) Course

On 1 October 1987, the Aviation Maintenance Officers Course (AMOC) Phase I and AMOC Phase II were combined into one start-to-finish course titled the MM/MTP Course. In reality, there are eight MM/MTP courses, one each for the following aircraft: UH-1 Huey, UH-60 Black Hawk, AH-1 Cobra, AH-64 Apache, OH-58A/C Kiowa, OH-58D, CH-47B/C Chinook and CH-47D.

Personnel who completed AMOC Phase I before 1 October 1987, but have not completed AMOC Phase II, are eligible to attend the aircraft track portion (test pilot portion) of the course until 1 October 1990. After that date, all personnel will be required to attend the entire MM/MTP Course.

Alternate Flight Aptitude Selection Test (AFAST)

The AFAST has been implemented and supersedes the Flight Aptitude Selection Test (FAST). Applications for flight training will be given further consideration only if the AFAST score received is equal to or higher than the qualifying score of 90. When a qualifying score on the AFAST is achieved, no retest will be authorized. If an examinee does not achieve a qualifying score on his or her first test, only one retest will be authorized. If the unit commander authorizes a retest, it is not to be taken until 6 months after the first test and it must be a second version of the AFAST reserved for retesting; no further retest will be authorized. Personnel who have received a qualifying score of 90 on the FAST will not be authorized to retest on the AFAST.

Reenlistment Eligibility for Alien Soldiers

The Army has a new reenlistment eligibility policy for alien soldiers. Features that may affect aviation soldiers are:

- Aliens now serving on Active or Reserve Component Duty will not be eligible to reenlist after they have more than 7 years of military service.

As an exception, alien soldiers who enlisted before 1 January 1986, may extend or reenlist for a period of service. However, their expirations of term of service cannot go beyond 31 December 1992, without their becoming U.S. citizens, no matter what their time in service at their extension or reenlistment points.

This exception allows time for alien soldiers now in the service to become citizens, thus meeting policy requirements and qualifying to extend or reenlist.

Prior-service aliens who want to enlist in the Army National Guard or Army Reserve will not be eligible when their total terms of military service add up to more than 7 years at the time of enlistment.

- Aliens who have more than 7 years of military service and who want to reenlist will be permitted to extend their current enlistments for periods not longer than 12 months, if they can show proof that they have filed for citizenship and are waiting for court dates.

These restrictions do not apply to the Federal States of Micronesia or to the Republic of the Marshall Islands.

This change is consistent with a recent Department of Defense (DOD) policy that requires all DOD personnel with security clearances to be U.S. citizens.

Changes are being made to appropriate regulations to reflect this new policy.

West Point Seeks Teachers

The U.S. Military Academy, West Point, NY, is encouraging academically qualified officers to apply for instructor and tactical officer positions for the Corps of Cadets. Selected officers will attend a graduate school for up to 24 months and will then teach at West Point for 3 years. Most positions are for company-grade officers. Aviators desiring more information should write to the Superintendent, U.S. Military Academy, ATTN: MAAG-0M, West Point, NY 10996-5000.

THREAT

Captain Sheila L. Chamberlain
Threat Division
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

THREAT DIVISION UPDATE

WE'VE COME A long way since the May 1984 *Aviation Digest* article on the Threat Branch. Many changes have occurred within the aviation threat community. Not only has our mission been revised according to new regulations, our responsibilities have also increased.

On 1 October 1986, the Threat Branch became the U.S. Army Aviation Center Threat Division, which is subordinate to the Directorate of Combat Developments, Ft. Rucker, AL. The U.S. Army Training and Doctrine Command (TRADOC) directed this change according to TRADOC Regulation 381-1, "Military Intelligence Threat Management," and Army Regulation 381-11, "Threat Support to U.S. Army Force, Combat and Materiel Development." The purpose of this change was to allow the Aviation Center to "accurately reflect the scope and diversity of activity in which the threat manager and threat personnel participate."

The mission of the Threat Division is to "ensure the application of accurate intelligence into Aviation Center training and force modernization activities."

The goal is to "ensure the timely provision and accurate portrayal of the threat in the concept based requirements system and in support of the TRADOC mission, 'To Prepare the Army for War.'"

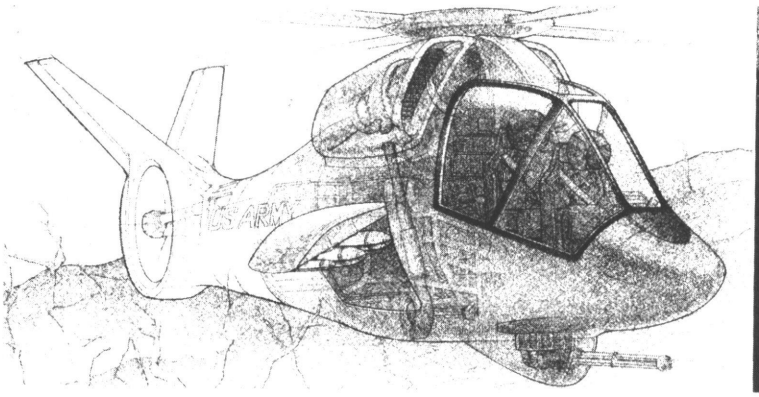
We are able to accomplish our mission and goals through briefings, conferences, meetings, fact sheets, threat assessments and other intelligence channels. As a Threat Division, we are often called upon to write threat assessments. Many people erroneously believe that these assessments are actually intelligence products.

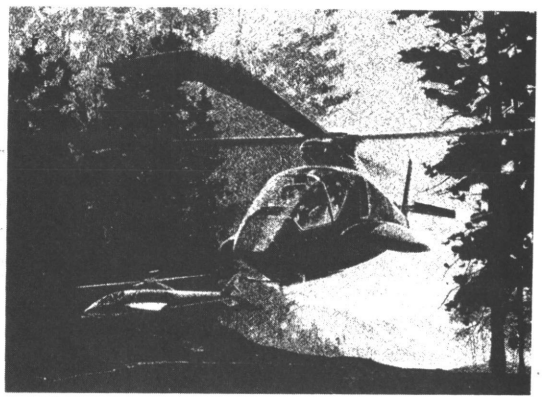
Intelligence is "the product resulting from the collection, evaluation, analysis, integration and interpretation of all information concerning one or more aspects of foreign countries or areas that is immediately or potentially significant to the development of plans, policies and operations." The division receives this type of information from national intelligence agencies or other services with whom we interface to obtain current information.

A threat assessment is "an evaluation of an enemy's or potential enemy's current or projected capability to limit, neutralize or destroy the effectiveness of a mission, organization or item of equipment. It involves the application of threat analysis to a specific mission, organization or item of equipment within the context of the military operation. Threat assessments consider the product of threat analysis vis-a-vis a U.S. force and include the military judgments of the evaluated threat force." The division provides this information to the combat developments community.

Our responsibilities have increased since threat assessments that were formerly the purview of national intelligence agencies have been delegated to TRADOC branch proponent schools. The Threat Division writes the Aviation Mission Area Threat to support the Aviation Mission Area Analysis. We also provide threat support to more than 30 departments, agencies and other organizations at Ft. Rucker through combat developments, training and training development, and concepts and doctrine development.

First, we support the materiel acquisition process, which requires us to play a major role in the combat developments (CD) community. Threat developments in doctrine and materiel are often the driving factor behind Army acquisition programs. The most significant work





Equipment development such as the light helicopter experimental program relies on intelligence analysis and threat projections.

being done in CD is centered on the light helicopter experimental program. This work demands comprehensive intelligence analysis including threat projections throughout the system's life cycle. In this role we provide facts and figures on threat equipment, tactics and doctrine. Other CD projects we are working or have completed are air-to-air combat; AH-64 threat assessment update; directed energy weapons; nuclear, biological and chemical obscurants; logistics; radio electronic combat; mission area threat; mission area analysis; UH-60 Black Hawk threat assessment; and antiarmor/armor.

Second, the Threat Division supports training and training developments. The Department of Combined Arms Tactics (DCAT), Threat Intelligence Branch, conducts threat training to resident courses. The Threat Division reviews lesson plans to assure threat validity and currency. We also monitor threat instruction in coordination with DCAT. DCAT Threat Intelligence Branch and the Threat Division have the implied task of coordinating to assure local and worldwide Army Aviation organizations receive accurate and current intelligence data.

Third, to support concepts and doctrine development, the division continuously analyzes the threat and ensures the threat portrayal is accurate and current. Threat information is disseminated through threat committee meetings, fact sheets or special briefings. Threat committee meetings are a quarterly gathering of key representatives of the Aviation Center's directorates and various agencies. This often includes a presentation from one of the national intelligence agencies. These meetings are organized to "provide a conduit through which intelligence, threat information and guidance are passed between the threat manager and the committee member's organization."

In addition, we support the entire Army Aviation community by providing the appropriate threat support to various users and requesters. We have initiated production of a quarterly threat bulletin that will expedite the dissemination of current and pertinent threat information to the Army Aviation community. The Threat Division is also researching vulnerabilities of the threat to Army Aviation. This study will determine and describe enemy systems, tactics and organizations that are known or potential threats to Army Aviation assets, with the expressed purpose of highlighting threat vulnerabilities.

Finally, we manage and maintain the Aviation Center's intelligence and threat reference library. This library contains current aviation-related and nonaviation-related classified and unclassified intelligence documents from national intelligence agencies. Our information is tailored primarily to support the Army Aviation community. If you are interested in any type of threat information or have additional questions, write to Commander, U.S. Army Aviation Center, ATTN: ATZQ-CDT, Ft. Rucker, AL 36362-5195, or call AUTOVON 558-5606/5671, Commercial 205-255-5606/5671. We would also like to know what threat topics or subjects you would like to see in future *Aviation Digest* articles.

REFERENCES

1. TRADOC Regulation 381-1, "Military Intelligence Threat Management," 8 June 1987.

2. AR 381-11, "Threat Support to U.S. Army Force, Combat and Materiel Development," 14 April 1986.

3. USAAVNC, Directorate of Combat Developments History, Threat Division, 1986.

Job Calls For Trim, Nonclaustrophobic Person

Ms. Lola Lord
Public Affairs Office
Corpus Christi Army Depot, TX

THE MAN IN the bright, white suit eases himself through the opening. Slowly he squeezes through the hole, which is slightly bigger than the average long-play record.

Once inside, he will spend about an hour in an area about the size of the trunk of a car.

Mr. Doyle Jones and other workers from the Corpus Christi Army Depot, Corpus Christi, TX, rubber shop and welding branch are working on fuel tanks. They are destined for CH-47 Chinook helicopters' extended range systems.

Some helicopters equipped with this new system will be used to ferry fuel for aircraft while others will be used for long-distance travel.

This is a fairly new program that involves modification and refurbishing of old 600-gallon water tanks.

Inside the tank, Mr. Jones is cramped, but cool. A portable air conditioner prevents a stifling heat buildup. He carefully inspects the welds and cleans debris with a small vacuum cleaner.

Modification of this fuel tank began as it is ending, with cleaning. When it was completely clean, it was inspected for dents, breaks in weld seams and corrosion.

In spots where more than ¼-inch corrosion was found, patches were applied. Before the welder crawled in to place them, however, a safety check ensured that no chemicals or fumes were present. Additional tests are made every 48 hours to make sure no chemicals have built up inside the tank.

Then a special solution was sprayed around the inside of the tank to prevent future corrosion.

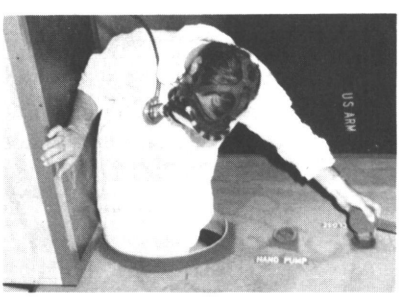
All tanks used in the program are tested for leaks by filling the tank with air and sealing it. If the pressure holds for 20 minutes, the workers are satisfied that there are no leaks.

When Mr. Jones and fellow workers complete this tank, it will be connected to three others and a pump panel. The last item will pump fuel into the helicopter's main fuel tanks.

Corpus Christi is working on a prototype pump that will be about half the size of the one used now.

The program calls for about 600 of these tanks to be completed during the next 2 years, according to the project manager, Mr. Henry Perez. About 100 tanks have been completed so far.

Corpus Christi Army Depot is part of the Army's Depot System Command, which is a major subordinate element of the Army Materiel Command.



Mr. Doyle Jones squeezes through the narrow opening of a helicopter fuel tank (above). Inside the tank (right), Mr. Jones vacuums debris as part of the inspection process. The tight space keeps him in this position during his time in the tank.

photographs by Rena Davis

BATTLE NOTE:

Engagement Areas Procedures and the Trap

Colonel Steele, through his professional development series for the leadership of the 2d Armored Cavalry Regiment, has focused on the "art of maneuver." Captain Miller has used Colonel Steele's battle note, with emphasis on the trap, as a vehicle to detail attack helicopter procedures.

Colonel James Steele
Captain (P) William D. Miller II
Headquarters, 4th Squadron
2d Armored Cavalry Regiment
APO New York

THE 2d ARMORED Cavalry Regiment recently completed the J-series transition. This presentation describes some of the fundamentals or art of maneuver as executed during regimental exercises such as Bold Dragon I and II and Lion Tamer, conducted at the Hohenfels training and maneuver area, Federal Republic of Germany.

Simply stated, an engagement area (EA) is a piece of ground on which a maneuver commander intends to meet an enemy force. Massed fire of available weapons systems are used to destroy the enemy. Ideally, the EA offers a tactical advantage, whether it be fields of fire, the ability to channelize the oncoming threat, the ability to effect a favorable force ratio or any number of specifics that will give a decisive edge.

The trap is not a counterattack or an offensive operation merely designed to regain lost ground. It is rather a combat operation designed to mass overwhelming combat power at a relatively weak point in the enemy's formation (generally the vulnerable flanks and rear) to surprise and destroy him. Traps use mobility, surprise and advanced preparation of the battlefield to seize the initiative, disrupt the enemy plan, create a favorable ratio of combat power at a critical point and destroy the enemy with a combination of firepower and psychological shock. General George S. Patton best described the basic tactical concept of the trap: "Hold the enemy by the nose while kicking him in the ass."

Ideal planning of engagement areas should include the following:

- Battle positions (BPs) that allow for maximum standoff range while anticipating enemy maneuver. Multiple BPs should be considered. Target intervisibility should be unobstructed.
- Obstacles that impede enemy movement and channelize the enemy force into the desired EA. (Never let the enemy have the opportunity to choose the place to fight!)
- Fires that are massed and continuous. Ground forces should be used to block enemy movement. Indirect fires should be planned to cover the entire EA. Shifting of fires should be planned to provide security for friendly forces, while field artillery scatterable mines (FASCAM) should be used to paralyze enemy forces in the EA as well as to separate first and second echelon enemy forces. Fire control measures should be effectively used to ensure that ground elements, attack helicopters and close air support (CAS) forces avoid engaging the same target. Phase lines and easily identifiable terrain features are used as fire control measures.

FIGURE 1: Time line for a 2-hour engagement scenario.

E − 2+00	WARNORD issued to attack helicopter commander. Teams move to forward arming and refueling point.
E − 1+45	UH-60 Black Hawk SAR A/C departs AA for linkup at FARP with attack troop.
E − 1+30	Operation order issued to commander. (Includes first intelligence update.)
E − 1+00	Unit FRAGO issued by commander.
E − 0+45	RALO contacted for close air support update.
E − 0+40	Troop moves to HA/contacts air cavalry scouts for update.
E − 0+35	EH-60 departs for mission support (standoff orbit).
E − 0+30	RECON/occupy HA/contacts ground force commander.
E − 0+25	Second intelligence update provided in HA.
E − 0+20	Initial coordination with artillery unit.
E − 0+17	Initial contact with CAS.
E − 0+15	Attack troop aeroscouts RECON BPs.
E − 0+06	Clear CAS forward to inbound points (IPs).
E − 0+05	Trigger point is "triggered." Battle handover.
E − 0+04	Attack helicopters (AHs) move to BPs.
E − 0+03	Scouts coordinate artillery fire.
E − 0+02	BPs occupied.
E − 0+01	Initiation of fires ordered/CAS cleared forward of IP to arrive at EA upon shifting of artillery and AH fires.
E Hour	Engagement.
E + 0+05	Security fires for egress provided by artillery.
E + 0+07	Egress.
E + 0+10	BDA reported to ground maneuver commander.
E + 0+11	Battle handover to air cavalry troop.
E + 0+15	Mission complete.

- Decision points that key the initiation of the attack. Decision points can be a time, a specific type enemy element observed by scouts, or the crossing of a certain piece of identifiable terrain by enemy forces.
- Holding areas (HAs) that provide a covered and concealed position near the BP and enable undetected movement to the BP. HAs also facilitate last minute battle coordination.
- Target priority should be briefed, as well as engagement priority on targets of opportunity.

Figure 1 depicts a time line for a 2-hour engagement scenario; e.g., 2 hours is required from the time the initial warning order is issued to the engagement time. (All regimental forces are well versed on the fundamentals of the trap and execution does not necessarily require 2 hours.)

The trap, shown in figure 2, uses the same planning factor described in the 2-hour scenario. The following sequence of events details why maximum planning must be used for a successful trap:

- The enemy is permitted to achieve a penetration.
- As the penetration develops, enemy reconnaissance elements are eliminated.
- The enemy force is stopped at a predetermined point by the fixing force. The fixing force is reinforced with mines, engineer obstacles and prepared fighting positions.
- Indirect fires disrupt the enemy, then are shifted to slow follow-on echelons as the strike force closes on the enemy's rear. FASCAM is very effective when used between echelons to close the trap on lead elements.
- Scouts clear the axis of advance for the strike force and protect its flanks. Simultaneously, attack helicopters (with aeroscouts providing security) strike on an opposing axis.
- Electronic warfare assets are directed against enemy command and control elements.
- Close air support and joint air attack teams are integrated against follow-on forces.

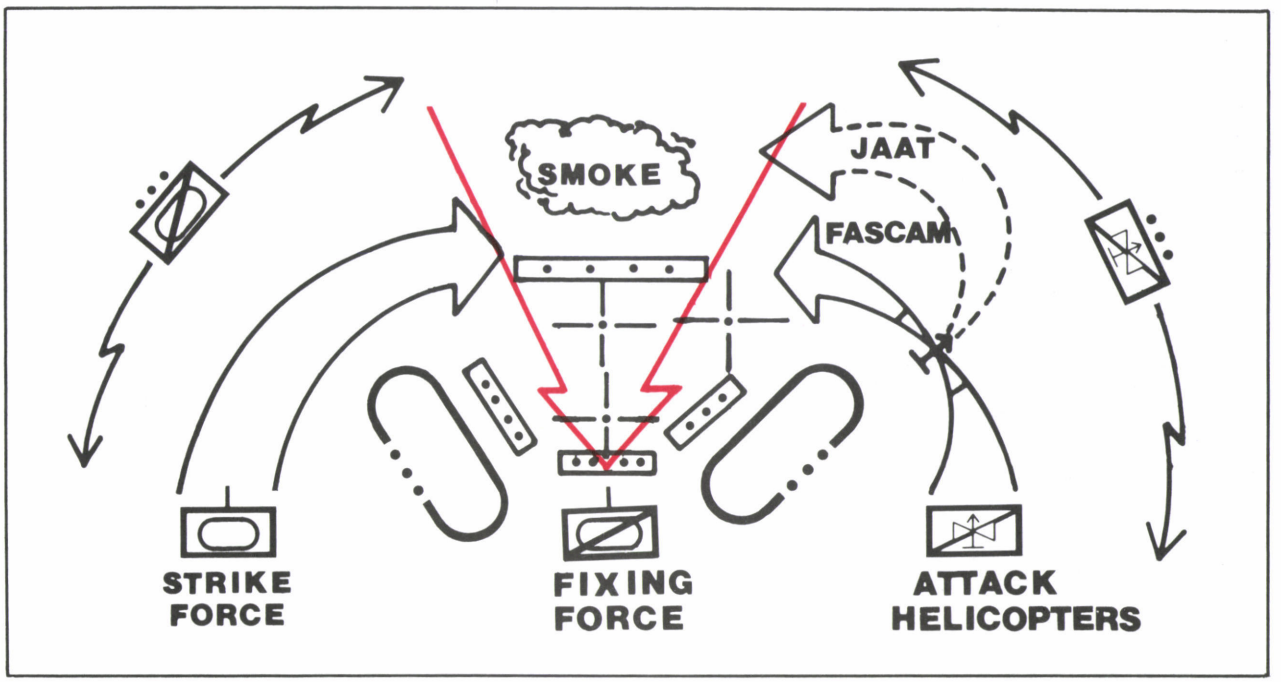


FIGURE 2: The time trap.

The following elements are considered to be very critical in the execution of the trap:

- Prepared fighting positions are a must for the fixing force, as the majority of the enemy's fires will be focused there.
- Indirect fires must ensure that the enemy force is initially disrupted.
- Timing is a critical element. As the enemy closes on the fixing force two things occur: The friendly force is subjected to tremendous fire and the enemy force compresses as its lead elements are engaged. Barriers are temporary and can be quickly breached. If the strike force is not moving before the enemy force is stopped, the enemy may well break through, destroying the fixing force and unhinging the entire operation.

The concept of engagement areas and the trap apply at all levels—troop, squadron and regiment. The difference is one of scale. Artillery or engineer support may be lacking, causing greater reliance on mortars and natural obstacles. The objective, however, is the same—destruction of the enemy through a combination of firepower, mobility and shock action.

"Toujours pret."

VIEWS FROM READERS

Editor:

The article "Focus on Training" in the May 1988 issue was relatively well written; however, some of the views of the author on what is nonessential training leave a lot to be desired. The specific instance in this case is his view to eliminate the instrument currency requirement for aviators flying the OH-58 Kiowa and AH-1 Cobra series helicopters.

Continued flight into deteriorating weather conditions is a big factor in civil accident statistics, as well as the military services losing aircraft and crews each year in weather-related mishaps.

The OH-58 and AH-1 are not certified for flight into instrument meteorological conditions (IMC). They are, however, equipped to fly into IMC in an emergency. The reasons that these aircraft are not certified have to do with required backup systems and navigational equipment. The aircraft are fully capable of flying IMC in an emergency.

An aviator who has maintained his or her instrument proficiency could, and in most cases should, declare inadvertent IMC, execute the vertical helicopter instrument recovery procedure, and fly home or to a suitable airport rather than continue to fly into deteriorating weather conditions and end up a statistic.

The thought process in the scout/attack community currently does not stress instrument proficiency. This is noted when administering annual instrument checkrides. The only reason that they now maintain any form of currency is because of the annual ride with their friendly instrument examiner. It is a well-known fact that the only way to maintain instrument currency is to fly instruments. If instrument currency requirements are eliminated for a specific group of aviators, we are surely signing the death warrant for some of them.

The main thrust toward effective combat training should be to learn "never to push a bad position or situation, go out and fight, and come back to fight another day." To accomplish this our aviators have to maintain all of their skills. Instrument proficiency is just one of them.

CW4 Terrence L. Borzewski
Army Instrument Examiner
Wisconsin Army National Guard
Truax Field
Madison, WI

Editor:

With reference to the article by Major K. T. Mason, M.D., in your April issue; this article certainly was *more* than informative. It opened up an area evidently little used or understood. I do wish, however, to comment on two things said by Dr. Mason, things that themselves could use a little more clarification. AR 40-501, chapter 4-30, does not deal with "emotional issues." It deals with overt and observable behaviors and responses by aircrewmembers. The use of the term emotional issues is somewhat misleading and tends to perpetuate the mythology that psychological dysfunctions are subjective evaluations, dealing with one's emotions. Emotions are behavioral responses to events that are important to the individual. While the individual's *experience* of emotions are subjective, his or her responses are quite observable, and measurable—and as potentially disabling or dangerous as any major medical problem.

To compare most psychosocial disqualifications to ear infections and sprained knees, as Major Mason does, is again misleading. Many psychosocial and psychological problems are disabling or dangerous. Attitude and behavior (as specified in the ARMA regulation) are very good indicators of underlying psychological dysfunctions.

I would hope that a flight surgeon, when dealing with a possible ARMA case, makes full use of a clinically trained psychologist and realizes that an ARMA case may really fall under AR 40-501.

The care of the Army's aviators can best be done by a team context, when physiology and psychology cooperate. The strong interest of the airlines and the other military services in aviator attitudes and traits surely points out the need for an enhanced role for psychology—as well as the full realization by the Army's medical community of the benefits to an aviator of a medical/psychological team.

Ronald John Lofaro, Ph.D.
Army Research Institute Aviation
R&D Activity
Ft. Rucker, AL

Editor:

The Joint Committee on Aviation Pathology would appreciate it if you would include the following notice in a future issue of your publication:

The 16th biennial scientific session of the Joint Committee on Aviation Pathology will meet in Toronto, Canada, on 15 to 17 November 1988. For information about the session, please write to: Secretary, Joint Committee on Aviation Pathology, Armed Forces Institute of Pathology, Washington, DC 20306-6000.

We feel that, through your publication, we will be able to reach those interested in the field of aviation and aviation medicine. The point of contact at the Armed Forces Institute of Pathology is Colonel Gormley, AUTOVON 291-3232 or Commercial 202-576-3232.

COL William T. Gormley, M.D.
Secretary
Joint Committee on Aviation Pathology

Readers can obtain copies of material printed in any issue by writing to:
Editor, U.S. Army Aviation Digest, *P.O. Box 699, Ft. Rucker, AL 36362-5042.*

MULTITRACK FIRST SOLO FLIGHT

Ms. Amy O'Neal
Public Affairs Office
U.S. Army Aviation Center
Fort Rucker, AL

photo by SFC Ray Coffey

WOC Julia St. John Anderson, the first student to solo in the UH-1 Huey as part of the multitrack flight course training at Ft. Rucker.

THE FIRST SOLO flight of the UH-1 Huey of the multitrack flight course ended in a smooth landing 15 June 1988 at Hooper Stagefield, Ft. Rucker, AL.

Warrant Officer Candidate (WOC) Julia St. John Anderson, Freedom Flight, Initial Entry Rotary Wing Class 88-15, became the first to meet her solo requirements in the course.

Mr. Charles E. Quinn, manager for training for Pan Am Support Services, flew with her to satisfy weight and balance requirements.

Before WOC Anderson could fly solo, she had to meet several requirements. In the flight course, WOC Anderson had to fly about 22 hours and complete initial classroom and procedural training. She was the first to complete her service hours because of one-on-one training with her instructor pilot, Mr. William D. McGowan II, a Pan Am Support Services instructor. Flight instruction usually has two students to one instructor, but this class had an odd number of students.

The multitrack primary phase, taught by Pan Am Support Services, will last 50 days for a total of 62.5 flight hours.

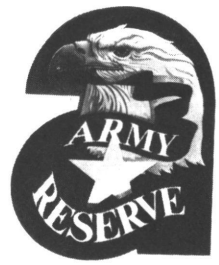
The course also includes procedural training, cockpit familiarization, startup and shutdown procedures, and includes accumulated flight hours and solo flight.

WOC Anderson finished the requirements for solo flight 3 days ahead of schedule. Flight commander Mr. Joseph J. Rallo of Pan Am, tested her satisfactory solo proficiency during the flight's three normal takeoffs and approaches.

When asked about her solo flight, Mr. McGowan said, "She's exceptional. She had a good flight."

WOC Anderson, a Sterling, MA, native was introduced to the course by a friend in the U.S. Army Reserve (USAR). She entered the USAR so she could learn to fly. WOC Anderson said she was ready for the solo flight and enjoyed every minute of it. WOC Anderson is scheduled to graduate from flight school in February 1989.

AVIATION MEDICINE TRAINING PLAYS INCREASED ROLE IN ARMY RESERVE



Lieutenant Colonel L. Kent Porter
U.S. Army Reserve Personnel Center
St. Louis, MO

AVIATION HAS played an ever-increasing role in support of the Army's ground forces and missions. This has been true since the early days of battlefield observation from the balloon systems to the fixed and rotary winged aircraft in the Army's inventory today.

As technology and sophistication continued to advance aircraft designs, the requirements for logistical and personnel support increased as well. Medical support needs of aircrews also determined the requirements for the aviation medicine qualified physician-flight surgeon.

Aviation medicine is a unique form of occupational medicine and is a subspecialty of the American Board of Preventive Medicine. The flight surgeon has very important functions, both clinical and nonclinical. He or she

provides medical support to the aviation population to ensure individual health, flying safety and successful mission accomplishment.

The flight surgeon serves as a key member of the aviation commander's staff, a principal advisor for aeromedical issues, a required member of the standardization committee and a clinician.

Considering the importance of aviation to the Army's mission, and the importance of the Army Reserve in supporting the medical needs on mobilization, flight surgeons are an important asset contributing to readiness. Becoming qualified in aviation medicine and remaining current to do the job can be both challenging and rewarding.

Army flight surgeons are trained at the U.S. Army School of Aviation Medicine (USASAM) at Ft. Rucker, AL. The Medical Corps Branch, Special Officer Division, U.S. Army Reserve Personnel Center (ARPERCEN), controls U.S. Army Reserve (USAR) quotas for Army Flight Surgeon Course, Number 6A-61N9D. Quotas are allocated to the USAR for the October-November and February-March courses but some may be arranged for the July-August course if seats are available.

Currently, mobilization requirement data indicate the need for 141 qualified flight surgeons. Medical Corps officers in specialties that exceed mobilization requirements are encouraged to become qualified in aviation medicine. These specialties include psychiatrist, pediatrician, pathologist and general medicine officer. This does not preclude officers in other specialties from attending the Army Flight Surgeon Course; however, priority will be given to officers in the Individual Ready Reserve who are in a specialty that is above mobilization requirements.

Generally, to attend the Army Flight Surgeon Course, an applicant must be a commissioned Medical Corps officer, a commissioned officer medical student in the senior year of medical school or an appointed physician's assistant. A Class 2F Flying Duty Medical Examination (FDME) must be completed per Army Regulation (AR) 40-501, "Standards of Medical Fitness," chapter 4. This examination must be reviewed and approved by the U.S. Army Aeromedical Center at Ft. Rucker.

Completed examination should be mailed to Commander, U.S. Army Aeromedical Center (ATTN: HSXY-AER), Ft. Rucker, AL 36361-5333. Clearly indicate "2F Flight Surgeon" in item 5 (Purpose of Examination) on Standard Form 88, Report of Medical Examination. No orders to attend the course will be published until the FDME is approved by the reviewer at Ft. Rucker. Applicants need to allow at least 90 to 120 days to be able to respond to problems found in review of the examination. This examination is valid for 1 year from the date of the examination, not the date of the review. Thereafter, the examination should be maintained on an annual basis during the officer's birth month.

New applicants to this course must plan to complete aviation medicine training within 2 years of phase one enrollment. The course can be completed in incremental sequence in any combination of phases.

Applications from units that have a physical examination mission from U.S. Army Forces Command in support of aviation assets will have a priority for quota allocation. Attendance may be instead of annual training or supported by ARPERCEN professional development education funds, or a combination of these.

Refresher or orientation training is available for flight surgeons who completed training in an armed service other than the Army or whose training has not remained current for 7 years or more. This is normally phase one of the Army Flight Surgeon Course. According to AR 600-105, "Aviation Service of Rated Army Officers," graduates of other than Army flight surgeon courses should not be awarded the "61N" designation until the orientation training has been completed in the Army's course.

Approved applicants will receive an administrative packet from USASAM before attending phase one of the course.

Applications (DA Form 1058-R) should be sent to: Commander, ARPERCEN (ATTN: DARP-OPS-MC), 9700 Page Blvd., St. Louis, MO 63132-5200 as outlined in AR 616-110, "Selection, Training, Utilization and Career Guidance for Army Medical Officers as Flight Surgeons." Applicants can contact the Medical Corps Branch at ARPERCEN toll free, 1-800-325-4919.

Considering the importance of aviation to the Army's mission, and the importance of the Army Reserve in supporting the medical needs upon mobilization, flight surgeons are another important factor contributing to readiness. Becoming qualified in aviation medicine and remaining current to do the job can be both challenging and rewarding. The need is there for officers of the Army Reserve who have the interest to meet the call.

SHORT TOUR TIME

Captain Walt Rainey
Captain Rainey was attending the Aviation Officer Advanced Course, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article.

LOOKING FOR AN alternative to Korea for short tour credit? If you want the challenge of a real-life mission and an opportunity to discover the Middle East, a tour with the Multinational Force and Observers (MFO) in the Sinai Peninsula, Egypt, could be for you. Be part of the peacekeeping force responsible for monitoring peace on one of the world's most contested battlegrounds for at least 50 invading armies since recorded history began.

The Sinai Peninsula is located on the southeast shores of the Mediterranean Sea. It extends eastward from the Suez Canal to Israel and southward from the Mediterranean Sea to the Red Sea. The terrain in the Sinai consists of mountainous and desert areas. In the southern portion, the terrain is extremely rugged with vertical cliffs and dry waterbeds winding between mountains called "wadis." Helicopters are the only means of transportation into many locations.

The MFO is an international peacekeeping organization created to carry out the terms of the Egypt-Israel Peace Treaty of 1979. The MFO was established by a protocol signed by Egypt, Israel and the United States on 3 August 1981.

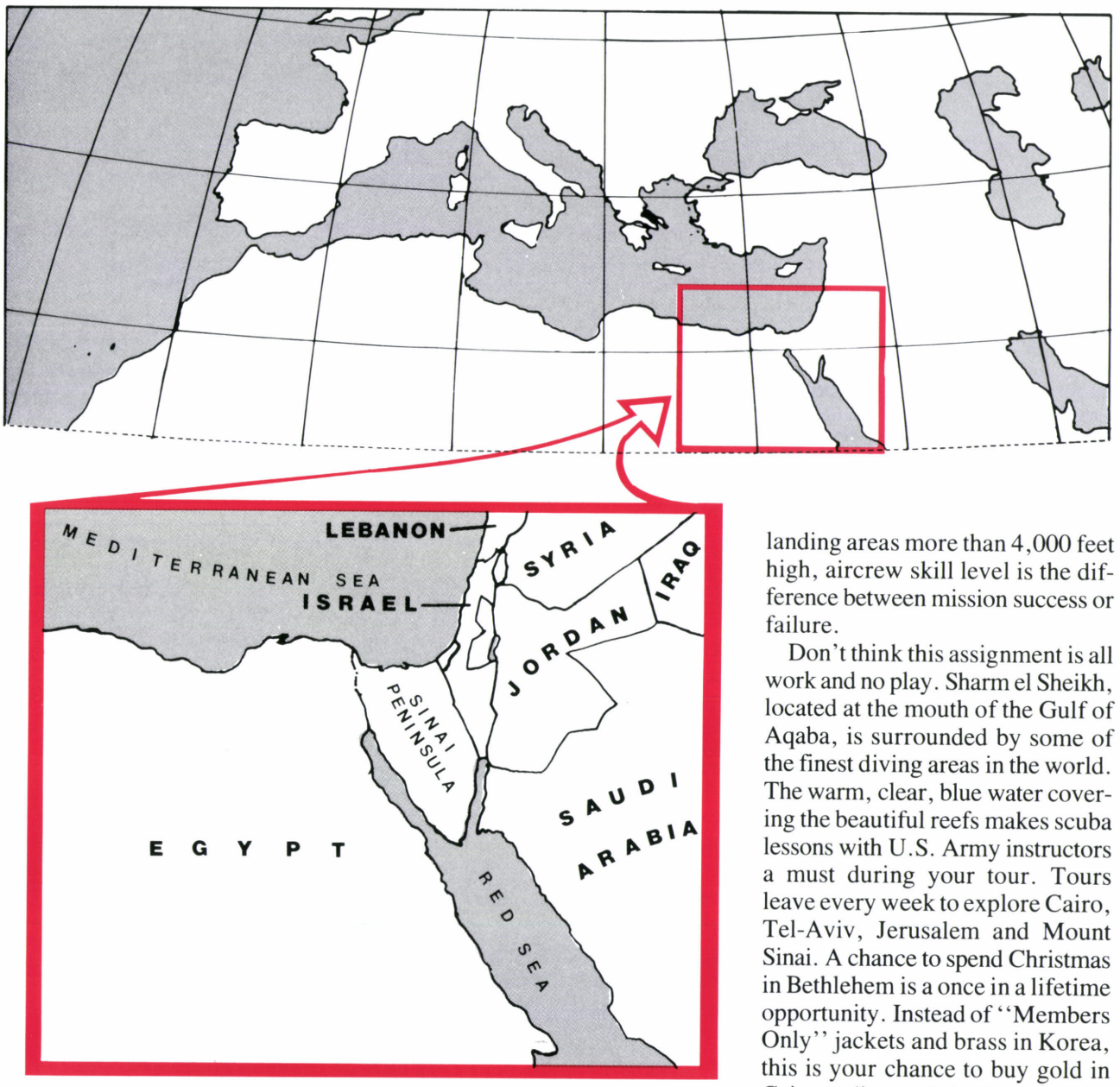
The peace treaty called for Israel's final withdrawal by 26 April 1982, of armed forces in the Sinai, which they had occupied since the Six Day War of 1967. The Sinai Peninsula was divided into four zones (A through D). A provision of the peace treaty provided specific limitations pertaining to the number of armed forces and fortifications in each zone.

The MFO international peacekeeping operation is under the supervision of the director general, a U.S. citizen who is appointed and reports directly to the governments of Egypt and Israel. His staff and headquarters are located in Rome, Italy. The Sinai force is commanded by a Norwegian general, whose forces occupy zone C. It is comprised of forces from 11 nations. Zone C is divided into three infantry battalion sectors: the Fijian Army in the north, the Columbian Army in the center and the U.S. Army in the south. The U.S. Army also provides the logistical support unit (LSU), which is the higher headquarters of the LSU Aviation Company. The Italian Navy provides the coastal patrol unit. Support elements from Great Britain, Netherlands, Canada, New Zealand, Uruguay and France round out the forces stationed in the Sinai.

Until May 1987, Army Aviation was part of the U.S. Infantry Battalion Task Force that served a 6-month rotation in the Sinai. Only personnel from the 101st Airborne Division (Air Assault), the 82d Airborne and the 9th Infantry had the opportunity to participate in the mission. Now personnel from the entire Army Aviation community can serve a 1-year tour.

Located at the southern tip of the Sinai Peninsula, Sharm el Sheikh is home to the LSU Aviation Company. This aviation company is composed of 110 personnel divided into three platoons. Headquarters platoon includes a flight operations section that performs flight following for MFO aircraft operating throughout the southern region. The maintenance platoon performs aviation unit maintenance and aviation intermediate maintenance in a modern, well-stocked hangar. The flight platoon consists of 10 UH-1 Huey aircraft and the crews for manning them. The platoon flies about 325 hours each month.

Missions for the company are many and diverse. The most important mission is medical evacuation (MEDEVAC). With aircraft on standby around-the-clock, crews are trained in the use of the rescue hoist to perform mountain or sea rescues. Treaty verification missions are second only to MEDE-



VAC. Aircrews fly members of the civilian observer unit into zones A and B to monitor Egyptian Army units and fortifications. Support for distinguished visitors keeps the unit very busy. The Sinai peacekeeping operation is a high profile mission. Numerous congressmen, senators and high ranking military officers visit each year. Logistics missions, however, make up the bulk of the flying hours. The LSU helicopters fly daily missions to resupply an island observation post unreachable by any other means. Last but not least, training is a constant mission. With summertime temperatures exceeding 110 degrees Fahrenheit and landing areas more than 4,000 feet high, aircrew skill level is the difference between mission success or failure.

Don't think this assignment is all work and no play. Sharm el Sheikh, located at the mouth of the Gulf of Aqaba, is surrounded by some of the finest diving areas in the world. The warm, clear, blue water covering the beautiful reefs makes scuba lessons with U.S. Army instructors a must during your tour. Tours leave every week to explore Cairo, Tel-Aviv, Jerusalem and Mount Sinai. A chance to spend Christmas in Bethlehem is a once in a lifetime opportunity. Instead of "Members Only" jackets and brass in Korea, this is your chance to buy gold in Cairo or diamonds in Netanya. The markets are full of bargains, but be careful, there are no price tags and the shopkeepers can spot an American a mile away.

Sound Interesting? Contact your personnel and administration center and put in a Department of the Army Form 4187. The LSU Aviation Company is one of the best kept secrets in the Army. Besides, where else can you get a year around suntan?

ATC FOCUS
U.S. Army Air Traffic Control Activity

Repair and Packing of Electronic Equipment

Mr. Neal E. Johnson
U.S. Army Air Traffic Control Activity
Fort Rucker, AL

FOR YEARS, many of us who have dealt with electronics and assorted electronic systems have experienced difficulty dealing beyond the vacuum tube, 20-pound transformer type of assemblies. Many of us have also failed to keep up with the evolution of electronic systems in the never-ending conversion from bulky analog equipment to the light compact digital and solid-state systems available today. Not only is this new generation of equipment a whole new concept of theory and practical application, it also requires some new approaches to repair and packaging.

First, let's look at repair. No longer may we use our 1,000-watt soldering irons, our blow torches and our welding torches to repair cards. Now that we have replaced wires and buss bars with lands and eyelets, complete new procedures are necessary. The ideal method for this type of maintenance repair is accomplished by using one of the many vacuum desoldering systems available. These systems allow us to remove and replace extremely sensitive components, such as transistors and integrated circuit chips on printed circuit boards (PCBs), with a minimum of heat for the shortest possible time. Excess heat can cause lands to separate from the PCBs, damage new components and, in some cases, render electronic modules unserviceable, thereby causing them to be coded out of the Army supply system.

We do not recommend a specific manufacturer of the desoldering systems, but a few of the better known corporations such as Pace, Unger and Weller produce quality desoldering systems. The price range varies from $361.00 to $2,988.00. When only occasional desoldering is anticipated, the lower cost portable desoldering kit would be more than adequate. This equipment is available through most electronic tool and equipment supply catalogs and some of the desoldering systems will be available through the General Services Administration.

Second, and equally important, is the problem of adequate packaging for transportation. Much of this equipment, particularly complimentary metal oxide semiconductor boards, is highly susceptible to rough handling and humanly induced static electricity. However, many solutions exist for both problems. Numerous sizes of "fast packs" and antistatic bags are in the Army supply system to accommodate almost any size module or subassembly. Some characteristic sizes and their national stock numbers (NSNs) are as follows:

Antistatic Bags With Zipper Closure

NSN	SIZE	NSN	SIZE
8105-01-197-2965	12" by 12"	8105-01-197-2966	10" by 10"
8105-01-197-7846	10" by 12"	8105-01-205-0207	8" by 12"
8105-01-215-0462	8" by 8"	8105-01-215-4752	11" by 15"
8105-01-216-7804	8" by 12"		

Foam Padded Type II Fast Pack

NSN	SIZE	NSN	SIZE
8115-00-101-7638	9" by 6" by 3½"	8115-00-101-7647	9" by 6" by 2½"
8115-00-787-2142	6" by 5" by 2½"	8115-00-787-2146	12" by 8" by 2½"
8115-00-787-2147	6" by 5" by 3½"	8115-00-787-2148	12" by 8" by 3½"
8115-01-019-4084	18" by 12" by 3½"	8115-01-019-4085	18" by 12" by 2½"
8115-01-057-1243	13" by 13" by 3½"	8115-01-057-1244	10" by 10" by 3½"
8115-00-192-1605	10" by 10" by 12"	8115-00-050-5237	12" by 12" by 18"
8115-01-015-1313	26" by 9" by 9"	8115-00-516-0251	20" by 14" by 9"

Using the above packing materials minimizes component damage, saves the Army money and keeps a steady flow of serviceable modules that are required to maintain safety of flight.

Readers are encouraged to address matters concerning air traffic control to:
Commander, USAAVNC, ATTN: ATZQ-ATC-MO, Fort Rucker, AL 36362-5265