UNITED STATES ARMY

DECEMBER 1976

AVIATION DIGEST

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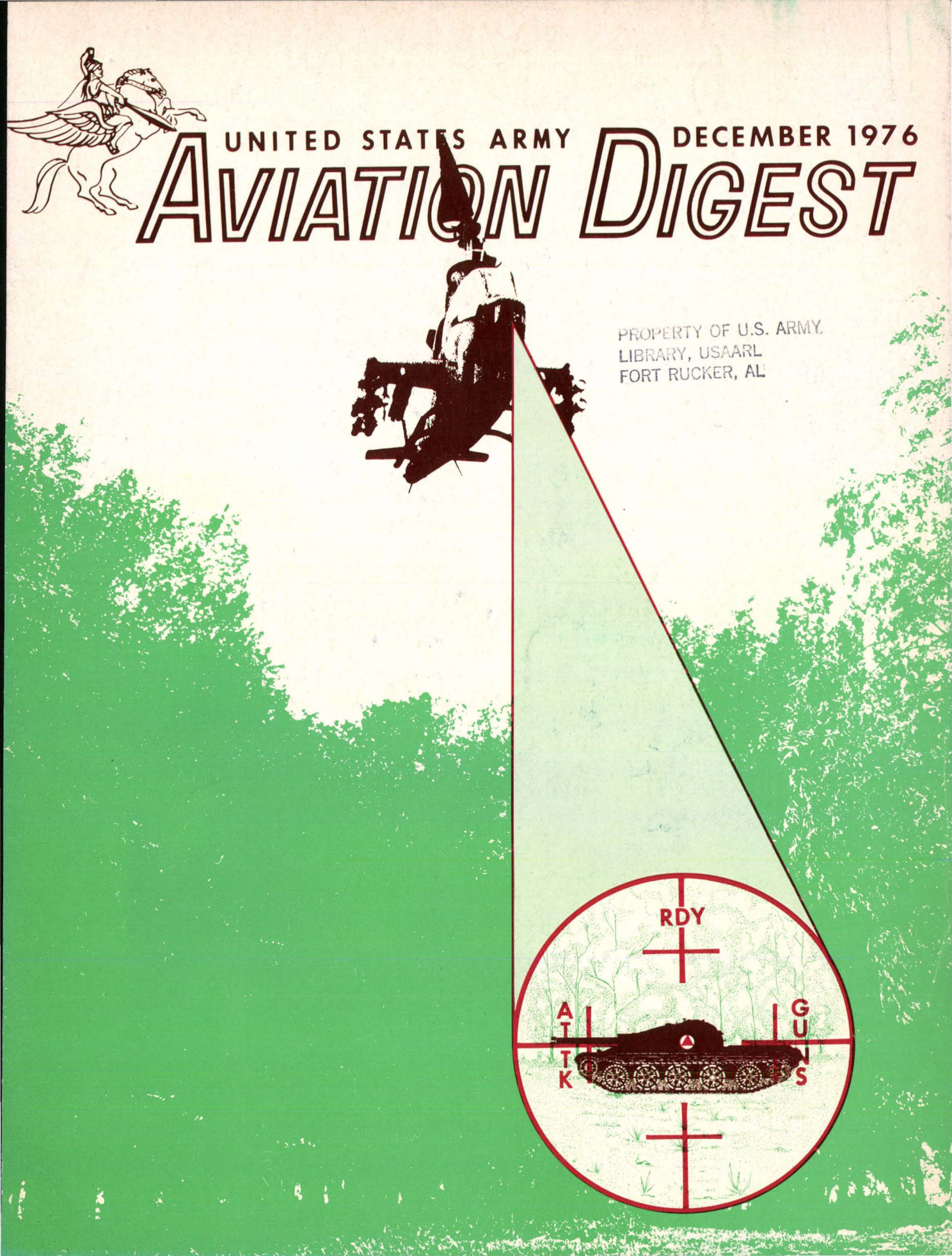

UNITED STATES ARMY AVIATION DIGEST

DECEMBER 1976 VOLUME 22 NUMBER 1

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VANGUARD OF FREEDOM
BICENTENNIAL 1775-1975
UNITED STATES ARMY

MG James C. Smith
COMMANDER
U. S. ARMY AVIATION CENTER
A major activity of the
U. S. Army Training and Doctrine Command

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Inspector General and Auditor General
of the U. S. Army

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U. S. ARMY AVIATION DIGEST

ABOUT THE COVER

The cover is a line conversion of a photograph of a 101st Airborne Division (Air Assault) AH-1 helicopter acquiring an aggressor tank in its sights during Reforger 76

The mission of the *U.S. ARMY AVIATION DIGEST* is to provide information of an operational or function nature concerning safety and aircraft accident prevention, training, maintenance, operations, research an development, aviation medicine and other related data.

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Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized t Editor, U.S. Army Aviation Digest, Fort Rucker, AL 36362.

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A Cobra from the 101st Airborne Division (Air Assault) fairly "smokes" into position demonstrating speed and maneuver capability of this tank-killer. Smoke and landing lights were required to allow the audience to identify the Cobras at their attack ranges during the "Air Assault in Action" demonstration — Reforger 76

THE HELICOPTER must provide the ground commander with mobility, firepower and logistical support in order to win the first battle of the next war. To do so the helicopter must survive the intense threat inherent in the battlefield of the future.

The Screaming Eagles of the 101st Airborne Division (Air Assault) have just concluded another "Rendezvous With Destiny!" With completion of Reforger 76, new recognition exists of the capabilities of Army aviation. The division, unlike previous Reforger participants, deployed from CONUS to Europe with its organizational equipment to include 348 helicopters. Within a few days after arrival the division was in a posture to conduct sustained combat operations.

The division exhibited a high state of training, discipline and esprit de corps by flying more than 19,000 hours in unfamiliar terrain and marginal weather while experiencing only one major and one minor accident with minor injuries. In accomplishing this, the division demonstrated the combined air assault capabilities to shift troops rapidly; engage and destroy enemy armor; provide the beans and bullets; and above all to survive in a mid-intensity environment.

The division conducted combined arms exercises over most of southern Germany in partnership with NATO Allies and generated solid evidence that the mobility, killing and staying power of the helicopter and the 101st Airborne Division (Air Assault) definitely have a significant role in the defense of Europe.

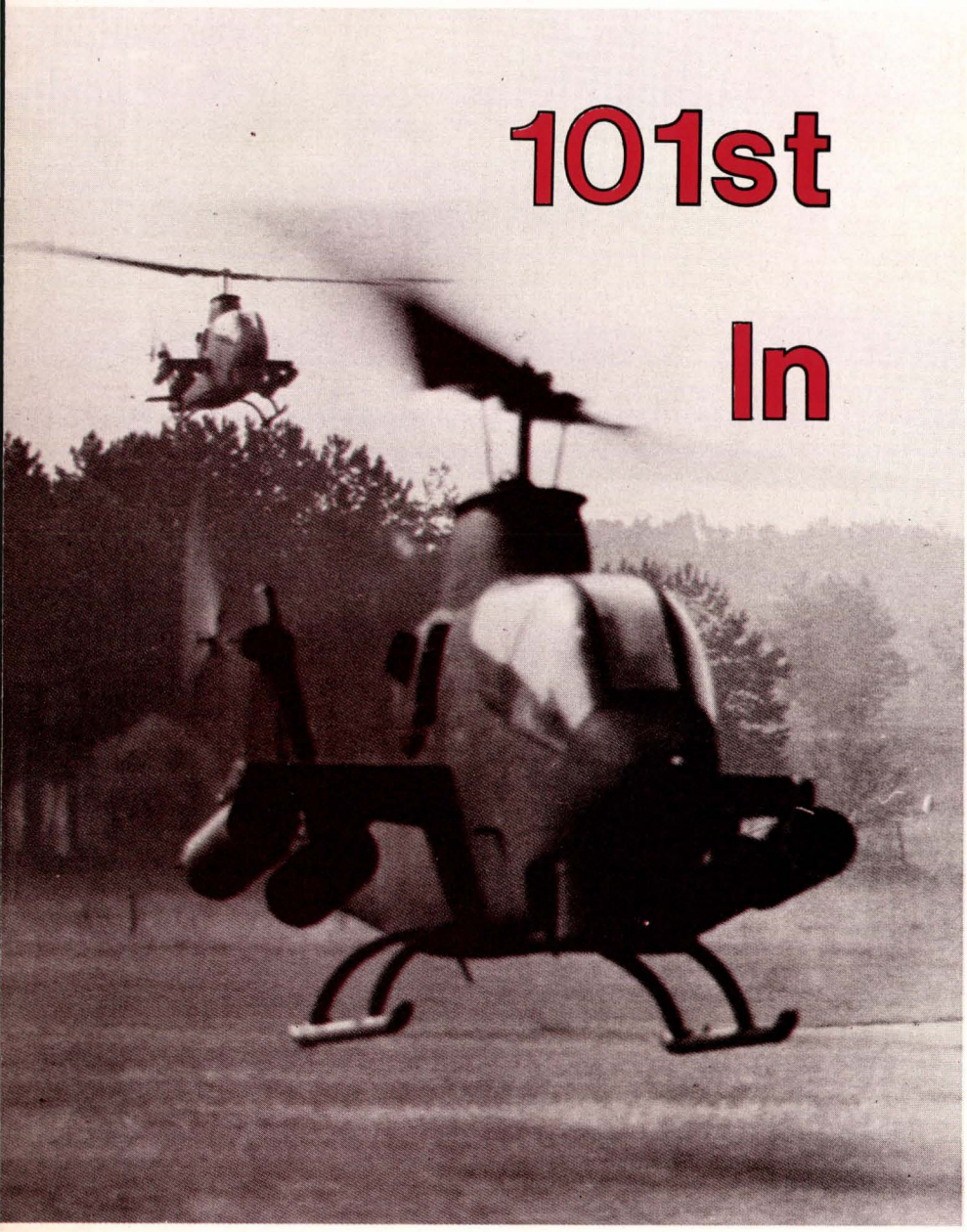
Army aviation can be justly proud of the wider recognition of helicopter combined arms capabilities that have been demonstrated by the Screaming Eagle aviators.

"AIR ASSAULT"!

JOHN A. WICKHAM JR.
Major General, USA
Commanding

This year's Reforger introduced the emerging air assault doctrine to Europe. The exercise demonstrated the versatility of Army aviation in strategic deployment and in the conduct of extensive tactical operations. Below, Cobras of the 101st were forced to merely "slow down" while NOE during marginal weather. At right, three 105s of the 101st are lifted into position by a CH-47 Chinook. Artillery raids occurred with the Air Assault Division in Reforger 76

101st In



REFORGER 76 has been completed! The Screaming Eagles of the 101st Airborne Division (Air Assault) have demonstrated the versatile capabilities of Army aviation on potential battlefields of the future. The division, as a part of Reforger 76, deployed from CONUS with 75 percent of its aviation elements along with other attached aviation units to Germany; participated in two major tactical exercises and returned to CONUS; flew more than 19,000 hours; and experienced only two accidents and no serious injuries.

In early 1976 the division initiated extensive planning to prepare its aviators for the difficult flying environment that would be experienced in Europe during Reforger 76. This planning began with arrangements for the USAREUR Aviation Orientation Briefing Team to come to Ft. Campbell, KY, to conduct a series of classes for all deploying aviators. The classes were conducted in mid-May and acquainted the aviators with international flying rules, ICAO flight planning, and different aspects of administrative and tactical flight in Germany.

In conjunction with these classes, the division's UHIFS 2B24 Synthetic Flight Training System (SFTS) was programed with the German air traffic control system and all aviators were required to complete 4 hours of German ICAO procedures.

The aviators were required to complete the Annual Written Examination, a standardization checkride and a class in the division's night vision lab. Each aviation unit prepared detailed maps of the expected exercise areas and conducted extensive map exercises. These activities enabled the aviators to become intimately familiar with the terrain over which they would be flying.

The division followed these activities with extensive update briefings on European flying procedures and weather. To support these preparatory activities,

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Reforger 76

Colonel Larry J. Baughman
101st Aviation Group Commander
and
Division Aviation Officer

Major Robert E. Jones Jr.
Operations Officer
Army Aviation Element
101st Airborne Division (Air Assault)

ATTACK

The formation of an attack helicopter battalion from divisional units was part of the answer by the 101st Airborne Division (Air Assault) to provide a quick-fix to kill tanks on a mid-intensity battlefield. The 4th Battalion (Attack Helicopter), 77th Field Artillery was formed in January 1976. It was tested at Fort Campbell, KY, in air assault tactics and deployed to Europe in August 1976 to participate in Reforger 76. The unit performed superbly and was recognized for its highly professional employment against armored vehicles with a mission ready availability in excess of 95 percent for 82 aircraft with no incidents or accidents in the hazardous flying conditions of Europe. Although many had expressed doubt that the unit could organize and train for such an exercise in this short time, the Soldiers of the battalion, like the bumblebee, didn't know that they could not. So, they ATTACKED to get the job done. This article discusses the battalion's training, preparation, deployment and participation in Reforger 76 and some of the lessons learned. While much has been done, the surface has only been scratched. The use of attack helicopters is only limited by the imagination of those who employ them against opposing forces.

THE MISSION OF Army aviation is to augment the capability of the U.S. Army to conduct prompt and sustained combat incident to operations on land. In order to accomplish this mission it is incumbent upon the leadership of the Army and those in aviation related duties to ensure that aviation units are continually scrutinized to determine their real value in augmenting the Army and if necessary, take the active rolls.

The threat is continually changing; therefore, to meet the threat and to support the ground gaining arms, Army aviation must not become stagnant in its tactical employment.

Army aviation experienced rapid growth during the Vietnam conflict during which the helicopter established itself as a formidable weapon. The enemy found it could not hide from helicopters nor escape ground attack from Soldiers moved

Captain Michael E. Sloniker

S-3
4/77th Attack Helicopter Battalion
101st Airborne Division (Air Assault)

Captain Gary R. Sosnowski

Liaison Officer
4/77th Attack Helicopter Battalion
101st Airborne Division (Air Assault)

An OH-58 Scout pauses in the trees to survey an armor approach route. Once targets are detected TOW Cobras will attack from ranges which allow minimum return threat from the chosen target

into the assault utility helicopters. But after Vietnam, it quickly became apparent that for Army aviation to accomplish its mission against armored vehicles in a mid-intensity environment, new weapons, techniques and operating procedures had to be developed.

Part of the new thinking was to place the TOW missile system on the Army's AH-1 HueyCobra helicopter to kill armored and mechanized vehicles. As with any change, skeptics believed the helicopter was too vulnerable to enemy weapons to be cost effective in a mid-intensity environment. However, there were those in leadership positions who recognized the helicopter's potential and believed a helicopter armed with a tank-killing missile could be a viable weapon against the threat.

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GET READY— GET SET— GO!!!

LTC John A. G. Klose
Commander
158th Aviation Battalion (Assault Helicopter)
101st Airborne Division (Air Assault)

MISSION: Deploy 50 UH-1H Huey helicopters; 51 vehicles and 425 personnel to Europe by rail, sea and air; maintain 47 of 50 helicopters flyable each day and fly 3,000 hours in 17 days; thereafter return all personnel and equipment to Fort Campbell by sea and air.

This article is not intended to extol the virtues of the 158th Aviation Battalion. It is written to share some insights into the logistical and maintenance problems and solutions necessary to accomplish the very rich and complex tasks associated with the mission given above.

The first question to arise was: "Which 50 UH-1Hs out of the 60 do we take?" The answer to that question was unique. During the period 1 to 30 July, all 60 UH-1Hs in the battalion underwent a 100-hour periodic phased inspection. Crews worked around-the-clock, 7 days a week to accomplish this task. The object of this series of inspections was threefold:

1) Because of time change components or extensive DS or GS maintenance, several helicopters would eliminate themselves from consideration.

2) By conducting this series of scheduled maintenance inspections while still maintaining an ambitious flying hour program, it was possible to increase the battalion's bank time (time to the next scheduled inspection) to 5,525 hours on the fleet of 60 UH-1Hs.

3) After carefully reviewing the results of the inspections and analyzing the possible long term maintenance problems, it was possible to select the best 50 of the 60 helicopters for deployment.

Without putting the cart before the horse, let me say that this series of inspections and scheduled maintenance paid very handsome dividends:

- 50 for 50 flew from Fort Campbell to Norfolk NAS without incident
- 30 had heads and blades removed while 20 only went through minimum teardown
- 31 were placed below decks on the *USS Meteor* while 19 were placed in plastic preservative bags and rode to Ghent, Belgium on the deck of the ship.

In all 348 helicopters made the journey from Fort Campbell to

GET READY!!!

Europe. In addition more than 2,500 vehicles, using 460 railcars in five trains also made the journey by rail, sea and convoy.

All of the helicopters after reassembly deployed to Kitzingen, Germany, again without incident. Then during the period 21 August through 20 September, the battalion flew 2,694 hours, all under tactical conditions with a 98 percent operationally ready rate!

Impossible, you say! Not really, if you got your stuff together and a team of highly skilled dedicated Soldiers who won't let unscheduled maintenance keep a helicopter down very long. Believe me, friends, when I tell you it happened. And read on as I explain some of the problems and solutions that helped us establish such a record.

The second question we faced was: "Given 50 helicopters in a strange land with uncertain parts availability, what parts should we take with us to cover the uncertainties of unscheduled maintenance?"

The answer to this question is also very rich and complex. First, the prescribed load list (PLL) of parts on which we had at least 6 months demand data requiring at least three requirements for those parts had to be determined. Next, based upon experience, certain critical parts (fringe items) that were considered mission essential, but did not actually meet the stockage criteria for the unit's PLL, were taken. There were 624 lines of PLL deployed with the 158th to Germany.

Essentially, each aviation unit in the 101st Airborne Division (Air Assault) used these same criteria to establish its PLL. The next ingredient in the solution was provided by the 5th Transportation Battalion (Aircraft Maintenance). It deployed to Europe a reinforced authorized stockage list (ASL) to support the PLLs of the 18 aviation units and their 348 helicopters. In addition the 5th Trans also deployed with several Quick Change Assemblies (QCAs), i.e., engines, transmissions, gear boxes and other dynamic components, to ensure availability of those items should they be needed. In most cases the QCAs were used to minimize downtime and proved to be very very important.

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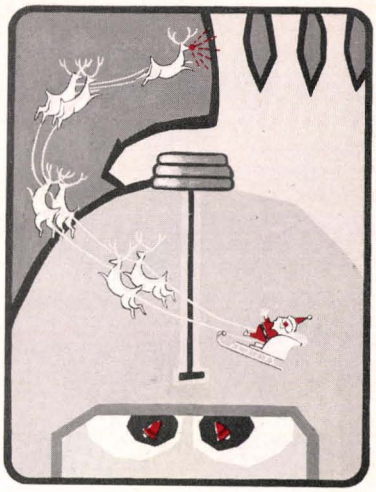
VIEWS FROM READERS



Sir:

I read your article "To Your Health" [July 1967 *DIGEST*] by Ted Kontos with interest and appreciation. I am pleased to see that DOD [Department of Defense] and DA [Department of the Army] have finally decided to field a coordinated implementing plan for OSHA [Occupational Safety and Health Act].

While serving as a squadron safety officer, I was astounded in 1975 when post safety descended upon us with an OSHA survey. We had not been notified that OSHA standards applied to military personnel until the survey team appeared.

Post safety, environmental health and the fire marshall formed an uncoordinated team and gave conflicting advice. Safety officers were embittered and commanders angered when units were held responsible for deficiencies that could be corrected only at post level. OSHA regulations weren't available below post level until 1 year after OSHA implementation. Coordination with USAAAVS [U. S. Army Agency for Aviation Safety] revealed that they hadn't been advised that the standards would be applied to aviation operations. After a 6-month battle between "workers" and inspectors the problems of unplanned implementation were worked out.

I have the following recommendations for improving OSHA acceptance at the company/battalion level.

• Don't implement OSHA in the Army until the DOD Policies, Procedures and Programs Manual is published.

• Throw away the OSHA regulations volumes I through V. They have a "fog factor" that would confuse an M.D. with a Ph.D in English and Physics. Let the experts at DA figure out what they require and incorporate the standards into DA publications (ARs, TMs, etc.).

• If the above suggestion is considered impractical, learn from the Air Force and publish an AR that lists those portions of OSHA that apply to Army operations (my copy of OSHA is 7 inches thick and mostly incomprehensible).

• Combine safety, environmental health and fire protection under the Installation Safety Director to provide direction and control for OSHA implementation.

• Require stockage of safety equipment (goggles, hearing protractors, safety shoes, etc.) in self-service stores. Normal supply channels are not responsive to OSHA requirements.

• Finally, don't hold commanders responsible for deficiencies which they have no authority to correct. Charge those deficiencies against the higher headquarters responsible for corrective action.

Right now, OSHA is known as the Other Safety Harassment Act and is turning people off to the entire safety effort. Hopefully that can be corrected before irreparable harm is done.

CW3 Donald Holliday
235th Aviation Company (Atk Hel)
APO New York 09036

Sir:

Recently, articles on the Night Hawk test by CW2 David Heaton and CW2 Doug Joyce appeared in *AVIATION DIGEST*. I was one of the students chosen from WOC Class 75-17 to participate in this test.

It wouldn't be possible to express in one article the amount of credit that should go to the people involved in this program—starting at the top with General Maddox [now retired] down through the military and civilian IPs to the flight surgeons. All of these people were dedicated and true professionals from the onset. Every moment of the Night Hawk phase of our training was held with the seriousness of life and the dedication of men who had a mission to accomplish, which they did. It was important that each student accepted the program as a chance to become a knowledgeable pilot. I'm sure that if it were possible to assemble all of the Night Hawk IPs, the one captain and seven lieutenants along with the eight warrant officers (then WOCs) in one room, you would find 16 men with a lasting and devoted friendship along with respect for one another unequaled anywhere else in today's Army.

Without going into material covered by Mr. Heaton and Mr. Joyce, let's take a close look at Night Hawk from one student's point of view.

Night Hawk for Class 75-17 started shortly after instrument checkrides were over. Word came down through rumor control that when classes 75-17 and 75-18 reported to Lowe Army Heliport for their contact and tactics briefings, eight students from each class would be chosen for additional night training. Of course this started the adrenalin flowing and minds wandering. The majority of students held hopes of being chosen for the program; others felt that graduation was close, 36 weeks were long enough and it was time to go on to their assignments.

After arriving at Lowe and departing the bus, names were called out for those who would be considered for the night training program. WOCs Mike Bledsoe (my stick buddy), Bob Coma, Will Johnson, Earl Haddis, Bill Liebel, Terry Sahlin, Mel Waldron and myself along with CPT McWhinney and seven lieutenants would report for a briefing. The briefing consisted of the format for the Night Hawk program, what had been done in the past test and what was expected to be accomplished in the future. Also we were told of the IPs' experience, along with who would be supporting us and what we would have to do in order to establish a harmonic relationship with them.

At this point all should be reminded that the life of a WOC and the life of a commissioned officer in flight school are different worlds. The 61st Company, CPT Wolfe and his tactical officers were to play a tremendous role in the WOC portion of Night Hawk.

I'm sorry but at this time I must leave the commissioned officers to fend for themselves, simply because our association with them was limited and I cannot present for them an unbiased opinion of what Night Hawk was to them.

After selections were made and the Night Hawk program explained, to include procedures for training and its goals, we were released for the weekend with our thoughts. Monday we would start our 3-week contact and meet our IPs who would hopefully take us through contact, Night Hawk and tactics.

For the married students it was home to break the great news to our wives, "Honey, guess what! I won't be home at night for 4 weeks." Needless to say this wasn't the most tactful way to break unexpected news. After all was explained my enthusiasm was soon shared and Night Hawk for me and the rest of the chosen students would soon be underway.

Contact went by quickly. Twenty hours passed and all came through checkrides with little trouble. For the Night Hawk student contact was slightly different than for the normal student. We had no night flights during contact, instead a block of sling load instruction was substituted.

We immediately started classes on night vision, the eye and ear, along with night vision techniques. Our regular classes were discontinued until completion of the Night Hawk program. This was done so that allowable time for rest was allotted to all involved.

Into Night Hawk we went, with great expectation and I'm sure some anxiety. The assigned instructors were outstanding and everyone involved benefited more than expected (personal opinion). The results have been explained by more knowledgeable people than myself.

We all were graduated with our assigned class on 30 June 1975 and, despite a maintenance strike, completed tactics and went on to our new assignments as Night Hawk qualified pilots. (Check our Form 66s.)

To all of the people involved, including the frontrunners for this article, CW2 Heaton and CW2 Joyce, along with CW2 Pat Dwyer I say, "thank you." And I say, "thank you again for the opportunity to learn and the privilege to learn and the opportunity to be a first."

Let's all enjoy safe night flying. I'm sure that with the expertise that exists in Army aviation today, programs like Night Hawk will continue and make us all better pilots.

Oh yes, if Mr. Joyce should hear eight Hueys over the Lake Lodge at midnight, just look for a Night Hawk patch. But ours was the first.

WO1 Herbert A. Downs Jr.
82nd Abn Div., Ft. Bragg, NC

OPMS CORNER

Officer Personnel Management System

Aviation Management

***CHANGES TO ARMY Aviation Regulations:* The Army recently made several changes to Army Regulations (ARs) regarding aviation personnel policy which have a measurable impact on the entire aviation community. These changes affect the selection criteria for initial entry flight training and eligibility criteria for the Master Army Aviator Badge. In summary, the changes are:**

•*Selection Criteria*—ARs 611-85 and 611-110. Age is no longer a prerequisite for participation in flight training. As a result of the General Officer Steering Committee on Equal Opportunity, the age requirement was deleted. The branch of service requirement also was revised. Commissioned officers assigned to a branch other than Judge Advocate General's Corps, Chaplain's Corps, and Army Medical Department (excluding Medical Service Corps) are eligible to attend initial flight training. Therefore, the aviation specialty is not limited by branch; however, quotas for initial entry flight training are allocated to Officer Personnel Management Directorate company grade divisions based upon force requirements. Company grade division training quotas for fiscal year (FY) 77 are 100 with a projected increase to 465 by FY 80. Training quota allocations—in terms of percentages—for career divisions are as follows: combat arms—63 percent; combat support—14 percent; combat service support—18 percent; and medical service corps—5 percent.

• *Master Army Aviator Badge*—AR 600-106. The requirement that a rated Army aviator attain 50 hours of actual instrument time to qualify for this award has been terminated; other criteria for award remain in effect.

ACIA Flying Data: The Aviation Career Incentive Act (ACIA) of 1974 required the Department of the Army (DA) to review the records of all commissioned and warrant officer aviators to determine their eligibility for continuous Aviation Career Incentive Pay.

The review was conducted by review boards convened at the direction of the Deputy Chief of Staff for Personnel, Department of the Army. Board actions were completed during May 1975 and the results announced in DA Circular 600-6, dated 19 January 1976. Aviation data in the circular was as of 30 June 1974 and included the following validated items: aviation service entry date; total operational flying duty credit; and months of total federal officer service. Aviation data for FY 75 has been processed by DA; and DA Circular 600-6 announcing the results was distributed to the field on 30 November 1976. Fiscal year 76 update letters have been mailed to all military personnel officers which validates aviation flying data through 30 September 1976. Results of the update will be announced during 3rd quarter FY 77.

A Terrific Job in EUROPE

Public Affairs Office
U.S. Army
Combat Developments
Experimentation Command
Fort Ord, CA

"FROM ALL THE reports we get, Team IV did just a terrific job in Europe," says Brigadier General Donald F. Packard, commander of the U.S. Army Combat Developments Experimentation Command (CDEC) at Ft. Ord, CA.

Project Team IV, referred to by General Packard, is the SOTAS Test Directorate Team which recently tested the Stand-Off Target Acquisition System (SOTAS) near Ansbach, Germany during Reforger 76. SOTAS, a side-looking, airborne radar mounted on a UH-1H Huey helicopter, was employed under realistic combat conditions for the first time. The 1st Armored Division used the system during Operation Lares Team.

The SOTAS, a prototype system under development by the U.S. Army Electronics Command, detects and accurately locates moving targets at extended ranges. Targets are displayed on radar scopes mounted in a display van located near the division tactical operations center. SOTAS operators are able to provide accurate, real time locations of enemy targets. Using this information intelligence analysts can quickly evaluate enemy movement patterns and provide timely enemy intelligence to the commander to use in tactical decisions.

The goal of CDEC's 12-man team was to conduct a test which was sufficiently comprehensive to determine if the system is operationally suitable from a doctrinal, organizational and tactical point of view. During the test CDEC data collectors were located with the tactical units, as well as with the umpires and controllers, to gather as much information as possible to evaluate its potential. The data will be used by Army planners to assess the capability of the SOTAS to provide responsive, timely, battlefield surveillance, target acquisition and other information to the commander.

On the ground the Stand-Off Target Acquisition System (SOTAS) recedes into the shadows of the aircraft. Airborne, the SOTAS hangs between the skids of a UH-1 helicopter

ATTACK—

Continued from page 5

The leadership of the 101st Airborne Division (Air Assault), the Army's only air assault division, also recognized the potential of an attack helicopter unit with a tank-killing missile to fight in a mid-intensity environment. After a careful evaluation of the aviation units of the division and their mission, a request was made through channels to the Department of the Army for authorization to form a provisional attack helicopter battalion to test in an air assault environment.

The provisional unit would be formed using the division's aerial field artillery battalion as a base unit and merging the two gun companies from assault helicopter battalions of the division plus some realignment of observation and utility helicopters.

The request was approved in December 1975, and the new unit was officially formed and designated the 4th Battalion (Attack Helicopter), 77th Field Artillery (Provisional) on 21 January 1976. This new unit *The Attack Battalion,* consists of 831 Soldiers, 60 AH-1Gs, 24 OH-58 Kiowas and 9 UH-1H Hueys.

From the beginning the leadership of the air assault division insisted the attack battalion should train and be prepared for employment in a large scale operation by mid-summer 1976. Little did Soldiers of the attack battalion know they would participate in Reforger 76 in Europe — an exercise providing near combat conditions in an environment the 101st Division's Screaming Eagles had not been exposed to since World War II. The attack battalion did not merely participate in Reforger 76 as part of the 101st Division, but it also performed its mission in a highly professional and effective manner against potential enemy tactics.

Early in the study of attack helicopter tactics and their employment—as discussed by the U.S. Army Armor School, Ft. Knox, KY, and the 6th Cavalry Brigade (Air Combat), Ft. Hood, TX — it was apparent that employment of attack helicopter assets is limited only by the imagination of the commander who understands their capabilities, limitations and vulnerabilities.

With this unlimited potential in mind, it was determined that even though the unit is assigned to the 101st Aviation Group, its assets would best be employed by the division G-3 based upon the immediate threat and the division commander's concept. It was further determined that to provide maximum flexibility and anti-armor firepower to the division, the G-3 should task organize the attack units for employment as companies or larger organizations in support of maneuver units — normally brigade-sized elements. These could in turn place the attack helicopter company(ies) in support of the brigade as required, as long as they remained integral units. Employment of attack units as companies or larger allows for thier maximum use through the use of the one-third rule — one-third of the force fighting the battle, one-third in the forward area refueling and rearming point (FARRP) and one-third enroute or staging.

Even though the attack battalion did not have the TOW Cobra helicopter, all training was conducted using TOW tactics, making maximum use of the 3,000 meters plus standoff range.

The training program was initiated 10 days after organization with most emphasis on scout training, selection of holding areas, firing positions and target handoff. Initial training consisted of half-day classroom training and half-day flying in the division's nap-of-the-earth (NOE) training areas. Weather did not cooperate during the early days of training and created difficulties in navigation and target handoff. However, these difficulties later proved to be an asset since this was typical of the Reforger weather encountered in Europe.

See Glossary On Page 15

One of 318 101st Airborne Division (Air Assault) helicopters is loaded aboard a Military Sealift Command ship bound for Europe to take part in Reforger 76 exercise. (Photo by Specialist 4 David Sleeth)

The first test of the training program began 6 weeks after the attack helicopter's organization in conjunction with the air assault division's 2nd Infantry Brigade's ARTEP. This exercise enabled the brigade commander to use his attack units by integrating them into his ground maneuver plan.

Target handoff was effected by either scout teams from the 2nd

Squadron, 17th Air Cavalry or from Infantry elements on the ground. Handoff from air cav scout teams proved to be the best method due to rapid response time and use of VHF and UHF radios for air-to-air communications.

Numerous growing pains were worked out during the air assault brigade's ARTEP and an excellent operating base was formed for future training. It became apparent that the Infantry brigade commanders were eager to put the attack battalion to work in support of their training. The 1st Infantry Brigade ARTEP was being prepared to include the attack helicopter battalion.

When word was received that the 101st would participate in Reforger 76, the attack battalion began extensive field training exercises along with other divisional units to prepare for this historic exercise in Europe. It would be the first time U.S. based units would deploy with their own equipment.

Until this time attack battalion aviators had not seen more than five armored vehicles at a time and had been restricted to less than 3,000 meters in range-to-target due to inadequate optics in the AH-1G. Furthermore, because of the high demand on training space at Ft. Campbell the battalion had been unable to employ all of its companies simultaneously in a realistic FTX. Fully recognizing these problems and limitations, preparation for Reforger continued at a rapid pace.

Five CPXs were conducted during the spring and summer months using only maps of the Reforger exercise area. Real distances were used in planning positioning of the unit's tactical operations center in order to test communications throughout the division. The CPXs were an invaluable training aid in familiarizing unit personnel with the terrain and possible courses of action available based upon a map terrain analysis. They also provided a basis for discussion of tactics and procedures during seminars subsequently held by major unit commanders of the division. [Other preparatory training is covered in the article "101st In Reforger 76," on page 2.]

As training progressed the attack battalion was notified that the Department of the Army had directed the employment of one attack helicopter company from Ft. Hood, TX, with the 101st division and that one of the attack battalion's units would not be authorized to participate as had been anticipated. The company identified by Ft. Hood officials for attachment to the 4th Battalion (Attack Helicopter), 77th Field Artillery (Provisional) was C Troop, 7th Squadron (Attack Helicopter), 17th Cavalry from the 6th Cavalry Brigade. With C Troop came 17 AH-1Qs, 8 OH-58s and 2 UH-1Hs for participation in the exercise. The expertise and professionalism of C Troop, the "Heavy Cav," rounded out the attack battalion as the unit eagerly anticipated the beginning of Reforger 76. C Troop also provided the battalion with its first exposure to the TOW firing Cobra.

In mid-summer training had been completed and the attack battalion's personnel and equipment had been readied for deployment to Europe. All aircraft deployed to Europe were prepared by maintenance to leave a minimum of 80 hours remaining until PMP when they self-deployed to Norfolk, VA.

Since the AH-1s were to be stowed below decks, minimal teardown was necessary. All wings, the horizontal stabilizers and one tail rotor blade were removed. The positioning of seven AH-1s in the hole required that their main rotor blades be removed; all other AH-1s retained their main rotor blades during shipment. OH-58 and UH-1 teardown consisted of horizontal stabilizer removal. All AH-1 wings were secured inside UH-1s for shipment.

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In early August the attack battalion's assets, augmented with C Troop and other elements of the 101st Airborne Division, deployed by ship from Norfolk, to Ghent, Belgium, and then self-deployed to the designated major unit assembly areas (MUAA) in the Federal Republic of Germany (FRG) [see "101st In Reforger 76," page 2].

The equipment arrived with minimal damage (much less than had been expected and predicted).

The attack battalion's personnel arrived in late August and began preparation for the exercise. The aviation personnel underwent flight orientation in the exercise area under their unit control to familiarize themselves with the area and operation hazards to the maximum extent possible in the short time before the first exercise. Maintenance personnel continued their efforts to ensure a maximum number of operationally and mission ready aircraft. In some cases, early time component change items were completed prior to the exercise.

Reforger 76 for the 101st Airborne Division (Air Assault) consisted of two exercises; one in the V Corps area, Gordian Shield, and the second in the VII Corps area, Lares Team, during the second and third weeks of September respectively.

Throughout both exercises the attack battalion was evaluated by umpires from the 334th Attack Helicopter Company stationed in Europe under control of Major Glenn Allen. Although the umpiring system had not been perfected, the assigned umpires were professional and evaluated every engagement by the book.

One aspect that had not been anticipated was that umpires allowed the AH-1 Cobras to be engaged by

the main guns of the opposing force's tanks at a range of 2,000 meters with a hit probability of 70 percent. This caused much concern and demanded extreme caution from the attack pilots during missile engagement. Some relief was gained by the attack scouts when they had stabilized optics on board. This gave them the advantage of obtaining maximum standoff in selecting firing positions after acquiring targets. Stabilized optics were also being evaluated.

In the V Corps exercise, the umpiring system allowed the TOW system a kill probability of only 70 percent at 3,000 meters (normally, it can be expected to receive a higher percent at 3,750 meters). To attain a kill, the umpire had to see the firing and ensure that the tank could be seen from the firing position. The engaging attack helicopter had to stay unmasked for a minimum of 30 seconds or no credit was given for the engagement. The major limiting factor was, that after the initial engagement, no further engagement could be made until the opposing forces were made aware of their acquisition by the TOW helicopters.

The VII Corps umpire system was similar except it did allow for a higher percent hit probability and firing at a range up to 3,750 meters. The attack battalion achieved a 71 percent kill ratio in the V Corps and a higher percent kill ratio in the VII Corps area for an overall kill/loss ratio of about 14 tank kills to one helicopter loss. As in any umpiring system, there will be difficulties and as stated by the umpire group in its after-action report, "The use of laser equipment used by the tanks and helicopters in the Ansbach Test would provide a more realistic evaluation but would be cost prohibitive."

On 6 September the V Corps exercise began as the opposing force made numerous attacks along sectors of the 13th Panzer Grenadier Brigade and the 11th Armored Cavalry Regiment (ACR). Both units were OPCON to the Screaming Eagles.

A Cobra of the 101st Airborne Division (Air Assault) snakes through the trees to occupy a firing position from which to attack an "enemy" tank — Reforger 76

Effective liaison had been made with both units by the attack battalion in anticipation that attack units would be committed to these units upon their request. The request was almost immediate and the Heavy Cav was sent into action with the 11th ACR while A Company of the attack battalion supported the 13th PGB.

The opposing force, using potential enemy threat tactics, attacked in force with armored vehicles and provided numerous targets. The third attack company (C Company) of the attack battalion was committed to the fight in direct support of 3rd Brigade, 101st Airborne Division.

One thought that arose on numerous occasions in discussions prior to the exercise was how the attack companies would react initially to the sight of a horizon filled with tanks. The answer was soon forthcoming as attack teams moved into perfect firing positions to make the kills. The "old hands" at antiarmor warfare led the way with the most tank kills on the first day while supporting the 11th ACR.

The V Corps exercise continued with great zeal and provided a vast amount of training experience in antiarmor tactics conducted over excellent tank terrain and in marginal weather. Often, cloud bottoms extended down to tops of hills and firing positions proved difficult to find. One method used with limited success was for attack helicopters to fire from forward slopes in areas with foliage and trees to the rear so helicopters would not be silhouetted.

The VII Corps terrain varied drastically from the V Corps area. It had many wide open flat areas that did not provide good cover and concealment at maximum standoff range. Also, the opposing forces in the VII Corps area made a habit of hiding in towns and villages and were extremely difficult to effectively engage.

Soldiers of the 159th Aviation Battalion, 101st Airborne Division (Air Assault), prepare to take off a CH-47 Chinook helicopter rotor blade during final preparations for shiploading at Norfolk Naval Base, VA. The aircraft were loaded onto one of four Europe-bound ships as the 101st prepared for deployment to Europe to take part in Reforger 76. (Photo by Specialist 4 David Sleeth)

Regardless of terrain and weather encountered in the exercise areas, the attack battalion provided the division with effective antiarmor destruction through the battalion's liaison officers (LOs) located at each supported brigade-sized maneuver unit. The LOs maintained continuous contact with the attack battalion and with the attack company supporting the respective brigade. They effected a continuous update of intelligence and aided in coordinating target engagements in support of tactical operations being conducted. They also enabled the brigade commander to know at all times the status of attack helicopter support in his area of responsibility. This included how these units could be most effectively employed.

In addition to the LOs, the supporting attack company commander or his representative made frequent visits to the supported unit to ensure maximum use of his units in support of the battle.

Close and continuous liaison is essential and greatly enhances mission effectiveness of the attack units supporting the ground gaining arms.

During the second exercise, the strength of the attack battalion was diminished somewhat by the requirement to support two task force operations in northern Germany with British and Belgium forces while the VII Corps operation was taking place.

The interoperability of a CONUS-based unit with Allied forces was conducted well and provided excellent experience in the professionalism and readiness of both NATO countries. The exercise demonstrated the attack battalion and Screaming Eagles can be depended upon to conduct joint operations on foreign terrain in an adverse environment with minimal difficulty, should the need arise to do so.

The two remaining companies (plus) were placed in direct support of the 1st and 3rd Brigades of the Screaming Eagles. Due to the large area of operations, the companies were directed to establish laager positions well forward for immediate employment. One attack company demonstrated an excellent method in this regard when it used one of its UH-1s as a TOC. The helicopter carried forward three RC292 antennas, one 3.5 kW generator, camouflage nets and was equipped with an ASC-15 radio console. Once in the general area of anticipated operations the aircraft was quickly camouflaged, the antennas were erected/connected to the console and the generator placed into operation to power the radios of the aircraft and ASC-15 console through the APU receptacle of the helicopter.

This setup provided the unit operations officer the normal complement of aircraft radios plus three FM radios from the console. In effect he had up to five FM radios (secure) and one each UHF radio to provide control over the battle by attack units. Once established in the area, attack teams were moved forward to concealed laager sites and controlled by the forward TOC.

Another capability demonstrated by the attack battalion was the command and control helicopter used by the company commander. This helicopter was equipped with internal auxiliary fuel tanks which allowed 5 hours of flight without refueling. This capability gave the company commander the flexibility needed to properly employ his forces and allowed him sufficient time to remain on-station during critical phases of the operation.

Many lessons were learned by the attack battalion during Reforger 76. Many will no doubt result in more effective training for future combat, should it be required. Some of the more important lessons include:

- *Survivability:* Survivability is a function of tactics to a large degree. Nap-of-the-earth (NOE) flying is an absolute necessity in the main battle area. Maximum standoff ranges must be considered when selecting firing positions.
- *Target Acquisition:* The preferred method for acquisition of targets by attack helicopters is by handoff from aerial or ground scouts, thereby reducing exposure time.
- *Staying Power:* Staying power is critical and must be adjusted to meet the anticipated needs of combat. Fuel trade off versus ordnance payload is one way of adjusting the stay time. A more effective method would be to have small amounts of prepositioned fuel well forward to support the battle. Another method is using fuel carried internally by the CH-47 Chinook (Fat Cow).

• *Crew Training:* Crew training was a significant factor in the success of the operation. Realistic training at Fort Campbell in NOE tactics enabled the attack battalion aviators to perform their mission throughout Reforger 76 without a single incident or accident. Numerous obstacles to safe flying existed. This training also enabled the aviators to navigate very effectively over new and unfamiliar terrain. Realistic training is a "must" in order to be prepared to fight in future conflicts should the need arise.

• *Organization for Combat:* Attack helicopters should be employed as companies or larger units in support of brigades or battalions and down to company level in rare situations. Although attack helicopters can be employed in platoons or fire teams, they can only do so for short periods of time without seriously degrading their effectiveness.

• *CSS Considerations:* Attack helicopter units require large volumes of Class III and V supplies for continuous operations. Forward area rearm and refuel supply points must be located as far forward as possible to reduce turnaround time and increase staying power.

• *Tactical Planning:* Attack helicopter operations must be fully integrated into the ground tactical plan. When moving from one support area to another, attack company personnel must be fully briefed on the ground commander's plan in the new area of operation if they are to be effective. Failure to do so will result in needless losses. On the other hand, the attack pilot must take the initiative to kill tanks. He must, however, be extremely cautious against well concealed/stationary targets. The attack pilot is most effective against moving targets as they are more readily acquired. Good ambush positions can be selected and the return threat is reduced. Suppressive, harassing or interdiction fires from field artillery or tactical air support is considered the best procedure to flush out stationary targets for rapid acquisition by the TOW Cobra.

• *Maintenance:* Aircraft maintenance is the key to successful operation of any aviation unit. The attack battalion maintenance support was superb throughout the exercise and provided an availability rate in excess of 95 percent for 82 helicopters. Success in this area requires small contact teams forward to repair minor discrepancies with the majority of the maintenance effort retained well to the rear for around-the-clock operations. Maintenance elements must not be subjected to frequent moves if they are to provide a high availability of mission ready aircraft. (Well-to-the-rear is considered to be about 40 to 60 kilometers depending upon the threat and the mission of the ground commander. . . i.e., attack, defend or delay.)

Reforger 76 was without question a success for the attack helicopter battalion (including the Heavy Cav) and the 101st Airborne Division (Air Assault). The training received by the attack battalion during Reforger, according to its commander, Lieutenant Colonel J. Thomas Denney, could not have been provided at a CONUS installation.

The opportunity for this unit to deploy with its organic equipment to a foreign country, train in that country in a free maneuver area and return to the United States is a tribute to those in leadership of our great country.

Exercises of this nature will ensure that our armed forces are given realistic training and if the time should ever come that these forces are required to protect freedom—they will be ready to take the initiative in the early stages of conflict. They will be able to ATTACK to win the first and each subsequent battle.

GLOSSARY

ADA	Air defense artillery
AGL	Above ground level
APU	Auxiliary power unit
ARTEP	Army training and evaluation program
CONUS	Continental United States
CPX	Command post exercise
CSS	Combat service support
DS	Direct support
FM	Frequency modulation
FTX	Field training exercise
GS	General support
ICAO	International Civil Aviation Organization
JP-4	Aviation gasoline
km	Kilometers
kW	Kilowatts
MSL	Mean sea level
NAS	Naval Air Station
NATO	North Atlantic Treaty Organization
OPCON	Operational control
PMP	Preventative Maintenance Periodical
POL	Petroleum, oils and lubricants
TOCs	Tactical operations centers
TOW	Tube-launched, optically-tracked, wire-guided [missile]
UHF	Ultra high frequency
USAREUR	U.S. Army Europe
VFR	Visual flight rules
VHF	Very high frequency

GET READY—

Continued from page 7

Lastly, the 158th Aviation Battalion deployed with some extras. Remember the 10 UH-1Hs that were eliminated from deployment consideration because of protracted maintenance considerations? These helicopters proved to be a readily available source for:

- Built-up and balanced tail rotor assemblies
- Major avionics end items, i.e., communications and navigation radios
- Instruments and gyros
- Extra helicopter batteries

Don't get me wrong, we didn't create 10 "hangar queens" or "basket cases" overnight. We created three "hangar queens" and seven-day VFR-only helicopters. Incidently, these seven UH-1Hs were flown 150 hours during the deployment period by our rear detachment in support of missions at Fort Campbell.

The next question was very complex and required some very detailed solutions: "Who is going to disassemble the helicopters at Norfolk; reassemble them at Ghent; test fly them; maintain them in the field for 30 days; disassemble them in Bremerhaven, Germany and then reassemble them again back at Norfolk—and test fly them before we fly them home to Fort Campbell?"

That is a difficult question considering time, distance, talent, tools, ground handling equipment and a whole host of other variables. The solution to this question was achieved by *forward planning* step by step and recording all of the requirements. For instance, at Norfolk it was determined that 40 helicopter mechanics and supervisors could disassemble all of the helicopters and prepare them for loading aboard the *Meteor* in a 3-day period. In addition, the required tools, ground handling wheels, tow bars and package POL were sent by C-130 aircraft to Norfolk in three X-4 airmobile shop shelters.

GET SET!!!

The disassembly crews were so efficient that when I landed at Norfolk and before I could sign off the flight in the log book, the windshield was covered; the sync elevators and antennas were removed and one blade of the tail rotor was removed. My very talented and tactful maintenance officer, Captain Don Bruns, said, "Sir, would you mind getting out of the helicopter, we need to strap down some of this equipment in your seat."

The reassembly and test flying of the helicopters at Ghent, was accomplished 8 days later by a crew of 62 maintenance personnel including 12 test pilots using the tools and equipment in the X-4 containers that had accompanied the helicopters on the *Meteor*. After the test flights the aircraft were lined up for fly away at Ursel, Belgium, airport. All of the aircrews in the division were impressed by the sight of 330 helicopters, UH-1Hs, AH-1G HueyCobras, OH-58 Kiowas and CH-47 Chinooks all ready for fly away. It was a magnificent sight and one that I shall never forget.

To make a long story short, 320 personnel of the 158th Aviation Battalion worked their way over to and back from Germany as disassembly crews, assembly crews, flight crews, convoy drivers, test pilots or technical inspectors. Only 105 personnel, cooks, clerks and others, got a "free" ride both ways. The redeployment worked much the same way as the deployment.

To make this deployment and redeployment work, every unit of the division had to make and execute detailed plans which matched faces and functions at every point along the way.

I've spent so much time on the

answer I forget the question. Oh yes, the question asked, *who,* and the answer is *everyone on the travelling squad* had several vital functions to perform to ensure successful deployment and redeployment.

The byword in the 158th was "If you are not part of the solution, you *are* part of the problem."

Another interesting question arose about maintenance during sustained flight operations when each aviation company could only have one nonflyable aircraft at any one time: "How do you handle scheduled maintenance under these circumstances?"

The answer to this question is also complex. First, you never allow any helicopter to go its full time between inspections. The reason for this is that if you fly all the time off any one helicopter, you no longer have the option of when and where you will perform the scheduled maintenance. To keep all options open and still have an effective scheduled maintenance program, the rule was, "at each lull in the action, turn the lowest time remaining helicopter."

Using this rule 24 phased inspections were pulled on the fleet of 50 helicopters during our stay in Europe. One of the helicopters got the next phased inspection when it still had 70 hours to go to the next inspection. Most of the helicopters received phased inspections when they had 30 to 40 hours left until the next scheduled inspection.

Another rule that contributed to our maintenance success was "defend the maintenance flow line from the left side!"

Only the maintenance oriented can understand this rule. Briefly stated, this rule means that instead of waiting for things to happen and managing the fleet on a flow line, attempt to keep all of the helicopters on the high side of the scheduled maintenance flow line.

There will be those who believe that this type of management is crazy. Believe me when I say it worked for us under these circumstances. Essentially we made things happen as opposed to waiting for things to happen.

GO!!!

I'm not going to bore you with our tactical operations except to say that we were successful in protecting the Federal Republic of Germany from the "Orange Forces" for another year.

I will say that anyone who doesn't think the evolving air assault doctrine has a place on the high threat battlefield of Europe, or that the helicopter can't survive, had better speak softly around Fort Campbell—or about 11,000 guys will punch him in the nose!

Seriously, for those of you who have played a part in the airmobile concept or the evolving doctrine of air assault, you can be proud to know that the "non-believers" have had to retreat to dream up some new things we can't do, *because we did everything that they said couldn't be done.*

Reforger 76 was a highly successful operation. The field training portion in Europe went very well. The magnitude of the deployment, maneuver and redeployment would boggle the mind of most people and fill several volumes. A great many lessons were learned and it was a very valuable experience to all of us who had a chance to participate in it.

Now that Reforger 76 is over and we have returned to our drab everyday ordinary lives of exciting challenging training at Fort Campbell, I better get back to fixing my three "hangar queens"—or I might soon be out of a job.

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Reforger 76

Continued from page 3

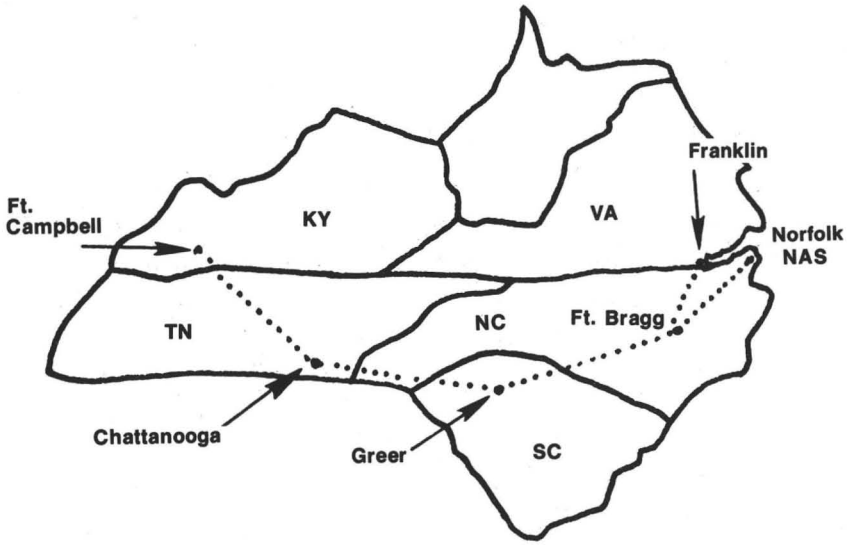
both European flight publications and individual pocket-sized Aviator Tactical Procedure Guides were prepared and provided to all aviators prior to deployment. During this time numerous personal liaison visits were also conducted by division aviation personnel to USAREUR in order to find solutions to the myriad problems that surfaced in the day-to-day planning.

One of the problem areas was the abundance of high tension wires throughout the German countryside. The division, in conjunction with USAREUR, established ground rules for approaching this hazard which included wire underflight under controlled conditions.

This time also saw the division heavily engaged in planning of a most detailed nature for the deployment, the exercises and for the redeployment. This detailed planning, designed to leave nothing to chance, proved to be highly effective and resulted in smooth operations that presented only minor problems.

At the beginning of August two aviators per aviation company were sent to Germany and attached to USAREUR aviation companies for a 2-week incountry orientation. These aviators in turn provided orientation and flight assistance for the remainder of their company aviators when they arrived in late August.

In late July the division began the rail loading of its ground support equipment and 1,200 vehicles. The division's 318 aircraft were flown to the Sea Port of Departure (SPOD) at Norfolk, VA, during a 5-day period. Aircraft were flown from Ft. Campbell, KY to Chattanooga, TN to Greenville-Spartanburg-Greer, SC to Ft. Bragg, NC to Franklin, VA, and into Norfolk Navy Base (figure 1). This route was selected in order to avoid the prevailing weather conditions encountered in the mountainous areas of Kentucky and eastern Tennessee.



CONUS Aircraft Deployment Route
Figure 1

At the same time aircraft were departing Ft. Campbell for Virginia, 27 aircraft from C Troop 7/17 Air Cavalry of the 6th Cavalry Brigade (Air Combat), plus an attached unit from Ft. Hood, TX, were flying to Beaumont, TX, for ship loading. Seventeen of these aircraft were AH-1Q TOW equipped HueyCobras. Three additional aircraft from the 256th Army Security Agency also were flown from Ft. Hood to Beaumont. These aircraft were loaded on the *USS Meteor* which then sailed to Norfolk for loading the division aircraft.

At Norfolk the aircraft were loaded on two transport ships; 100 on the *USS Meteor* and 248 on the *USS Callaghan*. With the exception of the CH-47 Chinooks all aircraft were loaded below decks to minimize exposure to salt air and water. The CH-47s were sealed in large plastic bags for protection and were stored above deck. With only minor exceptions, the aircraft arrived at SPOE at Ghent, Belgium in flyable condition.

At Ghent the aircraft were unloaded, reassembled as necessary and test flown to a nearby airfield at Ursel, Belgium. Aircraft were assigned crews newly arrived from CONUS and flown from Ursel to Beauvechain, Belgium, then to Mendig, Germany and into one of the division's four assigned Major Unit Assembly Areas (MUAAs).

Upon arrival in the MUAA an intensive 5 to 7 night and day flying program was begun to familiarize each aviator with both V Corps and VII Corps areas and to hone the aviator tactical flying skills that would be employed during Operations Gordian Shield (V Corps exercise) and Lares Team (VII Corps exercise). This flying was done primarily in marginal weather with ceilings between 100 and 1,000 feet; restricted visibility; early morning fog; and rain—typical German fall weather. Adverse weather coupled with mountainous terrain laced with forests and high tension wires presented the utmost challenge for division aviators.

With their flying skills attuned to the European environment, the

An OH-58 Scout of the 101st hovers in the trees as he "hands off" a target to a TOW Cobra in the VII Corps exercise Lares Team during Reforger 76

division moved north into the V Corps exercise area on 5 September. All aircraft were deployed under radio silence via two routes in a 3-hour period. They were flown at tactical altitudes to avoid radar detection and each unit moved into preselected assembly areas.

The division demonstrated its unique capability in interoperability by assuming command of the 11th ACR (U.S.) and the 13th PGB (West German) which already were involved in the exercise and conducting a delay against an overwhelming aggressor force. The division, with the attached units, continued the delay for a short period and then went into an active defense.

These tactical maneuvers required numerous short notice air assaults; economy of force operation; across line of contact operations; and air assault artillery raids. All, however, centered around the ground and airborne TOW's capability of seriously eroding aggressor armor. (All AH-1 Cobras were evaluated as Q models with the TOW system mounted.) The Cobras of LTC Tom Denny's 4/77th Attack Helicopter Battalion (Reinf) and LTC Gary Luck's 2/17th Air Cavalry Squadron accounted for 315 kills out of 464 aerial TOW engagements. The antitank capability demonstrated by the airborne TOWs and the Mule-mounted TOWs, which were moved by UH-1 Hueys, both internally and externally, provided a significant deterrent to the armored vehicles and ultimately were able to stop the aggressor's forward momentum.

At the end of the V Corps exercise two battalion-sized air assault task forces were formed. Each task force consisted of an Infantry battalion reinforced with an assault helicopter company (16 UH-1s), an attack team (5 AH-1s, 3 OH-58 Kiowas) and 3 CH-47s. The task forces were sent north to participate in separate Belgium (Blauwe Demiel) and British (Cool Gin) exercises. Each exercise was designed to demonstrate the interoperability of U.S. units with Allied forces and to demonstrate U.S. air assault tactics on the north German plains. The exercises not only provided the division an additional opportunity to conduct air assault operations with Allied forces but also created outstanding bonds of friendship, respect and confidence between the troops of these outstanding NATO units.

As Gordian Shield drew to a close the 101st Division was detached from V Corps and placed OPCON to the commander of VII Corps for participation in Operation Lares Team. The division moved all elements 200 km south to the VII Corps exercise area and after only 1 day for maintenance, it assumed an active role as the Corps mobile reserve in an exercise that was already in progress. In the mobile reserve posture the division was called upon to respond rapidly to threats created by airborne assaults near logistical centers.

Very shortly, however, the decision was made to relieve one armored brigade of the 1st Armored Division from the embattled frontline forces and to commit the division to the battle area. This necessitated the passage of lines of the brigade and a move forward

Pathfinders of the 101st Airborne Division (Air Assault) rappel into a position to prepare the landing of air assault companies

under extremely unfavorable weather conditions.

Again the division was able to demonstrate its unique capabilities by moving forces rapidly both laterally and vertically across the battlefield to meet the aggressor threats. During Operation Lares Team it again became apparent that the defense centered around the rapid response of both airborne and Mule-mounted TOWs. The airborne TOWs were credited with 132 kills out of 187 engagements. (This is lower than in the V Corps exercise due to the initial nature of the division's mission.)

Throughout this exercise as well as Gordian Shield, the responsive logistical support provided by the CH-47s of LTC Charles Oram's 159th Assault Support Helicopter Battalion was outstanding. A most welcome capability of the battalion demonstrated during these exercises was the internally loaded, 1,800-gallon (JP-4) capacity refuel aircraft. These aircraft, described as "Fat Cows," were able to relocate rapidly to forward areas where emergency refueling was needed.

The Chinooks were involved in continual movement of battalion, brigade and the division TOCs. These constant displacements of command headquarters were necessary both to keep up with the fluid situation of the battlefield and to preclude detection by aggressor intelligence. During the exercises these aircraft moved more than 3,000 combat troops; in excess of 60 artillery batteries; and more than 1,000 tons of cargo.

Prior to the tactical exercise it was recognized that exacting procedures for airspace management would be necessary to deconflict the 348 Army helicopters of the division from the hundreds of NATO high performance aircraft which were flying around-the-clock reconnaissance and strike missions. Procedures instituted were the establishment of a coordinating altitude of 2,800 feet MSL for Air Force high performance aircraft and 2,300 feet MSL for Army helicopters.

Before penetration of these altitudes could occur, aircraft commanders were required to obtain clearance from the airspace controlling agency. In the case of the Air Force, the Forward Air Control Party (FACP) controlled the airspace, while Corps Flight Operations Center (FOC) controlled the Army's airspace. The Air Force aircraft remained under the positive control of either the FACP or a Forward Air Controller (FAC) and all strikes were terminated no lower than 500 feet AGL.

Army aircraft operating in the division's area operated under procedural control. Procedures provided for tactical flights to be conducted under 100 feet AGL using tactical flight techniques. The few administrative flights flown in the area were between 100 and 300 feet AGL. All aircraft were required to monitor the division Flight Coordination Center (FCC) and the Brigade Airspace Management Element (BAME) frequency for air warnings and advisories. Information on weather, ADA, nuclear detonations, and Air Force strikes were passed over the FCC/BAME nets while flight following was accomplished primarily within the aviation units.

Air corridors were established from the Division Support Area (DSA) to the Brigade Rapid Refuel Points (RRPs). These corridors routed division aircraft around all known hazards. Artillery units, refueling sites and aviation helipad locations were provided daily to all operations officers and aviators to preclude overflights and minimize hazards.

Although the system worked extremely well as evidenced by no operational hazard reports (OHRs) or near misses, a standardized procedural system must be established by the Theater Army prior to initiating combat operations in order to facilitate minimal control and maximize the coordination of aircraft crossing boundaries and areas of responsibilities. In addition, the communications systems used in this vital area of intensive aviation operations require major improvements if the complete structure is to function properly.

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The high degree of mobility and rapid movement of the entire division had provided one drawback! All capabilities of the division could not be observed at any one time or place by interested officials and observers from USAREUR and NATO nations. Therefore it was decided to conduct an "Air Assault in Action" demonstration at the German training area of Wolferstetten Panzer Range. The many unique air assault capabilities witnessed by hundreds of invited dignitaries included air assaults; UH-1 mounted scout motorcycles; UH-1 mounted M-56 mine dispensers; the UH-1 mounted M-52 smoke generator; internally and externally carried Mule-mounted TOWs; TOW Cobra engagements; helicopter rappelling; and the Air Cavalry in action.

The guests observed and were openly impressed with the precision tactical flying by all aircraft lifting representative items of division equipment and the rapid transition from one capability to the next. An official report from USAREUR stated: "From commander to private, the division showed professionalism, enthusiasm, and esprit de corps. The division demonstrated convincingly its mobility and firepower in both defensive and offensive operations. The small number of air and ground accidents under typical European bad weather, without degradation of exercise activities,

Maintenance crews of the 101st Airborne Division (Air Assault) worked around-the-clock to maintain a 92 percent aircraft availability rate during Reforger 76

exemplifies the excellent discipline and command and control exhibited by the division.

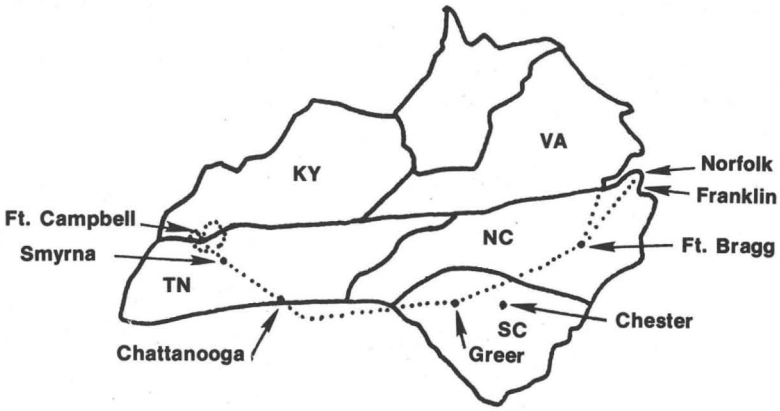
"There is a role for the 101st in Europe particularly in combination with armored and mechanized units. Its mobility permits rapid lateral movement coupled with significant antiarmor capabilities."

After the demonstration the division's mission in Germany had been completed. The monumental task of redeployment then began. Aircraft were flown from the MUAAs via Fritzlar, Alhorn and Wunstorf in northern Germany. All three sites were German military installations that provided excellent support in the way of aircraft repair, fuel and support for the aviators. At Wunstorf and Alhorn the aircraft were thoroughly cleaned, inspected by customs and the U.S. Department of Agriculture and then flown to the SPOD at Bremerhaven.

In all 331 aircraft were returned by this route over a 6-day period, with privates to lieutenant colonels aggressively scrubbing and preparing the aircraft for inspection (16 aircraft were left in Europe for unit issue and one was left in general support maintenance). At Bremerhaven the reverse cycle was begun to return the aircraft to CONUS culminating in the safe return of all aircraft and crews to their home stations (figure 2).

The Screaming Eagles had completed a cycle begun in 1963 when the 11th Air Assault Division (TEST) was formed at Ft. Benning, GA. That division was redesignated [1st Cavalry Division (Airmobile)] and deployed to Vietnam without being able to prove its capability to move to Europe and fight in a mid to high intensity war. Reforger 76 can be viewed as the culmination of many years of effort, of a constant flow of new ideas, and thousands of hours of planning and training.

During the exercise the division's aviators established many impressive records. The division's aircraft mechanics performed superbly by conducting phased maintenance in the MUAAs and in



CONUS Redeployment Route
Figure 2

the field. These Soldiers, members of LTC Jim Walker's 5th Transportation Battalion, aviation battalions, and company maintenance elements, working day and night under near combat conditions, were able to keep an average aircraft availability of more than 92 percent while the aviators flew in excess of 19,000 hours.

The safety record shows only one major and one minor accident. Only two minor injuries were suffered in these accidents and only one aircraft was not capable of being returned to CONUS. The aviators of LTC T. G. Allen's 101st Assault Helicopter Battalion and LTC John Klose's 158th Assault Helicopter Battalion conducted 11 night assaults and 14 day assaults while moving 9,000 combat troops.

The division aviation units lifted more than 950 tons of cargo internally and 160 tons externally. There were six air assault artillery raids conducted and more than 225 artillery pieces moved. The TOW Cobras were credited with 447 kills while the lift aircraft displaced more than 240 TOW Mules.

These impressive statistics were accumulated during unfavorable weather conditions, around-the-clock operations, over widely varying terrain and under near combat conditions in two separate Corps tactical zones.

The 101st Airborne Division (Air Assault) prepared for land, sea and air movement; strategically deployed all units to Europe; conducted extensive tactical operations; maintained a high state of readiness and safety at all times; and redeployed to CONUS in a record period of time. The air assault concept is here to stay and the 101st has a role in the defense of Europe.

The 101st is proud to report: *"We are combat ready; air assault, sir!"*

NOT GETTING YOUR DIGEST?

We'd like to deliver your copy personally, especially this month when we could exchange Christmas greetings. But even if that were possible, we couldn't drop by if you have overlooked submitting the *new* DA Form 12-5 dated February 1976. Each pinpoint distribution account must be renewed on the *latest* DA Form 12-5, or the subscription will be cut off.

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Editor
U.S. ARMY AVIATION DIGEST
P.O. Drawer P
Ft. Rucker, AL 36362

Charles L. Kelly
Major, MSC

ARMY AVIATION HALL OF FAME

MAJOR Charles L. Kelly, MSC, was Dustoff and Dustoff was "Combat Kelly." The two became synonymous in Vietnam in 1964 when the most effective of all emergency evacuation systems emerged to full maturity in the mountains and paddies halfway around the world.

As commander of the 57th Medical Detachment (Helicopter Ambulance), Kelly assumed the callsign "Dustoff." His skill, aplomb, dedication and daring soon made both famous throughout the Delta. The lonely silence of many a distant outpost was broken by his radio drawl, ". . .this is Dustoff. Just checking in to see if everything is okay." And when there were wounded, in came Kelly "hellbent for leather!"

On such a mission on 1 July 1964 Kelly approached a hot area to pick up wounded only to find the enemy waiting with a withering barrage of fire. Advised repeatedly to withdraw, he calmly replied to the ground elements advisor, "When I have your wounded." Moments later he was killed with a single bullet.

Kelly was dead but the air evacuation legacy was only beginning. His "Dustoff" became the callsign for all aeromedical missions in Vietnam, and "when I have your wounded" became the personal and collective credo of the many gallant medevac pilots who followed him.

An exceptionally capable instructor in medical subjects as a captain, Kelly demonstrated a high degree of positive leadership early in his career, an asset that became fully evident in later combat in Vietnam.

COMBAT-IN-CITIES

Figure 1

Major Alexander Woods Jr.

Deputy Professor of Military Science
University of California
Santa Barbara, CA

FIGHTING IN A combat-in-cities (CIC) environment brings up many questions and hurdles—especially concerning the helicopter's role. Many considerations were brought out by LTC Robert L. Graham (U.S. Army) and LTC Ray M. Franklin (U.S. Marine Corps) in an excellent article entitled, "MOBA" (military operations in built-up areas), which was featured in the February 1976 issue of *AVIATION DIGEST*. However, there are more answers and considerations that should be discussed.

As pointed out in the "MOBA" article, our world is becoming more and more urbanized; therefore, I feel there is a need for such an agency or unit. LTC Graham and LTC Franklin state in their article:

Those who are deeply concerned in MOBA may all be assigned to the Berlin Brigade. Their training considers their "unique situation." Look around your own post, camp or station. Are there any urban training areas?

The Berlin Brigade has been working on combat-in-cities techniques and helicopter operations have been a major portion of this project.

Increased urbanization throughout the world and especially in Western Europe has greatly increased the probability of extensive combat operations in built-up areas, should a major conflict break out. Our Soviet counterparts share this view in their appraisal of the situation. I quote from Combat-In-Cities Staff Study, West Berlin, July 1975:

In modern war, should the imperialist unleash one, combat in a city would be inevitable.

This *inevitability* is significant to the U.S. Army and in particular to members of the Berlin Brigade.

There are many techniques which can, if properly employed, greatly increase a unit's capability to successfully accomplish its mission. Concurrently, these techniques greatly increase the Soldiers' chances of survival during combat operations in built-up areas.

The Soviets have long recognized the importance of study and training in combat operations in built-up areas. As stated in the "MOBA" article,

The Russians are allocating training money and time to urban combat.

An offensive spirit is essential to all successful military operations. In 1971 MG A. K. Shovkolovich of the Soviet Army wrote in Combat Operations Of The Motorized Rifle Battalion In The City:

Combat-in-cities has an especially stubborn and fierce nature. Buildings or separate regions in a city may

– does the helicopter have a role?

Editor's note: While it is true that there is "no unit or agency solely designated by the Department of the Army for the proponency of updating CIC doctrine in general and related helicopter operations in particular," it should be noted that:

- **CIC doctrine formulation is the responsibility of the Training and Doctrine Command (TRADOC).**

- **TRADOC has several ongoing CIC actions.**
  √ Combined Arms Combat Development Activity is finalizing FM 90-10 covering MOBA.
  √ U.S. Army Aviation Center has published FM 90-1 which covers helicopter CIC.
  √ TRADOC and the Federal Republic of Germany are conducting a joint effort concerning CIC.

- **The Berlin Brigade is designated by Headquarters, Department of the Army as the testing unit for CIC doctrine.**

change hands several times. Aviation is adapted to the senior commander's plan; but infantry is the key to clearing buildings and fortifications. But in every case every defended building must be a fortress inaccessible to the enemy. The one who possesses the stronger moral qualities such as boldness, fortitude, endeavor and resourcefulness and knows procedures and methods for fighting in a city will be the victor.

It is the responsibility of all professionals within the U.S. Army to develop doctrine for fighting in cities which will ensure that the next victor is the American fighting Soldier.

New doctrine for helicopter operations in built-up areas must take into consideration that:

- Since Vietnam the role of the helicopter has been in a quasi-twilight zone. Old doctrine is virtually useless because urban fighting and urban employment of helicopters were not used in Vietnam. A new approach is needed.
- There is no "viable" doctrine for helicopter operations in built-up areas.

Two of the hurdles that BG James H. Merryman (former Director of Army Aviation at DA) pointed out in an article ["Evaluation In Tactics," *ARMY AVIATION,* March 1974] on updating Vietnam helicopter doctrine to a mid-intensity scenerio are also valid in new doctrine for CIC fighting. Namely, *conservatism* and *safety*. However, I agree with what BG Charles E. Canedy (Deputy Director of Operations and Army Aviation Officer) wrote:

> *. . . after training in high risk conditions for awhile the pilot will accept the risk as normal* ["The Readers Respond," *ARMY AVIATION,* February 1976].

Those of us who have flown and tried many of the techniques required in CIC fighting agree that safety and conservatism are obstacles and hurdles. However, as photographs accompanying this article indicate, the risks become normal and conservatism becomes realism.

As stated in FM 1-100, the mission of Army aviation is to augment the capability of the Army to conduct prompt and sustained combat operations on land. In the past (particularly in Vietnam) this meant high flying command and control (C&C) ships. It meant prepping landing zones. It meant flying above 1,500 feet was a "safe zone." We took air supremacy for granted. The helicopter meant mass formations and radio relay. *This is not so today!* None of the above apply to helicopter operations in built-up areas. The helicopter, although not born in Vietnam, matured in Vietnam—and to keep it from ob-

solescence a new prospective must be adopted.

What are the capabilities of the helicopter? There is no need to list them from the manual; suffice to say that reconnaissance and attack helicopters have a most definite role in a CIC environment. Lift ships have the standard delivery of troops and supplies. Of course, the delivery will never be routine due to the different shapes and sizes of the various rooftops.

There are limitations also—such as vulnerability on the ground to enemy actions (parking, refueling and maintenance areas); vulnerability to enemy air defense measures including enemy aircraft; high logistical support; and most of all, the effects of adverse weather and night operations.

I'm not going to say much about adverse weather; just think about inadvertent instrument flight rules low level in a huge built-up city. However, a quote of MG John L. Klingenhagen concerning weather operations is appropriate:

> *. . . that if the Army had had a platoon of all weather helicopter gunships . . . in World War II during the Battle of the Bulge, the Germans would have been stopped cold* [*AVIATION DIGEST*, back cover, May 1971].

MG Klingenhagen was right, but are we there in a CIC environment yet? As stated in the aforementioned "MOBA" article,

> *After sunset, helicopter operations continue with helicopter pilots trained to fly at night.*

Maybe I have temporarily lost the faith, but I cannot see such operations in a CIC environment due to confinements, buildings and wire strikes.

Before discussing ongoing training within the Berlin Brigade, I would like to briefly address the attack helicopter role in CIC.

CW2 Sam Lanningham in his article, "Evolution of The Air Assault Doctrine," states:

Figure 2

> *Most engagements will be brief and usually on the spot; one-time suppression on the targets rather than destruction missions, as with all low level missions* [*ARMY AVIATION*, January 1976].

I agree, especially in combat-in-cities. Attack helicopters should be attached down to the lowest possible level in most operations, even squad. Before everyone ponders too long on what I just said, remember any method used will depend on the situation, with regard to tactics and techniques.

CW2 Lanningham, in his article further states:

> *. . . that slow speed is an asset and has lent to the improved techniques of terrain flying.*

Not so in a CIC condition; to reduce the vulnerability of the helicopter to small arms, antitank, and air defense weapons will require the use of the relative inherent speed of each machine. Due to the "unique" situation in Berlin, attack helicopter techniques cannot be tested.

Current aviation doctrine recognizes the air defense threat posed to Army aviation in a contemporary, conventional, mid-intensity (high threat) environment. For this reason the concept of nap-of-the-earth (NOE) flying has been formulated. The question that surfaces is whether NOE is compatible with the CIC environment. To say the very least we have little experience in this area, certainly not in Vietnam. It is shunned during peacetime in the United States and Europe. However, CIC/NOE has been tried in Berlin and it can be quite frightening and demanding.

What's going on in the Berlin Brigade? Please follow along and I shall attempt to give you a "bird's-eye" view. Figure 1 depicts units assaulting the manmade "MOBA City" in West Berlin. At MOBA City realism is the hallmark. The city is complete with cars, curbs, floors, rooms and of course many different sizes and shapes of rooftops.

As part of showing the need for CIC training and to "get the word around" there is a very popular

See Glossary On Page 15

Figure 3

"Visit Berlin" training orientation offered to units stationed throughout the U.S. Army in Europe. To cut redtape and save time the units usually are flown into Berlin by Air Force C-130 aircraft. However, many come by the free duty train from Frankfurt or Bremerhaven, West Germany. There is no delay or redtape if units arrive by air through one of the three corridors over East Germany into West Berlin.

The week is busy and exposes everyone to the CIC special considerations. It is a concentrated training exercise with a 1-day break to tour East and West Berlin. Subjects include day and night training in barriers and obstacles; defensive emplacements; fire and maneuver in built-up areas; selection of positions; C&C (limitations of frequency modulated radio, to helicopters also); use of wire; and hand and arm signals. These are accomplished at individual, squad, platoon and company level. It is an intensive 51 hours that includes extensive operations with helicopters.

Units have "assaulted" actual World War II bombed-out buildings still remaining in downtown West Berlin (figure 2); this affords a sense of realism seldom found anywhere in the world.

CIC operations with helicopters in West Berlin have helped make us aware of the threat posed by the following two obstacles:

- The everchanging winds blow around the many odd-shaped buildings, constantly changing intensity and direction. They can put the most experienced pilot in a sweat.
- There is a constant threat of wires which, as every pilot will testify, can provide problems as acute as can any enemy soldier. Wire never sleeps and is always on guard. It can bring a helicopter down immediately.

I think wirecutters should be attached to all helicopters, expecially when operating in the CIC environment. I'm sure details such as

Figure 4

Figure 5

weight, length, aerodynamics, center of gravity and moment problems can be overcome. Of course Pathfinders would be a great help in overcoming these obstacles and others found in built-up areas.

In Berlin we have tested and tried many of the techniques that must be proven to establish that there is a role for the helicopter in city fighting. Rappelling (figure 3); various rooftop landings (figure 4); and STABO or Stabilized Tactical Airborne Body Operations (figure 5) are just a few of the daily training exercises conducted in the divided city of Berlin. Each reconnaissance platoon of each Infantry batallion assigned to the Berlin Brigade consists of trained experts in these areas. In addition, all rifle and 81 mm mortar platoons have been exposed to these vital operations.

MOBA city (constructed by organic combat Army engineers) is where the bulk of the CIC training and visiting unit orientations take place. To add realism the "Berlin Wall" which separates the Russian sector from the American sector is in full view of each building.

The ever-present VOPOS or VOLKSPOLEIZE (East Berlin city and wall "Peoples Police") watch night and day from guard towers only 150 meters away.

There are other questions concerning military operations in built-up areas:

- What type maps to use in the daytime—at night?
- What about the use of lights in night operations? When, where and how?
- What about wire laying in the city?

I'm sure we could have an "endless" list of such questions. But the Berlin command has started down the long road to find the answers. In other words, the Berlin Brigade has started the tempering process.

LTC Graham and LTC Franklin state in their conclusion:

There will be many interesting developments that can contribute to the combat effectiveness of our forces in built-up areas if the need is recognized.

I say the need must be recognized! The Berlin Brigade does realize the need now, as pointed out by the recent brigade commander. MG R. Dean Tice stated in a training seminar:

We are leading the leaders in CIC development.

I agree. But we *all* must recognize the need. Let each of us remember that we exist to support the Infantry which has the ultimate and difficult mission of closing with and killing or capturing the enemy. So whatever you want to call it—MOBA, city fighting, CIC, urban fighting—remember, the Infantry is going to need all the help it can get.

The Berlin Brigade has some of the answers and is jumping the hurdles and testing many of the concepts and techniques. I propose that it be established as the proponent unit to update urban fighting doctrine to include the role of the helicopter. The Berlin Brigade is ready to be that unit.

Isn't it time you thought about helicopter operations in built-up areas? We will not be able to pass them or avoid them as old doctrine dictates. How do you answer the question, *does the helicopter have a role in combat-in-cities?*

Major Alexander Woods Jr. has served in various aviation and Infantry command and staff positions in Vietnam and Germany. Recently he commanded a rifle company and the Aviation Detachment in the Berlin Brigade

-10 CORNER

GOGOGOGO NO GO

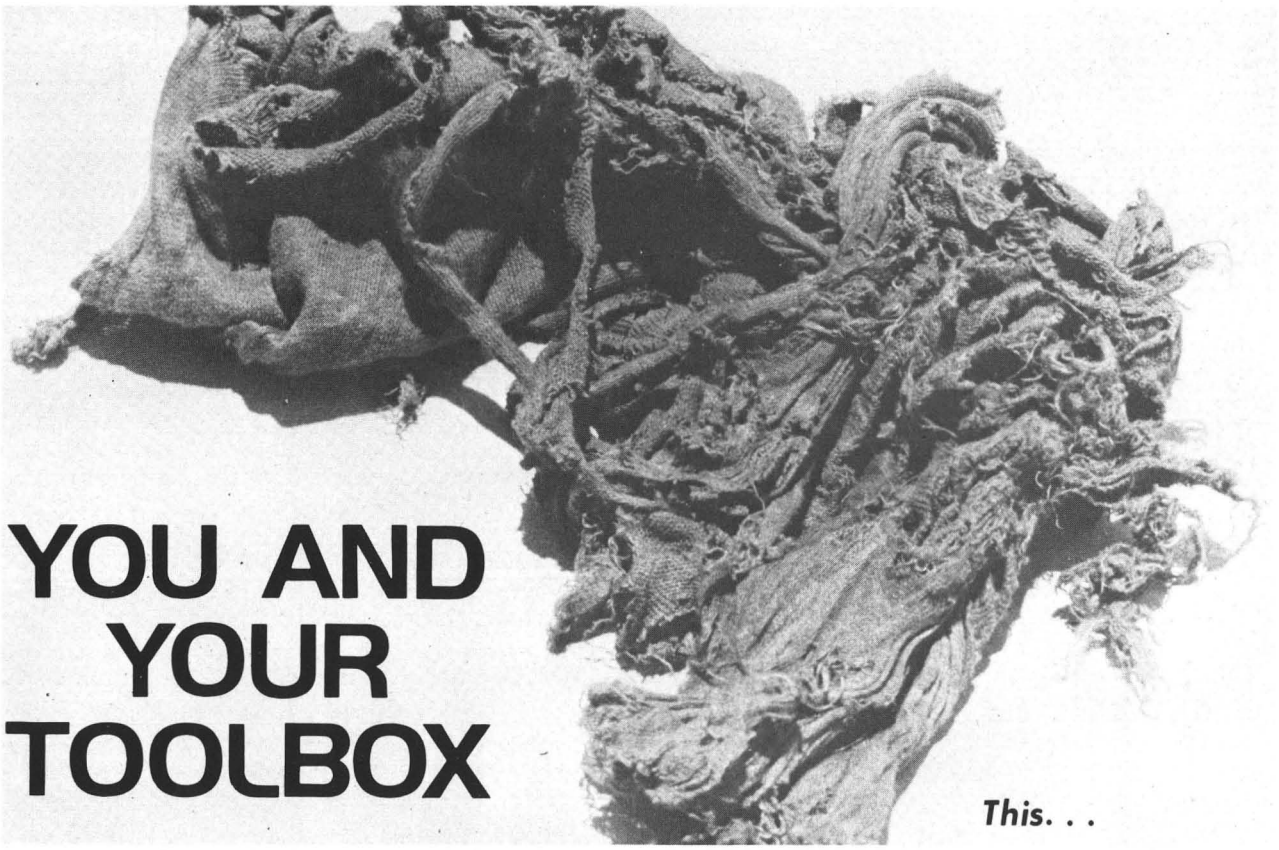
Pat Wall
Directorate of
Training Developments
U.S. Army Aviation Center
Fort Rucker, AL

FOR MANY YEARS we in Army aviation have relied, to some extent, on the go/no-go decal information in the UH-1 Huey to determine if a takeoff should be attempted. For a confined area we require 2 to 2.5 percent N_1 (gas turbine speed) above that needed to hover at a 2-foot skid height as a minimum of reserve power for the takeoff. Because the UH-1H is limited to 50 pounds per square inch gauge (PSIG) torque, we do not know if that torque limit will be exceeded when the collective pitch is increased to the N_1 value required for the takeoff. Consider too that the go/no-go check must be performed after the aircraft is loaded and brought to a hover. At that time it may be necessary to adjust the load to fit the aircraft's performance capability.

Did you ever wonder how to predict that performance capability prior to starting the aircraft? How do we equate a gross weight capability to an N_1 gauge in the planning phase of the mission? Just how much N_1 does it take to lift a prescribed load? The go/no-go placard won't tell us and searching through all of the existing performance charts for that aircraft will still leave those questions unanswered. There is nothing available to us in existing technical manuals on how to predict UH-1 performance based on N_1. We must recognize that go/no-go is not the answer to all hover/takeoff problems.

There is, however, a method for predicting hover/takeoff capability during mission planning that allows the pilot to know if the torque limit will be exceeded during takeoff. For example, referring to Engine Operating Limits, Military Power, figure 14-5, page 14-12 and Hovering Maximum Gross Weight (Out of Ground Effect), figure 14-10, page 14-38 in the UH-1D/H Operator's Manual, we can predict, prior to going to the aircraft, what the maximum hover-out-of-ground-effect (HOGE) capability for a given condition is. The information is not only valid for point of departure but can be accurately estimated for the landing area.

Unfortunately, these charts do not provide all of the needed information, particularly if we attempt to determine power requirements that are less than military power. The new standard format performance charts give us the additional information. Examples of the new charts appeared in the 1976 Annual Written Examination. So—expect to see more and more of these appearing in the dash 10 manuals this year.


YOU AND
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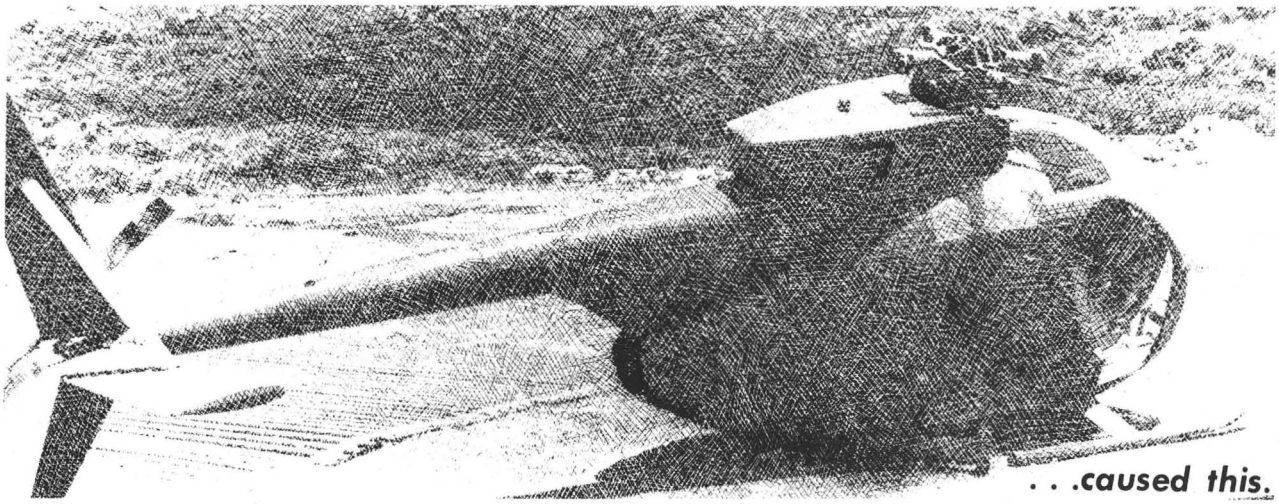
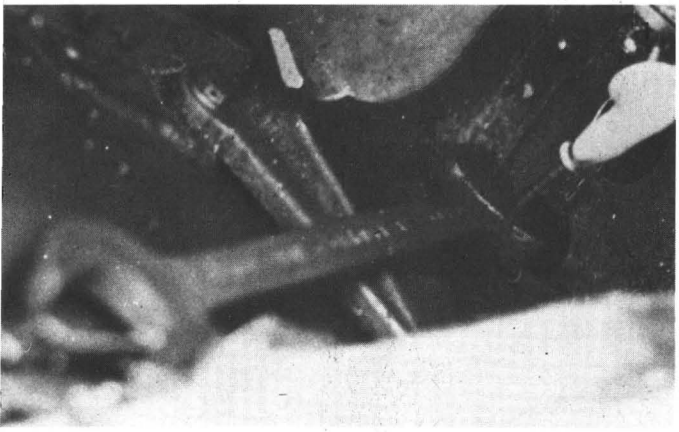

. . .caused this.

Sergeant First Class Jerry E. Mills
Directorate for Aircraft Accident Analysis and Investigation
U.S. Army Agency for Aviation Safety



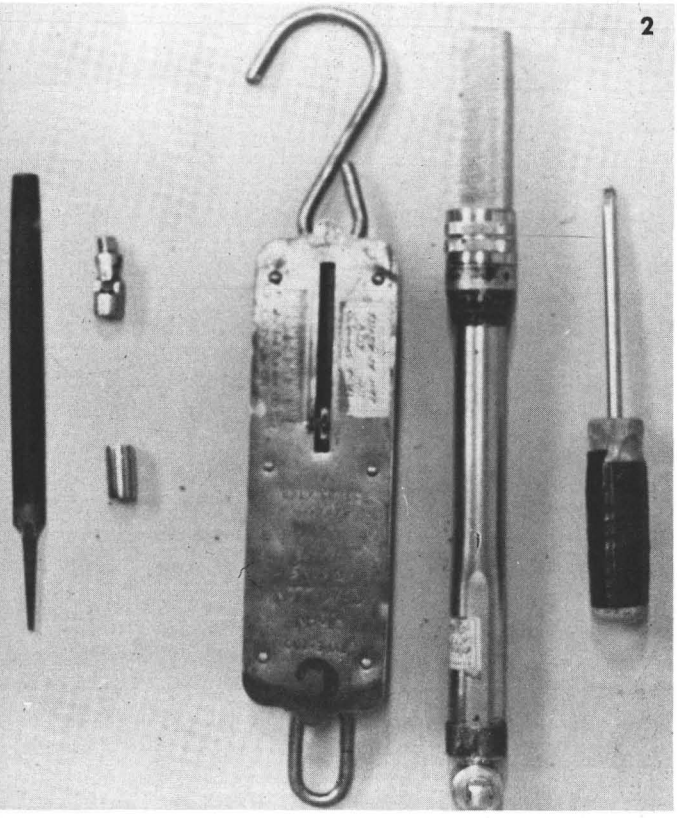


Photo (1) Wrench caused $16,000 accident when it jammed silent chain of AH-1G. (2) Tools found in tail boom during preflight by pilot with "sensitive" ears.

HOW WOULD YOU like to go for your annual physical—in perfect health—and come away sick? Or, after having undergone an appendectomy, receive the good news that you are making an excellent recovery, then later be informed that a pair of forceps seems to be missing from surgery and the hospital staff strongly suspects they are nestled somewhere inside your abdominal cavity? Wouldn't that news thrill you? Well, this is precisely the type of thing we have been guilty of in Army aviation.

We have often performed inspections and maintenance, pronounced the "patient" in excellent health, then walked away, leaving one or more potential hazards in its guts. Some of the in-flight emergencies that have resulted are reputed to have made saints of sinners, believers of unbelievers, and, on occasion, converted Episcopalians into Ecopalians—a portion of their denominational nomenclature having been lost at a crucial moment of some emergency.

Statistics show that tools and toolbox-related items caused 41 mishaps during the period 1 January 1970-31 July 1976, for an average of approximately one mishap every 2 months. Damage costs approached $¼ million, and this figure does not include costs for the more than 7,200 man-hours required to make needed repairs, or in those instances in which aircraft were successfully forced landed, for replacement of engines, transmissions and other components damaged by tools and related items.

Granted, based on the overall mishap rate per 100,000 hours of flight, these mishaps accounted for only .2 percent of the total number; and their cost was a mere .06 percent of the overall cost of nearly $348 million for mishaps from all causes. But we must bear in mind that all the mishaps we are referring to resulted from toolbox FOD. They do not include those caused by FOD from other sources. Consequently, they are highly significant.

To begin with, none of these mishaps should have occurred—all could have been prevented. What is even more important, they were all caused by the very people whose prime function is to ensure aircraft integrity and reliability. Further, the in-flight emergencies that occurred subjected crews and passengers to unnecessary risk.

In terms of resources, we can equate the temporary

YOU AND YOUR TOOLBOX

loss of equipment and the man-hours required for repairs with our removing 41 aircraft from the Army inventory for 22 days while hiring an individual to work 8 hours a day, 7 days a week for more than 3 years, repairing damages caused by other mechanics. However, the real significance can be seen by examining the types of mishaps that occurred, the individual causes, the aircraft involved and the personnel who played an active roll in either creating hazards or allowing them to exist until they caused mishaps.

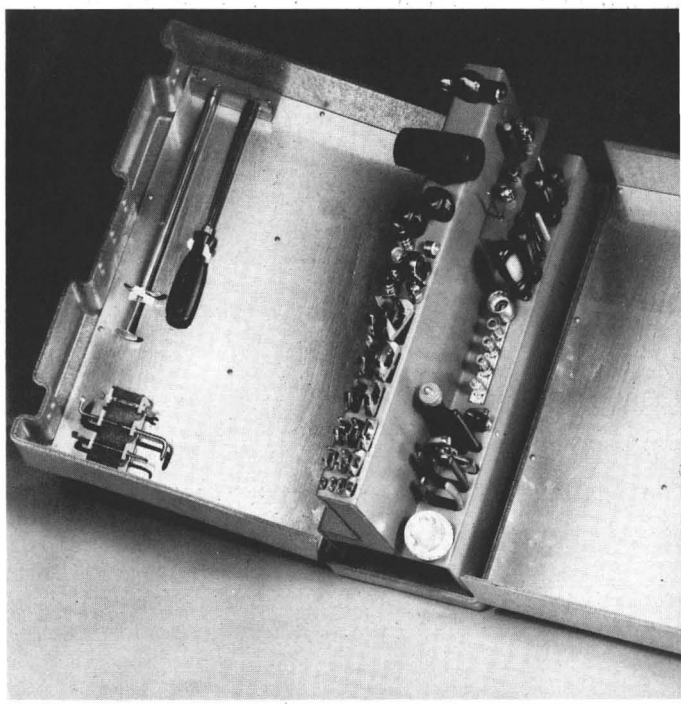
Records show 3 major accidents, 1 minor accident, 19 incidents, 5 forced landings, 10 precautionary landings and 3 ground type mishaps resulted from emergencies generated by tools or toolbox-related items during the 6½-year period covered. Of the 41 aircraft involved, 39 were helicopters and 2 were fixed wing. A breakdown by type reveals 23 UH-1s, 9 AH-1s, 3 OH-58s, 2 CH-47s, 1 OH-6 and 2 T-42s.

These statistics become more meaningful when we consider that in almost all instances rotary wing aircraft were involved, and that approximately 82 percent of these helicopters were of the UH-1 or AH-1 variety—aircraft more likely to be found participating in low-level or nap-of-the-earth missions where inflight emergencies can readily produce serious, if not disastrous, results. A look at some of the mishaps that occurred can give us additional insight into the problems we face.

In one instance, an AH-1G sustained major damage when tail rotor control was lost while the aircraft was being taxied out of a revetment. The Cobra struck the revetment, severing the tail rotor and 90-degree gearbox, and causing additional structural damage to the aircraft. An open-end wrench (photo 1) left in the 90-degree gearbox compartment had jammed the silent chain assembly. Inspection of the wreckage also revealed a 7/16-inch socket in the pylon.

In another instance, binding of the forward and aft cyclic of a CH-47 occurred during takeoff. Movement finally locked, preventing application of forward cyclic. The cause was a pair of dykes forgotten in the area of the control tubes. Fortunately, a precautionary landing was completed in time to prevent a more serious mishap.

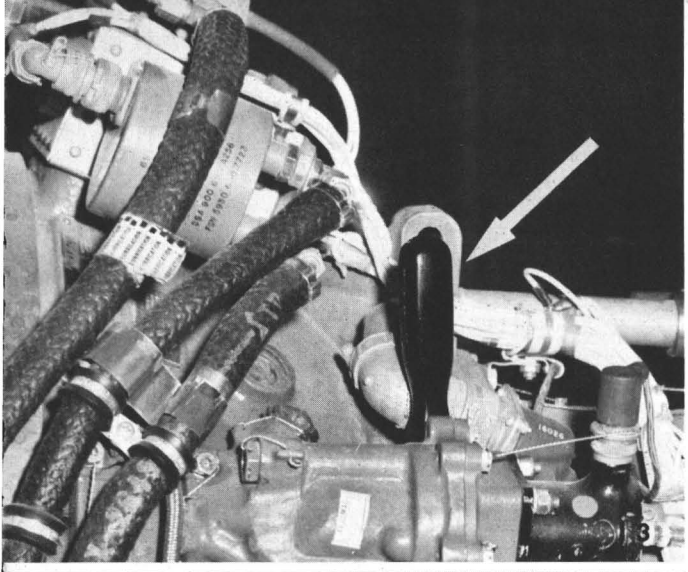
Photo (3) Screwdriver "stowaway" went undetected through two intermediate inspections. (4) & (5) Three sizes of instant inventory type toolboxes used by Navy. (6) Portable tool cabinet. (7) Cabinet designed primarily for use in hangars and shops.

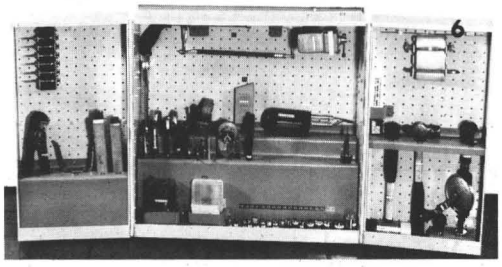


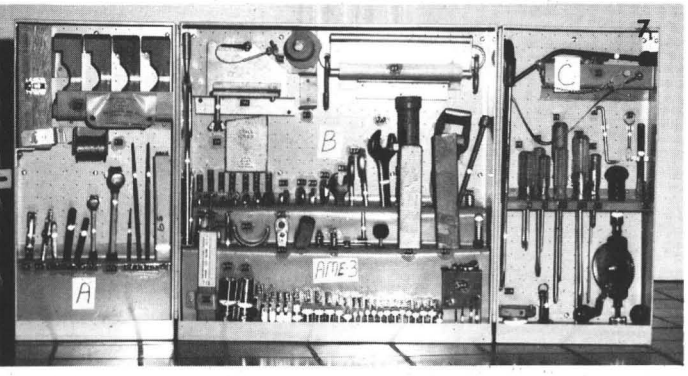
When mechanics fail to account for all their tools, they set the stage for toolbox FOD. Yet, mishaps can often still be prevented if other personnel properly perform their tasks. Consider, for example, the Cobra involved in an incident. After adjusting the main rotor pitch change links for low autorotation rpm, the crew chief forgot his wrench on the main rotor hub. The tech inspector (TI) failed to notice the tool during his inspection, and the pilot missed seeing it when he made his preflight. During runup, the wrench fell into the main rotor blades, damaging both. Cost for repairs was $6,000.

A similar mishap resulted when a breaker bar was left on the main rotor hub of another Cobra after the drag braces had been adjusted.

In each instance, carelessness on the part of one individual was accompanied by a complete breakdown of the established system of checks and balances. Un-







fortunately, this type of breakdown is not uncommon.

A UH-1 sustained incident damage from a ratchet and a mallet that were left under the No. 4 tail rotor drive shaft when the No. 4 bearing was replaced. The mechanic forgot the tools, the TI failed to note them, and the crew chief didn't see them when he performed the daily inspection.

Following engine shutdown, a TI noticed dents on the tail rotor drive shaft tunnel cowling of a UH-1. A check revealed additional damage to other components. The cause was a 12-inch screwdriver forgotten in the tunnel. The acceptance crew had failed to note the screwdriver, and the crew chief didn't find it during PMD.

In addition to these mishaps, nine others were caused by tools left in the tunnel area of UH-1 and AH-1 aircraft.

Collectively, these mishaps single out the "tunnel" as one of the major FOD problem areas, substantiating the findings of research personnel who listed aircraft design as a strong factor in tool FOD to structures and related components. For example, when the tunnel cowling is opened for maintenance to be performed, the mechanic finds the ledge a natural work bench on which to lay his tools and toolbox-related items. A socket, screwdriver, or extension can readily roll away from his immediate work area and be forgotten when he completes his job. Or he may inadvertently leave a tool behind as he works his way along the tunnel from one end toward the other.

Nor is the aircraft mechanic the only one susceptible to this type of oversight. Other maintenance specialists, such as sheet metal workers and painters, are equally apt to leave tools behind them as evidenced by the number of bucking bars, steel rulers, paint brushes and rags found in the tunnel area of aircraft. Fortunately, these items have not always caused damage or mishaps.

Although an infrequent cause of tool FOD, work interruption has resulted in some costly mishaps. In one instance, a UH-1 sustained damages of approximately $30,000 after a mechanic was called away from his job to act as fire guard. He had broken his pliers while performing maintenance and was looking for the pieces when his assistance was requested. He forgot about the broken pliers until after the engine was started and the damage occurred.

However, one of the predominate maintenance-related causes of engine FOD is not the result of tool ingestion but that of rags and towels—both paper and cloth.

An OH-6 sustained major damage during the emergency landing necessitated by the loss of engine

power and rotor rpm following liftoff (photos on page 30). A cotton cloth ingested by the compressor caused the engine failure. Cost for repairs exceeded $37,000.

A rag became lodged against the variable inlet guide vanes on the lower right side of a UH-1 engine, causing severe loss of power during flight. Engine and rotor tachometer needles split. When the pilot attempted to stretch his glide to avoid obstructions in his flight path, rotor rpm decreased and the aircraft landed hard, causing damages in excess of $100,000.

A study of mishaps caused by toolbox FOD reveals two important facts. The first, that aircraft controls and engines are the most commonly affected systems, creating the greatest hazards to safety—engine failures and loss of aircraft control. The second, that the number of tools or toolbox items inadvertently left aboard aircraft are much greater than the mishaps attributed to them seem to indicate.

Tools, shop towels, rolls of safety wire and related items have been found aboard aircraft during investigation of mishaps from other unrelated causes. They have also been discovered during the course of various inspections.

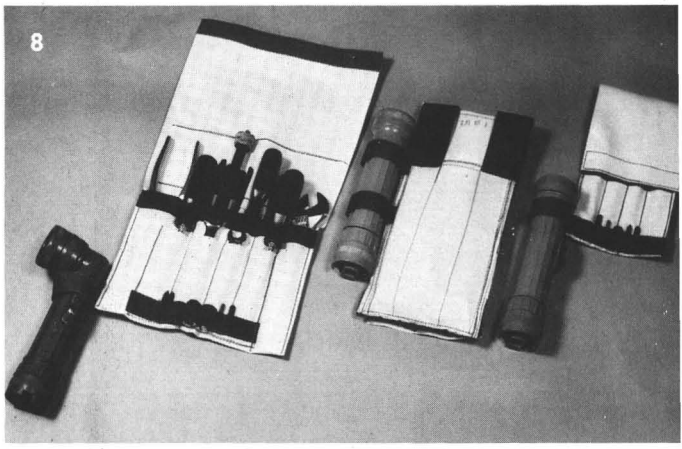
One cautious pilot placed his ear to the tail boom of a UH-1 during preflight and listened for rattling noises as he thumped the underside. He heard them. Photo 2 shows what he found when the cowling was opened.

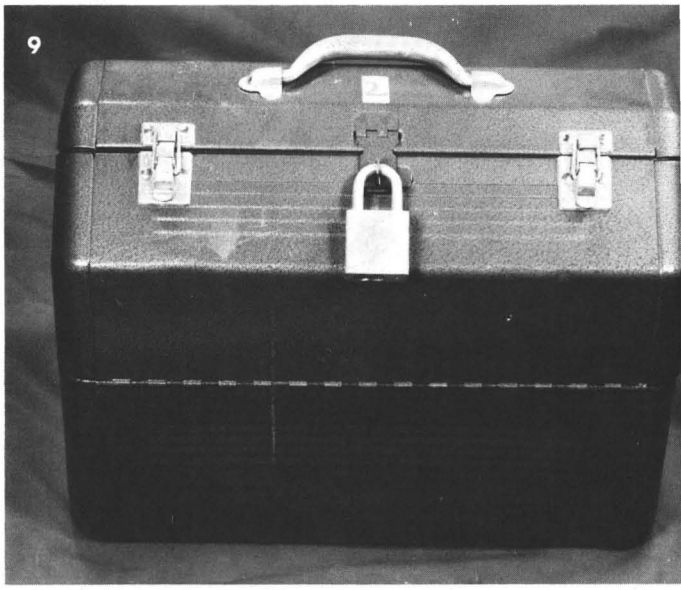
In another instance (photo 3), an 18-inch screwdriver was found on the engine of a UH-1. The aircraft had undergone two intermediate inspections and had been flown by five different pilots before the tool was discovered.

With newer and more sophisticated aircraft programmed to join the Army inventory, together with the emphasis being accorded low-level and nap-of-the-earth flying, it is little wonder the Army is deeply concerned with the danger toolbox FOD poses to both personnel and equipment.

To help us visualize the type of situation we are facing, we have only to look at but a single accident that involved an aircraft belonging to a sister service. The mission was routine and the flight had been uneventful until suddenly, while in cruise flight, the aircraft entered an uncontrolled roll, forcing both pilots to eject. The ejections were accomplished successfully, but of course, the aircraft was destroyed. A 6-inch steel ruler was found to have jammed the lateral control actuator. Cost of the ruler was 45 cents; cost of the aircraft, $6 3/4 million.

Unfortunately, this was not a one-of-a-kind accident. Unaccounted tools have destroyed jet engines and caused control problems that resulted in ac-





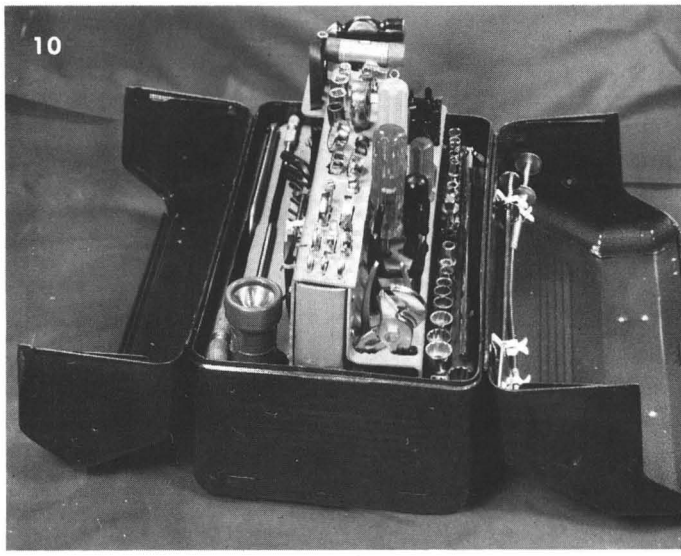


Photo (8) Three types of belt-type tool pouches. (9) External appearance . . . (10) . . . masks redesigned interior. (11) "Old" standard issue toolbox presently in use.

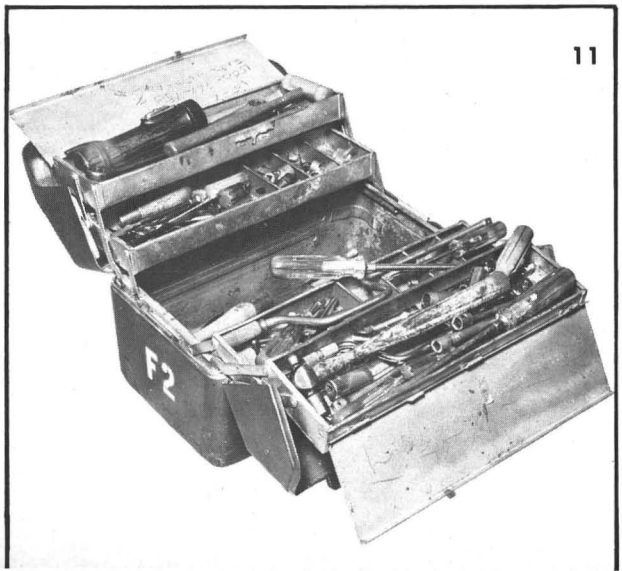
cidents, with loss of lives as well as equipment.

As pointed out, most of the personnel directly or indirectly involved in causing toolbox FOD mishaps include a variety of maintenance types, technical inspectors, crew chiefs and pilots. Further analysis of causes reveals inadequate supervision and failure to ensure a continuous and effective on-the-job training program as strong contributing factors. While renewed emphasis in these areas is a good starting place to effect a cure, the main question still remains unanswered: How can we ensure tools and toolbox-related items are not left aboard our aircraft? In the past, our best recommendation was for each mechanic to perform a thorough toolbox inventory following each maintenance job.

Much research has been done over the years by all military services afflicted with the problem of FOD, and every avenue that might provide a cure has been explored—regardless of how unorthodox some of the methods may have appeared. If a method had any semblance of merit, it was tried. Assignment of personal toolboxes, performance of weight checks of tool kits, use of brightly colored tools, and magnetic implantation of tools or their treatment with some type of radioactive material for rapid detection were some of the procedures studied. Yet, when all was said and done, the most effective means was found to have remained unchanged—the performance of a toolbox inventory check following every maintenance job.

But while the concept remains the same, the procedure to ensure its effectiveness has been drastically altered, requiring the use of instant inventory tool kits for positive and rapid verification that all tools are accounted for. Basically, the system consists of a variety of toolboxes and pouches specially designed to carry a select type and number of tools, and to hold each securely in a particular location. A quick check can readily point out any that are missing.

The idea is not new. The British Royal Navy developed an instant inventory tool control program in the 1960s, and found it immensely successful in reducing accidents caused by tools. Since then, both our own Air Force and Navy have done some excellent research in this area and have established effective tool control programs of their own. Aside from safety, the prime objective, the instant inventory concept offers many additional advantages. It reduces the need for maintenance personnel to carry, on every job, far more tools than they need. Toolboxes are standardized, inventory times reduced and proper tools are readily available as needed. Box quantities are reduced and tool losses minimized, effecting additional savings.



11

Presently, the Navy has developed three different sizes of handcarried toolboxes (photos 4 and 5), each designed for a particular level of maintenance. For larger tool assortments, two types of tool cabinets are available. One is primarily for shop use (photo 7) while the other is a portable unit (photo 6). Also, belt-type tool pouches (photo 8) are available for use by mechanics performing "normal" maintenance. As an added innovation, special reflective tape is now being used to mark each tool, further reducing the possibility of its being left aboard an aircraft, and greatly aiding personnel in locating any tools determined to be missing.

How effective has this system of instant tool inventory been for the Navy? In one instance, a screwdriver was noted to be missing after a fuel cell was replaced. When a search failed to locate it, the fuel cell was removed. The screwdriver was found lodged between the bladder and the airframe. In another instance, a wrench could not be accounted for and a search of the aircraft was made. The wrench was found in a flight control bellcrank assembly.

The Army has not been asleep concerning this matter and from the numerous research projects conducted has developed composite tool kits to meet the needs of its own maintenance personnel. Photos 9 and 10 show a prototype of one instant inventory toolbox configuration which has been made available, on a limited basis, to specific units. As compared with photo 11, the exterior appearance of the toolbox remains unchanged. However, its interior has been completely redesigned to house only those tools determined to be necessary, and to support each in a particular location.

Composite tool kits such as this one; a continuous on-the-job training program of all maintenance personnel; ample supervision to ensure all inspections, including preflight, are accomplished by the book; and frequent spot checks of toolboxes can collectively work together to eliminate the threat of FOD from toolbox items. But make no mistake about it. For a complete cure of this illness, the individual mechanic continues to remain the principal factor upon whom success depends. This means *you*. You and your toolbox will determine the outcome.

LISTEN
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VOICE/NON VOICE
RADIO SET AN/PRC-90
TALK

USAAAVS

stateside survival

MUCH TIME, EFFORT and money have been spent in providing aircrewmembers with personal survival equipment. The use of this equipment in the jungles of Vietnam was a must for successful search and rescue of downed aircrewmembers. The fact that we are no longer in Vietnam does not eliminate the need for this equipment in the States. USAAAVS mishap files contain many cases proving the need for survival gear, especially signaling equipment such as survival radios, personal signal kit and signal mirror on all flights. These records also show accidents need not occur in remote areas to create a need for personal survival equipment.

One classic example was a helicopter crash in a wooded and swampy area covered with heavy foliage. When the pilot failed to report in an hour after the intended end of flight, the helicopter was considered missing and an unsuccessful search was conducted. The wreckage was *accidentally discovered 53 days later* by a farmer when he saw the reflection of the sunlight in the red anticollision light mounted on the transmission. *The wreckage was located only 2.8 miles from a small community.* Evidence at the crash site indicated that one or both occupants survived the crash and lived for an undetermined length of time. When the flight originated, the pilot was wearing his flight jacket with the green side turned to the outside. However, when his body was found, the orange surface was exposed. The aircraft first-aid kit was found about 10 feet from the wreckage and part of the contents had been burned. It was reasonably assumed that at least one of the occupants was alive for some time after the crash and had tried to signal for help. If the pilot had been carrying a pen-type flare gun or other distress signaling devices, he would have most likely been rescued.

In another case, a helicopter crashed only 2 miles from the airfield. Two occupants were killed on impact and the third lived for approximately 30 minutes. There was no signaling equipment aboard. While it is doubtful the survivor would have been able to signal for help, had his injuries been less severe the lack of any signaling device could have been the deciding factor in his survival since it took almost *12 hours to locate the wreckage.*

There are many cases in which survivors, sometimes seriously injured, have had to walk out to get help or wait to be discovered because no signaling equipment was carried aboard the aircraft.

- A helicopter crashed in a heavily wooded area, killing several occupants and seriously injuring two others. The survivors were thrown from the aircraft and knocked unconscious, with intermittent brief periods of consciousness. After spending the night exposed to rain and falling temperature, they *left the wreckage 24 hours after the crash* to go for help. One of the survivors could not make the trip because of his injuries. The other finally got to outsiders for help.
- Two aviators and one passenger were reconning a river in an attempt to locate a drowning victim. The aircraft struck wires and crashed on the river bank. All three occupants were seriously injured. Luckily a civilian found the wreckage and telephoned for assistance. Medical aid arrived about 2½ hours after the crash.
- Another pilot had to walk for an hour before reaching a farmhouse after his helicopter crashed in a heavily wooded area. He called the airfield to report the accident and its location. Fortunately, he and his copilot had received only minor injuries.
- A student pilot was pinned in the wreckage and the IP was unable to free him. Fuel from the fuel tank vent flowed in the student's helmet and onto his shoulders for about an hour. The IP was unable to bend the tube and stop the fuel flow. Although seriously injured, he had to walk out of the wooded area to get help. No emergency signaling devices had been carried aboard the aircraft.

If the survivors of these accidents had not been able to get help or had not been discovered, the end result could have been tragic.

Field visits by USAAAVS reveal that many times life-support equipment is available but not issued or else issued but not used. Pilots must have survival gear and they must use it. SOPs should specify that essential gear will be carried on all flights.

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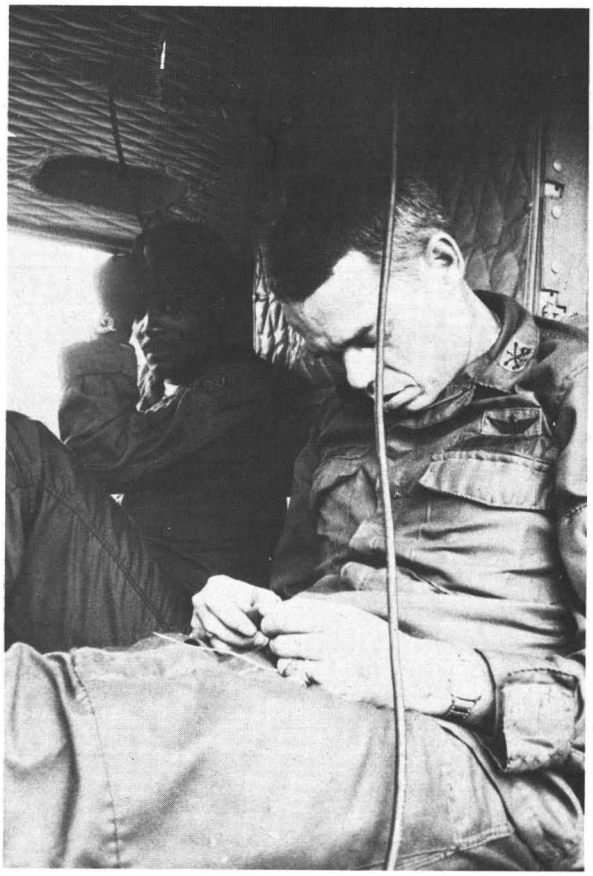
No. 12

flight limits and crew rest



Lieutenant Colonel David H. Karney, M.D.
Medical Division
U.S. Army Agency for Aviation Safety

USAAAVS

DURING FISCAL YEAR 1976, aircrew fatigue was identified as a contributing cause factor in 10 Army aviation accidents which resulted in 5 fatalities, 12 injuries and $1,960,562 in aircraft and property damage. A revision of AR 95-1, scheduled for release in January 1977, will require that local commanders prescribe flight crew limits and crew rest programs. Major commands have directed that subordinate units develop flight time and crew rest standards and many aviation units have requested USAAAVS assistance in establishing SOPs.

Because of the need to better define maximum flying time and minimum crew rest requirements, USAAAVS has recommended that AR 95-1, Section II, Flight Limits and Crew Rest, be changed. The following suggested revision of the regulation is published to assist units in developing SOPs on flight limits and crew rest and to solicit comments from the aviation community. Address correspondence to: Commander, USAAAVS, ATTN: IGAR-M, Fort Rucker, AL 36362.

GENERAL. Anticipated stress on personnel and compensating rest periods must be considered in planning for flying operations. The maximum number

of hours which may be flown in any one day will vary with the factors affecting safety of operations and will be adjusted at the local level, based on such factors as type of missions, type of aircraft, operating conditions, weather, time of individual flights, crewmember diet, physiological and psychological condition of crewmembers, and rest facilities available.

SCHEDULING STANDARDS. The following chart indicates scheduling standards for the utilization of aviation personnel on crewmember status:

SCHEDULING STANDARDS

1 Time Period (Hours)	2 Maximum Duty Hours	3 Maximum Flight Time–Day	4 Maximum Flight Time–Night	5 Maximum Flight Time–Day & Night
24	12	8	6	7
48	24	15	12	13
72	36	22	18	20
168 (7 days)	72	37	30	33
720 (30 days) (Peace)	288	90	70	80
720 (30 days) (Mobilization)	360	140	100	110

Crewmembers logging flight time within 5 hours of the indicated hours shown in columns 3, 4, or 5 above in any 72-hour period will be scheduled a minimum of 24 hours off duty, prior to performing further flying duties. Any crewmember performing a tour of duty as Officer of the Day, Staff Duty Officer, Charge of Quarters, Noncommissioned Officer of the Day, or other similar type duty which does not allow for a normal period of uninterrupted sleep will be scheduled a minimum of 8 hours off duty prior to further flight duty. It is emphasized that the scheduling standards indicated are maximums, necessary in the interest of safer and more effective Army aviation operations. More conservative limits may and should be imposed at all command levels when deemed advisable to further enhance safe operations. When developing local standards, commanders will consider the advice of the flight surgeon and the aviation safety officer in determining limits for specific operations or time periods. It is further emphasized that scheduling standards prescribed cannot be safely exceeded in Army aviation operations. As these limits are approached, time available for ground duties necessarily will be curtailed. Such consequences must be anticipated and accepted during periods of heavy flight activity. Every effort must be made to hold flight demands to levels that can be satisfied within the standards shown above. Where circumstances dictate, low priority missions will have to be refused or deferred. Where essential demands cannot be satisfied within the standards prescribed, requests for augmentation of resources will be submitted to higher headquarters.

FLIGHT CREWMEMBER RESPONSIBILITY. The above standards impose limits upon commanders in the interest of improved mental and physical readiness of aviation crewmembers. Benefits derived depend upon the individual properly utilizing off-duty time to insure sound physical and mental fitness. It is the moral and military responsibility of an individual crewmember not to engage in off-duty activities which prevent him from reporting for duty fully rested. It is extremely difficult for commanders and responsible supervisors to remain constantly aware of the status of each individual crewmember in regard to the standards imposed by this paragraph. These provisions will be brought to the attention of all flight crewmembers, and each flight crewmember shall be required to advise his commander or supervisor when he is approaching or has reached the prescribed limits.

EXCEPTIONS. When urgent circumstances require, standards may be waived by commanders on a calculated risk basis, preferably after consulting the flight surgeon, with the understanding that flight safety will be affected with attendant rise in mishap potential. A report shall be submitted to the next higher headquarters giving circumstances for each case in which standards are waived.

USAAAVS

Crew error is consistently the greatest single cause of aircraft accidents. Year after year, pilot error shows up as a factor in 80 percent of all accidents. However, our study of accident data shows that pilot-error accidents aren't all "pilot."

PILOT ERROR, A COMMAND FAILURE

MOST ACCIDENT investigating boards and reviewing and approving officials believe that because a pilot is at the controls when the accident happens, he must have done something, or failed to do something, and thereby caused the accident. However, other factors often contribute to pilot-error accidents. One of these is command supervision.

Lack of supervision, the one cause common to most of our accidents, was the second highest contributing cause factor in FY 76.

Inadequate supervision was identified as a factor in 50 of our 94 accidents, 14 of 18 fatal accidents accounting for 44 of our 54 fatalities, 10 of 12 weather-related accidents, 6 of 9 overgross accidents, and 27 of our 47 total-loss accidents.

These accidents show that commanders must get more involved in the operations of their units.

The irony of the matter is this: Those with responsibility for safety do not necessarily pay the consequencies if safety supervision breaks down. Army aircrewmen pay the price in full for lack of proper and adequate supervision.

In one case, five people were killed and five others injured when their overloaded aircraft with a known "sick" engine crashed during a low-level troop lift mission. The pilot-in-command (PIC) was considered to be well qualified. He had more than 3,000 flying hours and was an IP and instrument examiner.

The PIC with a crew of three, six passengers with field gear, and 1,200 pounds of fuel, took off without knowing the density altitude—which was approaching its peak at that time of day—or even the exact number of passengers on board. The crew had not received a weather briefing nor had they been told how many passengers they would be carrying.

There was no evidence to indicate that anyone in the chain of command felt this was a problem. The unit commander, operations officer and flight platoon leader definitely contributed to the accident. Not only did they fail to make available the information required to accurately plan for the mission, but they did not emphasize the requirement for preflight planning.

In another accident, a pilot and copilot with limited recent experience were paired in the same aircraft for a difficult night combat assault mission. Both were injured when their helicopter crashed into trees. These pilots' duties were primarily administrative and they had significantly fewer hours than the average pilot in the unit. On top of this, both the pilot and copilot had been awake for more than 18 hours before the accident.

Another pilot was killed on a solo mission when he inadvertently encountered IMC, became disoriented and flew his aircraft into the ground. This pilot had been with the unit for only 3 weeks and had no experience in flying under marginal weather conditions common to the area. He was allowed to fly a single-ship mission and depart the field site at his own discretion without a weather briefing.

All too often, the young and not so young Army aviator will try to do more than he is capable of successfully accomplishing. These accidents clearly prove that constant supervision is required to temper the "can do" attitude with discipline and judgment.

Although commanders cannot be physically present in every cockpit on every flight, each commander can make his presence felt in that cockpit. His presence would be the attitude he has established through his own example, and the requirements he places on his subordinates and crews.

The supervisor must assume the responsibility for the failure of his command. Pilot error is a command failure. When it has been determined that pilots have not had the benefit of a supervisor who knows and accepts his safety responsibility, pilot error may well be the result of supervisory error.

Sammy Mason

WINGS WIZARDS AND WISDOM

I WATCHED AS the pilot closed the throttle and started his pattern toward the target. As he turned from base onto final, he was obviously too high. He slowed the airplane by pulling the nose up and soon the descent angle was steepened. The airplane began to settle rapidly. When it was still apparent he was going to overshoot the spot, he pulled the nose up even higher, violating everything sacred to safety. Now his descent angle was something to behold. His genius in converting lift into a plummeting descent was outstanding. It appeared that he might come close to the target. He was low enough that I could see the set of his jaw and I imagined crosshairs on his glazed eyeballs as he fell toward the bull's-eye. Results were to be determined quickly as this aluminum hunk of gravity dropped rapidly to the spot.

The landing gear tried to cushion the crunch but it spraddled under an indecent shedding of aluminum garments. The windshield, still in one piece, shot from its frame and landed well ahead of the bending airplane. In a mighty halo of dust, most of the parts settled into one shameful heap.

This happened during an airshow as I watched several contestants competing in a spot landing contest.

I was very close and ran to offer assistance, but found two healthy people. The dazed pilot seemed crestfallen; obviously things had gone poorly for him. Perhaps he was disappointed that he had fallen short of the spot he tried so valiantly to hit.

People are committed to mental institutions when unable to place things into proper perspective. They may be highly skilled, even extremely smart in many ways, but something has happened to them that short-circuits their ability to see things as they really are. Because of this, they become hazardous to themselves and those around them. In a similar way, pilots are sometimes struck with moments of insanity that temporarily paralyze their judgmental ability. You may be a wizard at the art of flying but if you are lacking in putting things in their proper perspective, it is possible that you are heading for an accident.

All pilots probably acknowledge that safety has priority over everything. We can't picture ourselves doing anything quite as stupid, for example, as old Smiley Smertz who navigated his flying machine into a rock. However, most of us are likely to possess certain human deficiencies that can short-circuit our reasoning momentarily.

It is often low-priority items that lead to an accident. The highest priority is an accident-free conclusion of a flight. But such things as a desire to get a

If you are not involved in a constant learning situation, flying may become as dull as any other job.

WINGS, WIZARDS AND WISDOM

contract signed over at Fogville, a compulsion to get home in spite of a rough-running engine, or the temptation to show the boss you can descend lower than minimums and get him to that important meeting are all low-priority reasons for flying. The thoughtful and conscientious pilot will not permit things of lesser importance to compromise his basic desire to fly safely.

There is a tendency to equate the ability to make good decisions with some doubtful qualities such as an IQ test. We tend to say, "Either you have it or you don't." It doesn't take a mental wizard to use good judgment but it does take a proper mental attitude toward the task of flying an airplane.

A very high percentage of the mentally elite are involved in flying stupidity, so it isn't mental voltage that determines the use of good judgment. However, whether we are wizards or just ordinary folks, our ability to make good decisions should improve with experience. The ability to use good judgment is the capstone of skills and knowledge.

Barriers Against Foolishness

As a young and very inexperienced aviator, I impulsively blundered into more than one hair-raising experience. Now, as I view the same situations through bifocals and cogitate under thinning gray hair, I have insights that provide barriers against foolishness. I'm sure that frequent doses of substantial fright had much to do with changing my attitude toward flying and forced my judgment to function more logically. The most important change, however, was my acquisition or development of a more thoughtful attitude.

The pilot who spends time visualizing and thinking about the complexities of flight is more likely to use good judgment than one who never uses his imagination to advantage. The cool head that does everything right when the serpents of disaster are coiled for a strike has probably been conditioning his decisive powers through a thoughtful attitude for many years. A few good scares can be the catalyst that hurries a pilot toward judgmental skills, but it doesn't have to be: many pilots gain these skills without the factor of fear.

As a flight instructor, I try to pass on as much of my experience as possible to my students. We practice simulated emergencies that can be done with a reasonable margin of safety. However, in the interest of safety and good judgment, I can only carry these simulations so far. Beyond the line of safety, I can only talk about the various techniques or courses of action that might be applied.

I encourage pilots to think about potential hazards and emergencies and try to visualize what they would do under these conditions. I tell them flying is a thinking person's game and the more they think about it, the more they will have to draw upon when they really need it. In my opinion, the unimaginative pilot is potentially dangerous, primarily because he is unable to visualize the results of his decisions.

Unfortunately, some employers fail to understand that a pilot needs to have plenty of time to think about and plan everything relating to his flying job. The

Ideally, a pilot should have nothing on his mind but getting his aircraft to his destination safely. However, life is made difficult by complexities and distractions that short-circuit our best efforts. Recognizing that we could be potentially dangerous under these conditions will go a long way in forcing us to concentrate

company boss who expects a pilot to work too much at non-flying-related tasks when he is not flying pours sand into mental machinery that is developed and geared for the realm of flight.

Character has much to do with a pilot's ability to exercise good judgment. Honesty is extremely important. A pilot who is accustomed to twisting the truth to expedite, or more readily accommodate a situation, may not have the ability to evaluate honestly all of the circumstances. A sensitivity to the value of human life and a genuine concern for his fellow man will give a pilot proper sense of priorities so essential to flying safety.

Ideally, a pilot should approach his aircraft with nothing on his mind but getting his aircraft to his destination safely. However, life is made difficult by distractions and complexities that tend to short-circuit our best efforts. Some of these situations can be overwhelming, such as the death of a loved one or some other highly emotional thing. But far lesser complexities often serve as thorns that affect our ability to think clearly. We may be forced to carry on our flying tasks under difficult conditions. However, a recognition that we could be potentially dangerous under these conditions will go a long way in keeping us alert and forcing us to concentrate.

We have little difficulty, in a routine environment, keeping our mind working as it should; we perform all of the normal cockpit tasks with skill and efficiency. However, when we are forced out of our usual pattern we need to be alert to possible deficiencies that are present in our performance.

Once I was asked to fly a high-ranking air force official of a foreign government from Burbank to Palmdale in a light twin. I was instructed specifically to show this influential person extra courtesies and consideration. When I met him, he immediately informed me what a great pilot he was. Then he questioned my qualifications. I assured him I could not match his ability and changed the subject. He insisted on occupying the right seat, which was understandable.

His grandiose attitude continued as I received clearance and taxiied from the ramp. After the runup, I called the tower and was cleared "into position and hold." As I swung onto the runway, Mr. Ego shoved both throttles to the wall and blurted: "I fly." I concentrated all of my efforts in subduing my rage. I forgot all about the tower's instructions to hold, and tried to keep this maniac from busting the airplane. When we reached the intersection of the two runways, another airplane flew over the top of us and the tower reminded me that I was to hold.

Accidents are often the result of cockpit surprises. An unusual distraction can short out our thinking process and everything essential quits functioning. These intruders can take many forms: they can be attitudes, pressures, emergencies, an emotional situation—anything that is not part of normal routine.

Take Time to Preflight

The real value in air transportation is that it is fast and saves time. However, the crew who is going to fly the aircraft needs time to prepare themselves and the machine for flight. A major deficiency contributing to aircraft accidents is failing to take enough time for everything relating to a preflight. A pilot should be a sort of diagnostician and take time to see if he has a healthy or unhealthy situation on his hands. The most dramatic personal example of how "haste makes waste" occurred at an airshow at the old Curtiss-Wright airport on Long Island.

Our airshow troupe had been pushing a front all the way across the country from California and had frequent delays because of weather. I was first to arrive—about 15 minutes after showtime. Concerned about the delay, the promoter was prodding me to get an act into the air. One of my acts consisted of a rocket-assisted takeoff (RATO). The rocket bottle was already fastened to the belly of the 450-hp Stearman and all I had to do was hook up the ignition wire.

With everything connected and ready, I quickly taxiied the Stearman to the runway and, without a moment's hesitation, started the takeoff. As soon as I felt control effectiveness, I squeezed the trigger on the stick grip and detonated the rocket. The airplane jumped ahead with a tremendous surge and I jerked the Stearman into a vertical climb. At about 200 feet in the air, the engine quit—cold.

The low thrustline of the rocket caused the airplane to arc toward the inverted position. I shoved the stick full forward but the reaction was too powerful to overcome. Suddenly the airplane snapped into a wild, inverted gyration and settled into the dense column of rocket smoke. I had slowed the gyration just as I entered the smoke and with the nose now pointing toward the ground, the engine restarted with a surge of power. With the combined power of rocket and engine, I regained flying speed and control rapidly and pulled the airplane from the dive as details on the ground rushed sharply into focus. Dust swirled as I

Know yourself. If you can't do something, be honest and admit it.

barely cleared the ground. I fully expected to crash and, but for the grace of God, I would have.

The cause of this near-disaster was that I forgot to turn on my all-attitude fuel system prior to takeoff. As soon as the Stearman was pointed straight up, the gravity fuel system failed to supply fuel to the engine and it quit. After that incident, I always had an assistant stand on the wingwalk and watch me turn on my inverted fuel system prior to takeoff.

Perhaps readers are not as fallible as I am. There are times when I have to force myself to slow down and take time to preflight an airplane properly. It is my nature to hurry. I can shave fast, dress fast, eat fast and work fast. When I am around an airplane, I need self-discipline to slow down—to protect myself from myself.

Some pilots seem to have an intuitive ability to sense trouble and avoid it. However, the "intuition" is probably nothing more than a *thoughtful attitude* and an alertness to what is taking place around them. For example, during a hot day while walking out to the airplane at a remote airport, you feel the softness of the asphalt as you walk. Not a breath of air is stirring. As you settle into the left seat you set the altimeter at 29.92 and read the pressure altitude and the outside air temp. A turn of the computer and a look at the performance graphs show that you can barely get out of this short field at your gross weight.

A cockpit check sets everything in order and you fire up the turbines. They rumble a little more than usual and you watch the starting temps closely. You discover that it takes a bit more then normal power to taxi as the airplane rolls slowly on heavy, sticky tires. The air conditioning ducts are fogging profusely and blowing a bit of "snow."

With everything checked, you start a turn onto the runway and observe that the windsock at the takeoff end of the runway is hanging limp while the windsock at the other end of the runway is indicating about 15 knots of wind and swinging wildly across the runway. You look at a granite hill about a mile off the end of the runway and observe dust spilling down the slope, moving toward you. You look at your copilot, shake your head and turn off of the runway, announcing: "We're going to shut down and wait a few minutes."

"Why?" he asks.

"Something tells me I should," you answer.

Perhaps without realizing it, in a few moments you have formulated all of your reasons for aborting. There were factors that could not be readily measured, such as rolling friction, humidity and a potential wind shear condition.

After waiting a mere 5 minutes, both windsocks indicate about 15 knots of wind blowing straight down the runway. Now intuition tells you to take off.

Five Steps to Better Judgment

The supreme ingredient of flying skills is judgment. The wiles of wings, wind and weather demand that the power of mind over matter be overwhelming. How can we improve our judgment?

1. The most important step is to acknowledge that we are indeed human and can make mistakes. The flying fraternity has been creating and guarding its image for many years. With reluctance it gave up the former symbols of riding breeches, boots, leather jackets, scarfs and helmet and goggles in exchange for a single cumbersome chronometer. However, the spirit of imagery is still with us in outlook and attitude. The appearance of the super personality has long been associated with flying an airplane and some have been guilty of believing that we are a step above humanity. When we discover that we are fallibly human like our earthbound brothers and

The pilot who spends time thinking about potential emergencies and what he would do is more likely to use good judgment when he really needs it.

humbly join the ranks of average humanity, we have taken a giant step toward flying safely. Fully understanding our individual limitations is of utmost importance when decisions are to be made. Good judgment demands the character of genuine humility.

2. Get into training situations that demand a little more from you than your normal capabilities. If you have been flying for an extended period without making a mistake, you need to get involved in a training program where you can safely make one. We all have our limitations. If a training session doesn't reveal some sort of weakness, it probably hasn't been thorough enough. Training that forces our minds to work while under pressure will tend to lower the panic factor when the real heat is on.

3. Do something to restore your interest in flying. This may seem like an unnecessary comment but I have known pilots who no longer found flying to be fun. There are many different aspects to flying and you will never discover them all. Aviation is a vast, interesting area of adventure, filled with new discoveries—if you remain alert enough to see them. You don't have to be flying a high-performance, sophisticated aircraft to spur your interest in flying—any flying machine can do it and there are things it can teach you. If you are not involved in a constant learning situation, flying may become as dull as any other job.

Remember those thrilling flights while you were learning to fly? You could hardly wait until the next lesson. There was a constant challenge and you were constantly learning. You made mistakes and lots of them—everyone made them. If you had a good instructor, he never made you feel ashamed when you did something wrong. You began to really learn when you could recognize your errors and analyze your deficiencies. Those were the fun days and your first solo was the most thrilling day of your entire career.

Then there was the day when you flew well enough to earn your license. It was a day of achievement. However, those government ratings are not intended to represent the ultimate in flying achievement. They are actually testimony to a rather low plateau of learning and experience. If you are not flying and thinking better than when you first got your license, there is something wrong and it may be related to a lack of interest.

4. Avoid prolonged and unnecessary "comfort zones." Most pilots have areas of flight that they prefer to avoid and this is as it should be. However, there is a tendency in many of us to establish too much of a buffer zone between what we consider to be safety and hazard. Too much of a buffer zone will result in a gradual decay in our flying proficiency. I recently read an article in the MAC FLYER that I thought was a skilled representative analysis of the cause of many an accident. This particular story told of a scheduling officer who was in a position to select all of the best trips for himself. He selected the ones that were not too difficult, where the weather was usually good and not much skill was required. Then one day he was forced into taking one of the tough ones, where the weather was usually bad. The result was tragic and unnecessary. The ability to exercise skill and judgment under demanding circumstances will depend upon how often these abilities are used.

5. Develop convictions and perform honestly. "I'm sorry, I'm not currently qualified to make that flight," is a mark of character and a display of maturity. There are times when it takes more boldness to back away from a flight than it does to go ahead with it. The adage that there are no old, bold pilots is not true because I know some, but none of them lack humility.

When I read accident reports, it's like hearing a broken record or reading history—it seems to be human nature to make the same mistakes over and over. We learn best from our own mistakes.

When the next accident occurs and the next life is lost, it will not be those from the statistical past who will be responsible. It will be one of us living in the present. We will be intercepted by some circumstance that will short-circuit our wizardry and cause us to perform as fools. Then from the ivory towers of those who have never tumbled in the real rough of aviation will come forth the mighty rubber stamp proclaiming: "PILOT ERROR."

Eighty-five percent of all aircraft accidents are caused by human factors. It seems obvious that we are potentially defective and we need as much working in our favor as possible. One of the reasons most of us choose to fly airplanes is because there is an element of risk involved that presents a challenge to us. Make no mistake about it, the risk and the challenge are still there.

USAAAVS

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

If you have a question about personal equipment or rescue/survival gear, write Pearl, USAAAVS, Ft. Rucker, AL 36362

Replacement Cuffs for Nomex Jacket

The U.S. Army Troop Support Command has told us that a replacement cuff for the new Nomex flyer's jacket, NSN 8415-00-217-7220, will be available approximately 1 December 1976. Replacement cuffs should be requisitioned by supply personnel from the Defense Personnel Support Center (DPSC), Director of Clothing and Textiles, Philadelphia, PA 19101, using the following nomenclature: Cuff, knit, nonmelting nylon, color OD 106, NSN 8315-01-024-5725. This color matches the new Nomex jacket.

Batteries for AN/PRC-90 Survival Radio

The DA special staff officer for life support equipment indicates that sufficient batteries, BA 1568/U, NSN 6135-00-838-0706, are available. According to the Electronics Command commodity manager, approximately 32,000 of these batteries are on hand. Refer to TM 11-5820-800-12 for replacement of batteries and useful life.

Cold Climate Sleeping Bag

The NSN for the cold climate survival kit sleeping bag, type SRU-15/P, has been changed from 8465-00-753-3226 to 8465-00-479-1792. However, the old sleeping bag should not be turned in for the new one or the new one requisitioned unless it has been damaged beyond repair or lost. Presently, there are 227 kits in stock which have the old bag and 132 kits with the new bag. Either kit is appropriate for use.

Painting of SPH-4

Is the OD paint on the SPH-4 helmet fire retardant and is there an Army regulation which requires that the helmet be painted OD rather than white?

The U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL, states that the OD paint on the helmet is not fire retardant and that there is no regulation that requires the helmet to be painted OD. However, in accordance with paragraph 3-20b, TM 10-8415-206-13, dated April 1972 with change 1 dated 22 March 1973, the only paint authorized for the helmet is OD color, NSN 8010-00-297-0560 (1-gallon container) or NSN 8010-00-297-0561 (5-gallon container).

SPH-4 Helmet Deficiency

According to the U.S. Army Aeromedical Research Laboratory, there is a deficiency in the SPH-4 helmet, NSNs 8415-00-144-4981 and 8415-00-144-4985. The eyelets pull out of the nylon straps that fasten the ear cups retention harness to the helmet shell.

Specifications and drawings have been corrected to eliminate the problem. However, helmets bought under older specifications should be fixed to correct this deficiency. Figure 1 shows the "fix" and the materials needed. This "fix" applies to all helmets manufactured before FY 76.

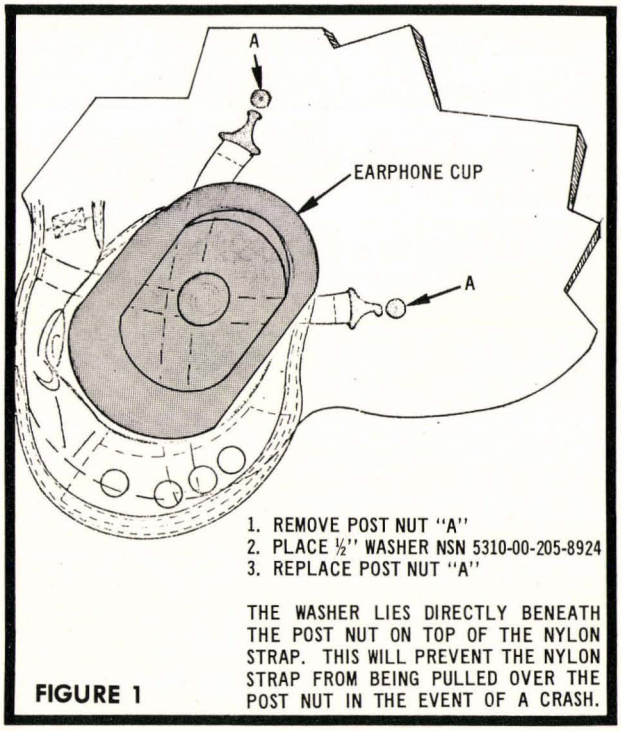


FIGURE 1

ATC action line

UNITED STATES ARMY AIR TRAFFIC CONTROL ACTIVITY

WITH ALL THE new automation devices available to the air traffic controller, what additional services can the aviator expect?

Additional services consist of advisory information provided by air traffic control (ATC) which includes but is not limited to the following categories: traffic advisories; vectors, when requested by the pilot, to assist aircraft receiving traffic advisories to avoid observed traffic; altitude deviation information of 300 feet or more from an assigned altitude as observed on a verified automatic altitude readout (Mode C); advisories that traffic is no longer a factor; weather and chaff information; weather assistance; bird activity information; and holding pattern surveillance.

Additional services are provided to the extent possible contingent upon the controller's capability to fit them into the performance of higher priority duties and on the basis of limitations of the radar, volume of traffic, frequency congestion and controller workload. The controller has complete discretion for determining capability to provide or continue to provide a service in a particular case. The controller's reason not to provide or continue to provide a service in a particular case is not subject to question by the pilot and need not be made known.

Air traffic controller duty priorities are:

- Give first priority to separation of aircraft as required in the Controller's Handbook and to the issuance of radar safety advisories.
- Give secondary priority to other services that are required but do not involve separation of aircraft.
- Give third priority to additional service to the extent possible.
- Priorities for the handling of emergencies cannot be prescribed because of the infinite variety of possible situations which may occur.

The above is and should be considered an impressive array of goodies. One of the best services, however, is self-rendered when operating in today's often wild blue environment, and that is use of uncaged eyeballs to maintain continuing surveillance outside the cockpit!

What procedures are used to update Sectional Charts between the scheduled 6 months published cycles, and how can I as an aviator locate this information?

Although the Sectional Charts are designed for visual flight, their use is enhanced by conveying certain types of selective operational data. This selective and relatively stable data, displayed on the legend panel, includes airfield status (closed, private, civil, military, etc.), communications and NAVAIDs data, airspace designations and other useful information to complement the basic pilotage function for which the chart is designed.

Changes in these selective operational items are made as necessary from current flight data services and reflected in the subsequent editions. A note on the legend, however, also warns you — the user — that NOTAMs and related current flight information publications should be used as basis for latest changes in this operational category data. On the other hand, the Sectional Chart producers assure us that the best available current information can locate changes occurring between the 6-month cycle involving discrepancies, corrections and new obstructions by reference to a DOD document aptly titled the Chart Updating Manual (CHUM). This basic document and the monthly supplements thereto are available for your use in airfield operations planning facilities. Based on the nature of normal VFR cross-country missions, your desire to consult this updating document is probably questionable. Should a "Braille" mode of flight be in order, the CHUM can be highly useful.

Some DOD FLIP IAP Charts have procedure turns shown as an initial approach fix (IAF). Some do not. Why?

Most FAA procedures do not contain the IAF legend due to FAA's belief that pilots know that the fix is the IAF for filing purposes. However, FAA will in the near future identify and chart each designated IAF. This will be done as FAA procedures are revised for other procedural reasons.

Readers are encouraged to send questions to:

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

I Was a Witness To a "War"

SP4 Gary Grieser

326th Medical Battalion
101st Airborne Division
(Air Assault)
Fort Campbell, KY

IT'S THE 24TH of December 1976 and this story is late; but the "war" gives one little time. I'm really writing this in reference to a chain of events that have happened since last Christmas.

It all started when we went to Chattanooga to pick up a patient that was injured in an auto accident. He had a broken jaw, wrist, two broken ribs, a compound fracture of the left leg, plus internal hemorrhaging. I had to pull traction on his leg while the medic applied the splint. While this man was screaming from the pain, Chattanooga tower said we were clear of the area, and the pilot had the poise to say, "Merry Christmas." I wanted to cry.

On Christmas Day I pulled "first up" and watched the Mike Douglas Show. Blood, Sweat and Tears sang "I Was A Witness To A War." And the best thing that happened all day was that the "crash phone" didn't ring one time.

Since then I have started seeing my job as it really is. It is a war between time, skill and knowledge, professionalism, and most of all life and death.

Today I saw MASH, which told all about how they felt about war. Radar told about the cluster, mom, etc. B. J. talked about "the world." Father McCahee talked about the professionalism of the unit. And, Hawkeye was crying when he talked about the war, the Army, the killing and the fear. I can only say I have never been in a "real" war and pray I never will.

The other day we took two premature babies to Norton's Childrens Hospital and the worse part about this kind of "mission" is watching the father. Three times during the trip I had to hide the fathers' eyes from seeing the babies getting resuscitated.

What I really like about my job is that everyone in our unit has the capacity to joke about the drudgery. I look at my job in two ways: one is if the hotline doesn't ring, then there isn't someone hurt bad enough to need us. And, if it does ring, we have the ability to handle anything that comes up.

Thank you for reading my story. I hope you have a Merry Christmas.

Christmas Cookies and Foam

Captain Thomas J. Lee

Aviation Safety Officer
Aviation Div., DPT, USAARMC
Fort Knox, KY

UDORN, THAILAND in December is not a place that fosters Christmas spirit. But the 20 pilots and crewmen standing on the airbase ramp several years ago were all in a good mood. The aircraft bringing the last load of Christmas mail from the Republic of Vietnam was due any minute, which added a little excitement to an otherwise gloomy Christmas Eve.

Someone pointed, and the group squinted through heat waves at the aircraft touching down on the opposite end of the 2-mile-long runway. The dirty jokes and general horseplay reached a new high as the plane rolled along the taxiway on the other side of the field. Each man had his mental fingers crossed, hoping the mailbags contained his Christmas package from home.

The mailplane had gotten behind an Air Force C-130 taxiing for takeoff. That would cause an irritating delay for men itching to see what word they might get from that faraway place called "home."

Soon the C-130 had been cleared into position on the runway and was waiting for an instrument flight rules release. That's when the gloom returned to this Asian Christmas Eve. . . . .

The mailplane began to taxi behind the poised C-130 toward the ramp where the group waited. Suddenly, aware of what was about to happen, someone said to nobody in particular that the pilot sure as hell better get out from behind the C-130. Funny he should say that.

As the Christmas mailplane crossed directly behind the cargoplane, the four engines on the transport wound up to takeoff power, leaving behind a hurricane of turbulence as it started its bid for flying speed.

The mailplane was instantly blown over onto one wing tip and the right propeller began to eat concrete. Twenty mouths fell open as the drop tank ruptured on the pavement and began spilling its half ton of JP-4 fuel into the ever increasing tornado of C-130 prop blast. Instantly the stricken airplane was shrouded in a haze of vaporized fuel swirling in the wake of the disappearing C-130. Now 20 open mouths were topped by 40 tightly shut eyes.

No fireball! The 40 eyes began to slowly open and saw two huge crash trucks roaring toward the battered mailplane. The right engine had stopped itself when the prop hit the ground. The pilot had shut the left one down and done his imitation of the world's fastest emergency exit, when the fire trucks arrived and buried the aircraft in a blanket of foam extinguisher. The right drop tank still merrily poured JP-4 onto the runway. The mail had arrived!

Later, holding a foam-covered, brightly-wrapped package of ruined Christmas cookies and new socks, one crewchief mumbled something about how stupid some pilots can be. There are people that just never get into the Christmas spirit.