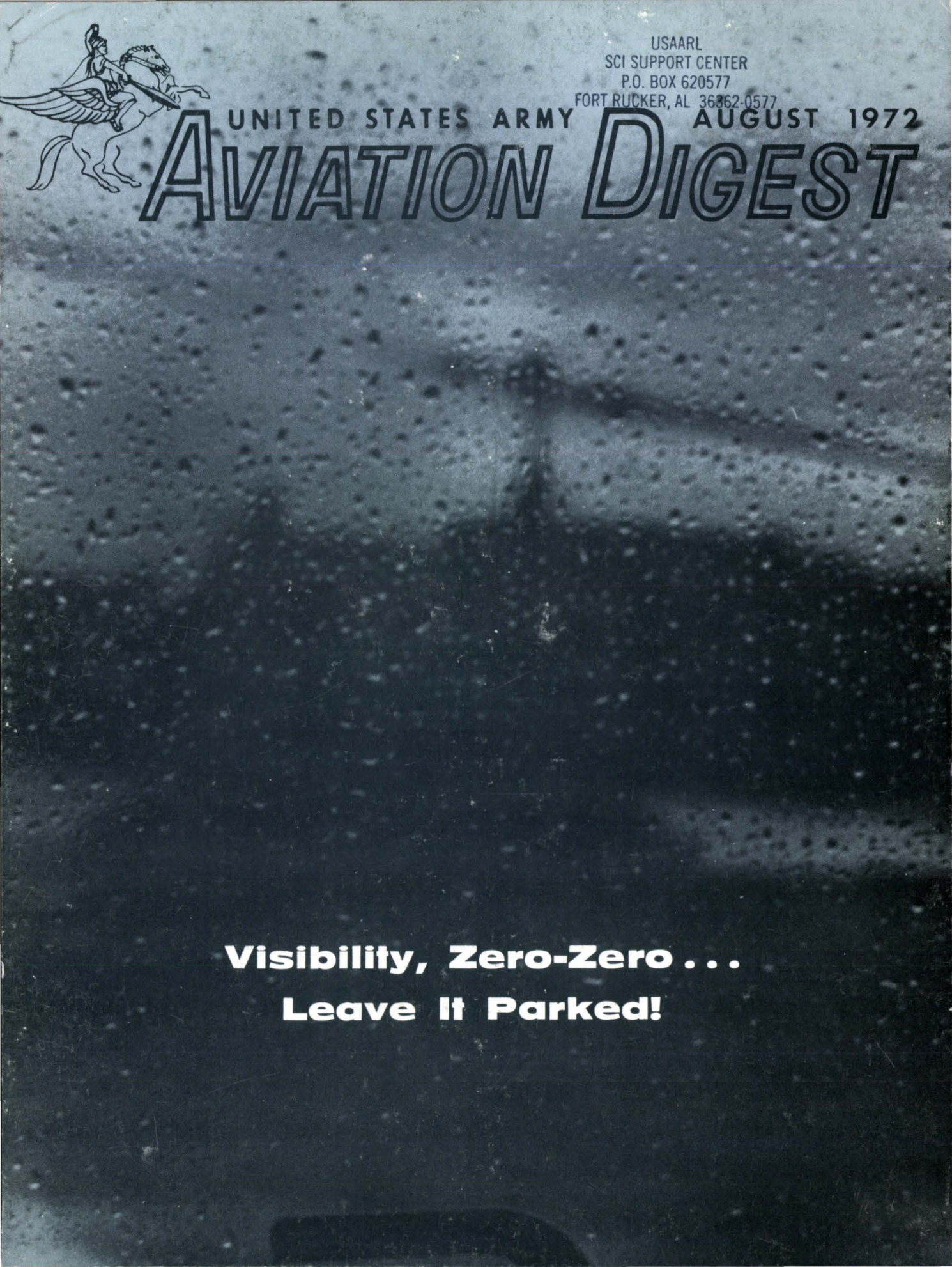
USAARL
SCI SUPPORT CENTER
P.O. BOX 620577
FORT RUCKER, AL 36362-0577

UNITED STATES ARMY AUGUST 1972

AVIATION DIGEST



Visibility, Zero-Zero . . .
Leave It Parked!

UNITED STATES ARMY AVIATION DIGEST

AUGUST 1972 VOLUME 18 NUMBER 8

Views From Readers	1
Guardian Angels	2
Charlie And Danny's Write-In	7
The Chinook Story	8
OHR	15
I Have Several Questions	16
Help For The Cab Squad	20
Maintenance Matters	22
Fog Dissipation Questionnaire Results	24
What Would You Do?	26
New Aviation Airmobile Fuel Laboratory	30
Nails For Sale	32
The Perfect Pro	36
Aviation Accident Prevention Forum	40
Aircrew Integrity Equals Flights	42
The Copilot	46
Aviation Accident Prevention Management Course For NCOs	47
Professional Problems?	48
The Three W's	50
The Men Who Never Returned	52
Pearl's	54
To Save A Life	56
Did You Learn Anything?	60
USAASO Sez	64

DIRECTOR OF ARMY AVIATION, ACSFOR DEPARTMENT OF THE ARMY
BG William J. Maddox Jr.

COMMANDANT, U. S. ARMY AVIATION SCHOOL
MG Allen M. Burdett Jr.

ASST COMDT, U. S. ARMY AVIATION SCHOOL
COL Earl W. Fletcher

EDITOR, U. S. ARMY AVIATION DIGEST
Richard K. Tierney

ABOUT THE COVERS

Summer heat and winter frontal systems both produce thunderstorms and poor visibility which can end your career . . . any day in the year

Cover photographs by CW3 Mike Lopez

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

The DIGEST is an official Department of the Army periodical published monthly under the supervision of the Commandant, U. S. Army Aviation School. Views expressed herein are not necessarily those of Department of the Army or the U. S. Army Aviation School. Photos are U. S. Army unless otherwise specified. Material may be reprinted provided credit is given to the DIGEST and to the author, unless otherwise indicated.

Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U. S. Army Aviation Digest, Fort Rucker, Ala. 36360.

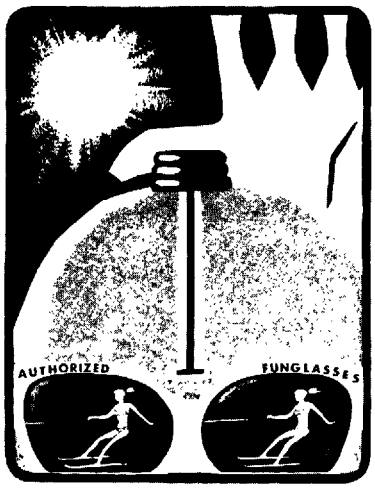
Use of funds for printing this publication has been approved by Headquarters, Department of the Army, 1 October 1970.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1. Complete DA Form 12-4 and send directly to CO, AG Publications Center, 2800 Eastern Boulevard, Baltimore, Md. 21220. For any change in distribution requirements, initiate a revised DA Form 12-4.

National Guard and Army Reserve units under pinpoint distribution also should submit DA Form 12-4. Other National Guard units should submit requests through their state adjutants general.

For those not eligible for official distribution or who desire personal copies of the DIGEST, paid subscriptions, $4.50 domestic and $5.50 overseas, are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

VIEWS FROM READERS



Sir:

In reference to the article "Doorgunners Do The Damnedest Things" in the May 72 issue, page 60, I feel that doorgunners and crewchiefs in RVN have done and are still doing a good job. They are as deserving of praise for this as anyone. However this article bothers me enough to write this.

Regardless of our location in this world self-control, maturity of actions, common sense and professionalism should not be allowed to escape us. We should strive at all times for self-discipline.

What classification would most of you give to the actions of the pilot in the referenced article that were taken to dislodge the gunner from his position outside the aircraft? I call it "horseplay." Accident files and hospital records are full of cases where the injuries or fatalities resulted from horseplay. In hangars, shops, offices, around ramps, machinery, in cars, boats, etc., you name it. Horseplay is fun maybe, but too many times its results are not worth that little bit of fun. We can place practical jokes in this same category.

It seems to me that the mature, common sense thing to have done in this case would have been to fly as smoothly as possible, make the gunner get back where he belonged, then tell him he did surprise you but not to do it again. How did the pilot know for sure the gunner's monkey belt was secure? . . . How would the pilot have felt if the belt had not been secure and his foolish action added to that of the gunner had resulted in a fatality?

The article goes on to tell about the answering of a Mayday call. This resulted in the rescue of a crew but the loss of the gunner. Fortunately not forever. I ask why was he allowed to get on the ground without a survival radio for commo? It was even stated in the article that one of the injured had talked to the rescue helicopter crew by such a radio. What happened to it? Why did he not take at least one smoke grenade with him? Why when the aircraft had to leave the area and the gunner stayed on the ground wasn't someone checking headings and time?

Lastly it appears that everyone involved in this episode felt badly about losing the gunner. This is due to the statement, "We listed Jones as missing in action on the morning report and put him in for an award, citing his 'constant fortitude and perseverance' in the face of danger. I doubt if Jones knew what any of those words meant but is was a way of making us all feel better."

When after about 2 weeks the gunner showed up, what happened? The award was canceled. It matters not that this gunner was able to survive and make his way back to friendly forces. That he did in fact distinguish himself in the face of hostile surroundings and under less than ideal conditions. That his 2 week ordeal was caused by incompetence, immaturity, lack of professionalism and self-discipline on the part of the aircraft commander.

Regardless if this story be truth or fiction, I consider all involved to have been very fortunate in the outcome through no doing of their own. I would also hope that all participants learned something although I have some doubts about that.

CW3 Dwayne L. Petersen
USA ELM LSE
CMR Box 2009
APO New York 09224

Sir:

The article in the May issue entitled "Doorgunners Do The Damnedest Things" undermines the professionalism and principles of sound judgment that USAAVNS works so hard at instilling in the junior officer aviator.

The point was well taken that "Doorgunners" — do — "Do the Damnedest Things" but it also shows that seemingly professional aviators "do the damnedest things" as well. By "easing onto the controls and banking sharply left" with a man perched precariously on the left skid of a UH-1H, the author has shown his own lack of professionalism. That

Continued on page 29

Getting Out Soon?

If you are getting out of the Army soon, don't hang up your wings. The same joys of flying plus some extra money can be yours if you join up with the National Guard or a Reserve unit. For a list of these and where they are located write—

Editor
U. S. ARMY AVIATION DIGEST
Fort Rucker, AL 36360

Guardian Angels

"KHE SANH TOWER, this is Stag 417, 5 miles to the east for landing."

This was the beginning of another air traffic control (ATC) operation. It is typical of 25,000 others that have been occurring every day at big airfields and remote heliports scattered throughout the Republic of Vietnam. Twenty-four hours a day the men of the U. S. Army's 165th Combat Aviation Group have been standing ready from the Delta to the DMZ to assist the pilots of allied aircraft to safely accomplish their missions.

Manning control towers, radar facilities and flight following facilities the aviation group's personnel have been a very important adjunct to military air operations in Vietnam. This numerically small group of professionals has been performing a mission far out of proportion to its minute size. They are truly among the unsung heroes of the conflict in Southeast Asia.

Flying personnel have an awareness of the demanding and exacting duties of the air traffic controller under normal circumstances. . . . The following is an account of these controllers during the Vietnam war, their increased diligence even while under attack by small arms, sappers and mortar and rocket barrages. . . . Why these young pros are considered the Army aviator's "Guardian Angels"

Colonel George P. Kelly

The burden of air traffic control for over 20 air terminals and several flight following facilities has rested squarely on the collective shoulders of these young controllers. Young may be an understatement because some of these men are still at the age where shaving is only a twice-a-week chore. There is no doubt, however, as to their professionalism. They are definitely in the first rank of all controllers.

Products of the Air Traffic Control School at the U. S. Army Aviation School, Ft. Rucker, AL, or the facility operated by the U. S. Air Force, Keesler Air Force Base, MS, these soldiers have to assume the same responsibilities that their civilian counterparts undertake daily at major airports throughout the world. To this task are added the additional problems of small arms fire, occasional enemy sapper attacks and the ever-present danger of rocket and mortar barrages.

The controllers operate in detachments that rarely exceed 25 men at airfields ranging in size from the small brigade base camp at LZ English to the sprawling air terminal complex at Tuy Hoa Army Airfield.

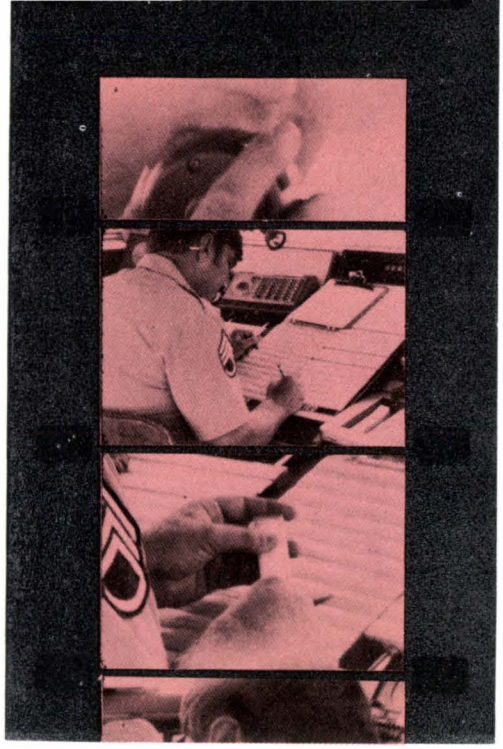
Their efforts are often overlooked until the pressure is increased to the breaking point, and then it is noted with amazement that they are still doing their jobs. Prime examples of this can be cited at Quang Tri Army Airfield during Operation Dewey Canyon II in January and February 1971 and Operation Lam Son 719 from February through April 1971.

Located near the critical juncture of Vietnam highways 1 and 9 in the northern sector of Military Region I, Quang Tri had long been the base of operations for the Army's 1st Brigade, 5th Mechanized Infantry Division. The airfield was operated by the 321st Aviation Detachment (Divisional) (ADD), a subordinate unit of the 165th Group.

For years the men of this unit had run Quang Tri airfield with efficiency and they created a smoothness of operations. Then came the buildup for the support of the South Vietnamese Laotian campaign: Dewey Canyon II had begun.

Almost overnight command elements began to move into the base camp area. Soon units from independent platoons up to and including a corps headquarters had swelled the population of Quang Tri far above its normal census. In addition to occupying every piece of usable terrain, this added population soon taxed the facilities at the base just to provide the necessities of life.

To support this temporary boom town air operations into the base increased tremendously. During the month of February, the first month of operations, the traffic count more than doubled and at its high point reached a staggering 47,478 sorties for the month of March. With the airfield operational around the clock that figure averaged out to an ATC operation every minute of the day, every day of the month . . . a remarkable feat for a detachment with only 35 people.



Each day almost 400 tons of cargo and an average of 1,500 passengers rolled over Quang Tri's runway. At its peak of operations 6,000 soldiers passed through the field in a single 24 hour period.

With large Air Force cargo planes landing every 7 minutes during heavy operations, and aircraft of every size and description using the field as a staging or stopover point, the refueling operation alone reached mind-boggling proportions. The POL section averaged dispensing over 60,000 gallons of fuel per day, and some days the quantity exceeded 80,000 gallons.

Up to 3,000 aerial rockets and several tons of other ammunitions were issued daily at the aviation rearmament section just to support the air effort.

With operations increasing daily in the Quang Tri sector, the 321st Aviation Detachment assumed more and more of the role of operating the giant air head. No air terminal operated at Quang Tri, but the 321st fulfilled the transportation needs of the gigantic temporary city. In addition to their normal duties controllers secured rides for thousands of people ranging from privates to generals. The aviation detachment also became an unofficial locator service for Quang Tri as the camp assumed a completely different appearance from its pre-Dewey Canyon days. Everything seemed to be misplaced from mess halls to airplanes, but the harried controllers appeared able to keep track of everything on this rapidly changing base . . . from where a colonel parked his aircraft to where a thirsty PFC might be able to find a cold soda.

It was only after Operation Lam Son 719 finally subsided and life began to return to normal at Quang Tri that the tower operators realized that they had never stopped talking during their 6 hours shifts, and the GCA radar operators started to notice that they missed many meals as they guided nearly 2,000 aircraft into safe landings. To hear them talk it was just a job. That may well be true, but they earned the admiration of thousands of men during Dewey Canyon II and Lam Son 719.

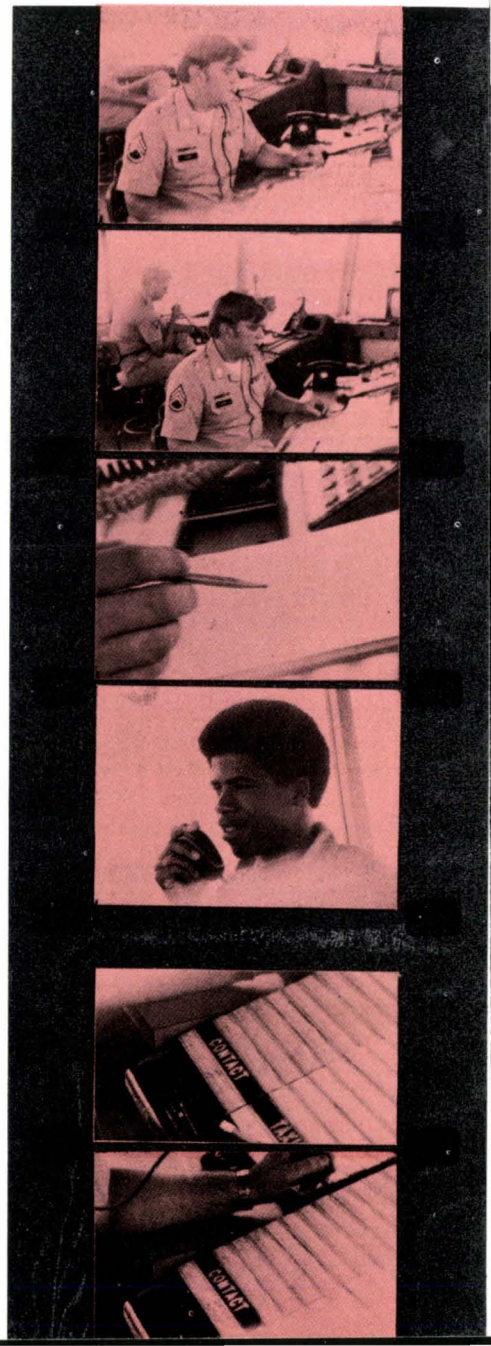
While the 321st was demonstrating the ability of a small detachment to grow with and handle a big job, another saga was unfolding in the Saigon area that would prove the ability of an air traffic control detachment to move anywhere to meet a challenge.

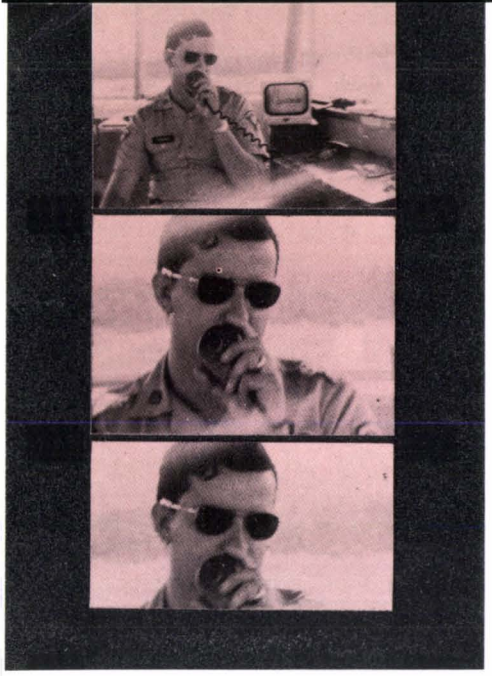
On 24 January 1971 the 347th Aviation Detachment was operating the airfield at Lai Khe, about 20 miles north of Saigon. Little did these controllers know that they were about to play a very crucial role in a major operation in the northern reaches of the Republic of Vietnam.

The Army's master plan for support of the Laotian campaign—Operation Lam Son 719—called for the reopening of the support base at Khe Sanh, which had been closed since the successful U. S. Marine stand there several years earlier. The 347th was tagged to operate this base during the forthcoming campaign.

Once the decision was made the 347th got its marching orders to prepare to move. In less than 36 hours the detachment ceased operations at Lai Khe, packed its equipment and moved to its initial staging area at Bien Hoa air base.

Since the Lai Khe operation involved only a control tower, additional equipment had to be secured for the unit so it could operate in its new role. A GCA radar section and a maintenance crew joined the unit and other equipment was requisitioned, processed and received. Like a finely tuned machine, the supply system located required





equipment throughout the theater and filtered it into the unit staging area.

Personnel had to be screened for the move and any man with less than 90 days remaining in the theater was transferred out and replaced.

All equipment was thoroughly and painstakingly subjected to extensive maintenance since it was known that the equipment would have to function under the strain of continual operation and onsite maintenance would be limited.

Only the detachment commander knew the ultimate destination for the unit.

Early on the morning of 1 February five Air Force C-130s taxied up and were loaded with the detachment's equipment and personnel. Hours later, these giant cargo planes delivered their contents to Quang Tri airfield. The men of the 347th realized that they were in the middle of something big when they saw all the activity at this normally quiet site. For 2 days the unit was the guest of the 321st, and then left as rapidly as it had arrived.

Equipment was slung beneath the bellies of Army CH-47 helicopters and flown westerly to Khe Sanh, the desolate outpost which was to be "home."

With precision and teamwork the equipment was rapidly put into operation, and thanks to the extensive maintenance at Bien Hoa neither the tower nor the beacon was destined to fail throughout the entire operation.

The 347th was in the vanguard of the assault on Khe Sanh. Three days later the 101st Aviation Group and most of the 347th's supporting units arrived at the camp. The men of the detachment had worked out the arrangements to secure fuel, water and rations and they were hard at work controlling the ever-increasing traffic load. Before the operation was over almost five complete aviation battalions were to operate out of Khe Sanh and all would be controlled by the 347th . . . not to mention numerous Air Force cargo planes.

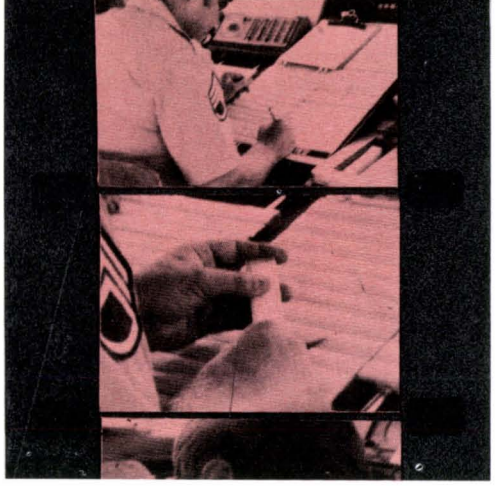
The GCA section was not needed as things worked out because the Air Force flew in one of its radar units which was larger and more versatile than the 347th's.

Everything at Khe Sanh had to be revetted in and soon the GCA controllers were busy with pick and shovel, sandbags in hand, ensuring that the vital equipment would be adequately protected. The camp at Khe Sanh soon resembled an ant colony with bunkers of various sizes connected by a labyrinth of tunnels and underground passageways.

The engineers installed a 3,200 foot assault strip which was to be used by the C-130 traffic until the larger 3,900 foot main runway could be repaired. Once the assault strip was completed the C-130s started the logistical buildup that was to sustain the South Vietnamese on Lam Son 719. C-130 sorties climbed and often surpassed 70 per day.

With Khe Sanh operating as a largescale wholesale supplier for the operation, the helicopter units began the retail delivery to the ultimate users: the South Vietnamese operating across the border in Laos. Helicopter sorties increased daily as the South Vietnamese drove deeper and deeper into the North Vietnamese stronghold. Soon helicopter sorties totaled more than 3,000 per day.

As additional helicopters daily joined in the giant aerial armada, traffic patterns were constantly being altered to accommodate them. Some pilots quipped that if you were dissatisfied with the approach



into Khe Sanh you needed only to wait a few minutes and it would be changed. They were partially right because the patterns were changed several times until a workable solution was finally found.

Change was the one thing that was constant at Khe Sanh. With rapidly changing traffic patterns, extensive engineer work and constantly relocating units, the air traffic controllers at this base were continually taxed to their limits. Yet not a single mishap at Khe Sanh over the entire course of the operation was attributed to faulty air traffic control.

The GCA operators were cross-trained on the site to assist the harried tower controllers and they were all talking themselves hoarse during each shift. After their stint in the tower they still had a large job to do in strengthening the base's defense works. Much sleep was lost at Khe Sanh, but operating efficiency reached a high point and was retained throughout the entire operation.

The initial movement into the area of Khe Sanh must have surprised the local Viet Cong forces because it was nearly a month before they were able to start harassing the base on anything but a small scale. Once they were able to get their second wind, though, the North Vietnamese and Viet Cong forces were able to make living rather difficult within the confines of Khe Sanh. During the last part of March there were constant rocket, mortar and artillery attacks on this forward outpost.

One rocket landed right at the base of the control tower and killed a passenger in the area who was waiting for a ride on a helicopter. Shrapnel rained over the control tower cab and three controllers on duty were slightly wounded. Operations merely shifted to the secondary control tower and other tower operators took over and continued to control traffic for the base's air strip.

Forty sappers penetrated the base's defense works one night and destroyed three helicopters directly in front of the control tower. Still, operation continued uninterrupted with controllers paying as much attention to the ground around them as they did to the airspace overhead.

One problem arose during the staging of units at Khe Sanh. It was discovered when a damaged helicopter had to utilize the air strip for an emergency landing. There was no maintenance detachment readily available with the capability of removing damaged helicopters from the air strip. Whenever a damaged helicopter blocked the strip it usually took from 45 minutes to 1½ hours to rig it and secure a CH-47 to remove it from the runway. During this time the strip was closed to C-130 operations.

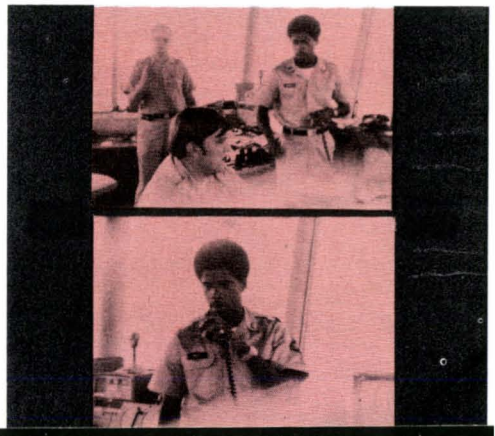
These extended delays were unacceptable in the eyes of the controllers, especially when they realized that those C-130s were the lifeline for thousands of South Vietnamese troops fighting across the border in Laos. One enterprising young soldier had a better idea and he proceeded to procure a set of ground handling wheels and then instructed the other controllers in their use. With a little practice, and there was plenty of that with the fierce air-ground battle taking place in Laos, the off-duty controllers became proficient in the runway clearing operation. The best time record for clearing the active runway was set at less than 10 minutes; no mean task for personnel used to talking to aircraft, not manhandling them.

With the South Vietnamese withdrawal from Laos imminent, it became increasingly evident that Khe Sanh would have to be closed once more before it became too vulnerable to a largescale attack. A decision was made to relocate the base to a more secure area.

On 25 March, scarcely 2 months after they were first notified to move out of Lai Khe, the 347th again began to move—this time out of Khe Sanh. For 6 days and nights the detachment worked at closing out the strip. The last vehicle airlifted out was a radio-laden jeep that was doubling as a control tower. The detachment commander, four tired controllers and a blurry-eyed radio repairman also loaded on the waiting C-130 at 1500 hours on 31 March and thus officially closed the strip some 56 days after they had opened it.

During those 56 days Khe Sanh may well have been the busiest airport in the world. Over 117,000 separate air traffic control movements were recorded at the tiny airfield during this brief time.

The stories of the 321st and the 347th are but two examples of the thousands of stories of outstanding effort and dogged determination that go by virtually unnoticed each year. Air traffic controllers of the 165th Combat Aviation Group have been contributing each day to increased air traffic safety throughout the war zone and certainly live up to their motto to "Guide, Follow and Safeguard."



Charlie and Danny's Write-In

Dear Danny: It seems that in OH-58 helicopter TM 55-1520-228-10, chapter 3, page 3-5, paragraph 3-20, item i, "Fuel Boost Switch— ON," leads to confusion. Why is it necessary to turn the fuel boost pump on when according to the old dash 10 the fuel boost pump remains on at all times?

LT K. J. T.

Danny's answer: You have cause to be confused. Several changes have been made in the fuel system operation and the fuel boost pump. There has been no change to the system on aircraft with serial numbers 68-16687 thru 70-15215. On aircraft with serial numbers 70-15216 thru 70-15649 a change has been made. The purge line to the fuel tank has been blocked. This blockage prevents unfiltered fuel from entering the engine in case of fuel boost pump failure. The fuel boost pump is turned on at all times. The only restrictions in case of fuel boost pump failure are that the engine will not operate efficiently above 10,000 feet MSL.

Aircraft with serial number 71-20340 and subsequent have the purge line removed which will not allow unfiltered fuel to enter the engine when the fuel boost pump is not operating. These aircraft have a fuel boost pump switch installed in the lower right corner of the instrument panel. The switch was added to provide for increased safety in the event of a crash landing. This is realized if the aircraft is flown with the fuel boost pump switch in the OFF position. Added safety is realized by the fact that the fuel system becomes a vacuum system versus a pressurized system. The switch should not be in the ON position for engine starting since a relay automatically operates the fuel pump whenever the starter trigger is engaged. Whenever electrical power is supplied to the fuel pump, whether by switch activation or starter trigger engagement, power is supplied to the boost pump caution light. The light is illuminated if the low fuel pressure switch is activated. To check the fuel boost pump caution light with the engine running, move the fuel boost pump switch to ON position, move the fuel boost pump

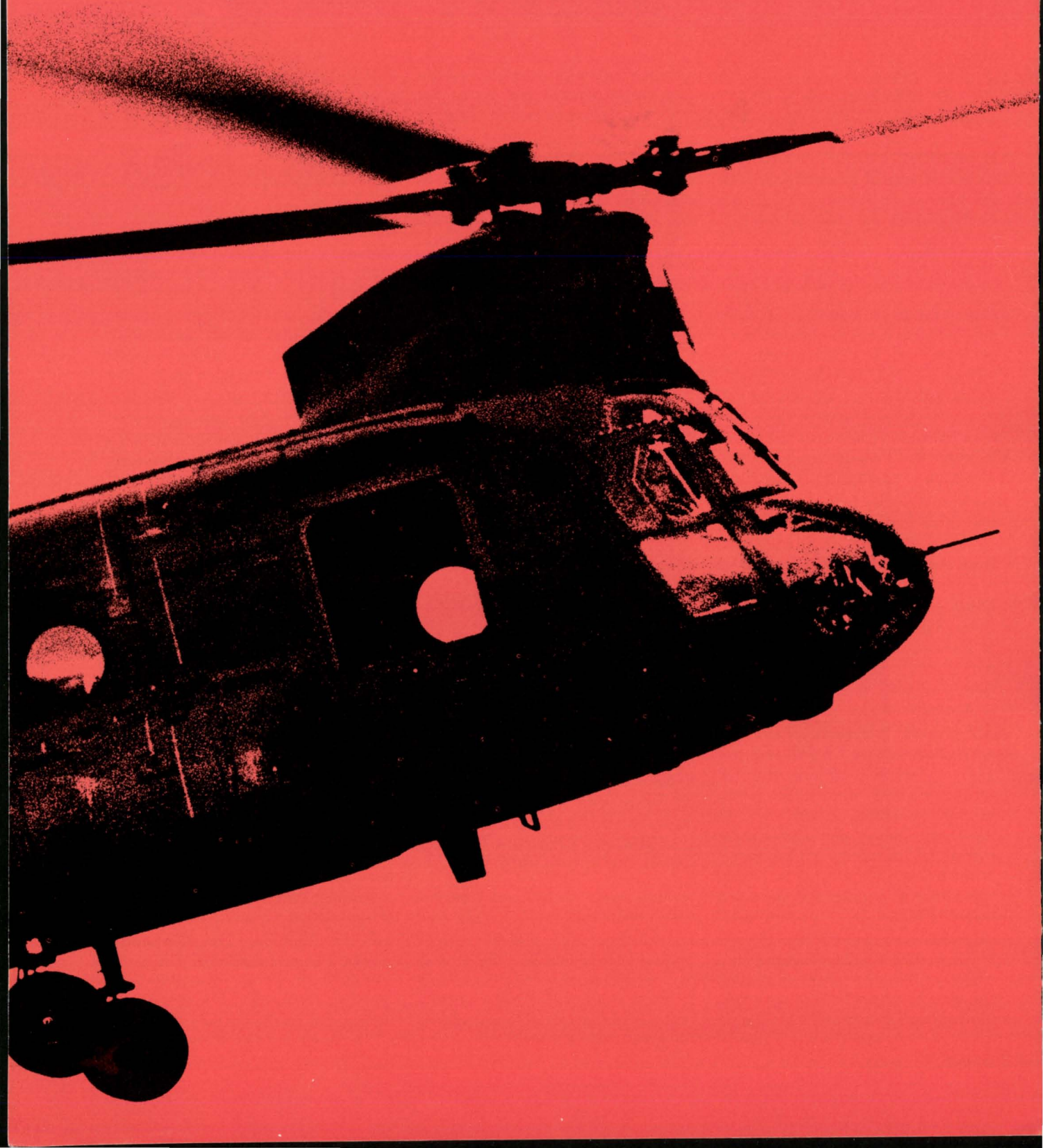
circuit breaker to OFF position; the fuel boost pump caution light should be illuminated. The fuel boost pump must be OFF for takeoff below 10,000 feet MSL. This information will be included in the next printing of the dash 10 which will be out late in 1972.

Dear Danny: It has been rumored that a new automatic relight system for the T-63A-700 gas turbine engine in the OH-58A helicopter is to be installed in the near future. If this is true please give a description of the automatic relight system and give some indication when it is expected to arrive in the field.

CPT G. H. H.

Danny's answer: The rumor you have heard is a fact. MWO 55-1520-228-30/11 directs that all OH-58A helicopters will have the automatic relight system installed. Generally the installations will be made in areas where cold weather and snow persists, then to the fleet in the remainder of the world. The system consists of an automatic relight control assembly, engine relight relay, engine automatic reignition switch, automatic reignition indicator light and the interconnecting wiring and connectors. The system energizes the ignitors automatically to provide relight when a flameout condition is sensed by the automatic relight control assembly. The engine relight switch and engine relight indicator light are located in the lower center of the instrument panel. The switch must be in engine relight position for automatic relight to function. The system is deenergized when the switch is in the OFF-RESET position. The OFF-RESET position also resets the relight relay to provide proper circuiting to reactivate ENGINE RELIGHT indicator light to indicate a subsequent relight. The ENGINE RELIGHT indicator light will illuminate when the automatic relight system is operating, and on engine shutdown if the switch is in ENGINE RELIGHT position. The automatic relight system receives power from the 28 volt D. C. essential bus. This information is included in change 10 to the OH-58 dash 10.

The concept of Army aviation in support of the ground forces has been proven in Vietnam. A large share of credit goes to the battle-proven, combat-tested CH-47 Chinook and the men who flew her



The Chinook Story

Leo Burnett
Group Engineer
The Boeing Company

IN 1956 THE U. S. Army announced plans to replace its piston-powered, transport helicopters with turbine-powered equipment and to develop a new multiturbined, medium transport helicopter. In September 1958 a joint U. S. Army-Air Force selection board recommended to the Army that the Vertol Division of The Boeing Company be selected to produce a new medium transport helicopter.

In less than 4 years after the go-ahead the first production Chinook helicopter was delivered to the Army. In keeping with the policy of naming Army aircraft after North American Indian tribes, the name "Chinook" was chosen for the CH-47.

Beginning in 1961 the Chinook successfully completed a series of tests which included extreme temperature evaluation, desert testing, high altitude, arctic and operational evaluations. Through extensive, successful usage in Vietnam, the Chinook has been performance and combat tested.

Since 1961 over 600 Chinook helicopters including "A," "B" and "C" models have been delivered to the Army. The Chinook's ability to transport troops, equipment and supplies has resulted in a major advancement in the mobility of the Army.

Mobility has long been a major factor in the determination of success on the battlefield. Hannibal had his elephants, Genghis Khan his mounted Cossacks and Stonewall Jackson his lightning-fast infantry. For centuries no major advancement in the means of mobility was developed. Field commanders achieved their victories by unique application of the means available —foot soldiers, cavalry and chariots.

During the American Civil War the infant railroad was used to great advantage by both sides for the strategic movement of large bodies of troops. The first major breakthrough in tactical mobility came about during World War I with the advent of the truck, the tank and the air vehicles—airplanes and balloons. It was during World War II that the means of mobility made rapid advances and we first began to see the marriage of ground combat units with an air vehicle and we could visualize the advantages of airborne operations.

The Army Tactical Mobility Requirements Board (Howze Board) in the early 1960s developed today's airmobility systems. In a series of tests resulting from the Howze Board's studies, the 11th Air Assault Division (T) proved that the CH-47 could successfully be used as a "flying truck," moving men, equipment and supplies in Vietnam.

As the U. S. ground forces had by now become heavily involved in the Southeast Asian conflict, this was the final test prior to deployment of the 1st Cavalry Division (Airmobile) to the battle arena—the last chance to answer the "unknowns" that would determine the success or failure of the airmobile concept of operations. Could the highly sophisticated Chinooks rise to the challenge of operating in a primitive environment while logistically supporting front line troops with ammunition, fuel, food through a whole spectrum of combat situations, defense troop movements and artillery insertions, and do so with any degree of reliability? Army personnel participating in Air Assault II indicated the CH-47 Chinook fulfilled its missions effectively and efficiently throughout the exercise.

The operation clearly showed that an air line of communications

Some of the 228th ASHB CH-47s at Mayport, FL, (August 1965) awaiting loading onto the *USS Boxer*—destination Vietnam

(ALOC) using a mixture of fixed wing Caribou aircraft and CH-47A Chinook helicopters as primary carriers could maintain and sustain supply of an air assault division completely by air up to a distance of 150 to 200 miles.

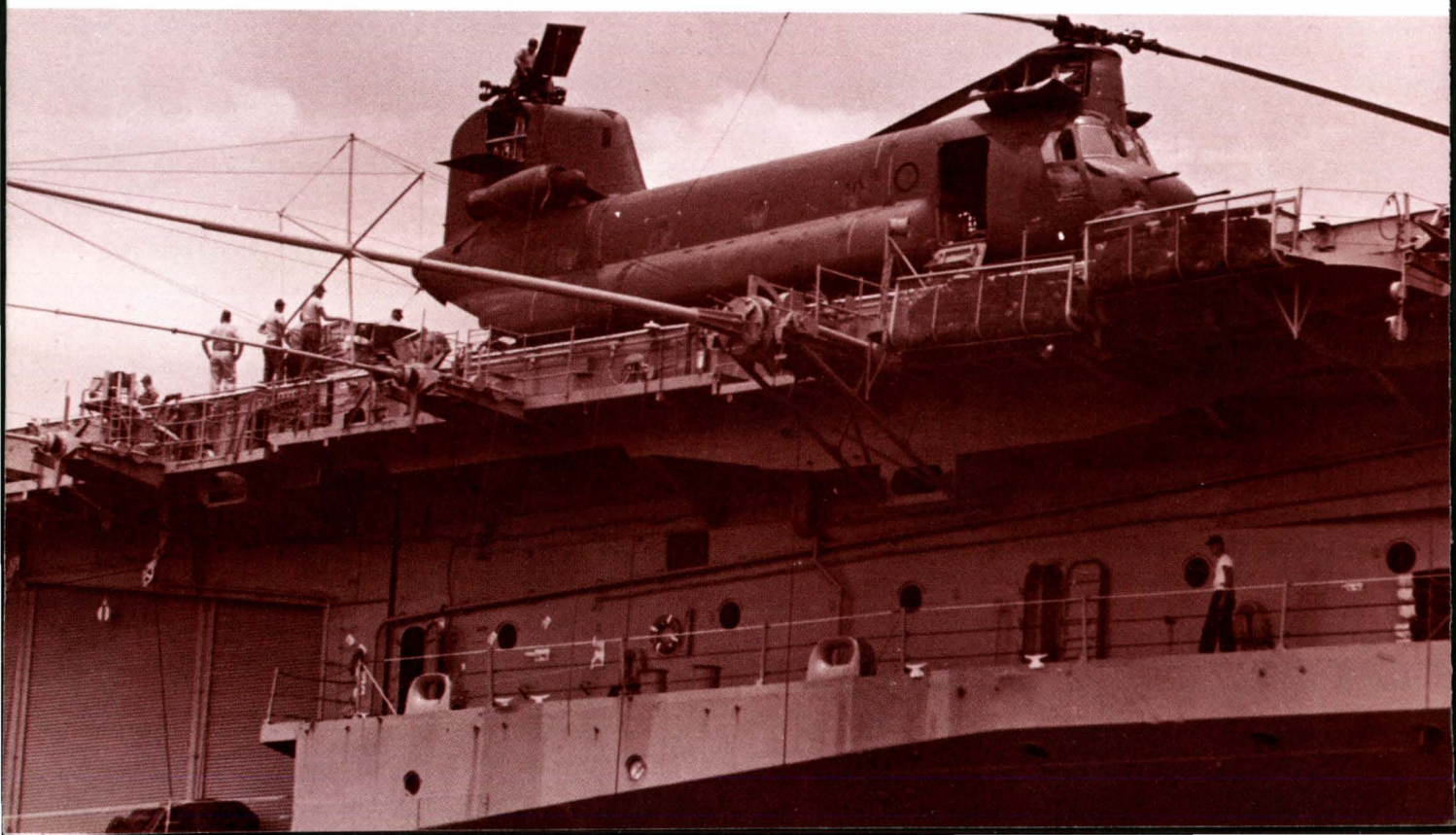
It was also established that the speed with which an airmobile division can accomplish its mission indicates that it will consume 50 percent fewer supplies than an infantry division on a like mission by doing the job in substantially less time.

Another unknown, the ability to maintain large numbers of complex aircraft under field conditions, was answered with results that exceeded expectations. The Chinooks were exposed to field conditions for the first time on a large scale and were available 59 percent of the time, which exceeded the Department of the Army standard of 50 percent availability established for the CH-47A at that time.

During the operation 59 Chinooks flew a total of 5,195 hours.

The initial deployment of the Chinook to Vietnam began in July 1965 when all the aircraft of the 228th Assault Support Helicopter Battalion (ASHB), 1st Cavalry Division (Airmobile), including 57 CH-47A helicopters left Ft. Benning, GA, for Mayport, FL, where they were preserved, bagged (covered with special waterproof covers) and loaded aboard the carrier *USS Boxer*. At the end of the 25-day trip from Florida to Vietnam the aircraft were checked, blades reinstalled and the Chinooks were flown from the deck of the carrier (anchored off Qui Nhon) transporting their equipment with them to An Khe to support the division's operations. One company of CH-47As flew 445 hours during the period 11 through 30 September 1965 transporting 4,826 passengers and 362

Maintenance crews prepare one of the Chinooks aboard the *USS Boxer* in the South China Sea for flight to Vietnam



tons of cargo in the divisional move to An Khe.

Through the period of the most intense 1st Cav operations in the Central Highlands, the 228th ASHB in 4,905 flight hours flew 10,972 sorties, transported 43,609 passengers and lifted 12,365 tons of cargo. Those quantities of cargo and personnel that were lifted in support of operations in the theater are additional testimony not only to the value of the Chinook but equally to the airmobile concept.

The Chinook was being employed in Vietnam according to the same doctrines developed during Air Assault II; i.e., support of infantry, rapid movement of artillery and logistical resupply. However, the severe operating environment and the requirement to carry a nonproductive payload of survival and combat equipment and armor protection (approximately 1 ton) for crew and vital aircraft components lowered the capability of the CH-47A. The requirement for a military payload capability of 5 to 6 tons appeared to be necessary under these adverse environmental conditions.

The CH-47 product improvement program was initiated in mid-1966 based on a requirement from the U. S. Army in Vietnam for a helicopter with capabilities exceeding those of the CH-47A because of degradation of payload and speed capability due to altitude and typical ambient conditions existing in Southeast Asia.

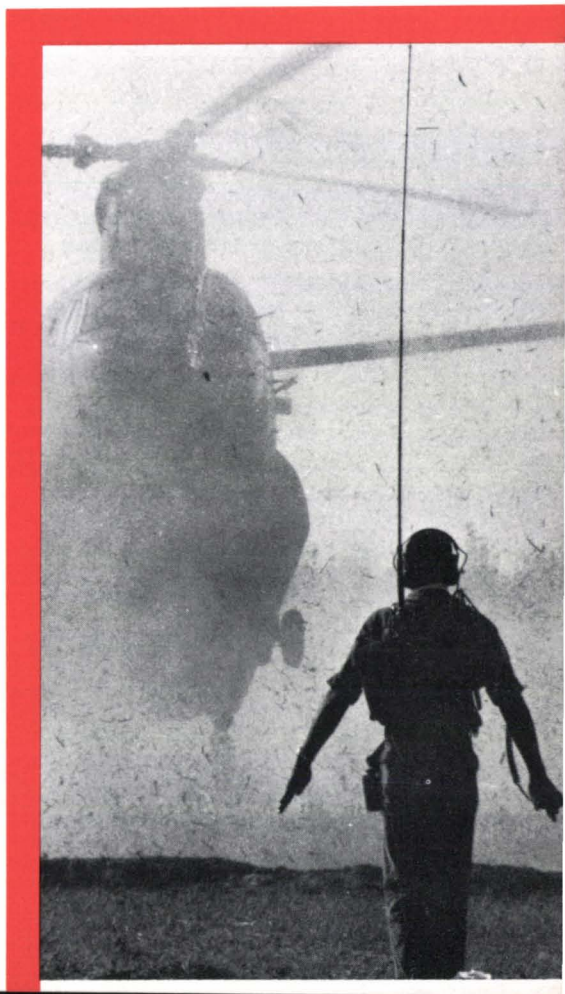
The Army Materiel Command (AMC), in response to this urgent requirement, formulated and launched a two-step airframe improvement program plus supporting engine and ancillary programs to provide substantial improvements in payload, speed and endurance of the Chinook. In addition to the performance improvements, modifications were incorporated to improve flying qualities, to allow full utilization of the expanded flight/performance envelope, to improve reliability, reduce maintenance and to increase aircraft availability.

The CH-47B was the first new version of the combat-tested Chinook. Except for slightly larger rotor blades it was identical in size and similar in appearance to the CH-47A. The flight performance of the CH-47B, however, was appreciably superior. This was achieved primarily through the use of more powerful twin Lycoming gas turbine engines (T55-L7C) and new rotor blades of advanced design which provided significant increases in both speed and payload. Other improvements included better stability and flying qualities through the use of a blunt tail and fuselage strakes plus provisions for additional fuel capacity. The first CH-47B was delivered in May 1967 at which point it became the production model Chinook.

Of course, the ultimate Chinook to evolve from the product improvement program was the CH-47C which provided the capability, under all deployment conditions, for airmobility to achieve its full effectiveness. While being identical in size to both the A and B models and similar in appearance, the CH-47C is powered by new Lycoming T55-L11 twin gas turbines with a drive system currently qualified for 6050 shaft horsepower at 245 rotor rpm. The fuel capacity has been increased to 1,129 U. S. gallons for the extended range/endurance required by some tactical missions.

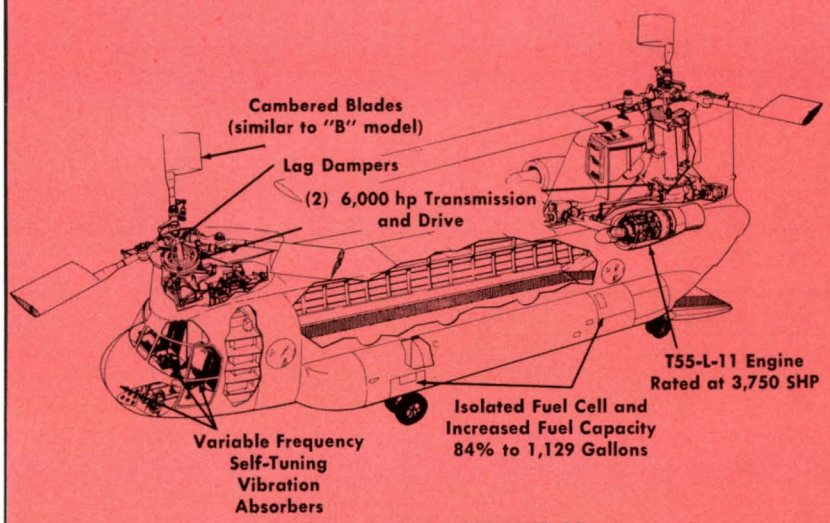
A review of availability statistics since deployment of the Chinook in 1965 shows a marked improvement with the introduction of the B and C model aircraft. During the period September 1965 through September 1970 availability of the CH-47A model fleet progressed from 53.7 to 77.9 percent with a cumulative availability of 66.8 percent. By comparison, the CH-47B introduced into the theater in February 1968 has demonstrated a cumulative availability of 72.8 percent. Finally, the CH-47C deployed in October 1968 has a cumulative availability of 75.5 percent. Average utilization during this same timeframe has been 59.9 flight hours/aircraft-month for the CH-47A; 60.7 for the CH-47B; and 62.4 for the CH-47C.

From its initial introduction into the Southeast Asian conflict the Chinook has continued to exceed the U. S. Army's standard for availability. On the basis of this ability of the CH-47 to maintain a high rate of availability, the Army has continued to adjust its readi-



This pathfinder stands ramrod straight, relentlessly against the scattering debris and wind as he directs the giant Chinook helicopter in for landing during participation in the Lam Son operation, Vietnam

CH-47C Chinook Improvements



ENGINE CHARACTERISTICS

	CH-47A T55-L-7B	CH-47B T55-L-7C	CH-47C T55-L-11
Maximum rating (shaft horsepower)	—	2,850	3,750
Military rating (shaft horsepower)	2,650	2,650	3,400
Normal rating (shaft horsepower)	2,200	2,400	3,000

WEIGHTS AND PERFORMANCE

WEIGHTS:		CH-47A	CH-47B	CH-47C
Design gross weight	(pounds)	28,550	33,000	33,000
	(kilograms)	12,950	14,969	14,969
Alternate gross weight	(pounds)	33,000	40,000	46,000
(1)	(kilograms)	14,969	18,144	20,865
Empty weight	(pounds)	17,932	19,375	20,378
	(kilograms)	8,134	8,790	9,243
Payload capability	(alternate gross weight)			
• 10 nautical miles	(pounds)	13,800	19,300	24,100
18.5 kilometers	(kilograms)	6,250	8,754	10,931
• 100 nautical miles	(pounds)	10,300	—	19,800
185 kilometers	(kilograms)	4,760	—	8,981
• Full fuel	(pounds/nautical miles)	10,313/115	15,900/95	17,300/149
	(kilograms/kilometers)	4,678/213	7,200/176	7,847/276
PERFORMANCE (33,000 pounds gross weight, standard atmosphere):				
Hover ceiling—out-of-	(feet)	7,300	10,500	14,700
ground effect	(meters)	2,220	3,200	4,481
Maximum power				
Forward rate of climb	(feet/minutes)	1,590	2,010	2,880
(Sea level/normal				
rated power)	(meters/seconds)	8.1	10.2	14.63
Service ceiling—two				(2)
engines	(feet)	9,200	14,000	15,000
(Normal rated power)	(meters)	2,802	4,267	4,572
Speed capability	(knots)	110	155	165
(Sea level/normal				
rated power)	(kilometers/hours)	204	287	306

(1) Excludes troop seats, supports and engine inlet screens
(2) Envelope established by current flight test program

ness standard upward from 50 percent to the present high of 65 percent.

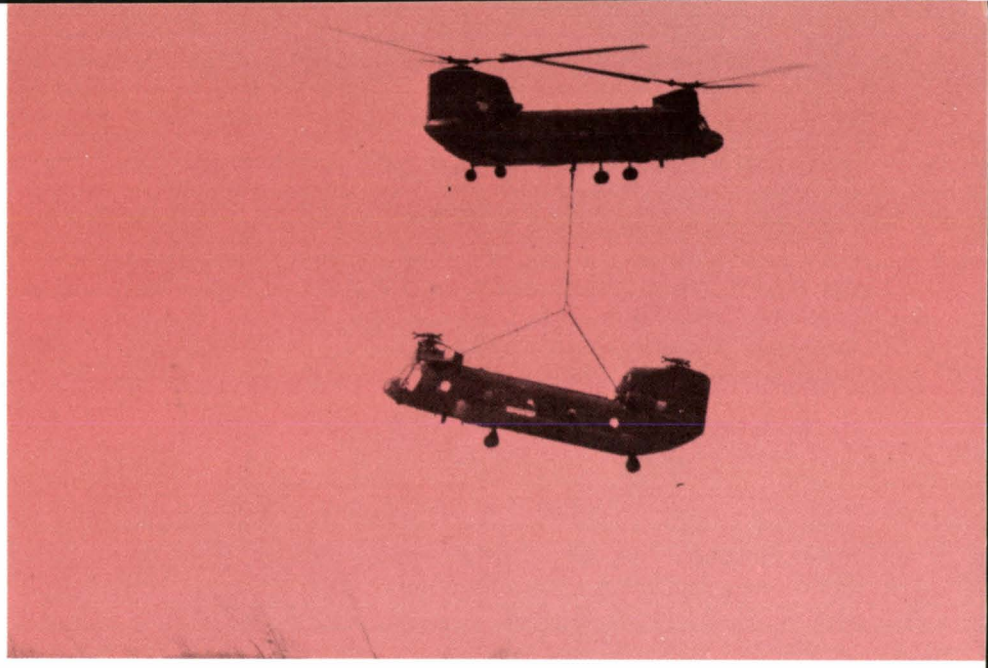
The Chinook fleet has recovered the remarkable total of over 10,000 aircraft in Vietnam that have a replacement value of 2.7 billion dollars. One assault support helicopter company equipped with "B" model Chinooks established a record by recovering 73 aircraft in 1 month. The increased payload of the CH-47C broadens the scope of recovery operations by minimizing preparation time at the recovery site. A recovery of a Chinook by a CH-47C (April 1970) illustrates the point. The downed aircraft was extracted intact with only the blades removed. The estimated weight of the recovered aircraft was 18,000 pounds.

The Chinook has aptly demonstrated the capability of performing an extremely wide range of missions while operating in Vietnam. As was stated by one officer, "The only limitations on the missions a CH-47 can perform in support of a combat operation are strictly dependent upon one's imagination."

In 1966 a new innovation was introduced to Army aviation, namely a CH-47A armed Chinook or as it was fondly called "Guns A-Go-Go." Four CH-47As were modified to flying gunships by the addition to armor and heavy ordnance; i.e., a flexible grenade launcher under the nose, two 20 mm cannon firing forward, five pintle-mounted machine guns (two on each side of the aircraft and one mounted aft) and two rocket pods also firing forward. The great advantage the armed Chinook had was the multiplicity and flexibility of the weapons system and approximately 2½ tons mixed ordnance to ensure maximum loiter time in target area.

This formal test and evaluation, the first actually conducted of an

A Chinook damaged in Vietnam engagement is recovered by another CH-47 and carried 40 miles to a maintenance depot



Army aircraft during combat operations, was controlled by the Army Concept Team in Vietnam (ACTIV). The missions were usually flown by two armed Chinooks for mutual support and included armed suppression, counterambush, close-in fire support against point targets, roadblock destruction, aerial coverage and others. During the 223 missions flown by the "Go-Go's" in 402 flight hours an availability of 61 percent was maintained.

The tests were very successful. However, due to entrance of the AH-1G HueyCobra in the theater, follow-up production of the armed Chinook was not initiated.

Combat support missions are by far the most important and indeed the most hazardous missions the Army aviator must perform in Vietnam.

One Chinook from the 228th Assault Support Helicopter Battalion forced by weather to fly through an artillery fire area was actually hit by a 105 mm howitzer round which went completely through the fuselage without detonating or striking the crew or vital aircraft structure.

In spite of operating continually in combat conditions, the Chinooks have maintained an availability of 69.1 percent over a 5 year period. One aviator made the comment, "I never knew there were so many areas in the Chinook that could be hit without seriously damaging the

Center right: A Chinook brings in sling-load of artillery shells during Operation "Bolling" in Phu Yen area September 1967. Right: This Chinook performed pinnacle hover in Vietnam with room for only aft wheels... note offloading during hover

aircraft or some vital spot within the aircraft."

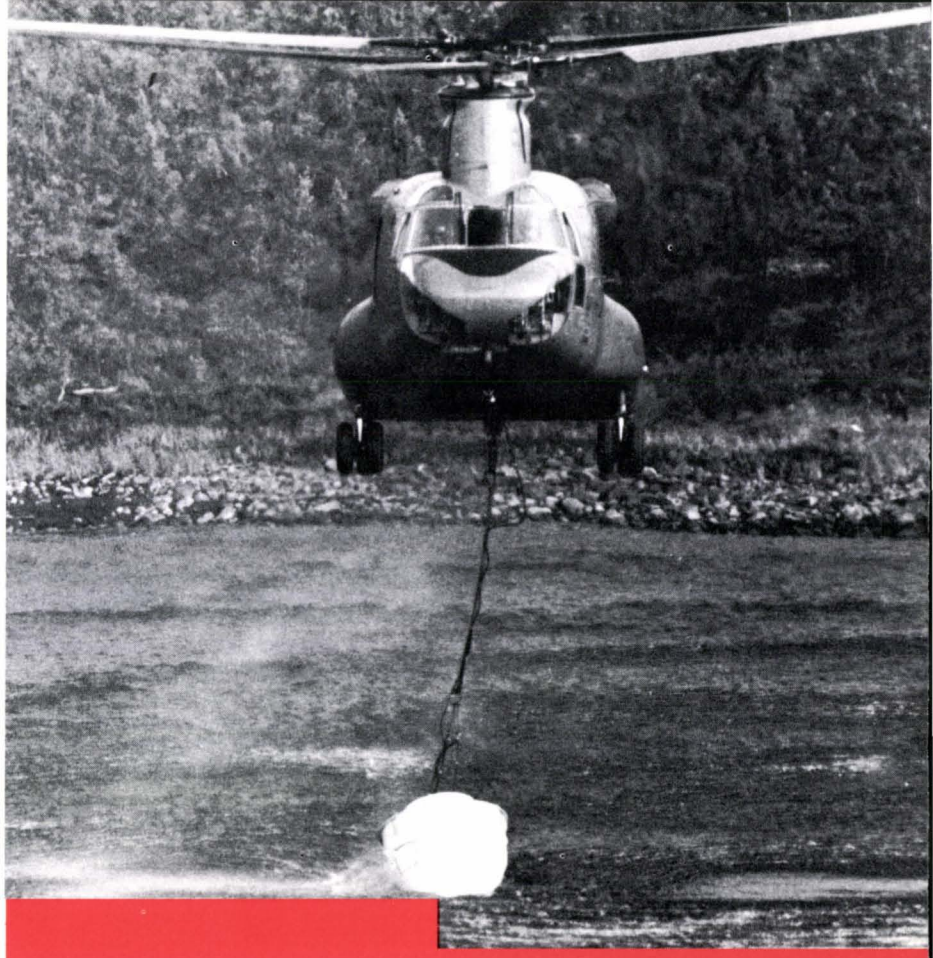
The Chinook has consistently been maintained at the operating unit level in the primitive areas of Southeast Asia with the Army mechanic's standard tool kit and a basic minimum of special tools. The integral auxiliary power unit furnishes the power for systems check out and engine starting: sight gauges have replaced dip sticks; permanent or oil-lube bearings have eliminated the daily grease gun routine; and integral flush steps and work platforms provide all necessary component access. The built-in provisions for a light air transportable crane have permitted major component changes in remote combat areas, putting the Chinook back in service in minimum time.

This inherent maintainability, so vital in Southeast Asia, indicates that the Chinook can successfully perform routine service anywhere in the world.

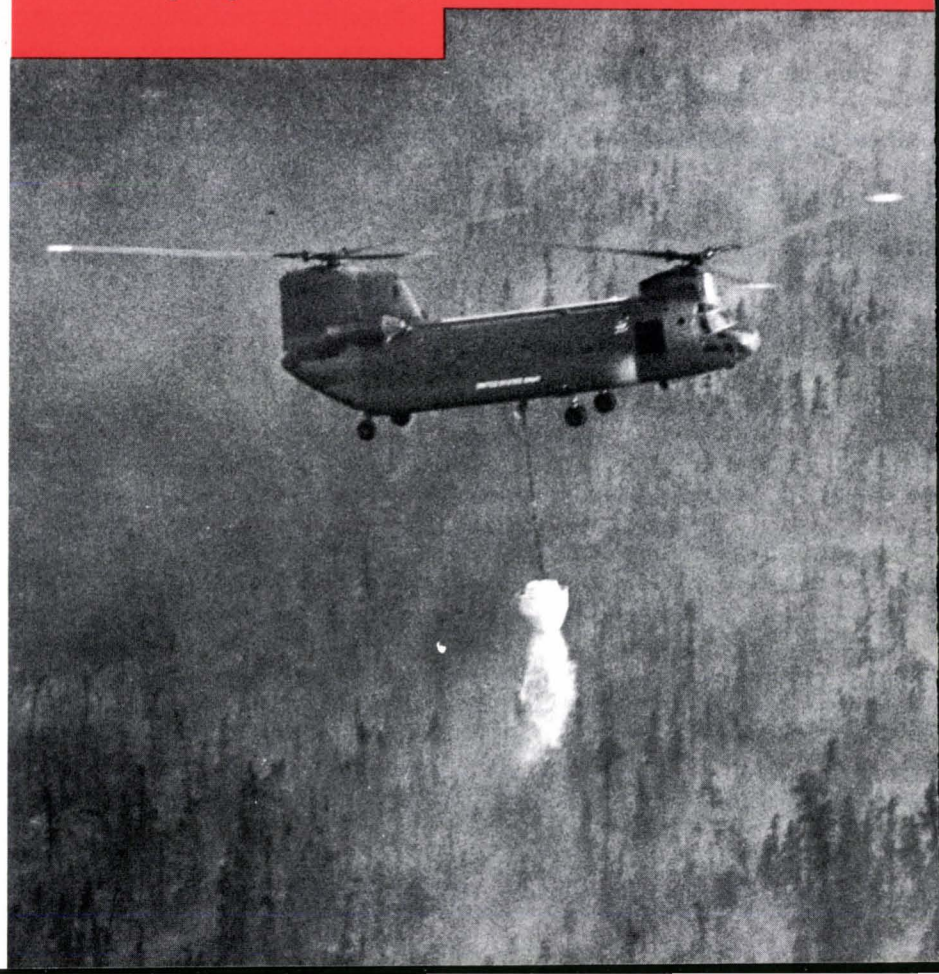
Today's military commander has at his disposal the most advanced means of mobility ever enjoyed in any battlefield in the history of warfare.

As a result of its spectacular record in Vietnam, the Chinook is winning favor in many other areas of the world. Although primarily designed and intended for tactical uses, it will continue to be utilized in other roles which are humanitarian in nature and value. Already the familiar beat of its rotors are being heard in South Korea, Alaska, Thailand and Europe. Soon the Chinook will be a commonplace sight to many of the inhabitants of remote areas of Italy, Iran and Australia as it flies its peaceful missions of disaster relief and assistance.

In 1971 the CH-47 A, B and C have exceeded 1,000,000 flight hours, most of the time accomplished in the skies of the Republic of Vietnam.



The CH-47 in one of its peacetime roles — fills water tank (above) for forest firefighting mission (below)



OHR

Ever Written An Operational Hazard Report?

CW2 Peter J. Smith

THE OPERATIONAL hazard report (OHR) is the single most effective way of eliminating hazards to flight.

We all know this—or at least we should—but still many have never filled one out. I cannot help but believe that every one of us has seen (or at least heard of) a hazard that should have been written up and never was.

Have you ever received confusing directions from a tower operator, or noticed someone hovering a helicopter along at 40 or 50 feet for no apparent reason? How about a bad crack in a runway or taxiway? Or, do you recall a POL area that didn't have fire extinguishers or grounding leads? The problem arises when a person doesn't do something about them when he sees them. If he doesn't submit an OHR he is continuing a vicious circle which includes others like him who are leaving it to someone else.

The OHR may be typed, handwritten or filled out with anything you happen to have handy . . . even a crayon. Nobody is going to bounce it back because of misspellings, or because it has a splotch of grease on it, or because it's a little wrinkled. You can drop it off at any operations office and you don't even have to sign it. (However, if you would like to know the end result you must put your name and address on it.)

Once you start an OHR along its way, it must be indorsed by every subordinate commander it goes through on the way to higher headquarters, and then on the way back down to the unit responsible for the condition or act that caused you to write up the OHR. Then the commander of that unit must take suitable corrective action to immediately clear up the hazard, take corrective action against any personnel concerned, or come up with some real good reasons why it can't be done. He must fill out the appropriate section of the OHR, sign it and forward it back up the chain of command to the higher headquarters where it is reviewed to see if the corrective action is satisfactory. If it is acceptable the OHR is sent down through channels to you.

Processing an OHR does not usually take as long as one might think since there are suspense dates imposed up and down the line. When it is returned you will be able to see what has been done about the reported hazard. It's a satisfying feeling to know that you personally have been responsible for correcting a flight hazard which might prevent an accident, injury or even death.

Where do you find OHRs? They are listed as DA Form 2696 and may be obtained through normal administrative channels. You should also be able to get one in any operations office. The format might be a little different depending on the branch of service you are dealing with, or for that matter a civilian office since the Federal Aviation Administration (FAA) also has them.

But herein lies another problem. Many operations offices do not have these forms readily available. And, even if they did it would not (in my opinion) be enough. There should be several of these blank forms in *each* aircraft ready for immediate use. All too often a pilot will see a hazard while he is flying and then forget or not bother to write it up when he gets back.

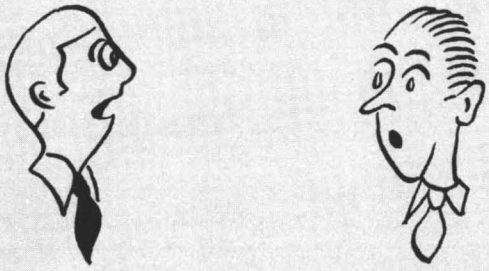
Ask your operations officer or safety officer to make these DA Form 2696s readily available in the operations office, aircraft log books and other key areas where they might be seen and used.

How about *you* writing an OHR the next time you see a flight safety hazard? Remember, safety *is* everyone's business!

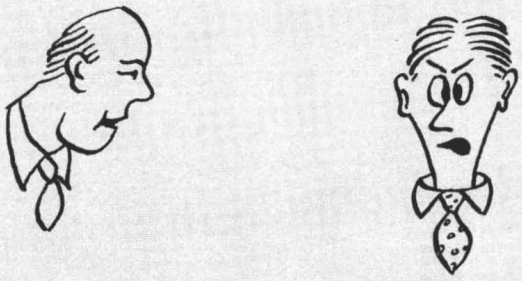
I Have Several Questions

Hubert Pate

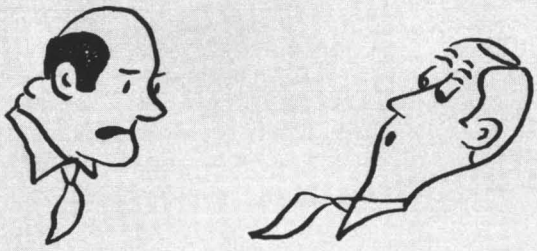
A recent survey indicated that many U. S. ARMY AVIATION DIGEST readers want an occasional expanded "Instrument Corner." This is the first; others will follow. The author is an academic instructor, Advanced Subjects Branch, Flight Subjects Division, Department of General Subjects, Ft. Rucker, AL



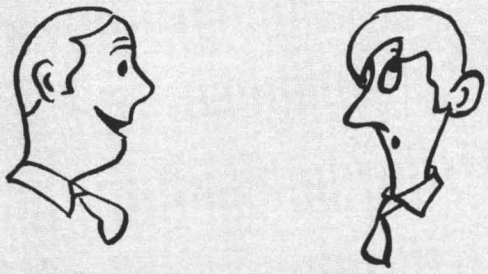
What is a direct route of flight?



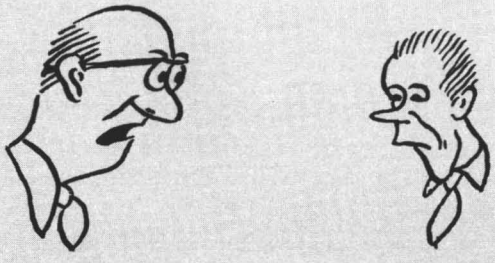
What is the approach gate?



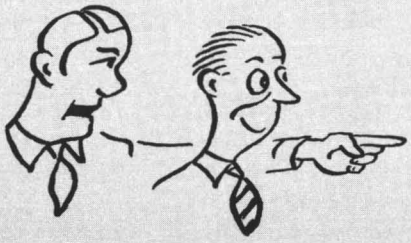
What are the dimensions of a direct route?



What is prevailing visibility?



What is the touchdown zone?



And here are the answers to these and other questions

PRIOR TO 1926 flying was like a game of dodgeball played at altitude. Every pilot was on his own with no governmental regulation. Before this time there were very few flying machines and little need for flight regulations or air traffic control. The government took over regulation of aviation with the passage of the Air Commerce Act of 1926. Since this time rules and regulations have been written in the interest of the safe, expeditious flow of air traffic. In recent years there has been a vast increase in the amount of air traffic and rapid technological advances which have increased the performance characteristics of aircraft. To meet the needs of aviation, new rules and regulations are being written daily and old rules and regulations are being changed. The age of simplicity has ended and the age of professionalism has begun.

Forty questions frequently asked in the last 3 years by students in the Instrument Flight Examiners Course about IFR rules and regulations and their application have been selected for this article. It is hoped that they will clear up some of the misunderstanding and confusion which exists.

1. What is a direct route of flight?

Answer: All or any portions of the route which will not be flown on the radials/courses of established airways or routes. (Reference: AIM Part 1)

2. What are the dimensions of a direct route?

Answer: Five statute miles on either side of the course. A direct route must be not below 1,000 feet above obstacles in nonmountainous area and not below 2,000 feet above obstacles in designated mountainous area. (The DOD FLIP 22 NM entry does not apply to Army.) (Reference: FAR 91.119, FLIP Section II)

3. What are the responsibilities of the pilot when filing by direct routes?

Answer: The pilot must plan his route, select an altitude to meet obstacle clearance requirements and plan the legs of the flight to remain within the selected route. (Note: A leg may be flown using time and distance. It is the pilot's responsibility to ensure the aircraft remains within the dimensions of the planned route.) (Reference: AIM Part 1)

4. When are position reports required on direct flights?

Answer: Overall points named in the flight plan to define the route of flight. (Reference: AIM Part 1, FLIP Section II)

5. What is the significance of a "cruise" altitude assignment in an ATC clearance?

Answer: Cruise—a word used instead of "maintain" in a clearance to indicate to the pilot that climb to and descent from the assigned altitude may be made at his discretion and is authorization for the pilot to proceed to and make an approach to the destination airport. (Reference: AIM Part 1)

6. What is the approach gate?

Answer: That point on the final approach course which is 1 mile from the approach fix on the side away from the airport or 5 miles from the landing threshold, whichever is further from the landing threshold. (Reference: AIM Part 1 and TM 11-2557-29)

7. When being handed off to another controller after radar contact has been established, how is the pilot made aware of whether or not he still has radar contact?

Answer: Subsequent to being advised that the controller has established radar contact, this fact will not be repeated to the pilot when he is handed off to another controller. Radar contact is assured until the pilot is informed, "radar contact lost" or "radar service terminated." (Reference: FLIP IFR Supplement)

8. When may a pilot make a straight-in approach?

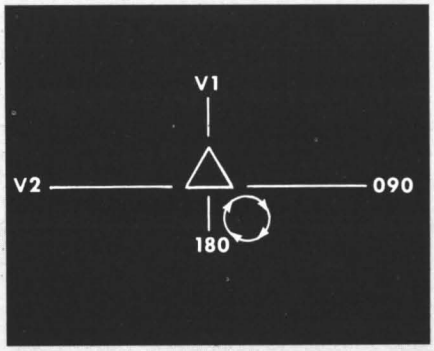
Answer: When issued a clearance for a straight-in approach or when conducting a timed approach from a holding fix or when the initial approach published on the instrument approach procedure is designated NoPT or when ATC radar vectors to a final approach position are provided. (Reference: AIM Part 1)

9. How should a pilot inform an FSS that a reply on the VOR frequency is desired?

Answer: To avoid confusion pilots are urged to use the name of the VOR to which they are listening when a reply on the VOR voice channel is desired. For example, call "Riverhead radio"; the call will be answered by New York FSS, "This is Riverhead radio." (Reference: AIM Part 1)

10. What are the dimensions of an airport traffic area?

Answer: Five statute miles from the geographical center



of the airport, from the surface up to but not including 3,000 feet above the elevation of the airport. (Reference: AIM Part 1)

11. A pilot is eastbound on V2 with DOG as his clearance limit. What action should he take if he arrives at DOG with radio communications but without further clearance? (See figure on page 17)

Answer: Hold in the charted pattern. (Reference: AIM Part 1, FLIP Section II)

12. When may an aviator descend below the procedure turn altitude during an instrument approach?

Answer: The procedure turn altitude is the minimum altitude until the aircraft is established on the inbound course. (Reference: FAA AC No. 90-1A)

13. Where does an instrument approach commence?

Answer: The instrument approach commences at the initial approach fix. When the intermediate fix is part of the en-route structure it may not be necessary to designate an initial approach segment. In this case the approach commences at the intermediate fix. (Reference: TM 11-2557-26)

14. Where is the published airport elevation taken?

Answer: Airport elevation is the highest point on the landing surface. (Reference: FLIP IFR Supplement)

15. What obstacle clearance is provided by the minimum sector altitude published on an instrument approach chart?

Answer: One thousand feet within a 25 nautical mile radius of the navigation facility or fix within the designated sector. (When an area is not divided into sectors the same obstruction criteria is applied throughout. This entire circular area will have a common minimum safe altitude and be noted on approach charts in the lower right-hand corner.) (Reference: TM 11-2557-26)

16. When may a pilot descend below the MDA for a circling approach?

Answer: Descent below the MDA is not authorized until the pilot is in a position to make a normal visual approach to the designated runway. (Reference: AR 95-2)

17. What constitutes the runway environment?

Answer: The visual approach aids, runway threshold or runway markings associated with that runway. (Reference: AR 95-2)

18. What action should the pilot take if weather goes below minimums after an instrument approach has been commenced (straight-in or circling)?

Answer: Continue the approach. However, descent below the appropriate MDA or DH is not authorized until the pilot establishes visual contact with the runway environment and can reasonably expect to maintain visual contact throughout the landing. (Reference: AR 95-2)

19. When is an instrument rated copilot required for flights in Army aircraft?

Answer: An instrument rated copilot qualified in the aircraft being flown is required for all fixed and rotary wing flights into known or forecast instrument conditions (except for the OV-1 Mohawk). (Reference: AR 95-2)

20. Is an aviator who is instrument qualified in both helicopters and airplanes required to maintain both instrument ratings?

Answer: Aviators who are instrument qualified in both helicopters and airplanes are required to maintain instrument qualification only in the category which is most appropriate to their TOE or TDA position. (Reference: AR 95-63)

21. For what period of time is an instrument rating valid?

Answer: The date of expiration of any instrument rating will be the aviator's birthday nearest the date of qualification plus 1 year. (Reference: AR 95-63)

22. After returning from an assignment in Vietnam where instrument qualification was waived, how long does the aviator have to regain instrument qualification?

Answer: Six months. During this period the aviator may regain instrument qualification by meeting only reissued requirements. (Reference: DA TWX 765017, dated 31 May 1966)

23. When may an aviator take a flight examination to renew his instrument rating?

Answer: Normally, a holder of a current instrument rating will take the instrument flight examination during the 90 day period preceding his birthday. An applicant departing for an assignment where maintenance of instrument qualification will be difficult may take the examination within the 180 day period preceding his birthday. (Reference: AR 95-63)

24. What are the ground components of an ILS?

Answer: The basic ground components of an ILS are the localizer, glide slope, outer marker and middle marker. The approach lights are visual aids normally associated with the ILS and are required for approval of lowest minimums. (Reference: TM 11-2557-26)

25. A pilot receives the following holding clearance: "Hold north of Dothan VORTAC on V241W, right turns, 1 minute legs, expect further clear-

ance 1345." What action is expected?

Answer: This is a detailed holding clearance and indicates that all outbound legs will be flown for 1 minute regardless of inbound leg time. (Reference: FAA Manual 7110.8B)

26. Who is responsible for aircraft separation in uncontrolled airspace?

Answer: The pilot. Uncontrolled airspace is that portion of the airspace within which ATC has neither the authority nor the responsibility for exercising control over air traffic. (Reference: AIM Part 1)

27. When cleared to climb or descend enroute, at what rate should the altitude change be made?

Answer: If an altitude change of more than 1000' is required, climb or descend as rapidly as practicable to 1000' below or above the assigned altitude and then attempt to climb or descend at a rate of 500' per minute until the assigned altitude is reached. (Reference: AIM Part 1)

28. What are STARs and how do they apply to Army pilots?

Answer: STAR—standard terminal arrival route—is a coded IFR arrival route established for application to arriving IFR aircraft destined for certain airports. Until military STAR publication and distribution is accomplished, STARs will be issued to military pilots only when requested in the flight plan or verbally by the pilot. (Reference: AIM Part 1)

29. What acceptable navigational signal coverage is provided by the MOCA?

Answer: Twenty-two nautical miles. (Reference: AIM Part 1)

30. May Army helicopter pilots reduce the visibility minimums in approach procedures that are noted "For Helicopter Use Only"?

Answer: Yes. (Reference: AR 95-2) The note "For Helicopter Use Only" is used on procedures that have not been converted under helicopter criteria (Chapter 11/TM 11-2557-26/new). When converted, the title of a helicopter procedure will be changed and the word COPTER will preface the approach direction, e.g., COPTER VOR 176 degrees. The note restricting the procedure will also be changed to read "COPTER ONLY." A visibility reduction in this case is not authorized. AR 95-2 is under revision to cover this point. Army helicopter procedures in the U. S. have not been converted pending the AR 95-2 change.

31. What is prevailing visibility?

Answer: The horizontal distance in miles and fractions of miles at which targets or known distance are visible over at least half of the horizon. (Reference: AR 95-2)

32. How is the pilot alerted when a VOR or localizer has been taken over for maintenance?

Answer: The coded identifier will be removed. (Reference: AIM Part 1)

33. What is the transponder code for lost communications?

Answer: 7600. (Reference: FAA Manual 7110.8B)

34. What is the correct approach at the destination under lost communication procedures?

Answer: The approach is pilot choice. FAA protects airspace for all approaches at the destination airport. (Reference: AIM Part 1)

35. What is the touchdown zone?

Answer: The first 3,000 feet of runway beginning at the threshold. (Reference: TM 11-2557-26)

36. How many VOR receiver accuracy checks are authorized?

Answer: Five—VOT, ground check, airborne check, dual receiver check and airways check. (Reference: FAR 91.25)

37. What is the minimum radio navigation equipment required in Army aircraft for IFR flight?

Answer: ADF (low frequency). (Reference: AR 95-1)

38. When a pilot is taken off his filed route and cleared short of his destination, what additional information must the controller provide?

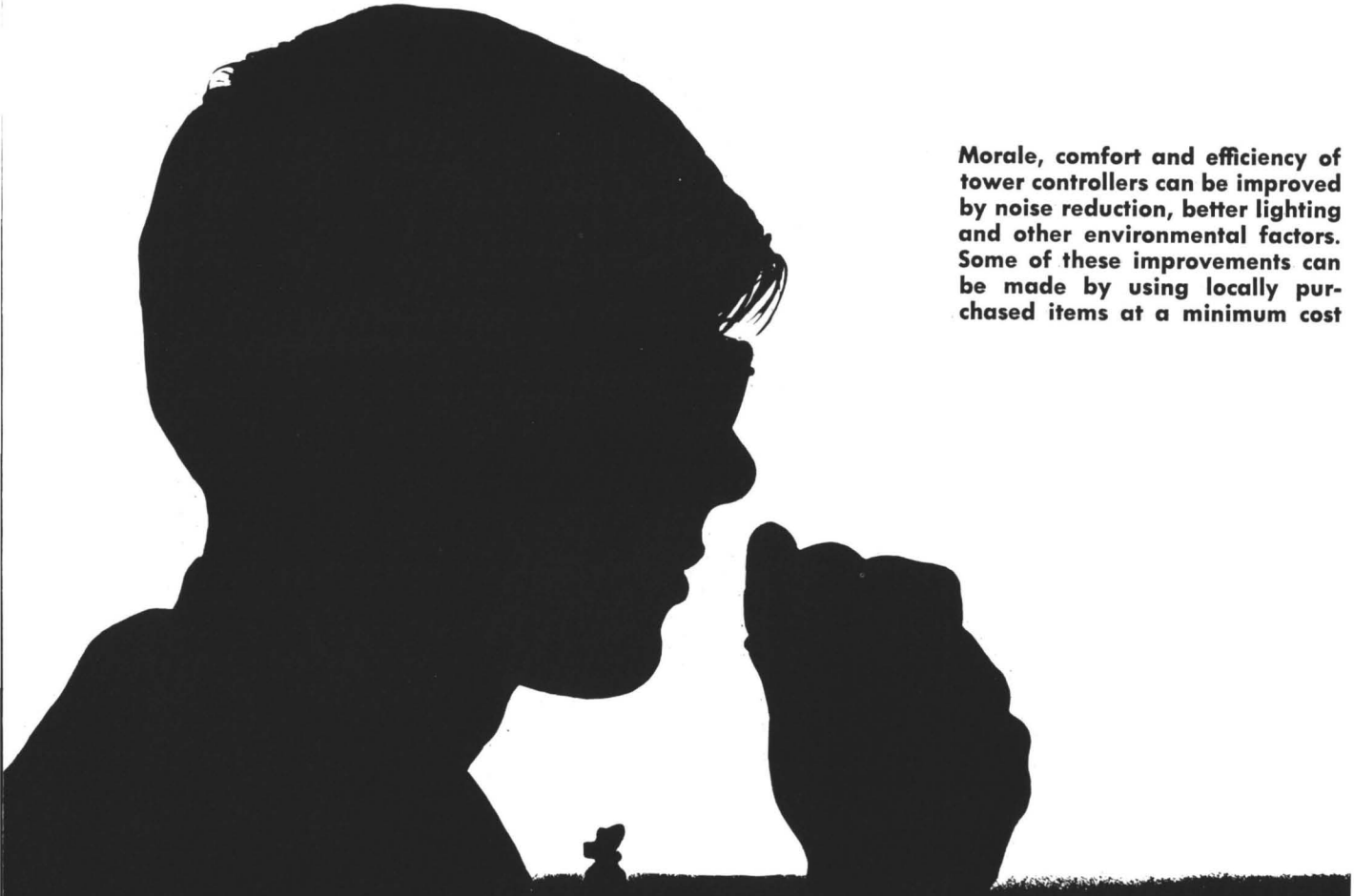
Answer: The expected further clearance routing which will carry the pilot to the destination or carry him back to his filed route. (Reference: FAA Manual 7110.8B)

39. A pilot receives the following approach clearance: "Cleared for straight-in ILS runway 6 approach, circle to runway 36." What weather must the pilot have to commence this approach and to what altitude may he descend without establishing visual contact?

Answer: This is a circling approach and the pilot must have the published ceiling and visibility for circling to commence this approach. He may not descend below the published circling MDA without establishing visual contact. (Reference: AR 95-2)

40. In a situation where no violation of FAR 91 is involved, but the pilot is given priority by ATC in an emergency, what report is required and to whom should the report be submitted?

Answer: A detailed report to the chief of that facility within 48 hours if requested to do so. (Reference: FAR 91)



Morale, comfort and efficiency of tower controllers can be improved by noise reduction, better lighting and other environmental factors. Some of these improvements can be made by using locally purchased items at a minimum cost

Help For The Cab Squad

John McKeeman
Air Traffic Control Specialist
U. S. Army Services Office

THE GROWTH of aviation throughout the world is causing those concerned with air traffic control (ATC) to take a second look at our control tower cabs. The morale, comfort and efficiency of the tower controller can be improved by changes to his work area. This in the end results in greater use of our airspace and aviation system.

I have been in contact with members of Army, Navy, Air Force and Federal Aviation Administration to determine what they are doing in the way of improving control tower cabs. They have quite a few good ideas for cab improvement. Some of the ideas could be applied locally to our Army control towers at a minimum cost; others are very costly and are not readily adaptable.

The FAA is currently conducting an environmental improvement program in which control tower cabs are improved using local resources. Improvements were made in noise reduction, cab lighting and environmental factors.

One of the towers that has been improved is at Washington National Airport. The sound levels were reduced in this tower by the following techniques:

- Placing carpeting on the floor.
- Placing carpeting on the ceiling.
- Use of sound absorption materials on all wall surfaces.
- Reduction of speakers and installation of headset jacks at operating position.
- Having control consoles dipped in a sound absorptive material.

These actions reduced the noise and added to the operator's comfort and morale.

Cab lighting was the next item addressed. The following lighting techniques were used at Washington National Airport:

- Ceiling color was changed

from white to charcoal gray.

• Battery powered emergency lighting in the ceiling was provided.

• Dimmable ambient light for cab cleanup and maintenance was provided.

• Recessed ceiling mounted task area spotlights were used on such places as flight data strip boards and control panels. These lights eliminated light reflections on the cab glass.

• "Stumbling area" lights around console bases and the stairwell were used.

The tower cab environmental improvements were made by using the following techniques:

• Carpet static buildup is best controlled by keeping the cab humidity at 40 percent.

• Use of 5 mil smoke color window shades for use in bright sun, haze and snow conditions.

• Use of new type controller chairs manufactured by Domore Office Furniture, Inc., Elkhart, IN. Two models are used—a high base chair for the local and ground controllers and a low base chair for the flight data position. Both chairs are GSA items, Federal stock code group 71, part X, class 7110, item 184-1. The low base chair is Domore model 603-E14SP ($85.50); the high base chair is model 88E-SP ($71.55).

All of these improvements are available now. What is coming up in the future? Each agency has its own specific problems and is working on these separately; however, a lot of control tower problems are common to all agencies resulting in common development of equipment.

In the area of prefabricated control tower cabs, the FAA has developed a six-sided configuration complete with communications console equipment. The U. S. Air Force has developed the GSA-135 communications console to replace the aging AN/FRC-19 consoles. The Army does not have a new console under development but is seeking to improve its existing AN/FSW-8 equipment.

The Army, Navy, Air Force and FAA are jointly purchasing a new generation of VHF/UHF radio equipment. The first delivery to the Army is scheduled for October 1972. The equipment nomenclatures are: AN/GRT-21 (VHF transmitter), AN/GRT-22 (UHF transmitter), AN/GRR-23 (VHF receiver), AN/GRR-24 (UHF receiver) and AN/GRC-171 (UHF transceiver).

Intercom, telephone and key systems were discussed with all agencies. Most users are installing call directors in control tower cabs and control consoles. The Navy is purchasing the AN/FSA-58 key system for tower/GCA/RATCC facilities.

Future data systems for control towers will include Air Force developed digital readouts for RVR, wind direction and wind speed. The FAA has a flight data printer used in the control tower to directly print flight strips from the center computer memory. This is an interesting but expensive system. The radar Brite equipment provides the tower operator with a daylight viewable TV repeater indicator of a nearby radar set. At busy airports this aids the tower operator to correctly space arriving and departing traffic. An interesting configuration using two independent Brite displays is set up in the Wilkes-Barre, PA, control tower cab.

The Wilkes-Barre IFR room was shut down and the Brite indicators in the cab were used for the approach control function, providing for more efficient use of controller personnel.

FAA studies are being conducted for automation in the tower cab where a small computer will handle some of the controller workload. Each controller position would have a display panel which displays airfield data, NOTAMs, aircraft flight data and weather data. Controllers will be able to hand off flight data to the next position via electronic circuitry instead of using the current paper flight strips. Controllers could enter any changes to these electronic flight strips via a keyboard at their consoles.

Brite consoles are being considered for modification so that they can display data other than radar. Data, such as NOTAMs and weather, could be available to the tower operator from his Brite display.

All agencies are hopeful that a tinted glass can be developed to eliminate the use of window shades. The FAA recommends that cab air conditioning units be mounted on the cab roof. The cool air will be injected at the top of the glass flowing downward into the control consoles cooling the console electronics, and then being returned to the air conditioner for cooling again.

What is the Army doing to improve control towers? A standardization program has been launched based upon TB 95-1, U. S. Army Air Traffic Control and NAVAID Facilities. Our capable Strategic Communications Command types are doing the equipment installation and engineering for the program and the major commands will have overall management responsibilities for the airfields within command. The end aim is to get our control towers as much alike as possible. The high density traffic control tower standard engineer drawing is being replaced with a completely new Chief of Engineers drawing which makes more efficient use of tower floor space than the old design.

By including some of the foregoing improvements in the Army control towers we can further improve the efficiency of the cab squad and the Army aviation team.

Maintenance

WHEN JACKING AN AIRCRAFT

Maintenance Tips: Hold it! Are you sure you are ready to jack up that aircraft? Did you realize that TM 55-1500-204-25/1 has 13 checks and a warning listed before and during the jacking operation? Remember, TM 55-1500-204-25/1, chapter 1, section II, paragraph 1-70, plus the maintenance manual for your type aircraft, should be consulted. Check it out and then jack it up!

★ ★ ★

Ignition System Problems? Maintenance of a turbine engine ignition system primarily consists of cleaning, inspection and replacement of components. Igniter plugs in this system can cause problems and the following tips can be helpful in eliminating them. Reference TM 55-1500-204-25/1, paragraph 5-182.

• Keep all igniter unit connections tight and all leads and conduit free from abrasion or other damage. Accomplish the following steps when igniter plugs fail to spark:

1. When two igniter plugs fail to spark, replace one plug and energize the system. When the plug sparks, replace the other plug and retest. Replace the igniter unit if the plug fails to spark.

2. When one plug fails to spark and a new plug does not remedy the defect, replace the igniter plug lead. If the plug still fails to spark, replace the igniter unit.

• Igniter plugs not heard firing when the engine is started should be cleaned or replaced as follows:

1. Clean igniter plug barrels with a wire brush. Buff threads with a cloth wheel. Do not clean the nose end or electrode.

2. Replace plugs with cracked insulation, damaged threads or pin contacts, or when foreign material is found lodged in the nose of the plug.

3. Replace igniter plugs that fail to produce continuous and regular sparking.

• Clean the lead assembly with dry cleaning solvent, Federal specification P-D-680. Replace any lead having frayed shielding, bent or mutilated socket contacts or contact pins, and worn or stripped threads on coupling nuts.

• Clean control harness leads with methylethylketone, Federal specification TT-M-261, and dry with air blast. Replace the harness if it is found to be open or shorted.

★ ★ ★

Preservation Of Turbine Engine Fuel Controls: The fuel control on a turbine engine should not be left unpreserved for a period longer than 48 hours. Moisture present in JP-4 fuel will corrode the internal parts of the fuel control causing serious damage. TM 55-1520-218-20, chapter 5, section 9, paragraph 5-322, step K.

★ ★ ★

Lost Hardware? When removing the main drive shaft (short shaft) on UH-1 aircraft for maintenance, all clamps and attaching hardware should be installed on the input drive quill and the engine output

Matters...

shaft to prevent mixing parts or loss.

★ ★ ★

Teflon Or Metal? A lack of information on the UH-1C and AH-1G swashplates has resulted in an excessive amount of downtime and high cost for replacement parts which could have been avoided. It seems that pilots and maintenance personnel find what appears to be metal shavings around the swashplate support area and collective levers on postflights following a PE inspection.

A breakaway adjustment is made during a PE inspection and includes shimming the swashplate to the uniball. This increased tension applied to both surfaces causes small flakes of teflon to form around the assembly which may appear as metal shavings.

Recommend a close check be made before condemning the assembly. One check is to rub these particles between the fingers; if they are teflon they will break up and look like charcoal. Also a simple TI magnet may be run across the area or a metal test taken before a final decision is made to replace the assembly. TM 55-1520-220-35, pages 9-3, paragraph 9-37.

★ ★ ★

Cleaning Your Turbine Engine: When cleaning that turbine engine take proper precaution to ensure that the assembly lines, air temperature sensing element and fuel control fuel pressure elements do not become clogged while washing internal components of the engine. Proper procedures are outlined in TM 55-1520-210-20, chapter 5, section II. Improper procedures could lead to false readings and malfunctioning controls.

★ ★ ★

Anyone For 2,500 Volts? Warning —when working on the T53 engine ignition system, be sure that the exciter box input lead is disconnected. The exciter box is a capacitor discharge type. If the electrical system has a leak in it, it is possible to build up enough voltage in the exciter box to discharge 2,500 volts. And what mechanic would want to be a conductor for 2,500 volts?

★ ★ ★

Prevent FOD: Caution—check the bottom of your ridged sole boots for foreign objects prior to climbing on to your aircraft that is equipped with a turbine engine. This will help in reducing FOD to your equipment.

★ ★ ★

Too Much Grease: IAW TM 55-1520-210-20, inject a maximum of two pumps of grease into the tail rotor crosshead to prevent grease from entering the tail rotor gearbox.

★ ★ ★

U-21 Tip: The U-21 wheel halve retaining bolts should be installed with the nut facing inboard. If the nut loosens it can be detected during preflight or daily inspection. If the nut is overtorqued it is possible for the bolt to shear at the nut and not be visible if the nut is not facing inboard.

The U. S. Army Atmosphere Sciences Laboratory and U. S. Navy Weapons Center conducted joint experiments at Arcata, CA, with a CH-54 Flying Crane (see photos). An 830 gallon tank filled with water gave the helicopter weight, forcing the downwash to penetrate the fog further. Spraying water from the tank did not seem to effect the fog

Fog Dissipation Questionnaire Results

THE DOWNWASH directly under a UH-1 Huey is generally moving at about 40 miles per hour. This has prompted various experiments to determine the feasibility of using a helicopter's downwash to blow away or disperse fog. A part of this program included the questionnaire printed in the June 1971 DIGEST.

Major fog dissipation research first began in 1964 when the U. S. Army Cold Regions Research and Engineering Laboratories (CRREL) conducted experiments along the wharf at Thule Air Base, Greenland. Since then, experiments were conducted independently in 1968 by the Air Force Cambridge Research Laboratories and in conjunction with the U. S. Army Atmospheric Sciences Laboratory (ASL) in 1969. That same year the Army Concept Team in the Republic of Vietnam conducted limited experiments. A year later ASL and the U. S. Navy Weapons Center teamed up for experiments at Arcata, CA, and in 1971 CRREL studied ice fog modification while ASL was experimenting at Ft. Rucker, AL.

A CH-54 Flying Crane was used in the joint Army-Navy experiments (Project Foggy Cloud III-B) at Arcata.

To give the helicopter maximum gross weight, an 830-gallon tank filled with water was suspended on a standard pallet. This weight added to the CH-54's fog-clearing capability because it forced the downwash to penetrate further. The experimenters also sprayed water from the tanks, but this did not seem to affect the fog.

Individual aviators have tried experiments on their own. However, their efforts had not been coordinated or recorded. To correct this, ASL distributed questionnaires in 1971 (including the one printed in the DIGEST) asking rotary wing aviators for the results of their experiments. It was hoped that the final tabulations would help develop a united approach

Figure 1

FOG DISSIPATION FOR DIFFERENT AIRCRAFT TYPES

Aircraft Type	Successful	Unsuccessful	Total
OH-6	1 (50%)	1 (50%)	2
AH-1	2 (100%)	0 (0%)	2
UH-1	9 (69%)	4 (31%)	13
CH-34	2 (67%)	1 (33%)	3
CH-47	8 (89%)	1 (11%)	9
CH-54	2 (100%)	0 (0%)	2
Totals	24 (77%)	7 (23%)	31

Of the 31 tries, 24 were successful –

to the fog problem and lead to better techniques for solving it.

In studying the questionnaires, ASL tried to cross-reference fog types. This proved impossible because the individuals who witnessed the experiments did not have a common guide to aid them in determining the type and thickness of the fog. But it was determined that the types of fog encountered were the warm radiation and advection type, generally less than 500 feet thick.

Results of the experiments by the various units are summarized with respect to aircraft types in figure 1. Of the 31 tries, 24 were successful. Significant dissipation of fog was therefore achieved. Figure 2 shows a summary of the experiments over various types of terrain.

The many variables of fog clearing preclude the accurate prediction of the best type of helicopter to use for specific fog depths. However, as a general rule penetration is primarily a function of gross weight and disc loading of the helicopter main rotor (disc loading $= \frac{\text{gross weight}}{\text{rotor diameter}}$).

Thus, a general table can be constructed showing what might be expected in various fog thickness with various helicopters. Figure 3 shows fog penetration by helicopter types.

Figure 2

FOG DISSIPATION FOR ALL INVOLVED AIRCRAFT IN DIFFERENT TERRAINS

Terrain Type	Successful	Unsuccessful	Total
Flatland	10 (77%)	3 (23%)	13
Rolling hills	7 (70%)	3 (30%)	10
Mountainous	7 (88%)	1 (12%)	8
Totals	24 (77%)	7 (23%)	31

Figure 3

FOG DEPTH PENETRATION BY HELICOPTER TYPES

Fog Thickness	CH-34, 47, 54 Cargo	OH-6, UH-1, AH-1G Utility/Attack
100 feet	Yes	Yes
300 feet	Yes	Sometimes
500 feet	Most of the time	No

What Would You Do?

CW2 Gary M. Pollak

The author discusses the initial actions and proper procedures for reporting a military aircraft accident

IT MUST HAVE BEEN close to 1900 hours that brisk evening when my wife and I decided to take a leisurely drive toward the outskirts of town. It was cool and seemed a good way to relax and enjoy the evening breeze.

Having lived close to the airfield for nearly 2 years both of us were quite accustomed to the constant noise from aircraft flying overhead. My wife could even identify several types of aircraft by the sound they made. We were having a pleasant drive but little did we know that this would be a night we would never forget . . . for as we reached the city limits tragedy struck.

A loud backfire and then total silence brought our immediate attention to a nearby T-41 airplane as it glided silently toward earth. It seemed like only seconds before the aircraft struck the nearby trees. Shocked silence swept over us as we raced toward the scene of the crash. A dozen thoughts rushed through my mind. What to do first? How could we help?

Any one of us—especially if we are associated with Army aviation —could find ourselves in a similar situation. And if we do it is important to know what to do. The following guidelines should be helpful. They are based in part on Joint Service Booklet #1 entitled "What To Do And How To Report Military Aircraft Accidents." The booklet should be available from the safety office of your nearest military base or by writing to the Safety Education Department, U. S. Naval Safety Center, U. S. Naval Air Station, Norfolk, VA 23511.

The starting point is to offer aid in rescue and care of the injured. In conjunction you should also

take the necessary actions to prevent injury or death to the survivors. These should be your first actions upon arrival at the scene of an accident. If survivors are in the aircraft, and you can approach the aircraft, remember to:

• Remain clear of external fuel tanks or rocket pods. The reasons are relatively clear: armament thrown clear of the wreckage may explode and fuel cells are highly volatile.

• Avoid access to aircraft through or on the side of fuel spills.

• Avoid jagged metal. If you have gloves use them.

• If you approach the crash site by vehicle, use extreme caution for survivors may have been thrown from the wreckage.

• Usually you do not move injured personnel. However, if in your judgment a postcrash fire is possible move the survivors a safe distance and begin immediate first aid. While removing the injured be as gentle as possible making every attempt to keep the head, neck and spine stable. If necessary, assist breathing first. Then stop bleeding by direct pressure. When possible splint obvious fractures with whatever is available from the countryside. Summon medical personnel as quickly as possible, and if civil hospitals and medical faculty are used assure them that payment for services will be made by billing the military hospital. Leave *obviously* deceased members of the crew where they are found unless fire is imminent. Their position and condition are important for aircraft accident investigation.

• Keep bystanders and any other unauthorized personnel out of the area. The reason for this is to protect bystanders from possible injury due to fire, as well as to preserve evidence for accident investigation purposes.

• Establish a "no smoking" rule because of the possibility of fire.

A point that goes hand in hand with rescue is knowing how to use access hatches, rescue points and exits. On all military aircraft an orange-yellow marking on the outside indicates escape hatches, doors or exits. On jet aircraft a large red arrow with "rescue" in letters printed yellow and black on the arrow will indicate the rescue point. *Do not* manipulate any control on the seats. It could be an ejection seat which if tampered with could eject and cause serious or fatal injuries. Be completely sure that you know what you're tampering with before you move it. Remember, when removing a survivor from an aircraft release his seat belt and radio cords. If he is wearing a parachute and oxygen mask remove these.

The next step is to protect property. Your first concerns at any crash site are the possibilities of igniting fuel and causing a postcrash fire or of armament exploding and causing a fire. *The "no smoking" rule must be enforced.*

If civilian homes are in danger swiftly evacuate all people. To fight fuel fires you should use high pressure water fog, foam, carbon dioxide or a dry chemical powder. If you know of or see armament present in the wreckage, cool it with an extinguishing agent. If there are nuclear weapons involved the only additional danger may be from radiation; fire will not cause a nuclear detonation but may cause a high explosive detonation. And remember, panic is the most hazardous aspect of any emergency.

Now that we have visually observed the crash site, and after you have given the survivors all the attention you can, notify the nearest military authorities of the accident.

The following is a step-by-step procedure for reporting an accident:

• Call the operator and explain that you wish to make a collect call to the nearest military installation to report a military aircraft accident. When your call is answered give your name and location and report that a military aircraft has crashed at (time) and that there (is) or (is not) a fire.

• Try to give accurate geographical coordinates. If unable give useful landmarks that are prominent to both vehicles, helicopters, firefighters and medical personnel.

• Advise whether the crew parachuted out or went in with the aircraft and if medical help is needed.

• Explain that the crew of (all or give number) is believed to be living or dead.

• Report all damage to private property and give a list of any civilian injuries that may have occurred.

• Report the aircraft serial number on the tail of the aircraft; the type or model of aircraft; where someone will meet the rescue team; and the nearest suitable helicopter landing area.

• Make sure the receiving authorities fully understand your report.

• At this point if you have any other pertinent information explain it.

• Wait for any questions and any instructions from the authorities.

• Leave a number for a possible call back.

After informing the proper authorities and you are sure they are on their way to the crash site, your next step is to guard the wreckage. Guards can be either civilian bystanders or military guards. Their duties are:

• Protection of civil or military property.

• Prohibiting removal of deceased persons until properly identified by military authorities.

• Keeping spectators a reasonable distance away.

• Admitting only authorized personnel.

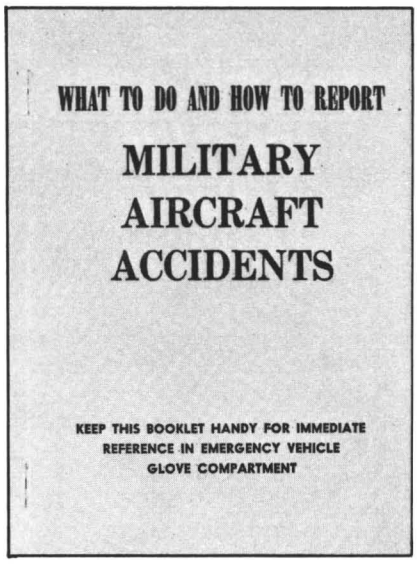
Trying to prevent handling or disturbing any part of the wreckage. A theft of any item is considered stolen government property. Prevent souvenir hunting by spectators.

After the wreckage has been secured properly, you should next preserve the accident site. Personnel who should be allowed access to the scene are crash, fire, rescue and accredited news media personnel.

Each piece of wreckage is of extreme importance in determining the cause of the accident, so it must be left in the exact position it is found until the investigation team identifies it, tags it and removes it. Marks on the ground are as important as debris, so avoid trampling the area as much as possible.

Witnesses are necessary for determining the cause of the accident. Names and addresses should be taken for interviews at a later date.

When handling the news media, remember that newsmen and photographers have jobs to do. If they arrive prior to military officials, explain that for their own safety they are to remain clear of danger areas. By no means should force be used by military personnel to prevent picturetaking. Advise members of the press that deceased persons' names are not to be released until the next of kin are first notified; photographing of deceased persons is discouraged; and photographing classified equipment is a Federal crime as well as being detrimental to national security.



Finally, items worth noting would be:

- The time of the accident.
- Witnesses' names, addresses and telephone numbers.
- Weather at the time of the crash.
- Direction aircraft was heading and what the crew appeared to be doing.
- Was the aircraft on fire in flight?
- Was there an explosion?
- Did you hear any noises?
- Impact angle and relative position of bodies or survivors.
- Did you see any parachutes or objects fall from the aircraft?
- If you removed survivors, record their position, use of restraints (seat belts, shoulder harness) and whether or not you cut them, use of protective equipment and configuration (helmets, gloves, boots, etc.).
- Record in detail the crew's state of consciousness. Did they say anything, or move, or respond to stimulation? This may be very important to the individual for later return to flying status as well as for aircraft accident investigation.
- Did you witness anyone removing anything from the wreckage?

If you are a professional aviator you should know your local standard operating procedures concerning accidents, incidents, forced or precautionary landings. Your SOP should consist of at least these basic parts.

1. Contact your nearest military tower or civilian tower either on their designated frequency or guard frequency—243.0 UHF or 121.5 VHF. If contact with a control tower is not possible contact the nearest air traffic controlling agency and have them relay to the nearest military base operations. If at all possible have the ATC fix your location by radar. Finally, a transmission in the blind or to another aircraft for relay would be your last resort. You should relay the aircraft type, serial number, location (grid coordinates), number of persons onboard (if known) and type of injuries (if known). If you monitor a radio transmission of an emergency immediately initiate radio silence. If you are airborne continue and the control tower will advise you. If on the ground you should be instructed to hold your position until the crash crew can depart. The site of the accident immediately becomes a restricted area unless otherwise advised by a crash control center.

2. If there is a medevac ship available such as from a flight training center (Ft. Rucker, Ft. Wolters or Hunter Army Airfield), orbit the area until the medevac people release you or request your assistance. You should relay to them the injuries if known.

3. Army Regulation 385-40 defines the procedures to follow in the event of a forced or precautionary landing. As interpreted, aircraft crews will secure the aircraft upon landing and engine shutdown. Once the aircraft is on the ground and secured, it becomes the task of the maintenance personnel to perform the necessary mechanical repairs. You as a pilot should never attempt to restart or fly the aircraft until it has been checked and cleared for flight by the maintenance personnel.

Once an emergency has occurred it is too late to take the book out and read the procedures to follow. You must know them in advance. Consider that you may be the man in the emergency situation next time and you will want the rescuer to *know* his procedures.

VIEWS FROM READERS

Continued from page 1

act could easily have resulted in fatality or serious injury to the doorgunner. If that had been the consequence, I wonder if the author would relate this story in the same light.

If aviators use their aircraft to thrill or scare crewmembers or passengers, whatever the reason, then someone has missed the boat.

CPT Charles R. W. Black
Office of Inspector General
Ft. Devens, MA 01433

• The DIGEST has received several letters commenting on "Doorgunners Do The Damnedest Things." The two printed above were selected for publication in "Views From Readers" because they are representative of the thoughts expressed. The article was not based on any specific incident, but was a composite of war stories. It is hoped that the thought generated by this article will, in the final analysis, result in a wider dissemination of professionalism throughout Army aviation.

Sir:

The April issue of the DIGEST contained an article titled "Accurate and Thorough." I found the article very interesting until I came to the end of the article where the findings of the board were listed. Then a bit of the old "blame it on someone or something" came through the clouds. Accident number 3, page 42, the requirement to retorque the lateral servo to stop leaks; the article leads the reader to believe that this is some kind of complicated operation of the type requiring great skill. It should be pointed out that this was probably a loose hydraulic line and that the only requirement for torque was the result of vibrations and not the result of improper torque at the installation. At either point the reason for the need to retorque the hydraulic system is the leak and the reason for the leak is guesswork. The investigator seems to use some psychic power to determine the source of cause. He next leads the reader to believe that the reason the aircraft stayed out and crashed was because the TI took approximately 20 minutes to retorque the hydraulic system. Next the investigator makes a big issue out of the fact that the pilot's attitude indicator was inoperative. It fails to mention the copilot has an attitude indicator. Then it goes on to indicate that the MWO that was a direct support function to comply was another factor that caused the crash. Next the investigator failed to read TM 38-750. It states that an inspection overdue or due is a red dash condition. If we were to follow the investigator's suggested example of putting a red cross on the daily inspections and engine flushes, then we will need a tech inspector to sign off daily inspections and another change to TM 38-750 to make inspections a red cross condition. Whether an inspection is due or overdue is still a matter of question and debate. Next the investigator says in the recommendations that "Increased supervision to assure proper maintenance procedures are complied with be implemented." The investigator failed to find one single point that contained any validity to show that proper maintenance procedures were not followed. The best qualified maintenance man in the unit retorqued the system. This could have been accomplished by a regular mechanic with no additional training. Next he recommended that "increased command emphasis be placed on flight safety related MWOs." It should be noted that all MWOs come with instructions that state who will apply the MWO, which aircraft will be modified, the time frame for compliance, who will order the MWOs, and how long it takes to complete the MWO using a certain number of MOS specified persons.

It is my opinion that the investigator did a wonderful job of impressing some aviation people; however, when his work is reviewed by persons that are well qualified in the aviation field, only one solution is left: he did a sorry job and pointed fingers everywhere he could. I believe that he should have spent more time getting facts and should have left the cause determination to someone better qualified.

This article leads senior officers not aviation orientated to believe that a red dash on the log book is a grounding condition and that we have poor maintenance supervisors. This article gives aviation a black eye and should have never been printed in the DIGEST without someone researching it and giving a more accurate picture. Accurate and thorough—a big laugh.

CW3 Jerry D. Dickson
Army Air Opns Directorate
Holloman AFB, NM 88330

• U. S. Army Agency for Aviation Safety has made the following comments in reference to Mr. Dickson's letter.

The investigation of this accident was conducted by a board consisting of four qualified aviators and a flight surgeon. One of the aviators, as stated, was also a maintenance officer. The cause of the leaks was not definitely determined, nor was it included in the board's findings. However, the fact that maintenance was performed on the lateral servo system 2 days before the accident led the maintenance officer and the board to conclude that this *indicated* improper torque and was one factor leading to their recommendation for increased maintenance supervision.

No inference was made about the length of time to repair the leaks. In fact, the board stated in its description: "The TI worked *quickly* on the Cobra, repairing the leaks in approximately 15 to 20 minutes . . . ."

In the AH-1G, as in any helicopter, the copilot's attitude indicator is extremely difficult to read from the pilot's seat with any degree of accuracy. As stated, the weather in the area was not good and the pilot's attitude indicator was inoperative before the mission started—a red X condition.

Failure to comply with modification work orders has been found to be a cause factor in many accidents. Since the board found this to be a factor, their recommendation is valid.

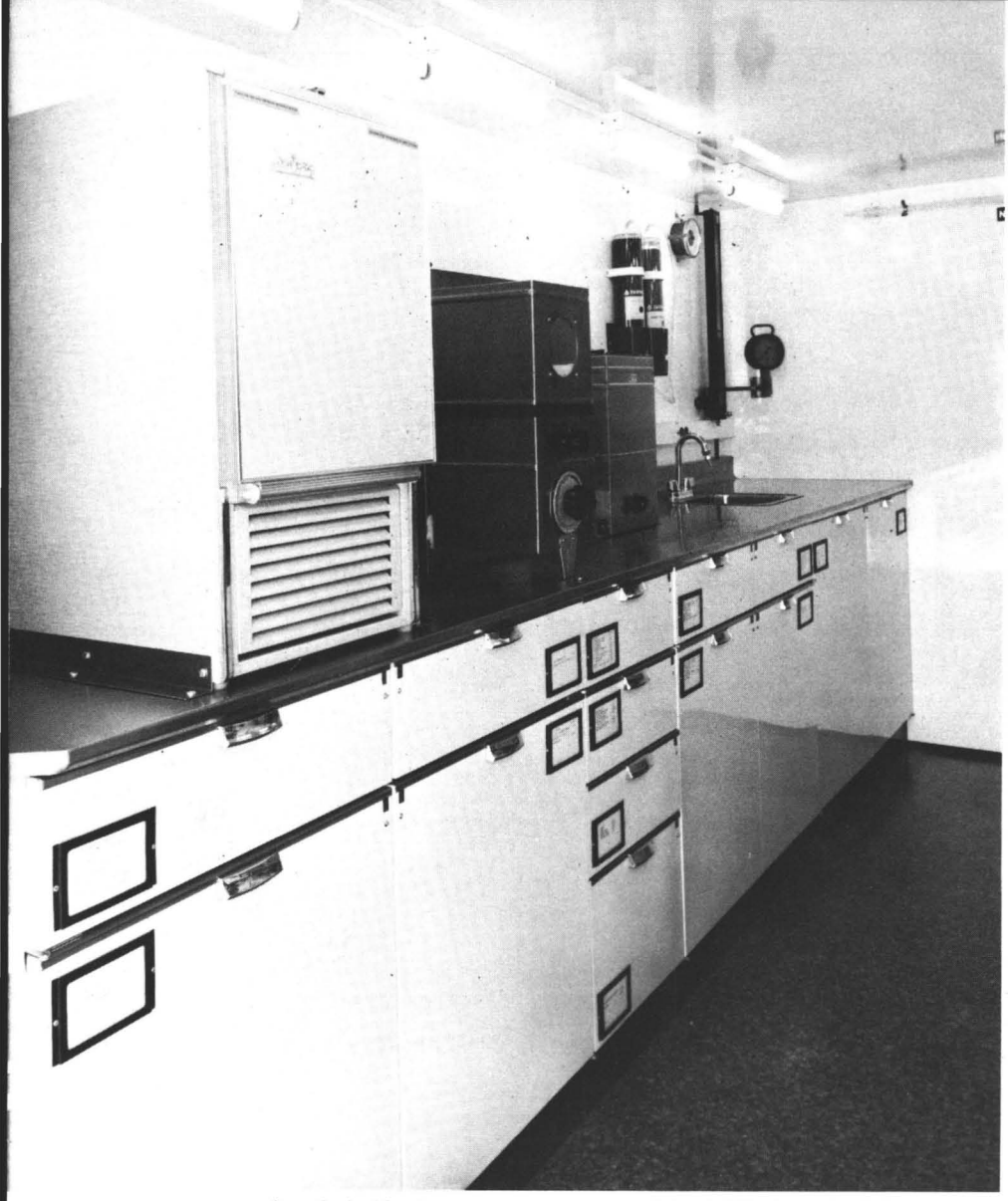
No change to TM 38-750 is needed. A CO and maintenance officer can order a red X condition any time a maintenance situation or operating environment warrants it, as was obviously the case in this unit.

Paragraph 10-1, AR 95-5 states: "An investigation is a systematic examination to disclose all relevant facts. The aircraft accident investigation board has two functions.

"a. To determine all established, probable, or suspected factors which caused or contributed to the accident.

"b. To evaluate and analyze the acquired information and develop recommendations for action that will prevent recurrence of similar accidents."

We stand behind our original statement that the board which investigated and reported this accident can rest assured that they have made a substantial contribution to the aviation accident prevention program because they were *prepared* and because they were *accurate and thorough.*



Curb side view

S-280 electronic shelter

NEW

Aviation Fuel

ARMY AVIATION now has a new improved airmobile laboratory for testing military aviation fuel in the field. Developed by the U. S. Army Mobility Equipment Research and Development Center, Ft. Belvoir, VA, it is slated to replace laboratories now in use. It is being distributed by the U. S. Army Mobility Equipment Command at St. Louis, MO (FSN 6640-902-9711).

The new laboratory is a completely self-contained unit which requires only an external power source, a water supply and a waste water disposal facility when in operation. It is housed in a standard electrical equipment shelter, type S-280 B/G, approximately 12 x 7 x 7 feet. The shelter has been modified to accommodate all the equipment, apparatus, instruments and supplies needed to conduct fuel quality tests in forward areas.

The 3,340 pound unit is designed for quick onsite setup and will function in an ambient temperature ranging from minus 40 to plus 125 degrees F.

Tests can be made of vapor pressure of petroleum products, flash and firepoint, distillation, copper strip corrosion, gravity determination, moisture determination, millipore-for-solid contamina-

Airmobile Laboratory

tion and water tolerance of aviation fuels. The lab has an ultraviolet detector kit for undissolved water and a tank-and-drum sampling and gauging kit.

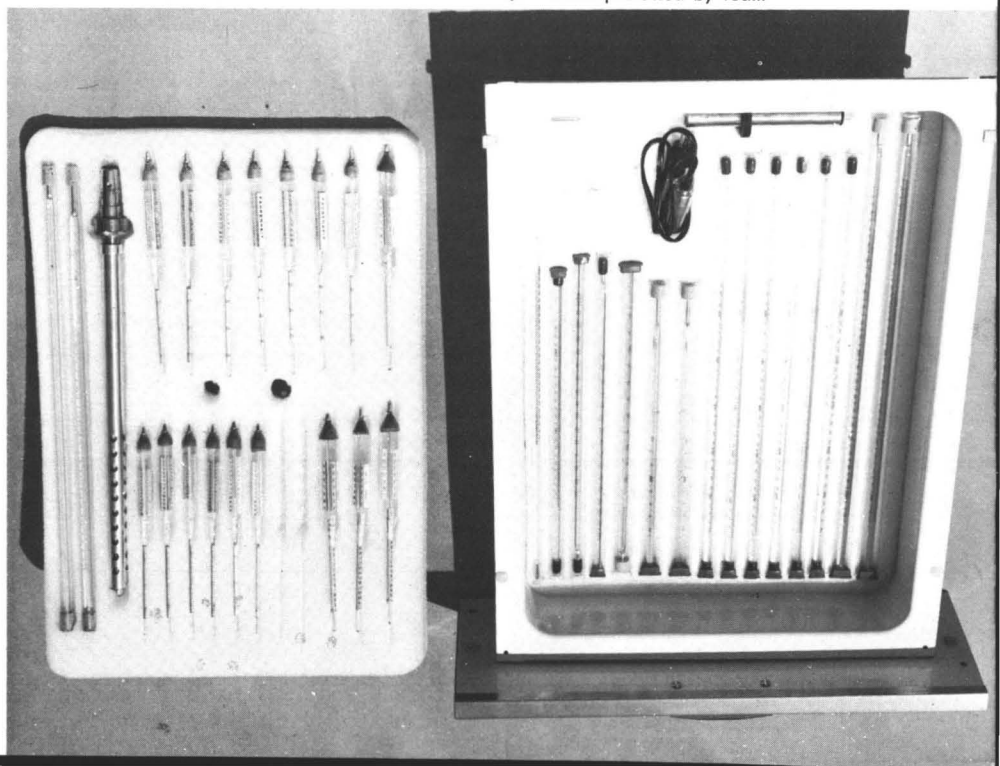
The operation of the laboratory requires as a minimum a 15 KW, 60 Hz, 120-208V A.C. generator. Power is fed to the laboratory by a four-conductor power cable. All the major circuits have either circuit breakers or fuze protection against overcurrent.

When an outside source of water is not available or not operating, the lab has a reservoir that will hold 20 gallons of water. This is pumped to the sink by a radial flow centrifugal pump at the rate of 7 gpm at 17 psi. A pressure switch located in the water supply line automatically turns off the pump when the faucet is closed. The pump and reservoir may be bypassed if an outside source of water is available.

As a safety precaution an automatic purging and alarm system will prevent explosions due to a buildup of an explosive vapor mixture.

Drains for the shelter floor, the airconditioning unit, the sink and the Reid vapor pressure bath are located outside so that a pipe or hose can carry waste water away from the laboratory site.

Road side view



Items protected by foam

For want of a nail, the shoe was lost;
For want of the shoe, the horse was lost;
For want of the horse, the rider was lost;
For want of the rider, the battle was lost;
For want of the battle, the kingdom was lost;
And all from the want of a horseshoe nail!

—Anonymous

WHAT DOES a nail cost? If you say a few cents, then read the next to the last line of the above stanza. It can compound into a much more expensive item.

The average Army aviator still rears back, kicks his heels up on the ready room table, draws a swig from his coffee cup, blows a cool smoke ring from his cigar and says he is not affected since the aviation game doesn't involve nails or horses. Besides that, he isn't a supply man and as a pilot he doesn't even have any supply function. Oh! Who says?

We in aviation have been up and down the scale in the past several years as to how many hours one is required to fly in various jobs. Did you ever stop to think why flying hour programs fluctuate so much? The primary cause is funding of aircraft and fuel to support the program. No money—no fly. Where do you, the individual pilot, come in? Let's look at an actual case, cite some facts and draw some conclusions.

A pilot and his stickmate go out to fly a UH-1D helicopter. They are doing support work but are also logging combat-readiness flying hours to economize—an "atta-boy" for them! We'll give them recognition now because they will need it later on.

At the end of the day their DA Form 2408-12 reads like this:

Flt #1	1.0
Flt #2	.8
Flt #3	1.5
Flt #4	2.3
Flt #5	.4
Total	6.0

(Effective 1 September 1972 the revised TM 38-750 requires flight time to be recorded in hours and tenths of an hour.)

All looks well and good? Normally one would say yes, but let's go one step further. What you are about to read is not intended to be sneaky nor designed to get anyone in trouble. However, it is a very useful and exacting management technique that is often overlooked. As will be shown, it is certainly a supply manager's method that must be utilized.

Let's compare the DA Form 2408-12 flight time to section 11 of the DA Form 2408-13 which supports this day's flight by comparing fuel consumption with time

In a penetrating analysis of cockpit economy, the author closely examines the serious results of the innocent padding of flight time

Lieutenant Colonel Donald R. Jordan

flown. It requires some ground rules and "grocery store" computations as outlined in figure 1.

Fuel consumed as recorded on DA Form 2408-13 is reflected in figure 2.

Aircraft fuel consumption rates are relatively constant and the L-11 just isn't that economical. Therefore, the pilots must have logged more time on the DA Form 2408-12 than is reflected by aircraft fuel consumption on the DA Form 2408-13.

Some may say, "Big deal." Others may say, "Hang the guilty bums for falsifying official records." The latter is not the intent of this article. This article is addressed to the expounders of "big deal." What did this cost the government? Let's look at the difference of 1 hour flight time. In fact, that may be too high. Let's look at the difference of only 15 minutes extra padding per day of flying. By merely equating this "small" padding of a day of flight for a given number of aircraft we can show the real impact of the problem.

Within the aviation school fleet at Hunter Army Airfield, Ft. Stewart, GA, there were about 148 UH-1D aircraft when this was written. Let's consider an availability rate of 70 percent which is lower than the DA norm and this means 103 aircraft were available each day. Since an adjustment has already been given as a "fudge factor," no further reduction will be considered for a factor known as "commitment rate." If 103 aircraft fly per day and do so for 5 days a week, this results in 25,750 aircraft

Type aircraft:	**UH-1D**
Fuel used:	**JP-4**
Weight of fuel:	**6.5 pounds per gallon**
Fuel consumption rate:	**650 pounds per hour (using test stand data on T53-L-11)**

Figure 1

Nails For Sale

days per year (50 weeks is used since flying is drastically reduced during Christmas holidays).

Considering that our well-meaning pilots log 15 minutes (¼ hour) more per day than they should, this means 6,437 extra or "padded" hours on the fleet per year. Using a consumption rate of 650 pounds per hour and taking into account 6,437 hours logged but not flown, there might be shown a false savings of 4,184,050 pounds or 643,700 gallons. At 11¢ per gallon, this gives $70,807 worth of fuel which was perhaps programed but not used.

For purposes of explanation we must logically assume that no POL contract is going to be based upon other than demand or actual usage data, so transportation and storage costs will not be considered. We must also logically assume that this "savings" is purely hypothetical in nature.

But fuel costs are dwarfed when we turn our attention to our erstwhile friend, the "nail." Inspections, oil filter kits, hardware and components are for the most part performed and replaced based upon airframe time taken from DA Form 2408-12. Let's look at a table based on the 6,437 hours of logged time which was not flown and we will see estimated costs for some of the inspections required at various times of the aircraft's life (figure 3).

Now, even though these figures are conservative because they take into account only the wrench bender's manhours and not all of the costs of supervisory and supply structures, $81,268.48 surely isn't chicken feed.

Now we will haul out some more big guns—component costs (figure 4).

Adding time on the DA Form 2408-12 whether the aircraft flies or not means adding time to a number of high dollar value time between overhaul (TBO) components. This means that one aircraft which has logged 100 hours but has actually flown only 95 hours has lost 5 percent of its time on TBO components or 55 hours in 1,100. This 55 hours represents two intermediate inspections at 40 manhours a whack and half of a periodic inspection which would take about 65 manhours. The painful part is that they are inspecting, changing components and servicing the aircraft before it really is required. Another thought is the fact that 55 hours represents about ⅔ of one aviator's annual flying minimums.

Lost maintenance manhours and short-sell of components costs the Army money because it is not receiving full value for investment. The big picture of overhaul statistics and costs is even more bleak. Flying time data is collected and used in programed overhaul for each fiscal year or quarters of each fiscal year. When time is accelerated it starts a backlog of maintenance which jams depots. The jam is cleared by emergency overhaul contracts which cost prime dollars due to priority or overtime work on existing contracts or by purchase of new components. Contracting of these services or components brings everyone from the user through the U. S. Army Aviation Systems Command and the Department of the Army funding authority into the action. The money has to come from somewhere and this brings us full circle back to the user. Reduced funds for flying can and

Service No.	Added	Total in Tanks	Remarks
1	0	224	This is "topped-off" for flight
2	140	224	This is first refueling
3	140	224	Second refueling
4	75	224	Third refueling
5	93	224	Fourth refueling
6	2	224	Fifth refueling "topped-off"
Total	450		

Formula 1: Conversion of fuel from gallons to pounds
450 gallons × 6.5 pounds per gallon = 2,925 pounds

Formula 2: Conversion of fuel (in pounds) into flight hours

$$\frac{\text{2,925 pounds consumed}}{\text{650 pound/hour rate}} = \text{4.50 hours}$$

Figure 2

	M/H Per 100 Fly Hrs	Hr Pay For E-5	M/H Cost Per 100 Hrs	Padded Hrs In 100's	Total Cost Due To Padding
Intermediate (PMI)	120	$3.08	$369.60	64	$23,654.40
Intermediate (PMP)	125	3.08	385.00	64	24,640.00
Forms and records	30	3.08	92.40	64	5,913.60
Hotend and engineer check	133.3	3.08	410.50	64	26,272.00
Tail rotor hub inspection	4	3.08	12.32	64	788.48
Total costs of inspections due to padding					$81,268.48

NOTE: The first column reflects manhours per 100 flying hours even though certain inspections come at varying intervals; i.e., it takes 40 manhours to perform a PMI, thus 120 M/H in every 100 flying hours. The fourth column represents 6,437 padded hours cut to 64 to fit the formula: M/H per 100 × hourly pay × 64 = total cost

Figure 3

often do result, so the secretive padder has stung not only himself but also everyone else.

A more intimate point you must consider is your personal safety. Let's assume that your unit's pilots attend to their logging of flight time with real professional accuracy and other Army pilots who are flying similar aircraft are fudging on time. If these components were originally designed to last 1,000 hours and all of them are looking good (except yours which flew more real hours) when overhaul time comes around, then the TBO may be extended based upon the preponderance of inaccurate input from the field. High failure rates in your unit might result even though you are adhering strictly to proper logging of time. As one component after another fails causing accidents in your unit you become the subject of an investigation and the real "bad guys" scoff, drink their coffee, blow smoke rings, pad their time and get away scot-free. The sad part is that their cheating has been a direct negative influence on your safety.

How about fuel? We have pointed out that while fuel is not actually expended, the time is logged. In programing installation budgets the consumption data and the flight hours are evaluated. The result is a possible overprograming which means the Army procures excess fuel. While fuel is not the best example of storage/maintenance costs versus procurement/salvage costs, it does convey the possible impact of improper programing on budgets.

Let's look at another aspect of *cockpit economy*. You are the pilot of an aircraft, but for some reason known only to yourself you have shirked your responsibility to know your aircraft. I mean *really* know your aircraft. For example, take the U-6. This aircraft has brake pucks which have a wear indicator as part of the mechanism. Several years ago the word was "when the indicators became recessed a given distance in the mechanism, change the pucks." This has now changed so that the pucks must be removed and measured for thickness. If you, as pilot, are not aware of the new technique you could possibly cause premature change. You say, "How?" One way would be to have the change done at a civilian field using a Standard Form 44. For example, you are on a cross-country mission. Upon preflight of the aircraft, after an RON at a civilian field, you decided (erroneously) that the pucks need to be changed. You are authorized to serve as a "contracting agent" for such repairs using the Standard Form 44 (you should have one in your cross-country kit).

Another example is found in the overzealous crewchief who takes your word as gospel. These fine young men, eager to please, often perform corrective maintenance without question. This is a failing of human nature, particularly if you happen to appear as an unapproachable individual who will not stand for your authority or word to be questioned. Believe me, there are some of this type around too. In any case this can result in undue maintenance cost. It proves the point that knowing your aircraft goes beyond the dash 10. While you do not need to become a qualified maintenance officer, you certainly should understand maintenance; if your unit maintenance officer doesn't already do so, it is suggested he realize part of his job is education. This can be done in accident prevention sessions, operational briefings or other discussion groups.

The whole point is that you—the Army aviator—do have an impact on supply. You are a very vital link in the logistics management system. Without understanding this fact and approaching it with the same professional attitude as you use in flying the machine, it can cost you, Uncle Sam and the rest of us a good size piece of change each year. The surface of the problem has only been scratched here but should provide you with food for thought.

For the want of a nail don't you as an Army aviator be a battle loser.

Component	TBO Life	No. Used Due To Padding	Overhaul Cost (Est.)	Cost of Overhaul
Main transmission	1,100	5.8	$ 4,390	$ 25,462.00
L-11 engine	1,550	4.1	10,000	41,000.00
42 degree gearbox	1,500	4.3	295	1,268.50
90 degree gearbox	1,100	5.8	400	2,320.00
Mast	1,100	5.8	315	1,827.00
M/R hub	1,100	5.8	1,600	9,280.00
M/R blades	1,100	5.8	*3,239	18,786.20
T/R hub	1,100	5.8	* 682	3,955.60
T/R blades	1,100	5.8	* 286	1,655.80
R/L elevators	3,000	2.1	55	115.50
Oil	100	1,408	** .93	1,309.44
Oil and fuel filters	25	257	** 1.02	262.14
			Total	$107,242.18

NOTE: Column #2 represents the number of components changed in 6,400 flying hours. Costs of overhaul are estimates only and are not to be construed as government contract figures.
*** Shows original estimated costs due to retirement and replacement.**
**** Shows cost per quart of oil and cost per replacement kit.**

Figure 4

Ted Kontos
Education and Prevention Department
USAAAVS

Maybe there's no such thing, but a simple test can show how closely you approach perfection as a professional Army aviator

THE PERFECT PRO

THERE ARE many ways of defining professionalism, and all of them are probably good. But for simplicity's sake, let's operate on the premise that as an Army aviator you are in a profession, and therefore, you are a pro. The question is, how professional are you? Want to find out? All you need is a pencil. So pause a moment, and take the following test. It's short, and although you may feel it is about as scientific as an alchemist's attempt to transform a frog into gold, the results may surprise you.

Got your pencil? Let's begin.

Since this test is somewhat different from most, we'll do question number one and check the answer choices before proceeding to the remaining questions.

1. You are a student aviator, and have completed your solo flight. Your flight training school is located near the coast, and many solo students have been violating regulations by flying low-level along the beaches, buzzing sunbathers as well as boats in the area. Despite warnings, this practice continues. Without your knowledge, "spotter" aircraft have been assigned to monitor these "off limit" areas and report the aircraft numbers of violators. You are on a solo flight and you decide to do a little low-level work over the coastal areas to add some spice to your otherwise routine life. You have just completed a low-level pass and are in a climbing turn when you catch sight of an aircraft above and inland of you. You immediately suspect it is not another student, and remembering the warnings, you realize it may be a spotter. You assume you have been seen but you know that the pilot of the other aircraft cannot be certain you have seen him. You immediately do which of the following?

a. Get out of the area and adhere to your flight plan.

b. Approach the suspected spotter aircraft and determine for certain if it is, indeed, a spotter.

c. Return to your home station and land.

d. Get on the radio, call your home station, inform them you are lost and that you have descended over a coastal area to try to identify it and establish your position.

Okay, mark your choice.

Choice *a* is not practical. If the other aircraft is a spotter he's probably seen you, got your number, and you're in for it.

Choice *b* is even worse. If the other aircraft is a spotter, it is remotely possible he has not yet gotten your number. By approaching him, you not only give him a chance to identify your aircraft, but also to get a good look at you.

Choice *c* is still less rational. You've admitted guilt and are ready to confess without even knowing for certain you've been caught. You've panicked.

Choice *d* denotes a clear head, fast thinking and ability to remain calm under stress. Your navigational skill may be questioned, but you'll stay out of hot water.

If you marked choice *d,* give yourself 25 points, and now that you've gotten the idea, complete *all* the remaining questions before checking *any more* answers. In this test, it is possible to score *more* than 100 points, so if you didn't score on question number one, don't fret. You'll have ample opportunity to make the grade. Let's continue.

2. You are going to test fly an O-1 that has undergone maintenance work. The aircraft has been moved outside the hangar but is parked close to the building. After completing a preflight, you decide to start the engine and taxi without having the aircraft moved further away from the structure. You use a fire guard, but while you are warming up the engine, he goes into the hangar. As you begin to taxi, you hear a thud and feel a slight shock. You look out and see the hook-and-ball at the end of an A-frame cable swinging in the air. The A-frame is next to the hangar but the cable had been dangling low enough that you clipped the hook with your wing tip. You know the damage is slight and you note it is only to the wing tip. You also note that nobody else saw what happened. Which of the following actions do you take?

a. You shut down the engine, get out, survey the damage and make a form entry.

b. You complete the test flight, then make the writeup.

c. You complete the test flight, then enter a "bird-strike" in the form.

d. You complete the test flight, then park the

aircraft and make no entry concerning the occurrence.

3. You are a member of an accident investigation board impaneled to investigate an accident involving a pilot who is a close friend of yours. He is a highly qualified aviator with several thousand hours of flight. However, almost all his flight experience was gained in heavy, high performance aircraft. He had only recently been checked out in an O-1 and was on a solo flight when the aircraft crashed on takeoff. This takeoff was attempted with a quartering tailwind and high gusts. During the investigation you determine that the pilot, accustomed to high performance aircraft, mistook ground speed for air speed, lifted off prematurely, stalled and crashed. Fortunately, he was not hurt—only his ego and the aircraft. Your final determination entered in the report states which of the following as the accident cause factor.

a. Pilot mistook ground speed for air speed, lifted off prematurely, stalled and crashed.

b. Cause could not be definitely determined.

c. Suspect aircraft encountered wake turbulence from some other aircraft, causing loss of control.

d. An act of God.

4. You are a maintenance officer in a unit that has maintained a perfect safety record since you were designated maintenance officer and your longtime friend and classmate was appointed CO. During landing after a test flight, an OV-1, which had just come out of your shop, was seen to veer slightly as the right wing dropped. The gear then collapsed, causing the aircraft to ground loop. Major damage resulted. Quickly, your mind goes to work. The aircraft was in your shop for maintenance of the landing gear. You call the mechanic who performed the work and your inspector. The mechanic tells you he replaced a "kabbobit" on the right gear. He shows you the one he removed and a new one similar to the one he installed. The inspector shudders. The two "kabbobits" look alike and will fit, but the new one is constructed differently internally and is designed for use on another type aircraft. You know a Murphy has occurred. You also know that a "kabbobit" can be removed and replaced in approximately 30 seconds. Which of the following actions do you take?

a. You immediately dispatch your mechanic, along with other maintenance personnel who will eventually haul the damaged aircraft back for repairs, to the wrecked OV-1 and have him replace the improper "kabbobit" with the proper one.

b. You do nothing, leaving the accident investigation board to determine the cause.

c. You submit a request for transfer before the accident investigation can be completed.

d. You apply for emergency leave to tend to pressing business in Alaska.

5. You've made the big time. You've been designated CO of an aviation unit in a combat zone. Unfortunately, you've been "snakebit." Nothing seems to be going right for you. Your luck is so bad that if you suddenly turned into a centipede, you would immediately contract a severe case of athlete's foot. Aircraft in your unit are involved in, not one or two, but *three* major accidents in just a few day's time. All three aircraft are destroyed. Although injuries occurred, there were no fatalities. Your safety officer feels certain that mechanical failure caused two of these crashes and since the aircraft were *not* on combat or combat support missions, he is anxiously seeking an accident investigation of each mishap.

Which of the following actions do you take?

a. On each crash facts message, list the mission as combat support or stipulate that the pilot involved thought he was being fired at and attempted to evade the fire when the accident occurred. Do not permit any accident investigations of these mishaps.

b. Transfer the safety officer to another unit.

c. Apply for retirement.

d. Conduct a thorough investigation of each accident.

Well, there you have it. Those are the five main questions of this test. However, just in case you may inadvertently still be scoreless, two short true and false type questions follow. This is your last chance to get on the scoreboard.

6. You know you've overstressed the main rotor of your UH-1 but you don't know to what extent. However, you are over wooded terrain and you can't land. Your home station is your nearest clear area, so you proceed there and make an uneventful landing. Afterwards, you check the main rotor head and blades and you can find no visible damage. There is no need to enter this overstress in the aircraft log.

7. A pilot in your unit has an in-flight emergency which results in a forced landing under difficult circumstances. He does a superb job of landing the aircraft, with no damage or injuries. You should *immediately* submit his name as a candidate for the Broken Wing award.

That's all. Either you've made the grade or you haven't. Ready for the answers? We've covered

number one; so let's begin with question number two.

If you selected choice *d,* give yourself 25 points. After all, this displays immense use of logic. You are the only one who knows about the mishap. It is not a dangerous condition. It will be caught either during postflight inspection or during the next preflight and will be corrected. When informed about it, all you have to say is that you heard a noise while taxiing past some other operating aircraft, but didn't note anything abnormal. Undoubtedly, everyone concerned will assume that some loose object was blown against your wing tip and the whole matter will be forgotten. Choice *c* is close but there may probably be some paint marks from the struck object on the wing tip, making a bird strike difficult to explain. However, if you selected *c,* go ahead and give yourself five points for effort. Sorry, you get nothing for choice *a* or *b.*

You get a real break with question number three. Choice *d* earns you 35 whopping big points for originality and ability to plot. As a matter of fact, this indicates you may have the makings of a successful novelist. After all, some weird phenomena do occur. For example, although rare, lightning strikes have been documented as having occurred during clear weather and blue sky conditions. If a cow in the shade of a tree or out in open pasture is struck by such a bolt, wouldn't that be an act of God and unavoidable? Choice *d* is worth 35 points. If you marked *c,* take 15 points. You're on the right track. Choice *b* gets you 5 points. Not many points, but the solution is not too original. However, it is safe and that's worth 5 points.

For question number four, choice *a* permits you to get in the race if you have been scoreless up to now. It's worth 50 points. That's right, 50 points. Not only does this action save the day for you, your CO and your unit, but it also shows you have a great sense of humor. Can't you just picture the findings of the accident investigation board? Will they admit they can't find the cause? See, you're really testing their integrity. It isn't often you have such an opportunity and you certainly don't want to muff it. Can't you just picture engineers with slide rulers in hand, walking around half dazed, mumbling something about forces, loads, vector quantities, etc.? And don't forget the specialists at ARADMAC when they attempt to determine the cause of failure. And the poor manufacturer, trying to find some plausible reason why a perfectly good piece of equipment failed. Undoubtedly, your action will drive these experts up a wall. Fifty points for *a.* Sorry, no points for any of the other choices.

Similarly, choice *a* to question number five is the only choice that will earn you any points. It's worth 75. After all, the damage is done, it can't be undone, and other accidents probably won't occur from similar causes, whatever they were. And if they do—well, there is always the factor of predestination. If it's going to happen, an investigation won't prevent it. Better let well enough alone. Be happy there were no fatalities.

Now for the two quickies. If you answered true to question number 6, give yourself one point. It's not the correct answer, of course, but after all, the aircraft maintained its integrity during flight back to its home station. Why burden maintenance with needless work? And besides, the main rotor will probably be due for a change soon.

Question number seven was loaded (?) and considered unfair. Submission for a Broken Wing award is definitely in order, but not *immediately.* Be sure a crash facts message has been submitted first. During a recent month, five of the nominations for the Broken Wing award submitted to USAAAVS had not been preceded by crash facts messages. Can you imagine the embarrassment which resulted? Whether your answer was either true or false, you get *no* points whatsoever for question number seven.

Quickly add up your score—small or large—and write it down. Now you are ready to be rated. The *maximum* passing score on this test is zero. That's right—zero. If you scored even one single point, you failed. After all, there is no such thing as being a tiny bit pregnant—either one is or isn't. You'd be just as dead if you failed to clear a mountain peak by 5 feet as you would if you failed to clear it by 5,000 feet.

If you scored zero, consider yourself a pro. If you scored in the low range, you've got some refresher work ahead of you. What about those of you who became disillusioned after the first question? Good! You're one notch up the ladder leading to perfection. If you really were turned off and stopped taking the test, moving on to some worthwhile article elsewhere in the magazine, then you won't be reading this analysis, but maybe someone will give you the message:

Your professional status is unquestionably near the apex of perfection. Give yourself a pat on the back and keep up the good work.

But are the questions and choices really way out? Back up a moment and read each question along with the corresponding answer choice that offers the *greatest* number of points. These are not contrived situations. They are *factual.* That's right. Admittedly, they're disguised to prevent identification, but *every single one occurred.* Any questions?

What about those of you who made high scores? Have you ever considered another profession? . . .

AVIATION ACCIDENT PREVENTION FORUM

an interchange of ideas between readers and USAAAVS on subjects of aviation accident prevention

Survival Panel

Recently our brigade flight surgeon pointed out a fact to us "jockeys" about our Nomex trousers. To wit, the extra pocket found inside the survival-knife zippered pocket. Doc says this pocket was designed to carry a signal panel and that it was to be issued with each pair of trousers.

Not only were the majority of us amazed to discover a new pocket, but the idea of the Army supposedly paying for these panels and not receiving them bothers us.

Please be kind enough to clarify the situation.—LTC, Signal Officer

Thank you for your interest in safety and us taxpayers. A requirement for a survival panel, 36" x 36", was included in the original procurement document for the Nomex trousers (Trousers, Flyer's, Hot Weather). The Nomex panel was to be folded to approximately 2" x 9" and inserted in the pocket inside the knife pocket of the right thigh pocket. Nomex material, however, would not accept the dye for the panel; and because of the urgent need for the trousers in Southeast Asia, the panels were not included in the procurement.

A panel manufactured from nylon fabric is now being procured as a separate item and was to be available for issue—also as a separate item—on or about 1 August 1972. You must submit a separate requisition for the panel.

Nomex Uniforms

Reference the article (May 1972) concerning Nomex uniforms, I totally agree with the MAJ, Executive Officer. I believe that it's about time Army aviation woke up to the fact that passengers are not interested in the pilot's clothing. Who do the operation officers think we are impressing with this display of class A uniforms in the cockpit? This problem could be solved very easily; require approved flight clothing for all crew members during all flights in Army aircraft. Perhaps if we altered the regulation to read this way, then we could enjoy the benefits of the money and materiel that went into the perfection of the present flight clothing.—CWO, Maint Tech

Thank you for your interest in aviation safety. We suggest you submit a DA Form 2028 requesting that the pertinent regulation (AR 95-1, par. 4-15) be changed to reflect your sentiments. Be sure to include complete and detailed justification for your proposed change.

Aviation Ground Accidents

We have recently received Change 3 to AR 95-5 which requires us to report "aviation ground accidents." What is an aviation ground accident?—CWO, ASO

USAAAVS cannot give you an answer at the time of this writing. A change to AR 385-40 containing the official definition of this type of accident is expected to be published in midsummer.

Temporary Flying Restrictions

How long after a party do you have to wait until you fly?—CPT, Aviator

AR 40-8, dated 12 January 1972 and effective 1 March 1972, has the answer together with certain other information you may be interested in. Entitled Temporary

Flying Restrictions Due to Exogenous Factors, *AR 40-8 outlines the following restrictions that apply not just to pilots but to all personnel on flight status:*

a. Alcohol—No flying until 12 hours after last drink and until no residual effects remain.

b. Antihistamines and barbiturates—No flying during period taken and for 24 hours after discontinued use or after any "sequelae," whichever is longer.

c. Mood ameliorating, tranquilizing and ataraxic drugs—No flying during use and 4 weeks after drug is discontinued.

d. Immunizations except smallpox—No flying for 12 hours after.

e. Blood donation—Following donations of 200 cc's or more, no flying duty for 72 hours. The regulation also states that no aircrew member will be a regular blood donor.

f. Rapid decompression or high-altitude chamber training—No flying above a pressure altitude of 10,000 feet for 24 hours.

g. Low-pressure chamber runs, SCUBA diving, compressed air dives, or high pressure chamber runs—No flying for 12 hours following.

IMPORTANT: AR 40-8 makes the individual aircrew member responsible for telling the flight surgeon when he has participated in activities or received treatment after which flying restrictions may be appropriate.

Although not a flight restriction, AR 40-8 prohibits aircrewmen from wearing contact lenses at any time.

Fatigue

As so often happens, the role of fatigue in aircraft accidents was recently a topic of discussion among a group of pilots. Can USAAAVS give us any factual information on this subject?—CPT, Aviator

According to USAAAVS statistics for a recent 18-month period, fatigue was known to be a contributing factor in 19 accidents and was suspected in 96. During the same period, loss of sleep was a known factor in nine accidents and suspected in 24.

Fatigue, whether from flying or other activities (mental or physical), is a well-recognized detriment to physical performance and mental alertness. In aviation, where these factors are paramount for safe and proficient flying, fatigue can have a critical effect on both the individual and unit mission accomplishment.

Unfortunately, fatigue is a very complex and subjective thing not amenable to accurate measurement even under laboratory conditions. Situations in which fatigue is a factor may also involve many other environmental factors (heat, cold, noise, vibration, darkness, fog, dust). Personal problems of concerned individuals may play a part in reduced efficiency. The amount of worthwhile training and experience has a bearing on performance that may obscure the effects of fatigue. Age and physical condition are likewise important.

Until such time as science can unravel the mystery of fatigue and provide the aviation community with a useful handle by which to seize the problem, fatigue will remain an adversary.

Readers are invited to participate in this forum.
Send your ideas, comments and recommendations to Commanding Officer, USAAAVS, ATTN: E&P Department, Ft. Rucker, AL 36360

Sergeant First Class R. A. Mullinax
Aircraft Accident Analysis and Investigation Department
USAAAVS

Aircrew Integrity EQUALS Flights

INTEGRITY—the quality or state of being complete or undivided—should be a definite goal in the formation, training and performance of an aircrew. In general terms, an aircrew is the integration of one or more personnel into a team devoted to maintaining, inspecting and operating an aircraft in a professional manner that ensures safety and mission completion.

How can we achieve the integrity that we need in an aircrew? It's not really something that the commander or the platoon leader or the noncom can achieve. They can guide toward it, train toward it and pray for it, but only the individuals comprising the crew can achieve it. When we consider the complexity of today's aircraft and couple it with the complexities of human behavior and individual personalities present in an aircrew, it becomes obvious that only the aircrew can produce the final desired integrity. Since the basic mission of an aircrew is to participate in flights, let's take that word, break it down and, from it, extract some of the characteristics that an aircrew must develop to attain true integrity.

"F" is for faith, and certainly it has a pronounced effect on an aircrew. Faith, in its archaic definition, means to believe or trust. Clearly, the crew chief must believe that his pilots can fly and navigate. The pilot must believe that the crew chief, gunner and copilot can perform their assigned duties, and each must trust the other to do just that.

Faith is perhaps the most precarious of all the characteristics in that it may well be the easiest to destroy. Consider the pilot who, upon checking the dash 13, finds that the crew chief has completed the daily inspection and then, on preflight, discovers that both engine oil and hydraulic fluid levels are low. How much faith can he place in his crew chief in the future? Or consider the case of the noninstrument pilot who files VFR on top, under radar control, due to severe weather en route. After flying until he feels he is over his destination, he decides that the radar control center must be wrong and he promptly lets down through the first hole he finds. He then discovers that he has no idea where he is except that it sure is a thick jungle. Finally, after flying treetop level in near-panic, he finds another hole,

climbs back on top and then discovers that radar can no longer pick him up. Just how much faith will the crew place in him on the next flight? Unfortunately, neither of these cases is a rare occurrence.

After faith comes loyalty which is defined as the state or quality of being loyal. To go a little deeper, the word "loyal" means to be faithful to a person to whom fidelity is due. It's obvious, then, that to destroy one's faith will also serve to erase his loyalty. Can you picture the tension among crew members who have no faith and no loyalty to each other? Such a crew would be as unsuitable for flight as a helicopter without a rotor.

The loss of either faith or loyalty would decrease the effectiveness of the next desirable characteristic —interaction. Interaction is defined as "mutual or reciprocal action or influence." In other words, "teamwork," each person knowing enough of the other's functions to anticipate and react accordingly, enabling the entire crew to operate as a single entity. To achieve this requires much effort on the part of all crew members—proper briefing of the crew by the aircraft commander, proper briefing of pas-

Aircrew operation is like a mutual admiration society in which each man tries to impart some of his knowledge to the others

AIRCREW INTEGRITY

sengers, assurance by the crew chief that the aircraft commander is aware of any delayed discrepancy writeups on the aircraft and a lot of just plain working together and knowing each other.

What about grit? This is, perhaps, a gut-level word, but it can be misconstrued quite easily. Grit is defined as "a firmness of mind or spirit." Now let's look at the crew member whose personal motto is, "When it's too rough for everyone else, it's just right for me." Is this grit or is it just lack of common sense and intelligence in failing to recognize one's own limitations and, thus, the limitations of the crew? Certainly, grit is needed in an aircrew which, under some circumstances, may be flying 8 to 10 hours a day under far from desirable conditions. But like most things, grit is best when served with a good side dish of common sense.

Honesty walks hand in hand with grit and is our next aircrew characteristic. Honesty is defined as "fairness and straightforwardness of conduct." It's easy to see that the lack of honesty on the part of a crew member could also greatly reduce faith and loyalty. Wouldn't the aircraft commander have more faith in the crew chief who did not sign off the daily inspection until after he had serviced the oil and hydraulic fluid systems? Or what of the devoted pilot who, in fear of being grounded, tries to cure himself with patent medicines, failing to admit—and be honest with himself—that some medications can induce drowsiness, loss of depth perception or other adverse reactions?

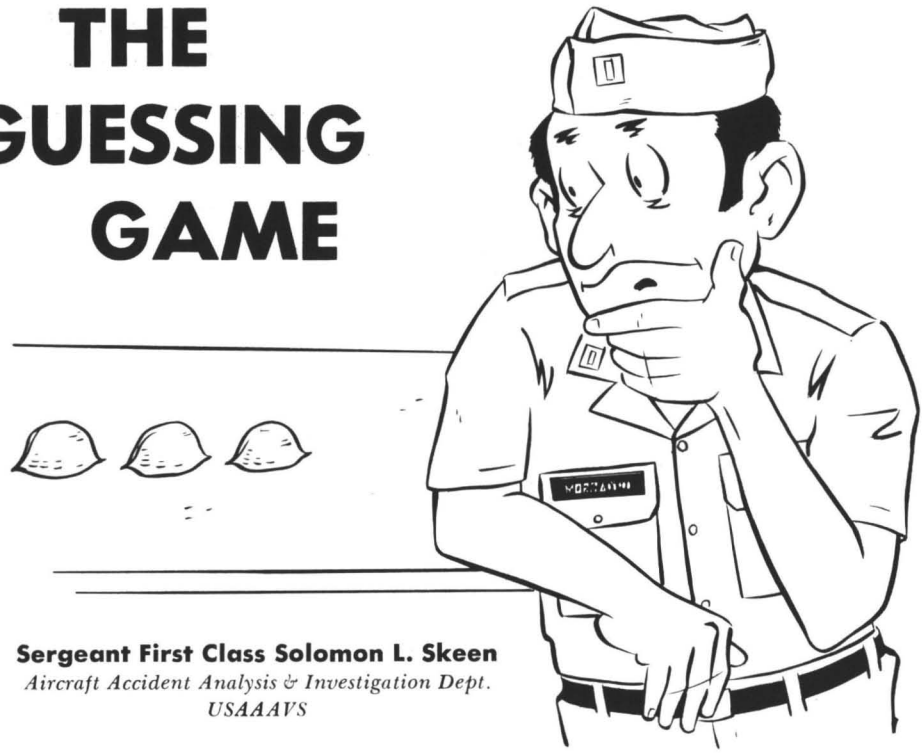
Training is defined as "the state of being trained," and perhaps is a rather ambiguous characteristic of a flight crew because so many people have their fingers in the pie. When is an aircrew fully trained? Who is responsible for crew training? How and where is crew training conducted?

First, an aircrew is never fully trained! The members may be operationally ready to function, but it is impossible to say that a crew is fully trained to cope with any emergency or situation to which they may be exposed. Therefore, an aircrew must be considered to be constantly in training. Theoretically, the commanding officer is responsible for this training, but common sense tells us that the CO can't directly supervise the training of a number of aircrews; so who is directly responsible to see that the training is progressive and continuous? The platoon leader, the platoon sergeant, the executive officer, the first sergeant and, as was stated earlier, nearly everyone has his finger in the pie. We must concede that each member of a crew is trained in his own specific job or he would not be assigned as a crew member.

It's the training as a crew to develop the required interaction that we must be concerned with. Sure, the POL man who has been assigned as gunner may be the best M-60 man around, but what does he know about the aircraft? About the principles of flight? About flight safety? About all the little oddities of the aircrew business? We know the pilot can fly, but does he know enough about the mechanics of his aircraft? About his armament systems? About his crew? Aircrew operation is like a mutual admiration society in which each man tries to impart some of his knowledge to the others. Maybe it's time to consider formalized aircrew training and assignment as crews rather than as individuals.

Finally, the word "flights" ends with "s," but that's really where aircrew integrity starts because "s" stands for selection. Selection of the aircrew is the starting point, the corner block from which the crew must build. Those who have the responsibility of assigning personnel to crew duty must select only the most qualified, whether for aircraft commander or gunner, copilot or crew chief. The material with which we build will determine the ultimate strength and usefulness of the finished product.

THE GUESSING GAME



Sergeant First Class Solomon L. Skeen
Aircraft Accident Analysis & Investigation Dept.
USAAAVS

A CH-47 WAS in cruise flight at an altitude of 2,000 feet over water. Inside were five crew members, two passengers, a loaded ¾-ton truck and a ¾-ton trailer. Everything appeared normal until the aircraft commander smelled hot oil. He looked at the transmission oil pressure indicator and noted the reading was zero in the "scan" position. Hot oil then began pouring over his right sleeve, and he shouted, "Oil!", simultaneously lowering the thrust lever to initiate an autorotation. The pilot continued lowering the thrust and went into full autorotation.

At the word "Oil," the crew chief started taking off the soundproofing and the armor protection underneath the forward transmission. After gaining access to the transmission, he saw that the oil was coming from the forward transmission oil filter. Using a socket and a speed handle, he rotated the nut three full turns before it became snug on the stud. Because the transmission was no longer leaking oil and failure appeared to be imminent, no attempt was made to see if any of the other retaining nuts were loose. As the aircraft neared the water, the aircraft commander attempted to save the Chinook and proceeded toward shore at a very low altitude, the cargo ramp frequently touching the water.

When approximately 1½ miles from shore, the forward transmission began to squeal and growl. Finally, rpm could no longer be maintained (180 rpm maximum) even though indicated torque was 950 ft lbs, and the aircraft commander ordered the crew and passengers to bail out. The crew, passengers and pilot exited the helicopter. The aircraft commander shoved the cyclic to the right so that he could safely exit and avoid the rotor blades. The helicopter rolled over on its right side and then on its back and sank.

There were five life preservers aboard the Chinook. The aircraft commander, pilot and flight engineer exited without life preservers. The two remaining crew members and two passengers had preservers. A USMC CH-53 dropped several life preservers to the aircraft commander, pilot and flight engineer, but none was able to open and inflate these life preservers as they were unfamiliar with that type. Finally, a U.S. Navy Swift Boat successfully extracted all occupants of the downed Chinook from the sea.

The cause? Estimating the torque when installing the forward transmission oil filter nuts instead of relying on a torque wrench. Too many times this happens because it is easier and faster to use the improper tool (speed handle) for a job instead of a torque wrench. Fortunately, in this instance, all occupants were rescued, but playing this "guessing game"—an expensive and dangerous pastime—cost one CH-47 and cargo.

What about yourself? Do you gamble, or are you *sure*?

Major Roy P. Hooks
Education and Prevention Department
USAAAVS

THE COPILOT

IF IT HAD not been for my copilot, this mishap could have easily terminated in a major accident instead of an incident. After we lost hydraulics, the controls were so difficult to move that I had to have his assistance to make a significant change. But more importantly, he tuned the radios and made all the emergency checks listed in the checklist. He had been monitoring my navigation and when the emergency arose, he assumed navigation and directed me to the nearest suitable landing area. . . ."

". . . I always leave the flaps down until I reach about 300 feet after takeoff. Much to my surprise, we had barely become airborne when the copilot raised the flaps. By the time I reacted, we had lost so much altitude that I almost hit the perimeter fence. . . ."

Who is this individual we call copilot who, in one situation, saves an aircraft and crew from disaster while, in another, triggers the events that lead to an accident? When is he required? What are his duties?

The prefix "co-" is a shortened form of "com-," meaning "together with, as in co-operation." Logically then, the copilot is the assistant pilot. Under provision of AR 95-2, he is required for all fixed and rotary wing aircraft being flown into known or forecast instrument conditions. (This requirement is waived for OV-1 aircraft when mission requirements dictate otherwise.) Those are the only times the Department of the Army requires a copilot.

But since a major portion of our flying is accomplished with a copilot on board, what are his duties? If you are expecting a "laundry list," I'm sorry to disappoint you, but there is none—not at the Department of the Army level, anyway. How, then, is the copilot to know what is expected of him? To answer this question, let's first consider the pilot's duties.

AR 95-2 states that the aviator in command of the aircraft will be directly responsible for its technical operation and will have final authority as to technical operation of the aircraft. That statement embraces a lot of territory—preflight, use of checklists, flying the aircraft within its envelope, passenger briefings, compliance with regulations—you name it. It's the pilot's responsibility. What he requires of his assistant, the copilot, depends on the particular situation. That's the way it should be. Only after an analysis of his own experience and proficiency; the experience and proficiency of his copilot; and the area of operations, flight conditions and mission requirements can the pilot logically determine the appropriate duties for his copilot. Some general and specific duties could be appropriately included in local SOPs as copilot responsibility. This inclusion might be of particular value in areas where aviators regularly fly the same type, model and series aircraft on similar type missions.

General duties might require the monitoring of engine and flight instruments, as well as the pilot's navigation, and watching out for other aircraft. Specific duties might include the clearing of weapons systems (using checklist) prior to entry into cantonment areas, tuning and operating radios during emergencies and disembarking and monitoring refueling operations.

But regardless of the duties assigned a copilot, one point must be emphasized: *The key to proper use of copilots is briefings*. These briefings must be conducted in a thoroughly professional manner, and they must be programed into the *preflight* planning phase—not conducted in the cockpit as an afterthought or, worse, neglected. This procedure will eliminate or reduce confusion in the cockpit, promote competence and foster confidence between the pilot and his key man, the copilot.

Aviation Accident Prevention Management Course for NCOs

THE UNITED States Army Agency for Aviation Safety (USAAAVS) is continuing the 1-week aviation safety course for enlisted personnel through FY 1973. The course provides training in Army aviation safety management and includes accident investigation, reporting and prevention. Classes are currently being conducted at building 5301, Ft. Rucker, AL, under the supervision of the commanding officer, USAAAVS.

This course is intended for personnel not previously trained in a formal aviation safety course and who are presently assigned, or anticipate assignment, to aviation safety positions. The program is open to all personnel in grades E-6 through E-9 (specialists included) in aviation related MOSs. Qualified individuals interested in attending this course should contact their local school officer. Personnel who have orders to attend should contact the Ft. Rucker Billeting Officer, building 308, upon arriving, or call AUTOVON 558-3780 for billeting arrangements prior to departing for TDY. Following is the class schedule for FY 1973:

Class No.	Starting Date	Closing Date
73-1	24 July 1972	28 July 1972
73-2	28 August 1972	1 September 1972
73-3	25 September 1972	29 September 1972
73-4	30 October 1972	3 November 1972
73-5	27 November 1972	1 December 1972
73-6	22 January 1973	26 January 1973
73-7	26 February 1973	2 March 1973
73-8	26 March 1973	30 March 1973
73-9	30 April 1973	4 May 1973
73-10	21 May 1973	25 May 1973

Captain Allen C. Eckhoff
U.S. Army Combat Developments Command
Fort Belvoir, Virginia

PROFESSIONAL PROBLEMS?

IT'S OBVIOUS the fast-paced modern Army is not going to be slowed down by nonprofessionals. Since aviators are subject to actions by UCMJ, FEB and RIF, there isn't much room left for continued inefficiencies. Is it possible some aviators are victims of problems affecting professionalism that we are aware of, but have failed to adequately suppress? Most of these problems can be defined in three basic categories—proficiency, maintenance and knowledge. It's time to remind ourselves of some of the more prominent continuing problems and attempt to achieve workable solutions.

We all know about the individual regarded as "One of the best pilots in the world, because he can really fly that aircraft!" This person might well be adversely affecting the ideas of others because of his nonprofessionalism. He is commonly referred to as a *cowboy*. He's the one who does hammerheads in a Cobra, tries to do rolls and split S's in an OH-6, thinks he must impress passengers with his skill (?) and gets away with it. What he's really doing is exceeding the design limitations of aircraft and endangering lives.

This could be a result of inadequate emphasis on aircraft limitations. Perhaps we need to delve a little deeper into the subject and provide instruction on aeronautical engineering. The first step would be to remind aviators that such things as induced g-loading, zero-g maneuvers and height-velocity diagrams are discussed in dash 10s. Then explain what is meant by stress, strain, overloading, flight envelope, etc. Finding an instructor at unit level is often difficult, but a safety officer who has been to the Aviation Safety Officers Course at the University of Southern California or the USAAAVS Aircraft Accident Prevention Course at Ft. Rucker, AL, should be able to discuss these subjects. A note of caution—having someone merely read a lesson plan is worse than not even mentioning the subject.

It's not unusual to hear of an aircraft commander having to relinquish control to his copilot when going IMC (instrument meteorological conditions), more commonly known as IFR. This is usually because the copilot is more proficient as a recent graduate or through continued practice, while the aircraft commander has become a victim of the doldrum of daily VFR flying and failed to maintain instrument pro-

ficiency. This type of aircraft commander usually practices only two times—as a result of a scare from inadvertent IMC or just before his instrument renewal.

It's obvious there must be some type of encouragement to eliminate this recurring situation. Possibly, the use of form 175s only, when the supply of 1080s runs out, will influence the need for continued instrument practice. The new requirement for aviators to possess a standard instrument ticket will be beneficial. Unannounced and unscheduled check rides would have a significant influence. Until these are implemented, continued command emphasis and increased personal effort should be employed as *pushers* for instrument flying proficiency.

While experience is a good teacher, it is unreasonably expensive to gain through accidents. Two questions often asked about a pilot after an accident are: (1) "Did he receive *sufficient* training?" and (2) "Was he *properly* trained?" A postaccident check ride and review of his training folder will usually reveal the answer. But training also has its drawbacks. One of the major ones is a limitation on how emergencies can be simulated. This can best be realized in the fact that some thrust is still being delivered to rotor systems during simulated engine and tail rotor failures. Thus, sounds and aircraft reactions cannot be accurately simulated. Or *can* they? The point now is for the "thinkers" to determine if a combination of information from flight recorders, engineering calculations and accident histories could be integrated into flight simulators to provide more realistic emergency environments. If this integration proved impossible, the information could provide a basis for review of current training techniques and policies.

Maintenance has caused its share of problems, but these problems have been induced by one means or another. For instance, the 10 percent overflight on certain inspections and scheduled maintenance is merely a convenience. It might be interesting to know how many accidents resulted from inspections not being made as scheduled which may have revealed pending failures/malfunctions.

Preflight inspections are a must. However, their purpose is not to discover changes in tolerances or parts. Aviators should be informed of changes prior to preflights so they may have the opportunity to discuss them before they are in a rush on the flight line and can't find a maintenance man. This problem can be resolved by coordination of the maintenance officer and a designated pilot from the flight section. Another solution is to have meetings—maintenance, safety or whatever—but make them *meetings,* not classes. To get people to talk to each other and work together instead of at cross purposes, perhaps rap-session type meetings would be more suitable.

A true professional does not just achieve a certain standing or receive his rating, then sit back and gloat about it. He must continue to seek new information so he can be more knowledgeable and better qualified. One problem that has plagued us for many years is that technical manuals are usually so voluminous that one look at them usually discourages intended readers to a point where they never look at them again. If that doesn't do it, the fact that the manuals are so big will certainly not encourage users to carry them at all times.

So, you say, "Simple, make it smaller." That's just what the U. S. Army Combat Developments Command is doing with some of the manuals—paperback, pocketsize books written in modern language style to attract the interest of readers. Right now, the number of manuals to be revised is very few. However, it's possible crew members will be seeing operator's manuals and others in the new style in the near future.

People have virtually lost all sense of perspective in accidents because they were not knowledgeable about helicopter operations. This could easily be prevented with orientations or briefings to personnel of supported units. The commanders of both supporting and supported units should have an inherent responsibility to ensure that adequate liaison is established so that all personnel are informed, especially of appropriate actions to be taken in emergencies.

It becomes apparent that problems relating to proficiency, maintenance and knowledge are not always induced by aviators themselves. The task of solving and eliminating these problems is not insurmountable. However, immediate action is required to eliminate conditions which may develop into problem areas. Only through the joint efforts of all concerned will we be able to keep this an association of professionals.

Common as they are, don't underestimate them. They may someday save your life

THE THREE W's

Gene Berta
Education and Prevention Department
USAAAVS

AMONG THE FIRST *do's* pounded into a cub reporter's skull are getting answers to the four "W's"—who, what, where and when. These answers make up the meat of any newsworthy item. Expounding on them simply adds the gravy. In Army aviation, emphasis is now being placed on three of these—who, what and where. The *who* refers to the crew of an aircraft involved in a mishap; the *what,* to the type of aircraft being operated; and the *where,* to the environmental factors associated with the mishap. More specifically, the three "W's" stipulate the human element, aircraft design and all environmental mishap cause factors.

The need to accurately identify each of these areas, to determine the degree of involvement of each as well as their interrelationships, has long existed, but up to now, every attempt to find meaningful answers has met with disheartening results or dismal failure. In a sense, these important answers have remained hidden behind a locked door. This door is about to be opened with a key presently being forged by the U. S. Army Agency for Aviation

Safety (USAAAVS). The metal being used is the tremendous amount of accident information which already has been cranked into USAAAVS' computers. The forge is the computer capability which makes it possible to perform the kind of in-depth analysis required.

USAAAVS is conducting two studies designed to yield methods that will permit factual, objective analysis of two major areas that, up to now, could only be dealt with subjectively. The first, already mentioned, concerns the contribution of crew, aircraft and environment to aviation accidents; and the second, the accident potential of any given group of aviators.

Current research shows that human error is an attributable cause in at least 70 percent of all Army aircraft accidents. USAAAVS is now working on a system that will show what part of this is induced by aircraft design and environment, and what part is due solely to the man. In this way, accidents can be divided into human and nonhuman error categories. When fully developed and implemented, this method of evaluating mishaps will also be able to show the interrelationship of these causes. This information can then be applied constructively to pilot training, accident investigation, prevention and research, and can provide improved criteria for selecting or eliminating student aviators from the flight training program. Improved knowledge of the interaction of these cause factors can also lead to more precise action for preventing mishaps.

The development of a second method of objective analysis from a companion study will further enhance aviation safety by providing information about the individual aviator who is always a major potential source of human error. This method is being designed so that it can be used to measure the accident potential of any given group of aviators. The guinea pig for proving the usefulness of this method is a group of aviators who were "set back" in their flight training courses, given additional training and awarded their wings during a period of great demand for pilots. In-depth analysis will test the current hypothesis that low-ability setbacks may be responsible for a disproportionately large number of aviation accidents, especially those involving pilot error.

If the current hypothesis proves valid, several benefits to training and accident prevention should accrue. The characteristics defining a setback can be identified so as to influence the future selection of students for flight training. It may even be possible to isolate specific reasons for a student's being set back, or certain levels of flight performance associated with setbacks, identifying those students who should be eliminated from the program. Also, commanders could be alerted to any additional training needs for those setback aviators already in assignments which demand a high degree of flight skill.

On the other hand, if the setback hypothesis is not valid, the analysis should remove from the setback aviator, at least to some degree, the stigma of high accident potential. In either case, it is hoped that this method of analysis will prove viable, and other aviator samples can be processed in a search for human error potential. The development and use of these two methods of analysis are considered an essential part of USAAAVS' investigation of the human error problem in aviation accidents.

"Well," you say, "it sounds fine, but where do I fit in?" Good question. Not only do you fit in the picture as a recipient of any benefits that can result from these studies when they are completed, but also you play a most important role right now. One of the major problems in analyzing information already in the computer system is the ferreting out of incomplete or erroneous information. This must be done and additional, complete information made available before accurate and meaningful results can be realized. In short, data for use in these studies must come from the field, and must be accurate as well as complete.

The importance, then, of carefully prepared, completely filled-out crash facts messages and meticulous, objective, in-depth accident investigation reports cannot be overemphasized. Thorough reports are essential for effective accident prevention. After all, you wouldn't build a multi-million dollar medical research center to find a cure for some specific disease, staff this center with specialists, then feed these specialists incomplete or erroneous data, and expect results. How would this help you if, at some future date, you should contract the disease in question? Yet, this is precisely what we sometimes do in the field of aviation accident prevention research.

Yes, the key to the lock is being forged, but whether or not it will fit and unlock the door depends on *you*.

THE MEN WHO NEVER RETURNED

OF THE MANY challenges in Army aviation, perhaps the greatest involves the decision to attempt a particularly hazardous mission. Knowing chances for success are slim, the aviator freely chooses to fly in the face of great danger. Talking with such aviators afterwards, I have often asked, "Why did you do it?" The most frequent reply has been, "Because the job had to be done." In short, "duty." At some time or another, every combat aviator has faced this moment of truth and made his decision. Not all of them have returned.

February brought 2 clear days to the northern provinces in the Republic of Vietnam before the monsoon resumed. During those 2 days, a squad-sized patrol was air-assaulted to the western mountains, deep in enemy territory and high upon a bouldery, forested ridge. The men had disappeared on long nylon ropes beneath the hovering helicopters like khaki beads of water sliding down strings. The thirsty jungle had swallowed them up. Now the clouds descended over the mountains, and the wind swept the never-ending drizzle along the coastal plain. Deep in the mountains, the patrol, deployed under the enemy's nose, watched and reported.

On constant alert some 50 miles away, four helicopter crews anticipated the inevitable and dangerous mission of extracting the small patrol. The constant rain beat against the ready shack where the crewmen waited. Now and then, one of the young aviators would cast a bored and restless look at the weather. Stretched out on a delapidated cot, one of these men seemed especially relaxed. To look at him,

Major Robert L. Clewell
Data Center
USAAAVS

a casual observer would not have guessed that the lives of this patrol would hinge on his skill, maturity and judgment. He was scarcely 22 years old, but he possessed a carefully cultivated talent for leadership.

He was professional, meaning he conducted himself with a skill that was proven daily. Leaving nothing to chance, he operated by the book, but added to his actions a certain joie de vivre. He knew what it meant to be alive and was aware of all that was happening about him. He was one of those who conversed with his crew before and after each mission; not just to exchange amenities, but to ask their opinion of this or that, or to commend their performance. In the mornings, he got to his aircraft before the others. At night, more often than not, he was down along the flight line checking something or other before hitting the rack. He had flown the same dangerous missions as everyone else, knew the odds as well as his capabilities.

He called to the others as he came off the cot and stood. Seconds later, a breathless runner appeared at the door. Collecting their flight gear, the men wedged along a front row bench where the briefing officer poised before a huge map. In the hushed silence, a loud speaker hissed and crackled as code words flew out. The patrol, compromised and cut off from safe movement, now lay within a tightening enemy circle. There was only one way to escape.

One by one, the climbing helicopters vanished westward in the rain and the deepening grayness of late afternoon. At the edge of the mountains, thick clouds swirled, breaking among the peaks and along the ridgelines. With precious enough fuel, the lead aircraft flew down through the boiling mist to hover above the friendly force. Lowering long ropes through the trees, two crewmen watched as three desperate but disciplined men latched on and signaled. Slowly, so as not to hang them in the trees, the helicopter rose straight up, then whisked the men away. The next and the next repeated the daring descent so that three men remained to be saved. With fuel nearly exhausted, the helicopters beat their way to a forward fueling station and carefully deposited their human cargo. The lead aircraft had already refueled and winged back to the west. The sinking sun worsened the weather. What right-minded man could wish to fly among those darkened mountains through such clouds? Perhaps with this in mind, the others were ordered to return and soon reached the coastal plain.

Among the boulders beneath dank trees, three pairs of friendly ears listen as the single, searching, hovering ship comes into view. Lines lower, three men snap on. The enemy watches. Overhead, the hovering helicopter appears ghostlike in the low clouds, crewmen leaning down and out to talk the pilot up—straight up—mindful of the trees through which the human strands must come. Below, enemy eyes seek to see and shoot. Louder than the rushing, grinding wind, their weapons pop and crackle. A loud resounding crash and licking flames is the result.

Far off, distant sounds mutter as flames subside and darkness hides remnants of the past. Ships still fly where they must.

If you have a question about personal equipment or rescue/survival gear, write Pearl, USAAAVS, Ft. Rucker, AL 36360

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

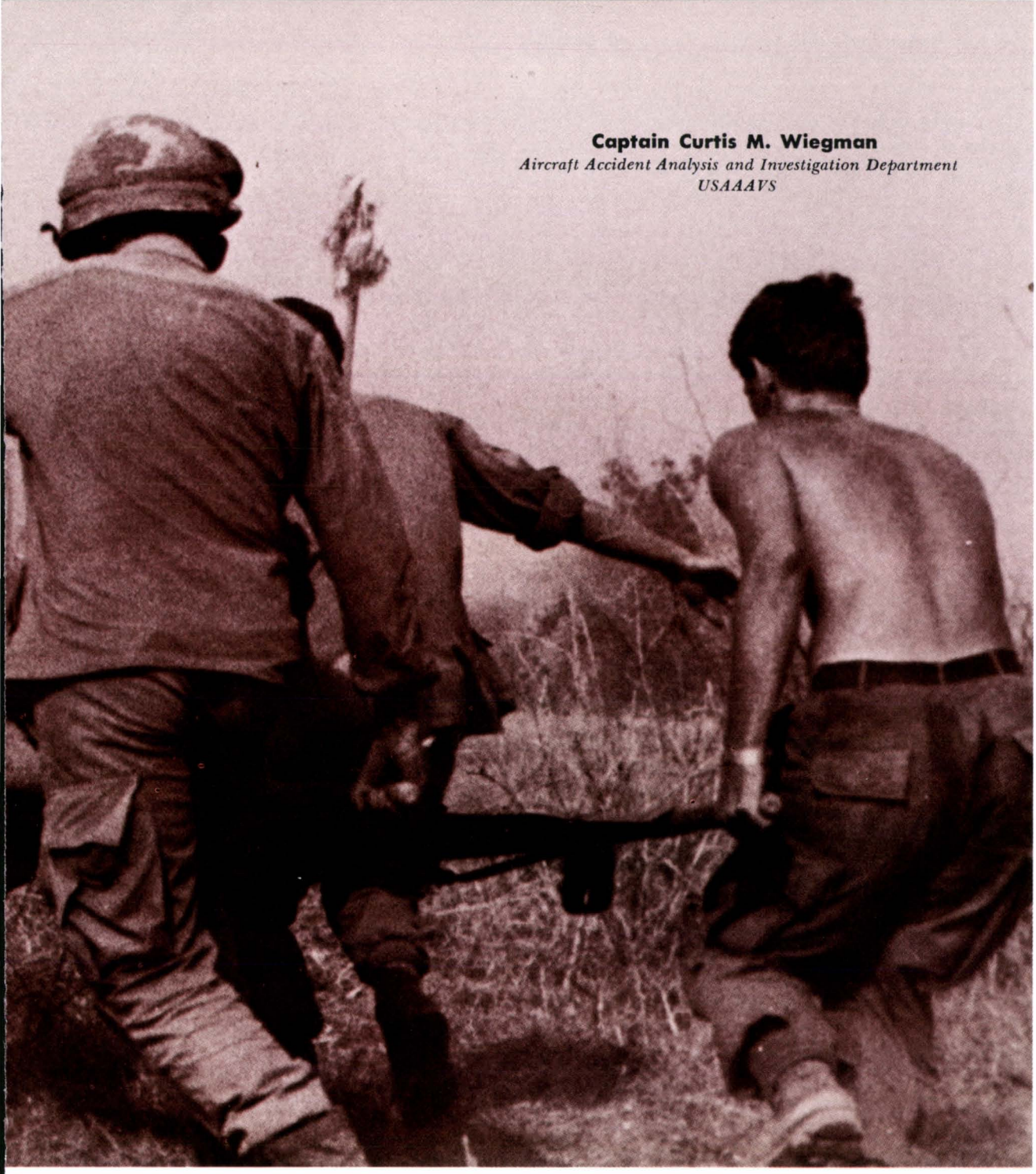
TIME AND AGAIN we have been warned about the hazards associated with aircraft fires, and urged to dress properly as a precautionary measure. No words can convey this more emphatically than the accompanying photographs. Both of these men were aboard the same helicopter when it crashed and burst into flames. During their escape, both were exposed to intense flames for equal periods of time. One sustained first and second degree burns over a relatively small area of his body. The other suffered second and third degree burns over an extensive portion of his body. One survived while the other died from his burn injuries. The deciding factor was clothing—proper flight clothing. One wore a Nomex flight suit and leather boots. The other wore jungle fatigues and jungle boots with nylon inserts. No need to ask who was wearing Nomex and leather.

It's too late for warning the men who died and "I told you so" won't help. But it's not too late for the rest of us to stop and check our flight clothing, including underclothing, to make sure it's the right type and to resolve to wear it properly when we fly. The price others have paid is too great to keep paying for lessons we should have learned long ago.

TO SAVE A LIFE

AN EXPLODING mortar round, followed by a chilling scream, echoes through a triple-canopy jungle. Then the shout comes, "Call for medevac!" Moments later, a "Dustoff" crew maneuvers into a tight LZ. Through the grime of battle, you see relief flood the wounded soldier's face. He knows he's only minutes away from expert medical care and his chances of survival are excellent. Though it holds the record for reruns, this is no make-believe scene from a TV thriller. It's for real.

Medevac units continuously supply the vital life-saving link between those who are hurt or ill in remote locations and the hospital care they desperately need. During a recent 2-year period, medevac crews in the Republic of Vietnam flew more than 184,000 missions, recording in excess of 161,000 flight hours. Many lives were saved. Unfortunately, this tremendous record was not made without the



Captain Curtis M. Wiegman
Aircraft Accident Analysis and Investigation Department
USAAAVS

loss of crews who fly mercy missions. More unfortunate still, many of these losses were unnecessary.

A medevac helicopter departed a forward area base camp for the rear area hospital at approximately 1900. On board were a local woman and her injured child. The child was severely burned over most of its entire body. The weather was, in a word—*bad*—low broken cloud cover, poor visibility, rainshowers and scattered thunderstorms. It was so bad the pilot had to use a highway to navigate. The searchlight was turned on and the chopper flew along the highway at approximately 150 to 200 feet. As the visibility deteriorated, the searchlight was turned off and they climbed to 400 feet. The pilots called GCA at their destination, but no radar contact could be established, so they climbed to 1,500 feet. Radar contact still could not be made, so the ADF was tuned to the local radio beacon. The aircraft com-

mander saw his attitude indicator indicating a left turn, though the turn needle was centered. However, he was able to keep the ship under control.

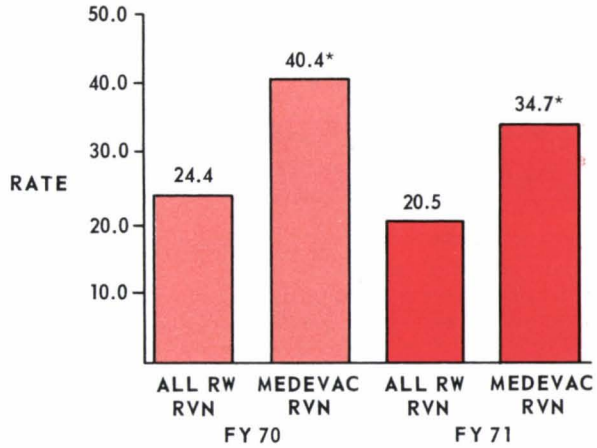
The tower contacted the pilots and informed them the airfield beacon had been turned on so the crew could tell when they were over the field. At this time, the crew saw a glow and, thinking the airfield was below, made a left descending turn. The aircraft commander developed a severe case of vertigo and the pilot took control, continuing the turn. The aircraft commander reoriented himself and resumed control at 1,000 feet. At this point, still in the clouds, both pilots experienced vertigo and both got on the controls. In this manner, the two disoriented pilots managed to control the helicopter and climb back to 2,000 feet where they encountered severe turbulence and heavy rain.

Both pilots began overcorrecting and the helicopter again went out of control. Air speed decreased and it entered a fast descending turn which was checked at approximately 1,000 feet. The low rpm audio then came on. As they went into a hard bank, the pilot heard the tower trying to call them, but he was too busy to answer. By now, they were descending at 2,000 feet per minute. The aircraft commander placed the transponder in the emergency position as they passed through 700 feet and, by adding power, they were able to slow the descent to 500 feet per minute. The attitude indicators were tumbling and of no use.

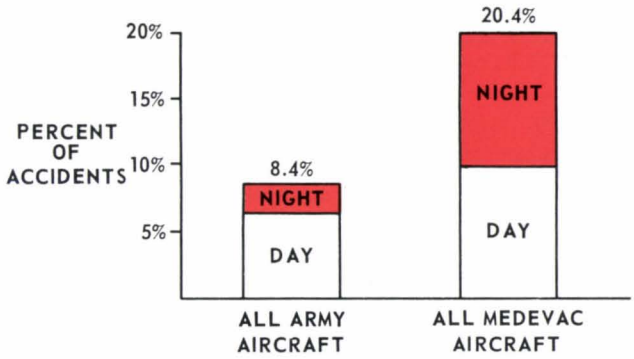
Within seconds, the helicopter impacted level terrain at approximately 500 feet per minute, with no forward air speed, and rolled on its left side. The mast snapped and the free main rotor severed the tail boom before it came to rest across the right side of the fuselage. This mercy mission accident resulted in three fatalities, three injuries and the destruction of one helicopter.

This is typical of one type of the 187 accidents and incidents experienced by crews flying medevac missions during the 2-year period. Weather was a cause factor in more than 20 percent of the accidents (see table). This is extremely high, compared to the 8.4 percent weather-connected accidents experienced by all Army aviators over the same time frame. In addition, of the 56 fatalities involved, over 40 percent occurred in weather mishaps. Medevac weather accidents were evenly split between day and night, while only 24 percent of all Army weather-connected accidents occurred after dark. To reduce the high number of medevac weather mishaps, the following recommendations and comments are offered:

All medevac pilots should have, at the minimum, a standard instrument card. This is presently being implemented with the requirement for all initial-entry rotary wing students to graduate as 3-2 aviators, as well as the requirement for all aviators to have standard instrument ratings by 31 December 1972. However, this is only a start. Once an aviator is qualified, realistic and conscientious training must be conducted by units to enable him to maintain the level of proficiency attained by initial qualification. While aviators are qualified and proficient in flying during instrument meteorological conditions (IMC), their training is generally restricted to flight in controlled airspace and making instrument approaches to established, well-equipped airfields. Commanders must realize that standard instrument ratings do not give aviators the ability to make instrument approaches and takeoffs from unimproved, noninstrumented field sites. Nor does it give them the ability to fly into severe weather—thunderstorms, severe or



Accident rates for all rotary wing aircraft in RVN in comparison to aeromedical evacuation aircraft over the same time period.
*Medevac rates are approximate hour figures supplied by aviation consultant, Office of the Surgeon General.



Percent of total accidents FY 70 and FY 71 which list weather as a cause factor.

extreme turbulence—beyond the structural limits of airframes, or beyond their physical capabilities. In short, the standard instrument rating doesn't make any aviator a miracle man.

Supervisory emphasis is also required to evaluate the real urgency of missions, number of personnel involved, extent of injuries, etc. All too often the dedicated aviator falls victim to a false sense of urgency that sometimes accompanies mission assignment. Medevac mission assignments encompass routine through emergency missions; the former allowing 24 hours from notification for pickup, the latter being self-explanatory. At times a routine patient is reclassified by the requesting unit after a few hours, in an effort to speed the evacuation. If this occurs at dark with the weather deteriorating, the hazardous condition is obvious.

One of the prime advantages of aeromedical flights is quick reaction time. Centralized control of individual missions at higher headquarters could jeopardize their effectiveness. However, commanders should consider a sliding scale in which the authority for sending aircraft on missions moves up the chain of command to higher headquarters as ceilings lower and visibilities decrease. If this is not satisfactory to commanders, another proposal is use of a single clearing officer at unit level, who would be responsible for weighing all factors of a mission before selecting a crew and releasing an aircraft for a mission. The need for guidance in this area is evidenced by this fact: Unforecast weather was listed as a direct cause factor in only three of the weather-related mishaps. Weather conditions were known in all other instances.

The second problem area involves the large number of landing and hover mishaps. Nearly 63 percent of the total mishaps occurred during landing or hovering phases of operation. While the majority of these were incidents, 45 percent of the accidents occurred during these phases, again unusually high in comparison to the entire Army, in which less than 25 percent of the incidents and accidents occurred during landing and hover. It was noted that 85 of the 107 incidents were blade strikes. The vast majority of these, 85 percent, were pilot induced. In some cases, pilots hovered into confined areas to pick up patients, knowing they would have blade strikes. Here, supervisory emphasis on the part of aircraft commanders and pilots-in-command comes into play. For example, if a patient can be moved a short distance to a larger pickup zone, the possibility of evacuation without loss of life or damage to aircraft increases.

The need for increased crew coordination is easily seen in the following incident briefs:

- While a helicopter was hovering for a basket hoist on a steep incline, one main rotor blade struck a tree to the right. The crewchief, preoccupied with the basket, did not warn the pilot.
- In a small LZ, prior to completing a 180-degree turn, the aircraft commander was advised to hold short, without being told about a small tree. The wind caught the tail and the tail rotor struck the tree.
- During a landing in an insecure area, one main rotor blade struck a very high stump.
- While a helicopter was descending through trees to make a hoist extraction, the main rotor blades struck a tree limb.
- A helicopter was being landed on a parking ramp when its main rotor blades struck one main rotor blade of a parked aircraft.
- On approach to an LZ, the crew was cleared for landing. Clearance was given by a medic who was standing to the left. While the helicopter was about one foot off the ground, the main rotor blade struck a tree.

There were no fatalities from these incidents, but the dollar cost averaged $4,900 per incident and the loss of mission effectiveness of the units involved was great. These could be reduced or eliminated through systematic crew training. Crewchiefs and medics should be taught correct procedures for clearing tail and main rotors during takeoffs and landings. Also, standard, universally understood voice commands should be established to maintain adequate clearance. In this same vein there should be established a single Army-wide configuration for medevac aircraft. Also hoist training normally conducted at the unit level should be made standard throughout the Army. If this were accomplished, any medevac pilot or crew member could be transferred from one unit to another without a loss of mission effectiveness due to operating with unfamiliar equipment. This problem is prevalent throughout the Army aviation world, and is under study in the proposed worldwide standardization program.

With the reduction in Vietnam and the buildup of National Guard and Reserve units, we shouldn't let these valuable and hard-learned lessons go by the wayside. The two major areas discussed here should be seriously considered and preventive actions taken by commanders of medical evacuation units, both overseas and in the United States. Some critics will say these mishaps are the price we must pay for having medical evacuation units. According to them, "You can't make an omelet without breaking some eggs." We'd like to remind these skeptics that damaged aircraft in a hangar or injured crews will not be available to save lives.

Arnold R. Lambert
Education and Prevention Department
USAAAVS

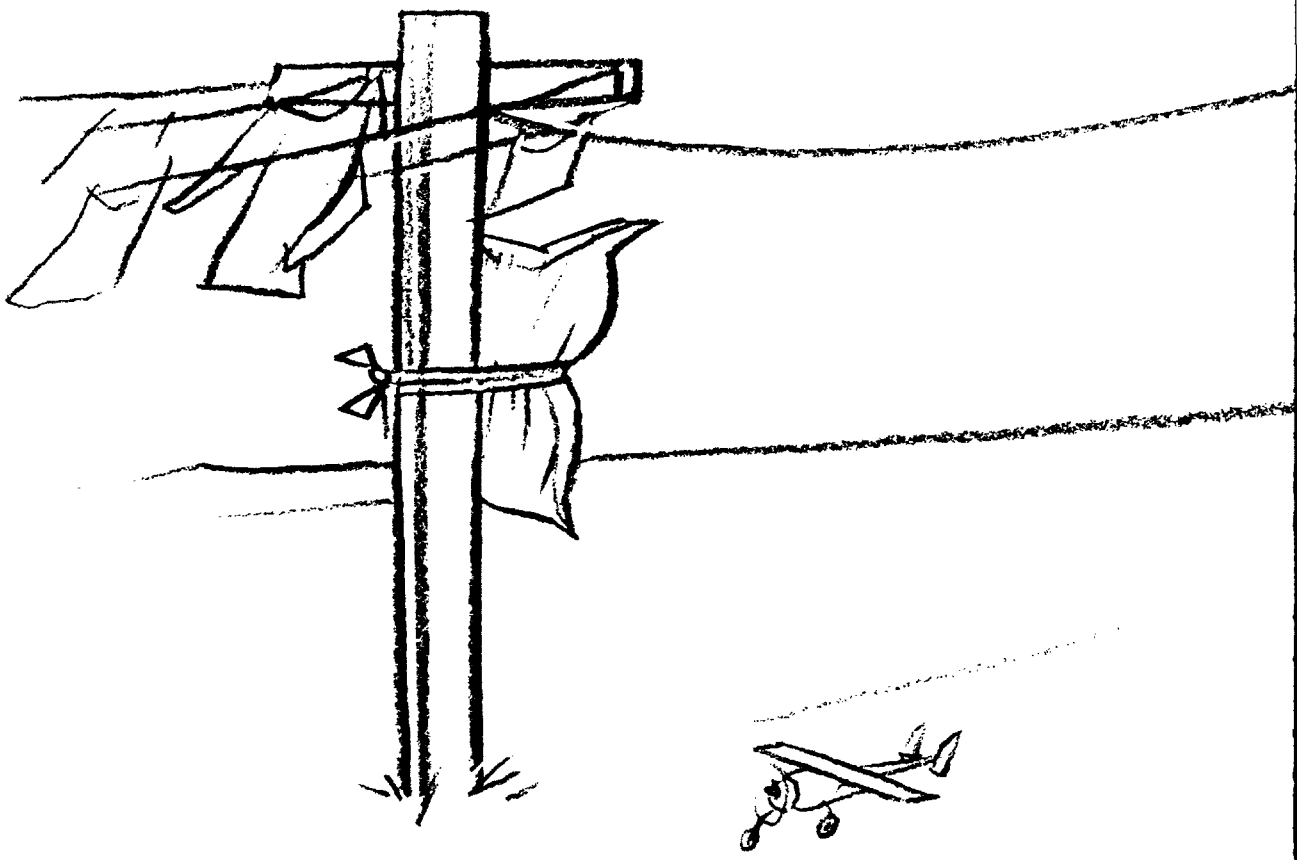
LET'S TAKE A look at a day in the life of an aviation safety officer (ASO). For background information, let's say he's 35 years old, has never had a broken bone or surgical stitch. He has a charming wife, two sons, a happy home and a bright future. He's a veteran of two tours in the Republic of Vietnam and has never been involved in a major aircraft or automobile accident. All our ASO needs is a name. Let's call him Pete.

In an interview with Pete, I asked, "How do you account for your accident-free record and lack of broken bones or stitches?"

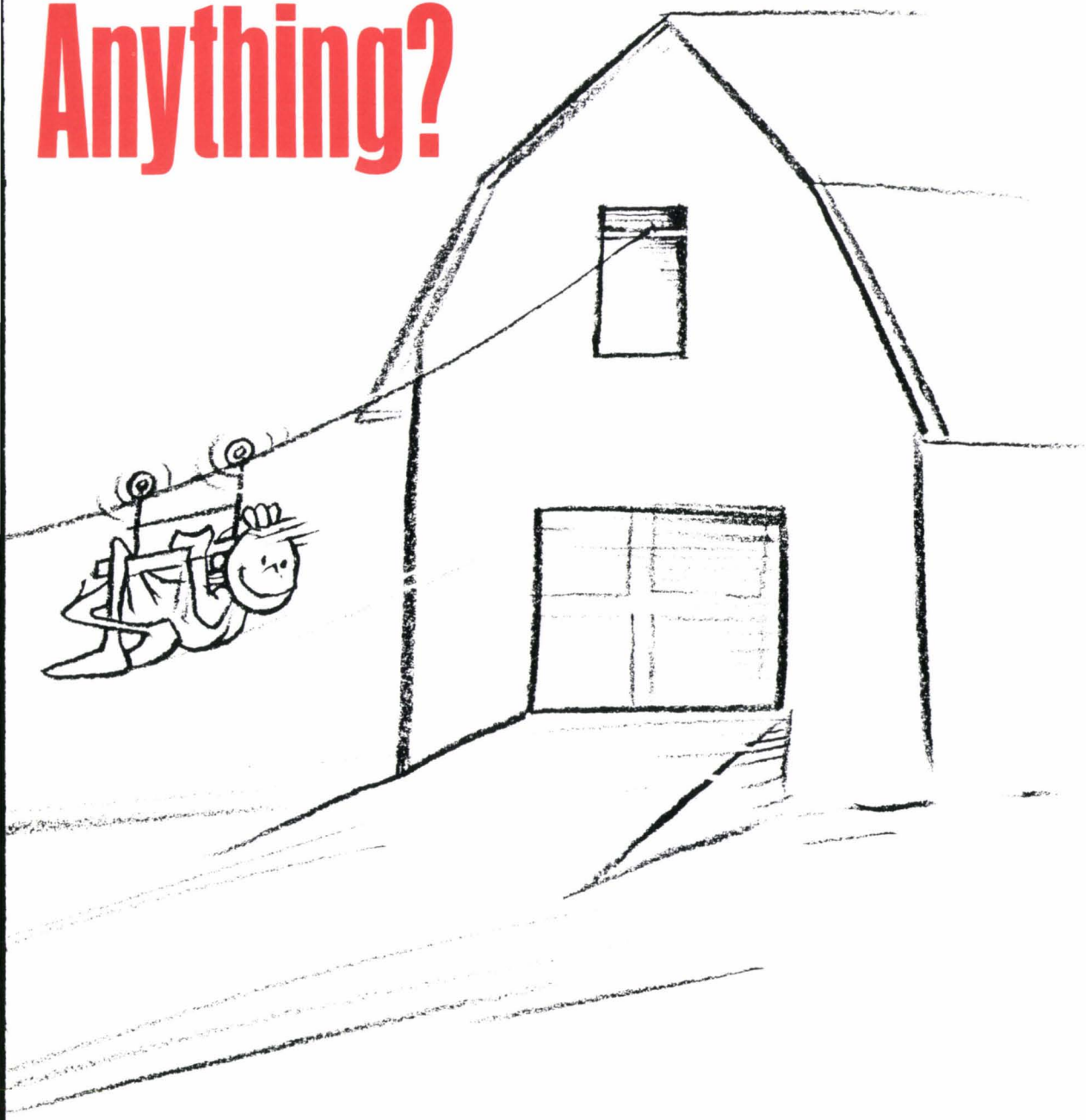
Here is Pete's answer: "I guess it all started when I was just a tot. Dad would tell Mom, 'Stop protecting that boy so much. You're going to make a sissy of him.' He'd say, 'A lesson learned the hard way is the one you remember best.' I can remember playing around some place or with something I shouldn't have been and Dad could see I was about to get hurt, but he would just stand there and let it happen. Afterwards he'd ask, 'Did you learn anything, son?' He asked that question so many times I finally learned to sense when he was watching me. I could tell by the look on his face I was about to get hurt, and I would stop what I was doing and think. When I was able to figure it out, he'd just smile and say, 'You learned something, didn't you, son?'

"I suppose because of this early training, I became more safety conscious than most people. I automatically consider the consequences before I act. Maybe that's why I was selected as an ASO. But as an ASO, I can't stand around and let accidents happen like my dad did. The price of learning would be too great. But when an accident does happen and we discuss it at a safety meeting, I always finish with, 'Did you learn anything?'

"I try to spot the cowboys in every unit I'm assigned to, and I devote extra attention to them because I feel they are potential accidents. As a



Did You Learn Anything?



matter of fact, I have one right now I'm trying to help. I hope he learns something—before it's too late."

This was where the interview ended because Pete had to attend a safety meeting. Some interview. He did all the talking. So now, let's follow Pete around for a day.

This particular day started with music from a clock radio. The music from the preselected FM station was so soft and pleasant, Pete smiled even before he opened his eyes. Moments later the whole family was stirring.

The shower was refreshing, and as usual, there was an extra pair of blue eyes watching the beard removal operation. As part of the daily ritual, Pete dabbed foam on the sides of a glowing smile, and with the blade removed, cautioned his son to hold still while he shaved the foam away. Afterwards he made certain he put the razor out of reach of the little hands.

After dressing, Pete walked into the kitchen just in time to hear his wife mumbling about the toast that wouldn't pop up out of the toaster, as she was attempting to remove it with the butter knife. His first impulse was to yell at her about the danger of such an act, but he refrained from doing so when he noted she had pulled the plug. Maybe he was being overly cautious, but it was a natural reaction with him.

After breakfast he kissed his wife, gave his young son a manly squeeze and climbed into his new car. Moments later, he was on his way. At the very first stop light he met a challenge. A teenage girl sat in something that resembled a Model "A" with no hood or fenders. Under all the chrome and carburetors was a red hot V-8. The girl looked at Pete, smiled, revved the engine and nodded as if to say, "Want to drag?" Pete returned her smile as he shook his head negatively. The light changed, tires screamed, and as the girl sped away, she threw him a quick glance that said, "Chicken!" It didn't bother him.

Pete pulled into an apartment complex to pick up a fellow aviator. As he approached the building where his friend lived, he saw three bicycles, manned by youngsters, heading in the same direction. Instinctively, he took his foot off the accelerator and put it on the brake pedal. As if it had been rehearsed, one of the riders darted in front of him. He applied the brakes and stopped with ample room between his car and the bicycle. He shook his head again and wondered if the child had learned anything.

Pete's friend had overslept, so he had to wait a few minutes. When they were finally on their way, Pete's friend said, "Sorry about making you wait, but you should be able to make up the time in this car." Pete was in no hurry. He'd rather be a few minutes late than take a chance of not arriving at all.

Ahead, Pete could see people rushing to a car that had jumped the curbing and was nestled against a large oak. He crossed the intersection and stopped to offer assistance. It was the girl in the "hotrod." He looked at her as she grimaced with pain. Except for shock, she appeared reasonably whole. The only visible injury was a badly twisted ankle. Probably broken, Pete thought as he tried to comfort her. "Dragging?" Pete asked. Reluctantly, she gave a positive nod. She had swerved to miss a car at the intersection. "Looks like you lost the race, but did you learn anything?" Pete asked as an ambulance pulled up. She didn't answer, but it was obvious she was thinking about it.

They arrived at the airfield late but safe, and Pete began his routine duties. He checked with supply about an overdue shipment of Nomex, talked to someone about leaking fuel nozzles and explosion-proof lights in POL, and after inspecting the ramp, ordered a magnetic sweeper to be put in operation. He checked fire extinguishers and jotted down notes for his next scheduled safety meeting. Everything pointed to another routine day—until the phone rang. A T-41 had crashed. His friend was the pilot. Following are the details of the accident:

The T-41, with a pilot and copilot aboard, departed the airfield on a local flight plan with no en route stops planned. During the next 40 minutes, the aircraft was observed flying low at several locations in the vicinity. Just prior to impact, the aircraft was seen to make an abrupt climbing maneuver, followed by a loss in altitude. It then struck a large tree approximately 20 feet below the top and crashed in an open field. Both pilots were killed.

Investigation showed the aircraft struck the tree at a high rate of speed, sheared its wings, then traveled 362 feet to the first point of impact with the ground. It then slid along the ground, shearing parts, before coming to rest 654 feet from initial impact with the tree. There was no fire.

The first witness to see the aircraft stated it appeared to be heading westerly at approximately 100 feet altitude. A second witness reported seeing

it at a low altitude, making a left turn and departing to the southeast. The third and fourth witnesses did not see the aircraft in flight, but heard it flying generally north-northwest.

The witness who was the first to arrive at the scene of the accident did not observe the aircraft in flight, but reported hearing an increase in the noise level immediately prior to impact. He described it as popping noises, silence, then a very high noise similar to that of a chain saw. Witness number five saw the aircraft before it disappeared from sight behind trees. His attention was divided between driving a vehicle on a two-lane highway and watching the aircraft. He stated that it began a maneuver which appeared to be a loop from an altitude of approximately 300 feet. He indicated that it appeared as though one wing dropped or lowered during this maneuver. However, he did not hear the aircraft. Witness number six, an 11-year-old boy, saw the aircraft and substantiated the testimony of witness number five, except that he did not see either wing lower during the maneuver. This witness heard the aircraft just prior to impact and reported it sounded like a go-cart revving up.

The wings and left elevator sheared on impact with the tree, and the right wing strut was broken into two pieces. It is believed the cockpit ceased to exist as an enclosed space at this point.

The engine was probably torn loose from the aircraft along with its mounts and was dragged with the fuselage, held by cables to the engine controls and instruments. The nose wheel was sheared during first ground contact and the main gear was sheared as the aircraft slid along the ground.

Examination of all systems revealed no apparent malfunction. This was later verified by laboratory analysis at ARADMAC.

The pilot had a total of 927 hours first pilot time, most of which was in the O-1 series aircraft. He had a total of 114.7 hours in the T-41, 110 of which were in the initial phase of flight school. On the day before the accident, the pilot took a checkride with the standardization instructor pilot and completed it successfully. The main factor that relates to the mishap is that he could have mistakenly thought the performance of the T-41 was closely related to that of the O-1.

Review of maintenance records revealed nothing to indicate failure of any component that could contribute to the mishap.

The engine had been operated for 85 hours and had a history of the chip detector light coming on. Fuel and oil samples taken after the mishap revealed no apparent malfunction of the engine. Teardown analysis indicated the engine was developing little or no power at time of impact. However, no defects or malfunctions were discovered which could have caused engine failure.

Analysis of all available facts indicated the aircraft entered a steep climb from a low altitude, approximately 300 feet agl, and the pilot lost control. The aircraft then entered a steep dive and crashed into a tree at a high rate of speed.

Findings of the accident investigators showed crew error as a factor in this mishap in that the pilot attempted a chandelle at an entry altitude of approximately 300 feet and terminated the chandelle in a wing-over maneuver that resulted in excessive airspeed and insufficient altitude for recovery. In attempting to execute this maneuver at an entry altitude of approximately 300 feet, the pilot exceeded his capability and/or misjudged the flight characteristics of the T-41.

The crew violated minimum VFR altitudes as indicated by witnesses who estimated their altitude to be approximately 100 feet or less at two locations before the crash.

Unrelated cause factors were determined as follows:

Pilot and copilot were not properly attired. The pilot was wearing fatigues instead of the recommended Nomex fire resistant flight suit and the copilot was wearing jungle boots.

It is suspected that both helmet chin straps were unfastened. It is suspected that the seatbelts were not adjusted snugly around the laps of the crew members.

Interviews with witnesses indicated violation of FAR part 91.71 which prohibits acrobatic flight below an altitude of 1,500 feet above the surface.

Recommendations included that continuous command emphasis be placed at all echelons of command on adherence to flight regulations and that the dangers inherent in exceeding aircraft limitations and individual pilot ability be stressed at future aviation safety meetings.

The necessity for proper attire and use of all available safety devices be emphasized at future safety meetings and monitored by operations and instructor pilot personnel.

As Pete surveyed the wreckage, he thought about his friend. He had learned something—too late.

USAASO Sez

The U. S. Army Aeronautical Services Office discusses

Alert Area: If someone suddenly asked you, "What is an alert area?", how would you reply? How many pilots, while hurriedly doing their preflight homework with probably one weathereye on the "tube" for other special info, actually give thought to its meaning, in comparison with other terms, applied to certain designated flying areas, or stopped to ask themselves, "By golly, just what is meant by an alert area? What is the difference?" You are probably now saying to yourself, "Heck, every experienced pilot knows air pilotage chart terminology, but do you really know the difference? How does it affect your flight plan?" The sectional and enroute air charts state and show many different variations of special use airspace areas such as: prohibited, restricted, warning, alert, danger and intensive student JET training areas. These areas consist of airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of those activities, or both, and with each one having a specific meaning and requirement.

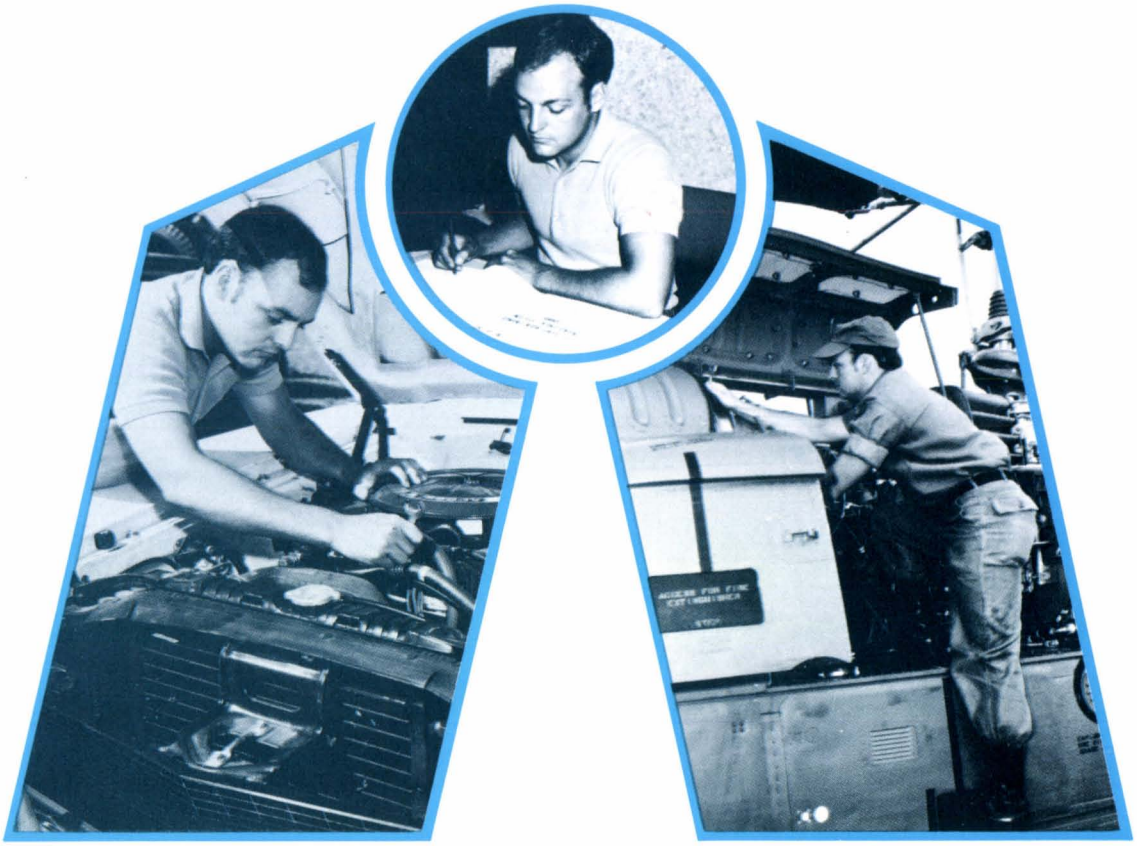
Each airplane pilot's operations and needs are varied. The nature of some operations require that restrictions be placed upon others for safety reasons because of airspace which may contain hazards to nonparticipating aircraft. The complexity or density of aircraft movements in other airspace areas may result in additional aircraft and pilot requirements for operation within such airspace. Safety, users' needs and volume of flight operations are some of the factors considered in the designation of a controlled airspace or transition area. When so designated the airspace is supported by ground/air communications, navigation aids and air traffic services.

Now that you have some small idea of factors considered regarding the designation of flight areas, you can see that there are differences in applied meanings of special use airspace. Without further ado let's get back to the original question: What is an alert area? It is an area depicted on aeronautical charts to inform nonparticipating pilots of an area of airspace utilized under prescribed conditions that may contain a high volume of pilot training or an unusual type of aerial activity, such as having a high concentration of aircraft, and pilots should be particularly alert. All activity within an alert area shall be conducted according to Federal Aviation Administration regulations, without waiver, and pilots of participating aircraft as well as pilots transiting the area shall be equally responsible for collision avoidance.

Air Traffic Management System: To quote a news commentator who predated the television era, "There is good news tonight." The struggle of the Army tactical air traffic control system is well documented as to its similar vintage. However, there is good news today.

In March of this year the Department of the Army approved a materiel need (MN) for an air traffic management system (ATMS). The MN contains an equipment requirement for a manportable airfield control facility (AN/TSQ-87), a three-man (operating positions) airfield control tower (AN/TSW-7), a tactical landing system (TLS), an air traffic management automated center (ATMAC) and related support equipment. The MN document was a joint effort of the Combat Developments Command Aviation Agency, Project Manager NAVCON and USAASO.

Now don't look for this equipment to show up in the field next month. The normal R&D testing and procurement process takes a little longer and we do want reliable standard type A equipment from this effort. Starting in 1974 some of this equipment is due to become operational with incremental introduction of the remainder by 1980. The system is designed for use in CONUS environments as well as tactical areas. You old hands will recognize the importance of this approach as it relates to logistics and training.
So you men working in the AN/TSQ-70A one-man control tower and the nonradar equipped AN/TSC-61A don't despair, for truly "there is good news today!"



GET WITH IT!

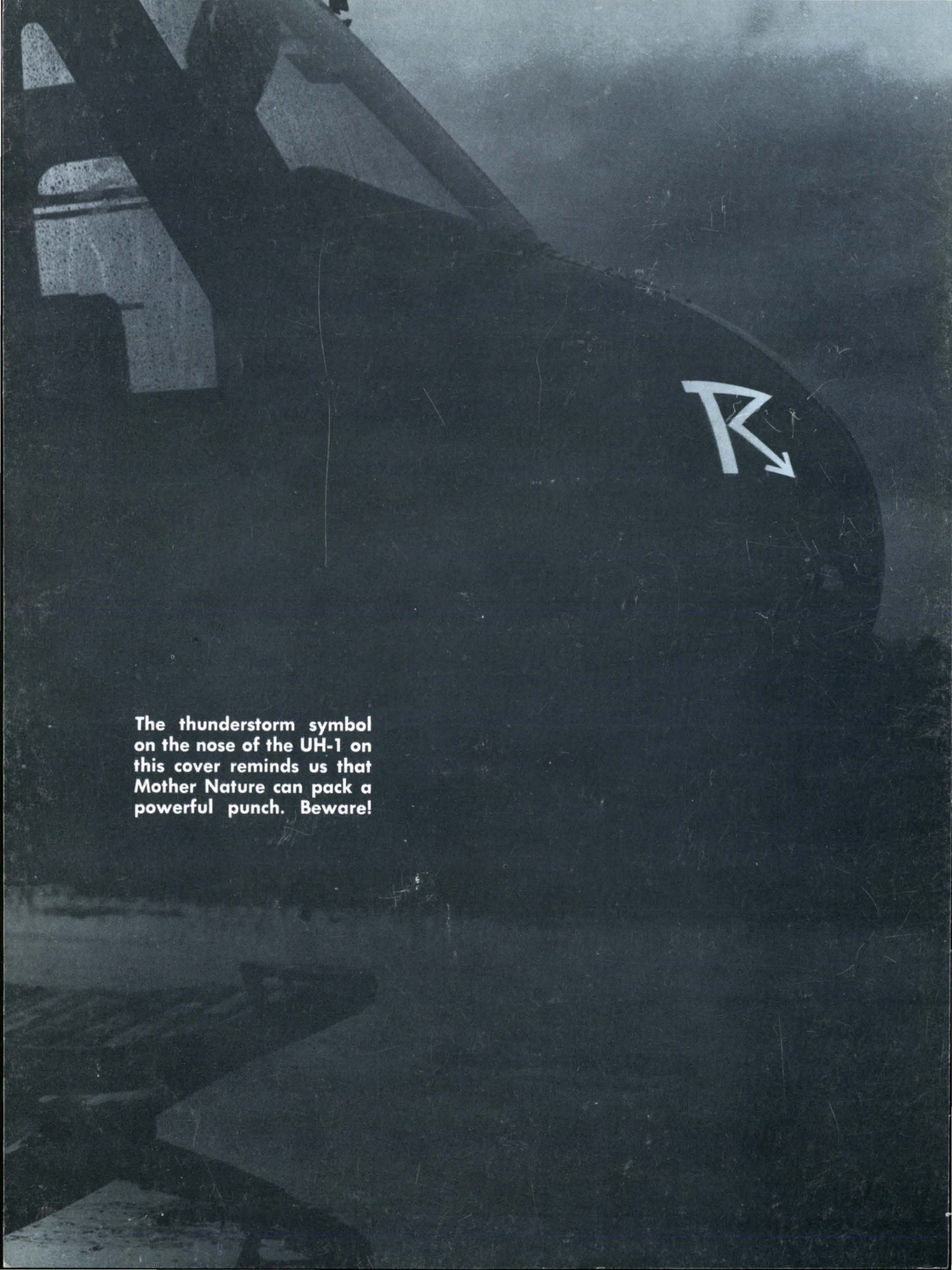
PREPARE FOR A REWARDING FUTURE IN THE MILITARY OR IN CIVILIAN LIFE

Enroll in an Army Aviation Correspondence Course and reach for success.

- ★Receive valuable training
- ★Gain knowledge
- ★Develop your potential
- ★Earn promotion points
  (Retirement points for Reservists and National Guardsmen)

For information write

Nonresident instruction
P.O. Box J
Fort Rucker, Alabama 36360



The thunderstorm symbol on the nose of the UH-1 on this cover reminds us that Mother Nature can pack a powerful punch. Beware!