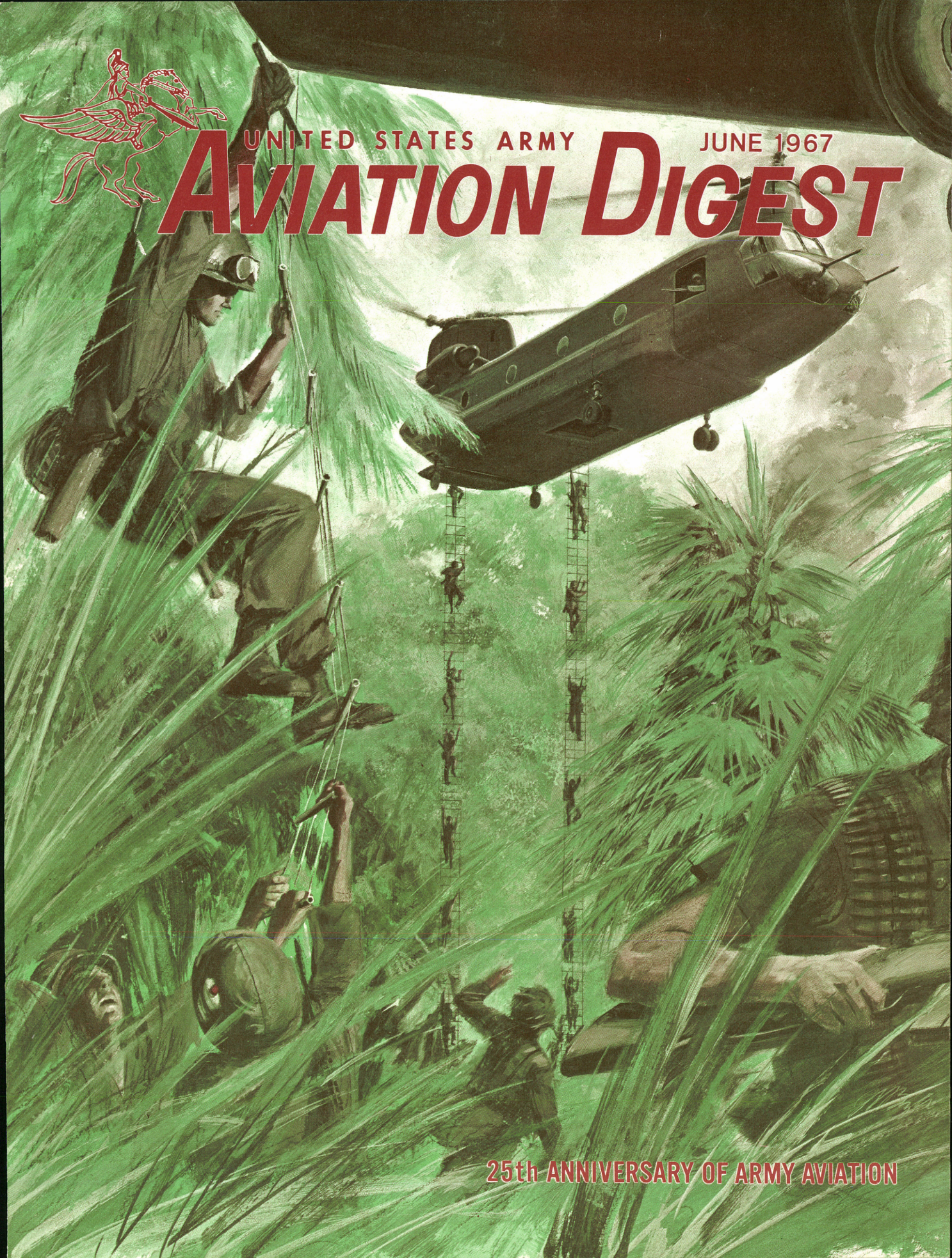
UNITED STATES ARMY
JUNE 1967

AVIATION DIGEST



25th ANNIVERSARY OF ARMY AVIATION

UNITED STATES ARMY AVIATION DIGEST

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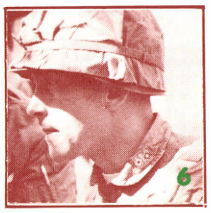

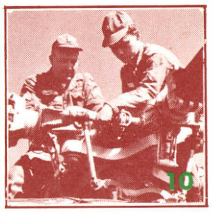

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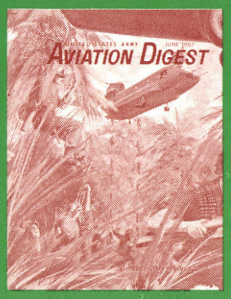

Cover courtesy of Boeing Vertol

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.

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Articles, photos, and items of interest on Army Aviation are invited. *Direct communication is authorized to: Editor-in-Chief, U.S. Army Aviation Digest, Fort Rucker, Alabama.*

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UNITED STATES ARMY
THE CHIEF OF STAFF

TWENTY-FIFTH ANNIVERSARY OF ARMY AVIATION

On behalf of all the men and women of the United States Army, I extend heartiest congratulations to Army Aviation, as well as appreciation for its achievements of the past twenty-five years. Since its beginnings in 1942, Army Aviation has advanced with the Army in acquiring new capabilities and refining old approaches to land warfare. In recent years especially, aviation has been essential to our consideration of concepts and techniques for improving the Army's performance in combat.

A fledgling in World War II, Army Aviation proved its value to the combat commander and went on to develop increasingly important abilities for fulfilling Army roles and missions. Today in the war in Southeast Asia, Army aircraft are involved in virtually every combat and combat support operation. Aviation personnel have met the challenges of operating in a difficult environment against an unseen enemy, and they have accomplished their tasks regardless of these hazards. Their bravery, professionalism, and dedication to duty represent the noblest of soldierly virtues.

I join your comrades in arms in expressing pride in your outstanding accomplishments. We know you will maintain this record of service to our country throughout the coming years.

Harold K. Johnson
HAROLD K. JOHNSON
General, United States Army
Chief of Staff

ARMY AVIATION OF THE FUTURE

Major General Robert R. Williams
Director of Army Aviation

A FEW predictions for 1980:

- The Army will have 18,000 aircraft.
- The Chief of Staff or the Vice Chief of Staff of the Army, the Commandant of the Infantry School, Armor School, and half the division commanders will be Army aviators.
- The Army's tactical transport aircraft will be VTOL but will be cruising at speeds of well over 300 knots.
- The Huey will still be with us in large numbers.
- The O-1 may still be in the inventory.

These predictions for 13 years in the future will no doubt startle many. Some tacticians will say it's ridiculous; the budgeteers will plan for some new locks to put on the budget; proponents of other high cost Army programs will gird themselves to protect their share of the budget, for they will realize the funds for such an expanding program must come from somewhere; and personnel management people may shudder a bit thinking about providing pilots to fly all these aircraft.

As background and possibly to place some of the older readers in a better frame of mind to accept the rationale that led me to these predictions, I ask that each reader step back in his memory an equal distance—13 years.

The Cobra (above) and the veteran Bird Dog (below) both figure in the future of Army aviation

In 1954 would you have believed that by 1967:

The Army would have over 9,000 aircraft and a still rapidly growing inventory?

The Army would pay in the millions for a single aircraft?

There would be one Army division with over 450 aircraft?

Two four star generals would wear wings (Howze and Powell); two commandants of the Infantry School would have been Army aviators, (Powell and York); in one infantry division in 1963 all three general officers would be pilots; the youngest general officer in all the services today would be an Army aviator (General Klingenhagen) and three of the youngest generals (Klingenhagen, Blanchard and Burdette) would be Army aviators?

The Army Aviation School would be expanding to an output of 625 pilots per month.

The UH-1, just an idea in the minds of a few in 1954, would be coming off the production line at today's rate?

The armed helicopter would be a very effective weapons system and one would be designed specifically for the mission of direct fire support?

Helicopters would attain speeds of over 175 knots?

A small observation helicopter (the OH-6) would fly nonstop from coast to coast?

The O-1 would still be in high demand in 1967 and will probably be with us for some time?

The argument will be made that the demands for Army aviation and its present somewhat explosive growth is occasioned by the conflict in Vietnam and is just a fad. I will grant that the conflict in Vietnam has provided an almost ideal military application for Army aviation, but I will also contend that it is providing a proving ground for Army aviation and indoctrination of personnel that will have a lasting effect on future Army organization and tactics in all levels of war. The leaders of our Army for the 1970-80 time period will almost without exception have fought in Vietnam. They will fight as battalion or brigade commanders. For one year they will conduct their operations based primarily on airmobility. Troop movement by air, resupply by air, air reconnaissance, aerial command posts and direct fire support by armed helicopters will become a way of life with them. In the future as they write doctrine, draw up organizations, or prepare equipment requirements for the Army of the future they will lean heavily on their past experience with airmobility.

This is the beginning of the true air age — not the crest. From an Army standpoint, we have in the past employed aircraft primarily in specialized or high priority roles. Aircraft were used only when they were the only means of accomplishing the mission or when the priority was high enough to "justify" the use. Our aircraft were in addition to our ground vehicles. Now we are learning to depend on aircraft as a primary and accepted means of accomplishing our mission and learning to capitalize on the speed and effectiveness they provide. This has come about in large part through the greatly improved dependability of aviation. Our aircraft are much improved; our pilots are more highly trained; and we have learned much about operating in adverse weather and in the field.

A direct parallel exists in civil air travel. The combination of speed, comfort, dependability, safety and convenience offered to the customer by the present day airlines has caused a rapid increase in airline travel.

"A recently completed 'Gallup Poll' for TransWorld Airlines showed that in 1964 only 34% of the adult U. S. population had flown on an airliner. By the end of 1966 this proportion was 42% and growing at a rate of 12% a year. By the 1970s, when the new, air transportation-conscious generation reaches adulthood, they will boost the figure to 60%."* Figures 1 and 2 on the following page depict the increase in the airline fleet and passengers over the past 20 years and the forecast of the future on which the airlines are basing multibillion dollar investments.

Another parallel exists in general aviation, the civilian counterpart of Army aviation. Companies and individuals are finding that

The Army leaders of 1970-80 will almost without exception have fought in Vietnam

*Gen Clifton F. Von Kann; Text, *US Air Transport Forecasts and an Answer to the Challenge.*

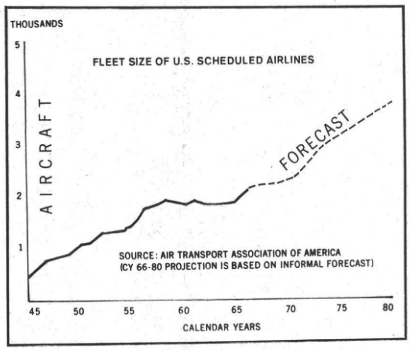
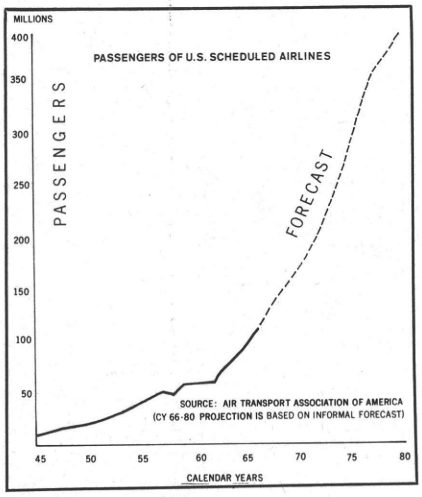


Figure 1



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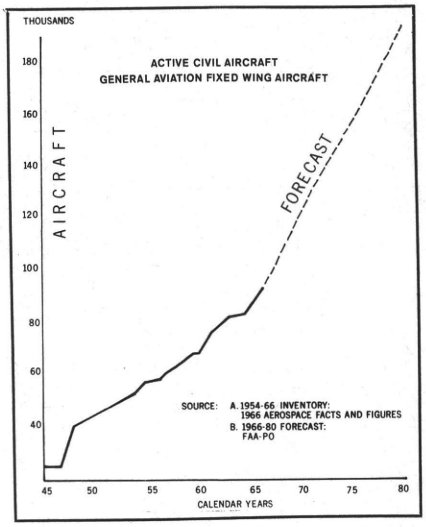

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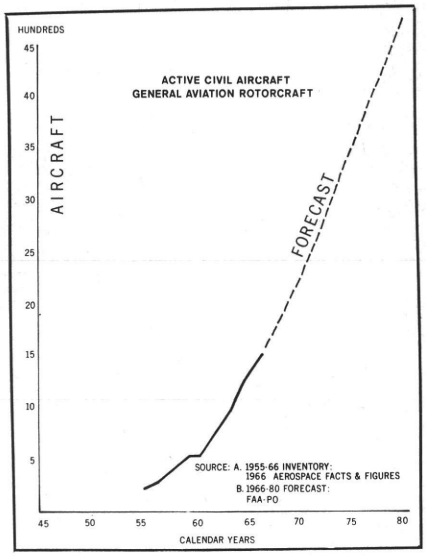
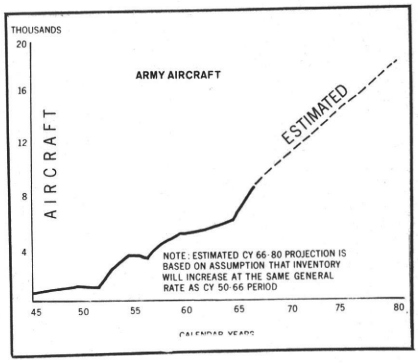


Figure 5



today's aircraft provide a dependable means of getting their job done. General aviation (which can best be defined as all civil aviation outside of the airlines) has considerable similarity to Army aviation. The types of aircraft found in general aviation are of the same size and characteristics as Army aircraft and are employed in much the same way. The following charts depict the growth of general aviation over the past 20 years and the forecast growth (fig. 3 and 4).

A similar plot can be made for the growth of Army aviation over the past 20 years (fig. 5).

The similarity of the data presented on airline, general aviation and Army aviation growth should be noted. These statistics provide the basis for my first prediction.

My second prediction is based on the growing importance of Army aviation and on the people who are now Army aviators. Let's do a little analysis of the group who are potential generals in the 1970-80 period. They are now lieutenant colonels and colonels.

Graduates of War Colleges (colonel on active duty): Army aviation 35.9%; overall 34.7%.

Selected for promotion to colonel on last list: Army aviation 45.4%; overall 28.6%.

Selected for promotion to lieutenant colonel on last list: Army aviation 76.0%; overall 74.5%.

Selected for Command and General Staff College in 1967: Army aviation 22.3% of total selected.

The following is a quote from a statement made by the Under Secretary of the Army to a Congressional Committee:

"In closing, I wish to take this opportunity to recognize the outstanding achievements of Army aviators during this period of turbulence, unprecedented growth, and pioneering on new frontiers in the use of aviation in military operations. The bravery, professionalism, and unfailing dedication to duty of these men and their crews have been in the finest Army tradition. They have unhesitatingly accepted every challenge, exceeded every expectation, and taken personal dislocations and inconvenience in stride. Our Army, like any organization, is no better than its people. These men have shouldered a major share of our undertaking in Vietnam which has led to making today's Army the finest ever fielded."

I am confident that, with the growing importance of Army aviation and the caliber of individuals who are now Army aviators, there will be many general officers wearing wings in the future.

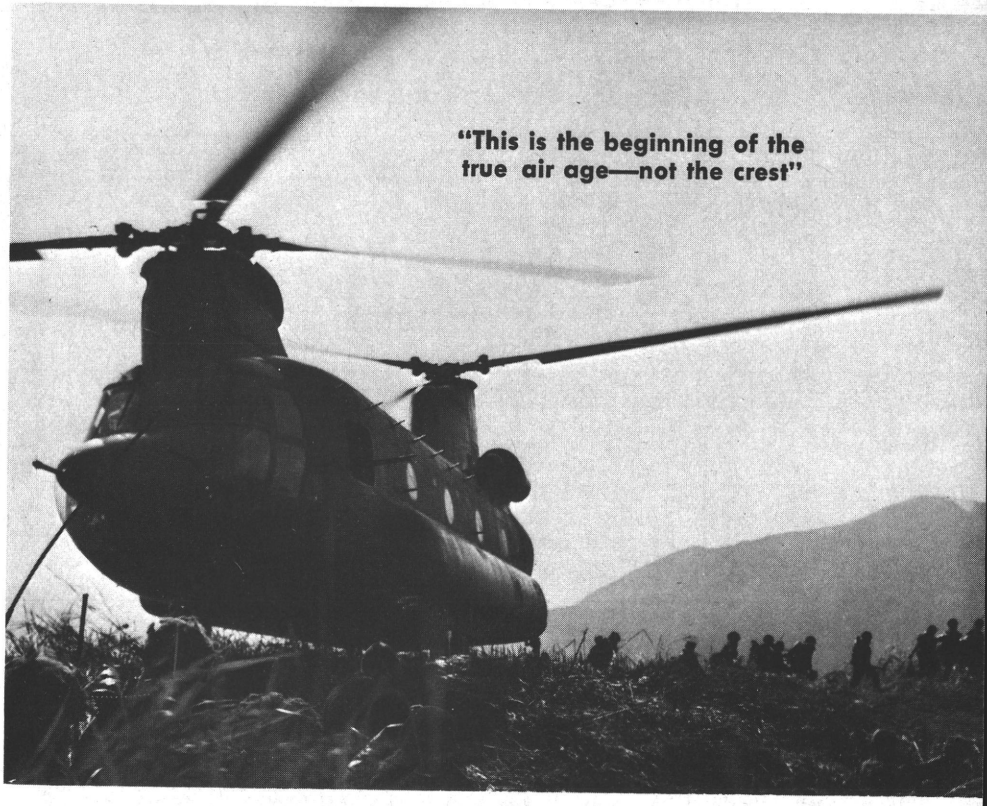
My third prediction is based on

the money and brain power that have gone into trying to cross-breed the helicopter and the airplane during the past 15 years. Starting with the XV-1 and XV-3 in 1952 and continuing through the composite research aircraft project now in progress, slightly more than one-half billion dollars have been spent to achieve a usable high speed VTOL aircraft. Several of these programs have been highly successful in demonstrating the technical feasibility of V/STOL systems. However, they have not yet been proved to the extent that they can live in the unrefined environment of the Army in the field.

Concurrent with the V/STOL effort, much has been done to improve the speed, stability and reliability of the helicopter. I foresee that there will be marked increases in rotary wing aircraft technology and that aircraft, which lift off on rotors, will be able to cruise at speeds above 300 knots by stopping, stowing or tilting the rotor blades to eliminate rotor drag.

My fourth and fifth predictions are based on the time-proved fact that a really good aircraft just will not go away. Every now and then off the production line comes a real winner. It makes a name for itself early in life and everybody just has to have one. Production gets stretched out. Then the aircraft lives long after production ceases. A good utility aircraft can have an amazingly long life. The Huey will in my opinion last as a highly serviceable aircraft just as the old DC-3 has. In 1980 the pilots of all U. S. services and of many nations will probably be cussing it as slow, hard to fly and obsolete—but they will still be flying it.

No matter how many studies we write showing that the O-1 should be replaced, they are still in demand. Maybe the next generation of pilots will give up.



Flying has been described as hour after hour of boredom punctuated by moments of stark terror. Army aviation's growth however, can best be described as month after month of stress and labor punctuated by days of desperation. I am sure that all aviators and nonaviators, who have worked so hard to bring airmobility to the Army, feel proud and well rewarded for their long hours of work.

Now before the rotor wash completely clouds my crystal ball, I want to say that I see continued growth for Army aviation, with its future development limited only by the imagination and ingenuity of those of you who will be at the controls. As modern technology rapidly advances, Army aircraft of the 1980-90 time period may even stagger the imagination of those of us who have witnessed our progress from the Cub to the Cobra. Army aviation is on the move and all of us should consider it an honor to be a member of the team.

TO OUR CONTRIBUTORS:

We wish to express our gratitude to our many readers who have contributed very fine articles for our anniversary issue. Your response has exceeded our anticipated input. Due to the space limitations of the AVIATION DIGEST we are unable to include all of the articles in this issue. However, succeeding issues during this, Army aviation's 25th anniversary, year will contain other commemorative articles.—The Editors

DAYS OF DECISION— YEARS OF CHALLENGE

Major General Delk M. Oden
Commandant, U. S. Army Aviation School

The success of Army aviation can be traced primarily to the Aviation School (both at Fort Sill, Okla., and later Fort Rucker, Ala.) where most of today's airmobile concepts were born.

ARMY AVIATION'S "star" burns brightly in Vietnam today. Our aviation personnel and units have accepted the challenge of combat and have proved the validity of many of the concepts and tactical applications of Army aviation for which they also fought valiantly, but in a different way, on the home front. Today in Vietnam airmobile operations supported by Army helicopters are the backbone of operations against the elusive Viet Cong.

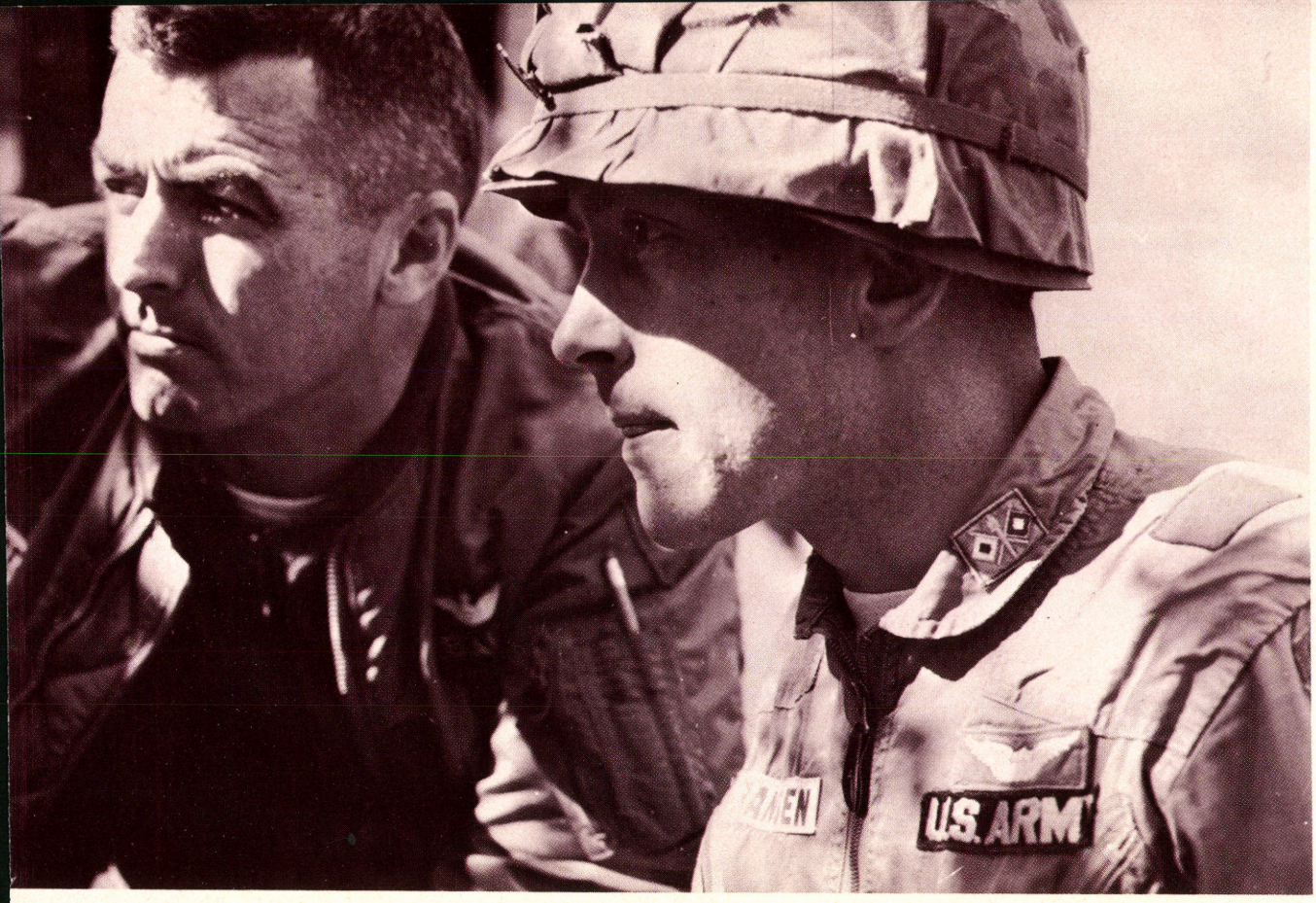
Almost without exception operations begin with helicopter lifted forces moving into strategic positions to surprise the enemy, to block his retreat, to capture his base camp, or to fix his position. Regardless of the size of the encounter, Army helicopters are employed throughout the operation in lifting reinforcements, effecting vertical envelopment, resupply, reconnaissance, and evacuation of casualties. When the operation ends the Army helicopter is the last combat vehicle to leave the battlefield. This normally involves lifting the rear guard from its last contact with enemy forces to the security of its base camp.

Our ground forces in Vietnam are sold on airmobility. They like the idea of being picked up refreshed and rested at their base camp.

They look over their shoulders as the lift helicopters depart the landing zone, knowing they'll be back with food, ammunition, and reinforcements. They know too the helicopters will be available to return them, as quickly as they brought them, to medical attention if they're wounded in the engagement. When the battle is over and uppermost in their minds is rest, hot food, and a shower, the sound of familiar popping blades of Army helicopters is heard in the distance, and they are soon back within the security of their home base.

Yes, the ground trooper likes this kind of support because it allows him to meet the enemy when he, the trooper, is at his best both physically and mentally. Our ground forces returning from Vietnam will be Army aviation's strongest supporters in the future, because they have found a better way to go to war and they will insist on that way for the future.

Since the first shipment of Army aircraft from the United States in 1961, the whirling blades of the Army's choppers have never stopped turning in defense of freedom in Vietnam. Our first aircraft commitment, the banana-shaped CH-21 helicopter, was transported to Vietnam by aircraft carrier. These choppers literally "hit the beach running," in flying from the carrier decks under their own power, and in



lifting troops into combat within three days after their arrival.

For several years following this initial commitment, United States advisers and the Army's aircraft carried the load of the United States effort in Vietnam. As the Communist buildup in South Vietnam moved ahead at a rapid pace the loyal forces of the Republic of Vietnam were staggering under an avalanche of defeats, and the prospects for victory lay heavily with the Viet Cong. A dramatic success in battle was needed to bolster the sagging morale of the government forces. Such a success was supplied in the battle of Dong Xoai in June 1965, which saw the Free World Forces turn defeat into victory largely through the use of Army aviation.

Armed helicopters launched continuous attacks against the enemy regiment surrounding the Dong Xoai Special Forces camp, while troop-carrying helicopters landed continuous reinforcements. When the heavily outnumbered garrison was out of ammunition and the remaining defenders were dead or wounded, Army helicopters braved a barrage of point-blank enemy fire to evacuate the survivors of the doomed fortress. On the same day, within three hours after this evacuation, Army helicopters fought their way back into the soccer field next to the Dong Xoai garrison, the same spot from which they had evacuated the survivors. They unloaded a striking force of Vietnamese Rangers, and then reinforced this element with additional troops until the Dong Xoai garrison was again in friendly hands.

In the Pleiku campaign beginning in October 1965, the magnificent 1st Cavalry Division (Airmobile) fought a running battle with the three regiments of a North Vietnamese division in the Air Cav's first baptism of fire. Helicopter-borne elements of the division assisted in breaking the enemy's siege on the Plei Me Special Forces camp and then chased the North Vietnamese division all the way to Cambodia, inflicting thousands of casualties on the enemy.

History may well record this campaign as the turning point of the war in Vietnam. This was the enemy's first commitment of a division size force, and they were soundly defeated. A force of this size has never since been committed in the Vietnam conflict. Following the success of the 1st Cavalry Division in the Pleiku campaign we began hearing the phrase, "We have stopped losing the war in Vietnam."

The strength of Army aviation has expanded until today we have over 2,200 aircraft in the Vietnam conflict. They provide the mobility that allows our forces to meet the guerrilla threat with considerably fewer ground troops

Blades of Army helicopters have never stopped turning in the defense of the Republic of Vietnam
Here a sergeant of the 1st Cavalry Division directs the landing of a Huey arriving with supplies

than anyone would have anticipated would be required just a few years ago.

We know that Army airmobility through the use of helicopters is an accepted doctrine today as a result of the test of combat in Vietnam. However, during the early *years of challenge* that began on 6 June 1942, only a few stout hearted individuals fought the battle for the advancement of Army aviation.

Following its birthdate and during the early years of the reign of the fixed-wing aircraft, the progress of Army aviation moved slowly. The helicopter was the shot in the arm needed to get the program going, and the turbine powered Huey was the champion that permitted the breakthrough in airmobility. Armed helicopter development closely paralleled the airmobility concept, meeting with similar difficulties.

The revolutionary concepts of aerial firepower and troop mobility were brought to the forefront when the Army shocked the military world with the introduction of "Sky Cav" during Exercise Sagebrush in the middle 50s. Repercussions went all the way to the Secretary of Defense, and there a decision was made to allow the Army to continue its experiments with the Sky Cav concept. The lid was off; a program that had been pushed laboriously forward by the sweat and tears of a few individuals began to move under its own momentum, gathering size and speed. In Vietnam it matured.

The nucleus for the advancement and growth of Army aviation has been the Aviation Center and School. It was at the school that the early battles were fought through concepts, doctrine, and experimentation with airmobility and the armed helicopter. The campaign had started at Fort Sill, Okla., with the Artillery School. Aviation moved on to Fort Rucker in search of its own place in the sun and an opportunity to spread out.

Since this early beginning many other military posts have added momentum to the big push through significant contributions to the advancement of airmobility. On the birthday of Army aviation, the center and school pause to acknowledge the loyal support and well wishes of the many and varied military and civilian groups and activities.

The Aviation Center and School have reacted in a most commendable manner to the challenge of the accelerated demand for Army aviation support throughout the free world. The growth of the school during the past 18 months has far exceeded any other growth period in the history of Army aviation. Many new training programs are underway at Fort Rucker, most of which are heavily Vietnam oriented. A noticeable sense of combat urgency and direction is associated with all training now being conducted at the Aviation School.

A look at some development data and statistics from the Aviation Center will reveal the magnitude of this expansion in aviation training. During the past year Fort Stewart, Ga., was selected as an addition to the training base for the original purpose of conducting primary fixed wing flight training. The 16 weeks of the initial entry primary fixed wing training was moved from

Fort Rucker and established at Fort Stewart in July 1966.

In a very recent addition to the Fort Stewart complex, the facilities of Hunter Air Force Base at Savannah have been turned over to the Army. This installation has been designated Hunter Army Airfield and is part of the Fort Stewart command. Hunter will be primarily a helicopter training area and will be the school's training base for the AH-1G HueyCobra. We will graduate and send to Vietnam the first instructor pilots from our Cobra course this August.

As a result of the steady expansion of training, the flying hour program at Fort Rucker more than doubled during the past 18 months. This is represented by an increase from 31,000 flying hours per month in January 66 to 70,000 per month in June 67. In fiscal year 68 this monthly rate will increase to in excess of 80,000 flying hours per month for a yearly total of approximately one million flying hours.

The total operating budget for the Aviation School and Center for fiscal year 67 stood at $80 million. In fiscal year 68 the budget will increase to $96 million.

Expansion in student training is even more impressive. The big buildup in student load began early in 1966. The history of the training program at the Aviation School in the several years immediately preceding 1966 had been a very gradual buildup of rotary wing training and a gradual decline in fixed wing training. In the three years prior to 1966 the average student load was 74 helicopter pilots and 85 fixed wing pilots. By September 1966, the school was graduating 290 helicopter pilots and 30 fixed wing pilots.

This number has steadily increased. In April 1967 the school's output reached an all time high

Aviation training geared to combat

of 375 helicopter pilots and 50 fixed wing pilots each month.

These figures of training growth and expansion are impressive, but the end is not yet in sight. A new training goal has been established and this fall the school will begin its buildup to graduate an additional 200 helicopter pilots per month at the Army Aviation School element at Fort Stewart, Ga. This will bring the total school output to 625 pilots per month for an annual total of 7,500 Army aviators. As you are well aware this yearly output will exceed the total aviators in the Army aviation program before the beginning of the big buildup.

We have proved in Vietnam that the helicopter has a survivability on the battlefield beyond many peoples' expectations. The testbed for this survivability has been at treetop level within range of even the smallest of the enemy's individual weapons. With appropriate modification of our tactical employment of helicopters we have every reason to believe that our survivability against a sophisticated enemy would be as good as it has been against the guerrilla. The battlefield advantage of maneuver, mobility, and aerial firepower will be just as important, just as decisive, in a sophisticated environment as we have found it to be in the counterinsurgency environment.

If you think back to World War II and the Korean war you can recall numerous instances where a heliborne force could easily have broken a deadlock with enemy forces, traversed an impenetrable wooded area, performed a critical river crossing, or assaulted the enemy rear areas. The Rhine River would not in itself present any obstacle to a heliborne force on the offensive. Our hasty retreat from the Yalu River in Korea when heavily outnumbered by Red Chinese forces cost us thousands of lives and millions of dollars worth of equipment. This costly retreat could have been accomplished as an orderly withdrawal by the use of helicopters in a defensive role.

Horizons Unlimited are the marching words for Army aviation in the future. At the same time we must bear firmly in mind that we cannot march off and leave the ground trooper for the sake of aircraft sophistication. The limiting factor must not be budgetary considerations or size, but the ability of our aircraft to continue to live with and be maintained by our forces under field conditions.

On this 25th anniversary of Army aviation we honor our dead and wounded of the war in Vietnam. We are ever mindful that the sacrifices of many of these gallant flying soldiers were made freely for their country. Many factors unite in the motivation of a man to achieve such a high plateau of service and sacrifice, not the least of which is his desire to advance the capability of the Army through its aviation.

Army aviation looks to the future. With the coming of the Cobra and follow-on systems for direct fire support, airmobile operations will improve. Increased payload, fuel range, and speed for all our helicopters will allow us to better support our surface forces. The future of Army aviation is bright, and we are only beginning to exploit the possibilities for the application of our new found aerial firepower and tactical airmobility.

Army aircraft maintenance and supply training accounts for the major portion of the activities of the Transportation School at Fort Eustis, Va.

The Care And Keeping OF ARMY AVIATION

Major General W. N. Redling
Commandant, U. S. Army Transportation School

AS MANY PROPONENTS of Army aviation are probably aware, Department of the Army General Order No. 76 (1952) assigned the responsibility for logistical support of Army aviation to the Transportation Corps. The number of this general order is not important; the date of the document is, because the order charged the Transportation Corps with a great and growing responsibility (a responsibility that all personnel in the Corps continue to shoulder with pride) in the field of fixed- and rotary-wing aircraft.

Today Army aircraft maintenance and supply training accounts for the major portion of the activities of the Transportation School at Fort Eustis. A meaningful insight behind the rationale of this newly acquired responsibility can be gained by reviewing some of the factors which led up to this most significant development.

During the period following the Korean war, the Transportation Corps in carrying out its mission — that of transporting men and equipment — was acquiring more and larger helicopters and was rapidly becoming a major user of Army aircraft. Simultaneously, maintenance and supply problems were becoming increasingly complicated in all arms and branches that used rotary-wing aircraft to satisfy mobility requirements. It was soon concluded that the Ordnance Light Aviation Maintenance Companies which were charged with most of the logistical support of this type of activity were no longer capable of accomplishing the specialized maintenance and supply responsibility demanded by the ever-increasing inventory and variety of aircraft.

These considerations, combined with a general concern for more effective supply and maintenance procedures, led to the decision to concentrate all responsibility for maintenance and supply, including training, in one branch of the service and, if possible, at one location. Accordingly, in 1952 the Department of the Army, having decided to give the responsibility for aviation maintenance and supply to the Transportation Corps, started looking for a suitable location.

A team visited the Transportation School at Fort Eustis, Va., to determine the caliber of instruction given by the School and to survey existing facilities. Sufficient space was desired not only to conduct aviation maintenance courses but also to institute other

courses of instruction related to the logistical support of aircraft and aircraft units. Since some buildings previously used for marine and highway training were found suitable for aviation maintenance training, it was not long before the maintenance training program was established at Fort Eustis. At the outset the entire staff was composed of two officers and a civilian who supervised about 85 instructors.

The reminiscences of an early member of the aviation group at Fort Eustis illustrate the growing pains initially experienced at the Transportation School. Fresh out of flight training and still wearing Ordnance insignia, he reported to Fort Eustis in mid-1953. Not knowing where to go, he asked the MP at the front gate for directions to the flight strip. The MP replied, "There are no airplanes around here. You better go over to Langley Air Force Base. That's where all the aviators are."

At this time, there was so little aviation activity at the Transportation School that only two aviators were assigned; they were instructing the officer classes on the employment of Army aviation.

Our reminiscing aviator recalls that in 1953 the only visible evidence of aviation activity at Eustis was the airstrip. This was a runway 2,000 feet long covered with pierced steel planking but without a control tower. The only facility available was an old wooden building left over from the days of the CCC which was used as an operations office. In front of this operations building was a Lister bag and in back, that obsolete necessity, a "two-holer." The total flying equipment at this time was one H-13, one L-19 and an LC-126, which, if your aviation history is not up to snuff, is a Cessna 195 purchased for military use.

Initial planning for maintenance training started late in 1953, about the same time that our early aviator changed his Ordnance insignia for a TC wheel. At this time, he was issued a directive to get ready to teach aviation maintenance training subjects and to prepare requisite lesson plans. From October 1953 to June 1954, he and his few associates wrote lesson plans like mad.

Another stimulating challenge for these pioneers was the acquisition—a better word might be "scrounging"—of suitable training aids. They went all over the Tidewater area gathering up parts from wrecked aircraft. They paid weekly visits to the Navy junkyard in Norfolk, Va., to pick up components that could be used in training the classes. Dedication was much in evidence. One instructor made a monthly trip with a rental trailer to a Naval Air Station a few hundred miles down the coast to pick up any aircraft salvage that had accumulated during the month.

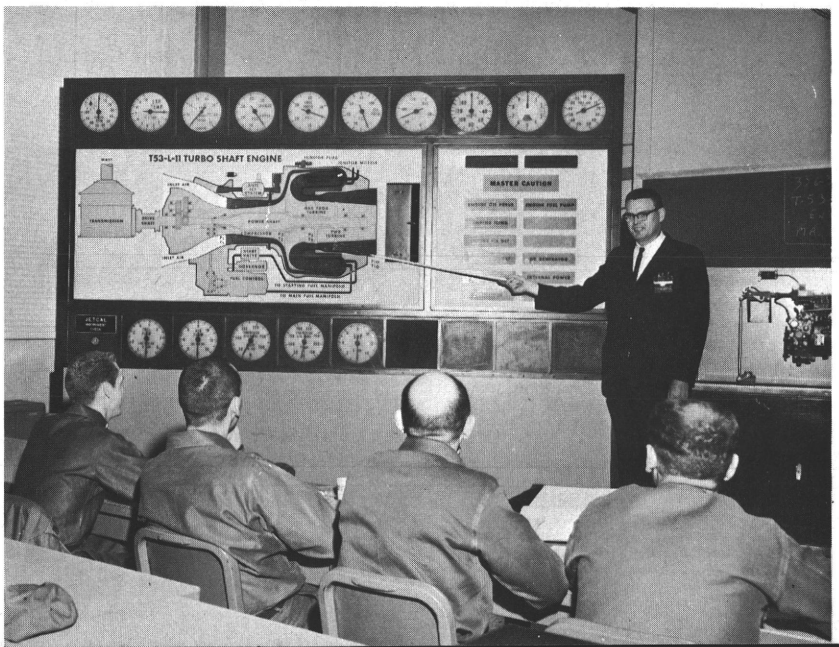
Little or no attention was paid to the origin of the component. After all, a pump was a pump. In the process they acquired a collection of components of every description. These were tirelessly torn down and reassembled, and step-by-step lesson plans were developed. Eventually, the first students arrived and classes started about 1 July 1954.

Other than the airfield the only area available for flight line activity was an old driver training range used by the Highway Department of the Transportation School. The instructors moved some L-19s and H-13s out there and taught inspection, runup procedures, operational checks, taxiing, and other related maintenance procedures right out in the open field. There were no hangars or shops. The only permanent facility was a bleacher which had been covered over to keep out the wind and rain, and equipped, of course, with that modern convenience—the Lister bag.

A major addition to the physical plant was made in 1955. Members of the Field Servicing Branch procured and erected, by their own effort, a surplus metal building to accommodate personnel and training aids during inclement weather. For the next few years, no great changes were made in the physical plant, but many improvements in training aids were made as the junkyard items were replaced by components of aircraft in the Army inventory.

What probably helped most at this early stage was the degree and

An instructor discusses the T53 turbine engine troubleshooter trainer



type of dedication found among aviation personnel of all grades. Many of our members were recent transferees from other arms and branches of the Army. These people, rather than be separated from their first love, pulled up long established roots and joined the Transportation Corps family. Above all, they wanted to stay with and contribute to further development of the new concept of mobility.

Most Army aviation personnel will agree that this strong sense of belonging has persisted since the first steps were taken toward initiation of the concept to permit the Army to develop and employ aircraft responsive to its own unique requirements. Without this firm loyalty, this strong desire to be associated with aviation, it would have taken us many more years to develop the program to the point we have attained.

An interesting expedient developed by this early group of devotees was in the area of crash rescue training. A couple of instructors went up to Patuxent Naval Air Station and picked up a crashed Navy F6F. This wreck was hauled down to Fort Eustis on a commercial flatbed and installed with great pride in the training area. Apparently the instructors would push it over a bank and then haul it out with wreckers to show the students proper crash rescue and recovery procedures.

This aspect of the training program eventually caused a bit of trouble to the Aviation Department. Among the instructors was a very eager first lieutenant—a real bug as far as airplanes were concerned. On nights and weekends, he would go down to the crash rescue site and work on the engine. He finally fixed it up enough to run, but it made so much noise and caused so many complaints from residents on the post that the IG made an inquiry and declared it to be illegal.

In our efforts to establish proper maintenance training procedures, we soon learned that: standards of aircraft logistics are extremely rigid, aircraft components are most sensitive to logistics, aviation supply is an extremely complicated matter, and an acceptable level of aircraft availability cannot be attained in terms of the supply response adequate for ground vehicles. Furthermore, we learned that aircraft, once procured, no matter how refined in design and quality, require a high level of maintenance.

Each plane had its own complement of special tools as well as its individual peculiarities and sensitivities to certain maintenance techniques. This was something new. Our experience with railway equipment, landing craft, and trucks had not, to say the least, completely prepared us for this new role with its finer tolerances. After all, with a truck or boat, if something goes wrong, you can stop in the shade or drift; with an airplane, you do not have this alternative. A basic philosophy was adopted and continues today: "Out of ground effect is no time to discover the part was faulty or the mechanic untrained. Each must be proved before becoming a part of the aircraft or aviation team."

Another problem confronting the School was that of securing the proper type of equipment for use in training. The tool system had not caught up with the aircraft. We often found that we had to improvise. For example, it was noted that some of the torque functions on one component of the H-19 required as much as 500 foot-pounds. The largest torque wrench we had in our tool sets was for 400 pounds. So we fabricated a wrench and then attached 5 feet of gas pipe to it with a 10-pound fish scale on the end of it for calibration. To tighten the fan hub nut—the one causing the problem—we detailed about a dozen men to hold the fan steady, applied a K factor to compensate for both the weight and the bend in the pipe and applied the requisite amount of pressure. The next step was to write to the Chief of Transportation to urge him to get the tool sets equipped so that the maintenance training mission could be performed in a satisfactory manner. It might be interesting to note though that the nuts tightened under this less-than-recommended procedure went their full life.

Particularly vexing problems encountered resulted from lack of continuity of assignments and the difficulty of maintaining a reservoir of skilled aviation maintenance personnel. As aircraft became more complex and the inventory rose, maintenance and mechanical problems also became more complex. Aircraft were being brought into the inventory more rapidly than the MOS code, which identified the skill of the mechanic, could be revised. As a result, mechanics were being trained and fed into the maintenance system without an adequate means of identifying their type of skill. The personnel people did not always recognize the requirements of the aviation field. They sometimes made personnel assignments on the basis that maintenance or supply were the same whatever the type unit.

Many additions have been made to maintenance training

facilities. We now have grown from a few bays in boat sheds to a total of 36 buildings, occupying over 540,000 square feet. More space and facilities are being built or are on the drawing boards. During the past year, three new hangars have been constructed and 23 World War II buildings have been converted to classrooms to accommodate the increased workload, which has grown about 300 percent since the summer of 1965.

Today the maintenance training program consists of 20 aviation maintenance military occupational specialty (MOS) producing courses and two other courses for officers. Nine of these courses apply to rotary-wing aircraft, nine to both rotary-wing and fixed-wing aircraft, and the remaining four to fixed-wing only. During fiscal year 1967, in-resident student personnel in excess of 14,000 will be undergoing training in the aviation maintenance courses.

Approximately 350 officers will receive training in aircraft maintenance and 30 pilots will be trained annually in the Aircraft Maintenance Test Pilot Course (UH-1). The Aircraft Maintenance Test Pilot Course is the newest of the officer courses; the first class was graduated in September 1966. A total of 491 classes of all types will be conducted throughout the coming year.

On an average day 3,200 enlisted students and 107 officer students in residence are attending 103 enlisted and five officer courses.

Nine different types of helicopters and six different types of fixed-wing aircraft are used for training in the aviation maintenance department at the present time, including the OH-6A (LOH) and the CH-54A Flying Crane. Programs are being developed for the HueyCobra, the Advanced Aerial Fire Support System (AAFSS), and the U-21A.

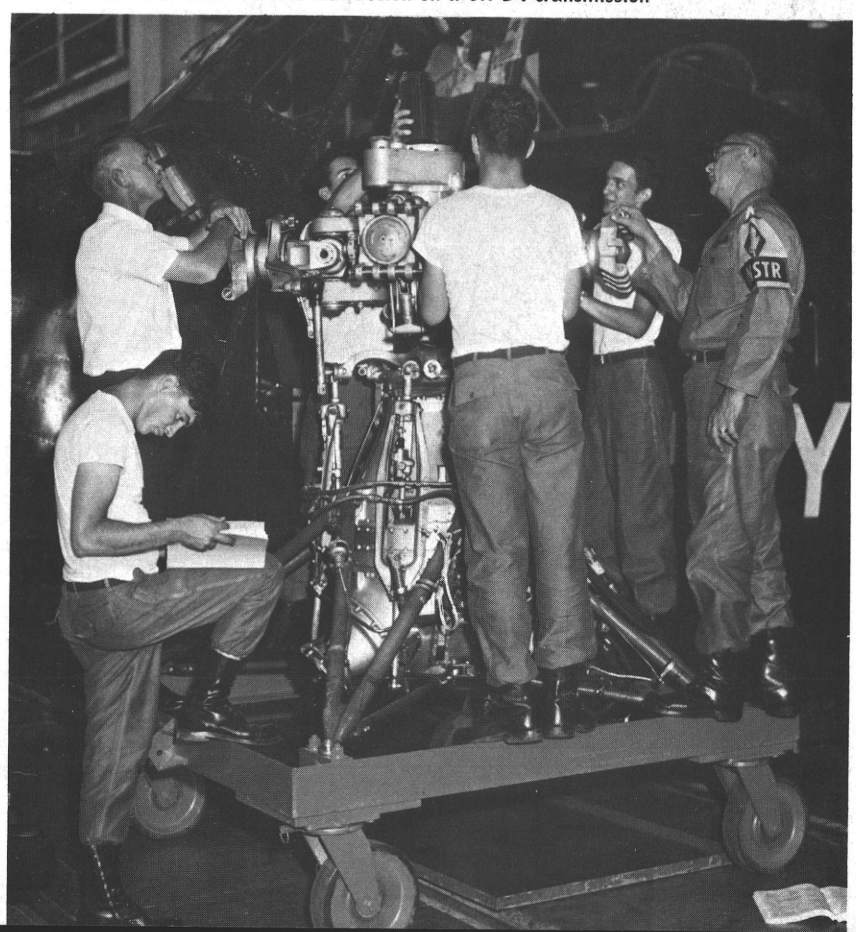
With extensive resources available, an ever growing body of talent, and more efficient equipment to use for training, the contribution of the U. S. Army Transportation School to Army aviation continues to keep pace with aviation developments. Constant liaison is maintained with industry. Experiences in Vietnam are being studied and pertinent changes are already being made in the curriculum and in methods of instruction.

Great progress has been made in Army aviation in the past 25 years; growth continues as current challenges are met and future requirements anticipated. The contribution that Army aviation is making in Southeast Asia, indeed throughout the world, is being documented in many ways and in many forms. We might ask ourselves, "When can or when will its contribution be assessed?"

It is probably a bit too early to make any conclusive assessment. Everyday, through experience gained in teaching aviation maintenance or in studying the achievements of the graduates of the Transportation School, we find that change is needed here, that improvement is required there. New units are being created. New equipment is coming into the inventory.

Army aviation is now in the process of receiving its first big field test. Its capabilities are being tested under a variety of conditions, and new lessons are constantly being learned. It is functioning as an effective member of the military team. This may be the answer to the question of how or when will the contribution of Army aviation to the overall Army effort, indeed that of the Transportation School to Army aviation, be assessed. In the final analysis, the achievements of the team are dependent upon the individual contribution of each member.

Students at Fort Eustis receive instruction on a CH-34 transmission



ARMY AVIATION-

the newest member of the team

The real reason Army aviation has progressed so dynamically is that it has never lost sight of its real purpose: to augment the capability of land forces to conduct prompt and sustained combat operations incident to land warfare.

Major General Robert H. York
Commandant, U. S. Army Infantry School

EVERYONE is looking up to Army aviation, and rightly so.

Remember when the Infantry Division was authorized only 11 aviators and 10 aircraft? Compare this to the modern airmobile division with over 938 aviators and 434 organic aircraft. What accounts for Army aviation's growth by seven league bounds? What fed it and kept it alive during the cutback in military resources which occurred after World War II and Korea? What is its future?

The Army airmobility concept was born of necessity to reduce the widening gap between firepower and mobility of the individual soldier. That gap, once recognized, had to be breached if we were to maintain a balance among the combat functions of firepower, mobility, intelligence, support, and command and control.

So time and circumstances dictated the airmobile approach. The concept was developed, tested, and, as we all well know, it has withstood the final test of combat. But what about the formative days of Army aviation? Why did it grow so rapidly and strong?

The real reason Army aviation has progressed so dynamically is that it has never lost sight of its real purpose: *to augment the capability of land forces to conduct prompt and sustained combat operations incident to land warfare.* In my opinion the key word here is *augment,* because by providing this essential augmentation to our combat forces, Army aviation has taken its rightful place alongside the other members of the Army team.

Another major reason Army aviation has become a full-fledged and highly respected member of the Army team is through the demonstrated professionalism of the men who make up its ranks.

This professionalism not only applies to the officer and warrant officer aviators but also to the many others who perform the less glamorous but nevertheless important tasks from crewchief to fuel truck driver. These are unsung heroes, but a lion's share of the credit must be attributed to them. Perhaps special recognition should go to crewchiefs, many of whom not only must fly long hours with their aircraft, but also put in equally long weary hours maintaining them under the worst possible field conditions. It would be impossible to fully recognize all the many different jobs being done by these soldiers, but the spirit to render the best possible service has permeated throughout the men of Army aviation and is strongly reflected in their pride of performance. Although their individual contributions vary, collectively they make up the total effort, and that effort is overwhelming!

I could reiterate some of the impressive statistics accrued by the men of Army aviation, but by the time you read this article they will undoubtedly be surpassed by others even more impressive. Besides, statistics are not all that

Obstacles such as dense jungle (right) slow down and tire the infantryman. But Army aviation provides the means to bypass these obstacles and arrive in the target area fresh and ready for combat (above)

important. What *is* important is the feeling of mutual respect that is being established as a result of their deeds and the developing reliance on Army aviation by the other members of the Army team.

Now that Army airmobility is an integral part of our thinking, what is it doing to further enhance its future? In Southeast Asia, this bold new concept has opened a dimension in warfare that is perhaps the greatest tactical innovation since the German blitzkrieg of World War II.

Because of it we are now able to employ more effectively our singularly most important asset—a physically fit, well equipped, highly motivated combat soldier on or very near his assigned objective area. His strength is no longer sapped by exposure to rigorous approach marches over difficult terrain. Instead he has bypassed that terrain by helicopter. We have emplaced him, replaced him, resupplied him, and eliminated his need to burden himself with heavy equipment. We have reinforced him and provided close intimate fire support when he got into a scrap. Most significantly, we have withdrawn him from one area within the battlefield to another. All of these have been accomplished over and over again by aerial means!

Obviously then, the value of the individual combat soldier has been greatly increased through Army aviation, simply because we can now accomplish much more with our resources.

In addition to being able to rapidly deploy airmobile forces and their equipment and supplies about the battle area, Army aviation has performed other essential combat functions equally well. Through the speed and range of the aerial vehicle and its ability to overfly obstacles, the procurement of timely, accurate intelligence information by our combat forces has been tremendously increased. Army aircraft have provided the ground commanders with airborne eyes and ears that have significantly enhanced their reconnaissance, surveillance, and target acquisition efforts and enabled them to greatly expand their area of influence.

Perhaps one of the greatest contributions Army aviation has made has been in the area of command and control. In the previous wars our Army has fought, commanders in many instances were required to assess the tactical

Continued on page 62

THAT SOMEBODY UP THERE

Supports This Cannoneer

Major General Harry H. Critz
Commandant, U. S. Army Artillery and Missile School

FOR AN 80-YEAR period extending from the Civil War through the initial commitment of U. S. Forces in World War II, field artillerymen valued aviation as a supplement to ground observation teams, and it wasn't a wholly reliable supplement at that. Whether it was a hydrogen-filled balloon of Civil War vintage or a stubby Piper Cub, the mission was the same—observe and adjust fire. It was for this purpose that aviation organic to the artillery was first authorized on June 6, 1942, at Fort Sill, Okla.

Today, the artilleryman's appreciation of aviation has sharpened. Operations being conducted in Vietnam bear witness to a much larger role than that which prompted the War Department to provide the artillery with organic aircraft. Aircraft now serve not only as aerial observation platforms, but provide the Army with airmobile capabilities, aerial resupply, aerial reconnaissance, and a growing aerial artillery fire support. Despite these innovations and diverse applications of aviation, the role of observation now merits greater emphasis than ever before.

Aerial observers were first tactically employed by U. S. forces during the Civil War. Professor Thaddeus Lowe became the first aerial forward observer of an American unit when he successfully directed artillery fire from a balloon against Confederate forces on September 24, 1861. Aerial observers continued to support Union ground forces throughout the Civil War with varying degrees of success.

Balloonists were trained at Fort Sill during World War I, and balloon units continued their training until the last unit was deactivated in 1942. Only one balloon was on station at Fort Sill at the outbreak of World War I,

but with America's entry into the conflict, the artillery's penchant for balloon observation ushered in a hectic period of training.

During World War I, Fort Sill witnessed the construction of the Henry Post Airfield, named in honor of Second Lieutenant Henry B. Post, a pioneer military aviator, who was killed in an airplane accident near San Diego, Calif., on February 9, 1914. Construction of the field started August 8, 1917, and the field was sufficiently completed by January 1918 to accommodate the balloon school—a five-week course with a capacity for 315 students.

A Balloon Corps training school was established at the post where aviators and observers were trained and special technical courses were given to enlisted personnel. During the war years, the school trained more than 700 balloon officers and organized 89 balloon companies. Thirty-three of these companies were sent overseas.

Although development of the airplane during World War I made the balloon obsolete, the Artillery saw little application for the airplane in an observation role. Thus, balloon companies were kept on active duty through the years between the two world wars.

What dealt the balloons their deathblow was the inevitable adoption of the airplane for aerial observation purposes. The decision to use the plane for this purpose was not a sudden change of heart but merely a revival of tacticians' thoughts. Also, development of the airplane had progressed significantly from the planes used in the Army as early as 1915.

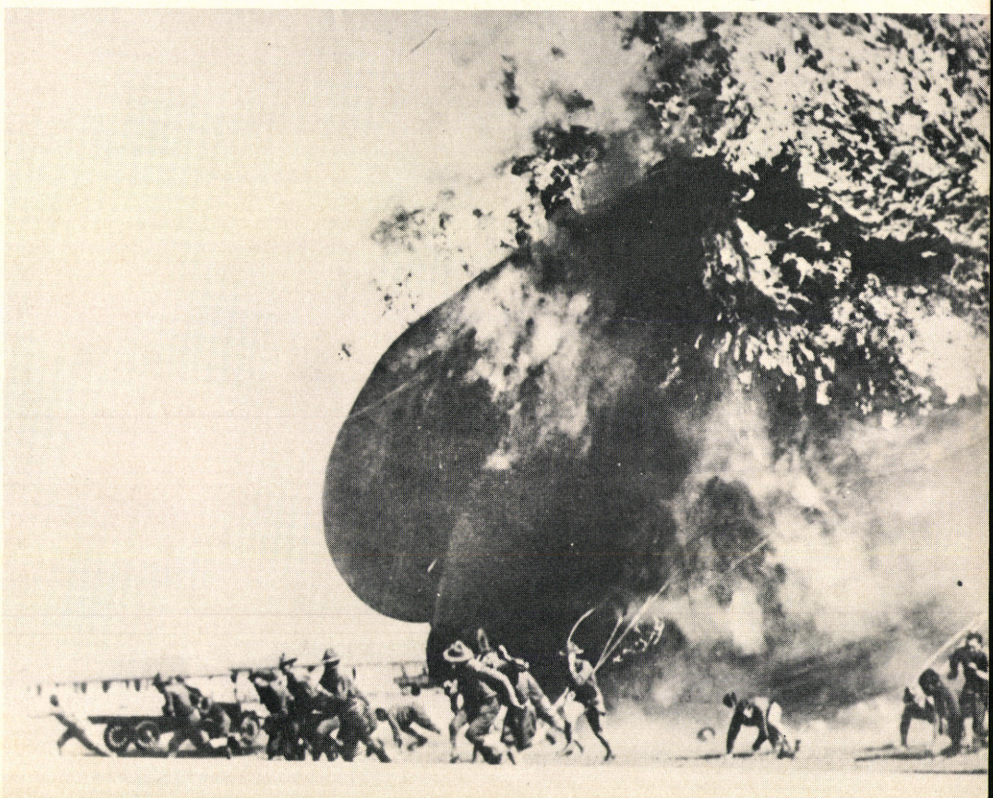
It was in 1915 that America's first squadron arrived at Fort Sill to conduct experiments in artillery fire observation. Designated the First Aero Squadron, the unit consisted of airplanes of the J. N. tractor type (Curtiss JN3). Inclement weather conditions and mechanical difficulties grounded the planes for more than two months. As a result, the experiment failed to convince the artilleryman of the airplane's potential.

While at Fort Sill, however, the squadron did contribute a "first" in aviation. The first aerial photo mosaic was developed, using a Brock automatic camera. The aerial photographic work done at this time resulted in the redesign of the Brock camera and in further development of aerial cameras.

Only one plane was stationed at Fort Sill at the outbreak of World War II. Development of aerial observation with planes continued on a sporadic and generally ineffective course until 1941. A variety of aircraft were in the experiments, including a strange looking craft, tagged an "autogiro," which provided a modified plane body with rotor blades. At that time no one could see any use for the weird looking flying machine.

In 1941 aviation organic to the Artillery received its big shot in the arm which led to the establishment of the Air Training Department at the Artillery School at Fort Sill in 1942. Results from large maneuvers undertaken in May 1941 and later trials in Tennessee during June resulted in recommendation to the War Department that the light airplanes be made a regular component of the artillery. But it may have been an article written by MAJ William W. Ford, a field artilleryman, aviation enthusiast, and sportsman pilot, which served as the major inducement to the War Department's proposal. In his article Major Ford outlined his concept of aviation in the Field Artillery. The article, published in the FIELD ARTILLERY JOURNAL, was forwarded to MG Robert M. Danford, then the Chief of Field Artillery.

Following a visit to Fort Sill and a discussion of aviation with Major Ford, General Danford resubmitted an earlier recommendation to the War Department that light aircraft manned by artillery officers be made organic to



Balloons played an important role as observation platforms in the early history of Army aviation. But they were extremely vulnerable to airplanes and fire. The balloon at right bursts into flames and injures 24 men on the afternoon of 2 April 1918 at Post Field, Fort Sill, Okla.

division and corps artillery units. Prematurely, the recommendation was disapproved. Major General Leslie J. McNair, Chief of Staff of General Headquarters and later the first Commanding General of the Army Ground Forces, felt that a fair trial must be given the new system of air support commands—and generally favored the massing of support elements as opposed to General Danford's proposal.

Subsequently, however, the Office of the Chief of Staff ordered a test of General Danford's proposal. After the originally scheduled test was interrupted by the attack on Pearl Harbor, the Second Infantry Division and the 13th Field Artillery Brigade were designated test units. Lieutenant Colonel Ford, recently promoted from major, was placed in charge and the test was ordered to proceed at Fort Sill.

Major Gordon J. Wolf, a reservist who had been corresponding with Colonel Ford, was recalled to duty to help select personnel for the test group and organize the air training detachment under which they would function.

Instruction began on 15 January 1942. The students, thereafter referred to as the "Class Before One," were divided into A and B flights. Instruction consisted of flight and ground training, and both of these were further divided into three stages.

Training was completed at Fort Sill on February 28, 1942. The civilian instructors returned to their homes while the "Class Before One" students split into two groups and departed for continued testing elsewhere.

By the end of April 1942, the tests were completed, and the groups reassembled at Fort Sill to await the outcome of more than three months of tedious work.

The boards appointed to observe the tests were impressed. Their findings and recommendations to the War Department highly favored organic aviation for field artillery units. Despite concern over the "vulnerability of the light planes," General Headquarters concurred in the recommendations.

On June 6, 1942, the War Department authorized organic Army aviation. That same month, Lieutenant Colonel Ford was promoted to colonel and named director of the Department of Air Training of the Field Artillery School.

Although the Artillery had proved the advantage and the feasibility of organic aviation, it could not rest on its laurels. Opposition to the concept of organic aviation persisted and was heard on several occasions. Friction soon developed between the Army Ground Forces and the Army Air Forces over the organization and control of liaison aviation. This issue was further complicated in 1943 when the question arose as to what type of plane should be used by the ground force. In this year General McNair, who by this time had been firmly convinced of the need for organic aviation, offered the following arguments:

"The planes are right where they are needed, not back at some centralized airfield.

"The present organization, unlike any other, insures satisfactory unit communications.

"By daily association, complete understanding between the pilots and other battalion officers is obtained."

It wasn't until more than a year later that organic aviation was assured permanence.

Under the organization inaugurated in 1942, two airplanes—low-performance aircraft of the Piper Cub type—two pilots, and one mechanic were made organic to each field artillery battalion, to each divisional field artillery headquarters, and to each field artillery brigade or group headquarters. Thus, each infantry division was authorized 10 aircraft—2 in each of the four field artillery battalions and 2 in the division artillery headquarters—and each armored division was authorized 6 aircraft—2 in each of the three field artillery battalions. It was not until later that the armored division had an artillery headquarters.

With the organization established, necessary courses for this tactical training were organized in the Air Training Department set up in the Field Artillery School at Fort Sill. The first graduation occurred on September 18, 1942, with 18 graduates constituting the first class to follow the "Class Before One." A majority of the early graduates and all available planes except those used for training at the school were sent overseas to initiate the equipping of units taking part in the invasion of North Africa.

While the first graduates were experiencing combat action, training at Fort Sill continued. The Army Aviation School reached a peak enrollment of almost 300 students and by the end of the war 263 pilots and 2,262 mechanics had been trained there.

It was from combat reports that the Army recognized that requirements existed for aircraft usage other than merely for observation. In 1943, artillery aviators started aerial medical evacuation, particularly in jungle areas of the South Pacific. At the same time, artillery aviators in both theaters began flying limited supply, com-

munication relay, surveillance and reconnaissance and wire laying missions. In addition, they also were used in controlling advancing armor and infantry, and making aerial photographs.

By the end of the war, preparations were underway to expand organic aviation to other branches based on the variety of missions undertaken by aviators in combat.

During the late forties, tests were conducted on various models of observation planes to replace the L-4, which was used extensively during the war. Most were found wanting, although the L-17, thought to be strictly an "airport airplane," later far outperformed its supposed capabilities in Korea. Finally, the Army settled on the L-19, which was designed by Cessna. The original contract for 420 L-19s was let in 1950. The aircraft, with slight modifications, to include designation (now O-1), remains, pending replacement by the light observation helicopter.

While the Army was trying to decide on a light observation plane for the Artillery, training continued at Fort Sill with the L-4 Piper Cub and a variety of experimental models.

Much of the aviation training at Fort Sill was concerned with fixed-wing aircraft; however, rotary-wing aircraft were to play a most important part of the School's overall operations.

The acceptance of the helicopter gave the Army greater mobility and versatility and gave Fort Sill aviation a heavier training requirement.

This latest concept in aviation was introduced formally to Fort Sill in October 1948 when the Army established the advanced tactical training course there. Colonel Hubert D. Gaddis set up the flight training course and flight standardized the first Army rotary-wing instructor pilots. In August 1954, when the Army Aviation School was moved to Camp Rucker from Fort Sill, the rotary-wing course was changed from a section of the flight department to a department of its own.

L-4s with pontoons were tested at Fort Sill during World War II

While at Fort Sill, aviators were trained to fly the H-25 and the OH-13 helicopters. With a requirement for a greater number of pilots, the Army implemented the first warrant officer class at Fort Sill in 1951. August 1953 witnessed the first full class of these rotary-wing aviators.

Also in 1953 the first instrument examiners course was started at Fort Sill. The LC-126 was the instrument trainer for the first four examiners.

The loss of the Aviation School in 1954 dealt a blow to Fort Sill's aviation activity, but did not terminate it. A new role was adopted for Fort Sill in 1955 with the training of CH-34 Choctaw helicopter aviation companies.

Instrument training resumed at Fort Sill in 1957. The Cessna 182s and Piper Comanches were used as primary instrument trainers for this program. The Spartan Aviation School and, later, Ross Aviation were the instrument program contractors. In addition to this program, tests were begun on the T-37 Cessna jets which were to be used as high performance planes for artillery observation.

During the summer of 1958, the 54th Transportation Company received twelve CH-37 medium helicopters. The CH-37 was the first helicopter with the capability to lift a 105-mm howitzer and crew. CH-37s and attached sling loads were a common sight at Fort Sill until the Chinook assumed the old Mojave's role.

Fort Sill was first affected by the growing involvement in Vietnam when Headquarters and Headquarters Detachment of the 45th Transportation Battalion Headquarters deployed in 1961. This Sill unit, which had served as training headquarters, was the second aviation unit to move to Vietnam.

The loss of Fort Sill's aviation training headquarters brought new changes, and the aviation units stationed at Fort Sill were assigned to the 1st Field Artillery Brigade. This was Fort Sill's aviation headquarters until 1963 when the Artillery Aviation Group (Provisional) was formed.

Aviation continued growing and diversifying at Fort Sill as a new breed of "tiger" was born. The armed helicopter "tiger course" was implemented in 1963 to train helicopter aviators in tactical, terrain and combat flying.

It was also in 1963 that Fort Sill became further qualified "medium weight" in the Army aviation arena. The CH-37 Mo-

That Somebody Up There

javes, already on station, were joined by the CV-2 Caribou of the 57th Aviation Company. Fort Sill aviation was now capable of moving the artillery to just about any place at any time.

With Fort Sill's Artillery Aviation Group capable of handling any assigned mission, III Corps Artillery moved on post in August 1964. Henry Post Army Airfield had a new face to meet these requirements. Three new hangars and a complete taxiway could now handle any aircraft in the Army inventory. The Artillery Aviation Group (Provisional) was redesignated the Artillery Aviation Command.

With an expanding training program, Fort Sill branched out into other areas. With a need for more responsive fire support for airmobile forces, test and evaluation of future fire support systems was initiated in 1963. In March of that year the Committee for Aerial Artillery Test and Evaluation (CAATE) was formed. The committee was composed of members from each department of the School with the director of the Gunnery Department as chairman. To provide the committee with an organization capable of accomplishing its required missions, the 1st Aerial Artillery Battery (Provisional) was organized in May of that year.

One of many missions assigned the committee was to determine the most feasible means of employing aerial artillery. Four CH-34s and 50,000 rounds of 4.5-inch rocket ammunition were made available for test purposes.

Since direct firing of aerial rockets was an accomplished fact, emphasis was placed on developing a suitable indirect fire capability. Certain adaptations were required before the CH-34 helicopter could be used for this purpose. One 10-tube, 4.5-inch rocket pod was affixed to each side of the aircraft. Initially all quadrant elevation and traverse was accomplished manually. Later developments resulted in a more sophisticated system featuring electrically controlled quadrant elevation and traversing mechanisms.

Although this system has yet to accomplish the accuracy desired for a direct support artillery piece, progress has been made toward an acceptable weapon. The ability of the aerial artillery battery to receive a fire mission in the air, to land, and to complete the mission with indirect fire was aptly demonstrated by the test group. The battery was laid for direction and the first rounds in adjustment were on the way in 2½ minutes after the first aircraft landed. Fire from two aircraft equaled that of a battalion of 105-mm howitzers firing two volleys.

In April 1964, for the first time in the history of the Artillery, an aircraft was placed on line with other artillery weapons at Fort Sill's Artillery Firepower Demonstration. This was true recognition by the Artillery and Missile School of the concept of a flying artillery weapon.

Tests have proved the helicopter-mounted rocket system to be as accurate as the ground launcher for the same rocket. However, research indicates product improvement in the rocket propellant and launcher conditions will increase range and accuracy for the aerial system. The feasibility of combining the 4.5-inch rocket and the UH-1 helicopter is being considered.

The First Aerial Artillery Battery (Provisional), in its testing at Fort Sill, has given the Army an entirely new concept for providing our maneuver forces with artillery fire support. This system has the capability not only to deliver indirect fire from the ground, but also to fire on targets of opportunity from the air while moving to a new position. Further development of the aerial artillery concept will lead to even more avenues for employment of a system of this type. At present, a method of quickly detaching the rocket mounts from the aircraft is being developed. This development would allow the battery to continue firing from dug-in positions while the aircraft were being used for ammunition resupply. Wars, both present and future, could use a system as flexible and mobile as this.

Fort Sill's contribution to aviation spans a period of more than 50 years. Indications are that it will continue. Artillery observation testing and training brought the first tactical Army aviation squadron to Fort Sill in 1915 and it was for this purpose that organic aviation was authorized 27 years later in 1942. As U. S. units became engaged in combat, aviation was found to be extremely useful in other aspects of operations. Artillerymen were early in expressing their preference for the plane over the balloon and, in turn, promoted the adoption of the helicopter.

Throughout the gradual development of Army aviation, the veteran redleg, recognizing the significance of aerial support, mustered greater respect for the Army aviator.

Having gained the confidence of the veteran redleg, the Army aviator continues to strive for even greater proficiency in supporting the Artillery. However, he retains enough professional pride never to allow the artilleryman to forget that he's that somebody up there watching out for him.

The Flying Part of Armor

Armor and aviation have had a major common interest over all others — mobility

Major General A. D. Surles, Jr.
Commandant, U. S. Army Armor School

COMMANDERS throughout military history who have gained a mobility differential over their enemy, made maximum use of available firepower, maintained effective control of their forces, reacted quickly to accurate and timely information of their enemy, and provided for adequate combat service support have been the most successful on the battlefield. Essentially these keys to success are the five major functions of combat commonly referred to as command and control, maneuver, firepower, intelligence, and logistics. All are essential to success in combat, although one may carry more weight than another in a particular operation. In any operation the commander at each level with the assistance of his staff considers each of these functions in relation to his mission.

Historically and currently, Armor, with its characteristics of armor protected firepower, great mobility and organizational flexibility, has tactically exemplified the combat functions described above. Complementary to, and coincidentally with, the ever developing capabilities of Armor, early recognition of Army aviation potential has extended Armor's combat power into the third dimension. Armor and aviation have had a major common interest over all others—mobility.

I think it can be said that Armor has provided the basic philosophy of mobile warfare upon which Army aviation has grown and developed. Many may feel that this is an unduly parochial statement on my part; however, it is not intended to be taken in this light. Armor has always stressed highly mobile combat operations with a predominance of mounted combat. Army aviation elements are organized to take maximum advantage of a greatly improved mobility differential over all ground forces.

The Flying Part of Armor

It has that great advantage of not being restricted by the terrain, thus markedly enhancing the elements of surprise and subsequent shock effect on the enemy.

Lack of a ground gaining and holding capability of our present aviation units should be recognized by all commanders and offset by integrating their combat power and favorable characteristics with the ground forces' plan of operation. No pure force, tank, infantry, etc., possesses all the ingredients essential to conduct effective sustained combat operations. It was recognized early by armor leaders that Army aviation from inception was a necessary part of the combined arms team.

The first use of Army aviation elements to extend the reconnaissance capability of ground elements cannot easily be fixed. In World War II, for example, Cubs organic to the field artillery battalions were used on numerous occasions to perform reconnaissance for ground elements other than their parent organizations. The arming of the first Army aircraft would also be very difficult to specifically pin down. It is known, however, that an aviator in the 4th Armored Division as early as August 1944 threw hand grenades from his Piper Cub. Later he wired the struts of the aircraft with bazookas on each side.

I am sure that many other ideas were in the minds of our early Army aviators that were not tried for one reason or another. The fact remains that the concept of using Army aircraft in a unit designed to perform the traditional missions of armored cavalry was born through the farsightedness of many officers. This discussion of the air cavalry concept is not intended to be a historical record with documentation, but is to outline the development and growth of this concept.

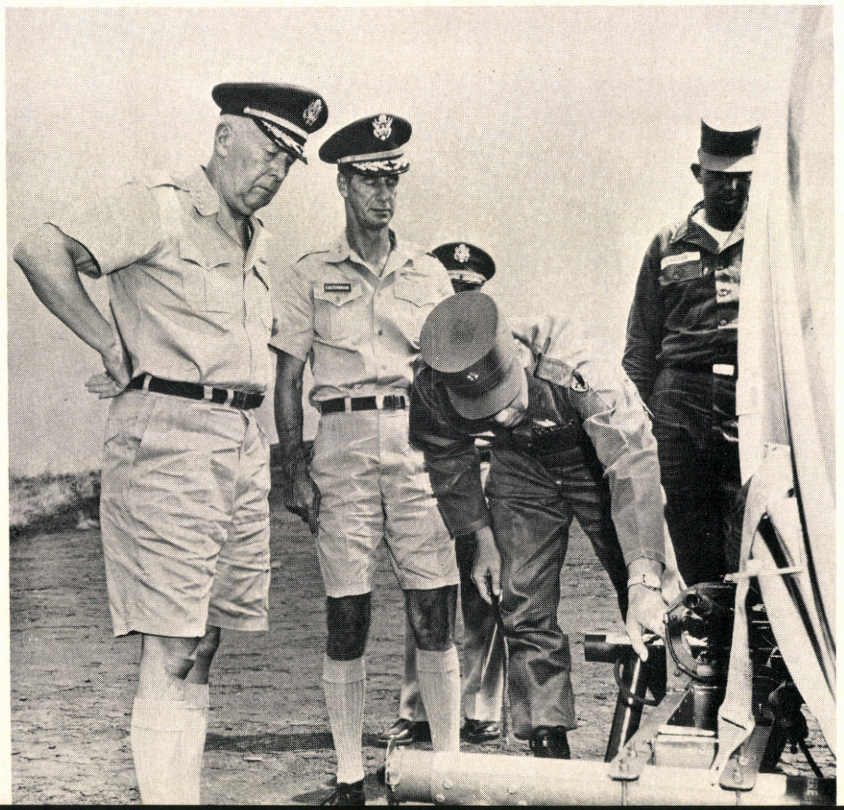
AIR CAVALRY CONCEPT

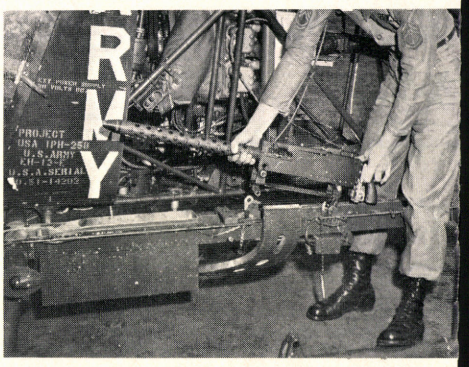
Development of the air cavalry concept was based on the need for a reconnaissance and security unit with greater mobility than ground mobile forces.

The first experimental "Sky Cav" company was organized and tested on Exercise Sagebrush in 1955. A follow-on Sky Cav company (provisional) was organized and tested in 1957 on Exercise Sledge Hammer. These test results indicated the feasibility of integrating Army aviation elements with ground elements, but further study and testing were needed to perfect a suitable organizational structure.

In 1957 the term "Sky Cav" was replaced by the term "Aerial Combat Reconnaissance." The Army Aviation School already had by this time an ACR platoon (provisional) that had been conducting demonstrations at Fort Rucker, Fort Benning, Fort Knox, and other military installations. These demonstrations greatly assisted in spreading the word and stimulating imagination and interest in the promising capabilities of air cavalry units.

The first Aerial Combat Reconnaissance Company (experimental) was activated in 1958 at Fort Rucker. Aircraft organic to this unit were equipped with weapons systems fabricated and designed at Fort Rucker. This unit, al-





Left: General Bruce Clark of CONARC visits the Aviation School in late 1960 where MG Ernest F. Easterbrook (center), the school commandant, briefs him on early helicopter armament experiments. MAJ Carroll M. Cook, ACR company commander, points to a kit which later evolved into the M-1 and M-2 armament subsystems. WO Clarence J. Carter of ACR is at right. Above: a closeup of the kit Major Cook is pointing out

though equipped with jerry-rig weapons systems, demonstrated such potential it caused many of the doubters to change their views on the armed helicopter mobile task force.

Major General Robert Grow said, "Leading cavalrymen have contended from time immemorial, reconnaissance to be effective must include fighting; therefore, our reconnaissance units must be able to survive and accomplish their mission on the modern battlefield." The ACR company was given this capability to fight for information through use of its armed helicopters and airmobile elements. Although the ACR company was never fully tested in the field, it did accomplish, through the use of many demonstrations, the objective of assisting in getting other actions taken which did result in a similar unit being organized and tested.

The Armor School made its contributions to the Sky Cav and ACR units through recommendations to CONARC, direct liaison with the Army Aviation School, providing test evaluators, and closely monitoring the entire program. During this period, the Armor School was also applying all the capabilities of this concept to the area of traditional missions performed by armored cavalry units. Therefore, it was no surprise when CONARC in 1959 directed the Armor School to prepare advance plans for an armed helicopter mobile task force which was to be specifically designed to augment the traditional missions performed by armored cavalry elements. The school was further directed to prepare a draft training text and a tentative plan of test.

In meeting the requirements outlined in these directives, the Armor School worked in close coordination with the Army Aviation School. The unit designed

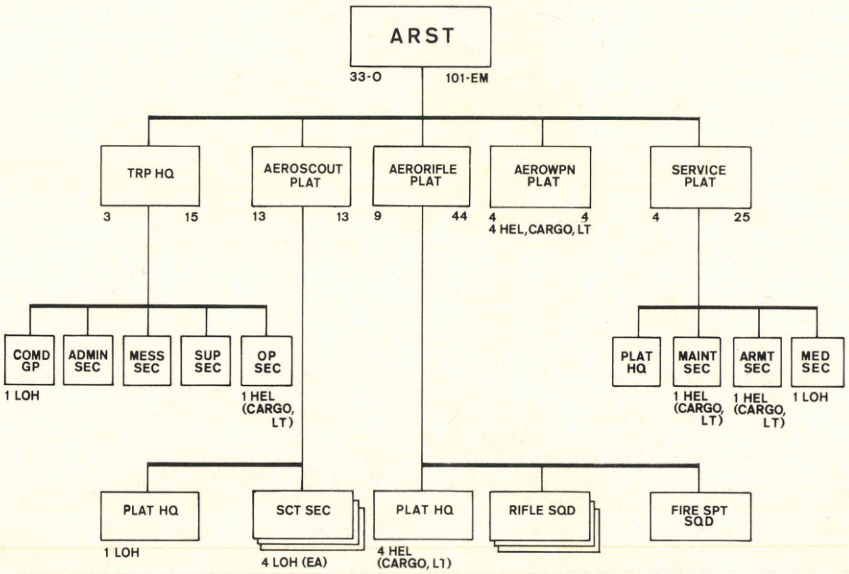
The SS-10 on the H-13 (above) is an early helicopter armament experiment

was an Aerial Reconnaissance and Security Troop (ARST) which closely paralleled the organization of the ACR company. The original unit proposed by the Armor School was as shown in the diagram on this page. It is significant to note the similarity of this original unit with the present air cavalry troop. This is primarily due to the original unit being organized with a combined arms team, a combat proved organizational concept that optimizes flexibility.

The weapons systems were the best that had been developed at Fort Rucker. The ARS test troop was organized at Fort Benning and in January 1960 moved to Fort Stewart for training and testing. Final results of this test proved beyond a shadow of a doubt the requirement for and the feasibility of the air cavalry concept.

This unit was also evaluated in Europe on Winter Shield I in 1960. A provisional ARS troop was activated and trained under the supervision of the 14th Armored Cavalry Regiment. The Armor School provided the regiment with all the information that was available at that time to assist them in training and operating. The troop was attached to the 14th Armored Cavalry Regiment for the entire exercise, although it did perform missions for other ground elements.

The ARS troop was the first air cavalry unit that really had the capability with its aircraft and



armament systems to perform the traditional missions of the armored cavalry. It, like our present air cavalry troop, was primarily employed to extend the security and reconnaissance of a ground element by working in conjunction and in close coordination with the supported ground element. This does not mean that it cannot operate independently but it is most effective when employed with a ground force.

In 1961 Armor School representatives headed a test and evaluation team whose primary objective was to determine if the light observation helicopter (LOH) could be maintained and logistically supported, if assigned at the armored cavalry troop level. An air scout section consisting of four LOH was assigned to an armored cavalry troop, 8th Cavalry, 4th Infantry Division. Tests were conducted at Fort Lewis and Yakima Firing Center.

The air scout section performed its own organizational level support, and backup organizational maintenance support was provided by helicopter mechanics who had been integrated into the squadron's maintenance elements. Scout helicopters remained with the troop at all times and were employed by the troop commander to augment and extend his reconnaissance and security capability. Test results indicated that the LOH could live with the armored cavalry troop, could be maintained by the pilot and crewchief observer, and could be logistically supported in the same manner as other troop elements.

In 1962 the air cavalry troop was made organic to the divisional armored cavalry squadron with the reorganization of the Army division under ROAD. The TOE for this troop provided it with the most advanced helicopters and armament systems. Some armament systems specifically designed by civilian industry through the research and development program of the Army were now available.

It was also in 1962 that the Armor School provided representatives for the Army Tactical Mobility Requirements Board (the Howze Board) that was being formed. The work of this board laid the foundation for the fundamental concept for the 11th Air Assault Division, Air Cavalry Squadron, and Air Cavalry Combat Brigade.

The Air Cavalry Combat Brigade later changed to the Air Cavalry Brigade and was never organized, primarily due to other higher priority commitments for aviation equipment and personnel.

The 11th Air Assault Division had an organic air cavalry squadron. This squadron now is organized with three air cavalry troops and one ground armored cavalry troop. The 1st Cavalry Division (Airmobile) has been operating very successfully in Vietnam for over a year. Its air cavalry squadron, 1/9 Cavalry, has proved itself in combat.

In 1964 an air cavalry troop replaced the aviation company organic to the armored cavalry regiments.

Two separate air cavalry squadrons, 3/17 and 7/17 Cavalry, were activated at Fort Knox in November 1966. These squadrons are organized under the same TOE of the air cavalry squadron organic to the 1st Cavalry Division (Airmobile).

Air cavalry units presently authorized in the Army include: one air cavalry troop organic to each divisional armored cavalry squadron; one air cavalry troop organic to each armored cavalry regiment; one air cavalry squadron organic to the 1st Cavalry Division (Airmobile); and two separate air cavalry squadrons in training at Fort Knox, Ky.

I think it is obvious to everyone that the air cavalry concept is on the move. Advanced scout and fire support helicopters will be entering the inventory of Army aircraft in the near future that will greatly enhance the capability of these units to perform their combat mission.

DIVISIONAL COMMAND AND CONTROL HELICOPTERS

Armor historically has used Army aviation elements to assist in the command and control of its formations. General I. D. White, when he was commander of the 8th U. S. Army in Korea said, "Army aircraft have been my long right arm. With them I can reach out to any part of the command as the need arises."

Armor commanders need Army aviation support for performing such missions as radio relay, formation control, command visits, staff visits, liaison activities, etc. The Armor School position on the G-series TOE as pertains to command and control aircraft authorized is that there are not enough. The division headquarters command aviation section needs more than six helicopters if it is to fulfill its mission. For example, where will the DISCOM (division support command) elements get helicopter support for command and control? These elements are scattered throughout the division's area of operation, and it has been proved that the tactical elements aren't going too far without this support.

Brigades need more than four LOH because each commander of the attached combat maneuver battalions should have one LOH under his operational control, in

addition to requirements of brigade headquarters. Divisional armored cavalry squadron headquarters should be provided with an organic aviation section for command and control. The squadron commander should not use helicopters assigned to the air cavalry troop for this purpose. This would be the same as taking a reconnaissance vehicle or tank from one of the ground cavalry troops.

After-action reports from Vietnam reinforce this need for increasing divisional command and control helicopters. We should take another hard look at the divisional requirements for organic Army aviation support.

FUTURE TREND

Where does Armor go from here? Within the decade a new highly sophisticated main battle tank will appear. Although this tank will possess a greatly enhanced capability in firepower, protection, and mobility, it will still be tied to moving and fighting on the ground. Yet, at the present moment a bold new idea of moving and fighting from the air by ground forces is emerging.

The Infantry has taken full advantage of the potential of airmobile formations to ride the riflemen to the battle scene where he dismounts to fight on foot.

The air cavalry units conduct reconnaissance and security operations from the air to complement the ground force formations. As mobility of our ground forces increase, the need for more air cavalry units will continue to grow.

Armor is looking forward to a Dynamic Tri-dimensional Mobility (DTM) concept for maneuvering and fighting mounted, from air and ground combat vehicles. Integration of air-armor maneuver units into armor formations will provide a marked increase in mobility over present armor formations. These air-armor maneuver units must live within the battle areas with other ground armor units and have a capability of seizing and holding ground. Yet, while these air-armor units lift from the ground, their firepower and shock effect will remain and be enhanced.

The key to the Armor DTM concept will remain the balance of firepower, protection, and mobility. Just maneuvering rapidly through the air without the capability to seize and hold ground will be improper. Likewise, armor protection to the point of reducing mobility and, therefore, losing rapid mobile reaction will be undesirable.

Armor looks to the future with the Dynamic Tri-dimensional Mobility (DTM) concept which promises air-armor maneuver units living among other ground armor units and boasting firepower, shock effect, and a capability of seizing and holding ground

The Armor DTM concept will not infringe upon the missions of the tactical air force, infantry airmobile forces, or even air cavalry forces. Army aviation elements will play an even bigger role in this concept, which assuredly will grow and thrive on the battlefield of the future. The horse was replaced by wheeled and tracked vehicles; yet, the role of the cavalry did not change to any extent, and its capability for conducting traditional missions was greatly enhanced. Neither will the DTM concept change Armor's role, but it will change its methods of operating and greatly enhance its capabilities.

Charging horse-cavalrymen with drawn sabers became a thing of the glorious past with development of the machinegun. Reluctantly, the cavalrymen dismounted from their horses and mounted their new fire-spurting armored vehicles. Again, we face the challenge of mounting a portion of our forces in air vehicles that dart about the battlefield, very close to the ground, bringing heavy volumes of firepower to bear on the enemy with great speed, surprise, and shock effect.

Major General Adna R. Chaffee said, "It is often said, and it may be true in the abstract, that the principles of war do not change. It is, nevertheless, absolutely true that methods do change and are constantly changing. We may study the great captains of the past to learn of their principles and, above all, of their character, but do not let us be tied too much to their methods. For methods change with every change of armament and equipment."

We will continue to stress, as we have in the past, at the U. S. Army Armor School, that the armor commander must take maximum advantage of the most favorable characteristics of each element of his combined arms team, which I am sure will continue to grow in Army aviation strength and combat effectiveness.

I take pleasure in extending my congratulations to all Army aviation personnel, on the 25th anniversary of Army aviation, for a job well done. I am sure each of you will continue to exercise your technical know-how, imagination, and ingenuity that has contributed so much to the success enjoyed by the Army aviation program.

TALONS FROM THE SKY

"It is with extreme pride, deep humility and great expectation that I congratulate Army aviation on its silver anniversary. I am proud to be associated with the magnificent men who wear the Army aviator's badge—humble as I recall the many whose fantastic accomplishments in the skies over every battlefield of the last 25 years have brought us to our position of high esteem today—have great expectations as I study the faces of our newest members, shining with dreams and plans of even greater deeds to come."—

G. P. SENEFF, JR., BG, USA, Commanding, 1st Aviation Brigade.

THEIR FLIGHT log boasts a million hours in the skies of Vietnam. Their insignia depict an attacking golden hawk spreading its awesome talons, set against the sword of U. S. Forces in Vietnam. Their motto is "Nguy Hiem," the Vietnamese phrase meaning DANGER. Flight plans for their aircraft record their presence over Vietnam from the northern reaches of jungle covered mountains, southward to the rice-rich paddies of the vast Mekong Delta.

This profile describes the officers and men of the Army's largest aviation unit, the 1st Aviation Brigade. One must, however, see such an organization in action to fully realize its impact on the war, for the Army force structure has not reflected an aviation unit of this magnitude since the Army Air Forces days of World War II.

It is necessary here to view the course of events which led to the brigade's establishment in May of 1966 before reviewing part of its first year in operation as a full-fledged member of the Army Team in Vietnam.

The year was 1965. The Army's

air role was destined to play an increasingly vital part in the Vietnam war—a war which was taking on the appearance, if only in numbers alone, of a conflict fought a few thousand miles to the north in the fifties. There was no doubt in 1965 that Army aircraft were in Vietnam to stay. Many more were to come.

As U. S. ground troops poured into this region of Southeast Asia, it became necessary to chart a course for the arrival of greater numbers of faster, larger, more sophisticated aircraft. This took on urgent and immediate importance, as did pilots and crews to man them.

Aviation units settling in readily met the challenge as the massive buildup shifted into high gear. Battalions, companies, platoons, detachments, sections of aviation, however small, were debarking at so fast a clip that diminishing control and management became apparent.

This rapidly changing situation spawned the inevitable. A headquarters was established to provide command, control and staff planning for aviation units, other than divisional, to more effectively support U. S. ARVN (Army Republic of Vietnam) and the increasing numbers of Free World Military Assistance Forces. This headquarters was labeled an Aviation Group (Provisional). Later in the same year it became the 12th Aviation Group, commanding the several battalions and companies of aviation which then dotted the battle map.

The months that followed saw Army aviation reaching dimensions in Vietnam not dreamed of a year before. Four of these months had hardly elapsed before it was realized that arriving aviation units were outgrowing the control of the new group. The problem was intense. The solution was obvious: another group.

Few escape the fury of the "Hawks"

By winter, the 17th Aviation Group was formed with a mission akin to that of the 12th.

Only the U. S. divisional organic aviation and special aviation support units remained outside the command of the two newcomer groups.

It wasn't long after the old Army Support Group had blossomed into its own massive headquarters called U. S. Army, Vietnam, that the need for a single subordinate aviation headquarters became apparent. Needed was a headquarters that would be charged with the hierarchy of command, staff planning and administrative supervision of the two groups. The result was called an Aviation Brigade (Provisional). On 23 May 1966 the brigade became officially the 1st Aviation Brigade.

July saw the creation of the newly named "Capital Aviation Battalion" by the brigade. In the wake of reorganization, the 13th Aviation Battalion parted company from 12th Aviation Group control to continue Army aviation's involvement deep in the Delta.

August found the 13th Aviation Battalion and the Capital Aviation Battalion trading their variety of patches for that of the "Golden Hawk." Early that month the new shoulder patch had been approved by the Institute of Heraldry.

Early 1967 saw more new units coming—to relieve men and machines who had been flying twice as much as either are supposed to fly.

No major combat operation since the brigade's inception has found itself without support in one form or another from one or more of the brigade's ten battalions, whose 44 aviation com-

panies hold title to more than half of the Army's aircraft on Vietnamese soil.

The wide assortment of aircraft cast their shadows over the entire length of Vietnam. These machines lent to combat operations the versatility and awesomeness of the Huey slicks and gunships; the strength of the Chinook; the eyes of the Bird Dog; the reliability of the Otter; the variety of the Beaver; the sophistication and electronics of the Mohawk; and, for a few months, the STOL capability of the Caribou.

The accomplishments of these aircraft and the gallant men who fly them provide the basis for any review of the brigade's first year. A glance at their results is to know success in combat.

During a 6-month period, a staggering 1,008,167 operational sorties were flown under severe weather and hazardous combat conditions. Brigademen entered a total of 460,069 hours in their logs for this half-year period in every variety of mission. One

Continued on page 63

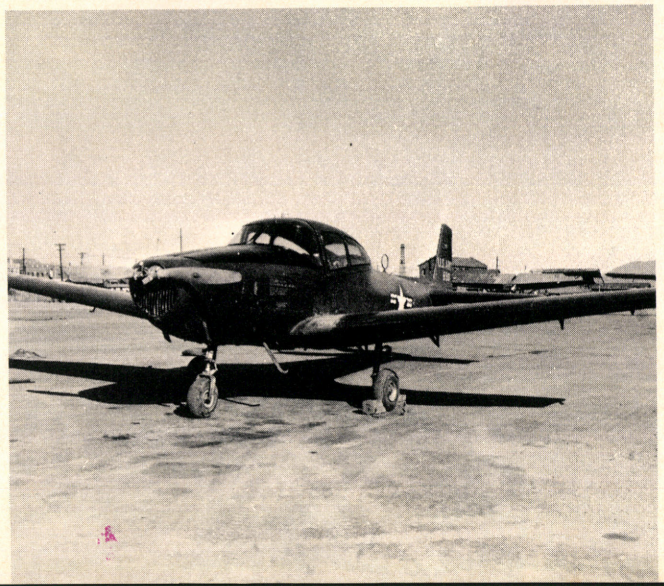
Above: Professor Lowe at Fair Oaks

A COLORFUL QUARTER-CENTURY OF ARMY AVIATION AIRCRAFT

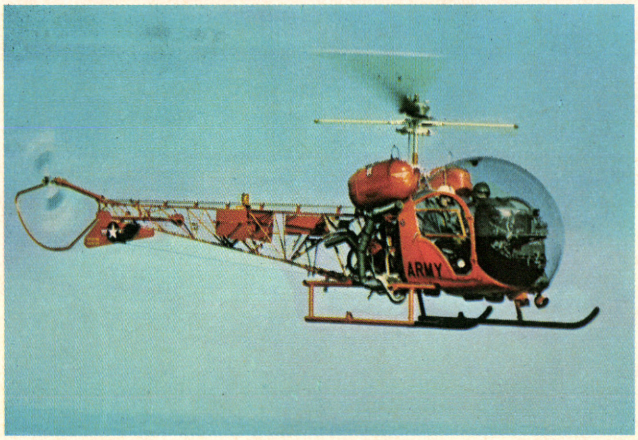
THE OFFICIAL birthday of Army aviation is 6 June 1942, when the War Department authorized light aircraft organic to the Field Artillery. However, this climaxed an endeavor that began on another June 6th—in 1861 when Professor Thaddeus S. C. Lowe demonstrated how balloons could provide aerial support to the ground forces. Since, the Army has used many aircraft in its sincere search for optimum aerial support of the ground operation. Aircraft on the next six pages certainly are not all of those that have contributed to the development of Army aviation—but they are representative. (See the Jun-Oct 1962 DIGESTs for a complete history of Army aviation aircraft.)

Above: An L-5 at Ft Rucker's Army Aviation Museum
Below: An L-16 at The Presidio, Calif., in 1951

Below: An L-17 parked in Korea in 1954

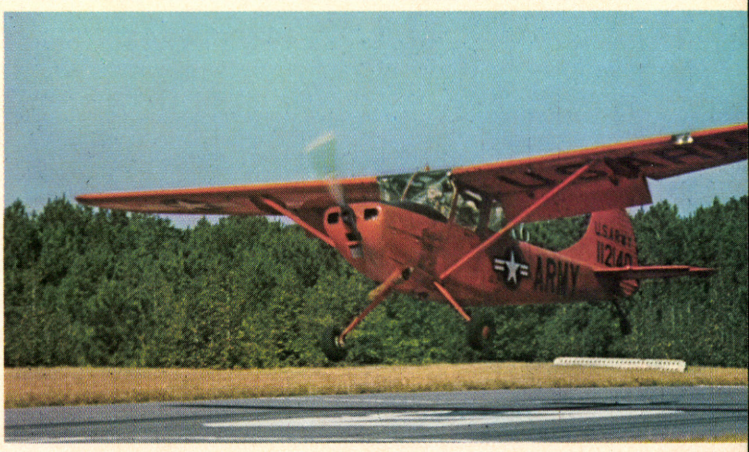


The L-4 (above) was the principal combat airplane used by Army aviation throughout World War II

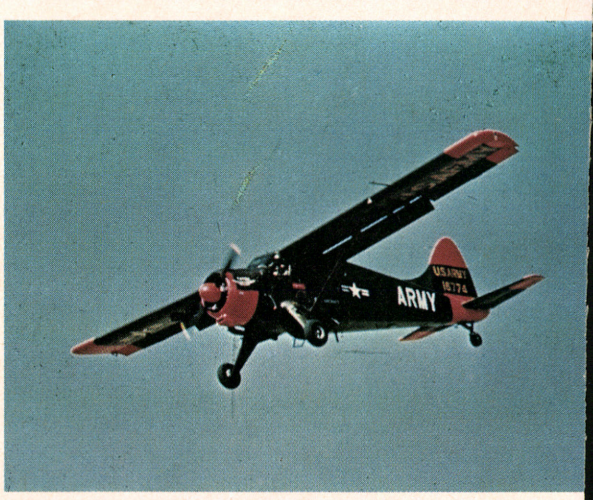


In 1946 Army aviation obtained its first helicopters—H-13s, similar to the one above. Early in 1952 Army aviation received its first transport helicopter, the H-19 (below)

Above: The original Grasshopper patch worn by the first liaison pilots at Fort Sill, Okla., in the early 1940s. It is from the A-2 jacket of MG Robert R. Williams, Director of Army Aviation, who donated it to the U. S. Army Aviation Museum. Below: Army aviation's first L-19 was obtained in December 1950. It made its debut in Korea in February 1951 and is still active in Vietnam

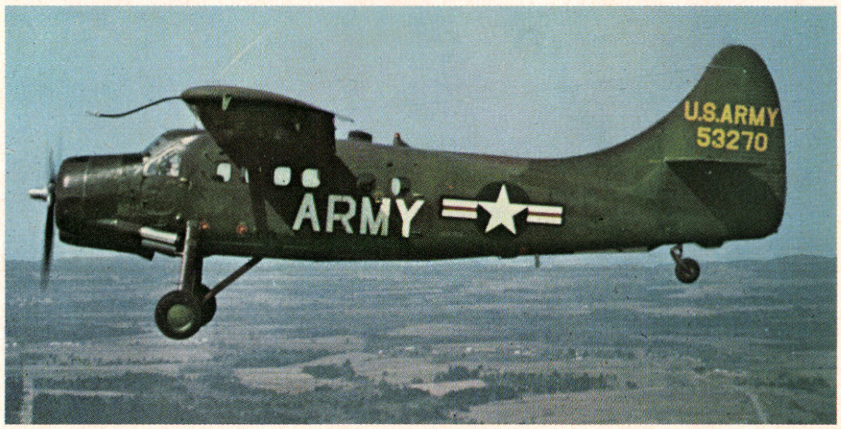


In 1960 the Army boosted its observation capability with the OV-1



The U-6 (above) replaced the L-17 in 1951 and provided an additional transport capability at the front in Korea. In 1955 the Army obtained the U-1A (below) which carries a larger load

FIXED WING AIRCRAFT



The highly successful CV-2 (below) joined the Army in 1959 and was transferred to the Air Force in 1967

The U-8 (below) is the Army's command aircraft

Above (top to bottom): The UH-19, CH-34 and CH-37. In 1954 the Army supplemented its UH-19 transport capability with the CH-34, and in 1956 added the CH-37, then the world's largest twin-engine helicopter. Right: In 1966 the Army got a big lift from the CH-54

ROTARY WING AIRCRAFT

Above: The UH-1, obtained in 1956, was the Army's first turbine helicopter. Right: In 1961 the first CH-47s went to work for the Army. Below: CH-21s, obtained in 1954, carried the early load in Vietnam

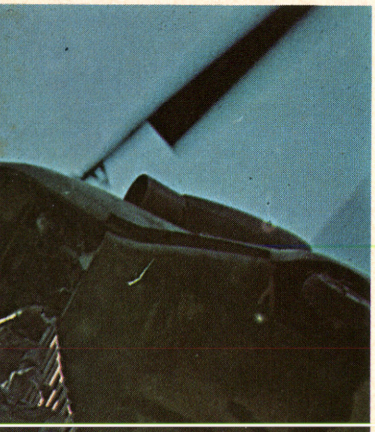
ARMY AVIAT

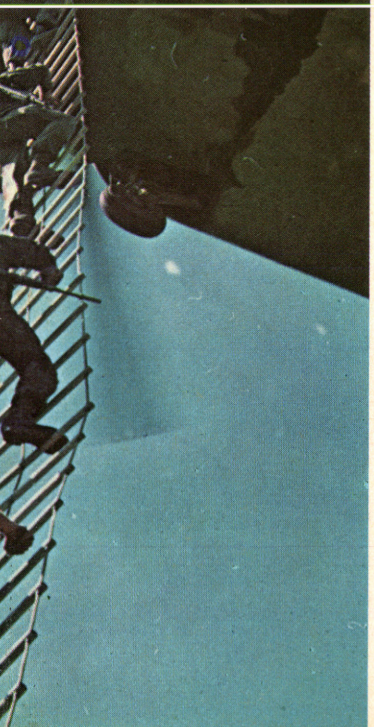
THE SOLDIER at the left might well be telling the Vietnamese boy why he sees so many Army aircraft flying over his country.

American soldiers with their helicopters and airplanes are in the Republic of Vietnam—just as their predecessors were in Korea, Africa, Europe and the Pacific—to continue the seemingly eternal struggle against those who would deny mankind his inherent right to freedom.

The helicopter right above you, the soldier might be saying, is the powerful Crane, which can lift

ON IN ACTION





thousands of pounds. Above it is the sleek Mohawk taking off on an observation mission. Beside it is the Cayuse, the Army's newest and fastest observation helicopter.

In the center, troops climb down from the Chinook, a huge transport helicopter that can carry as many as 32 troops into combat. In the far upper corner, one of many heroic Huey door gunners is at work. Below him, the deadly Cobra, newest attack helicopter, joins its Huey cousins and then at the lower right bares it fangs on a fire mission.

the following 28 pages prepared by the United States Army Board for Aviation Accident Research

pearl's

personal equipment and rescue/survival lowdown

Tired, after paddling ashore, Pearl stands at water's edge. She removed boots to aid in paddling. Shore was sandy, so she waded in with bare feet. Had shore been rocky or covered with shells, she would have used boots to save her tootsies. First order of business was to dry her clothes. While dressing, Pearl heard sound of aircraft. Quickly, she got out her survival kit and removed the pen gun.

She fired two flares, but the sound of the aircraft faded away. Thirsty, Pearl took the water bag from the survival kit, filled it at the water's edge, and dropped in purification tablet. Thirst satisfied, she felt hunger pangs and decided to try her fishing luck. Using the saw blade from the kit, with the pen gun as a handle, she cut a fishing pole and attached line and hook.

Plastic top of kit breaks off on perforated end to form shovel. Using this, with pen gun as handle, Pearl dug until she found a nest of grub worms for bait. She fished through the reeds at the edge of the water and her efforts were soon rewarded. Pearl shows off 1½ pound crappie, main course for lunch.

Using survival knife, she quickly scales her lunch and carves filets. Teflon covered metal portion of survival kit serves as ideal frying pan with pen gun attached as handle. Pearl wears gloves to protect her hand from heat as she fries fish filet.

Hunger satisfied, Pearl waited for several hours, but heard no sound of searching aircraft. She decided it was time to make her way back to civilization and put on the wrist compass from the kit. Checking directions, she gathered her equipment . . . and followed the advice of Mr. Horace Greeley. Late in the afternoon, she came to a road and put up her thumb. Some lucky motorist was in for a delightful surprise.

Dear Pearl,

You doll! Why did the world's greatest aviator have to discover you in a magazine? Where were you when I was dazzling the wiregrass beauties around Fort Rucker? Now that I've seen you, I'm very disappointed that you didn't avail yourself of the opportunity to admire my masculine form and hear about my heroic exploits.

Never fear! I, Horatio Frozzleforth, have a proposition for you. Forget the pen guns, smoke flares, and all the other unnecessary survival gear you've been peddling! I know a nice little deserted island off the coast of Florida where I could teach you the art of survival in ways you've never dreamed of!

You and I will go to the island with nothing but our bare hands and ingenuity. We will be entirely alone, with no outside help or interference. I will teach you everything you need to know! I will show you how to survive in the water and on the beach—how to serve a six course meal from the sea and jungle!

In the evenings, after your lessons, we will sit around the campfire and watch the sun sink into the Gulf. While we sip our coconut cocktails, I will tell you about my vast flying experience and how, single-handed, I captured a whole Viet Cong regiment.

This is a once-in-a-lifetime opportunity. I urge you to accept!

Fondly,
CPT Horatio Frozzleforth

Dear CPT Frozzleforth:

I am thrilled and delighted to accept your invitation. My mother, my aunt, and six of my cousins, who are all professional boxers, have agreed to go with us. I'm sure we'll all benefit from your great experience. When shall we leave?

PEARL

Dear Pearl:

Request that you supply this headquarters a current list of all individual rescue and survival equipment authorized for aviators. Please include the source of authorization.

This unit has been experiencing difficulty procuring these items because of our inability to cite specific authoritative references. Any assistance given this request will be greatly appreciated.

CPT David A. Dolan
Flight Support Section Leader
Hq, 1st Support Brigade

Dear CPT Dolan:

Thank you for your letter and interest. The specific authority for your unit to draw individual aviator equipment, to include rescue and survival items, is found in CTA 50-901, dated 5 October

If you have a question about personal equipment or rescue and survival gear, write to Pearl
U. S. Army Board for Aviation Accident Research
Fort Rucker, Alabama 36360

1966. In addition, CTA 50-901 was changed by message AMXCP-A1 (EBP) 3619, dated 24 January 1967, to add the Signal Kit Personnel Distress (pen gun flare kit) and the gray gauntlet glove.

Of particular interest to me is a new personnel survival kit which has been developed and is on its way to Vietnam. This kit (see pages 34-36) is much improved and should be available for issue later this year.

I hope the above is helpful. If not, be sure to drop me another line.

PEARL

Dear Pearl:

I think you missed one of the most obvious mistakes of our misguided Army aviator as pictured on page 49 of the March issue of the AVIATION DIGEST. He is not wearing a flight suit. After four years in Army aviation it is disheartening to see the flight suit remain a neglected stepson. I have always believed that it was designed and produced with safety in mind. Evidently this is not the case. . . .

Isn't it time for the U. S. Army Board for Aviation Accident Research to take a stand? Let's either endorse flight suits, encourage their wear, or get rid of them and concentrate efforts on protecting that layer of skin between blousing garters and boot tops that is invariably exposed while flying in an Army fatigue uniform. Yes, I tuck my trousers in my boot tops. Do you? How many on your staff do?

My next point concerns survival gear. Why can't each Army aviator be issued a personal survival kit and knife when he draws his first APH-5? Seems it would save a lot of trouble and eliminate all that good gear safely locked away in the supply room syndrome I have found all too prevalent.

CW2 Charles T. McNair
Department of Tactics
Fort Rucker, Alabama

Dear Mr. McNair:

Thank you for your letter and interest. The U. S. Army Board for Aviation Accident Research has taken a position on the wearing of flight suits. This position has been that all personal equipment, such as helmets, flight suits, gloves, and combat boots be worn on tactical flights. However, USABAAR can only recommend. It cannot dictate policy.

There is a small development requirement (SDR) for aviation crewmember's flight clothing presently under study. This new flight suit will look like fatigues in order to satisfy field commanders. At the same time, it will be permanently fire resistant (the present flight suit is not) and will be as functional as the present flight suit by adding the required pockets.

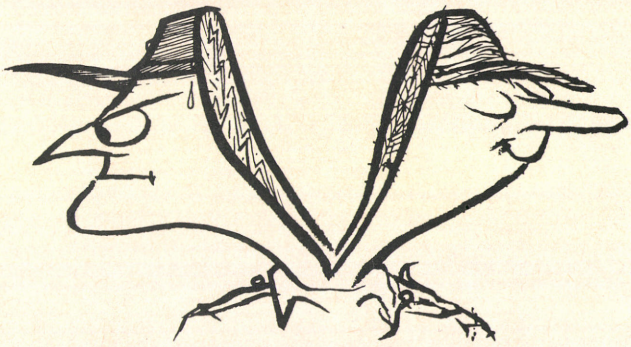
There are survival kits in the Army system. The personal individual survival kit now available in CONUS is the SEEK-1. In this issue, I am demonstrating a new survival kit that is being sent to RVN. Another 100 of these kits are being evaluated for possible adoption worldwide. It has been recommended that this kit (with a survival knife) be issued to student pilots along with their APH-5 helmets. In addition, the kit should be inspected annually for completeness and for the service life of some items in the kit.

PEARL

"IT COULDN'T HAPPEN TO ME!"

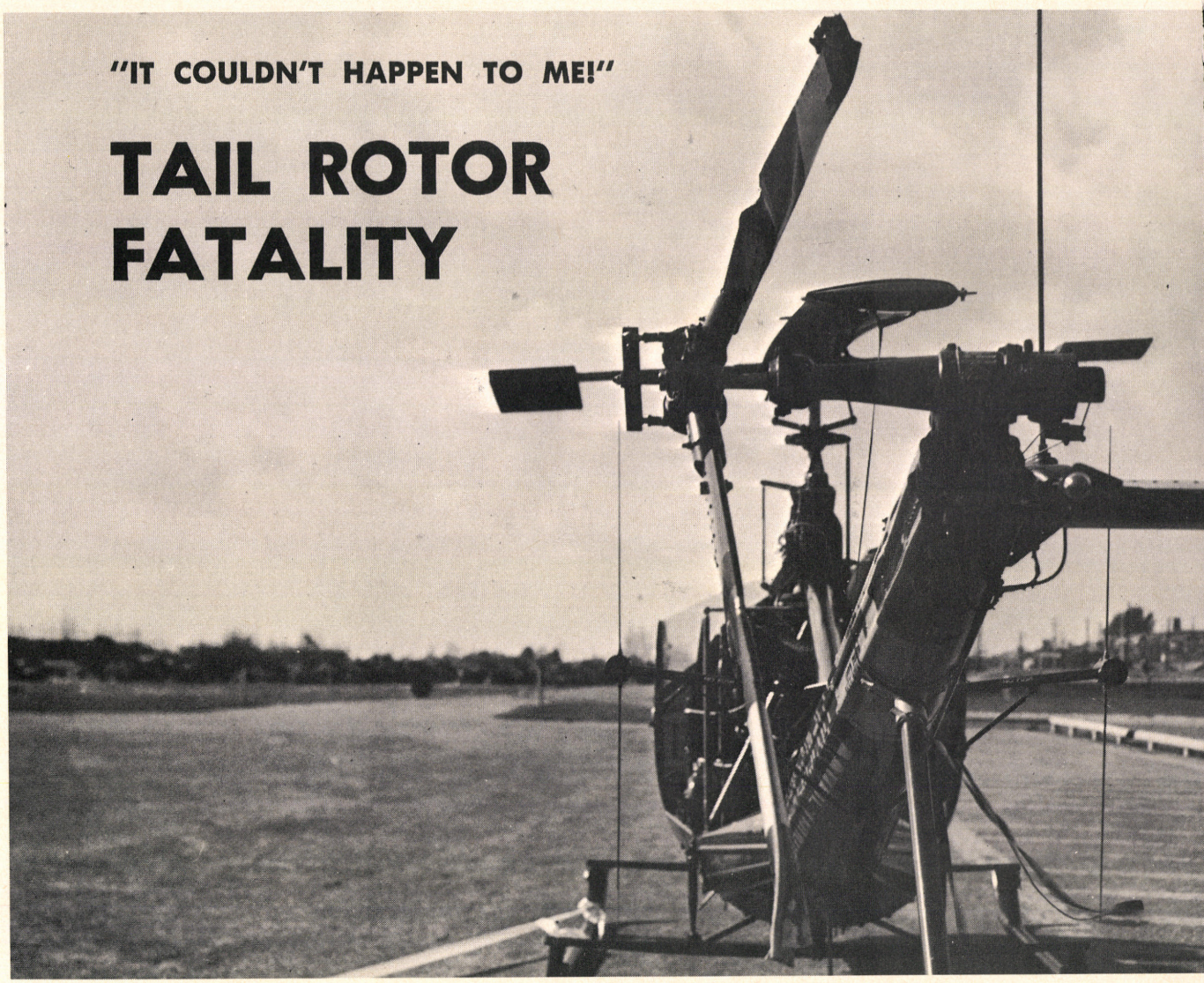
EGO IS A NECESSARY PART of our total personality. We must like and admire ourselves if we are to live with what we see in the mirror 24 hours every day. If we don't, conflicts arise and we develop traits described by gentlemen wearing thick glasses and white coats. Ego is one of the driving forces that makes us want to do well or excel in all of our activities. When we govern it with common sense, it becomes a healthy asset.

Unfortunately, the ego doesn't limit its growth by reality. It not only feeds on ability and accomplishments, but it has a healthy appetite for false pride. Given the chance, it will prod us into actions beyond our ability. It will give us a false sense of security in situations we are unable to cope with. In short, we develop a sometimes arrogant, sometimes complacent, IT-COULDN'T-HAPPEN-TO-ME attitude. For those who spend their working hours as mattress testers, this is of little consequence. But for those who fly, work around, or ride in aircraft, it can be fatal.



"IT COULDN'T HAPPEN TO ME!"

TAIL ROTOR FATALITY



Passenger approached from right rear and walked into tail rotor

. . . I heard a thud from the rear of the aircraft and felt a severe shudder. I knew something had struck the tail rotor . . .

Pilot: "I was on a routine helicopter mission in an OH-23G and my first stop was made to pick up two passengers. I landed, cut the throttle back to idle, and saw three people standing next to the passenger lounge. After about 30 seconds, one of the people started toward my aircraft, approaching to the right rear.

"I yelled at him and motioned for him to approach the aircraft to the front.

"When he got to the helicopter, I opened the door and he asked who I was waiting for. I told him who I was supposed to pick up. Before I had an opportunity to reprimand him for approaching the rear of the helicopter, he turned and ran back toward the building to pick up a box.

"An officer started toward the aircraft, approach-

. . . practically every soldier may expect to be in and around helicopters during his Army service. It is considered essential that he receive training in propeller and rotor hazards during his basic training.

ing to the right front. I opened the right door and started to adjust the seat belts on the right side. As the officer arrived and started to enter the aircraft, I turned to the left side and started to adjust the left seat belt. At this time, I heard a thud from the rear of the aircraft and felt a severe shudder. I knew something had struck the tail rotor, so I jumped out the left side and found the body of the soldier who had first approached lying to the rear of the aircraft. I called for someone to get a doctor, but it was quite evident that nothing could be done for him."

Flight surgeon: "Careful interrogation of the people who knew the soldier failed to bring out any medical reason for his actions. He apparently was in a hurry, excited and slightly apprehensive about his first helicopter ride, and completely forgot that a helicopter has two rotor blades. An effort should be made to inform everyone of the basic hazards inherent in entering helicopters."

Investigation board: "The board determined that the pilot was fully qualified and was on an authorized and scheduled mission to transport two passengers. Command regulations permit passengers to board or disembark from helicopters while the engine is running, providing the pilot has cautioned the passengers about the dangers of the rotor blades. In this case, the pilot felt he had fulfilled this requirement. Shortly after landing, he saw an individual approaching the helicopter in a dangerous manner. He motioned and called to the individual to prevent him from walking into the tail rotor. The pilot felt that the individual realized his dangerous act. However, the soldier later used the same route again that he had intended to use the first time.

"It was concluded by the board that the deceased either did not understand the dangers of helicopters, or he had forgotten them. . . . His anxiety or excitement may have influenced his judgment.

"The pilot was possibly a victim of circumstances. He thought he had conveyed his message to the prospective passenger. When the soldier approached the aircraft the second time, the pilot was preoccupied in preparing the seat belts. Therefore, he did not observe the soldier's movement.

"The primary cause of the accident was the passenger's failure to use proper procedure in approaching a helicopter. . . ."

Letter of transmittal: ". . . All units have been directed to conduct quarterly training in propeller and rotor blade hazards.

"Commanders have been directed to survey principal heliports and institute measures to reduce rotor blade hazards. . . .

"The increased use of helicopters in military operations indicates that practically every American soldier may expect to be in and around helicopters during his Army service, either as a passenger, or in some other role. It is considered essential that every soldier receive training in propeller and rotor blade hazards during his basic training and periodically thereafter. . . . It is further recommended that posters showing hazardous and safe areas around each type and model of helicopter be distributed throughout the Army."

MISSED APPROACH

. . . the CV-2 was approaching from the southeast at a low altitude. The landing gear was down and the aircraft was heading toward the mountain.

GCA controller: "A Caribou was calling approach control on a common frequency, so I was receiving the call the same as approach control. They were having a little bit of trouble locating him, so I offered my assistance because they didn't have SIF/IFF interrogator equipment and we did. I located it after I had the pilot squawk for identification. I got positive radar contact seven miles south. The Caribou was proceeding on a southwesterly heading.

"I saw that in approximately two miles it would intercept the on-course. I advised approach control that I had a weak target on it and a strong IFF return. I asked if they had any contact on radar, but I got the impression they were too busy at the time. They tried to find him, but they were working a departure at the same time. As the Caribou crossed the on-course, I decided I'd take control of the aircraft and give the pilot a right turn.

"I zeroed his turn, gave him the lost communication procedure and all runway information for a surveillance approach to runway 34. He acknowledged all transmissions. . . . I rolled him out on final and he appeared to roll out on course at approximately eight and one-half miles, heading 345°. At this point, I lost radar contact. All I had was the IFF. I advised the pilot that I had lost radar contact and had an IFF target only, and that the continuation of the approach would be IFF target, with no radar separation applied. He acknowledged and I noticed the IFF target to be slightly left of the on-course. . . .

"I saw a video target once again at approximately seven and one-half miles. It appeared to be left of the on-course, maybe a quarter of a mile. The IFF target appeared to be very close to on-course, maybe slightly left. At this time, I gave the pilot a right turn to 040°. I wanted to see how he tracked as long as I had video. I wanted to give him a considerable turn so I could figure out a good heading for final. However, I lost radar contact again and was still on IFF. I brought him back on course and rolled him out with a heading of 350°, this time at seven miles. . . . I told him to prepare to begin his descent in one mile. I gave him another check, a 15-second warning to begin his descent in 15 seconds at six miles. I told him to begin his descent from 4,500 and that GCA recommended 750 fpm for 90 knots. This was the second time I advised him of this. I always advise an aircraft a second time so the pilot gets it for sure. . . . I told him not to acknowledge further transmissions on final unless requested to do so.

". . . At five miles, I gave him a passing altitude of 4,000 feet. He advised me that he was at 4,300 feet and making up for it. At this time, I gave him slightly left of course. . . . He proceeded inbound and at four miles I gave him a slight left correction . . . then on course, and told him his passing altitude should be 3,500 feet in his descent. He acknowledged, saying 'We've made up for it,' meaning that he had made up for his higher altitude at the five mile mark.

"At that time, my IFF target started to bloom. I got a bulging target. . . . I was still trying to get a video return from the aircraft, but was unable to at three miles. I gave him no on-course information at three miles because I wasn't sure of it. The target was blooming badly left and right at that time. I told the pilot that his passing altitude

should be 3,000 feet in his descent and he acknowledged. . . . I was concerned over the blooming target, so I decided to call the approach off just out of 3,000 feet and three miles. I told the pilot radar contact was lost and to execute a missed approach, climbing outbound on a heading of 360° to 3,500 feet. I told him to reverse his course with a left turn when he reached 3,500 feet, and to contact approach control. The pilot acknowledged. Approximately 20 seconds later, I got another transmission from him asking the frequency to contact approach control. I gave him the frequency and he said, 'Thank you.' That was the last transmission I got from him. . . ."

Question: "After you got identification of this aircraft, you vectored it to a position where you could put it on final approach. Is this true?"

Answer: "Partially. It crossed the on-course while approach control was trying to get a target on it. I had to reverse the pilot's course and descend him to an altitude to intercept the glide path."

Question: "Do you know what his altitude was when he started descending?"

Answer: "I'm pretty sure that it was 5,500 feet. I gave the pilot a right turn to a heading of 090°, and instructed him to descend to and maintain 4,500 feet."

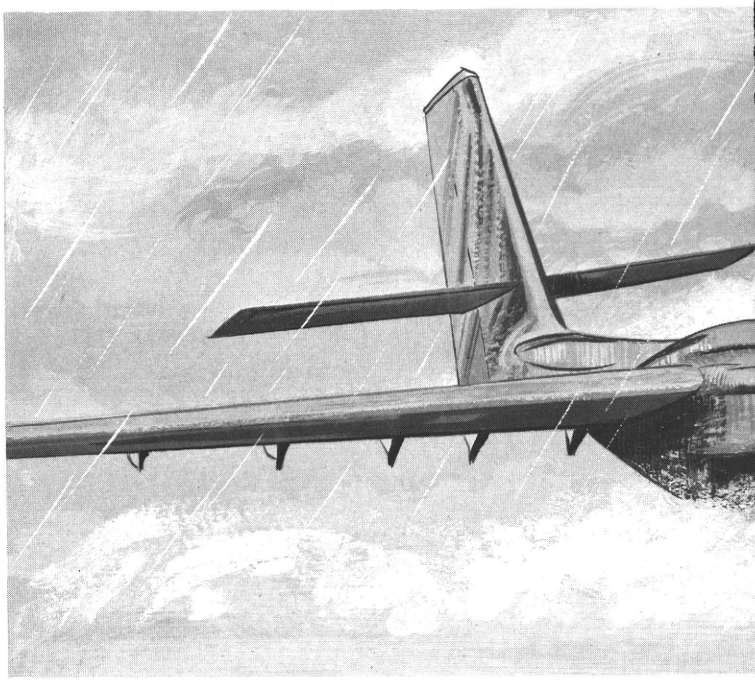
Question: "Did he acknowledge this when you gave it to him?"

Answer: "Yes, he did."

Question: "You indicated that when you did this you had a weak radar target and a strong IFF return. Would you explain this?"

Answer: "Yes. The radar was working at half power that day and from what I can understand

. . . the pilots did not have a full understanding of the implications of an IFF only approach. They did not realize that their position in relationship to the centerline could not be accurately pinpointed.



from conversations with previous pilots we had given departures to, the overcast was quite heavy. At half power, it's difficult for the radar to cut through the overcast. It is actually quite a job when operating at full power. The IFF return is not the same. I was getting a strong IFF return and a weak radar return."

Question: "What type of advisory did you give the pilot at that time?"

Answer: "I advised him that the continuation of his approach would be with an IFF target only and that radar separation could not be applied."

Question: "What was his answer to your advisory?"

Answer: "I don't remember his exact words. It was something like 'wonderful' or 'marvelous.' It gave me the indication that he wasn't too excited about getting an IFF approach, but did approve of it."

Question: "What were your intentions by continuing the IFF? Did you hope to get radar back and bring him in, or were you attempting to vector him to the airfield?"

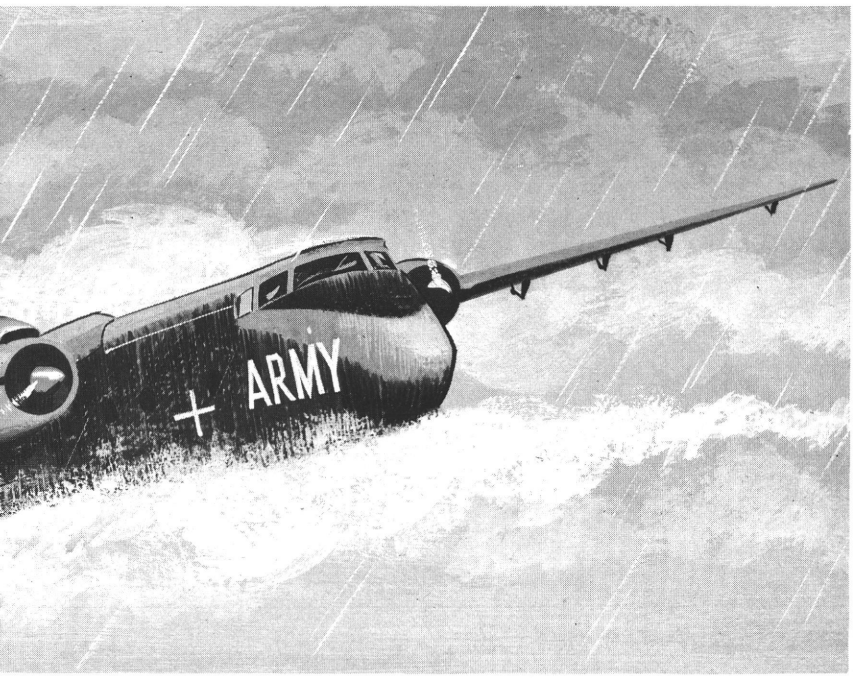
Answer: "My intention was to give him an approach using IFF. When the IFF started getting out of hand, I realized the approach could not be continued and I discontinued it by giving him a missed approach."

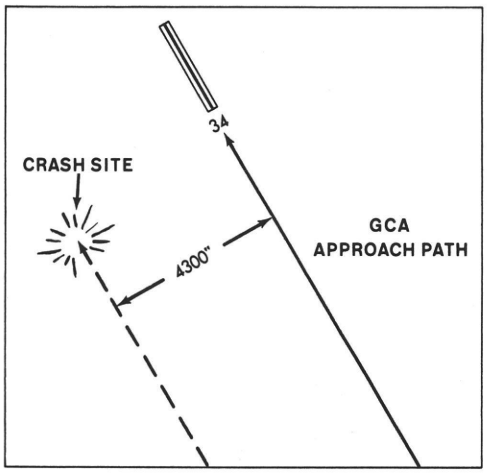
Witness: "Another soldier and I noticed a CV-2 approaching from the southeast at a low altitude. The landing gear was down and the aircraft was heading toward the mountain. The top of the mountain was completely hidden by fog. As the aircraft approached our position, there was no change in the pitch of the engines, and none as it neared the mountain. As the aircraft disappeared into the fog, we heard the sound of an apparent crash."

The airplane struck trees, crashed, and came to rest inverted. The crew of four and nine passengers were killed. Two passengers sustained critical injuries, 14 passengers sustained major injuries, and three passengers escaped with minor injuries.

The point at which the Caribou struck the mountain was measured and determined to be 4,300 feet left of the approach path for runway 34.

Investigation board analysis: ". . . Sensing that approach control was busy assisting an aircraft which was outbound, and apparently unable to concentrate on a target for the approaching aircraft, the controller decided to direct the surveillance approach. After transmitting adjustment turns, the control targeted the aircraft as on-course, eight and one-half nautical miles from touchdown. The controller transmitted missed approach instructions which were acknowledged by the pilots. The controller stated that the GCA equipment was presenting a weak radar target and a strong IFF interrogator return. He again stated that at the eight and one-half nautical mile mark, he lost radar





contact and had only IFF interrogator return. At this point, the GCA controller advised the pilots that radar contact had been lost and that he was receiving an IFF target only. He further transmitted that the continuation of the approach would be with an IFF target and no radar separation could be applied. This condition was acknowledged by the pilots.

"After discussions with other pilots, and analysis by the board members, it is the opinion of the board that the pilots did not have a full understanding of the implications of an IFF only approach. They did not realize that their position in relation to the centerline could not be accurately pinpointed. When a duplicate approach was made, operating the GCA equipment at one-half power, the radar video target was lost prior to the time the aircraft was established on the final approach course. The operator was unable to regain the radar video target. During this duplicating approach, the weather conditions, with the exception of precipitation, were such that the aircraft had to be targeted while flying through clouds. Although the cloud conditions were not a duplicate of those present at the time of the crash, the GCA equipment was required to target the aircraft while it was in clouds. . . .

"The IFF interrogator target return presents an arc shaped target which can cover as much as a two-mile area on the radar scope. During a surveillance approach, the GCA controllers, under normal conditions, provide course and distance information. Altitude is the responsibility of the pilot. Advisory service for altitude at various distance marks is furnished by the GCA controller. Altitude advisories were given to the pilots of the crashed aircraft at each mile interval. . . . "

Indorsements: "Concur with the finding that the descent of the aircraft to 2,100 feet after issuance and receipt of missed approach instructions constitutes the primary cause of the accident. Likewise, concur that a principal contributing cause was the use of the SIF/IFF interrogator beacon, with resultant inaccuracy. . . ."

"Notwithstanding improvement in ground navigational equipment and controller personnel, it remains the fundamental responsibility of the aviators to comply with emergency instructions as issued."

"There was one additional navigational instrument available and evidently functioning which, if used, would have indicated to the pilot that he was considerably to the left of the approach course. This was the ADF which was tuned to the ADF beacon at the airfield, but evidently not used as a crosscheck by the pilot or copilot.

"Failure to use all available instruments as crosschecks during instrument approaches is a habit easily acquired and constant emphasis on avoiding this habit is essential."

Witness: "I was flying on a northeasterly course when I saw a helicopter ahead and to my left, at about 200 feet below. My altitude was 2,000 feet. The aircraft went into what appeared to be a normal simulated forced landing. It turned a little more than 90° across in front of me, after which the nose started to tuck under. It continued tucking until I was looking at the skids. After the nose had tucked about 90°, I saw a flashing in the rotor which gave the appearance of the rotor starting to come apart. The aircraft continued somersaulting until I lost sight of it for about the last 200-300 feet of its descent to the ground. I started turning after losing sight of the aircraft and saw it on the ground."

The helicopter continued to tuck under at the point where the witness lost sight of it, coming to an inverted position. As it did so, a main rotor blade severed the tail boom. The pilot was thrown out of the aircraft and struck by the same blade. The helicopter rolled over laterally and hit the ground in a level upright position with little or no rpm. The pilot was found 45 yards from the wreckage and 90° to the flight path.

Examination of the wreckage showed the force trim selector switch in the left (copilot's) position. The antitorque pedals for both the pilot's and copilot's positions had been adjusted to the full rear position. The fore and aft cyclic control friction lock was found to be five turns toward the lock position. Both seat belts and shoulder harnesses were unlocked. According to the pilots who had flown the aircraft last before the accident, the antitorque pedals had been left with the right seat pedals in the full extended position and the left seat pedals aft in the next to last position.

The pilot was also qualified and experienced in fixed wing airplanes. He held a commercial rating and had flown more than 500 hours. He frequently rented airplanes for pleasure flights.

Colleague: "One evening several weeks before the accident, my friend and I left the flight line, immediately changed clothes, and drove to the airport in my car. Another friend was with us. He and I untied the plane while our friend went in and checked the plane out and got the keys. When he came back, he made a short preflight and we got in. I was in the back seat and my friends were in the front.

"We took off and headed for an airport near a large city. He didn't gain much altitude right at first because he wanted to do some tree level flying after we were away from the airport. He did quite a lot of tree level flying. No fancy maneuvers, just flying as close to the trees as possible and into clearings, pulling out just over the trees.

"After passing a town, he brought the plane to about 2,000 feet, let our colleague take the controls, and gave himself a forced landing to about 10 feet. We then climbed back to altitude and flew straight to our destination.

"When we landed, we met my friend's girlfriend and went to the snack bar for hamburgers and cokes. Then we started back to the town where our base is located. The girl was in the back left with our colleague, and my friend and I were in the front. He took off, got up to flying altitude, and then let me have the controls. He had given me a couple of hours instruction before. By this time it was dark, so we headed straight for home.

"I flew the plane until we were almost halfway, where my friend unfastened his safety belt, moved through the space between the two front seats into our colleague's lap, while his girlfriend moved from her seat into the pilot's seat. My friend then took her seat in the back. After they were fastened back down, I gave the girl the controls. She flew for awhile, until we were approaching our town, then my friend and I exchanged seats in the same manner. He let his girlfriend fly the plane through final, but, because it was dark, he took over and made the approach and landing, then taxied back to the hangar. . . ."

Airport manager: "Several weeks prior to his fatal accident, I walked into the hangar at the air-

"IT COULDN'T HAPPEN TO ME!"

CHANGED SEATS?

It is speculated that he landed the aircraft and changed to the left seat. Why he did this is unknown . . .

port and saw one of our planes making takeoffs and landings. I asked who was flying as the landings were not too good. I watched another landing and it was very bad, so I went into the office and asked them to advise the pilot to come to the ramp.

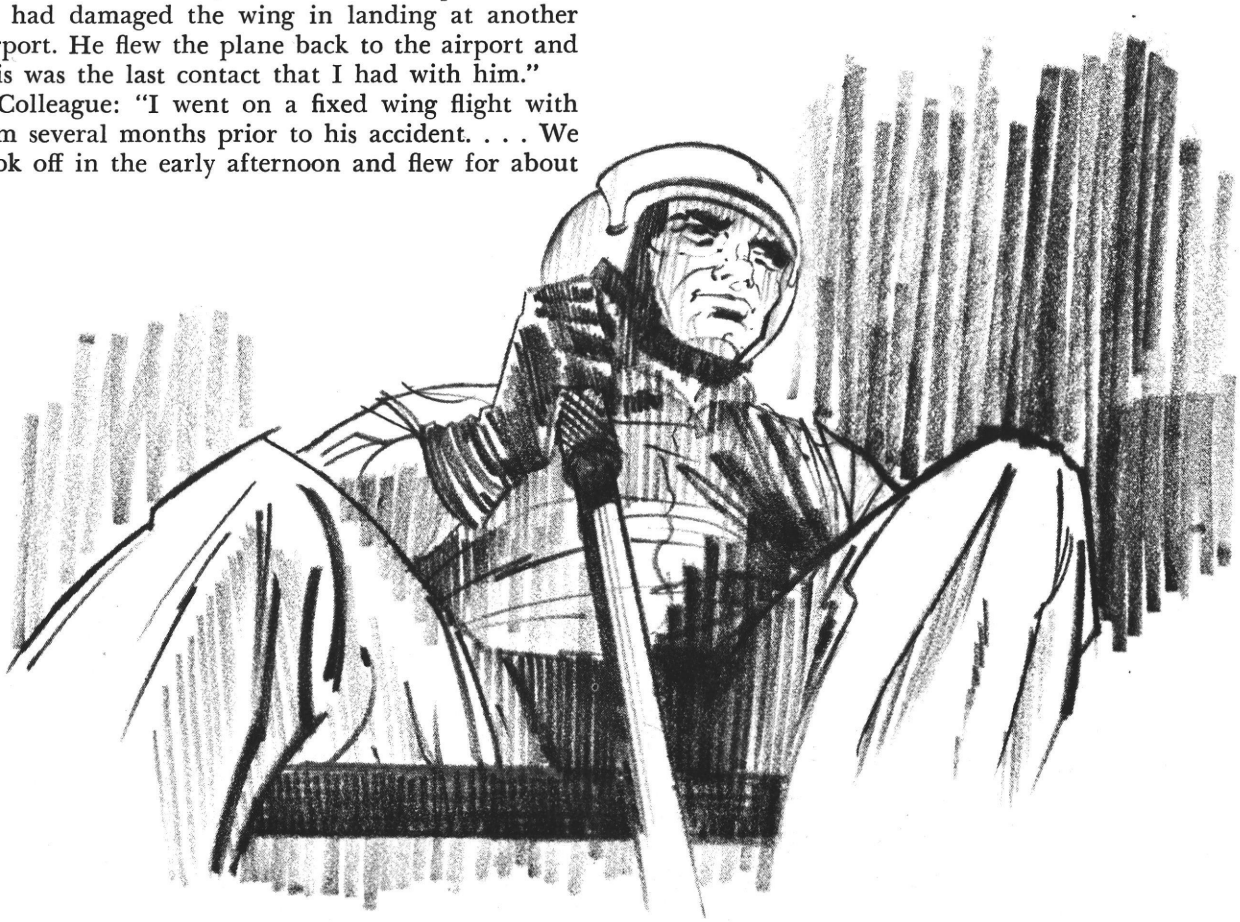
"He was amazed that I should stop him from flying. However, in addition to the bad landings, several people had told me that he had taxied out so fast that the plane was almost flying. I told him he was acting smart and was a show-off and that I did not want him to fly the airplane any more. I also told him that if he did not change his ways he would surely kill himself. He asked me to fly with him and I told him that I did not have time.

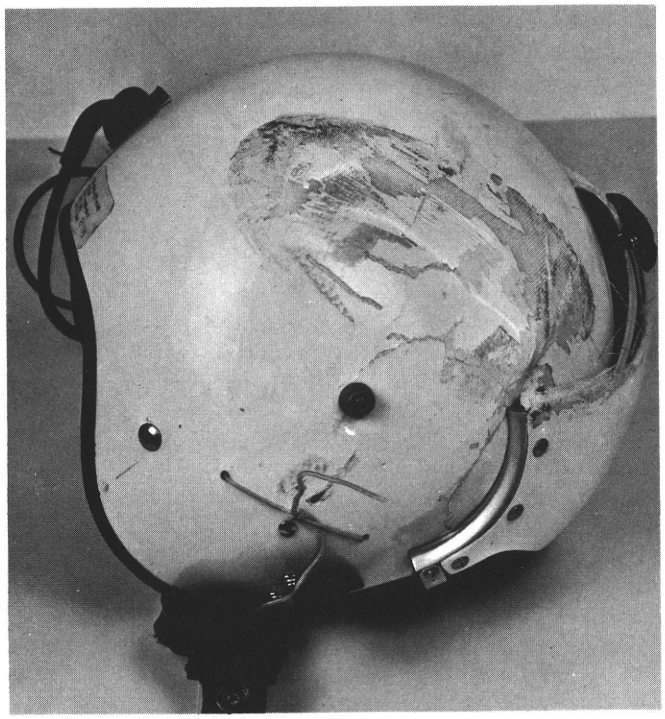
"He continued to call me the next week and the last time he called, I told the clerk at the airport to make an appointment for the weekend and I would ride with him. I met him at the airport, gave him a checkride, and he demonstrated satisfactory ability and proficiency. I then told him he could fly the plane locally, but not to land at any other airport.

"Later he came back and rented the plane. In about one-half hour, he called and reported that he had damaged the wing in landing at another airport. He flew the plane back to the airport and this was the last contact that I had with him."

Colleague: "I went on a fixed wing flight with him several months prior to his accident. . . . We took off in the early afternoon and flew for about

. . . he decided to change seats in flight . . he apparently released his safety harness and belt, frictioned the collective, and began a move to the right seat . . .





Main rotor blade strike on pilot's helmet was confirmed by laboratory analysis. Pilot did not have seat belt or shoulder harness fastened and he was thrown out while aircraft was in uncontrollable attitude

two hours. During this flight, several maneuvers were not made the way I thought they should have been done. He made very tight turns and stalls at low altitude. This led me to terminate the flight sooner than planned. I have over 2600 hours fixed wing time and I considered these maneuvers dangerous.

"He told me on several occasions that he liked to fly low and fast. . . . I talked with him after his first flight on the day of the accident and he said that he had been up to a lake, buzzing two girls on water skis. . . ."

Flight surgeon: ". . . The sequence of events on the day of the accident were, in general: The pilot arose at the usual time, met a formation, then returned to his room to catch a little extra sleep while his colleagues had breakfast. According to them, he never ate breakfast. . . . He was in bed about 2230 the evening before, and asleep about 2300. He did not appear upset or despondent and there was no evidence of organic illness. . . . He neither drank nor smoked, and was never observed taking medication, not even aspirin.

"He flew the aircraft for two hours, then returned to refuel. While his aircraft was being refueled, he confided to a colleague that he had gone to a small airport where he had a fixed wing accident the previous weekend. He reported that after he left the airport he had flown over a lake and buzzed some girls on water skis, causing them to fall into the lake. He made no reference to any difficulties during his first flight.

"After refueling, he took off and what happened from that time until he was seen by the one and only witness to his fatal descent is unknown. It is speculated that he landed the aircraft and changed to the left seat. Why he did this is unknown. It is speculated that he flew in the left seat until it was time to return to the base. He began the return in a northeasterly direction and, about 8-10 miles from the base . . . he evidently decided to return to the right seat in flight. . . . He apparently released his safety harness and belt, frictioned the collective, and began a move to the right seat. It

is speculated that he inadvertently pushed the cyclic and the aircraft went into the disastrous attitude described by the witness. (Attempts to change from the left to right seat on the ground by the accident investigation board resulted in inadvertently pushing the cyclic.)

"It is believed the aircraft was approximately 600 feet above the ground, at an airspeed of 50-55 knots. The witness lost sight of the aircraft when it was about 250-300 feet above the ground.

"No doors were on the helicopter and the pilot was thrown out of it in any of several uncontrolled positions at approximately 100 feet. . . . A main rotor blade struck his helmet, causing skull fractures, lacerations of the jaw, fractures, and other injuries. The blade strike caused instantaneous death and the pilot was dead when he hit the ground. . . .

"Among the items found to indicate a left seat position were the antitorque pedal settings on the left side in the full aft position, as near to him as possible. He was very short, about 5′6″. The pilot who flew the aircraft last in the left seat used a different pedal setting entirely. The pedals on the right side were also in the full aft position. The seat belts on both sides were unfastened, with no evidence of strain or tear, and the force trim control toggle switch was adjusted for the left seat. . . .

"The major disconcerting area is the pilot himself. His spoken and observed antics while in the air are alarming and certainly lend credence to a set of bizarre but plausible suppositions."

The aircraft accident investigation board found the cause of this accident to be: "Suspected self-induced control movement . . . which resulted in an uncontrollable aircraft attitude."

Listed as contributing factors were: "Pilot was not properly secured by the restraining system, which caused him to be thrown from the aircraft while in an uncontrollable attitude," and "a strong possibility exists that he may have attempted to change seat positions while in normal flight."

Among the recommendations made were: "That the widest possible dissemination of facts surrounding this accident be brought to the attention of flight personnel," and "that USABAAR consider using this accident for prevention purposes in existing safety publications."

HILL 1028

In view of the six aircraft destroyed on this one particular hill, an article in the Aviation Digest is needed to publicize Hill 1028 . . .

UH-1D aircraft commander: "We got up at 0500 and planned on a 0600 takeoff. The weather looked bad so we decided to eat breakfast. I called the weather station and they said the ceiling was 400 feet and was breaking up and looked pretty good to the south.

"We took off at approximately 0700. I was flying from the right seat. I was on instruments and the pilot was maintaining visual reference with the ground.

"We entered a pretty solid fog bank and I started a climbing left turn. I think I may have gotten vertigo. Either the pilot or one of the passengers pointed to the front and I saw a hill. It was coming at me awfully fast. I flared the helicopter and leveled the skids.

"After impact, I must have been knocked out. . . .

"There was no pressure exerted by any of the passengers about continuing the flight or turning back prior to the crash. I had flown the helicopter two hours the day before and it was a good flying ship. All the instruments were functioning properly. We had 1,000-1,100 pounds of fuel on board and it took 95% N1 for takeoff. I don't know if the pilot was on the controls with me at the time of the crash or not. There was no fire prior to ground impact."

Crewchief: ". . . We were flying low level over a

road to the valley where the weather was clearing. We were flying about 200 feet above the ground and at about 90-95 knots airspeed. We started to hit fog down to the road and the aircraft commander pulled up and tried a 180° turn to the left in the fog, at about 80 knots. I could see the trees about 200-250 feet below, then grass and fog blended together.

"The next thing I saw was the ground closing in fast. The aircraft commander pulled up with pitch and cyclic. Then we hit and rolled end over end, and the ship was on fire at first impact. I was thrown from the aircraft approximately 25 yards. . . . The aircraft was in flames by the time I was able to turn toward it. People were rolling out and machinegun rounds were going off from the heat inside. I found the aircraft commander next to the front of the aircraft about six feet away, face down. I saw the pilot's hand on fire outside the window and reached in and pulled him out. He rolled away from the wreckage down the hill. I picked up the aircraft commander and started to get away from the wreckage when a fuel cell blew up and flames began shooting out in all directions. . . . When help came, we walked down the hill."

Burned UH-1D on Hill 1028. Arrow points to wreckage of C-123 which crashed in same location

Accident investigation board narrative: ". . . The weather in the area at this time of year can best be described as variable and uncertain for both ceiling and visibility, with numerous showers and intermittent ground fog. Current weather observations can be extremely misleading. The aircraft commander received his weather briefing by phone shortly before takeoff. . . . The route of flight was south along a highway. Altitude varied between 50 and 100 feet above the terrain. During the flight, thin patches of fog were encountered. However, it was 'in and out' until they reached a point just to the west of Hill 1028. At this point, the aircraft entered a fog bank and did not break out.

"The aircraft commander had been watching the flight instruments while the pilot maintained visual contact with the ground. When the aircraft did not break out of the fog bank, the aircraft commander started a climbing left turn. While in the turn, at an airspeed of approximately 80 knots, he saw the hill and flared. The aircraft struck the hill (slope estimated to be 50°) in an estimated 50° nose high attitude. . . .

"It hit hard enough to crush the skids upward and allow the bottom of the fuselage to be crushed. . . . At the time of impact, as the aircraft slid forward, the left aft fuel cover section was ripped out of the fuselage and left sticking in the ground.

"The helicopter skidded forward about 35 feet up the hill and began to nose forward, ripping out the bottom front plexiglass. As the front end dug in, the aircraft flipped over, landed on its top, and began burning. This is when the passengers found themselves in an inverted position, locked in their seat belts, except for the crewchief who was thrown from his seat belt when the aircraft started to flip. As the passengers unlocked their seat belts, they fell and rolled out the left, down the steep slope. . . .

"Analysis: A visual flight was attempted, instru-

ment conditions were encountered, and the aircraft crashed. . . .

"The crewchief was thrown from the aircraft on impact due to not having his seat belt tightly secured. . . .

"The aircraft commander was not instrument qualified and was unable to properly evaluate the situation.

"In view of the unit's mission, its aviators are required to be away from their home station for extended periods. Due to the shortage of instrument qualified aviators, it is not possible to assign an instrument qualified aviator on all missions. . . .

"In view of the number of aircraft destroyed on this one particular hill (one C-123, one A-1E, one CH-47, and three UH-1s) it is suggested that an article be written and submitted to the AVIATION DIGEST in order to publicize Hill 1028."

The board stated that the cause of the accident was the aircraft commander inadvertently flying into actual weather conditions which exceeded his capabilities and resulted in his becoming disoriented while making a climbing left turn. It listed contributing factors as:

Weather—ceiling and visibility diminished during the flight.

The desire to complete the mission.

A left turn while flying from the right seat, which further restricted visual references.

Spatial disorientation caused by frequent changes from visual to instrument flight conditions.

The board recommended a NOTAM be published warning all pilots of the hazard of flying up the highway when low ceilings and visibility prevail. It also recommended publication and reemphasis of the hazards resulting from attempts to fly VFR in IFR conditions.

Although the aircraft was destroyed by fire, all occupants survived. The aircraft commander, pilot, crewchief, gunner, and four passengers sustained major injuries. One passenger escaped injury.

Flight surgeon: "The major injury producing mechanism was that of rapid and total deceleration upon impact. This resulted in compression fractures of the lower spine in seven of the nine individuals. That this is the limit of the severity of the injuries, with the exception of a 30% body burn suffered by the pilot, must be directly attributed to the fact that all seat belts and shoulder harnesses held, even though the aircraft came to rest in an inverted position. The crewchief was thrown from the aircraft at initial impact, not due to the failure of his seat belt, but because he was wearing it in a loose position to facilitate control of his weapon in covering low level flight.

"The burns suffered by the pilot involved only those areas not covered by clothing. He was flying with his fatigue sleeves rolled up and suffered severe arm burns.

"Although no recommendations could be made to prevent the rapid deceleration injuries, it has certainly been demonstrated that vertigo may result from the combined use of instrument and visual references. In addition, it is recommended that all people flying in aircraft wear their sleeves rolled down and gloves if at all possible. It should also be recommended that all passengers wear seat belts securely fastened, as this has certainly been demonstrated as effective in preventing serious injuries."

Reviewing official: "Concur with the cause factors as stated by the accident investigation board.

"Concur with the recommendations by the board. In addition, the battalion has published an instrument familiarization training circular . . . which will provide basic helicopter instrument training for noninstrument rated rotary wing aviators. All units within the battalion have been briefed on this accident and have been directed to cite this accident and its causes in quarterly special weather briefings to be conducted for all aviators.

"Reference the flight surgeon's analysis and recommendations, the battalion SOP spells out specifically that all crewmembers will be equipped with and wear flying gloves, and that sleeves will be rolled down while flying. Increased command emphasis has been directed to insure compliance with the SOP in this respect."

Third indorsement to letter of transmittal: ". . . The findings and recommendations of the investigation board are approved with one exception. It appears that the aircraft commander intentionally rather than inadvertently flew into the weather. . . ."

USABAAR policy requires that publication of accident accounts be completely anonymous, with no reference to names, dates, or places. This policy has been followed in the account of the above accident. However, in view of the recommendation of the aircraft accident investigation board that Hill 1028 be publicized, and in view of the large number of aircraft which have crashed on this one hill, it is considered essential that the location of Hill 1028 be given. Hill 1028 is located south of Pleiku, along highway 14.

"IT COULDN'T HAPPEN TO ME!"

While on the subject of low visibility VFR flying, it is appropriate to include a lesson taught by Mr. Gerard Bruggink in the Aviation Safety Orientation Course conducted by USABAAR. This lesson is entitled . . .

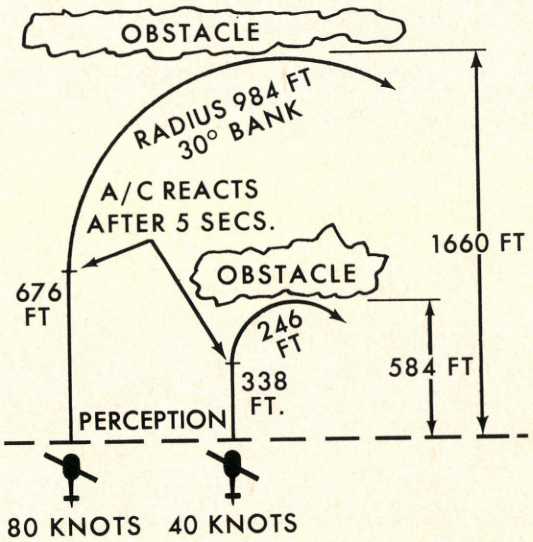
AS FAST AS YOU CAN SEE

You are flying your helicopter at treetop level, trying to maintain visual contact while visibility is limited to 1,000 feet. You are on the lookout for obstacles that may loom out of the grayness around you, hoping you'll have enough room to make an evasive turn when necessary. Feeling slightly uneasy, you have reduced your airspeed from 100 to 80 knots.

A practical question at this point is: How much forward distance will you travel from the moment you see an obstacle until you complete the first 90° of an evasive turn? If your total forward travel exceeds the existing forward visibility, you are in trouble. In that case, the accident board would probably blame your demise on: "Flight into low ceiling and visibility conditions without an appropriate reduction in airspeed." (This is a direct quote from one of the many reports on weather accidents.)

There is no reason to doubt that our colleagues who killed themselves under poor visibility conditions slowed down when walking in the dark or driving in the fog. Their failure to use the same protective instinct when flying can be explained only by a lack of understanding of the relationship between safe forward speed and existing visibility, as shown on the figure below.

The figure is based on the assumption that it takes about five seconds to perceive, to make a decision,



and to start a corrective maneuver (WADC Technical Report 58-399—VISION IN MILITARY AVIATION). The forward distance traveled during these five seconds—under no-wind conditions—is a function of TAS and is shown by the straight line on the lower portion of the graph. At 80 knots, the aircraft's forward displacement in five seconds is 676 feet.

Assuming that the evasive maneuver consists of a coordinated turn, it is obvious that the first 90° of this turn will bring the aircraft closer to the obstacle over a distance equal to the radius of the turn. For reference purposes, a bank angle of 30° is used as a standard. At 80 knots, this would produce a turn radius of 984 feet (and a rate of turn of about 8° per second). Therefore, the total displacement of the aircraft towards the obstacle, from the moment of perception until the completion of a 90° turn, would be 676 + 984 = 1,660 feet. With a given visibility of 1,000 feet, your problem is simply the lack of 660 feet to maneuver in. In other words, a collision becomes inevitable unless you engage in some last second acrobatics which would probably only increase the spectacularity of your mishap.

CHART 1

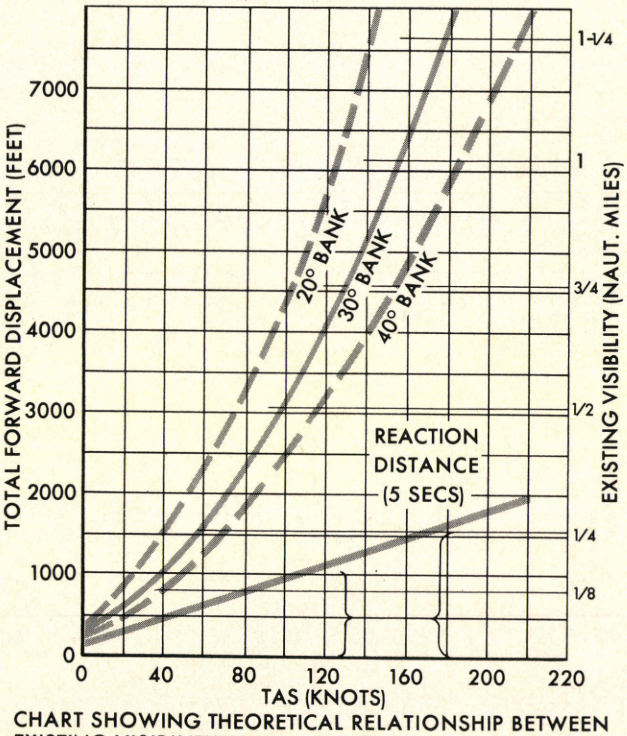


CHART SHOWING THEORETICAL RELATIONSHIP BETWEEN EXISTING VISIBILITY AND MAXIMUM SAFE AIRSPEED

What would your chances be if you reduced your speed to 40 knots with the same 1,000 foot visibility? A look at the figure shows that your total forward displacement in that case would be 338 + 246 = 584 feet. This would give you an approximate 400 foot visibility margin (and a six second time margin).

Chart 1 shows the theoretical relationship between existing visibility and maximum safe airspeed for various speeds and bank angles. It can easily be seen that the fixed wing pilot who operates in a higher speed region has to give himself a lot more maneuvering room under conditions of poor visibility. For instance, at 180 knots his total displacement towards the obstacle during an evasive maneuver with a 30° bank angle is about 1 nautical mile. The implication is that, at 180 knots, he needs at least 1¼ nm visibility. When he reduces his speed to 100 knots, his forward displacement is about 2,300 feet and a visibility of 1/2 nm would give him a reasonable margin of safety.

The chart is based on no-wind conditions. It speaks for itself that a headwind works in a pilot's favor and a tailwind against him. It should also be noted that poorly visible obstacles such as high tension lines may increase the existing visibility requirements by a factor of 10 or more. The dotted lines on the chart show the total forward displacement when bank angles of 20 and 40° are used. (Take into consideration the increase in stall speed when you increase the bank angle: at a bank angle of 40° the stall speed increases by about 14 percent, and in a 60° bank by 40 percent.)

The only purpose of this discussion is to show that, theoretically at least, existing forward visibility is directly related to maximum safe airspeed as shown in chart 2.

CHART 2

VISIBILITY	MAX SAFE AIRSPEED
600 ft	Below 40 knots
1/8 nm	Below 50 knots
1,000 ft	Below 60 knots
1/4 nm	Below 75 knots
2,000 ft	Below 90 knots
1/2 nm	Below 115 knots
3/4 nm	Below 150 knots
1 nm	Below 175 knots

To summarize, *the charts don't tell you how to fly your airplane when visibility is poor. They are only a reminder that the smart pilot doesn't fly faster than he can see.*

"WHAT ARE YOUR INTENTIONS?"

. . . this was the question asked three highly experienced aviators

The engines of a twin engine airplane were started at 1150. It took off with an IP, pilot, and copilot aboard at 1224 for a flight of 816 nautical miles. The IP filed IFR, estimating 04:30 en route, with an estimated 00:30 to his selected alternate. He listed 06:00 hours of fuel aboard. Destination weather was given as 300 feet overcast, 1 mile visibility, forecast to improve. Alternate weather was given as 25,000 feet broken, 7 miles visibility.

Communications log:

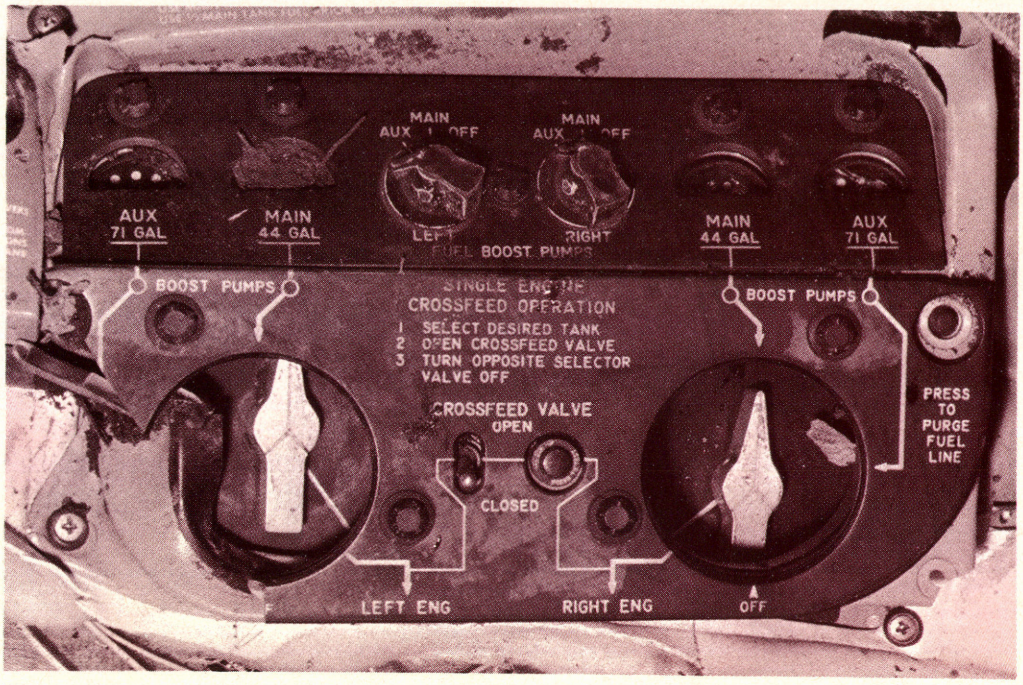
1624— As the airplane approached an en route reporting point, the center asked for identification. The pilot stated that the transponder was inoperative. He was cleared direct to his destination and instructed to climb and maintain 9,000 feet.

1626— The airplane was cleared to descend to 4,000 feet and the pilot was instructed to report leaving 5,000 feet. At 1629, he reported out of 9,000 feet for 4,000 feet. At 1631, he reported descending to 6,000 feet and asked for destination weather. The weather was given as 100 feet obscured, with 1/8 mile visibility in fog. At 1633, the pilot was told to hold on the 052 radial at his destination at 4,000 feet. These instructions were repeated and he was told to expect further clearance at 1650. The pilot requested the airport with the highest ceiling in the vicinity of his destination and was told to stand by. Communications were difficult, but the pilot acknowledged loud and clear.

1641— The pilot was advised that a nearby airport was open for approaches and to switch to another channel. The center relinquished control to the recommended alternate at 1642. At 1646, the pilot called the center and requested clearance to another airport. He was asked if he had approval to land at the requested airport and advised of a 30 minute delay. At 1648, the pilot reported out of 4,000 feet for 6,000 feet and was told to expect a direct routing from his original destination to his requested airport. This was repeated. Ten seconds later, the pilot cancelled IFR and this was the last center contact. The airplane was seen on radar proceeding southwest toward the airport the pilot had requested.

1703— The pilot called the alternate originally recommended to him and asked for its ceiling. He was given a pilot report of 1,000 feet overcast, 1½ miles visibility, altimeter 30.12. At 1707, the pilot reported over the outer marker at 4,000 feet, VFR, and stated that he would like an approach. He was told to expect an IFR clearance at 1740. At 1708, he was given the airport weather as 800 feet overcast, 1½ miles visibility, and asked for the full serial number and type aircraft. The pilot acknowledged and said that he expected approach clearance at 1722.

Approach control: "Roger, understand holding



Fuel panel from crashed airplane shows main tanks selected, with fuel boost pumps on auxiliary tanks

VFR. Maintain VFR."

Pilot: "Will let down to 3,000 feet."

Approach control: "Leave area or maintain 4,000 feet."

Pilot: "Will remain VFR."

1723— Approach control called the pilot and asked, "Are you still with me?"

Pilot: "Affirmative. Holding outer marker, 4,000 feet, thank you."

Approach control: "Expect approach clearance at 40, as previously issued."

1732— The pilot was told to revise his approach clearance time to 1745 and asked if he copied. He replied, "Affirmative." At 1734, approach control called the pilot and told him he could expect to go to a reporting point. He was given new weather of 200 feet overcast and 3/4 mile visibility in fog. The pilot acknowledged. At 1736 the pilot was asked if he was still at 4,000 feet VFR and able to maintain to the reporting point. He replied that he could and was instructed to proceed to the reporting point, maintain 4,000, and report over the reporting point for IFR clearance. At 1740, approach control asked the pilot his location and he replied that he was coming up on the reporting point, about 3 miles short. At 1741, approach control issued a blanket call, giving the visibility as 1/2 mile.

1742— Approach control: "Are you still over the reporting point?"

Pilot: "Right now."

Approach control: "Descend and maintain 3,000 feet, report leaving 4,000 feet."

Pilot: "Roger, out of 4 now."

1743— The pilot reported at 3,000 feet and approach control told him to expect his clearance at 47.

1746— Approach control: "Clear alternate outer marker via reporting point and ILS course, depart another reporting point 220 radial inbound on localizer at 2,000 feet. Report reporting point inbound leaving 3,000 feet."

Pilot: "Roger, out of 3 now."

Approach control: "What time do you estimate the reporting point inbound?"

Pilot: "Will leave reporting point in 30 seconds."

1749— Approach control: "Your clearance limit is the outer marker. Hold northwest on localizer, 1 minute patterns, left turns. The aircraft ahead of you just missed his approach."

Pilot: "Roger."

Approach control: "Expect further clearance at

1800." The pilot acknowledged and was advised that another pilot reported 200 feet overcast and 3/8 mile visibility in fog. He was told to report at the outer locator, holding.

1750—Other aircraft in the vicinity started diverting to other airports. At 1751, approach control issued a blanket call, stating that the weather would go to zero-zero until 2400 and later.

1754—The pilot reported outbound in the holding pattern over the outer marker at 2,000 feet. At 1755, talking to another aircraft, approach control reported the visibility steadily dropping, then at 1/4 mile.

1756—Approach control called the pilot and asked, "What are your intentions?"

Pilot: "We'd like to shoot an approach right now. We're procedure turn, inbound."

Approach control: "Roger. . . . Airport weather, pilot report, 200 feet overcast, visibility one-quarter. This is below ILS runway 16 straight-in minimums. Advise if you still wish to shoot the approach."

Pilot: "Roger, we still want to shoot the approach at pilot's discretion. Over."

Approach control: "Roger, understand. Cleared for 16, ILS approach. Report outer locator inbound."

Pilot: "Roger, thank you."

1759—Approach control: ". . . I have new weather, sir."

Pilot: "We're outer marker, inbound."

Approach control: "Weather, pilot report, 100 feet overcast, 1/4 mile visibility in fog. Contact tower. . . ."

The airplane crashed 2¾ miles from the approach end of the ILS approach, approximately 200 feet to the right of the approach path. The right wing hit a 70-foot tree, shearing the outer portion of the wing. The airplane rolled inverted to the right, sheared the left wing, then crashed to the ground inverted and skidded about 10 feet. All three occupants sustained fatal injuries.

Investigation board analysis: "After finding their destination below minimums, the crewmembers apparently were undecided as to what their course of action should be for 32 minutes from 1631 through 1703 hours. They then appeared to have misunderstood their approach clearance as 22 minutes past the hour, rather than 40 minutes past the hour. At 23 minutes past the hour, a 1740 approach time was verified by approach control, acknowledged, and accepted by the crewmembers. At 1732, approach control issued a new approach time of 1745. Once again, this was acknowledged and accepted. It appears from this, because no fuel shortage was mentioned, that there was no concern by the crew about the shortage of fuel. The possibility exists that the crew figured fuel consumption from takeoff time and disregarded the fact that at least 30 minutes of ground time was used prior to takeoff. Additionally, at least two climbs and descents were made and fuel consumption in climb is more than double the consumption at cruise power. . . .

"Two more extensions of approach times were given (1747 and 1800) and acknowledged with no apparent concern over a shortage of fuel. The first time any apparent concern was shown was when the decision was made to land at the pilot's discretion with the weather below ILS minimum. The board feels that the aircraft ran out of fuel because of the following facts:

"Total engine operating time at 1800 (apparent time of the accident) was six hours and six minutes.

"Due to the altitude and time of year, heater operation was required. Maximum heater consumption is three gallons per hour. An average of two gallons per hour is considered normal consumption.

"Using two gallons per hour heater consumption and the flow charts for the installed engines, cruise power (65%, not considering climb) consumes 39.6 gallons per hour. This gives an endurance of 5 hours and 32 minutes. The normal cruise power on this aircraft is 65%. Additionally, the IP was known to have always used the power chart to determine 65% and then cruised at that power setting.

"The left engine was not developing power at impact. This was determined by the type of propeller damage, postcrash propeller governor inspection, the lack of fuel found during engine fuel injection system inspection, and the position of the propeller and throttle cockpit controls.

"The right engine was attempting to develop takeoff power, as determined by propeller damage, propeller governor inspection, the limited fuel found in the engine fuel injection system, and the position of the throttle and propeller cockpit controls.

"A fuel management problem was indicated in that the cockpit fuel selector valves were both selecting fuel from the main fuel cells, and both fuel boost pumps were found in the auxiliary tank positions. Both main tanks contained no more than residual fuel during the postcrash inspection. A small postcrash fire occurred on the outbound side of the left engine nacelle, causing minor paint blistering. Insufficient fuel was available to sustain combustion."

Cause factors: "1. Lack of knowledge: incorrect-

ly assumed six hour fuel endurance (flight plan was filed with six hours of fuel). Normal flight planning is for 5 hours and 30 minutes endurance.

"2. Lack of discipline: remained undecided on a course of action in the destination area for 32 minutes; then held on top for another 53 minutes in a rapidly deteriorating situation (weather, fuel, air traffic) while VFR weather was within 15 flying minutes."

The three men aboard this aircraft were all highly experienced aviators. The IP had more than 7,000 flying hours and held a special instrument rating. The pilot was a master Army aviator with more than 4,500 flying hours, and the copilot was a master Army aviator with more than 5,000 flying hours.

Two questions remain unanswered about this accident. Why did this highly experienced crew fail to plan for and monitor their fuel consumption? The apparent answer is that they did not know the fuel consumption rate or the endurance limitations of the airplane. This is indicated by the fact that the IP listed six hours of fuel aboard on DD Form 175, while normal flight planning for the airplane is for 5 hours and 30 minutes. Why did they continue to mill around in the destination area and the alternate, knowing the weather was deteriorating rapidly, when it was clear only 15 minutes away? The answer to this question is more complex. There was an obvious desire to get as close as possible to their destination. This desire, coupled with pride and overconfidence, may have tipped the scales of judgment just enough to result in the faulty decisions which led to the crash.

the density altitude was low and the pilot didn't feel that the passengers would present any problem . . .

UNQUALIFIED

OH-23C pilot: ". . . After arriving at my destination, I refueled, filed a local flight plan for four hours, checked the weather, and made a map reconnaissance.

"I departed the airfield at 1005 and flew to the area where I was to meet my passenger. I flew around the area approximately an hour attempting to locate him. . . . I located my passenger and landed at a point near the junction of two roads. I had no problems with the low reconnaisance or the approach and landing. I shut down and got out.

"It was decided that I would have two passengers who wanted to make an air reconnaissance of the area. After takeoff, we toured the area for 15 minutes and returned to the point of departure.

"I set up an approach into the wind and all seemed normal. I terminated approximately 15 feet short of my intended touchdown point at a hover of about 6-8 feet, moving slowly forward. At this time, I noticed a slight power loss to 2900 rpm. I attempted to add more throttle, only to discover that full throttle had already been applied. The rpm kept dropping slowly.

"The helicopter then started to back up slightly. I lowered collective pitch some and gave forward cyclic. We began to descend, but continued backward with the rpm still dropping. I then realized we were going to the ground. . . . It appeared as though we went backwards enough to put the aircraft over very unfavorable terrain, rough and sloping. I decided to turn 180° right, gain some airspeed, and descend to possibly regain enough power to sustain flight. I realized that with some airspeed I could descend at least as much as the slope. I also aligned the aircraft with our path over the ground, thinking I could run the skids on the ground to regain power and rpm. I gained approximately 15 mph and lowered collective, maintaining directional control. Apparently this was not enough, because the left skid struck the ground. The aircraft then turned to the right, uncontrolled, and hit a second time on the left skid. The skid tucked under and the aircraft rolled on its left side and came to rest. . . ."

The pilot and his two passengers escaped injury, but the helicopter was a total loss.

"IT COULDN'T HAPPEN TO ME!"

RPM was lost when approach was terminated below hilltop on downwind side. Helicopter hit on left skid and rolled on its left side

. . . the mission was assigned to the pilot by the company commander, who later informed the pilot he was cleared for passengers . . .

Accident investigation board: ". . . The pilot had a total of 72 helicopter flying hours. Of these, 61.3 hours were in OH-13s during a qualification course. He had started OH-23C transition training and had 7.5 hours in the OH-23C, of which 2.5 hours were dual rides given by two instructor pilots. No checkout work sheet was made by the first instructor pilot. The checkout work sheet made by the second instructor pilot showed that maximum performance takeoffs, running takeoffs, running landings, slope operations, confined area, pinnacle, decelerations, and reconnaissance had not been performed. A night checkout was not performed. The pilot stated he had not left the traffic pattern during the two instructor pilot rides and that he had not made any touchdown autorotations. He also stated that he discussed his difficulty with rpm control with the second instructor pilot. The board noted that there was no remark about rpm control in the remarks section of the check ride report. . . .

"The board asked the pilot if he had ever taken a written examination on the pilots handbook for the OH-23C and his answer was no. When asked if he had studied the pilots handbook, the answer was no.

"The board found that the mission was assigned to the pilot by the company commander, who later informed the pilot he was cleared for passengers and made the remark 'Passengers' along with his initials on the rotary wing check ride report, but did not date it. The pilot stated that the company commander had not ridden with him as an IP. . . .

"The company commander was asked if he was aware of the hours required for transition in the OH-23, and his answer was that it was normally 10 hours, but he wasn't quite sure of the training circular that required or stated the required time. Asked if he knew that the pilot was not qualified in the aircraft at the time he assigned the mission to him, the company commander answered that he did not know the exact hours, but that the pilot had planned on flying the aircraft 1.5 hours the evening of the day before the accident and that he would get more time on the trip out to pick up his passengers. . . . When asked how many hours of dual instruction he thought the pilot had in the OH-23, the company commander said he thought it was three or four hours. . . .

"The board asked the pilot if he was ever told at any time not to carry two passengers and the answer was no. When asked if he had ever demonstrated his ability to carry two passengers, the answer was also no. When asked why he elected to carry the two passengers, the pilot answered that the density altitude was low and he didn't feel that it would present any problem.

"The board noted that the ballast bar had not been moved to the rear, but the cockpit loading fell within the range limit so that the ballast bar did not have to be transferred. The board determined that minimum and maximum cockpit loading of the OH-23 was not explained to the pilot and that he was not fully aware of the cockpit loading and c.g. limits. There was no load limit plaque in the aircraft. . . .

"The board concluded that transition training had not been completed in accordance with AR 95-4 and that the pilot was very inexperienced in the OH-23. . . ."

With respect to landing spots and available approaches, the board concluded:

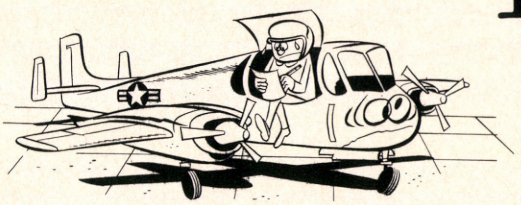
"The least desirable approach path was selected to the point of the intended landing. The pilot elected to approach across two deep gullies toward a steep hillside, when two ridge lines were available as approach paths.

"There were more favorable landing sites in the immediate vicinity that could have been considered and still have been within sight of the driver of the vehicle that was to pick up the passengers.

"The approach selected was terminated short of the intended point of touchdown. It was into the wind, but was terminated below the top of the hill and on the downwind side. . . ."

SHARE ITS

excerpts from near-accident and flight hazard reports



O-1D PILOT: "I was cleared into position on the approach end of runway 25. I waited momentarily while a UH-1 landed on the runway ahead of me. It then hovered to the parking area on the north side of the strip and set down. I was cleared for takeoff and proceeded down the runway, using short field technique.

"I lifted off at about 45 mph, gained about four feet of altitude, and lowered the nose of my aircraft. At this time, I noticed a UH-1 hovering out from the parking area on my right and turning east, between the runway and the UH-1 parking line. As I came abreast of the UH-1, its rotorwash stalled out my right wing. It dipped sharply down and struck the ground. My aircraft veered sharply to the right, into the UH-1 parking area.

"With full left aileron, the O-1 began to right itself. As I regained control, I was in a medium bank to the left at low airspeed. I rolled out on a southwesterly heading, and continued my climbout to the south. Both my observer and I were unaware that the wing had actually hit the ground, so we continued the mission.

"A subsequent check with the tower revealed that the UH-1 had not been cleared to hover and attempts by the tower to contact it by radio proved unsuccessful. This is not the first near-accident I have experienced as a result of a UH-1 hovering near or onto an active runway as I was landing or taking off in an O-1. The UH-1 pilots do not seem to understand the principles of flight applicable to light aircraft. They often display little regard for common safety precautions. I have attempted on numerous occasions to contact UH-1 aircraft on the ground by radio, both on tower frequencies and on guard, but have met with only partial success. Although some pilots display a high regard for ground safety, especially around fixed wing aircraft, some seem to feel that once they have completed their approach, there is no need for control or radio contact during ground operations."

★ ★ ★

Twin engine fixed wing pilot: "After being directed to the parking ramp by the tower (no follow-me vehicle), I had to wait five minutes for the operations sergeant to park the aircraft. He did not use any arm and hand signals. He just pointed to the general area he wanted the airplane in.

"I asked the operations sergeant if he could arrange for avionics to repair one of our omnis. He said it was 'highly impractical' to arrange for this because we (1) would need a work order, and (2) have to cross the field to get it approved. There was no transportation available. Since it was close to quitting time and transportation for our crewchief (who would have to supervise the repair) would not be available, we decided to leave the omni alone.

"We requested fuel and oil, but the vehicle did not arrive prior to the 1630 hours cutoff time. Since no transportation was available after that time to take us to our billets (three miles away), we had to postpone the refueling until the next day prior to departure. Also, no time was available for the crewchief to adequately perform his postflight inspection.

"The next morning our crewchief reported to the field at 0630 and once again requested POL. I arrived at 0700 and when I checked on the progress of refueling, I was told that the alert section had been notified and it was 'being taken care of.' I made out and filed my flight plan, proposing a 0800 takeoff. At the same time, the copilot preflighted the aircraft. He came back to operations at 0730 and stated that the POL vehicle had not yet arrived. After being told once again by the PFC, who was the only man in operations, that the alert section was taking care of it, I decided at 0745 to take my problem to the airfield commander. He took immediate action and by 0825 we were fueled and ready to taxi out for takeoff.

". . . The described circumstances prevented the performance of proper maintenance and encouraged a slip-shod, hurry-up attitude that is often first in the sequence leading to an accident. This is exactly what the Army aircraft accident prevention program is striving to eliminate. Won't you help?"

★ ★ ★

U-6A pilot: ". . . We had just broken formation at 300 feet and were following a formation of two UH-1Bs and a Flying Crane when my aircraft was caught in the rotorwash of the crane. I was holding a medium bank when this happened, at approximately 100 mph, and was just beginning a climb.

"The aircraft banked sharply over 90° and the rudder and aileron were very stiff and reacted against my corrections. It happened very quick, but I believe I lost about 100 feet of altitude before the U-6A could be brought under control. My flight path led into some hills approximately 500 feet high. . . . I had been caught in a downdraft in mountainous terrain in the past and it was very similar to what I experienced this time."

★ ★ ★

U-10A pilot: "While in no. 1 position, awaiting takeoff clearance for runway 35, two four-engine jets were cleared for takeoff on runway 17 approximately two minutes apart. Immediately after the second jet neared the departure end of runway 17, I was given takeoff clearance. I refused to take the active at that time due to probable wake turbulence from the jets at my end of the runway. At that time, a single engine aircraft, awaiting takeoff on runway 08, requested and was given takeoff clearance. At the time the pilot reached the junction of runways 08 and 35, he was approximately 50 feet in the air. When he hit the wake turbulence, his aircraft lost approximately 15 feet and appeared to be out of control. Fortunately, he was flying across the area of turbulence, instead of parallel to it, and was able to recover successfully.

"Had I accepted the takeoff clearance issued, I would very likely have lost control of the aircraft and become a statistic in the weekly accident summary. It demonstrated very vividly to me the dangers involved when we take chances to beat other traffic out of an airfield."

★ ★ ★

OH-23D pilot: "While on a training flight, I experienced what I at first believed to be air turbulence. After leaving a confined area, I again experienced rough flight. At this time, I discovered that the engine was cutting out, then surging. I elected to return to an airfield, feeling it would be safe.

"Halfway to the airfield, over a river, the engine got worse, so I elected to make a precautionary landing. I started an approach to a slope area, bringing in full throttle in order to hold 3100 rpm. On final, the engine cut out, surged to 3700 rpm, then quit. I had to go into autorotation at approximately 10-15 feet. Fortunately, I was able to land on a hill crest with no damage.

"A lot could have been avoided by making a precautionary landing when the first sign of engine failure was noticed. I would have had a more suitable landing site and could have landed under much better conditions if I had."

★ ★ ★

UH-1B pilot: "I was flying as aircraft commander of an armed UH-1B during combat operations. The aircraft was equipped with an M-16 type armed gun system, modified so that the rocket pods could be jettisoned separately. All crewmembers smelled smoke after we pulled out from our second firing pass.

"During both passes, all machineguns fired, and all rockets were expended. After smelling smoke, the rocket pods were immediately checked and one rocket was seen to be hung up. Since it could not be determined whether the rocket was burning or had just failed to fire, the pods were jettisoned. During this period, the fire team leader had maneuvered his aircraft into position to check for fire, but had seen nothing.

"As we turned toward the nearest airfield, the crewchief saw smoke coming from a point near the base of the transmission housing. I decided to land immediately in an infantry battalion CP. After landing, we found the source of the fire was a burning rag in the space between the 7.62 ammunition trays and the rear cabin bulkhead. Damage was limited to a slight scorching of the bulkhead upholstery. The cause of the fire was determined to be hot brass expended from the M-60 door guns dropping on the rag.

"This space between the arms trays and bulkhead is frequently used for storage of rags, books, etc., by the crew. It is certain that the SOPs in this unit will be changed to stop this practice and this incident should be brought to the attention of all."

ARMY AVIATION — NEWEST MEMBER
Continued from page 15

situation and make key decisions from a position somewhere to the rear of their forces. Their situation reports might have been second, or depending on communications, third hand information. Now through the command and control helicopter, the commander can place himself at a vantage point in the air where he can personally observe and influence all of his forces engaged in a specific operation. This is not to say that commanders did not personally influence units in the past. They most certainly did. But to do so meant that they would be required to pick a specific unit where they felt their presence might be most required.

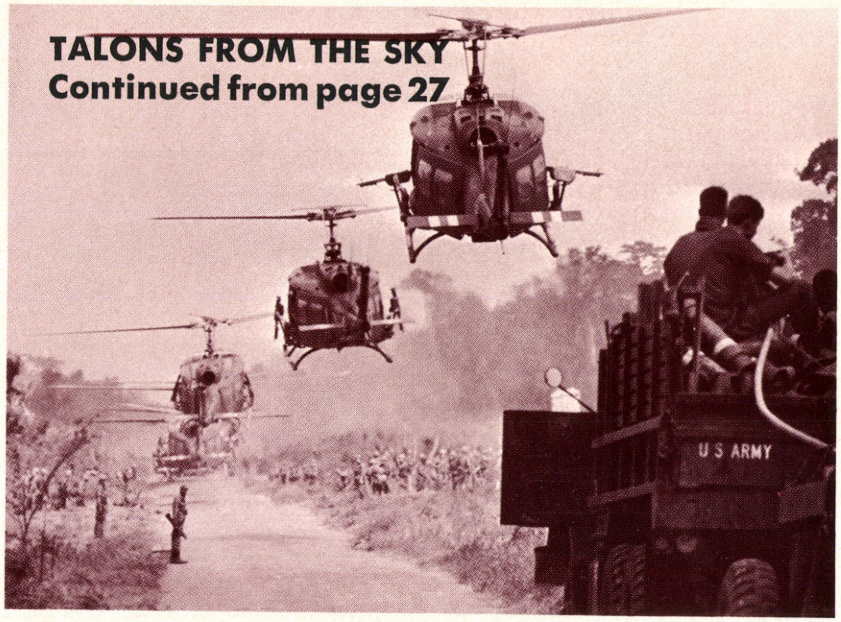
In the aerial command post, the airmobile force commander, with the aid of a small balanced staff and superior radio communications, can effectively control all facets of an operation. He can quickly lift or shift a fantastic variety of fire support and, as required, modify or alter his plan. When necessary he can discard one plan and adopt another in seconds. The old adage "shoot, move, and communicate," which has long represented the legs of the tripod of military success, has taken on a fresh new meaning through the capabilities of the newest member of the team.

Still there are opponents to the growth and development of Army aviation who have rationalized its combat success in Southeast Asia by stating that we are now engaged in a war that is completely unique. They will readily acknowledge mobility as the key to success in this particular war, because victory hinges on our ability to mass, assault and destroy the enemy before he fades into the safety of his inhospitable terrain. What they will not acknowledge is the potential of the Army airmobility concept in its envisioned application in higher intensity warfare. Strangely enough, however, if you consider the pattern of war we are presently fighting in the jungles, mountains, and paddies of Vietnam, it could very well be the pattern of future conflicts, *with tactical modifications to cope with the specific situation.*

Through the continuous application of sound tactics and techniques, Army aviation, like the vulnerable but highly versatile infantryman, can accomplish its assigned tasks regardless of the intensity of warfare encountered. We can fully appreciate that in a higher intensity environment the possibility of exposure to enemy long range artillery fighter bombers and armor forces would probably require some changes in our methods of employing Army aircraft. I am sure that imaginative flying soldiers will be able to cope with these new requirements with the same positive attitude they have maintained in the face of other challenging situations.

Army aviation has come a long way in 25 years. But the route has been strewn with frustration and unacceptance. Despite the formidable obstacles, however, it has continued to grow and thrive to fulfill the needs of a modern well balanced Army. Its future growth and potential will be limited *only* by the foresight and motivation of the men who will employ its unique capabilities in a manner to provide even greater service to the Army team.

Troops of the 173rd Airborne Brigade jump into the assault from a UH-1



TALONS FROM THE SKY
Continued from page 27

of many was the movement of 1,893,821 troops on the battlefield. That is more personnel than are necessary to completely man 126 Army combat divisions. Resupply, a prominent capability of Army air, accounted for cargo transported which tipped the scales at 138,288 tons.

The art of helicopter gunnery, fast becoming a legendary capability, categorizes our pilots and gunners as true professionals. Their expertise in gunnery tactics and the variety of skills forged in the landing zones of Vietnam by exposure to ever-changing tactical situations caught the enemy wherever he turned.

As proof that few escape the unleashed fury of "Hawk" gunships, hundreds of enemy sampans have been sunk along the hundreds of miles of canals and rivers which crisscross more than half the country. Fewer succeed in evading the all-seeing eyes of the ominous "Firefly" ships which prowl these waterways under cover of darkness, which is no longer the shield under which enemy craft once stealthily delivered their caches. Helicopter fire teams accompanying Firefly missions hunt, seek out, and destroy these contrabanders.

To ensure that this battlefield know-how was not lost, the brigade has published two editions and a pocket version of an operations manual which records the results of its combat experience. This experience has dictated the need to standardize aviation unit organizations, tailoring them to their missions. An important part of this program is the redesignation of all aviation units with titles more descriptive of their mission and organic aircraft. Renaming, until officially acted upon, has become an interim reality in the brigade. (See insert.)

While combat seasoning is gathered in battle, tribute is due the schools responsible for the degree of training with which their alumni arrive for combat. They are without exception a tribute to these institutions of military learning: aviators, crewchiefs, mechanics, gunners, and the scores of other categories of men who professionally serve the 1st Aviation Brigade in Vietnam.

Untold numbers of these men have given a tremendous account of themselves under the stresses of frequent flight, long strenuous hours and sometimes heavy combat conditions. Countless, too, are those who have run the gamut of sacrifice in this brigade, earning the right to personal and unit awards, both American and foreign, for extraordinary heroism, valor, and merit. Nor is the brigade without those who have made the extreme sacrifice.

As Army aviation commemorates it 25th anniversary, the 1st Aviation Brigade hails the beginning of its second year. Some will remember the brigade's victories of the first year. Others will join it in years to come. No one will forget that it exists.

EQUIPMENT	PRESENT DESIGNATION	PROPOSED DESIGNATION
N/A	Aviation Brigade	Aviation Brigade
N/A	Aviation Group	Combat Aviation Group
R/W	Aviation Battalion	Combat Aviation Battalion
F/W or Composite	Aviation Battalion	Combat Support Aviation Battalion
UH-1B Gun Company	Aviation Company (Airmobile Light)	Armed Helicopter Company
UH-1 Lift Company	Aviation Company (Airmobile Light)	Assault Helicopter Company
CH-47	Aviation Company (Airmobile Medium)	Assault Support Helicopter Company
CH-54	Flying Crane Company	Assault Support Helicopter Company
O-1	Aviation Company (Surveillance Airplane Light)	Reconnaissance Airplane Company
OV-1	Aviation Company (Aerial Surveillance)	Surveillance Airplane Company
U-1	Aviation Company (Airmobile Fixed Wing)	Utility Airplane Company

U-21, The Army's New Utility Aircraft

THE NEW U-21As, scheduled for first deliveries this month, are a cross between Beech Aircraft Corporation's King Air and Queen Air. They have the King Air wings and engines and a fuselage similar to that of the Queen Air.

Purpose of combining the two aircraft is to get the features most needed by the Army from each. The twin turboprop engines will give the U-21 power and reliability; the King Air wings will provide the lift needed to match the engines; and the Queen Air cabin the roominess needed to carry troops and cargo.

The U-21 looks very much like the NU-8F. This aircraft is a six passenger unpressurized turboprop transport converted from a Queen Air Model 80. The major difference in the looks of the U-21 and the NU-8F is that the U-21 will have a cargo compartment forward of the regular airstair cabin door to provide overall cargo space of 53½" x 51½".

The U-21s will be powered by twin Pratt & Whitney PT6A-20 engines. These engines have 550 shaft horsepower and have a dry weight of 309.5 pounds. They are 62 inches long and 19 inches in diameter. They drive three-bladed, constant speed, fully feathered Hartzell propellers.

A 58-gallon main fuel cell is located in each aft nacelle section. In addition four interconnected auxiliary cells are located in each wing; these hold an additional 131 gallons. This gives the U-21 a total fuel capacity of 378 gallons. A complete crossfeed system permits use of fuel by either engine from all tanks.

Nacelle and inboard tanks are completely self-sealing to provide protection for 202 gallons of fuel. The remaining cells in the outboard wing panels are standard bladders.

The interior arrangement allows for a variety of uses. The pilot and copilot sit side by side and are separated from the main cabin by a removable half-curtain. The cabin will accommodate ten combat equipped troops on center facing bench seats. An alternate ambulance arrangement will accommodate three litter patients plus three ambulatory patients or medical attendants. As a staff transport it will carry six passengers in standard forward-facing chairs.

With all passenger seats removed, the cabin can hold 3,000 pounds of cargo. Cargo tiedown fittings are installed in the floor. Usable cabin space is 55 inches wide by 57 inches high and 12½ feet long. Bulky items are easily loaded through a door 53½ inches wide by 51½ inches high.

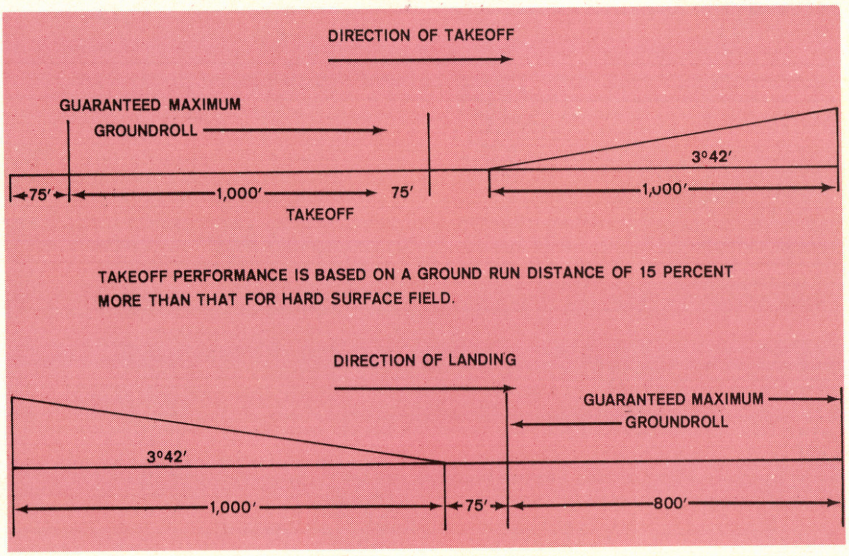
The floor is designed to withstand cargo loads of 200 pounds per square foot. Cargo tiedowns are capable of restraining 2,000 pounds.

The aircraft is designed to operate within a temperature range of −25° F to +125° F without modification. None of the equipment onboard will be affected by temperatures or weather conditions within this range.

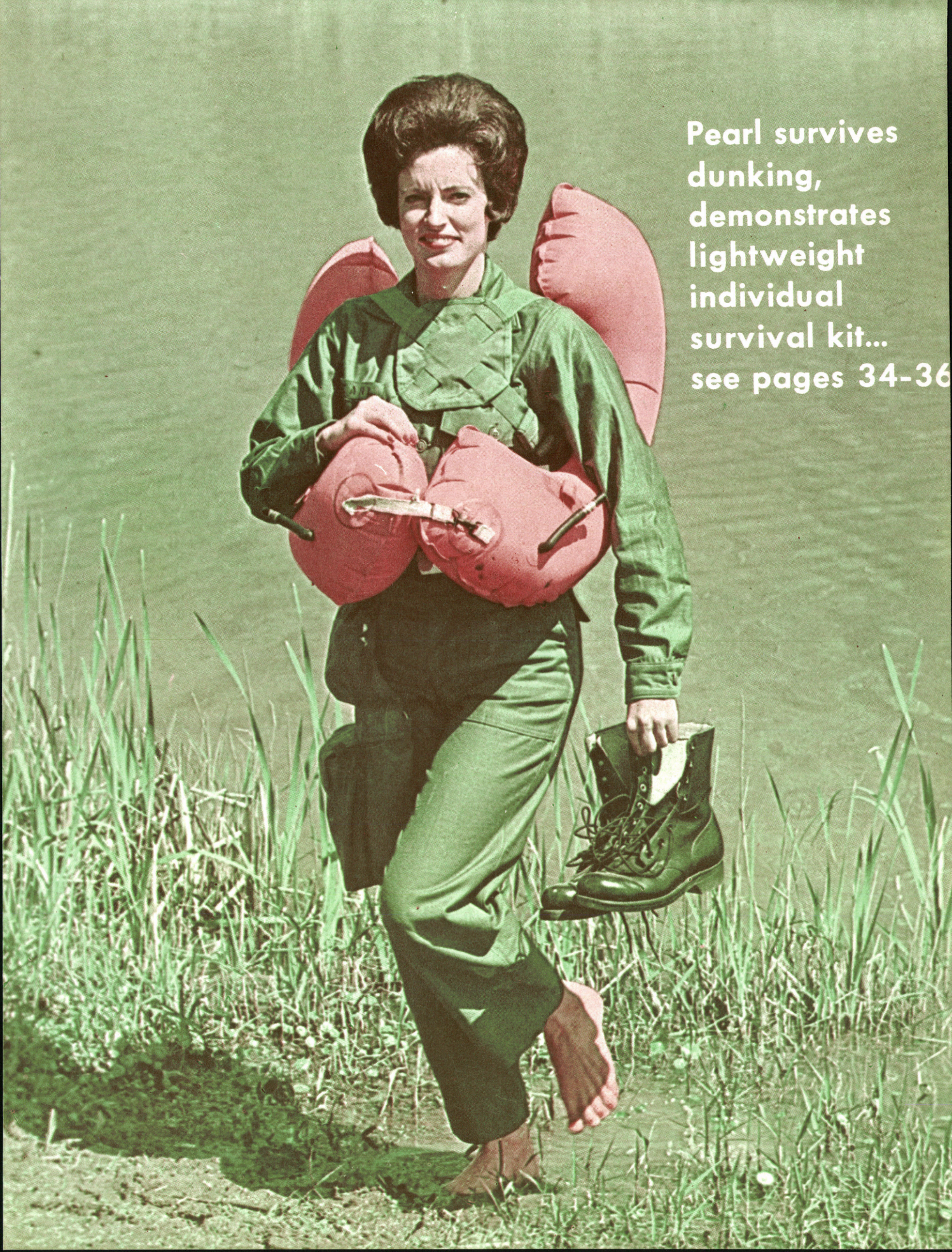
The Army has awarded the Beech Aircraft Corporation a contract for 88 U-21s. Delivery was started in March and should be completed by January 1968.

The initial contract comes to $17,631,081. The total contract, including spares, is expected to exceed $20 million.

Beech is also training 20 instructor pilots and 20 instructor mechanics to operate and service the aircraft. Training is being conducted at the Beechcraft facilities in Wichita, Kan. Classes include ground school instruction in maintenance and operation of the U-21 as well as transition flight check for aviators.



The U-21. Photo courtesy of Beech.



Pearl survives dunking, demonstrates lightweight individual survival kit... see pages 34-36