UNITED STATES ARMY

JULY 1970

AVIATION DIGEST

UNITED STATES ARMY AVIATION DIGEST

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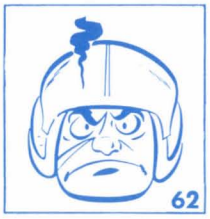

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ABOUT THE COVER

Last year Army aviation provided invaluable assistance in the wake of two devastating hurricanes—Camille and Francelia (see pages 2, 12, 18 and 21). Army aviation was there . . . just as it has been this year in Peru, and in so many areas before (page 32)

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

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

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

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VIEWS FROM READERS

Sir:

I am writing in regard to the article "Functional Test Flight of the UH-1" in the AVIATION DIGEST, January 1970.

I would like to compliment Major Volk on a very fine article, but after having taught this very course for 2½ years with the Maintenance Test Flight Branch, U. S. Army Transportation School, Ft. Eustis, Va., I feel there are several points which should be clarified.

The statement about checking for a torquemeter reading of 10 to 15 psi at 6600 rpm should further include "at flat pitch" and pertains to the L-5, L-9, L-9A and all of the L-11 engine models. The L-13 engine torque range is 8 to 12 psi. Emphasis should be placed on the fact that a variation of this *may* indicate a high or low rpm setting, but a straight-in autorotation must be conducted to verify actual autorotative rpm. The torquemeter reading *must never be used* in lieu of actual performance of the autorotation. The reason for verification by performance is because the accuracy of the torquemetering system has not yet been verified at this point in the test flight.

When rapidly moving the cyclic control forward and backward several times (the pylon rock check), the rate indicated is correct [one or two movements—Ed.] but you should not exceed three complete cycles; otherwise, you will have difficulty beginning your count of the dampening cycles.

While performing the hydraulic power cylinder check, the aircraft should be brought to a 5 to 10 foot hover in order to provide a safety margin in which to recycle the hydraulic control in the event the power cylinder should lock up. Some test pilots may prefer 60 knots forward speed in level flight. Feedback is always greater during maneuvering. For this reason pilots should be content with gradual or even sluggish maneuvers combined with unpreciseness during boost-off. This is the same as saying, "Don't expect to see a hippopotamus doing a ballet dance."

The air speed for the straight-in autorotation should be 60 to 70 knots, depending on the model flown (check the applicable dash 10). The reason for the different air speeds is the location of the pitot tube. Autorotational rotor rpm checks should be made using the dash 10 recommended air speed with collective all the way down and throttle at flight idle. Vary the rate of descent to control the air speed. The important idea here is that the check should be made consistently; i.e., do it the same way every time for each UH-1 model. A large variation of results will occur otherwise.

While conducting the stabilizer bar check you must maintain a given altitude and a constant air speed. The aircraft should be flown smoothly but positively into a bank of 20 to 30 degrees, then stabilized with the ball centered. Shortly thereafter (4 to 6 seconds) a tendency for the bank to increase should be evident. No continual oscillation or unusual vibration should occur.

CW4 Edward A. Gilmore Jr.
AWOAC 70-2
Ft. Rucker, Ala. 36360

Sir:

Having read your March issue, I am now thoroughly convinced that yours is an informative periodical of the highest caliber. I have been a reader of the U. S. ARMY AVIATION DIGEST for some time, along with other service magazines, and in comparison I believe that yours stands superior.

Although I am a member of another service, I can assure you that I can appreciate the fine quality of this magazine. It is an extremely well-edited piece of work.

Being a member of Helicopter Anti-Submarine Squadron Eight at the Naval Air Station, Imperial Beach, Calif., I am closely associated with the General Electric T58-10 engine; therefore, I was particularly interested in the article entitled "Project FOD" by Ted Kontos. It is this type of light comedy in an article which is of great importance as it draws readers who otherwise are uninterested in the subject matter. As I am working in a quality assurance capacity, this article was of added interest; however, this is only one out of a number of well-constructed issues.

To you and your staff I extend my sincere congratulations and appreciation for your excellent work.

AE2 Thomas Almirall
HS-8 Naval Air Station
Imperial Beach, Calif. 92032

Sir:

Hooray for Captain Wahl! Unfortunately, his well-defined point involving establishment of search and rescue (SAR) teams is not a new problem but one which has fallen on deaf ears ["Where's The First Team?" March 1970 DIGEST].

The very minimum of equipment that would be considered essential in USAF/USMC/USN SAR aircraft is considered a luxury item in Army helicopters, i.e., ADF homing on UHF. Any Army aviator that has served in RVN undoubtedly has heard "beeps" on guard channel without being able to respond. Isn't it a great feeling to say, "I hear ya buddy but just can't reach you—due to the lack of equipment."

Another angle: Wonder why the other services have SAR crews trained and ready and the U. S. Army stands by with "the largest number of aircraft in a single services inventory" and not a single SAR team on alert?

MAJ James R. Hughes Jr.
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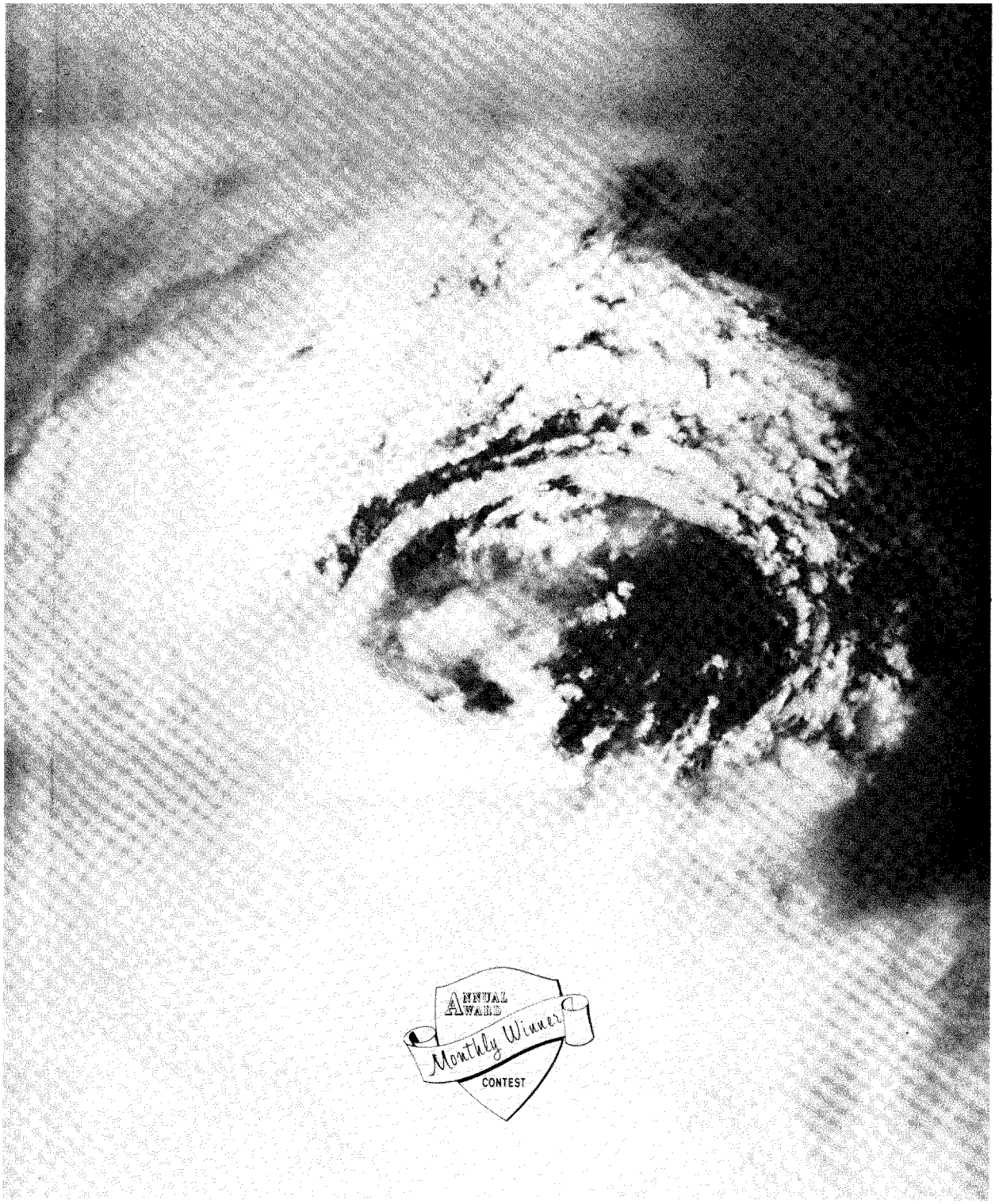


We will never know the maximum velocity of the winds in Hurricane Camille, but in the face of my experiences and observations I would conservatively estimate that they ranged at about 200 mph. This is the threshold of tornado intensity.—Dr. Robert H. Simpson, chief of the National Hurricane Center, Miami, Fla.

OPERATION CAMILLE

Captain John W. Griffin

DISASTER! This word, even with the help of many others, cannot describe Hurricane Camille's destruction. The devastation left by Camille tended to make a person feel that his senses were betraying him. The area it struck looked as if it had been under a nuclear attack.

Camille first was reported as a tropical storm in the Caribbean near Grand Cayman Island on Thursday, 14 August 1969. Moving northwest at about 10 miles per hour, the storm reached hurricane intensity the next morning and passed over the western tip of Cuba into the Gulf of Mexico Friday night.

Camille headed north during the night toward the Florida panhandle east of Fort Walton Beach. Residents of this area were warned of the intensity of Camille and told to take precautionary measures. Military installations, including Ft. Rucker, Ala., moved aircraft out of reach of the raging storm and took other measures to minimize damage.

On Saturday afternoon the hurricane stalled and its winds intensified to about 150 mph. After dark Camille resumed forward movement, but this time in a north-northwestwardly direction toward the mainland just west of Biloxi, Miss.

Early Sunday an Air Force aircraft flew into the eye of the hurricane and found the central barometric pressure to be 26.61 inches, the lowest ever recorded by an aircraft in the Western Hemisphere.

Camille was near the mouth of the Mississippi River Sunday evening moving at about 15 mph with winds near 200 mph. Her eye passed over the coast near Waveland, Miss., at about 2200 hours, bringing with it 20-foot tides. Camille slashed inland and roared north across Mississippi and into Tennessee before turning eastward and aiming its diminishing, but still dangerous, potency at Virginia.

Freed of the necessity of moving aircraft out of the path of the storm, Ft. Rucker officials made plans to send help into the stricken area. Lieutenant Colonel Dudley J. Carver, a native of Ocean Springs, Miss., and thoroughly familiar with the area, volunteered and was selected to direct Third Army units sent into the area.

Communications with the Gulf Coast were cut off completely. Telephone and power lines were down and the use of ground vehicles was limited and dangerous in the storm-stricken area. It was impossible to determine exactly what assistance was needed; however, the intensity of the storm and the almost flat (and in some cases marshy) nature of the terrain indicated that helicopters would be the best mode of transport.

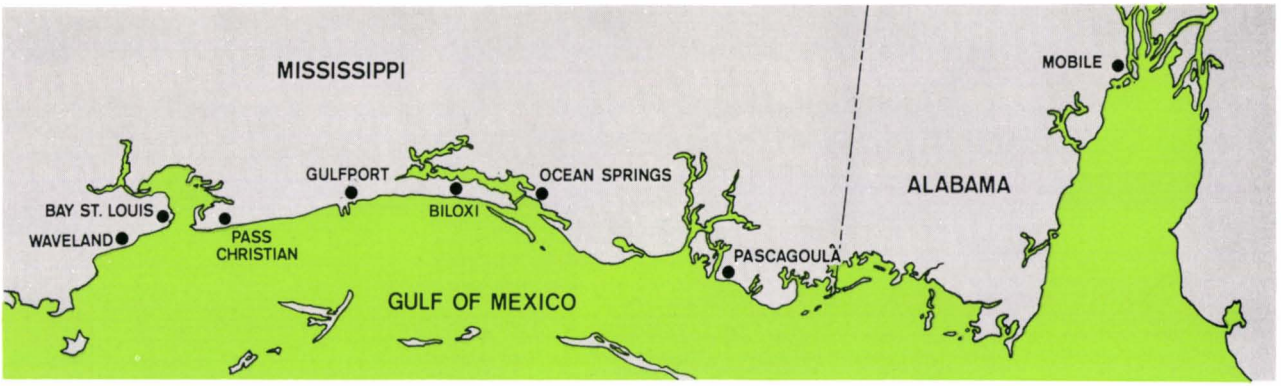
After consulting with Headquarters, Third U. S. Army, Atlanta, Ga., Ft. Rucker officials decided to send an initial exploratory unit of two UH-1Ds into the area. If more aircraft were needed LTC Carver was authorized to request them. The two Hueys were to leave Ft. Rucker as soon as the weather cleared.

The weather in the area continued to be bad all day Monday but by Tuesday there were signs that the high winds and heavy rains were subsiding. Early in the afternoon the advance unit left Ft. Rucker for the area where the worst hurricane in recorded history had hit the United States.

LTC Carver was in the left seat of the lead aircraft. Accompanying him were Captain John Diggs in the right seat and Staff Sergeant Richard Thomas, the crew chief. Wing position was flown by Chief Warrant Officer Tony Adams and myself with Private First Class Mark Herring as crew chief.

Our orders were to report to Major General Wolter G. Johnson, commanding general of the Mississippi National Guard, and establish a base of operations at Gulfport, Miss. We were to assist National Guard and regular troops in the area and render what aid we could to the civilian population.

We chose a route to Gulfport directly over the stricken area to make an enroute reconnaissance of the eastern end of the damaged area. Flying over Fort Walton Beach we saw little storm damage, however, near Mobile, Ala., the picture changed significantly. Along



the causeway (U. S. 90) just east of Mobile, automobile traffic was limited to one lane. We could see that business places along the causeway were badly damaged. Later we learned that Mobile had suffered heavy damage from flooding and downed trees and power lines. Electric current was still off when we flew over the city.

We flew west over I-10 and U. S. 90. At one point 90 was partially closed, but other than that there was little evidence of storm damage.

In the Pascagoula, Miss., area the storm had sunk a number of boats along the Pascagoula River [16 boats, 12 to 30 feet long—Ed.]. We noted a steamship, the *Mormar Sun,* aground on the west bank of the river and three barges beached north of Highway 90. Nearby, the Louisville and Nashville Railroad was washed out.

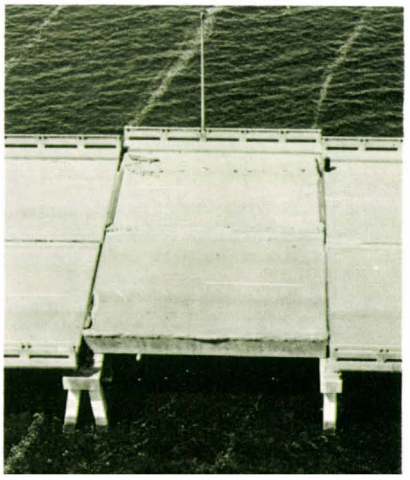
Early in the evening we passed over Ocean Springs and entered the area of major storm damage. For the first time we saw destroyed houses. We did not try to estimate how many there were in the little town but learned later there were about 75. We also saw 18 fishing boats sunk or beached in the city harbor.

Between Ocean Springs and Biloxi, Camille ripped into a four lane highway bridge built to resist damage from hurricanes. The huge slabs of concrete that make up the roadbed face the path usually taken by hurricanes in this area. However, the 200 mph winds and 20-foot tides were more than the bridge could stand. Some of the big slabs were pushed off their foundations and others were stacked one on top of the other like slices of bread.

All along the beach area of Biloxi and Gulfport and extending back several blocks there was almost total destruction. Huge trees were uprooted, modern motels smashed into small pieces of rubble

Mobile suffered very heavy damage from flooding and downed trees. Most power lines were down and electric current was still off when we flew over the city

Some of the big slabs were pushed off their foundations



and older hotels and homes were lying flat on the ground, their venerable sides in splinters. Hanging on iron fences that had been bent like copper wire were clothes washed from homes and left hanging when the water receded.

Flying over the East Point section of Biloxi we noticed a strange phenomenon. Among all the rubble and ruin an occasional building or house was left standing with only minor damage. We saw a magnificent church standing with only a window or two broken while everything around it had been destroyed. It was as if God had said to the devil in the hurricane, *Thou shalt not touch my church.*

A few of the fine old homes and hotels that have withstood many hurricanes were still standing—The Edgewater Gulf, The White House, Beauvoir (the home of Jefferson Davis) and some others were undisturbed. Even the old Light House at Biloxi was still standing, straight and tall.

We were convinced that the two helicopters we had wouldn't be enough. It was also clear that any night operations would be extremely dangerous since the warning lights on top of towers and other obstructions were not operating.

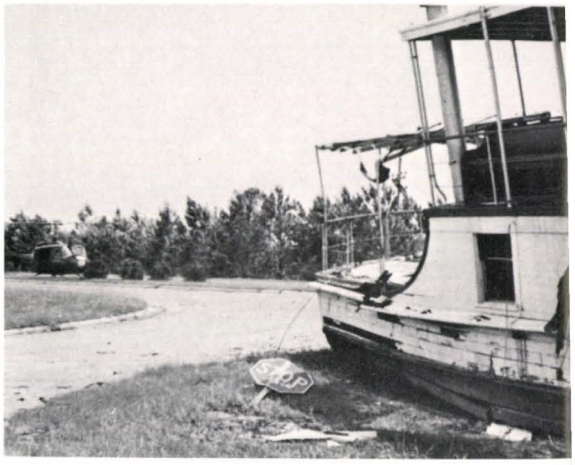
As darkness closed in, we landed at Gulfport Municipal and were met by Lieutenant Colonel Leonard G. Tingle, the Mississippi National Guard aviation officer. His briefing that night confirmed our estimation as to the intensity of the disaster. By this time over a hundred deaths had been reported with more to come.

The next morning we flew westward to complete our reconnaissance and saw even greater destruction along the Mississippi coast. The west end of Gulfport was about 30 percent destroyed, Long Beach suffered about 60 percent destruction and from the western limits of Long Beach to Pass Christian everything was gone.

Above, all along the beach and extending back several blocks there was almost total destruction. Below, at Pass Christian the storm sheared the front section of a church, leaving the back section containing the altar intact

Roads were washed out or blocked by fallen trees

Above, although the destruction at Biloxi was bad, it was even worse west of Gulfport. Bay St. Louis was more than 80 percent destroyed and Waveland almost completely wiped off the map. Below, huge ships had been washed aground in the Gulfport area. The port was heavily damaged



Above, boats of all sizes were left several blocks from water. Below, a barge broke its moorings and was on the highway running along the coastline

Army search and rescue missions flown over the Bay St. Louis area revealed extensive destruction and many people in need of assistance

Army helicopters evacuated thousands of homeless victims in wake of Camille

Bay St. Louis was about 80 percent destroyed and Waveland was completely wiped off the map.

Just about every road we observed was blocked by fallen trees and washed out bridges. Huge ships had been washed aground in the Gulfport harbor which was damaged extensively. Boats of all sizes were left high and dry, some blocks away from the water. A huge barge had broken its moorings and was left on the highway. The bridge across Bay St. Louis suffered the same kind of damage its sister bridge had at Biloxi. In addition, it had some of its concrete pilings damaged.

Our reconnaissance showed that helicopters would play a major role in the rescue operations; they were the only means of getting food, water and other help to many stranded people. Also, transportation was needed by officials, engineers and other rescue workers to properly monitor the flow of aid and organize the rebuilding of the area.

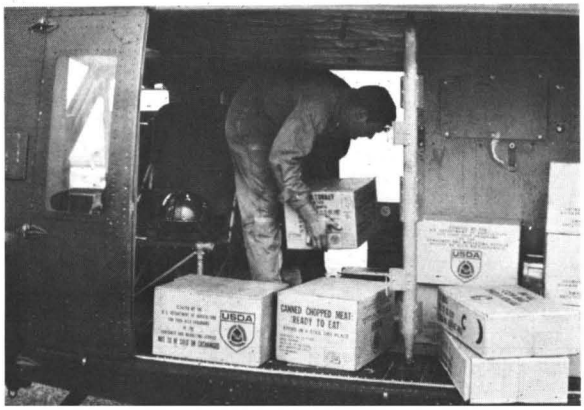
Somehow we were able to satisfy the most urgent needs of the officials and civilians. Red Cross facilities were being set up and they also required help to bring in supplies.

On Wednesday morning our search and rescue mission was concentrated on the Bay St. Louis area. Despite being hampered by low clouds and fog, we conducted a diligent search and soon located people in need of assistance. We flew directly over one couple who seemed to be in distress. We were able to land several blocks away and, after wading through the mud and water, found that the lady had a broken arm; also, neither had eaten since Sunday.

We knew that there had to be others in the area needing immediate care, so the man volunteered to have those he could find gather at a better landing spot for evacuation. Those who were not ambulatory would be made as comfortable as possible until we could fly in medical assistance and evacuate them. In each case we left C rations and water and reported the location of the victims to authorities at Gulfport. Fortunately, the weather allowed evacuation to begin early Wednesday afternoon and the Red Cross was able to set up an emergency hospital in Bay St. Louis.

Soon more Army helicopters began arriving. Elements of the 177th

In each case, the locations of the victims were reported and then C rations, water and other supplies were distributed



Word of Army aviation's rescue operations spread and requests for assistance soon poured in from civilian agencies

Impassable roads took many days to clear, a fact that accented the need for Army helicopter transportation

Supplies were flown to Wiggins, Miss., in CH-47s and then loaded in UH-1s

and 197th Aviation Companies from Ft. Benning, Ga., arrived Wednesday, complete with operations and maintenance personnel and equipment. LTC Carver organized a provisional unit and designated Major George S. Crawford (197th Aviation Company) as its commander.

Civil agencies in the area learned of Army aviation's operations and their requests for assistance poured in. Direct coordination with the Red Cross and other civil agencies was established. This greatly facilitated the disposition of the injured and refugees.

With more helicopters available, we were able to intensify our search and rescue mission. One of the problems we encountered was persuading some of the people without children to take the food and water. They felt that someone else might need the supplies more than they did. Only after we explained that we had plenty and it would be best for them to take the food and eat regularly did they accept.

We also found many who refused to be evacuated, some still in a state of shock. This created a problem in that we had to keep them supplied and furnish medical aid until they agreed to be moved.

About this time a body recovery team was set up. All bodies discovered were reported by radio and most of the recovery was done by the U. S. Navy, Coast Guard and National Guard. A system was established and a highly effective job was accomplished in this area.

Work in the coastal area was continued Thursday and consisted mainly of aiding the Red Cross. We carried doctors, nurses, supplies, evacuees and furnished help in any other way possible. By late Thursday the emergency requirements of the coastal area had been met. Ground vehicles again moved with relative ease. Elements of the Army Engineers from Ft. Benning and Ft. Rucker had arrived and did an excellent job of road clearing, which lessened the helicopter transportation requirements.

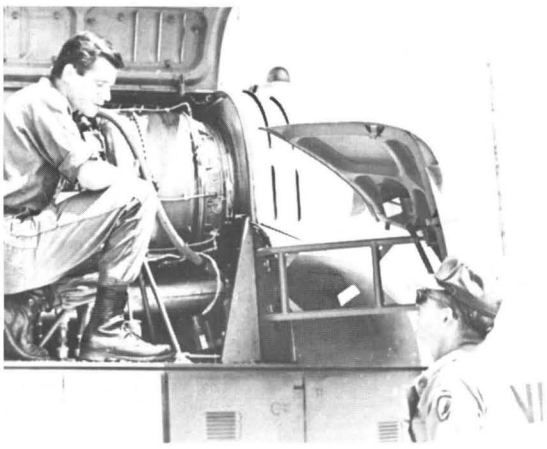
Friday morning we were joined by OH-6A observation helicopters from Ft. Rucker and we began search operations to the north of the coast. The OH-6s were a big help in that they could be landed in areas too small for the UH-1s.

We had assumed that only the coast was damaged; however, we soon learned that extensive damage existed inland. In the Jordon River estates area near Bay St. Louis we found 25 families completely isolated, homeless, without food or water and needing medical aid.

By the number of downed trees and buildings we could see that literally thousands of tornadoes had touched down as far north as 70 miles and across the entire southwest end of Mississippi.

Landing at several homes we determined that many people were

Army maintenance personnel did outstanding jobs during Operation Camille



in the same status as those we found in the Jordon River area. Every road was cut by fallen trees, power was still out, bridge abutments had been washed out, homes destroyed and dead animals were everywhere.

It was obvious that a different type of operation was now needed. Saturday morning we set up a forward base at the small airport at Wiggins, Miss. We used air cavalry reconnaissance techniques similar to those employed in the Republic of Vietnam. The difference was that here the OH-6s would locate people in need of aid and call in the UH-1s with the required assistance. In Vietnam the OH-6s locate the enemy and call in UH-1 gunships to attack.

Air cav reconnaissance methods like those used in Vietnam were employed. OH-6s located people in distress and called in UH-1s with medical aid, food and water

A team of two OH-6s and one UH-1 was assigned to each sector. The UH-1 was the team lead. Instead of weapons it carried a civilian doctor, a Red Cross representative and a load of medical supplies, food, water, bedding and clothing. When the scouts found an area in need, the Huey landed. While the supplies were unloaded and the doctors were working, the scouts would continue their search. This proved to be a very effective technique and allowed us to cover a large area in only a few minutes.

Resupply was made more easily available by the movement of supplies from Gulfport to Wiggins by CH-47s. These "Hooks" also were used to ferry supplies to the Red Cross centers in other towns in the area and to evacuate large numbers of people.

Eventually the work at Wiggins was absorbed by the Red Cross and engineers. Our mission now became one of ferrying government officials and VIPs. Some of the aircraft returned to their home bases and by Sunday all had been released except the first two UH-1s and two OH-6s from Ft. Rucker. These helicopters were used to aid the engineers, power companies, etc., and to fill miscellaneous utility missions for an additional 3 weeks.

The fact that there were no accidents involving Army aircraft or personnel and the magnitude of the job accomplished in so short a time speaks well of the training and experience of Army aviators and their crews.

Though all pilots concerned in the mission were Vietnam veterans, this was a different type job with which we were confronted. A great deal was learned about organizing and conducting operations in the wake of a natural disaster.

Camille, a vicious, unwanted killer, left much sorrow. But the grief surely would have been greater had it not been for the quick response of Army aviation units. And the invaluable experience Army aviators gained during Operation Camille will lessen the impact even more when an aroused Mother Nature strikes again.

The hurricane left many bridges badly damaged and stymied ground transportation—but not the Army's helicopters

Aeromedic

ARMY AIR CREWMEN AND JEEP DRIVERS' DISEASE

Major William T. Stubenbord

ONE OF THE THINGS that your flight surgeon checks for during a physical examination is the presence of a pilonidal sinus. To the public this is both a poorly understood and dreaded condition. In the military service it is of great concern because of the much higher incidence in young men. In aviators, particularly, it poses special problems since they often sit for prolonged periods of time in a confined and sometimes vibratory position.

In the usual sense, pilonidal sinus refers to the presence at the base of the spine of a skin-lined opening (sinus) which extends deep into the underskin and sometimes down to the bones of the lower back. When the sinus becomes closed or plugged with hair and skin secretions, a cyst is formed and this often becomes infected from the bacteria present. This infected cyst becomes swollen, red and extremely painful. As a result the cyst will either rupture on its own or, more commonly, the patient will consult a doctor because of the pain and swelling. The infected cyst will then have to be lanced after using local anesthesia.

People who sit a great deal and at the same time are subjected to repeated skin irritation, such as aviators, get into more difficulty with this condition. This accounts for the term "jeep drivers' disease" that was used in World War II to identify pilonidal disease in military jargon. Patricularly then the use of an aircraft's hard seats that are hot and vibrate a great deal will be poorly tolerated by those with a pilonidal sinus or cyst and (as will be noted later) may actually cause them to develop.

The origin of a pilonidal sinus is still a matter of considerable dispute among physicians. There are two widely held theories describing how the sinus originates. One school of thought is based on the idea that the condition is a congenital one (we are born with it). There is, however, considerable evidence against this thought, especially in view of the fact that it is extremely rare to see such a sinus in infants and children. The other, and now more widely accepted concept of pilonidal disease, is that it is an acquired condition resulting from ingrown hair. This is supported by the fact that pilonidal sinuses are more common in men (2:1) and especially in hairy individuals. The condition usually appears in adolescence and most commonly becomes symptomatic in the age group 20 to 30.

People who sit a great deal and also suffer repeated skin irritation are likely to contact pilonidal disease—a painful and dreaded condition

What is the treatment for this condition? As noted previously, in the presence of active inflammation and a swollen, sore, infected cyst, simple incision and drainage are performed just as would be done for any other boil. This does not solve the problem because as the wound heals remnants of hair and skin remain in the wound and usually infection and drainage of fluid will recur in the future. Often the wound will never completely heal and drainage will persist indefinitely. Active infection of a pilonidal sinus or cyst, or persistent drainage of fluid from the cyst or sinus, are conditions requiring a medical restriction from flying according to the Medical Standards for Flying (AR 40-501, chapter 4).

For the individual who has slow, persistent drainage and the individual with previous attacks of infection which have cleared up, the usual recommendation is that removal of the entire involved area be performed as a surgical procedure. This requires hospitalization and anesthesia. There are several different operations that have been recommended to cure this condition and this simply reflects the fact that no perfect method exists for curing the disease. Total removal of the involved area, with surgical closure of the wound, would be the fastest way to attempt this but, unfortunately, high rates of infection in the wound as well as recurrences of the disease occur with this treatment. By far the lowest recurrence rate results by simply removing the area of pilonidal disease and allowing the open wound to heal on its own. However, the recovery time involved here is long, averaging at least 6 weeks and often up to 3 or 4 months. During that time the individual can function well but is required to take frequent showers or baths to keep the wound clean and, because of the open wound, finds sitting somewhat uncomfortable. For aviators this, of course, precludes flying and it, therefore, means a medical restriction for several months. Once healed, however, it is rare that a pilonidal sinus or cyst removed in this fashion will reoccur.

It is interesting to note that this is a condition seen rarely in major medical centers and in the usual practice of medicine, yet in military hospitals and dispensaries it is a matter of routine. For aviators it is a frustrating process to await the complete healing and thereby the restoration to flight status.

Hurricane Francelia

A team of 13 Army aviators and 11 enlisted men was flown with four UH-1 Hueys by U. S. Air Force C-133s to aid in rescue operations after Hurricane Francelia wreaked devastation in Guatemala

Captain Benny J. Archuleta

ON 6 SEPTEMBER 1969 Hurricane Francelia struck the Republic of Guatemala with such an awesome force that the government had to request help from the United States. The country could not cope with the emergency with its own limited resources.

Shortly after the hurricane hit, the 4th U. S. Army received the request for help. That same day I was called to the operations building at Robert Gray Army Airfield, Ft. Hood, Tex., and placed in charge of the four UH-1Hs being sent to assist the Guatemalan government in the wake of the hurricane. I was apparently selected for two reasons: one was that I could speak Spanish and this would be a great help, and the other was that I was maintenance officer of the 181st Aviation Company and maintenance could be a major headache in this operation.

A team of 13 pilots and 11 crew chiefs and maintenance personnel from the 181st Aviation Company, 161st Transportation Corps Detachment, 1st Armored Division Aviation and the 2nd Armored Division Aviation sat in the battalion briefing room later that day when the S-3 began our briefing.

He explained that Francelia had caused extensive flood damage and our mission would be to conduct rescue and relief operations as requested by the Guatemalan government. Our mission would last about 2 weeks.

The operations officer pointed out that the field we would use in Guatemala had an elevation of 10,000 feet and some of the minimum enroute altitudes were as high as 14,000 feet. High density alti-

tudes could be expected due to the tropical climate and should be considered when carrying loads.

One U. S. Air Force C-133A would carry our UH-1H Hueys, crews and equipment. Liftoff time was 2300 hours 19 September with an estimated time enroute of 06+00. The disassembly and loading of the Hueys would be my responsibility. The proper shots and records to include orders were items of priority. Navigational charts, maps and supplements in limited quantity were available in the S-2 shop. The briefing ended with a reminder that we would be guests of the Guatemalan government and that we should conduct ourselves accordingly.

As I left the briefing room, I started thinking of flight manifests, spare parts, special tools, facilities available at our destination, disassembly, the language barrier and water that probably wasn't potable.

After selecting the helicopters to be used, I tackled the problem of loading them into the aircraft. I felt confident that someone in our battalion had done this before, but decided it would be quicker and easier to enlist the help of Red River Army Depot personnel who often are called upon to perform such a feat.

In spite of my fears, it went off without a hitch. By 1800 hours the C-133A was loaded with the Hueys and equipment. Three of our UH-1Hs were stripped of their main rotor blades, main rotor hub, mast, tail rotor assemblies and tail booms. The tail booms were stacked on top of the helicopter cabins using piggyback kits. The rest of the items were placed underneath and alongside the Hueys. The fourth Huey was similarly disassembled except that the tail boom was left intact. Twenty-one passenger type seats were mounted in the ramp area. The remaining passengers would ride up front in the crew compartment.

At 2330 hours we were on our way. After a three-hour layover at Kelly AFB, Tex., we touched down in Guatemala City at 0922 local time.

A strange feeling came over us as the giant ramp was lowered and we sat there still buckled in looking at the Guatemalan people while they looked back at us. Approximately 100 curious people had gathered around the C-133A to greet us.

We were met by the President of Guatemala along with the U. S. Military Group commander and the operations officer for the Guatemalan Air Force.

While the crew chiefs and maintenance personnel unloaded the helicopters, the pilots were given a briefing by the operations officer. He said that the hardest hit area was an area of about 30 by 100 miles along the lowlands of the southern coast (Pacific).

Hurricane Francelia had pushed the waters of the Pacific Ocean over the coastline and created severe flooding. Roads, bridges, railroads and homes had been washed away. There were many villages cut off from the rest of the world. Food and water were at a premium and not available at some places. Many of the people were sick and needed medical aid.

With the situation looking pretty grim, we went about the task of getting the Hueys offloaded and flyable. I estimated it would be noon the next day before the first bird would be ready and possibly late evening for the others.

The lack of ramp extensions was a minor problem which delayed offloading. However, we improvised with half a dozen 2 x 6 inch pieces of lumber to make a fairly good ramp.

As soon as the helicopters were offloaded, we started reassembly operations. As usual some bolts and parts were installed easily and others were not. Our good top-notch technical inspector and a complete set of TMs were a great help.

The U. S. Military Group in Guatemala had made prior reservations at a local motel for us so we were able to work well into the night without having to worry about sleeping accommodations. The inevitable human factor of fatigue had been present since our entire trip was performed at night. Working the rest of the day and night certainly didn't help.

Nevertheless, we were busy trying to weave our Hueys into flying machines early the next morning. I got so carried away getting them flyable that I almost forgot where we were and why we were there.

By midday the first helicopter was ready and the Guatemalan Air Force operations officer, myself and the other aircraft commanders made an area orientation ride via helicopter. The active volcanoes and magnificent countryside provided a breath-taking view. Not so breath taking was the area where Hurricane Francelia had hit.

Minus the artillery craters and Viet Cong, it looked like the Republic of Vietnam all over again.

Hungry villagers greeted food-laden Army helicopters

Approximately 80 percent of the bridges were washed away and the majority of the roads could not be traveled by motor vehicles. I estimated that 65 percent of the crops were destroyed or unuseable. Many of the grass hooch-type homes were strewed about the countryside as if somebody had flown over the country and dropped grass roofs at random.

The natives at a village called La Esperanza (meaning hope or being hopeful) told us that some of the villagers either had not eaten or had just barely enough to eat in the last four or five days. The only clothes some had were those they were wearing and they were badly worn and patched.

One Guatemalan cowboy reported seeing groups of live cattle floating downriver toward the ocean. He managed to lasso and pull five cows out of the rushing waters.

Upon return to Guatemala City, I found that two of our birds were ready to fly. They were dispatched immediately. By noon of the following day we were 100 percent operational.

The area was broken down into sectors so that we could systematically cover the entire area. Centers of operation, supply depots and refueling points were located at San Jose and Retalhuleu. A subrefueling point was located at Santa Clara to give us more time on station.

Initially, emphasis was placed on carrying foods such as corn, beans, rice, coffee, salt, sugar and "C" rations to individual homes and isolated villages. As one villager put it, "We were a sight for hungry eyes." A sense of satisfaction and of being able to help my fellow man in time of need was indeed worth every second of flight time.

Damage assessment crews from the Corps of Engineers in the Panama Canal Zone arrived on 17 September and began to assist the Guatemalan government in damage assessment operations from the air and on the ground. Local medical teams were transported to the stricken areas to render medical aid. The need for medical aid and damage assessment was determined by the reports rendered by the helicopter crews during debriefing periods. The Guatemalan Army furnished a trained pathfinder who was familiar with the area. Since only five members of the team could speak Spanish, he was a great help in communicating with the local populace.

In many instances the local villagers were able to direct us to places where relief was badly needed. On one of our first sorties we were met by four naked, hungry children and an elderly gentleman clad in a loincloth. They reluctantly accepted the "C" rations we gave them, but told us they didn't know what to do with the can opener and all the little packages. Since I could speak Spanish, I conducted a class in accordance with TM "C" rations, page 38, from the proper method of opening "C" ration cans to chewing gum. It was necessary to repeat this instruction at almost every stop we made.

Shortly after we arrived, our helicopter armada was reinforced with two other UH-1H helicopters and one UH-19 from the Guatemalan Air Force. This welcomed addition to our little fleet didn't last long, however. Maintenance problems knocked out one UH-1H and the UH-19. The other UH-1H stayed with us until we terminated the mission.

Due to high density altitudes I restricted our aircraft to 2,000 pounds internal load, pilot, copilot, crew chief, pathfinder and one observer per sortie. This restriction seemed reasonable and got the job done nicely.

At the end of each day we left our helicopters at a small airfield located near San Jose and the Guatemalan Air Force furnished a C-47 to ferry us back and forth to Guaemala City. The FAG (FUER ZA Aera de Guatemala), or Guatemalan Air Force, also transported 55-gallon drums of JP-4 to our refueling points.

Everything was going good—we were getting plenty of flight time and the mission was going well. Then, CRASH! FOD took its toll of one Huey.

A hasty examination showed that the first and second stage compressors were badly damaged. How it happened is still a mystery to us. We transported the FOD-stricken bird via U. S. Air Force C-130 to Guatemala City (La Aurora Airport).

Sand and grit from having to hover and fly around the coast, coupled with salt water spray off the ocean, created an urgent need for helicopter hygiene. It was necessary to fly the helicopters back to Guatemala City every other day so the maintenance crew could wash and clean the entire aircraft.

And so it went for 11 days. We hauled 217,475 pounds of cargo, 520 passengers and 14 medevacs in 379 sorties. Our total flying time was 136:25 hours.

To get us back to the States, the U. S. Air Force furnished us two C-124s. We had little difficulty getting the helicopters loaded into the two aircraft except for the extreme ramp angle and the width of the UH-1 ground handling wheels. TM 1-UH-1s gave us some helpful hints that could make things a lot easier. However, we didn't have the ground handling wheel modification kit (FSN 1730-760-3368) that it called for. Locally fabricated ramp extensions provided the answer.

With all four UH-1Hs, equipment and personnel loaded aboard the two C-124s, we left Guatemala with thoughts of friends we had made during our stay.

Attack Helicopter Utilization

Not enough has been done to teach nonrated commanders how to properly use attack helicopters in combat. Thus, choppers too often have been employed when a mission could have been more effectively and efficiently accomplished by other means

Lieutenant Daniel J. Blaney

IT'S ABOUT TIME a good hard look was taken at utilization and employment of attack helicopters. To insure that the proper use is made of these expensive machines, all commanders should ask themselves:

• Am I employing attack helicopters to the maximum degree without overcommitting all available forces?

• Am I assigning attack helicopters to missions rightfully belonging to other support elements such as mechanized infantry, artillery or scout units, both air and ground?

When I do deploy attack helicopters to perform a mission other than escort or direct aerial fire support, have I

• ensured that no other means is available to meet the commitment?

• checked with all sources to find out if a reconnaissance was performed recently and if so, has that intelligence information been made available?

• ensured that combat units are available in case the mission develops into a fight?

There are numerous other questions that require answering but I believe these are sufficient to stir up interest among aviation and ground unit commanders to insure that their subordinates (and especially their operations officers) understand the principles of utilization and employment of attack helicopters. This need has been recognized by all branches of the Army but not met.

There is a general officers aviation course conducted at the U. S. Army Aviation School, Ft. Rucker, Ala., and in some branches, from advanced course level up, classes have been implemented to cover employment of attack helicopters. But not enough has been done to educate the nonrated company grade officers and junior noncommissioned officers on attack helicopter techniques.

Answer this question: Who employs attack helicopters in the role of direct aerial fire support the most? That's right, it's the nonrated junior officers

and enlisted men. Certainly more effective classes for the junior company grade and noncommissioned officer should be established to help ensure that attack helicopters are used in the proper manner. Let's consider a few examples of misuse.

Reconnaissance-by-fire: Can you imagine the staggering number of flight hours misused accomplishing reconnaissance-by-fire missions? I do mean *misused, not overused,* for almost every recon by fire performed by attack helicopters could be performed by a direct support 105 or 155 artillery battery adjusted by a reconnaissance aircraft. Let's look at this from a cost reduction aspect. Which aircraft cost less to fly—an O-1, OH-6A, OH-58A or a fully armed UH-1B/C or AH-1G? What can fire more explosives and effective rounds at a less overall cost —a 105 battery or a light fire team? The 105 is my pick and probably yours.

Another question and probably the "biggie" of them all: Using the above facts just how should you conduct a recon-by-fire to ensure less cost plus best results with less exposure? Right again, most all reconnaissances should be conducted by scout aircraft with supporting artillery thus leaving the attack helicopters to function in their organic roles.

That's the general overall cost reduction picture. Now let's consider the utilization of aircraft. Let's say you do send out your one mission-ready fire team on a recon and a fight develops. That would mean the attack helicopters probably will perform a target attack before disengaging. About 50 percent of the ordnance would be expended and half the fuel load used.

After the disengagement the fire team leader will notify his unit, or whatever unit is on standby, to initiate a combat assault. This would then present the problem of who is to escort the slicks from the landing zone (LZ) to the pickup zone (PZ). Who will perform the LZ prep and hot escort and who will remain on station giving the friendlies air cover and direct fire support, if necessary? Only a prearranged standby fire team could perform the mission. A more pressing question would be who is going to stay on station to determine the direction of enemy movement after the disengagement? If scout aircraft were used in the first place this would not be a problem.

Just to throw a little something into the game—what happens if one of those two mission-ready attack helicopters was crippled or shot down during the engagement? Your unit better be very fast in coordinating or else your decision to employ attack helicopters in a recon role will have caused a target of opportunity to be missed plus unnecessarily exposing a fire team. This should lead to the general rule: If the recon can be performed by a scout unit, ensure that it is performed by that type unit and leave the attack helicopters to perform their primary missions.

Overprotection: Yes, there is such a thing and I'll give two typical examples.

How often have you seen a heavy fire team and two UH-1D/Hs supporting one UH-1 carrying VIPs. That's six aircraft involved in transporting a few VIPs. Certainly, it is necessary to supply our VIPs with enough firepower to silence any enemy contact that they may encounter, but please notice that I used the word *silence,* not *destroy*. Certainly, a light fire team could support this mission as well without overutilizing aircraft and still provide adequate cover.

The same applies to the two UH-1 chaseships. Only one should be utilized. This would allow the aviation unit assigned the mission to distribute its workload in a more reasonable manner, thus maintaining the same level of support but with an increase in overall efficiency.

Target attacks: I'm not going to speak about the attack helicopter's role in providing direct aerial fire support, but rather about the numerous times that these ships have been committed to action as flying infantry helicopters in support of no one but themselves.

You say that's never happened? Then explain this in any other terminology other than the catchall phrase "combat necessity". A report is relayed from an aerial scout ship that a squad of North Vietnamese Army troops has been spotted just outside of artillery range. The troops are heading south along a dike near numerous wooded areas. Most commanders would immediately deploy a fire team with the assumption that it would be capable of handling the situation.

Are they really? What if the enemy either becomes suspicious of reconnaissance aircraft or hears approaching helicopters and withdraws into the tree line? Then, just how useful is the normal armament subsystem and munitions in such a case? Hardly any at all.

Face the facts—if the fire team is outstanding, the tree line is sparse and the enemy stays in one general area, perhaps half of his number will either be killed or wounded (KBA or WBA) by air or artillery. Anyway, by the next day no evidence of the encounter will remain other than a few broken tree limbs and numerous bullet holes.

Now, let's take the same situation but instead of employing the attack helicopters alone we'll deploy enough troops to cut off the main escape routes, then attack the target. By the end of the battle, if all forces are brought together in the proper sequence, all the enemy should either be KWA, WBA or prisoners.

Don't send six helicopters to do the job of three—be they slicks or gunships

Although the above stated situation is simple and the rule most evident, it is in itself the biggest sin committed both for, by and against aviation units. Just think, you old-timer gunship drivers, about the number of times you performed this mission without supporting infantry units? If you don't run out of fingers you were in an above average unit.

Escort: This is truly a sore spot. On numerous occasions I was detailed to cover convoys from Quin Nhon to Bong Son in the Republic of Vietnam. Covering a convoy I didn't mind one bit, for that's one of the missions of both aviation and mechanized units. Some people have the opinion that air cover is the more warranted of the two and that it is used for immediate, explosive and violent response. However, sooner or later the aircraft must run out of fuel or ammunition and then it's up to organic firepower to take over. But, what if provisions were not made to have another fire team available on five-minute alert? What if the unit assigned the mission to provide cover for the convoy has its standby crew go down for maintenance or called out on another mission just before the convoy gets attacked? What if one ship from both of the fire teams gets shot down or suffers a mechanical malfunction during their respective attacks?

These situations are not just dreamed up; they happened to me on numerous occasions and probably many of you have requested just one fire team to provide support and received the immediate reply, "Sorry, no gunships available at this time."

Then you think to yourself, don't those aviators ever fly?—never stopping to realize that the unit you are calling may have truly overcommitted its available forces without having provided for other units to take over some of its missions if necessary.

Too much available firepower: This situation can and does exist. Let's assume that infantry units are to be lifted into prearranged encircling positions. During the initial assault all LZs will be prepped by heavy fire teams. There will be five initial LZs with simultaneous touchdowns planned, plus an additional three sorties for each LZ.

The initial assault goes as planned and then three of the five heavy teams return to rearm and refuel. Then they are placed on standby until the two heavy teams on station need relief. This is a mistake in my estimation, for it is seldom that the fire teams could be employed until after the ground troops have deployed. This takes time which could be used to reorganize the heavy fire teams into six light fire teams. This would maintain the some degree of aerial cover but reduce the overall flight time on the aircraft and pilots. Some of the attack helicopters could even be released to conduct attacks on predetermined targets within the encirclement operation or return to home base. If this attitude was adopted an all around increase in direct fire support capability, with a definite decrease in total flight time per ship and turn-around time, would be felt.

Although many misuses of attack helicopters are evident, there is no other field of Army aviation that performs assigned tasks in a more professional or outstanding manner. But, there is always room for improvement. Commanders must take the time to reevaluate their mission assignments. By reading FM-1-100 and FM-1-40 they can obtain definite information, data and priorities on employment, maintenance and developments in the attack helicopter field.

HURRICANE CAMILLE. .

I Had Seen What An *Ordinary* Hurricane Can Do

ALL DAY SUNDAY, 17 August 1969, I followed the path of Hurricane Camille as it moved steadily northward in the Gulf of Mexico toward Mississippi and Louisiana. I had seen what an ordinary hurricane can do and this one was particularly vicious. I was worried about the destruction it would cause and was concerned for the people living in its path. Silently I thanked heaven that my family and I were hundreds of miles away and that I was not personally involved.

But my thankfulness was short-lived. Late that afternoon my telephone rang and I was no longer just a sympathetic bystander. The duty officer at Ft. Hood, Tex., was calling with a mission for me. The U.S. Army engineers at New Orleans were going to need helicopters to assist in the cleanup and rebuilding operation after Camille had passed and I had been appointed officer in charge.

The Army aviation support mission was divided among the 1st Armored Division, 2nd Armored Division and the 55th Aviation Battalion. Each was to supply one aircraft and crews.

Besides myself, the crew members were CPT Richard Bares, CW2 Paul S. Fitch, CW2 Richard Weiss, CW2 John D. Reed, CW2 Robert Chison, CW2 James Daugharty, CW2 Peter T. Hollman, CW2 Charles R. Normand, CW2 Robert L. Cowell, SP6 Kenneth N. Testa, SP5 Michael S. Jaworski, SP5 Mitchell Morrow, SP5 Mike A. Pinkalla and SP5 Johnny Cash.

All pilots and crew members were alerted at approximately 2100 hours. This was about the same time Camille was sweeping inland, leaving a wake of destruction.

At a late night planning session it was decided to take off at 0600 the following morning. We were worried about the weather at our destination because following a hurricane the weather can be very nasty for several days. However, Camille's eye had passed inland at Waveland, Miss., east of New Orleans. Even though Camille was a very intense hurricane it did not spread out over a wide area as some do. Consequently, we felt that by the time we reached New Orleans the weather would be clear.

After a 4½-hour flight and two refueling stops, two of our UH-1s arrived at Collander Field Naval Air Station, La. The third helicopter had minor mechanical trouble and arrived 2 hours later.

As soon as I set down I contacted MAJ Steve West, deputy engineer of the New Orleans District. We had just finished a cup of coffee when he arrived with a fist full of sorties for us to fly.

At a short briefing session MAJ West explained the situation. In the 4th Army area the hurricane had hit Plaquemines, St. Bernard, Washington, St. Tammany and a portion of Lafourche parishes (counties are called parishes in Louisiana). He said that a large portion of the land in this area is at about sea level or even below and that water in the Mississippi River and the numerous bayous are contained by levees. The levees are designed to withstand hurricanes and he felt that for the most part they had held. Sometimes

4th Army Operations

Major Jimmie S. Ford

there are two levees—one in front along the body of water and a back levee designed to keep out water from the low land behind the built-up area.

Unfortunately, when there is as much rain as accompanied this hurricane water builds up between the levees. The only way to get it out quickly is by pumping.

MAJ West felt that surface transportation would be quickly restored where it had been knocked out. Being a marshy section of the country, many roads have extremely high roadbeds that keep them above flood waters. Also, the strong, high levees next to the rivers and bayous can be used for roads in emergencies. He further explained that in the affected area most of the inhabitants have boats and pirogues [canoe-shaped boats]. He was sure these would be quickly pressed into service where road transportation was impossible.

We would not be the only aircraft flying in the area. Coast Guard aircraft would fly survival and rescue missions over the large bodies of water, extending 40 miles into the gulf. The Coast Guard had 14 aircraft available and also would use two 210-foot cutters in the Southwest Pass area.

National Aeronautics and Space Administration aircraft would photograph the disaster area and make detailed mosaics for both immediate and future use. Emergency rations of food and water were to be flown in by the U.S. Air Force.

It did not seem that we would need to fly rescue missions for the civilian population. The coastal region of Louisiana has a long history of hurricanes and the people have learned to get out of their way. Most vividly recall Hurricane Betsy's recent sweep through this very same area and the extensive damage she inflicted.

In some areas—especially the hard hit Plaquemines Parish—the evacuation prior to the hurricane was almost complete. The Red Cross estimated that nearly 42,000 persons were being sheltered, 10,000 of these were from Plaquemines alone.

Our first sorties were flown down the Mississippi River to look for damage to the levees and places where leaks must be plugged. We paid particular attention to the area between Port Sulphur and Venice, La. Then we spread out over the entire area of Plaquemines and St. Bernard parishes. After this we flew northward to check Washington and St. Tammany parishes.

The reconnaisance convinced us that Plaquemines was by far the hardest hit and would require considerable aid. The parish had suffered from heavy rains and extremely high winds and tides. To add to the problem there was an electric power failure over the entire parish affecting sanitation facilities, water supplies and hospital needs.

Flooding was the main cause of damage in St. Bernard Parish. Washington and St. Tammany were mostly affected by the high winds and their biggest problem was the litter that seemed to be everywhere.

In our flights over the lower reaches of the Mississippi River we spotted nine seagoing ships grounded near the Head of Passes.

After heavy rains accompanying Camille had flooded the low lands south of New Orleans (left and center), helicopters provided the best way to reach victims in the area (right)

Aerial surveys conducted with Army helicopters provided Army engineers with the information required to conduct the massive rebuilding operation needed in the wake of Hurricane Camille

We also noted 65 crewboats, barges and tugs lying completely out of the water and on top of, or on the slopes of, the west bank Mississippi River levee just above Fort Jackson. An additional 15 pieces of floating equipment were beached on the riverbanks and on the foreshore protection levee below New Orleans. Five sunken barges were noted along the riverbanks.

As a result of these and other surveys, the engineers were able to make their plans. The key to the operation was to dry up the area so that it would be possible to clear out the debris, restore telephone communication, get electric power operating again and take other necessary rebuilding steps.

There were some stationary pumps in the area but most were out of action; emergency pumps had to be brought in from New Orleans and St. Louis, Mo. Two huge hydraulic dredges that were working near New Orleans were pressed into service. They proceeded full speed down the Barataria Bay waterway after our reconnaissance ensured that this route was clear. The dredges arrived Friday morning (22 August) and began pumping over the back levee in the Empire and Buras area.

One barge had a 20-inch suction line and was capable of pumping 1,200,000 gallons of water an hour, while the other had a 24-inch line and could pump 1,800,000 gallons an hour.

In addition to these dredges, eight 11-inch emergency pumps and one 16-inch pump from St. Louis were ordered into the area. In Plaquemines, a 12-inch pump already was in operation. In all, they pumped out more than 5.5 million gallons of water per hour.

When the area around Empire (the upstream limit of the flooding) was dried out, pumps were moved south to remove flood waters from areas with lower elevations.

Besides the Corps of Engineers, Army aircraft also were flown for the Department of Health, Education and Welfare; the Office of Emergency Planning; the Small Business Administration; local and national civilian authorities; and the Red Cross.

Two flights were made to Baton Rouge so engineers could confer with the governor of the state and one flight was made to Gulfport, Miss., with a load of medical supplies.

For the most part we had no weight problem; the cargos were well within our limits. At one time, however, a 2,500-pound reduction gear had to be airlifted to a pumping plant in Venice. A CH-47 helicopter working out of Gulfport flew the special mission for us.

During the first week we flew all three of our Hueys from about 0800 to 1800 each day. The second and third week, however, we were able to get by with only two aircraft. Two of our UH-1s returned to Ft. Hood on 11 September, with the third continuing to fly the mission until 27 September. Our flying time for the entire mission was 222.1 hours.

We had no fuel problems since we were based at Collander Field. However, there would have been a problem if we had needed to fly rescue missions in areas as far away as Plaquemine.

A minor problem was encountered communicating with the units we were supporting. They did not have radios that would net with ours. Faster coordination of additional missions could have been accomplished had a good radio system been available.

Also, it is strongly recommended that an air liaison officer who can coordinate with other units working in the area be available to act as advisor to the supported unit. This would eliminate duplicate missions and result in better use of the aircraft. If the liaison officer has radios, it also would eliminate the communication problem.

Crews going to a disaster area should be prepared to stay for an extended period of time. In our case we did not think we would be in New Orleans as long as we were, so we did not bring sufficient clothes and other supplies. But we didn't find time to visit the French Quarter anyway.

VIRGINIA DISASTER RELIEF

Major D. T. Irby Jr.

HURRICANE Camille, after slashing through the south central United States last year, existed with a flood-producing downpour across the state of Virginia. Rivers and streams swelled to many times their normal size and, along with a sea of mud and rock, slammed into whole towns and villages. Where a quiet village had stood undisturbed since Lee's Army straggled through on its way to Appomattox and destiny, there was now nothing but engorged mountain streams and the scattered rubble of homes, churches, schools and stores.

It was in this area that Army aviators flew more than 800 missions of mercy in helicopters from Ft. Eustis, Va. They found that despite certain unique aspects of the overall mission the flight requirements and operational procedures were not difficult, nor beyond equipment capabilities.

The nature of the rescue and resupply mission in Virginia was such that the Army aviator was able to apply his training—it was just packaged a little differently than most assignments he normally receives.

The operation required the pooling of a large number of the aviation and support elements available to the First U. S. Army and the Continental Army Command student training program. Although initially pooled, the assets were subsequently deployed in small units to adequately support the many disaster stricken communities in Rockbridge and Nelson counties, Virginia.

This deployment principal was familiar to the Army aviator because, except for major lift efforts in the Republic of Vietnam, he frequently operates in small unit type operations of 5 to 10 aircraft.

Effective deployment of the aircraft presented problems and considerations which had to be faced by the major command, the unit commander and the aircraft commanders.

The major commander (Army) had to deploy his assets in a man-

During the operation Army aviators flew more than 800 mercy flights. They found that despite certain unique aspects of the mission the flight requirements and operational procedures were not difficult nor beyond equipment capabilities

PATH OF HURRICANE CAMILLE

ner that would accomplish the disaster relief mission and still allow him to meet his other requirements. Coordination had to be effected at the highest level of command and with the state government to establish a base of operations for the relief support requirement. The operations base was needed to coordinate the efforts of the entire relief support role, inform the civilian leaders of the capabilities of equipment available to the state's relief effort, serve as a collection point for data and coordinate with the Red Cross, Salvation Army, state police and other state and federal government agencies. Fuel and maintenance support for equipment, plus food and quarters for the aircraft crews, had to be coordinated with the Army area installations and state agencies. The major command also had the responsibility of accepting the initial support request, arranging funding, determining the extent of the support to be offered and assigning the mission to an Army installation.

The unit commander had to make certain basic plans. He decided upon the aircraft to be used, then prepared all the support requirements. He had aircraft records checked to determine when scheduled maintenance inspections were due and, if necessary, had them performed early. Sufficient lubricants, aircraft log forms and other support items were readied for the mission with care being taken not to oversupply and thus burden the effort.

The unit commander also determined that the aircraft were to be flown by maintenance personnel (assistant maintenance officer and other officers with maintenance experience) and assisted by a crew chief and technical inspector. Each aircraft was equipped with a set of cargo straps and current state road maps were supplied by the Virginia state police.

Individual aircraft commanders —in addition to normal aircraft preparation and inspection—conducted a thorough map reconnaissance of the area to be supported.

(In the case of the mission discussed in this article, prior study of the area maps by all the aviators resulted in immediate response to many mission assignments.)

Once the mission order was received and the preliminary coordination was achieved, Army aviation personnel from Ft. Eustis quickly went to work. Their area of operations included a 30-mile stretch along the James River, south to Glasgow, Va., and along the North River past Vesuvius, 20 miles north of Buena Vista, Va.

Buena Vista became the focal point of the Ft. Eustis support effort. The Lexington, Va., airport (5 miles west of Buena Vista) was designated as the logistics support base and included a refueling capability from 5,000-gallon tankers supplied by Ft. Lee, Va. It also served as the base for an Army T-41B aircraft which made shuttle runs to Ft. Eustis. The UH-1s were parked at the Buena Vista airfield overnight and security was provided by the Virginia state police and the Rockbridge sheriff's department.

Soon after operations began the first problem developed. The mission was staffed for flight support only and a dire need for a ground operations officer became evident. Someone who knew the operating characteristics and limitations of the equipment was needed to ensure a more rapid turn-around of aircraft and thus take maximum advantage of the military support. The problem was alleviated somewhat by thoroughly briefing one of the sheriff's deputies on the general capabilities of the aircraft and assigning him as the central collection agency for all missions. With his knowledge of the county, i.e., terrain, roads, homes, names of local inhabitants, access to a communications net and an understanding of the general overall requirements of the area, he proved to be a valuable asset. As mission requests came in he was able to efficiently separate those that could be handled by wheeled vehicles from those that required an aircraft. His knowledge of the location of homes and people enabled the unit to combine several missions on each flight.

Because roads were washed out and rivers had changed channels it was necessary to place local civilians aboard the aircraft to act as guides. They were a great aid to navigation and also helped influence certain families to forget pride and accept food and clothing.

After the immediate problems of resupply and rescue were solved, and as the flood waters receded, efforts were directed toward preventing an epidemic and searching for the missing. There were many miles of river and swamp to be searched and at first the task seemed monumental. But, after a conference with the pilots it was decided to use a method that had been successfully employed in Vietnam to find Charlie: long range reconnaissance patrols.

Then squads of 10 men—each

led by a local official—were inserted into an assigned area, then picked up at prescribed points and reinserted elsewhere. With this method large areas were effectively and rapidly searched.

During insertion and recovery of these squads another hazard was noticed. Telephone wires and power lines had been carried away by the floods and now were stretched across trees and through fields. It became a fulltime job for one of the crew members to look for wires during low level flights.

As the operation drew to a conclusion there were several points which stood out as lessons learned:

• There should be some program to provide selected civilian authorities with the knowledge and training to effectively use Army aviation support. Perhaps selected state police officials could attend Army sponsored seminars, or the Army could prepare an information packet for issue to all civilian disaster relief agencies. Misconceptions concerning helicopter capabilities caused some amount of confusion when selecting missions to be flown.

• The opposite side of that same coin would be for the Army to assign disaster relief officers and train them in the operation and structure of state and federal government disaster relief agencies. Perhaps one officer at each post could be assigned this duty.

• Ensure that the disaster relief officer is either aviation oriented (preferably rated) or has someone on his staff who is if a major portion of the relief effort is to be supplied by Army aviation.

• For the aviation element itself one officer and one NCO, in addition to flight crew requirements, should be taken along to serve as a ground liaison or operations officer.

• One additional helicopter should be assigned to provide support for governors, federal government agents and various VIPs who must be flown on damage assessment and other administrative flights.

• Some study should be given to providing a method for entering into a communications net with other supporting agencies. The state police, the sheriff's department and other state and federal agencies were not able to communicate directly with Army aircraft because of their inability to match radio frequencies. This lack of communication was a handicap.

• Plan to use local civilians as guides and be aware of terrain changes as a result of the natural disaster; i.e., river bed changes, landslides over roads, dislocated wires and transplanted buildings and structures.

• Frequent landings in unfamiliar areas can tax an aviator's abilities. Landing on pinnacles above fast moving water can be more treacherous than one might suspect. Approaches to tight, confined areas on mountain tops and mountain sides at high gross weight can be extremely hazardous.

• All personnel should continually strive to effect close coordination with state and local officials and maintain an attitude of compassion and understanding for the needs of the disaster victims.

That the operation in Virginia was successful is attested to by the many letters, both official and private, that were received by the members of the relief detachment. It was another chapter in the long chronicle of U. S. Army assistance to the needs of people in distress.

Many civilians were evacuated by Army helicopters

Dear Danny: I'm assigned to a UH-1H outfit and doing quite a bit of cargo hauling. In using the TM on range, fuel, etc., I can't obtain certain information. On a flight at 2,000 feet at a load of 9,000 pounds and at an IAS of 70 knots (which I find most comfortable), what will my range and fuel flow be? How did you figure it out?

CW2 J. A. L.

Danny's answer: I'll need one more bit of information and that is your outside air temperature at that altitude. From your location as stated in your letter and the time of the year you wrote, I'm assuming your average temperature is 32° C. Your range will be 177 nautical miles with a 30-minute reserve and your fuel flow will be 470 pounds per hour. How I did it will remain a secret for the time being. Just keep on watching the column. The magic method of solving these problems will be explained and displayed within the next few months. By the way, the torque required to get that air speed is 22 psi.

★ ★ ★

Dear Charlie: In the CL of the CH-54A there is no ground inverter check during the runup procedure. How come?

LT T. W. B.

Charlie's answer: Change 5 to the 217 CL and change 4 to the 217-10 will include this ground inverter check. This was an oversight on our part.

★ ★ ★

Dear Charlie: The CH-54A CL requires that the APP will be started with both generators and transformer rectifiers on. Is this necessary?

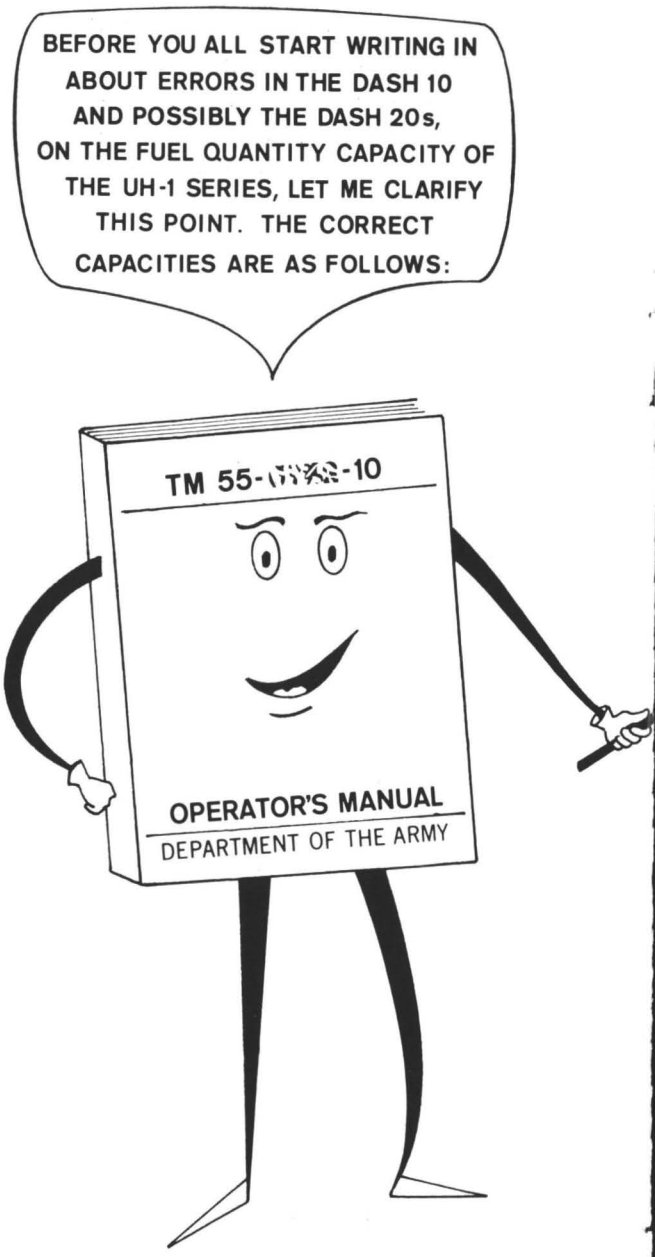
CPT I. M. T.

Charlie's answer: We have some real sharp people checking these CLs and dash 10s. You caught an error—both generators and transformer rectifiers should be OFF on starting the APP. This new procedure will be in change 4 to the 217-CL and change 5 to the 217-10. Thanks for catching this, captain, and keep up the good work.

★ ★ ★

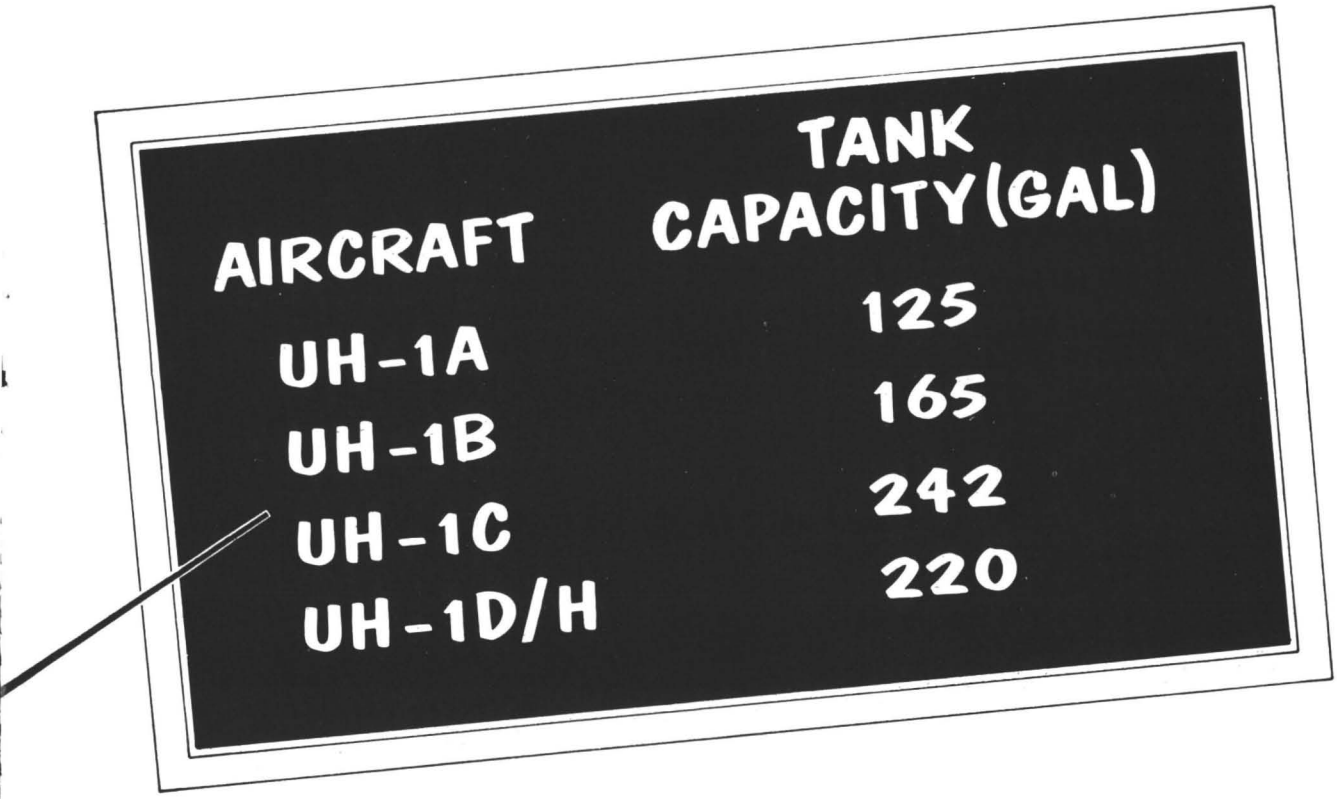
Dear Danny: When starting a CH-47B helicopter do you start No. 1 engine with the crossfeed open and the left boost pumps on, or do you start it like the CH-47A? Our unit does it both ways and we would like to standardize the procedure.

CW2 C. L. B.



Danny's answer: The procedure outlined in chapter 3 of TM 55-1520-227-10 is correct. The left main tank fuel booster pump switches are turned "ON" and the crossfeed switch moved to "OPEN" prior to starting No. 1 engine to purge the fuel crossfeed line of trapped air.

Charlie and Danny's



AIRCRAFT	TANK CAPACITY (GAL)
UH-1A	125
UH-1B	165
UH-1C	242
UH-1D/H	220

Write-In

Dear Danny: I need to know if we can fly the CH-47 in icing conditions. As an instrument examiner I am continually asked that question.

CW4 R. J. F.

Danny's answer: Paragraph 3-5c, AR 95-1 says in part, "If flight is to be made into known or forecast light or moderate icing conditions, the aircraft must be equipped with adequate deicing and/or anti-icing equipment." Chapter 10 of the CH-47 operator's manual states, "The helicopter is equipped with adequate engine anti-icing, pitot tube and SAS yaw port heating and windshield anti-icing systems to enable safe flight in *light* icing conditions." A publication written by the Directorate of Test Flight Operations, Air Force Systems Command in October 1965 titled "Adverse Weather Tests of the CH-47A Helicopter (ASD-TR-65-11)" summarizes a 1964-1965 test by saying that the CH-47A can be safely flown in light icing for extended periods. The subject was discussed at the last CH-47 operator's manual conference and it was agreed that flight into light icing conditions is authorized and safe if the anti-icing equipment is functioning and is turned on prior to encountering icing.

Crash Resistant Fuel System

Controlled tests (below) have shown that aircraft equipped with the new crash resistant fuel system can take substantial punishment with little chance of fire. Flexible fuel lines and the stronger puncture resistant fuel tanks help make this possible

Captain William T. Koehler

UH-1D and H model helicopters are now coming off the assembly lines equipped with a new Army developed crash resistant fuel system. The system also is approved for use in the AH-1G and the UH-1B and C model helicopters and by 1975 *all* selected Army aircraft are expected to be converted to the new system.

In FY 1967, 1968 and 1969 there were 424 aircraft accidents with postcrash fires. Of these 268 were potentially survivable. There were 123 fatalities due to burns and an additional 204 burn injuries. Approximately $106 million in materiel losses occurred from these fires.

Army safety experts are confident that the new fuel system will greatly reduce the number of deaths due to postcrash fires. In addition, materiel savings should ultimately amount to millions of dollars.

Initially, the Goodyear Tire and Rubber Company and the Dynamic Sciences Division of Marshall Industries, Phoenix, Ariz., were granted $2 million by the Army for research and development of the concept. The contract was monitored by the U. S. Army Aviation Materiel Laboratories (AVLABS) at Ft. Eustis, Va.

Investigations of crashes had shown that almost all fires are caused by ruptured fuel cells and fuel lines. The main failures are fitting pull-outs, seam failures, punctures, tears and sheared fuel lines.

To closely define these problems the civilian contractors staged a

MG Allen M. Burdett Jr., Director of Army Aviation, inspects a new crash resistant fuel cell as Bell Helicopter President E. J. Ducayet (left) and Project Engineer E. D. Jergens describe its operation

series of helicopter crashes at Phoenix. It was found that the greatest pressure and stress on the fuel cell was in a forward and sideward direction. This caused the fuel cell to rupture at the corners. Fuel line failures usually were caused by the dislocation of one bulkhead in relation to another.

During the staged crashes fitting pull-outs occurred repeatedly. It was common to find a fitting completely torn out of a fuel cell; but still attached by bolts to the aircraft skin.

With this information in mind, the development of a tougher, more crashworthy fuel system was initiated. In this development program tanks of increasing strength were subjected to crashes until, after many tests, a tank construction was found which had the ability to resist bursting upon impact, resist puncture by blunt objects and, if pierced by sharp objects, the tearing would be negligible.

Controlled physical tests were performed on the new cell before it was finally approved. One of the many severe tests included a 65-foot freefall drop of an aircraft configured cell filled with water.

Another test was for tearing. A sample of the material used in the cell was placed in an Instrom tensile test machine to measure its strength against tearing. It required 400 foot pounds to completely separate the material.

A bonus advantage that comes with the new fuel cell is that its increased self-sealing ability offers greater protection against enemy gunfire. The tanks previously had a .30 caliber hole-sealing capability. The new fuel cells seal holes produced by both .30 and .50 caliber machine gun slugs.

The new tanks with the breakaway fittings and flexible tubes increase the weight in the UH-1D/H by 160 pounds and reduce flight time from 6 to 7 minutes.

While the fuel cell construction was being developed, the fitting pull-out problem was being studied. A normal fuel cell fitting consists of a metal insert and two flanges molded as a unit. The fuel cell material is built into the flanges. This method of attachment is made to withstand 190 pounds per inch of circumference when pulled in tension. A new fitting attachment of increased strength was developed to withstand 1,500 pounds per inch of circumference when pulled in tension.

The system also includes flexible fuel lines instead of rigid lines. This will permit a degree of movement between system components under crash conditions.

Breakaway (self-sealing) valves are also included in the system. They are installed at strategic locations to permit complete separation of component parts without loss of fuel.

Drain valves contain guards to prevent them from opening due to crash loads. The fuel filter is relocated on the cabin bulkhead. The basic airframe requires some minor modification at the points where the system is attached. A new filler cap and adapter also is required. The new cap and adapter allows the cell to separate, self-seal and move freely in relation to the aircraft upon impact.

The new system is being service evaluated by the U. S. Army Aviation Test Board at Ft. Rucker, Ala. This is an operational test to detect any problems that may develop within the new system. The test board received its helicopter with the new system installed last October and completed over 800 hours of flight test without any significant problems.

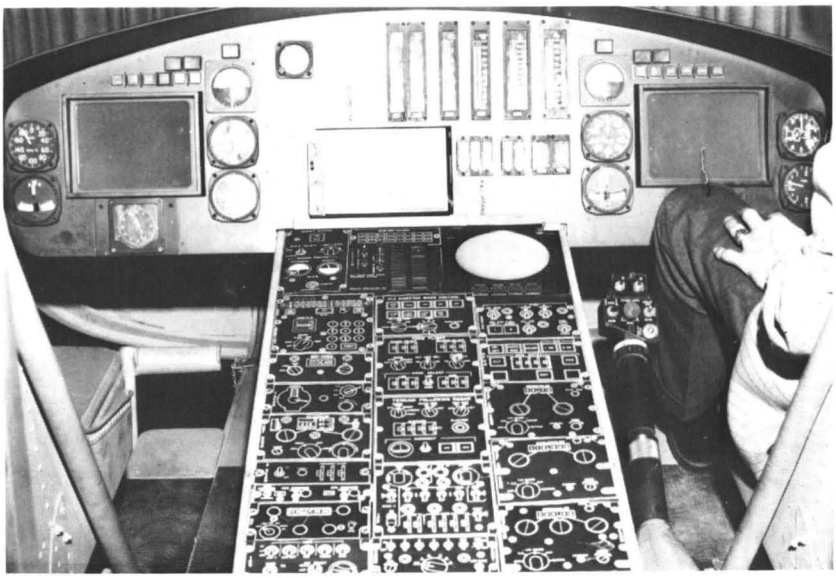
Aircraft deliveries with the new crashworthy fuel system began in April 1970 with UH-1H 69-15292. All subsequent UH-1Hs delivered to the U. S. Army will be equipped with the new crash resistant system.

UTTAS Mockup

A MOCKUP COCKPIT display of the proposed Utility Tactical Transport Aircraft Systems (UTTAS) was recently demonstrated by a team from the U. S. Army Electronics Command (USAECOM), Ft. Monmouth, N. J., to Combat Developments Command personnel at Ft. Rucker, Ala.

The mockup, looking somewhat like a UH-1 cockpit, featured realistic panel lighting, movable flight controls and audio-visual displays.

Built by Litton Industries for USAECOM, the mockup is the result of an analytical study and will lead to the development of the UTTAS cockpit. Mockup instrumentation consists of vertical scale instruments, a headup display shared by both pilot and copilot, an audio-visual warning panel, combined engine and rotor rpm display and individual engine and total torque displays.



Above, a closeup of the UTTAS mockup instrument panel. Below, Mr. Bud Dworzak, Army Electronics Command engineer, demonstrates the mockup on a visit to Ft. Rucker, Ala.

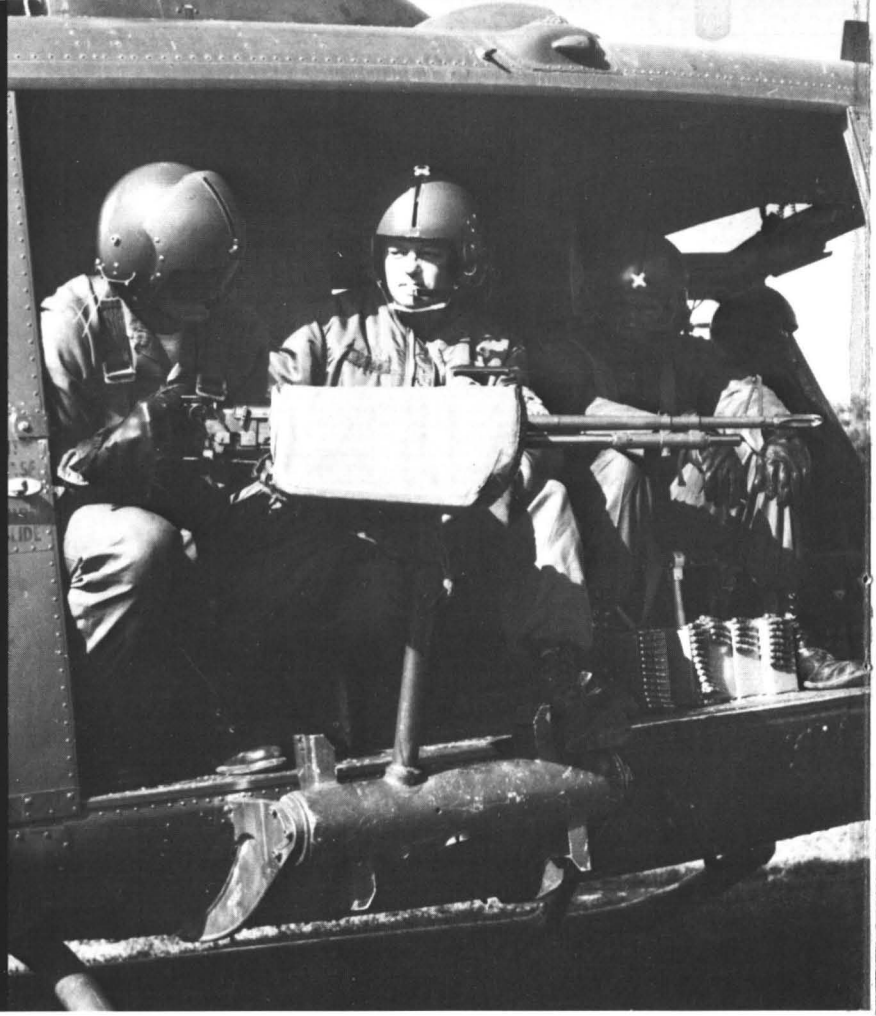
Two vertical situation displays which utilize cathode ray tubes (much like a television screen) present flight information to the pilots in a consolidated form, eliminating the necessity of scanning various instruments. The reduced scanning would be made possible by a central digital computer aboard the aircraft which consolidates information from various flight instruments. The system, when used in other modes, could provide terrain avoidance information, IFR approach data and IFR formation flight information. The terrain avoidance mode would be coupled to forward-looking radar and would allow nap-of-the-earth flight during instrument conditions.

While it is not anticipated that all of the equipment mentioned above will be used in early UTTAS models, Army engineers have made provisions for it all in the mockup. This gives the Army an opportunity to try various configurations of the latest equipment.

HERE'S PROOF

The U. S. Army Aviation School at Ft. Rucker, Ala., has a new electronic scoring device to determine the effectiveness of its door gunner training program

Captain John W. Rockom



THE DOOR GUNNER Training Branch, Aviation Armament Division of the Department of Tactics has been extolling the excellence of the helicopter door gunners produced at the U. S. Army Aviation School, Ft. Rucker, Ala. Now this can be proven, thanks to private industry which has developed a new scoring device being used while training helicopter door gunners.

The Del Mar scoring device from Del Mar Engineering Laboratories Inc., Los Angeles, Calif., employs an acoustical method of registering target hits within a predetermined radius. This is accomplished with a device similar to a microphone installed in the target area.

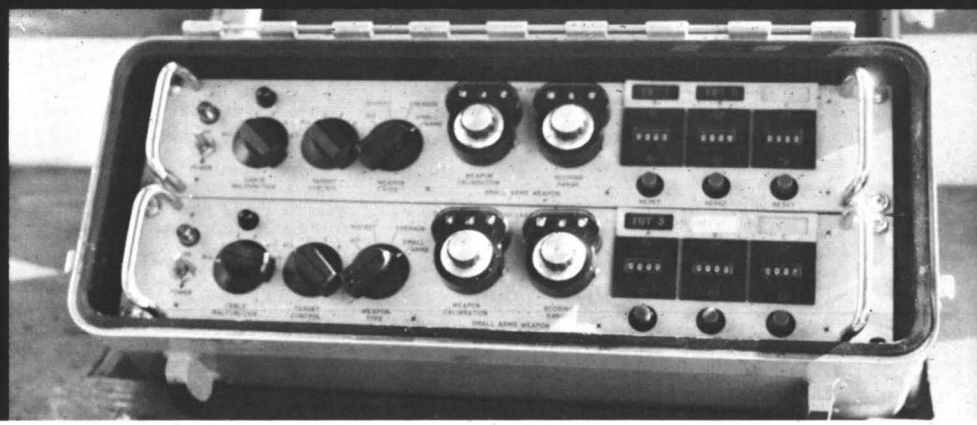
As a projectile passes through the target area, accompanying shock waves are sensed and transmitted through underground cables to a signal conditioning unit. Target hits are read out on a master control panel which is capable of recording up to 6,000 shots per minute. By altering control settings on the master panel, the operator can electronically vary the size of the scoring zone by increasing or decreasing the sensitivity of the microphone, and thereby its "hearing" radius.

On the aerial range student door gunners fire the M-23 weapons subsystem composed of an M-60D machine gun mounted on each door of the UH-1D helicopter. Since the M-60 was designed as an area fire type weapon, a scoring radius of 10 meters was established with a Vietnamese hootch-type target located in the center of the scoring zone. This zone can best be described as an imaginary dome, bisected in the middle. Projectiles impacting in front of the microphone will not register even though they richochet through the scoring zone. The velocity of a ricochet is considerably slower than normal, and the device measures velocity; therefore, it will not be sensed.

Before the installation of this system, scoring was accomplished by the instructor's visual approximation. This technique was considered adequate but the degree of unreliability was not known. The new device quickly established that this method was almost totally unreliable.

The ballistic characteristics of a round fired from a moving aircraft makes visual approximation of the bullet strike inaccurate and subject to a number of variables. The use of the acoustic scoring sys-

Left: the seating arrangement for training students with the Del Mar device. At left is the student door gunner; the instructor is in the center; and, the observer at the right. The weapon is an M-60D machine gun which is fired at the transducer's electronic cone from 300 to 800 meters. A student fires 100 rounds at the transducer cone and the penetrations are determined by the transducer and relayed through an underground cable to the control box for the number of penetrations out of 100. By totaling the penetrations for all of the individual student's firing runs, a grade is determined



Lower right: electronic Del Mar scoring device control panel which counts the number of rounds penetrating the electronic cone made by the transducer. It can score six separate transducers and give a readout for each. The transducer (upper right) is wired to the control panel. It makes a 10 meter cone of fire and scores the number of rounds penetrating this cone. It scores the rounds by velocity and will not score ricochets

tem has eliminated all the guesswork. Trying to estimate scores forced the instructor to devote all of his attention to the target area throughout each of the 100-round firing exercises. Using the new device, the instructor in the aircraft is able to concentrate his attention on instructional procedures and safety. This has resulted in a substantial upgrading of student training.

Accurate records have been maintained since the device was introduced and their utility in other areas has been significant. The number of hits by each student on each target is recorded on every training day. Other factors, such as sky condition, wind and turbulence are noted. Additionally, the type of ammunition, whether solid tracer or the standard four-and-one, is indicated. This information is used to determine a "K" factor on which the scoring table is completed. Based on these records, it became necessary to establish two separate scoring curves: one for solid tracer and the other for four-and-one tracer. It was found that the average scores obtained using solid tracer were nearly twice as high as those from four-and-one ammunition. Other variables, such as turbulence, wind and sky condition, were found to have only slight significance and, therefore, little effort was required to adjust scores for these conditions.

By continuous evaluation of these records, instructor effectiveness and student progress can be monitored through a comparison of scores from consecutive training days with those of qualification day. The system has become an effective quality control device—the manifestations of which have been used to significantly improve the quality of instruction.

The electronic scoring device has modernized the door gunner training program and brought a new look to instructor evaluation and student progress. Its use eliminates the possibility of human error in judgment and guarantees the student an exact numerical indication of his proficiency.

The ramifications of this device are only partially realized. In the short period in which it has been in use, it has established the superiority of solid tracer ammunition as a training device It has measured the effect of atmospheric conditions on aerial gunnery and has provided a basis for upgrading student training.

army a

IN IRAN

IN ECU

over the years army aviation has

IN 1956 TWO civilian airliners collided over the Grand Canyon and fell into "the hole" at an almost inaccessible spot near the intersection of the Colorado and Little Colorado rivers. One hundred and twenty-six people were killed. Under dangerous wind conditions, Army helicopters transported Civil Aeronautics Administration (CAA) investigators to the wreckage and evacuated the bodies of the victims. The exact cause of the crash might never have been determined if the CAA officials had not been able to reach the crash site.

The annals of Army aviation are full of similar examples of support, disaster relief and rescue operations, both at home and abroad. Whether an act of God, such as a hurricane, when Army aviation provided needed food, medicines and relief personnel; or a man-made disaster, as above, Army aviation has been there.

One of the earliest uses of Army aircraft in support of civilian agencies occurred during a volcanic eruption in Hawaii in 1955. Army aircraft were used to make a damage survey and to transport relief personnel.

Army aircraft flew in support of rescue operations during a tidal wave in Hawaii in the spring of 1957. The aircraft were used in making a rapid survey of the stricken areas for damage assessment and emergency relief.

Following Hurricane Audrey in 1957 in the vicinity of Cameron and Lake Charles, La., Army aircraft were used in support of the rescue operation. The aircraft evacuated injured persons from the swamp and bayou country and brought food and other emergency supplies.

Also in 1957 Army aircraft flew into the jungles of Ecuador to look for missionaries reportedly killed by Auca Indians. The crew members of one of the Army helicopters found the bodies and buried them. Identification papers and personal possessions found on the bodies were brought back to the States.

In 1961 Army helicopters helped the Chilian government map the Island of Tierra Del Fuego. During the operation one Army helicopter crashed in a mountain region. No one was se-

viation -- to the rescue

ADOR

IN THE GRAND CANYON

IN PANAMA

assisted many people in many ways

riously hurt but a Chilian passenger went into shock. After a considerable amount of time and much effort, another Army aircraft made the rescue.

Also in 1961 Army aircraft battled some of the world's worst weather conditions, as well as what is considered some of the most rugged terrain, to help in the construction of military and police installations in Iran. The engineers in charge of the operation afterwards said that the aircraft were as much an engineering tool as a bulldozer, a power shovel or a dump truck.

Early in 1963 Army aircraft participated in one of the largest mapmaking projects ever undertaken. The mission was to support the Columbia project of the Inter-American Geodetic Survey. The area mapped was the 66,000 square miles of the Ilamos Orientales in Columbia, South America. This project took more than 2 years to complete.

In late 1963 Army aviation won the hearts of the people in the Lombardy region of Italy by helping them rebuild a shrine on Mount Gugelmo. The shrine had been originally built at the turn of the century but had been destroyed by high winds. Army helicopters brought in building materials and other supplies needed in the reconstruction. Surface transport of these materials up the mountain side was an almost impossible task.

Imbedded in the concrete facade of the monument is the message: "All Brescian people on this inaugural day, gratefully remember the generous and essential contribution given by the U. S. Southern European Task Force to the rebuilding of this monument, which shall ever testify and betoken peace and friendship among nations."

In Panama, to complete a certain map sheet at least two more survey points had to be located. These needed to be in the vicinity of an isolated Indian village in the Darein Province. To get permission to go into the area the pilots had to negotiate with the village chief. In the end the aviators gave the village people 5 gallons of kerosene, several hats and neckties, some .22 caliber ammunition, $100 in cash, some cloth

IN COLUMBIA

IN ITALY

and food supplies and had to pay a landing fee every time they landed their helicopter.

In February 1963 Army aircraft helped map the 660 square mile Okefenokee swamp in southern Georgia. This almost impregnable swamp had never been mapped before. Until Army helicopters became available the only means of travel within the swamp was by boat. Foot travel was possible only under the most arduous conditions.

In mid 1963 Army aircraft responded to a request for aid from Italian officials in the Bellerno area. A tidal wave caused by the side of a mountain falling into the towering Vaiont Dam reservoir had flooded the village of Longarone, which had a population of 4,500. Five CH-34s of the 110th Aviation Company were used in the rescue operation. More than 1,000 people were evacuated from isolated hilltops and river villages. The extent of the involvement was so great and so well done that it was praised in Congress and made part of the Congressional Record of October 28, 1963.

In 1968 Army CH-34s from Libby Army Airfield were called upon to move a 51-foot light tower from atop a mountain near Wilcos, Ariz. The tower had been placed there in 1920 to guide the fledgling airlines of that time. When first built it took many months of back-breaking work to get the tower up the mountain. To get it back down would have taken an equal amount of time and work. The Army helicopter did it in only minutes.

In 1968 Hurricane Beulah struck the Texas and Mexican coasts at Brownsville, about 135 miles southwest of Corpus Christi, Tex. Overland traffic was brought to a standstill. The Rio Grande River flooded the countryside. Thousands of Americans and Mexicans were made homeless.

From Corpus Christi, the Army's Aeronautical Depot Maintenance Center (ARADMAC), eleven UH-1Ds and four CH-47s were flown into the area to help the victims. Before it was over the Army had logged over 847 hours of flying time, airlifted 4,508 passengers to safety and carried 242.1 tons of relief cargo.

One of the more amusing missions assigned Army aviation happened in the Washington, D. C., area in 1969. A student was unhappy about something. His solution to the problem was to take off all his clothes and climb a nearby radio tower. This interfered with the operation of the radio station. To get him down the Army flew a Huey to the tower. There is no report of what happened to the student after the pilots got him into the helicopter, although it is hinted that a visit to a clothing store was the next mission.

This is only a partial list of the many missions Army aviation has done for the civilian population. Army aircraft have assisted in many emergency relief projects during floods, hurricanes and bad storms; helped put out forest fires; transported food, fuel and supplies to snowbound and flood victims; and performed numerous search, rescue and evacuation missions for lost or injured individuals. Army helicopters have even been used by the U. S. Weather Bureau in preflood patrols to measure snow depth and water content.

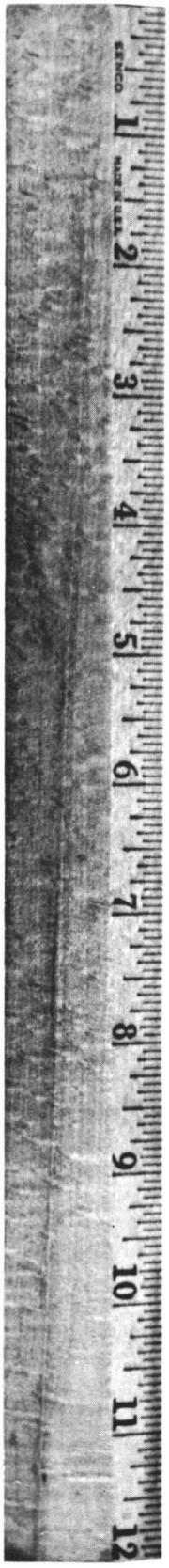
Major Edward Goldberg, head of the Rotary Wing Priority Air Transport Flight Division at Davison Army Airfield, Va., says: "If we see an accident or any other kind of dangerous situation, and our assistance will not place aircraft personnel in danger, we feel it is our duty to help another human being."

This pretty well sums up the feelings of all Army aviators.

IN ARIZONA

IN TEXAS

Each aviator's capabilities, limitations and professionalism must be continuously evaluated by unit instructor pilots . . . this permits the commander to measure the development of his pilots.



Captain John H. Schleimer
Education and Prevention Department
USABAAR

CREW EVALUATION-
cornerstone of standardization

A YOUNG CAPTAIN entered an office and introduced himself to the unit commander. He told the commander he was the officer appointed by the battalion to investigate the unit's recent UH-1H accident. After presenting a copy of his orders, he was offered a seat and could sense the commander visually evaluating him and forming a typical first impression.

The captain wasted little time in getting to the point. "Sir, during my interview with the pilot, he told me he was given an aircraft commander checkride in lieu of the mandatory postaccident checkride. I wanted to find out whether you were aware of this."

The commander shifted his weight in his chair and responded, "Son, I'm aware of everything that takes place in my unit. This pilot has been quite upset and depressed about the accident. I felt that giving him his aircraft commander checkride would restore his confidence."

The investigator flipped through several pages of his notes and again addressed the commander. "Also, sir, I noted during a review of the pilot's 759 that he is 40 hours short of the required UH-1H flight time to be eligible for aircraft commander. Finally, sir, according to unit records, he was 6 days overdue a 90-day standardization flight when the accident occurred."

Each comment by the captain was hitting home. Impatient and irked, the commander brought the interview to an abrupt close. He stood and glared at his visitor. "Captain, as commander, I have the right to waive the flight-hour requirements if I feel that any pilot is ready for aircraft commander. I'll take full responsibility for my actions in this case.

"You're new at this game, so I'll excuse your comments. However, I will be the judge of my aviators' capabilities!"

The captain wrapped up his preliminary investigation and headed back to the battalion to prepare his final report. A quick synopsis of the accident explains the investigator's curiosity about the pilot's aircraft commander checkride.

The mission was a fake insertion of an LRRP team. The pilot was in command of a UH-1H which was part of a three-ship formation with command and control aircraft running the show from above. As the formation approached a series of wooded ridgelines, the pilot was instructed by the C&C ship to break off and make a low level approach to an L-shaped landing zone. The C&C ship vectored the helicopter towards the LZ, but failed to alert the pilot in time to permit a normal approach into the LZ.

The pilot realized his approach was too hot. Still, he elected to come to a high hover over the LZ instead of starting a go-around. While bringing the helicopter to an abrupt hover, he was warned of an impending blade strike and jerked in more collective, decaying his rpm and producing a loss of directional control. The tail rotor whipped into the trees and the pilot was forced to reduce power and let the Huey settle to the ground. The accident resulted in $13,000 damages, requiring more than 850 manhours to repair and denying the unit a valuable combat helicopter for several weeks.

Supervisory error from the C&C helicopter can be identified as an element of the mishap sequence, but the pilot's poor judgment was the catalyst which caused the end result. Investigation revealed the mission would not have been jeopardized if the pilot had made a go-around. The unit SOP stated that aircraft commanders and pilots in command have

CREW EVALUATION— cornerstone of standardization

the final say about landing in any LZ.

Yet, the pilot's commander elected to disregard the facts uncovered by the investigation and sent him up for an aircraft commander checkride. The example established by the commander's action left an unfavorable impression with other aircraft commander candidates. It also had a marked impact on the attitude of the unit aviators toward the safety program.

The investigating officer returned to battalion headquarters and discussed his findings with the battalion safety officer. The information was passed on to the battalion commander and his response was immediate. He ordered the unit CO to rescind the aircraft commander orders. The unit commander reluctantly complied. This would appear to be the end of the incident. Unfortunately, it was only the beginning.

Two months later, this same pilot, again a UH-1H aircraft commander, was involved in another accident where poor pilot judgment was one of the conspicuous cause factors. During a service mission, the engine oil pressure gauge fluctuated erratically, but the aircraft commander continued the flight to the pickup point. Once on the ground, he dismissed the erratic gauge as being faulty. He decided going to the club for something cool was the No. 1 priority, instead of seeking out qualified maintenance personnel to check the gauge and engine oil system. The helicopter sat on the ground for almost 3 hours between an assault company and an aviation direct-support maintenance unit, so technical assistance was available.

En route home later that afternoon, the engine oil gauge started fluctuating again. This time the erratic needle was accompanied by warning lights. A few seconds after the warning lights illuminated the engine failed, leaving the aircraft commander only one alternative—autorotation. The selected touchdown point was a narrow dirt road, but the Huey fell 10 feet short.

His second accident resulted in $29,000 damages, requiring more than 1,400 man-hours to repair, and denied the unit a combat helicopter for an even longer period.

Analysis of the engine revealed the No. 2 main

CONCERTINA, friend or foe

Major Carl F. Mittag
Plans and Programs Department
USABAAR

TREES, WIRES, revetments and other fixed objects continue to exact their toll of Army aircraft. One obstacle that is generally present wherever combat troops set up housekeeping is concertina wire. Whether concertina wire is a friend or foe can be your choice as an aviator, operations officer, safety officer or commander.

We do not intend to discourage the use of concertina wire, but to highlight hazardous conditions induced when it is placed in close proximity to where aircraft operate. Concertina wire can be a friend by separating you from the enemy, or it can be a foe by contributing to aircraft mishaps. The following extracts are from accident reports received at USABAAR and are representative of mishaps in which concertina was a foe.

Case 1: A utility helicopter was returning from a mission. On short final, the pilot realized he had excessive speed and would probably overshoot the pad. He flared steeply to dissipate his speed and the tail rotor contacted a concertina barrier, resulting in separation of the 90-degree gearbox and tail rotor. Directional control was lost and the helicopter crashed. The accident board cited excessive air speed and failure of the crew chief or gunner to clear the rear of the helicopter as cause factors. The concertina barrier was not listed as a cause factor and no recommendations were made concerning it.

Case 2: The pilot of an observation helicopter completed an approach to a hover. When he put the helicopter down, the tail rotor contacted concertina wire, damaging the tail rotor drive shaft and tail rotor. Failure by the pilot to clear the rear of the helicopter was listed as the cause. The accident investigation board also cited the close proximity of the concertina wire to the landing area as a factor. They made the sound recommendation that action be taken to police the adjacent areas of all landing pads within the jurisdiction of the unit to eliminate debris and unnecessary obstacles.

Case 3: The pilot of an observation helicopter made an approach to a landing pad located in a rice paddy. During the approach, the tail rotor contacted a concertina barrier. The pilot lost directional con-

bearing failed due to loss of cooling and lubricating oil caused by overpressurization. The gauge was apparently trying to tell the aircraft commander something, but he did not heed its warning.

Who was responsible for the second accident? In the final analysis, the aircraft commander was in the cockpit, but mismanagement of one of the commander's key accident prevention tools—the unit standardization program—put him there. Less than 3 weeks after his first accident, the pilot was placed back on aircraft commander orders. During the intervening period, no supplemental flight training was programmed. Instead, he was scheduled as an operational pilot until he had logged the mandatory flight hours to qualify for aircraft commander.

The unit commander had relegated his standardization program to just satisfying checkride requirements. He had overlooked the inherent ability of the standardization program to provide aviator development through crew evaluations.

The cornerstone for a sound standardization program must be crew evaluation. Each aviator's capabilities, limitations and professionalism must be continuously evaluated by unit instructor pilots and recorded. This evaluation process permits the commander to monitor the development of his pilots and helps him select aircraft commander and IP candidates who are qualified to assume responsibility.

An up-to-date aviator file card on every pilot within a unit will give the commander an indication of supplemental flight training necessary to improve individual aviator proficiency and professionalism. This evaluation should not be limited to new pilots and aircraft commander candidates. Experienced aircraft commanders often develop poor cockpit habits through complacency.

It might be presumptuous to say that if the pilot had been given a comprehensive evaluation, the second accident would have been prevented. However, the objective of a standardization program is to prevent the *first* pilot error accident.

The potentiality of standardization programs is directly proportional to the imagination and efforts of individuals who control them. Without crew evaluations, the accident prevention potential of unit standardization programs will not be achieved. Crew evaluation is truly the cornerstone of standardization.

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trol and the helicopter spun and landed hard, causing the tail boom to separate. As stated, the pad was located in a rice paddy, but the paddy had 2-foot dikes surrounding it, with concertina on top of the dikes. The distance from the center of the landing pad to the dikes was determined to be 23 feet. Estimating uncoiled concertina to have a diameter of 3 feet, the obstacle was 5 feet tall! The cause factors were obvious and recommendations were that instruction be given to appropriate personnel on proper preparation of landing areas, to include dimensional criteria required for different aircraft and the proper marking of obstacles. In addition, it was recommended that aviators be given instruction on procedures to be followed during high, low and ground reconnaissances.

Although these cases involved tail rotor strikes, there are mishaps where undercarriages of both rotary and fixed wing aircraft have been caught in concertina barriers with catastrophic results. These cases illustrate how not to employ concertina. However, we realize that concertina is necessary in a combat situation and performs a vital function as a friend. FM 5-15, Field Fortifications, describes the various uses of concertina and states: "Protective wire entanglements are located to prevent surprise assaults from points close to the defense area," *not as an antiaircraft system to down our own aircraft.*

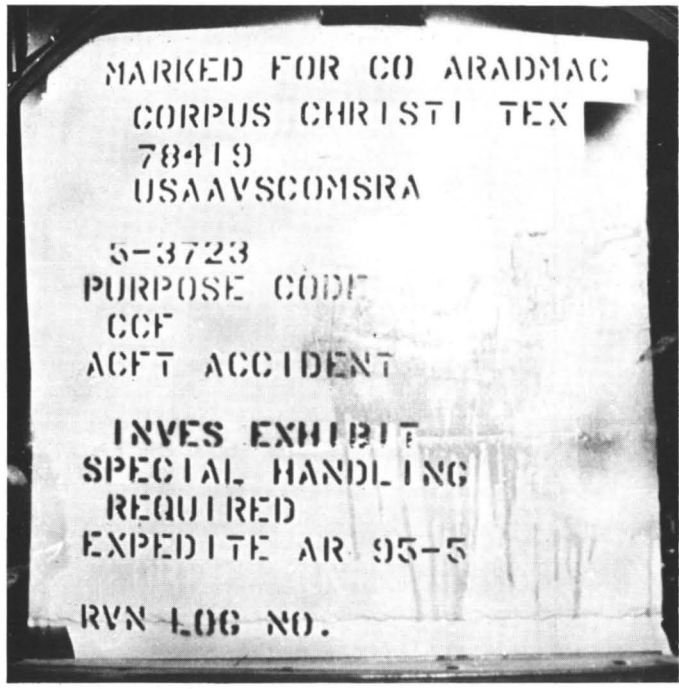
FM 5-15 also states: "As in the case of antipersonnel obstacles, they are close enough to the defense area for day and night observation and far enough away to prevent the enemy from using handgrenades effectively from points just beyond the obstacle, *normally 40 to 100 meters.*" Although cases 1 and 2 do not indicate the distances involved from barriers to intended touchdown points, it can be deduced that the wire was too close to be effective as a defensive barrier. Case 3 is a perfect example of locating a concertina barrier where its employment was highly questionable. In addition, its use compounded the hazards of an excessively small and poorly planned landing pad. There are exceptions. If the situation is such that concertina is required in close proximity to where aircraft are operated, precaution must be taken to ensure that concertina barriers are properly marked and that aviation personnel are advised of these hazards.

You can help eliminate concertina wire mishaps by:

1. Establishing minimum safe pad design criteria.
2. Providing the design criteria to supported organizations to enable them to construct safe usable landing areas.
3. Planning the location of defensive barriers around your landing areas.

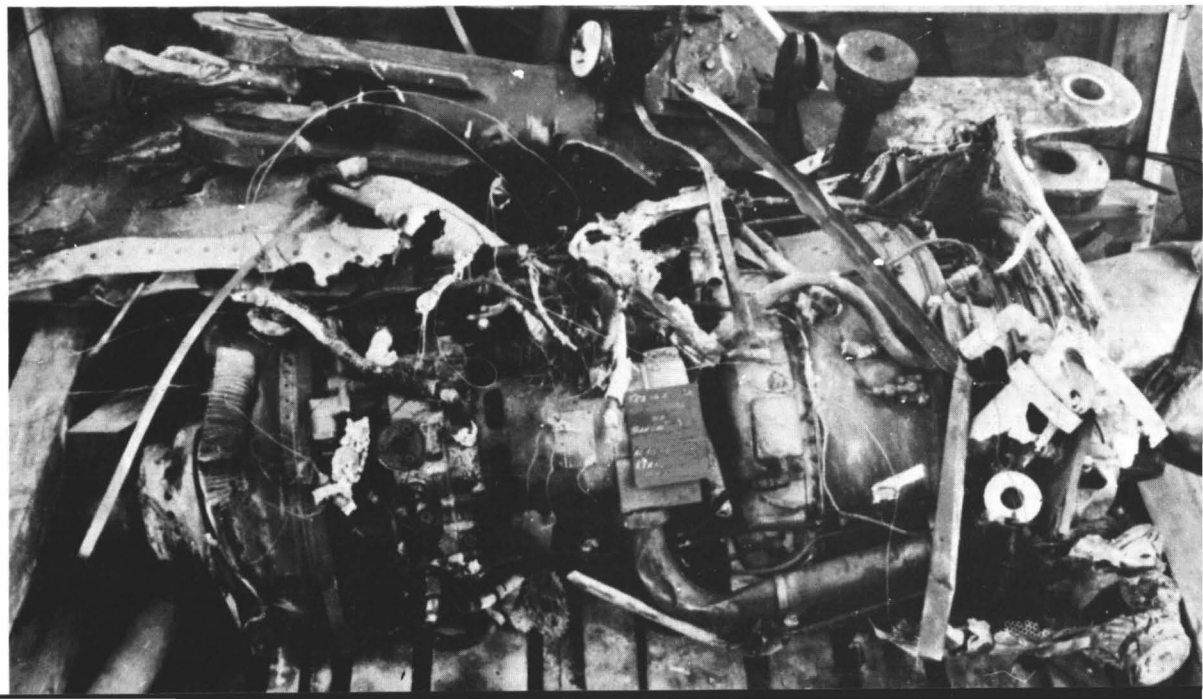
Accurate analyses of suspect components and parts demand particular care in preparation and packaging for shipment . . .

ACCIDENT OR SHIPPING DAMAGE?



Engine can properly marked for shipment

This is an engine, rotor head and other components as they were received for analysis. Note how all the components are thrown together in one box.
The accident investigation board may have saved a few dollars in crating, but they added time and money to the analysis. Worse, they may have destroyed vital evidence



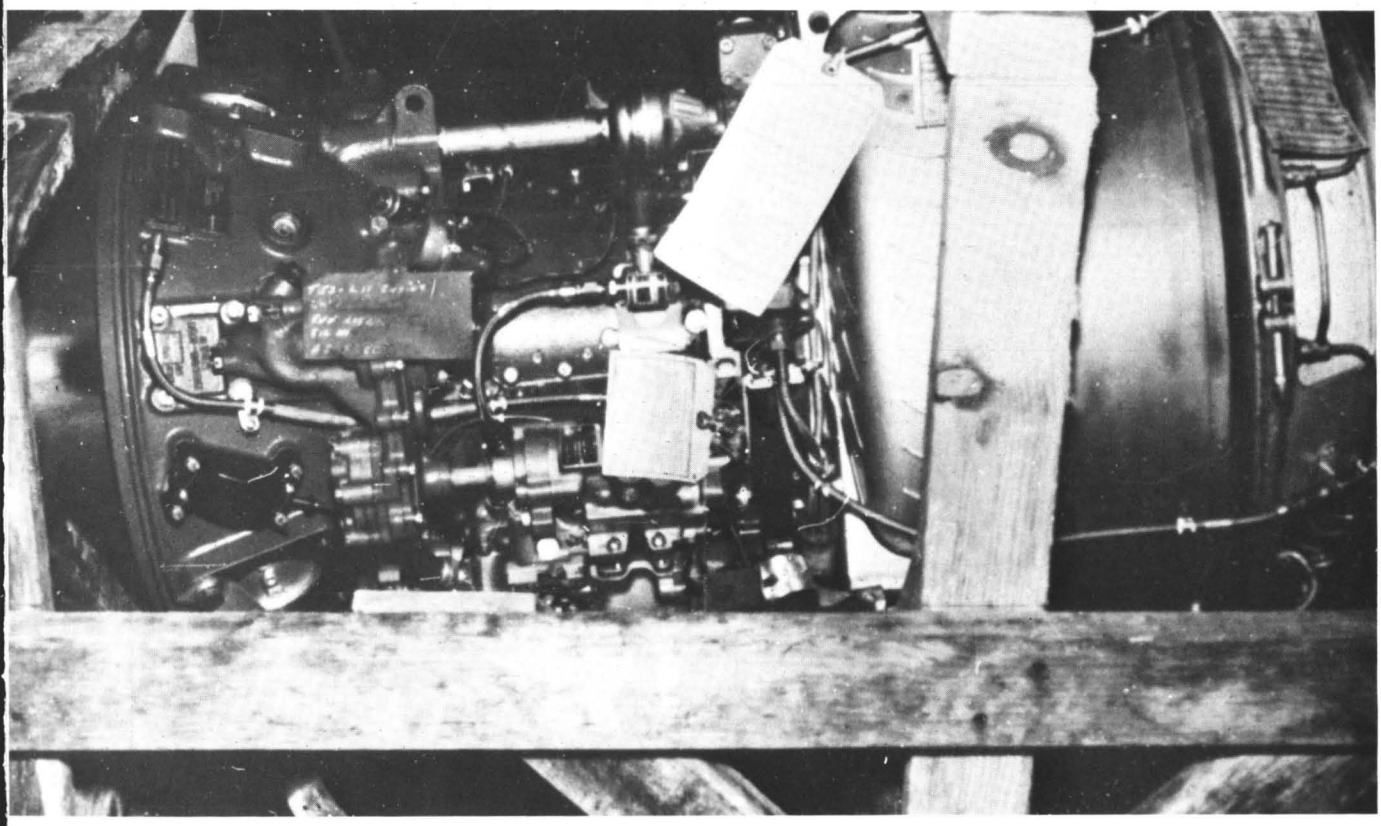
CW4 James A. Bartley
Aircraft Accident Review and Analysis Department
USABAAR

WHEN A catastrophic accident occurs, everyone wants to know what happened. Why did it happen? What can be done to prevent the same thing from happening again? Following any accident which may take only seconds to happen, an investigation takes place that may take weeks and weeks of hard work under the most adverse conditions. It is not as easy as some people think to find the causes of accidents. If a suspect item is found, an analysis must be performed to determine whether the component or part failed before or after impact. Was it fatigue, poor workmanship, design error, materiel deficiency or what?

Frequently, these questions can't be answered in the field. The Army has allocated money to ARADMAC, 1st Transportation Battalion (USNS Corpus Christi Bay) and other agencies to perform analyses of suspect items. These agencies prepare reports that assist accident investigation boards in determining cause factors. Equally important is the fact that these agencies help accident investigation boards present accurate recommendations to prevent similar accidents.

These analytical teardown facilities should not be used as a crutch by accident investigation boards. Most accident investigation boards do exercise initiative, integrity and interest in determining accident causes. In some instances, due to the limited facilities in the field, the best the boards can actually hang their hats on are suspicions. That is not good enough. We must be positive in determining cause factors so that facts are available for remedial action.

Requesting an analysis of a suspect component is the prerogative of the president of an accident investigation board. The CG, U.S. Army Aviation Systems Command, and Director, USABAAR, may also direct analytical teardowns of components when they deem them necessary. The unit maintenance



This engine was packed in a box, inadequately secured. It broke loose during shipment and was further damaged by being banged around in the box. It was impossible to determine which damage was caused by the aircraft accident and which was caused by failure to adequately secure the engine

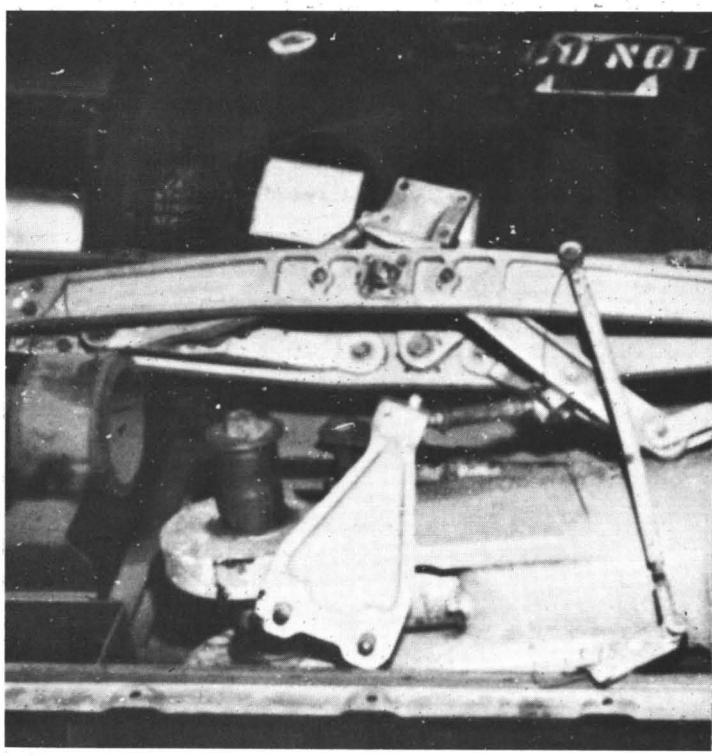
ACCIDENT OR SHIPPING DAMAGE?

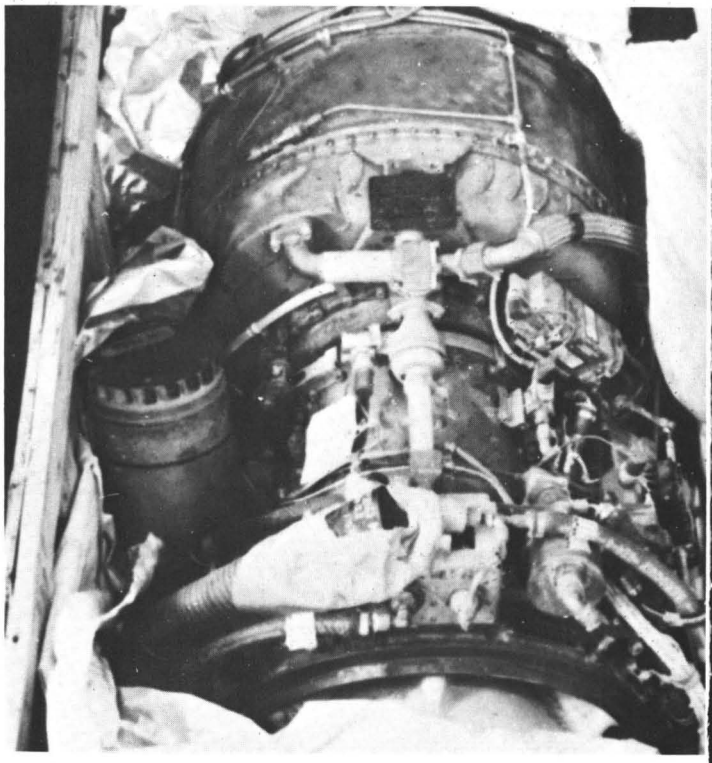
officer may select parts for analyses when incidents, forced landings and precautionary landings occur. Within CONUS, the president of the aircraft accident investigation board or maintenance officer (if applicable) will obtain concurrence and a control log number from USABAAR prior to shipping components. Overseas, the theater commanders establish approval and controls. These concurrences are required to expedite processing of teardown analyses and assist USABAAR and other agencies in monitoring analyses being conducted.

It is not the intention of any individual to curtail the initiative or action of the accident investigation board. However, judgment and commonsense must be used when selecting components or parts for analytical teardowns. In many cases, accident investigation boards have unnecessarily forwarded most of the wreckage to ARADMAC for analysis. This has occurred even when boardmembers' suspicions were centered around only one component or part.

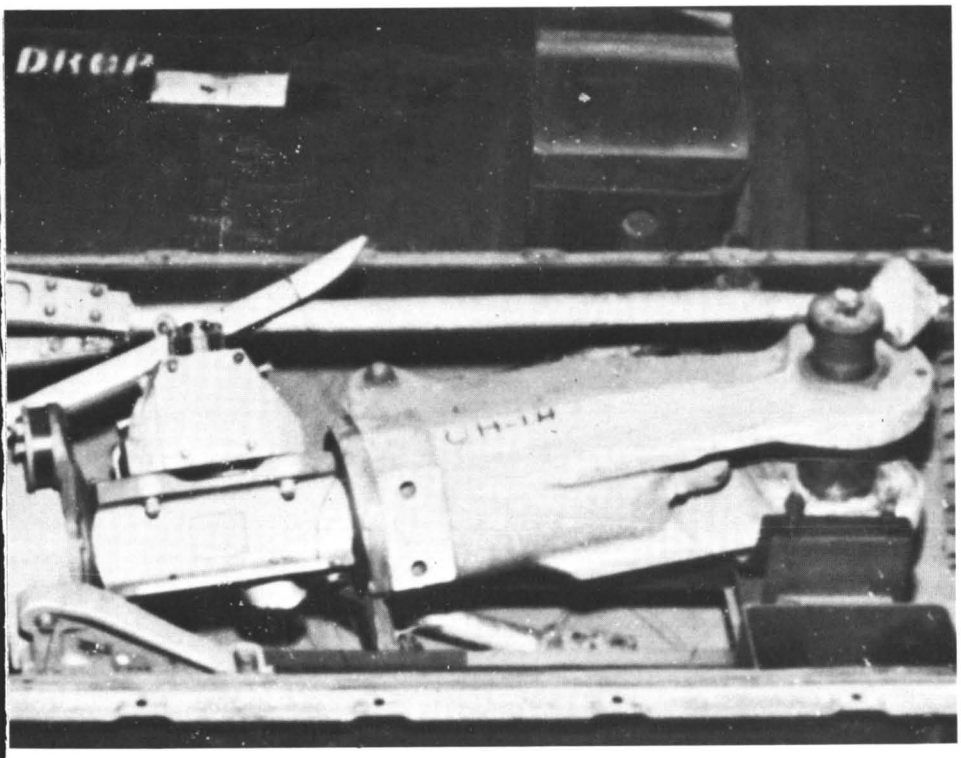
After suspect components are selected for analysis, the next important step is preparing them for shipment. Haphazardness or carelessness in preparation often results in further damage to the components. Every scratch and mark on the component is analyzed. You can readily see that marks and scratches occurring in transit can add to an already difficult task. Added marks, scratches, etc., not only add to the cost, but increase the time required for the analysis. Time is vitally important during aircraft accident investigations. The analytical teardown report is needed as soon as possible so that remedial action can be taken to prevent similar accidents.

How can investigators help? Easy! Change 1 to AR 95-5 specifically outlines the instructions for marking and preserving components for teardown analysis. Briefly, the parts or subassemblies suspected of failure, malfunction or faulty design must be wrapped or boxed to prevent loss or further damage. Parts requiring metallurgical analyses must be carefully cleaned and decontaminated to prevent health hazards. *Do not clean away vital evidence.* Metal suspected of failure should be coated with uncontaminated grease to prevent corrosion. Each component must be carefully tagged so that it is readily identifiable with the accident (i.e., aircraft serial number, date and location of the accident). The tag should contain a brief statement regarding the suspected relationship of the part(s) to the cause of the accident. Components must be properly wrapped and secured within shipping containers. After all precautions are taken to prevent damage to the com-

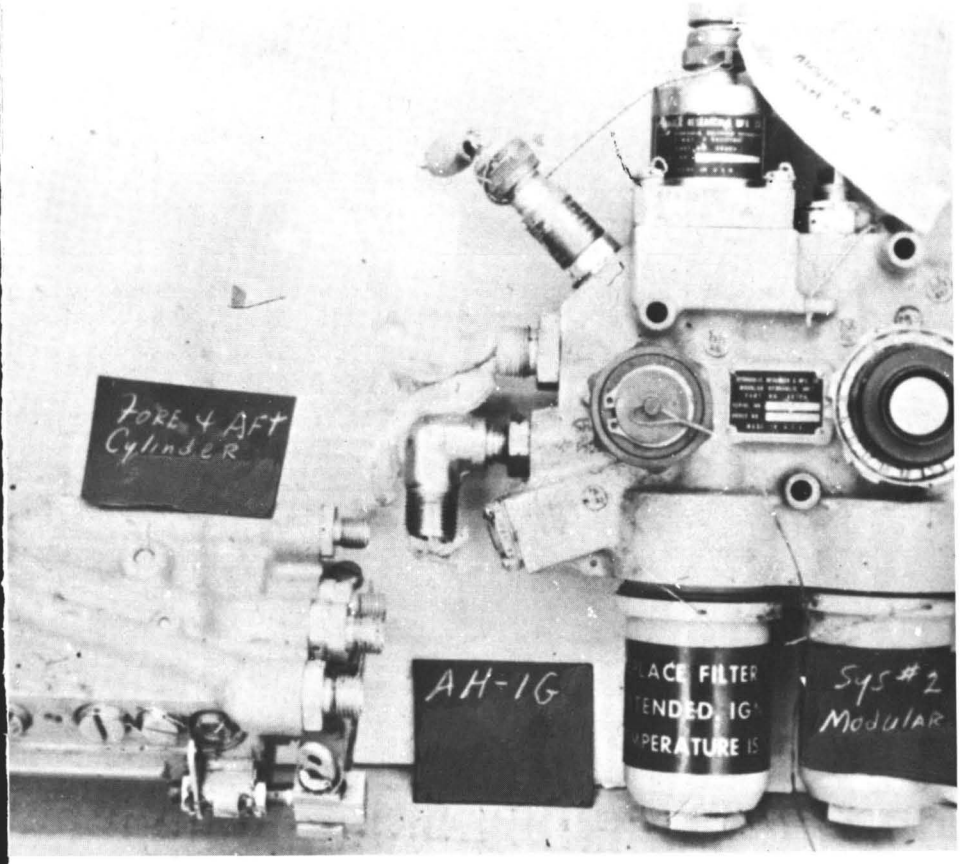




This shows an engine and starter packed in the same container. The starter was lying against the compressor case and bleed band mechanism. The damage to the compressor case was beyond repair



This rotor head and stabilizer bar were placed in a shipping can. No effort was made to secure them to the container. The broken end of the push-pull rod in the center of the photograph had rubbed against the top half of the can. Do you know what part the board wanted analyzed? You guessed it—the push-pull rod, to determine the type and cause of failure. It would be difficult, if not impossible, to make an analysis after the tube had rubbed against the case during a trip halfway around the world



Note the pieces of paper stuffed in the openings. The bits of paper entered the system, making tests unreliable. It is evident the individuals who packed these items for shipment did not comply with the requirements stated in the appropriate dash 20 and dash 35. These manuals state that whenever fuel, hydraulic or oil lines are removed or disconnected in preparation for shipment, all lines will be capped off to prevent foreign matter from entering the system. Furthermore, TM 743-200-1, Storage and Materiel, Change 1, dated January 1968, states in paragraph 3.14.5.1.8 that all the items must be cushioned, blocked or braced to prevent undesirable movement. Paragraph 3.14.5.2.9.2.1 states that only one item should be contained in a reusable container

ponents during shipment, it is imperative that the container be properly marked. Photo 1 is an example of how an engine can would look after the investigation board has properly marked it for shipment to the Commanding Officer, United States Army Depot.

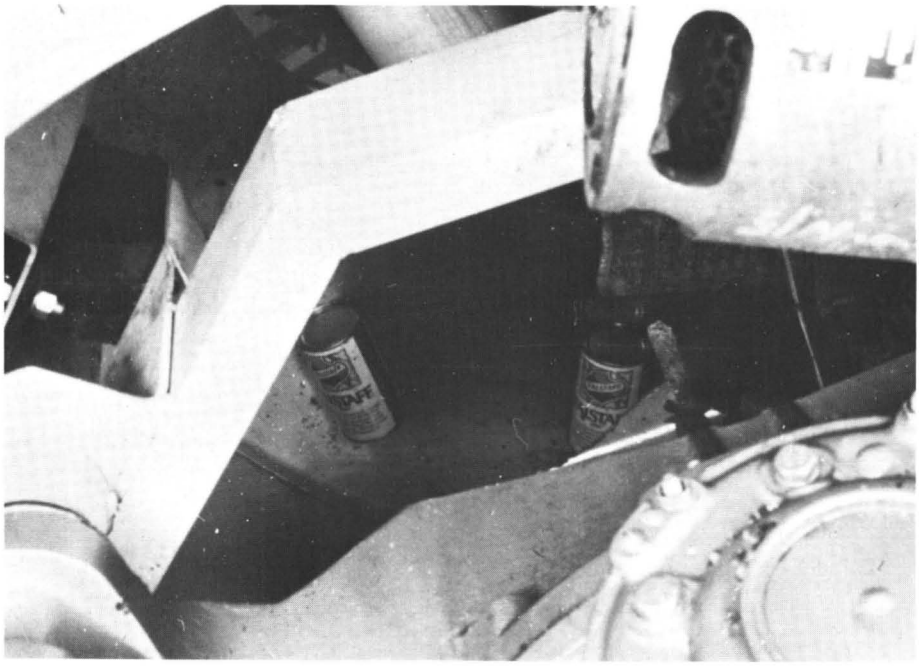
A completed Maintenance Request, DA Form 2407, filled out in accordance with TM 38-750, must accompany all components submitted for analysis. If the DA Form 2407 is not received with the components, ARADMAC and the other agencies will be unable to take any action.

ARADMAC and the other analytical facilities are receiving crash damaged parts which are not processed properly by aircraft accident investigation boards. Fifty percent of all parts received at ARADMAC have the wrong type markings on the containers. Fifty percent of parts received have improperly completed paperwork. Would you believe that approximately 30 percent of damaged parts have no paperwork at all? ARADMAC personnel want to do a comprehensive analysis of crash damaged parts. Is it fair to make them guess why the component was forwarded to their facility? The few minutes saved by personnel failing to complete required forms are detrimental to the aviation accident prevention program.

Each accident investigation board that submits components expects an accurate analysis with no questions asked. If you were to receive the components shown in the accompanying photographs, what would your reaction be?

We recommend that accident investigation boards use the services of a techincal inspector during the packing process. For the cases shown, it is suspected that the additional damage to components inflicted during transit could have been prevented if a technical inspector had been used as packing advisor.

Surely no individual would pack exhibits like those shown if he had given thought to the consequences. All of us, commanders, aviation safety personnel, aviators and accident investigation boardmembers, should strive to implement a strong aviation accident prevention program. When an accident does occur as a result of materiel failure or malfunction, ensure that AR 95-5 and other manuals pertaining to identification, preservation, packaging and shipment are complied with. Proper identification, preparation and documentation of aircraft accident exhibits will greatly enhance the analysis of crash damaged parts with the least expenditure of manpower and funds by our analytical agencies. In turn, this will permit these important members of the accident investigation team to complete their analyses and provide accident investigation board presidents with analytical teardown reports and recommendations that will help in preventing similar accidents.



This transmission was poorly secured and received additional damage during transit. The generator being sent in for analysis was placed in the container unsecured. It's evident the packers were enjoying their job. Note the cans in the bottom of the container

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is it a SAFETY HAZARD or not ?

THE TERM *safety hazard* appears to be an "in" term these days. It can be found in Army regulations and documents—those of the other military services and government agencies. It is commonly used by civilian agencies, societies and organizations who have an interest in aviation safety. The mere fact that it is used, however, does not make the term correct or even acceptable, especially since an adequate definition of the term is apparently lacking.

When selecting words or attempting to interpret terms, an obvious tool to use is the standard dictionary. The definitions of *safety, hazard* and *danger* are of interest in trying to determine the intent of the term *safety hazard.*

Safety: the condition of being safe from *undergoing or causing hurt, injury or loss.*

Hazard: a source of *danger.*

Danger: *exposure to injury, pain or loss.*

By combining the definitions of hazard and danger, we now have:

Hazard: a source of *exposure to injury, pain or loss.*

Similarly, it is a short step to:

Safety: the condition of being safe from *exposure* (undergoing or causing) *to pain* (hurt), *injury or loss.*

A third analysis of the definition brings us to:

Safety: the condition of being safe from *hazards.*

If safety can be defined in terms of hazards, then qualifying the word *safety* by the word *hazard* is redundant.

MIL STD 882, *Requirements for System Safety Program for Systems and Associated Subsystems and Equipment,* further demonstrates this redundancy. Two definitions included are:

Safety: Freedom from *those conditions that can cause injury or death to personnel, damage to or loss of equipment or property.*

Hazard: Any real or potential *condition that can cause injury or death to personnel or damage to or loss of equipment or property.*

It can be seen that the MIL STD 882 definition of safety can be defined in terms of hazards. By substitution, the definition now becomes:

Safety: *Freedom from hazards.*

It is a simple and clean definition. If *safety* is freedom from hazards, the term *safety hazard* is definitely redundant. What is appropriate phraseology for the term *safety hazard?* From this writer's viewpoint, preferable terminology would be *hazardous condition.* Instead of writing, for instance, that *"safety hazards* be identified," one should write that *"hazardous conditions* be identified." If it is necessary to be more specific when addressing hazardous conditions, the word *hazard* can be qualified. One basic qualification is to combine it with a noun to delineate the source of the hazard as in the term *fire hazard,* which is the hazard of fire, or the risk that fire could occur. Similar combinations are *electrical hazards, chemical hazards, mechanical hazards, etc.*

A second basic method to qualify *hazard* is to combine it with a noun to delineate the object of the hazard, such as a *personnel hazard,* a hazard to personnel, or *materiel hazard,* a hazard to materiel, etc.

The difference in these two methods of qualification is that the first is a hazard *of* something and the second is a hazard *to* something. The first delineates the hazard, while the second defines the object of the hazard.

Again consider the term *safety hazard.* Is the word *safety* the hazard, or is it the object of the hazard? The answer is obviously neither. Is it a *safety hazard* or is it a *hazardous condition?* We prefer the latter. Which do you prefer?

Effective Army aviation accident prevention programs result from . . .

Command Supervision Plus Team Effort

ARE YOU ONE of the countless number in the Army aviation program who believe an aviation company cannot operate for an extended period of time with an aircraft accident-free record? Do you believe we can afford aviation accidents in a combat environment that could not be accepted elsewhere? Hopefully, your response to both questions is an emphatic *no!*

Each day presents at least one new challenge to the aviation company commander. His overall responsibilities are a continuing challenge. The commander establishes the standards for his unit and there is no question that he is the one who bears responsibility for the maintenance of those standards. His command influence is exercised in two ways—direct communication on a day-to-day, often minute-to-minute, basis with his executive/operations officer, first sergeant, maintenance and flight platoon leaders; and accomplishment of objectives through these subordinate leaders who pass the word and directly supervise others who perform various tasks within the unit.

The successful aviation company commander must be aggressive, flexible and inquisitive. He must constantly develop and institute modern management techniques. This is especially true in the program that he implements to conserve the aviation resources (personnel and materiel) required to accomplish his assigned mission—that of providing air-mobility to combat and combat support commanders. Weaknesses in command supervision of the Army aviation accident prevention program are evident when the quality assurance techniques the commander has implemented do not improve the quality of workmanship displayed by aircraft, arma-

Colonel Eugene B. Conrad
Director, USABAAR

ment, avionics and component repairmen; airfield service technicians—refueling personnel, airfield control tower operators, etc.; aircraft technical inspectors and maintenance supervisors; noncommissioned officers in charge of flight platoons; and rated aviators. Supervision becomes a factor when an aircraft accident results from the lack of individual discipline and qualification, or the commander's failure to provide adequate training or time to maintain proficiency, establish adequate SOPs and eliminate hazards—flight, maintenance or inspection deficiencies. The correction of identified problem areas demands action by the company commander, if his aviation accident prevention program is to be successful.

While it is true the commander must establish the standards for and continually emphasize the importance of safety in the accomplishment of all tasks, it must also be pointed out that he alone cannot accomplish the objectives he has set for the unit's aviation accident prevention efforts. Dedicated team effort by *every* member of the company is the key to successful attainment of these objectives.

Can any aviation company commander maintain an effective aviation accident prevention program and still manage the other programs required to ensure the accomplishment of his objectives? Can this be accomplished under combat conditions? A resounding *yes!* should be your response.

Thirty-three company-size aviation units, representing a cross section of the world environment, operated during calendar year 1969 without an aircraft accident. Approximately 80 percent of these units operated for a period greater than a year with no aircraft accidents. Thirty percent of the units did not experience an aircraft accident during a 2-year period. Unfortunately, the number and names of the company commanders involved in achieving these magnificant records are not readily available. Congratulations to the commanders, aviators and enlisted personnel of the aviation units listed below. Their effective aviation accident prevention programs resulted in the conservation of aviation resources and demonstrated they were truly *ABOVE THE BEST*.

U. S. CONTINENTAL ARMY COMMAND

Unit	Accident-Free Period
C Troop (Air), 1/17 AR Cav Sqdn	4 years 6 months
177 Avn Co (Aslt Spt Hel)	4 years 6 months
182 Avn Co (Aslt Hel)	4 years
154 Avn Co (Aslt Spt Hel)	3 years 4 months
109 Avn Co. (Survl Airplane)	2 years 1 month
507 MD Co (Air Amb)	1 year 9 months
283 Avn Co (Aslt Hel)	1 year 7 months
8/1 AR Sqdn	1 year 6 months
181 Avn Co (Aslt Hel)	1 year 3 months
3 Avn Co (Attack Hel)	1 year 2 months
B Co (GS), 82d Avn Bn (Cbt)	1 year
291 Avn Co (Hvy Hel)	1 year

U. S. ARMY, ALASKA

Unit	Accident-Free Period
Medium Helicopter Company, 19th Avn Bn	2 years 4 months

U. S. ARMY, EUROPE AND SEVENTH ARMY

Unit	Accident-Free Period
421 Med Co, 7th Med Bde	2 years 8 months
Air Trp, 2d ACR, VII Corps	2 years 2 months
D Trp, 3/8 Cav, 8th Inf Div	1 year 9 months
66 Avn Co, 18th Avn Bn, V Corps	1 year 4 months

Command Supervision Plus Team Effort

U.S. ARMY, EUROPE AND SEVENTH ARMY

Unit	Accident-Free Period
351 Avn Co, 15th Avn Gp	1 year 2 months
D Trp, 3/7 Cav, 3d Inf Div	1 year
D Trp, 3/12 Cav, 3d Armd Div	1 year
207 Avn Co, 15th Avn Gp	1 year
350 Avn Co, 18th Avn Bn, V Corps	1 year

U. S. ARMY, PACIFIC

Unit	Accident-Free Period
225 Avn Co (Surv), 223d CAB, 17th CAG, 1st Avn Bde	2 years 5 months
245 Avn Co (Surv), 212th CAB, 1st Avn Bde	2 years 1 month
Co B, 7th Avn Bn, 7th Inf Div, USAEIGHT	1 year 11 months
355 Avn Co (HH), 268th CAB, 17th CAG, 1st Avn Bde	1 year 11 months
Det L, KMAG, Korea	1 year 6 months
Co A, 2d Avn Bn, 2d Inf Div, USAEIGHT	1 year 6 months
132 Avn Co (ASH), 16th CAG, Americal Div	1 year 6 months
Command Airplane Co, 165th CAG, 1st Avn Bde	1 year 6 months
478 Avn Co (HH), 101st Abn Div (AM)	1 year 6 months
25 Avn Co (Corps), 210th CAB, 12th CAG, 1st Avn Bde	1 year 1 month
242 Avn Co (ASH), 269th CAB, 12th CAG, 1st Avn Bde	1 year 1 month

The challenge that aviation company commanders, as well as all others involved, face today in aviation accident prevention is great. As proven by the units listed, it is not impossible. Admittedly, it is difficult to be too critical of the Army aviator who has an accident in a combat environment. The many variable factors present and the requirement to accept certain risks to accomplish the mission certainly set the stage for mishaps to occur. If, however, we look closely enough at these accidents, we begin to find deficiencies in the unit's aviation accident prevention program. Frequently, the accident investigation boards find that quality assurance has not eliminated errors in supervision, planning, maintenance and inspection techniques. They find aviators who cannot maintain self-discipline to conform to safe operational techniques. The unfortunate thing about the preventable accident that occurs in a combat environment is the prevailing attitude that accidents must be expected and accepted. Can we accept this attitude? Surely through the implementation of sound management techniques—training, planning and additional supervision, aviation company commanders can materially reduce aircraft accidents in all environments. *Professional performance of tasks by every member of the aviation company is a must.*

Undoubtedly, many readers are thinking, "You have identified many of the problems, expounded upon intangible philosophies and congratulated a few units that have operated an extended period of time with no accidents. Why not give me some tangibles that will assist in improving my unit's aviation accident prevention program?"

I would like to present two points that will provide the aggressive, ingenious aviation company commander a line of departure for improvement in his unit aviation accident prevention program.

Unit Analysis: Probably the most important and essential aspect of a dynamic aviation accident prevention program is the commander's analysis of his objectives, accomplishments and problem areas. Unfortunately, it is one that receives the least attention. At the company level, it is relatively easy to implement and is the heart of the program. Effective analysis requires frequent evaluation of aviators as well as all other personnel; operational procedures; and maintenance and inspection procedures, habits and techniques.

Identify Incipient Cause Factors: The commander must also devise methods and techniques that identify accident cause factors. He must be able to methodically lay out and analyze all the ingredients involved in each mishap, to be able to more easily identify the root or basic causes which must be corrected or eliminated. Programs must then be developed and implemented which will not only correct or eliminate these cause factors, but ensure they do not recur.

The aviation company commander cannot realistically hope to eliminate accidents immediately. He cannot expect to identify problem areas, develop and implement comprehensive accident prevention measures and enforce his program overnight. Realistic and attainable objectives must be established. Critical points, program reviews and other modern management techniques must be established. Projected goals must be developed for specified periods of time (i.e., 1, 3, 6 and 12 months).

Why not add your unit to congratulatory lists in the future and reap immeasurable benefits in conservation of aviation resources? Command supervision and team effort result in an effective Army aviation accident prevention program. This effective program culminates in unit operations over extended periods of time with no aircraft accidents.

FLIGHT DISCIPLINE, the key to reduction of the many accidents attributed to human factors, must prevail during all flights to achieve success in the accident prevention program. What is flight discipline? It is a deliberate effort directed toward safety. It must be persistent, habitual and forever present in the aviator's environment. It may also be defined as control of impulses.

Characteristic of impulsive flying is an overwhelming desire to do something—something like buzzing or other illegal acts. Spontaneous thoughts trigger the impulse and result in unsafe acts which are not mission requirements. Let's consider low level flying. Low level flight is necessary when the mission dictates it. In this case, because of necessity, the action is not considered impulsive because it is part of a plan. There is a purpose to exploit its advantages.

Impulsive actions, on the other hand, are inexplicable. By definition, an impulse is *the inciting influence of a particular mental state*. It is this influence that causes accidents in the early phases of flight training, as well as in combat environments. Spontaneous thoughts trigger these impulses.

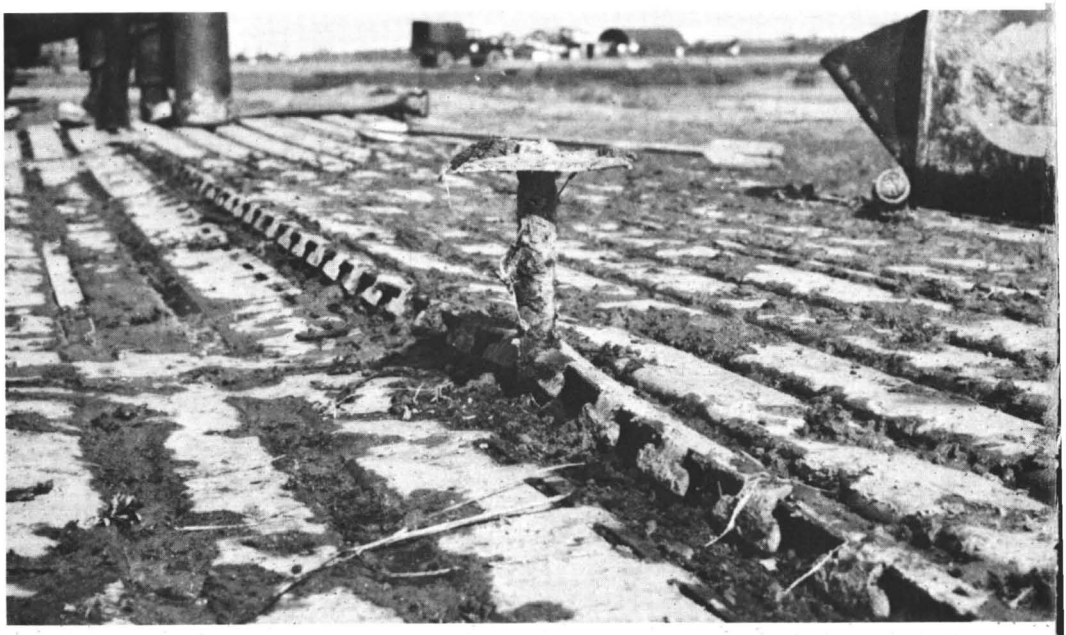
Flight discipline starts with adherence to directives. The mature acceptance of the rules set by others, in the interest of safety, is a requirement of a professional aviator. Disregard for these rules has and will continue to cause accidents. Tight formation flying, an example of impulsive flying and disregard for directives, serves no useful purpose and often results in accidents. Accepting the wisdom of the rules is the only sound approach to safety.

Flight discipline is professional. It is good judgment based on past experience and intrinsic motivation directed toward a goal. It is a desire to do the job right. It is the attitude of professional pilots. It involves discussion of accident causes and knowledge of recommendations made to prevent recurrences. This is the sole purpose of accident investigation. Flight discipline is therefore concerned with adherence to applicable procedures which are considered safe. It is the unit's responsibility to emphasize and disseminate the knowledge gained from accidents.

On a December night, a UH-1H departed a parallel revetment at a forward hover. As it hovered forward, it drifted to the right and the tail rotor struck the revetment wall, causing the helicopter to spin, crash and burn on the ramp. Analysis of this accident revealed it could have been prevented if ground contact had been maintained while departing

THIS SAFETY BUSINESS- can an overdose hurt us?

CW2 Jose A. Suarez
Plans and Programs Department
USABAAR



Skid shoes of UH-1H pulled spike from MA matting. When spike released, helicopter flipped violently on side

the revetment. The absence of psp in the revetment would have made it feasible to use ground contact. This procedure is safer for these reasons:

1. With part of the helicopter's weight on the ground (ground taxi), drift may not have occurred. If it had, the UH-1 would not have drifted as much.

2. Considering the possibility of vertigo because of various factors such as poor illumination, absence of good reference points, etc., a pilot is more susceptible to vertigo at night *while at a hover*. Had he maintained ground contact during departure, the possibility of vertigo would have been eliminated.

As a result of this accident, the unit made it SOP to ground taxi in and out of parallel revetments (whenever possible), even during daylight hours. Other points considered were:

1. During marginal crosswind conditions, maneuverability can be affected while hovering to a degree that pedal control could be inadequate.

2. Ground contact in adverse wind conditions provides greater control because the helicopter is not part of the air mass during this operation. Ground contact also provides the pilot with the opportunity to try again after a gust subsides.

3. Consider a tail rotor failure at a hover. Since any emergency comes as a surprise, the confinement of revetments, plus the hovering attitude, may allow the tail boom to overlap the revetment wall before the pilot can take corrective action (hovering autorotation) to counteract the sudden yaw. This would place the helicopter in a critical nose low attitude during the inevitable descent. If the tail climbs the revetment wall, it will probably remain on top of the wall at termination. With the nose lower than the wall, the main rotor has to strike the wall. When this happens, goodby helicopter!

4. Consider the same situation, but with the pilot maintaining ground contact. What then? The tail will slam the revetment wall. It will not climb it. And this makes a great deal of difference. The main rotor should not contact anything else because the helicopter is level and has maintained ground contact. The degree of damage and crew danger is minimized by adopting this SOP during all parallel revetment operations, whenever possible.

5. Other emergencies in parallel revetments, such as engine failures or high and low side governor failures, would derive the same benefits as those described, when ground contact is maintained.

Obviously, one method has advantages over the other. There are cases, however, in which ground contact would be inadvisable. For example, when psp is installed.

Flight discipline is reinforced and further stimulated at unit level by honest analysis, discussions and recommendations directed toward safety. By cutting risks, the chances for prevention are improved.

Flight discipline is adherence to standard procedures. No one can deny that learning often results in improvements, but it can bring undesirable changes also. The stenographer can learn to misspell words. A piano student can learn to play the wrong notes. A pilot can learn unsafe habits which, if not corrected in time, may become contributing factors in a probable accident. Prevention depends on individual standardization.

Let's consider the hot rod takeoff—pitch under the armpit, longitudinal axis 45 degrees to the horizon and chin bubble clearance commensurate with terrain. Then the followup: "This is the AC speaking. Our air speed is 110 knots, course 360 degrees and altitude 2 feet." Are you impressed? No doubt, this technique will ultimately end in disaster. Obviously, for reasons known to all of us, this procedure is far from standard. However, it can become habitual if not corrected in time.

Flight discipline is a great desire to abide by and perform in accordance with the standards set by the Army aviation school. The Army aviator cannot ride with an IP forever. The professional aviator must adhere to standard proven procedures. Because safety is of paramount importance, these standards have been adopted and incorporated in the training program. Any deviation is nonstandard, unsafe and inadvisable!

Flight discipline is attention to detail. A quick but accurate cross-check, for example, will allow additional time for division of attention to other equally important duties.

The concept of "challenge and response" is flight discipline in action. But, even when using this almost foolproof method, blunders do occur. Example: "Are we cleared and untied?" asks the challenger. "Cleared and untied, sir," comes the answer. Then, as the igniters pop and N_1 passes 30 percent, the shock of a great discovery proves that neither main nor tail rotors have moved. Catalog this regret in lessons learned "The Case of the Hung Start" and pass it on to posterity.

The basic safety rules learned in flight school apply now as well as they did then. Complacency can bring disregard for these principles. The record shows Army aircraft were involved in eight midair collisions during 1967 and eight more during 1968. Through 15 November 1969, midair collisions more than doubled over the two previous years, with 11 occurring in one 4-month period. Reference to the tip path plane during VFR conditions, whether in level flight, landing or takeoff, facilitates maneuvering and sharpens accuracy, but the biggest reward is safety. The use of the tip path plane to control aircraft attitude provides the pilot the added advantage of avoiding a midair by keeping his head out of the cockpit.

The pilot at the controls *is* the pilot in command during that portion of the flight. A fast cross-check of the instrument panel, followed by proper division of attention to see what is up front, above, below and to the sides of the flight path, will prevent midairs. Obviously, radio duties should be reserved for your counterpart.

The challenge and response method, "clear right and below," or "left and overhead," as applicable, or "clear tail boom right," if a pedal turn is made at a hover is the attitude for professional pilots. This habitual performance of the challenge and response will pay off in high density traffic areas. But let's not be complacent and only use caution in the vicinity of busy terminals or during marginal weather. Midairs, as you well know, have occurred in excellent weather and far away from crowded

airspace. Complacency was, without doubt, a contributing factor.

Flight discipline applies to preflight inspections as well. During a preflight inspection of a slick's rotor head, an IP commenced with the retaining nut and, from this point, worked gradually down the mast and transmission. Upon reaching a pitch change link, he discovered the bolt holding the link to the pitch change horn lacked a bolt head. Only the bolt stud showed where the head had once been. This preflight proved to be of great value and an eye opener to his three WOC students who, from that day on, became the three most highly competent bolt checkers in Army aviation. Preflights must be conducted with a proportionate mixture of interest, curiosity and commonsense to be effective.

Courtesy is safety! Aircraft were seen making approaches to the near end of a ramp in RVN and hovering the length of the ramp to their revetment. Extensive hovering creates a serious hazard to ground maintenance personnel. The disturbance created by hovering aircraft is obvious and should be minimized whenever possible. The practice described is nonstandard and proves the lessons learned at flight school can be quickly forgotten.

PSP is a hazard when starts are made. Adverse yaw is apt to occur and should be guarded against when applying throttle and accelerating to the flight idle position. Because of the smoothness of steel matting, torque will manifest itself rather abruptly unless some preventive measures are taken. Acceleration to flight idle and past flight idle must be made ever so slowly, anticipating the application of left pedal as rpm is increased. It is advisable to depress the idle release switch as the throttle is increased to flight idle. This will provide better control of the solenoid cam and prevent a power surge at a critical moment. During starts and shutdowns, collective should be at minimum setting.

Factors to be considered when operating on steel matting which may result in an even more hazardous condition are:

1. A right crosswind component.
2. Low fuel load.
3. Empty aircraft.
4. A wet steel matting surface.

During starts or shutdowns, crew chiefs and gunners should remain at least 5 feet away from the skids to avoid being injured if an abrupt yaw occurs.

Once the start is completed, another critical moment is when you bring the helicopter to a hover. PSI must be monitored as it becomes light on the skids prior to liftoff. As a general rule, 20 psi is a good figure to remember when a minimum crew is aboard. With a heavier load, or when the density altitude is higher, 24 psi may be required before it is light on the skids.

A UH-1H was involved in an accident when lifting to a hover on MA matting. The pilot continued to increase collective and did not monitor psi. The skid shoes pulled a spike used to hold down the matting as the helicopter left the surface. When the spike was released, the helicopter flipped violently on its side. A cross-check of the psi could have prevented this accident and allowed the pilot to return to flat pitch and make a visual inspection of the skids and matting surface.

Let's talk about the aircraft commander. Besides having the prerogative of making a decision, he also has the responsibility for briefing, advising and supervising his crew. Communication is essential to ensure mission accomplishment. This responsibility begins with the preflight, but does not cease when the rotors stop. There are other areas of concern, including the crew's morale, enthusiasm and motivation. The promotion of enthusiasm will invariably result in the acquisition of other desirable traits. An enthusiastic crew member is willing to listen and learn. His enthusiasm will make him receptive to safety and he will contribute to the welfare of the entire crew. Above all, an enthusiastic crew member is motivated to do his job well. This is the link upon which SAFETY gains its strength.

Daily communication between the AC and his crew promotes enthusiasm. A briefing by the gunner on the characteristics of the M-60 will stimulate his ego and all participants will profit by his lecture. A motivated crew chief will check the aircraft over when passengers deplane and the aircraft is parked to wait their return. The aircraft commander can lead him by taking the initiative. This type of action promotes enthusiasm.

A successful salesman believes in his product. This is the basis of his success. To sell safety, we must believe in it. We must talk about it often and generate enthusiasm for this most desirable of all traits in the flying business. Can an overdose hurt us? I think not!

The following article was taken from a letter from USARPAC Headquarters to the various commands in USARPAC:

INADVERTENT IFR

THROUGH THE YEARS countless lives have been lost when aircraft inadvertently entered clouds or other conditions which reduced visibility. Frequently, the crews were adequately trained for instrument flight and should have been able to cope with the situation. But, for unexplained reasons, the crews failed to respond. Witnesses, who might have attested to what actually happened, did not live to relate their experiences. The following is extracted from an accident report in which the crew did live to tell what happened. Fortunately, the helicopter did not crash. However, g stress limits were exceeded, there was evidence to substantiate high torque loads on drive components and there was heavy damage from popped rivets, wrinkled skin and torn, twisted and bent structural members. There were no injuries, but the cost of this occurrence was $190,000.

A CH-47 was returning to home base from a daylong resupply mission at approximately 1820. Official sunset was 1716. Weather enroute was forecast to be 2,500 feet broken, visibility 7 miles, with occasional snowshowers. The aircraft commander was a CW2 who had graduated from flight

school one year earlier. He had 426 hours total time, with 220 hours in type and model. The pilot was a captain who also had graduated from flight school one year earlier. He had 397 hours total time, with 187 hours in type and model. Both had tactical rotary wing instrument qualifications. The flight engineer was an SP5 with 11 months experience and 179 flight hours. The crew chief was an SP5 with 11 months experience and 179 flight hours. The door gunner was an SP4 with 9 months experience and 136 flight hours. There were no passengers aboard.

The helicopter was following a highway aligned with the natural contour of a shallow valley. Hilltops were 1,000 feet or less in the immediate vicinity, with higher terrain at a range of 10 to 15 miles in all quadrants. The helicopter was routinely equipped and the flight instruments were operable, but the radios were less than perfect. From DA Form 2408-13: "ADF works intermittently; high frequency radio very weak and works intermittently; FM radio works intermittenly." There were no other significant writeups.

Aircraft commander: "We were flying at 2,200 feet. The flight to . . . had been uneventful except for light turbulence. I could see cloud coverage ahead which appeared to be at 2,500 to 3,000 feet indicated. Suddenly and very unexpectedly, I was engulfed by a very thick cloud. It immediately entered my mind that I had three alternatives: descend, climb straight ahead or do a 180-degree turn. I decided on the latter. I started to decrease air speed from 120 knots to a turnaround speed of 30 knots. This maneuver resulted in cyclic climb. Power was reduced and, while looking both at the flight instruments and glancing outside the cockpit, I inadvertently zeroed the air speed and exceeded the angle of bank so as to lose my attitude indicator capability. I was immediately disoriented. Then, I think, the aircraft fell straight down, with the right side of the aircraft toward the ground. Shortly afterward, it assumed a nose low attitude and exited the cloud."

Pilot: "At approximately 1820 we abruptly pen-

etrated an extremely dense cloud. The aircraft commander began a steep cyclic climb and increased power to 650-700 pounds of torque. Shortly thereafter, I picked up my map to check MOCA to . . . air base and the approach control radio frequency.

"When I returned my attention to the flight instruments, the attitude indicator was indicating 15 degrees nose high, the turn ball was on the far left end of the race and the turn needle was indicating a right turn. The vertical speed indicator was going from 1,000 fpm climb to 200 fpm descent. I told the aircraft commander that left pedal and more air speed were needed. Then I realized he was attempting a 180-degree pedal turn with the intention of flying back out of the cloud.

"I glanced again at my map, then felt a sudden falling and swinging to the right. The attitude indicator was rolled all the way up, indicating a steep dive. I looked at the air speed indicator and saw the needle pass rapidly from 120 to 150 knots. I put my hands on the controls. We broke out of the clouds going nearly straight down and rolling to the right. I took control and entered an abrupt deceleration, with left cyclic to compensate for the roll. The aircraft leveled at an extremely high air speed headed directly toward a mountain."

Flight engineer: "I was in the rear when we entered a dark cloud. It appeared that the nose came up immediately, then we started turning. Seconds later, I felt we were nose down and in a left bank and rapidly losing altitude. My feet flew out from underneath me and I was pushed against one of the seats. Then I heard a voice say, 'I got it.' We returned to level flight and entered a decelerating flare."

Crew chief: "After entering the cloud, the aircraft commander said over the intercom that he would turn around and get out of the cloud. I went forward to the front of the aircraft by the cabin door. At this time we went into what seemed like a series of rolls. I saw the gunner fall out of the companionway and roll around on the floor. Our jumpbox and toolbox were tossed about."

Gunner: "I was standing in the companionway and saw the air speed go to zero. Then we began a climb at 2,500 feet per minute. The pilot said something about giving it right pedal. Then we went completely out of control. I fell backward and rolled around the floor. The next thing I remember is looking up and there was a mountain directly in front of us."

The accident investigation board concluded that the probable length of time spent in the clouds *was less than 1 minute.* How did things deteriorate so quickly? Simply stated, here's how:

1. The aircraft commander failed to follow the cardinal rule of instrument flight (i.e., control the aircraft by reference to the flight instruments). By dividing his attention between attempts to look outside, while simultaneously interpreting the flight instruments, he violated the cardinal rule and lost control.

2. The aircraft commander attempted the difficult maneuver of a decelerating, zero air speed pedal turn. This maneuver virtually guaranteed a severe case of vertigo.

3. The pilot failed to take control as soon as it became apparent that control was being lost.

While flight under marginal weather conditions will continue, careful flight planning and cockpit coordination can prevent mishaps of this nature. To accomplish this:

1. Mission permitting, wait for improved weather.

2. Perform a detailed map reconnaissance prior to takeoff. Anticipate the unexpected. Know terrain heights. Know what altitude must be reached to provide terrain clearance. Know how much altitude can be lost before ground collision becomes probable.

3. Agree beforehand that the pilot at the controls will concentrate only on his flight instruments. The other pilot will monitor the instruments and advise when visual conditions are again encountered.

4. Practice instrument flight continuously. Prepare yourself to cope with the unexpected.

In this case "lady luck" prevailed. Let's not rely on her too often.

Last month's issue contained an article entitled "Eleven Steps to Effective Aircraft Accident Prevention" by Colonel Eugene B. Conrad, director, USABAAR. Step 6 of the 11 steps is Adherence to Established Directives. The following accidents clearly support the wisdom of the step.

VIOLATIONS

ACCIDENT NO. 1: A brigade regulation called for a full crew to be aboard all aircraft when flight is anticipated to watch for obstructions and other hazards.

UH-1H pilot: "I was moving the helicopter from a revetment to a larger space between revetments. I brought it to a 3-foot hover, moved out to what I thought was the center line and started a pedal turn to the right.

"I heard a loud noise and immediately lost all antitorque control. The helicopter was leaning to the left and spinning to the left. It turned 360 degrees before I could level it. When I had it level, I split the needles and made a hovering autorotation . . . "

Investigation: ". . . After completing his preflight, the pilot had a ground crewman untie the main rotor blades. The ground crewman stepped away from the revetment, signaled the pilot that the helicopter was clear for starting and began to walk away. The pilot was alone in the helicopter and had no one outside to guide his departure from the revetment. . . . Upon impact, the tail rotor and 90-degree gearbox separated and one of the tail rotor blades hit the left synchronized elevator, ripping a 9-inch gash in the leading edge. The helicopter spun to the right approximately 450 degrees and landed left skid low, spreading the skids.

". . . the pilot exercised poor judgment and the accident was a direct result of his actions. It should be noted there is a conflict between this report and the pilot's statement. He said the helicopter spun to the left after impact with the revetment. The wreckage diagram indicated it spun right. It should also be noted that helicopters under power do not spin to the left when antitorque control is lost. It is believed the pilot became disoriented during the accident sequence and his statement reflects this fact."

Recommendation: "Full crews aboard all aircraft when flight is anticipated to watch for obstructions and other hazards, in accordance with brigade regulations. If no crew is available for repositioning an aircraft, it should be ground handled."

Corrective action taken: "All units will have both the crew chief and gunner aboard aircraft during all flights, except training flights in the local area. Either the crew chief or gunner will be a ground guide for the aircraft every time it is entering or departing a revetment."

Accident No. 2: A UH-1D with a crew of four, eight passengers, 300 pounds of baggage and 1,200 pounds of fuel took off at midmorning for an administrative flight.

Crew chief witness: "I saw it take off. They had to put it down because of bleedoff. They started off again, but had to put it down a second time. They finally got it in the air and took off over the fence. . . . When it started going down, it was around 50 to 75 feet above the trees. . . . As it was falling, it looked as though it was in a vertical descent."

The helicopter had traveled approximately 1,000

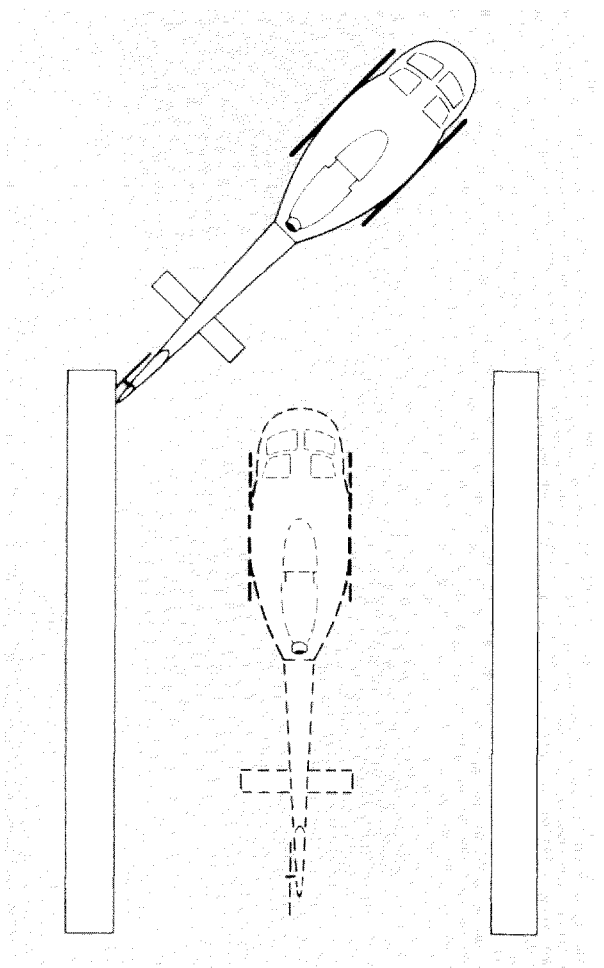
meters from the takeoff point when it crashed. Three crew members and two passengers were killed by impact forces. The remaining occupants sustained serious injuries and the helicopter was destroyed.

Analysis: ". . . From the point where he started his takeoff, the aircraft commander had approximately 125 meters before he had to clear concertina wire 5 feet high. After clearing the wire, it was necessary to clear a berm approximately 7 feet high. Beyond the berm, after another 200 meters, he had to clear a 10-foot fence, followed in 30 meters by 75-foot trees.

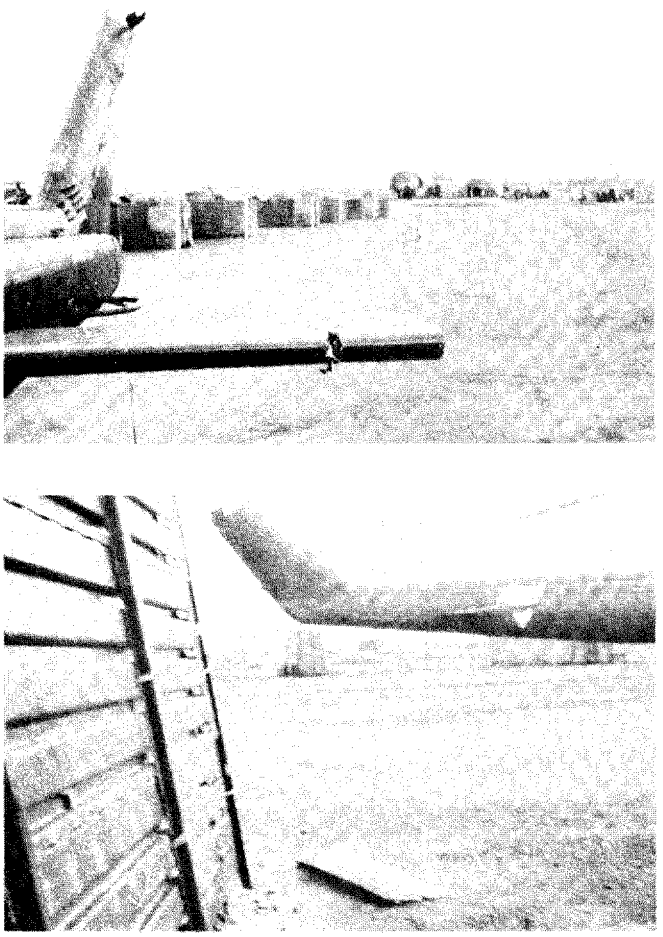
"The aircraft commander who flew the same helicopter the previous day stated it would not hover with 12 persons aboard, plus a full fuel load. He determined this while moving from a refueling point to the parking area late the previous afternoon.

"Once clearing the trees with low rotor rpm, there was little or no chance for the aircraft commander to maintain or regain adequate rpm, due to the uniform height of the trees.

"An analysis of the engine was negative and it was determined that the engine and fuel control were functioning properly at the time of impact. The heli-



Right turn was made before tail rotor cleared revetment



Tail rotor blade sliced through synchronized elevator (top). Portion of tail rotor blade came to rest beside revetment (bottom)

copter was seen descending to the left. . . . Based on the facts that there was no evidence of materiel failure and there was evidence of extremely low rotor rpm at impact, the board concluded the helicopter was incapable of sustaining flight and was out of control at impact."

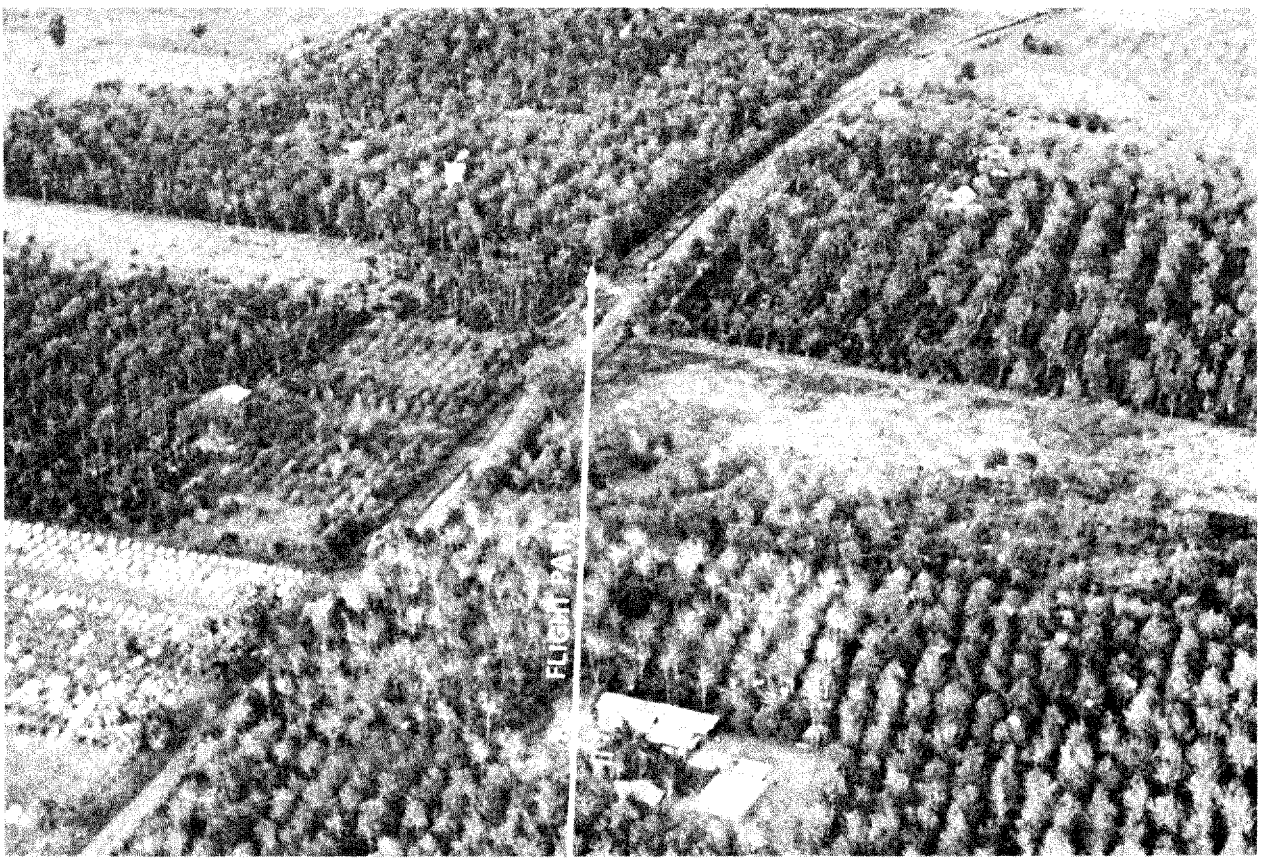
The board found the established cause factor to be the aircraft commander's decision to take off over obstacles with an overloaded helicopter. In addition, it found a violation of AR 95-1. One of the passengers, who was thrown out and killed at impact, did not have a seat in the helicopter and was not wearing any type of restraint. He was seated on a box and the flight surgeon stated: "He should not have been aboard, as there were no seats or protective devices available to him."

Accident No. 3: Command regulation: "Any attack, simulated attack, buzzing, diving out of the sun or hostile appearing acts of any type against ships, small boats, ground positions or other aircraft is prohibited unless specifically directed by this headquarters."

A UH-1D of this command was on a service mission in support of a ground unit involved in a field training exercise. The helicopter was flown to the ground unit command post and landed. Later, it was used to deliver a squad of troops to a field location.

Pilot: "I dropped the squad short and south of their objective, then took off to the north and made a low right turn around the objective. It appeared the squad wasn't reacting fast enough and the sergeant major aboard suggested I keep the personnel at the squad's objective busy and point the way for the squad.

"I started a low pass through the area, holding 50 to 60 knots air speed. Coming through the gully, I



Takeoff flight path was over trees shown in this photograph

began to pull in power to start a slight climb. All of a sudden, it felt like the aircraft fell out of the air. I had made ground contact with a glancing blow. In the excitement of the moment, the copilot pulled the cyclic back with me and we started to climb out. After we were safely airborne, I was told that the skids had been ripped off.

"A check of the instruments and controls led me to believe the ship could be flown home. The copilot flew it back and I landed on the mattresses laid out in preparation for our return."

Copilot: ". . . The pilot had put the aircraft into compromising attitudes which frightened me, but he had always been able to recover before this last maneuver."

Analysis: "The board concluded that the pilot made a tight 360-degree turn at low altitude and air speed. Prior to completing the turn, while still in a steep bank, he lowered the nose to begin a simulated gun run on a troop position. The steep bank, combined with the sudden lowering of the nose in a downwind condition, caused a rapid descent in close proximity to terrain with a rapidly rising slope. Application of recovery power was too late to complete the pullout before ground contact. The mission assigned this helicopter and crew did not authorize an exception to command regulation flight restrictions."

Helicopter was demolished by impact

Flight directives are born from common sense, tests and experience—expensive experience! They are issued for your protection and to protect vital combat resources. You may violate them and get away with it for awhile. But if you continue, sooner or later you'll find yourself up the creek without a paddle, rpm or a place to go. If you're lucky, you'll be around to answer the embarrassing questions that follow.

These directives are sound. They are designed to provide a basis for meaningful accident prevention programs. While most accidents do not prevent the obvious examples of violations presented here, *the majority of our accidents contain elements of flagrant disregard for oral and written instructions.*

As stated in "Eleven Steps to Effective Aircraft Accident Prevention," a good accident prevention program is a function of command attitude, which, if properly emphasized, can permeate throughout the command and down to each aircraft crew member. We must police ourselves and insist on good habits. If an aviator develops a reputation for unsafe flying, his commander should investigate. If command supervision and guidance do not solve an unsafe condition or correct an aviator's poor flying habits, disciplinary action should be taken.

It is not charity, nor is it compassion for inexperience, when we allow a flagrant violation which may lead to more violations and the inevitable accident to go uncorrected. Most accidents really result from supervisory error committed at some time in the background of individuals ultimately involved in mishaps. By winking at poor habits, poor techniques or poor discipline, we allow lax or unskilled pilots to place themselves, their crews and passengers in jeopardy.

Are you doing your part as an aviator, aircrew member, aviation safety officer or commander to call a halt to violations?

PEARL'S

Personal Equipment and Rescue/Survival Lowdown

From Supply Information Letter No. 2-70, 1 March 1970, U.S. Army Support Center, Philadelphia, Pa.

Item 4: Shirt and Trousers, Flying Man's, Nylon Twill, High Temperature Resistant (Nomex) AMXCP-AS

Shirt and Trousers, Flying Man's, Nylon Twill, High Temperature Resistant (formerly designated as Hot Weather Fire Resistant), replaces the Coveralls, Flying Men's (K-2B), FSN 8415-265-7374 series, which will no longer be requisitioned.

Complete initial issue of the new items is not authorized. Therefore, full utilization of all stocks of Coveralls, Flying Men's (K-2B) below DSA Depot level will be effected.

Sufficient quantities of the new Nomex flight clothing to meet all normal replacement demands will not be available until approximately 30 June 1970. Therefore, it may be necessary to delay supply action if demands exceeded the availability.

The Flying Man's, Nylon Twill, High Temperature Resistant Shirt, FSN 8415-935-4891 series, and Trousers, FSN 8415-935-4878 series, are listed as follows in size groups, and will be cited on all requisitions submitted to the Defense Personnel Support Center (RIC S9T):

SHIRTS (14 Sizes)	SIZE	TROUSERS (15 Sizes)
	SHORT	
8415-935-4891	X Small Short	8415-935-4878
8415-935-4894	Small Short	8415-935-4881
8415-935-4897	Medium Short	8415-935-4884
8415-935-4900	Large Short	8415-935-4887
8415-935-6201	X Large Short	8415-935-6206
	REGULAR	
8415-935-4892	X Small Regular	8415-935-4879
8415-935-4895	Small Regular	8415-935-4882
8415-935-4898	Medium Regular	8415-935-4885
8415-935-4901	Large Regular	8415-935-4888
8415-935-6202	X Large Regular	8415-935-4890

	LONG	
Shirt Size Not Procured	X Small Long	8415-935-4880
8415-935-4896	Small Long	8415-935-4883
8415-935-4899	Medium Long	8415-935-4886
8415-935-6200	Large Long	8415-935-4889
8415-935-6203	X Large Long	8415-935-6207

Item 5: Helmets, Flying: Repair Parts for AMXCP-AS

The following helmets are being phased out of the supply system:

FSN	DESCRIPTION
8415-577-4142(s)	Helmet Flying APH-5
8415-782-3036(s)	Helmet Flying APH-5A
8415-782-6350(s)	Helmet Flying AFH-1

Since no further procurement of the above helmets will be made pending introduction of the Helmet, Fliers, SPH-4, it is requested that maximum repairs be accomplished. To assure utilization of existing stocks of repair parts, it is further requested that requisitioners limit requests for repair parts to those actually required for maintenance, keeping reserve stocks to the minimum. Maximum cannibalization of nonreparable helmets should also be effected.

REPAIR PARTS AND SPECIAL TOOL LISTS FOR THE SPH-4 HELMET

Federal Stock Number	Item Name	Part Number	Qty Per Item
8415-490-1196	Visor Assy, Neutral	69C2109 (97427)	1
8475-117-4428	Liner, Regular	68C1839 (97427)	1
8475-117-4429	Liner, X-Large	68C1840 (97427)	1
8475-757-8213	Edge Beading	63A1088 (97427)	1
8475-999-5373	Chin Strap	59B700 (97427)	1
8415-410-4668	Track, righthand	61C846-1-RH (97427)	1
8415-410-4669	Track, lefthand	61C846-1-LH (97427)	1
8415-411-0115	Visor Housing	69C2100 (97427)	1
8415-933-9280	Visor Lock	8-2-184 (81337)	1
8415-490-1197	Visor Assy Clear	69C2110 (97427)	1
8415-410-4664	Headband & Suspension Assy Regular	69C2105-1 (97427)	1
8415-411-0110	Headband & Suspension Assy Ex-Large	69C2105-2 (97427)	1
8415-490-1198	Headband, Front Regular	69B2152-1 (97427)	1
8415-490-1200	Headband, Rear	69B2153 (97427)	1

SURVIVAL PAPER

A Huey lifted off the pad with a crew of four and seven passengers and climbed through warm still air. At 800 feet, the pilot leveled off into normal cruise, relaxed and looked down at the river below. The peacefulness was suddenly shattered by a violent jolt from the rear. Immediately, the helicopter yawed left about 45 degrees. The pilot determined he had antitorque failure and entered autorotation.

The area for touchdown was chosen and all went well, down to about 40 feet. A decelerative flare was initiated and, as the air speed fell off, the helicopter spun dizzily to the right and impacted the ground. It stayed upright, but the transmission separated and crashed through the roof, pinning a passenger under it. Those who were uninjured freed themselves and helped the injured out. Try as they might, they could not move the transmission and free its victim.

A frantic search was made for some form of signaling device. These were no flares, mirrors, smoke grenades, survival radio—nothing except a newspaper. In desperation, they spread the newspaper over the ground, in hopes someone would see it and come to the rescue. An agonizing 2 hours passed before the crew of another Huey spotted the downed helicopter and landed to help. The transmission was lifted and its victim pulled free.

Though other aircraft had been in the area immediately after the crash, the crash site was not seen. Almost any kind of signal equipment would have hastened rescue. Pen gun flares (Signal Kit, Personnel Distress) are authorized one per crew member on flight status. The FSN is 1370-921-6172. It's good advice to get one—regardless of where you fly.

Major Accident? You're Out of Your Mind!

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HOW MANY TIMES have you heard this statement made by an Army aviator who, unfortunately, really felt this way? How many times have you found yourself agreeing with him? For some pilots, this statement is very easy to accept. It generally stems from a lack of understanding about how mishaps are classified. Let's take two hypothetical and relatively similar occurrences and talk about them.

Assume we are talking about a UH-1 that has just sustained a relatively hard landing. The pilot shuts the helicopter down and, while making a visual inspection, discovers obvious damage to the landing gear. Possibly, in his estimation, he has spread the cross tubes slightly and the damage doesn't appear too bad, but it still has to be written up. At this point, the pilot has already made his own assessment of the damage. Maintenance and safety personnel—these are the people charged with the responsibility of classifying the mishap—haven't had time to determine exactly what they have on their hands.

One hour later, a similar mishap occurs. The pilot experiences a hard landing and discovers bent cross tubes during his visual inspection. Safety is again on the scene, and the process of classification is once again the name of the game.

When the pilot of the first helicopter is told to report to the flight surgeon and the pilot of the number two helicopter is returned to his organization, this becomes a point of confusion to the vast majority of flying personnel. How can one of these mishaps be a major accident and the other an incident with negligible damage? For all practical purposes, they both looked similar and the obvious damage appeared to be the same.

The aftermath of these two situations resulted in the pilot of the number one helicopter honestly feeling that someone was out to get him. And you can bet that when he had an opportunity to tender his opinions to a group of sympathetic aviators at the club, there was no doubt in most of their minds that someone was really after him.

Classification of aircraft damage is covered in AR 385-40. It is specific about the number of man-hours that can be expended to repair an aircraft and about which components are involved in determining the proper mishap classification.

First, aircraft fall in specific categories and, generally, the more complex the equipment, the more man-hours there are that can be expended on repairs before the mishap is classified an accident. A good

example is the CH-47. If incident damage occurs, providing no changes of major components are involved, up to 150 direct man-hours can be expended before it falls into the minor accident category. If an OH-13 requires the same number of hours to repair the damage, we're involved in a major accident.

One of the more complex problems facing an individual classifying a mishap is hidden damage. Obvious damage can be pinpointed and, in many cases, the man-hours involved can be called to the nearest 30 minutes. But, in cases of hidden or concealed damage, it could turn out to be another story. At this point, the person classifying the damage may have a tiger by the tail, but he still has to call his shots correctly. In many cases, where a mishap has occurred in the field, it may be necessary to bring the aircraft back to home base, jack it up and partially disassemble it before a true assessment of the damage can be accomplished.

When a situation such as this arises, complications are bound to develop. In one case, after a mishap occurred, the pilot was back flying before it was determined that major damage existed. Nevertheless, he still had to be called in and told to report to the flight surgeon for his postaccident physical. This generates much screaming and gnashing of teeth. Hence, the statement—"You're out of your mind!"

Prompt and accurate classifications prevent distasteful situations from arising. It should be remembered there is a difference between premature estimates and classification. If, in a sincere effort to get the job done, the person responsible for classifying a mishap fails to thoroughly evaluate the situation and comes up with an erroneous man-hour estimate, he has created a monster that is tough to cope with. This situation presents as many problems as late classification.

Let's take another look at the two mishaps previously described. In the case of helicopter number one, several complications can conceivably, and very often do, exist. To the layman, the obvious damage to the skids and cross tubes is very often the extent of his evaluation of the damage. But an experienced investigator has to go further. Airframe warpage may exist and could appear quite obvious to him. In this situation, possibly the cargo doors don't close properly. Or, when the doors are closed, he may see daylight at the top and not at the bottom. Because this exists, it does not necessarily indicate that warpage is present and rejigging is necessary. For all he knows, maintenance may have put the cargo doors from another helicopter on this UH-1, for some reason known only to maintenance. Therefore, the records must be screened and a measurement process begins.

Disregarding the doors, is the airframe properly lined up? Are any stringers or main support members buckled? Did the cross tube flex into the bottom of the airframe and cause hidden damage? This often exists and must be followed up. After opening the inspection doors, a major component may have had major damage and must be replaced.

To illustrate a point, let's say the airframe in this particular case is twisted and requires rejigging. The man-hours involved in accomplishing this, usually at depot level, exceed allowable man-hours stipulated in AR 385-40. We have a major accident. At this point, the helicopter is turned over to the aircraft accident investigation board and we have a thoroughly confused and irate pilot who feels the whole world is against him. He knows what he saw when he inspected the obvious damage to the aircraft after his hard landing. In most cases, his anger stems from the lack of knowledge on his part about how an accident or incident is classified and what criteria are used.

Rather than make his appearance in front of the accident investigation board, pilot number two appears before his commanding officer and tells him the story. A DA Form 285 is generated, indicating the corrective action contemplated to prevent further incidents of this nature.

To further complicate our case in point, can you imagine the feelings generated if both pilots were from the same flight and both mishaps occurred about the same time, with each pilot having the opportunity to look over the other's helicopter? It would be tough to explain the validity of the assessment of damage, unless both of them were reasonably knowledgeable about the contents of AR 385-40 and understood the classification criteria.

We have been referring to a hypothetical situation, but don't believe for a minute that this can't happen. It can, does, and will continue to do so as long as Army aviators don't take the time to read and understand the ARs that govern our flying activities. Unit safety officers have this information available. A visit to his office will generally clarify this situation. Every aviator should acquaint himself with these regulations. It just makes good sense. You wouldn't drive your car without knowing the ground rules. Why try it when you fly?

USAASO Sez

The U. S. Army Aeronautical Service Office discusses

Abbreviated Instrument Flight Rules Departure Clearance: A new procedure to simplify IFR departure clearances, approved by FAA and DA, was implemented on 1 July 1970. "Cleared as filed" replaces the ATC clearance and "Via flight planned route" procedure.

To ensure success of the program, an accurate relay of information between pilot and controller must be established.

a. Pilots should:

(1) Include specific SID/transition and preferred routes in flight plans.

(2) Request route/altitude verification or clarification from ATC if any portion of the clearance is not clearly understood.

(3) Use the following procedure when establishing contact with the facility concerned: State aircraft identification, location, type of operation planned (IFR) and point of first intended landing.

Examples: (a) "Cairns clearance delivery, this is Army 76542 at ramp three, IFR to Davison AAF."

(b) "Cairns ground control, this is Army 76542 at ramp three, ready to taxi, IFR to Davison AAF."

b. ATC facilities will issue an abbreviated IFR departure clearance based on the route of flight **filed in the IFR flight plan.**

c. The destination airport will not be stated in the clearance. The clearance as issued will be considered as a clearance to the destination airport filed in the flight plan.

d. A specific SID filed by the pilot, including a transition route if appropriate, will be considered part of the route of flight. ATC may specify an SID if not previously filed.

e. ATC may clear an aircraft with an SID which differs from that filed.

f. Enroute altitudes filed in the IFR flight plan are not part of the abbreviated flight plan program. In all cases, the assigned enroute altitude will be stated in the clearance. **It may or may not be the same as requested.**

g. In a radar environment, the controller will state "Cleared as filed" and:

(1) Specify the assigned altitude and any additional instructions or information to clear a departing aircraft via the SID and route filed. Example: "Army 76542, cleared as filed, maintain 5,000, report leaving 3,000."

(2) If unable to approve the filed SID, assign an appropriate SID and specify the assigned altitude and any additional instructions as information. Example: "Army 76542, cleared as filed, except change departure to read 'Clayton Four departure, maintain 5,000.' "

(3) If necessary to make minor revision to the filed route, specify the revision, assigned altitude and additional instructions or information. Example: "Army 76542, cleared as filed, except change route to read 'V-241W Columbus.' "

h. In a nonradar environment a controller will:

(1) State "Cleared as filed."

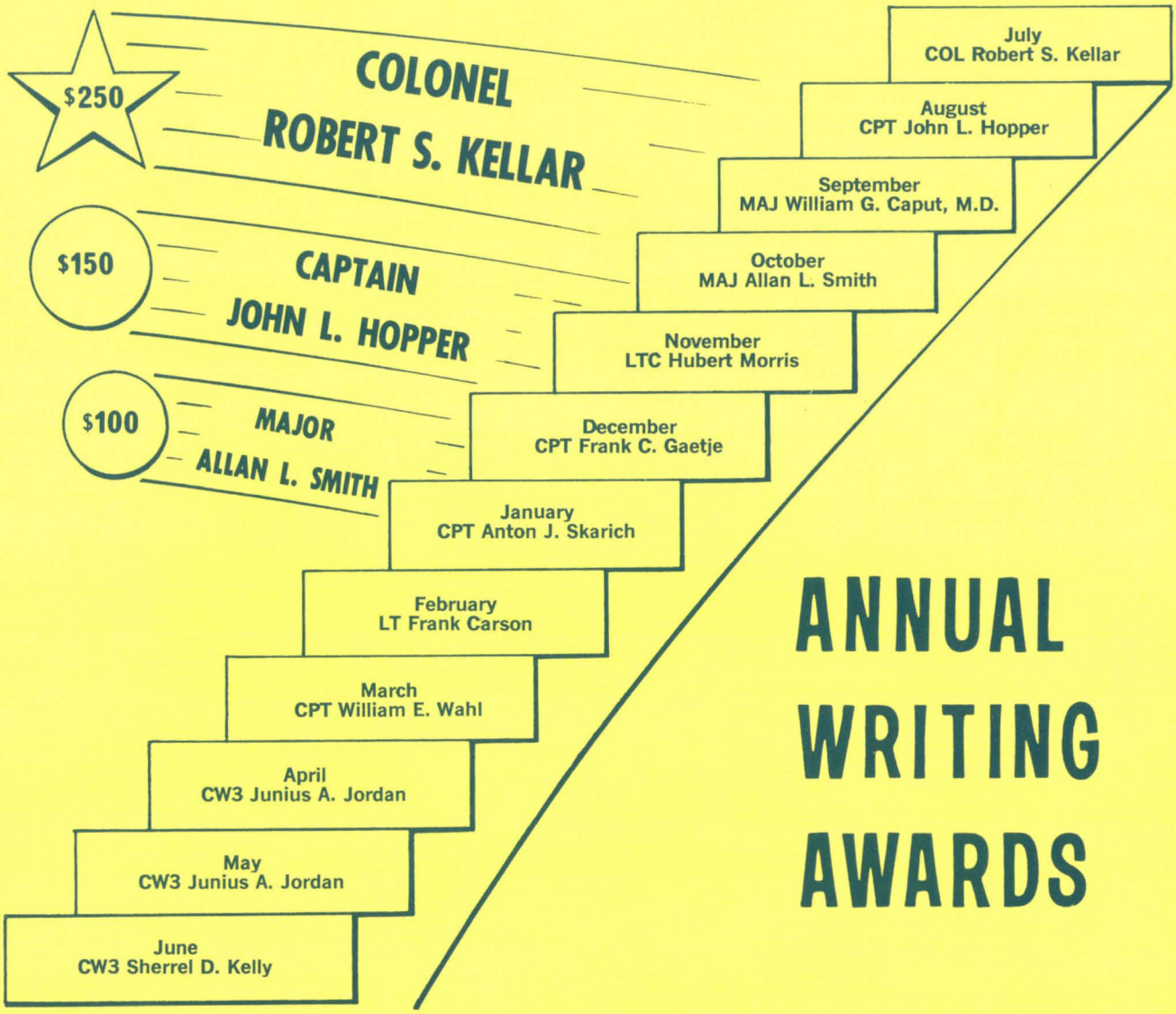
(2) Specify one, two or more fixes as necesarry to indicate the direction of flight.

(3) Specify altitude and additional instructions or information.

i. ATC will issue a detailed clearance when requested by the pilot.

j. Action has been initiated to include "Cleared as filed" procedure in the IFR Supplement, Special Notice Section and FLIP Planning, which was scheduled for publication on 25 June 1970.

Hey Controllers! We still haven't heard from many of you about the "saves" we asked you to send us last March. It's important that credit be given for aircraft saves, so send them to USAASO, Cameron Station, Alexandria, Va. 22314.



ANNUAL WRITING AWARDS

YOUR NAME COULD be among those listed in the winner's circle if you submit an article for the AVIATION DIGEST's tenth annual writing contest beginning this month. Each month the author of the article selected as the best of that issue receives an engraved plaque and a cash award of $25. From these monthly winners, the three best articles of the year are selected for prizes of $250, $150 and $100 respectively. Winners of the monthly awards as well as the top three prize winners for 1969-1970 are listed above.

To be eligible an article must be original and concern Army aviation or related subjects. Dual authored articles are not eligible for the contest, but this rule does not prevent their selection for publication. Authors of published articles will also receive credit in their 201 file.

Winning articles are selected by judges who review the manuscripts in original, unedited forms without bylines. Selection is based on accuracy, completeness, originality, readability, soundness, substance and overall merit.

Authors should include pictures, diagrams or charts available or necessary to illustrate manuscripts. Your articles should be submitted to: Editor, U. S. ARMY AVIATION DIGEST, Ft. Rucker, Ala. 36360.

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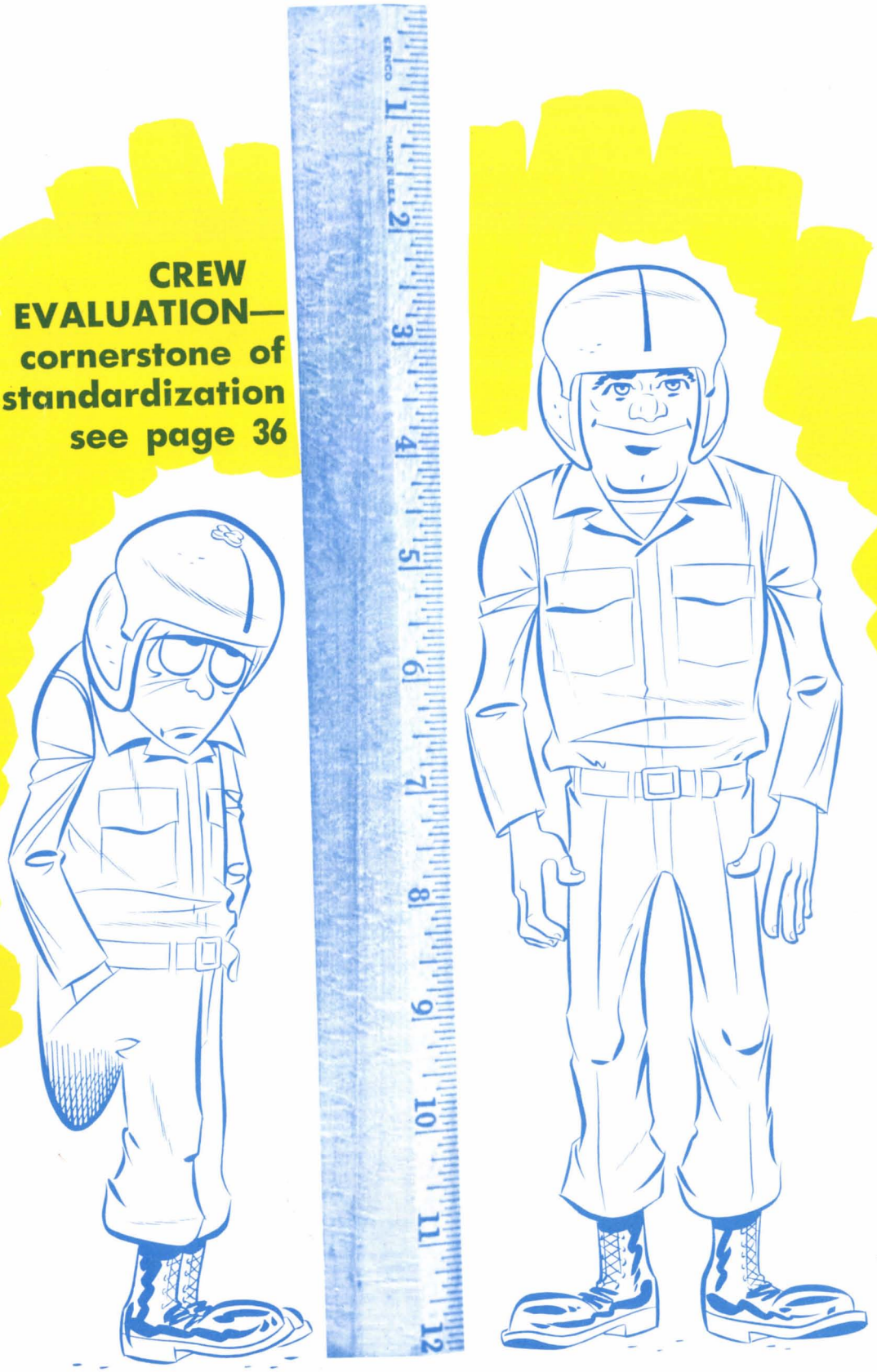
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