UNITED STATES ARMY FEBRUARY 1966

AVIATION DIGEST

AIRMOBILE PATHFINDERS Pg. 2

UNITED STATES ARMY AVIATION DIGEST

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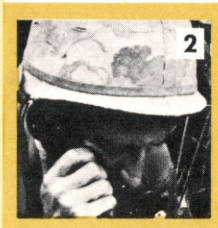

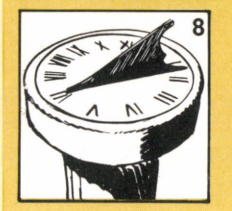

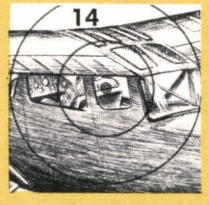

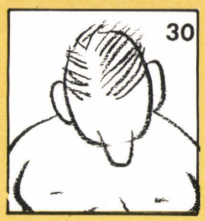

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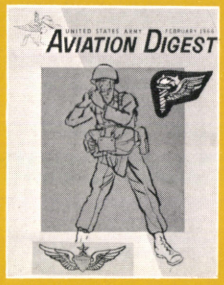

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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

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LETTERS

Col Francis M. McCullar, author of "Little Ole Watermaker Me!" which appeared in the October 1965 DIGEST, received the following letter which he brought to our attention:

Dear Col McCullar:

I read your recent article on "Little Ole Watermaker Me!" Having an M.S. degree in Botany and Zoology your article was of interest. Survival, especially the utilization of wild plants, has been my hobby for some years.

It would appear to me that your title "Little Ole Watermaker Me!" indirectly told a deeper story than the article did.

Is it not true that the amount of water that could be made available would be greatly increased by one saving his urine for deposit only along the sand bank underneath the plastic sheet? If it is a case of condensing and evaporating, all the impurities in urine should be removed and only distilled water provided.

If this is true why was not such a suggestion made in your article? Niceties are fine but survival is a matter of life and death. I think this is a very important point to make and it could increase many times the amount of distilled water available.

COL. WILLIAM D. DUNCAN
U. S. Army Attache
Ottawa, Canada

The suggestion in the letter had been discussed by several who experimented with the water still at Fort Rucker. The editors felt that the point expressed in Colonel Duncan's letter would be realized by the reader from the following sentence which appeared in the article: "If salt, brackish or polluted water is available, it can be poured into the hole and will be distilled into drinking water." However, Colonel Duncan's point is well taken and both Colonel McCullar and the DIGEST staff feel it should be passed on to our readers. Incidentally, one who had been discussing this point during experiments banteringly observed that if he were one of several in such a survival situation he'd want his own private still.—Ed

Sir:

In reference to the article written by Lt Col John G. Cleveland, "Professionalism," in your October 65 issue, the article was interesting and inspiring, but only to a point. Considering that this article won your Monthly Award toward the Annual Award Contest, I believe one correction should be made in order to retain the continuity of thought on "Professionalism." The mistake I'm referring to completely destroyed the theme and professionalism of the article. I lost all confidence in what the author was trying to put across. Now whether this was his mistake or yours as the publisher, it still destroyed the subject. The mistake I'm referring to is on page 4 under the paragraph titled "Quality Maintenance." Lt Col Cleveland refers to the most current and up to date manuals for our operators and crewchiefs and mechanics, and he refers to the most important of these manuals erroneously. I quote "DA Pamphlet 750-38 the Army Equipment Records System." Of course we all know that it should be TM 38-750, but how did this slip by? Was professionalism used in writing and publishing this Award Winning Article? I hope you see my point. I believe that anything written on a type of perfection must be perfect in itself. And I believe that professionalism is truly a form of perfection. What can be done now that this mistake has reached all your readers? How can the point of the article be rehabilitated to put across what it was meant to? Is it forever lost to all those readers who discovered this error?

2/LT JOHN P. EGAN
Executive Officer
Headquarters and Headquarters Co
2d Brigade, 4th Infantry Division
Fort Lewis, Washington 98435

While we readily agree that perfection is the aim to which professionalism points, none of us is perfect. We're sure the lieutenant will agree if he'll reread page 4 of the October issue. The colonel refers to DA pamphlets not technical manuals.—Ed

Sir:

In the December issue of Aviation Digest, Major James R. Barkley has an article of utmost importance in that he points out the correct way an ASTA Platoon should be utilized in periods of darkness and poor visibility. However, he has lost one cardinal point. In clear weather IR and SLAR will never substitute for results of visual and photographic missions. It is recognized that imagery will take a short time to develop, but when available it can positively identify activities and equipment. SLAR will give an indication of activity which must be confirmed and if IR is used identifications are possible only under optimum conditions. Also in fair weather more accurate and most rapid sightings can be reported by the observer which each aircraft carries.

LT COL JAMES M. SCHROEDER
203d Military Intelligence
Detachment (Corps)
Fort Hood, Texas

Sir:

I would like to congratulate you on the fine article in the November 1965 issue of the Aviation Digest called "By-The-Book Sense." It is one of the finest I have ever read. Since it is equally important for our mechanics and pilots in the Navy, I have taken the liberty to reprint it here at the Naval Air Station, Brunswick and distribute it to all of our people.

Thanking you again for your great interest in safety and perhaps saving us some problems.

R. E. ERICSON, Lt, USN
Aviation Safety Officer
U. S. Naval Air Station
Brunswick, Maine

Sir:

I have recently read with great interest the article entitled "Are You Confused?" dealing with MIL-L-22851A lubricants for Army aircraft engines. The author, Major Howard (Rip) Collins, has certainly done an outstanding job of explaining a most confusing situation. To someone not versed in the field of military specification lubricants, the changeover from the MIL-L-6082

Continued on page 10

Airmobile Pathfinders

Richard K. Tierney

UNTIL RECENTLY most U. S. Army pathfinder techniques were designed to support small units. But 11th Air Assault Division pathfinders soon found themselves engaged in large scale (company and battalion) operations.

Proceeding on a "live and learn" basis, the division's pathfinders worked closely with the pathfinder school at Fort Benning, Ga., to develop new techniques.

The biggest change was ensuring that pathfinders were aviation oriented as much as ground oriented. This was accomplished primarily by attaching the pathfinders to the aviation units they supported. Previously pathfinders were located at Army level.

When the 1st Cavalry Division (Airmobile) was formed the 11th Air Assault Division pathfinders were carried over within the aviation group. Organized as a platoon, it consists of a headquarters with 1 officer and 1 enlisted man, and four detachments, each with 2 officers and 13 enlisted men. On the TOE the pathfinder platoon appears under the group's Hq & Hq Company.

Ordinarily each pathfinder detachment is attached to one of the group's three helicopter battalions to provide direct support, while the fourth provides general support to the group.

For flexibility the pathfinder detachments are attached rather than organic to the helicopter battalions. Any detachment can be instantly pulled from the battalion it supports and redeployed for short term operations elsewhere. For example, a detachment might be needed to support another already committed, or perhaps to set up and operate a fixed wing airfield for CV-2s supporting the division. In Air Assault II maneuvers CV-2 airfields were set up 37 times in 30 days. Frequently it was necessary to pull pathfinder detachments from battalions to get the job done.

Redeployment of detachments is done through the platoon commander, who is chief advisor on the pathfinders' capabilities and deployment. In addition to operations, platoon headquarters is responsible for administrative matters, discipline, and training of pathfinder detachments.

CAPABILITY

The pathfinder platoon provides navigational aid ground facilities to assist Army aircraft operating in friendly, enemy threatened, or enemy held areas. Upon receipt of a mission the pathfinder commander involved establishes liaison with the commander of the unit he is to support. If the mission is in support of a helicopter battalion, it is almost certain to be a night operation, since rotary wing aircraft can vector themselves or use an observer aircraft to locate the objective area in the daytime. To exploit the element of surprise offered with night operations, helicopters usually need personnel on the ground for vectoring.

While the pathfinder team is alerted and prepares its equipment for the mission, the landing and/or pickup zones (LZ or PZ) are selected to support the ground tactical plan. If possible ground, aviation, and pathfinder unit representatives make a visual aerial reconnaissance of the objective area. If time is short, photograp

and maps are used. Also, if conditions allow it is helpful to coordinate details of the entire mission before embarking.

Every effort should be made to be sure that key pathfinders are *fully* briefed on LZs, PZs and alternates, checkpoints, time schedules, alternate plans, emergency procedures, maps, terrain, weather, enemy positions, etc. This is extremely important since the pathfinders vector the troop-carrying aircraft. Depending on enemy activity and other situations, pathfinders must be able to wisely make an assessment for the CO whether to continue, hold, or abort the mission as it progresses. Their decision *has to be right* because any mistake could be extremely costly in lives and materiel—and to the overall tactical situation.

While key pathfinders should be fully briefed, it must also be remembered that security is a prerequisite to a successful operation. Certain people need be told only a minimum amount of information to successfully complete various phases of an operation. Those who must be fully briefed should be isolated before the mission for security reasons.

Pathfinders may get to the objective by parachuting, swimming, walking, rappelling, or preferably landing by aircraft. Usually pathfinders received only a short lead-time of 1-3 hours to prepare for missions during Air Assault II manuevers. Consequently, pathfinders were airlanded about 90 percent of the time. Airlanding also allows more personnel to be placed into a given area and greatly reduces assembly problems.

For security the pathfinders preferably are placed about 1 mile from the objective area and work their way in on foot. If it is necessary to land in the actual objective area, the enemy may be deceived by making several diversionary landings.

If secrecy is essential, and time permits, pathfinders can be parachuted into or near the objective area (each member of the detachment must be a qualified parachutist). During 1964 maneuvers one pathfinder group parachuted into a swamp within the lines of an "enemy" battalion. It took over an hour to regroup, but the pathfinders were not detected and the mission was a success.

Only enough people are placed into the objective area to do the job. Usually three or four people operate most effectively. If needed for security a squad of infantrymen may accompany the pathfinders, but then the problem of hauling in big loads arises. Sometimes artillery, armed helicopters, or tactical air support may provide needed security.

The pathfinder detachment might also be augmented with additional personnel if radiological surveys are needed, major obstacles have to be removed, or if help is needed to carry and operate radios or other equipment not generally carried by the pathfinders but needed to accomplish the mission.

New techniques plus lighter and better equipment evolved from Air Assault Division tests allow each pathfinder detachment to airland an entire helicopter battalion—48 aircraft at once or 3 separate companies of 16 aircraft each.

Two PRC-25 radios (each weighing about 22 pounds) are carried into the LZ. They have a range of at least 15 miles, which is a considerable improvement over the PRC-10 which had a

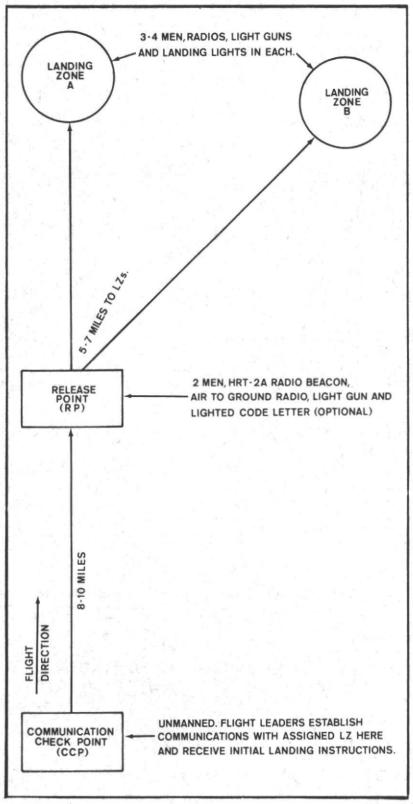


Figure 1

range of 8 miles at best. The PRC-25 enables the release point (RP) and communications check point (CCP) to be placed at greater distances from the LZ than was possible with the PRC-10 (fig. 1).

Other visual and electronic communications equipment used by the pathfinders include HRT-2A homing beacons (fig. 2) which are set up at the RP, anemometers for measuring wind velocity and direction (fig. 3), glideslope indicators (fig. 4), light guns (fig. 5), and landing lanterns (fig. 6).

SETTING UP

Upon arrival in an LZ, the pathfinders quickly establish a control center (CC) and begin running cross-checks on information obtained from reconnaissance (wind, best approaches, etc.). During Air Assault maneuvers major changes occurred two or three times before the aircraf arrived.

Prior to Air Assault maneuvers pathfinders used one central control center to handle all of the LZs in an objective area. Each LZ would relay information to aircraft through the main center. Now each landing area has its own CC and deals directly with the approaching aircraft. Such a control center can consist of one man with a radio, a flashlight in his back pocket, and a few flares.

The CCP (fig. 1) is usually unmanned and located 8-10 miles from the release point. Here approaching aircraft first establish contact with the CC via PRC-25 radio. If the flight is on the deck, radio contact can be relayed through an airborne CP or the release point.

The flight is given landing instructions or can be held up at the CCP in event pathfinders in the LZ encounter problems, such

Figure 2. Homing beacon

Figure 3. Anemometer

as enemy action. If the mission proceeds there are about 10 more miles to cover to the RP. Meanwhile flight leaders and pathfinders can think things over and make changes if necessary. (Traveling at 90 knots does not leave much time for changes. This is one reason 11th Air Assault Division pathfinders moved the CCP and RP farther out from the LZ.)

The RP is the final navigational check point. It is manned by two pathfinders and ideally located 5-7 miles from the LZ (fig. 1). It is equipped with the HRT-2A beacon, an air-to-ground radio, the SE-11 light gun, and (optional) a lighted code letter system.

The pathfinders try to get the RP within 15-20° of the required landing direction, because flights in large formations must hold turns as shallow as possible. It also helps if the CCP is located in line as much as possible.

At the RP the flight is given final instructions or held up if necessary. Once beyond the RP it is extremely difficult to abort or alter plans. Responsibility for the success or failure of the mission could easily rest with the pathfinders' decisions at the RP.

LANDING AIRCRAFT

As a flight approaches the LZ one aircraft will have a light on. Observing the light the pathfinders will guide the flight in by voice contact over the PRC-25 (turn right, left, etc.). It is also possible to vector the flight in with the light gun, through use of the control ship, and with the glideslope indicator. When needed, obstacles can be marked with hooded red lights turned on at the last moment. But it is wise to use as few lights as possible, thus increasing security and lightening the pathfinders' load.

Landing lights are set up in accordance with aircraft formation and are color coded to correspond to colors assigned platoons (yellow, white, green, and orange; red should only be used to mark obstacles or for emergency conditions).

Pathfinders may establish some assembly area aids (such as lights) for debarking troops. This is not usually done since it is a platoon leader's responsibility to get his troops moving in the right direction. However, the pathfinders may remain to assist with air traffic control, communications, security, etc.

Only a helicopter mission has been discussed. However, pathfinders use much the same general techniques in establishing and operating fixed wing landing zones. Also one pathfinder detachment can set up and operate three low level extraction (LOLEX) sites simultaneously.

Although pathfinders are not usually rated, they have much in common with Army Aviation personnel. They live and work together and are developing a solid foundation of mutual trust and admiration that will greatly enhance the successful employment of the Army's airmobile concepts.

Figure 4. Glideslope indicator

Figure 5. Light gun

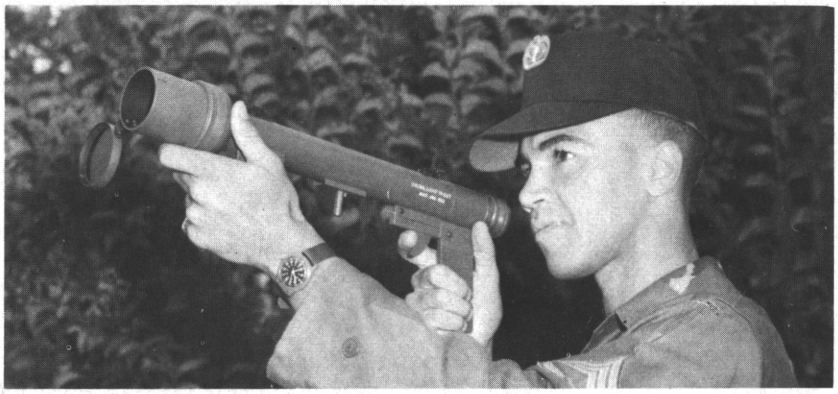


Figure 6. Landing lantern

Leber and the Moonshiners

IN PERFORMING their public relations duties, a general frequently travels to places not the usual stomping grounds for the military. If you are on good terms with his pilot, sometimes you can go along.

So it was in this case. The general was going to a nearby seaside resort to speak to the local Junior Chamber of Commerce. He would arrive there Tuesday morning and leave that afternoon. His U-8 pilot was Capt Rick Walters.

When Lt Joe Leber heard that his friend was flying the general, he immediately convinced himself that he had been working too hard and needed a rest—preferably one by the seaside. Of course, one day was not enough so he left a few days early and would return with Rick.

To cinch the deal, Joe promised to meet Rick at the airport Tuesday morning and take him swimming while the general made his speech.

At the appointed hour Lieutenant Leber was there along with the Jaycee reception committee in time to see the spirited U-8 come in. Rick is a past master at making soft landings, which probably accounts for his being selected to pilot generals so often. But this time he outdid himself, landing so lightly you never knew when he first touched ground.

Lieutenant Leber, expecting to see the beaming, happy face of his friend, was surprised by a pair of staring eyes in a face as white as the proverbial sheet. The general also looked like someone who had felt the cold breath of death.

"What happened?" Leber asked.

"Come over here," Rick said, grabbing Leber's arm and pulling him away from the reception committee.

When they were far enough away that they couldn't be heard, Rick said, "The General doesn't want it generally known just yet but we were shot at on the way here."

"You kiddin'?"

"No, I'm not. One bullet hit the windshield right in front of me. Must have been a glancing blow 'cause it didn't go through, thank goodness."

"But who'd shoot at you here in the United States? Now in Vietnam or . . ."

"Oh, not that kind of firing."

"Someone trying to shoot the general?"

"No."

"Well, what then?"

"Moonshiners."

"Moonshiners?"

"Yes, moonshiners. On the way here we passed over a big wooded area. You know how the general is. When he's not on duty he's hunting. Lives and breathes it. When he saw those woods we just had to go down close to look for deer. Then it happened. Didn't hear the gun of course but the airplane was peppered with shot of some kind."

"Penetrate?"

"Yes, I took a quick look as we disembarked, and some of the holes are big enough to put your finger into."

"What are you going to do?"

"I've got to call back and report it. They might have to send us another plane. Don't think this one is safe to fly back."

He paused for a few seconds as if thinking and then said, "Look, Joe, you're good at this sort of thing. Help me look over this bird so I can tell them at the post just what happened. They'll be full of questions and I don't want to give them halfcocked answers."

By this time the general and the Jaycee reception committee had gone. Leber went over to the airplane. On the port side there was no damage. But on the starboard side there were several holes. Most of them were in the forward baggage and avionics area. Lieutenant Leber looked at these very carefully, and as if to confirm Rick's statement he put his little finger in one of them.

"What kind of gun do you

think it was?" Rick asked.

"Looks like an old blunderbuss loaded with nuts and bolts."

"What?"

"Look, Rick, you were peppered only once, right?"

"Yes."

"And if it were a shotgun the pellets would make little holes, not big ones like these."

"O.K. I'll buy that. But don't tell me we were hit by shrapnel."

"Well these moonshiners are pretty tough babies, but I don't think they are using artillery. No, it's got to be something else."

With that Lieutenant Leber opened up the baggage compartment and stuck his head inside. He grunted and picked up a small piece of metal from the floor of the compartment. After examining it a second he stepped back and looked at the leading edge of the wings. Then he went over to the starboard engine. He ran his hand over the propeller and then examined the airscoop.

"Rick, did you preflight this thing?"

"Sure."

"How about the airscoops?"

"They were there."

"I know that, smart guy, but did you examine them carefully?"

"Well, I looked at them as I went by. Nothing was blocking the filters."

"But you didn't put your hand inside to see if anything was there?"

"No, I guess I didn't."

Holding up the piece of metal, Lieutenant Leber said, "This is one of the bullets. It was your airplane that did the shooting, not moonshiners. The bullet is a piece from a pair of pliers. I'd say some mechanic laid it in the airscoop. The airscoops on this model make handy shelves when you're working on the engine. That's why you should put your hand in and feel, especially if the light is bad as it must have been this morning when you left.

"As long as you flew level or noseup the pliers stayed right there, but the minute you nosed down it allowed engine vibration to more easily move the pliers forward. When they fell they hit the propeller. There are knicks and gouges on two blades to prove that.

"Pliers the Army buys are usually made of drop forged steel but they won't stand that kind of treatment. When they hit the propellers, they shattered and were thrown sideways.

"Now, the way the propellers on the U-8 revolve, if the pliers had hit the port one they would have been thrown clear of the aircraft. But on the starboard side they would be thrown into the aircraft. So you get damage in this area only.

"I can even tell you what kind of pliers they were. Most combination pliers have slip joints which allow the jaws to open wider. They're the most common type. But diagonal pliers don't have slip joints and are round on top and flat on the bottom. This metal is part of the joint. You can see it's not a slip joint and is round on top and flat underneath.

"Diagonal pliers are ideal for pulling and replacing cotter pins. I bet when you get back you'll find that the mechanic who left the pliers was replacing a cotter pin."

Rick looked at the metal, turning it over in his hand very slowly. Then he said, "And I had the general thinking the moonshiners were after him."

The Fateful '40s

William H. Smith

AS THE FIGURE 50 begins to come up on the speedometer of my life, I feel an uncontrollable urge to advise you youngsters just reaching the "fateful 40s," hoping to ease you over the bumps a little.

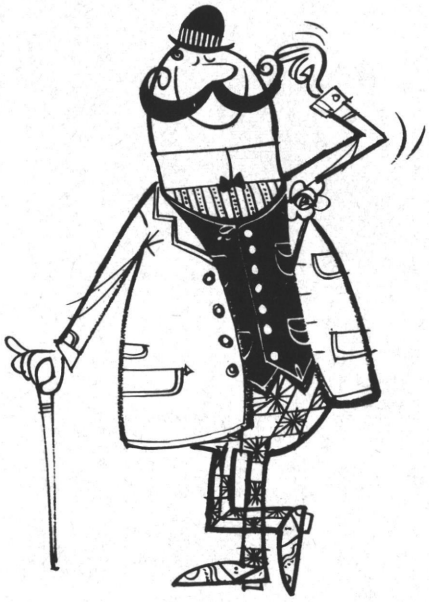
The period between 40 and 50 years is one of the most significant of your life and ranks in importance just a little short of the years around your 21st birthday. As you enter the 40-50 year period you are an old-young person. As you leave it you are one of the young-old.

During this 10-year period you will find certain changes in the attitude of the people around you. The younger generation (anyone 39 or younger) will become solicitous towards you and help you into the aircraft or offer to do the stooping and bending at preflight. With a wistful look in their eyes they will ask about your retirement plans. They will assume that anyone who has been flying as long as you must know a lot and will ask your advice on many subjects.

More and more you will be referred to as an experienced aviator, but only occasionally will some inconsiderate person call you an old pilot. Your copilot will ask permission to take over the flying more often and will become very interested in carrying out the landings.

Before the 10 years are up you will notice that your appearance will be smart only in a baggy

After 40 your waistline will show need for a slenderizing program—diet plus exercise



sort of way. Your uniforms will get smaller. Room for improvement will appear around your waist, and you will create an unfavorable impression on the cushion of your chair. You'll also notice that the older you get, the thinner and younger others look.

Essentially you won't be a player of games anymore, but will join the ranks of the spectators. The younger men will stop asking you to substitute on the bowling team. In your younger days, swimming was fun. It gave you the chance to show off your manly physique. Now the physique is gone and swimming will be just too much trouble. On the other hand, golf will become more and more suited to your physical abilities and new found dignity.

Other changes won't be so apparent. You'll still want a new car when they come out, but your tastes will be more conservative (or you'll go to the other extreme and buy flashy convertibles). Television shows that interested you when you were 39 will still interest you when you are 49—except now you will find time to look at the old movies (if you can stay awake that long). You'll have a new idea once in a while but it will take longer to understand the ones that are not yours.

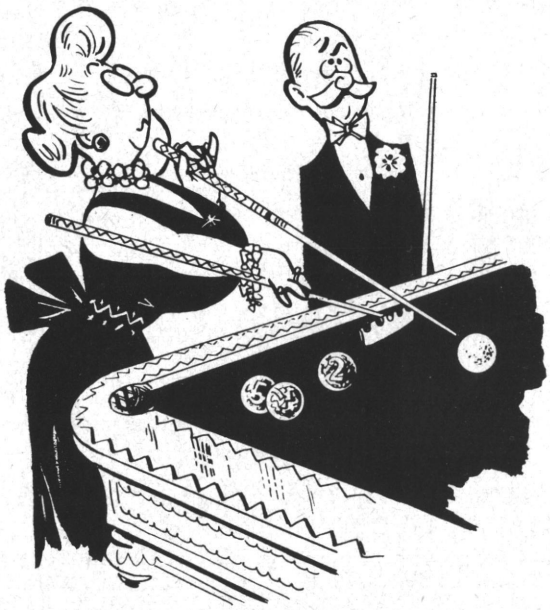
The girls in the office will still be just as pretty, but you will notice that they seem to be getting younger and younger—even though their average age will be the same.

To keep your friends (including the girls at the office) from thinking you are ancient, there are certain do's and don'ts you must follow. For instance, don't make the mistake of talking too much about the past, such as when Junior was a baby or about your adventures in World War II. Don't

After 40 you'll want to buy a new car every year

Swimming used to give you a chance to show off your manly physique. Now?

Don't recall the days Junior was a boy



Moderate exercise is the order of the day

catnap at your desk at lunch time and for goodness' sake don't smoke a corncob pipe.

Keep your desk free of APCs, "Tums," family pictures, wartime souvenirs, little black books full of outdated telephone numbers, and old cigar butts.

Control your waistline by exercising moderately. In this effort keep up with the youngsters only in the tales you tell. When you use the stairs run (down only, of course). Buy a new tennis racket and show it to everyone at the office. When they have seen it, give it to your daughter as a present (this suggestion gives you double for your money). At the club dance get up and do the jive, dog, watusi, swim, pony, or whatever is popular at the moment. It doesn't matter if you don't know how. Just jump up and down or shake real good, and you've got it made. Better still, play a cool game of billiards.

Buy yourself a boat and parade it around the post every chance you get (this suggestion for the few remaining bachelors—and married men with no children in college).

In your conversation, keep up to date on the latest expressions. No specific examples are possible here because they change so often.

Well, freshmen "40 lifers" there you have it from an old pro. These suggestions won't entirely cure your age troubles, but follow them and you'll get through the next 10 years. I did.

Letters

Continued from page 1

1965 Annual Index Now Available
Write Editor-in-Chief, U.S. Army Aviation Digest
Fort Rucker, Alabama 36360

Grade 1100 oil to MIL-L-22851A Type 11 oil has posed many perplexing problems to Army Aviators, especially at civilian and other than Army airfields.

As an employee of a large west coast manufacturer of military specification lubricants, I can only say that Major Collins' article is correct in every sense, including his assumptions. His research into the problem reflects a great deal of depth and awareness of a rather confusing situation. The article is likewise presented in a most meaningful and descriptive manner which can be readily understood by all interested personnel.

RICHARD A. DEMMER
Aviation Officer
Hqs 40th Armd Div Arty
Calif Army National Guard

Sir:

In your December issue, you have two consecutive articles outlining correct and incorrect emergency procedures for the U-6A. Under the heading "Emergency Procedures—Right Way," the pilot makes this statement: ". . . the surface wind was from 240° at 10 knots and I landed on runway 32. As we touched down in a slight *right wing low* attitude to correct for the crosswind, the airplane made a skip bounce and swerved to the left. I applied right brake and rudder, but the left turn continued. When it became obvious I was going to leave the runway, I applied full power and started a go-around. I also applied *right* aileron to raise the left gear, decrease the drag, stop the turn, and allow a relatively straight takeoff."

Following this bit of aerodynamic gobbledygook, the article goes on to explain how the pilot allowed time for the runway to be foamed, then completed an emergency landing—again with a swerve to the left. The cause of the accident was attributed to a material failure of the left main gear rear attaching lug.

As instructor pilots in the U-1A transition program here at Fort Ord, we completed some 15,000 landings and takeoffs in the last year, the majority of these with the prevailing left crosswind with which our airfield is blessed. We find it no mystery that with a right wing low attitude in a left crosswind this airplane skipped and swerved to the left. The only thing amazing about this is that the aircraft didn't groundloop and shear *both* gear. Then, after the swerve and skip routine, with the gear on the ground, full power, and *right* aileron (again), which would only aggravate the swerve, and certainly increase the probability of more "skips," it is remarkable that this aircraft ever did get off the ground.

Granted the procedures following the go-around were proper and fitting, perhaps it would be worthwhile to note that improper crosswind landing techniques may have contributed to the material failure responsible for this accident.

Thanks for the many fine articles which *do* appear in the Digest, and for the fine contribution your magazine makes to Army Aviation.

CWO GERALD D. ANDREWS
Staff Aviation Section
Fort Ord, Calif. 93941

CWO Andrews and other sharp eyed readers caught this serious error in crosswind landing technique. However, we're happy to note that the error was editorial and not pilot induced. The pilot in this accident touched down "left wing low," but the submitting agency reversed his ailerons.—Ed

Instrument Examiner Forward

Major Paul L. Stansel

HAVE YOU EVER been in the frustrating position of being unable to complete your mission because the destination field strip lacked an instrument approach facility? Sure you have! Remember how hard it was to explain to that Infantry brigade commander? Ole Colonel Snort had a way of making you feel personally guilty about bringing in bad weather, didn't he? That unreasonable old cuss simply could not understand why his troops should go hungry just because the sky was cloudy. Remember the last time it happened? Think back a little and try to remember what your unit instrument examiner was doing that day. If he was back at home field waiting for the weather to break, then perhaps you should feel guilty.

In the operation of an air line of communication during exercise Air Assault II, we in the Caribou Battalion were faced with this problem on a greater scale than we had ever encountered before. We were expected to keep an entire division resupplied, regardless of the weather or frequent change of landing sites. Our job was further complicated by the side effects of four tropical storms, bringing extensive rain and low visibility into the maneuver area. The ultimate success of our mission rested heavily on one individual: the instrument examiner.

Provided with a UH-1B, the examiner was attached to the Air Assault Division forward elements as liaison officer (LNO). In this capacity he kept himself, and the Caribou Battalion commander informed of impending assaults and probable new landing sites for the CV-2s. These probable sites were posted on the operations map and assigned a number. A thorough map study of the site area was conducted, with particular attention to any obstacle or obstruction that would interfere with an instrument approach. Aerial photos of the area were also requested; however, they were generally not available. All

During Air Assault II exercise Maj Stansel was S-3 Officer, 37th Air Transport Battalion, 10th Air Transport Brigade, Ft Benning, Ga.

Pathfinder landing zone controller guides CV-2B pilot to successful IFR approach

available information on these new sites was disseminated to each Caribou company operations officer for posting and study.

The LNO-examiner also studied the map. If possible he reconnoitered the site; however, presence of the aggressor prevented this in most cases. Based on his study, the LNO constructed a probable ADF approach procedure, subject to confirmation by actual flight check. The terminal navigational aid to be used for the approach procedure was the portable nondirectional beacon (NDB) organic to the pathfinder landing zone control team of the Air Assault Division.

Immediately after seizure of the intended landing zone, the LNO advised the pathfinders on beacon location. Once it was in position, he made a flight check of the preplanned approach. After confirming the approach, or altering it as necessary to meet clearance criteria, the LNO radioed the information back to the Caribou Battalion S-3 officer via high frequency single side band radio.

Transmission was simplified by using a checklist with twelve numbered items. Only the item number was transmitted, preceding the actual information (fig. 1). A duplicate of this check sheet was kept in the battalion S-3 shop, and filled in as item numbers were received. This information was then transposed into a visual sketch, and reproduced on a standard stencil machine. Copies of the procedures were dispatched by helicopter courier to all the Caribou company log base sites (fig. 2).

Of course, this approach was worthless without the ability to get there. In our case, close coordination with the 72d Air Traffic Company (ATC) (Army) solved our problem. Telephone coordination established routes, altitudes, and missed approach procedures. Because of lack of holding fixes and control facilities in the forward area, missed approaches were not allowed to return to the terminal fix. They departed the area at an altitude and heading designed to avoid aircraft on approach. The ATC clearance was usually to the last designated fix on the established airway, then a cruise clearance off airways to the terminal fix.

Due to limited power output of this pathfinder NDB, it was often necessary to fly a time/distance/heading course until within a few miles of the NDB before a positive ADF signal could be received. Approach was started immediately upon crossing the fix, with reports to the LNO when departing altitudes and procedure turn inbound. These reports allowed the LNO and the LZ control team to space departures without danger of collision.

All aircraft had been dispatched from the log base area with a 10 minute time separation and an assigned airspeed to ensure constant separation. Without special equipment, other than a clipboard and pencil, it was found that the LZ control team, assisted by the LNO, could time departures from the forward sites in the same manner, using a prearranged altitude and heading to intercept the airway system for return to the log base area.

The ATC Company assumed control of departing aircraft as soon as radio or radar contact was made. Aircraft executing missed approaches were treated as departing aircraft and wer

INFORMATION FOR INSTRUMENT APPROACH

1. Runway Heading: 080/260 Elevation: 200 (MSL)
   Approach Obstructions: None
2. Beacon Location: 56/432
3. Outbound Heading: 280
4. Procedure-Turn Altitude: 1500
5. Inbound Heading: 080
6. Recommended Minimums: (MSL) 800
7. Highest Obstructions:

Type	Location (MSL)
None	

8. Obstructions to Missed Approach:

Type	Location & Elevation (MSL)
None	

9. Other Hazards to Approach: 30' trees general vicinity
10. Beacon Frequency: 1275 Kc
11. Controller's Call Sign: Anytime 25
12. Remarks: No beacon ID-Pulsating tones only

Figure 1

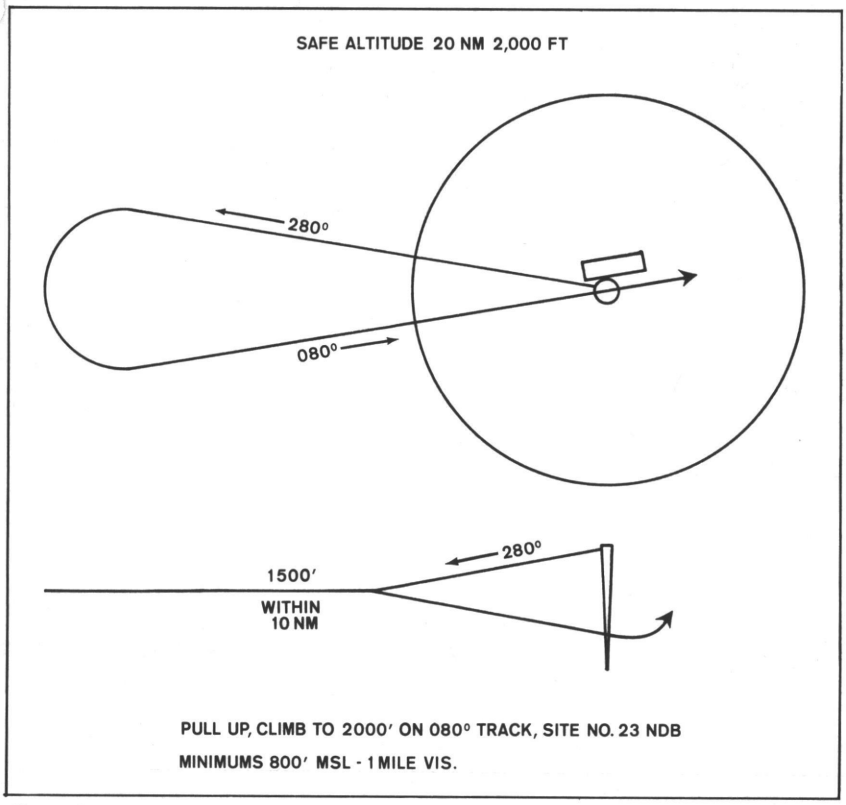


Figure 2

routed back to the log base area to refuel and return "round the horn." Under ideal conditions, this arrangement would have given us a complete circle of Caribou extending from the log base area to the forward site and back again, with an aircraft every 10 minutes all the way around. Although this ideal situation was never achieved, we managed to deliver enough fuel, rations, ammunition, and miscellaneous items to support over 400 helicopters and 13,000 troopers. Colonel Snort would have been proud of us!

As the air head expanded and consolidated, the landing site usually became either a division or brigade logistical base, with conventional approach facilities and controls, including a GCA. This usually was within 24 hours of initial occupation. The ATC Company then extended their airway system to encompass this site. All control responsibility then passed from the LNO, leaving him to collapse for a few hours into a damp sleeping bag, comforted by the knowledge that his efforts enabled delivery of over 400 tons of supplies under IFR conditions before establishment of a conventional approach procedure!

Problems? Sure we had them, but none that couldn't be overcome by training, thorough crew briefings, and mutual trust between the aviators and the LNO on the ground. After a couple of successful approaches, one of our younger tigers was heard to brag that he could execute a perfect ADF approach using an electric razor for a terminal fix. You know, I believe he could with a good instrument examiner forward!

Crash Fire Rescue

Inside the Aircraft

THERE IS more to crash-fire work than putting out a fire. The fundamental in every case is the saving of lives. Inside the crashed aircraft or possibly outside and close to the burning plane are personnel who must be rescued. To save lives, trained hands are needed to effect their removal.

Proof of this is contained in the survivability percentages of four severe air carrier accidents which Aviation Crash Injury Research of Cornell University investigated:

64% of the people involved in the four accidents could not move of themselves and were in need of assistance.

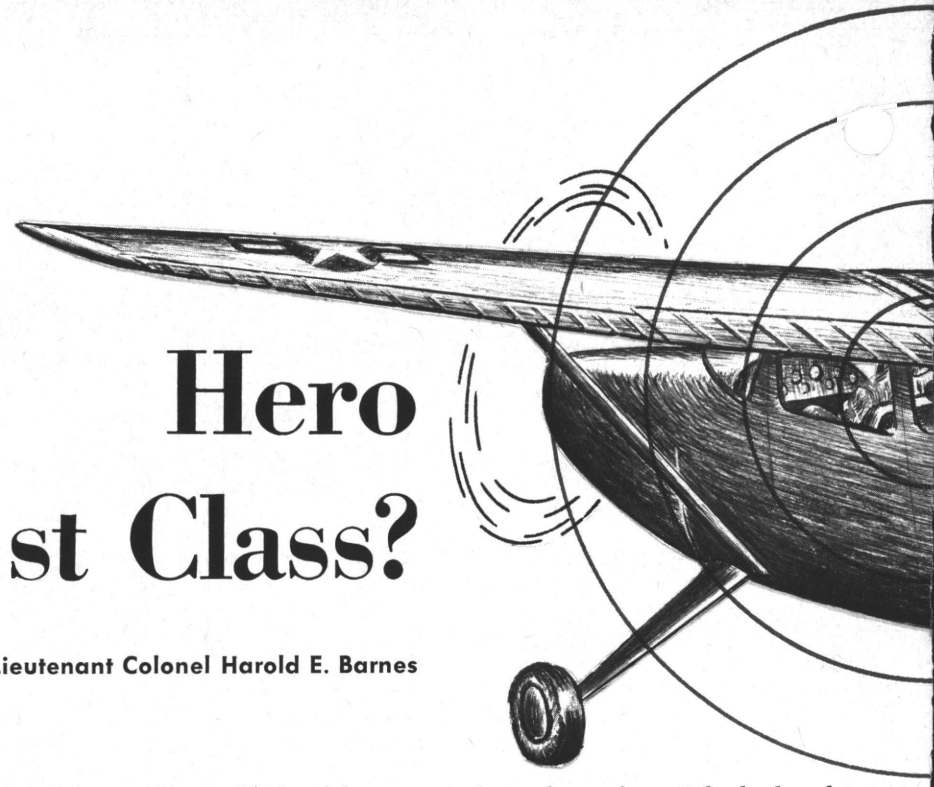
42% had periods of unconsciousness (32% had severe concussions and suffered periods of unconsciousness lasting from a few hours to 17 days; 10.2% had moderate concussions and brief periods of unconsciousness).

6.4% suffered mild concussions, but at no time were unconscious. These were in a state of shock.

44% were injured in their lower extremities.

26% were injured in their upper extremities; some suffered injuries in both areas.

Obviously, crash-fire crews should be as well trained to work rapidly and competently inside the aircraft as they do outside, since they will have to remove many survivors on stretchers—and the task is made all the more difficult by broken floors, seats torn out, fuselages either on their sides or upside down.



Hero 1st Class?

Lieutenant Colonel Harold E. Barnes

IT WAS THE fall of 1955, 28 October to be exact, and I had been in Korea less than a month. One week of this had been spent in Eighth Army Headquarters for my assignment, briefing, and orientation. This left me as a real neophyte in the Far East.

I was a major with 11 years in Army Aviation and a Senior Army Aviator for almost 3 years, having spent all my military career in Army Aviation. Although I had served three tours in Europe and had, I thought, flown over all types of terrain in all kinds of weather, under all conditions, including combat in an L-4, and under various trying circumstances, I had yet to butt heads with the elements found in Korea.

This "clank story" originated when I was asked to fly an admin flight from Kwangju, A-37, to Seoul, K-16, and return. As I left Kwangju in a Bird Dog there was a solid overcast at a couple of thousand feet. Visibility was around 5 miles with a little haze. The trip to K-16 was uneventful and the flight was terminated on the island haven without incident.

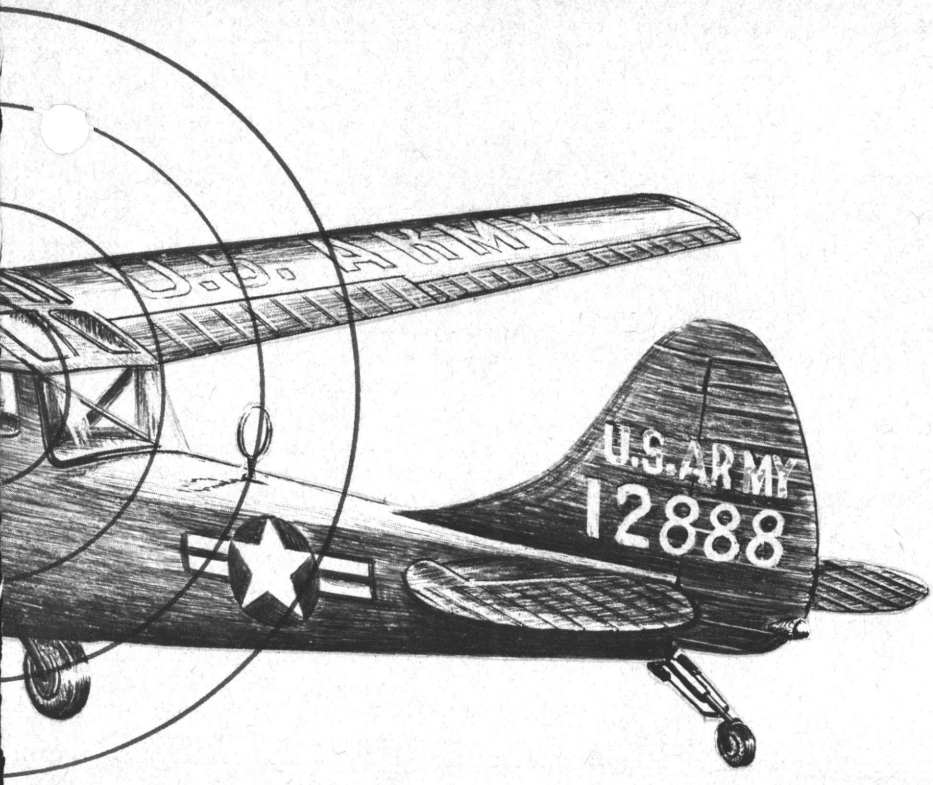
Lieutenant Trim from our detachment was at K-16 with our one and only Beaver. He had made a routine admin flight to Seoul and was to return to A-37 that afternoon. Having only been in the detachment a short time I did not know the lieutenant very well. We did get together, had lunch, and "shot the bull" with some of the headquarters pilots until it was time for me to go. I was to take off and Trim was to follow shortly thereafter.

I filed my flight plan (which consisted of signing the log book), took off and headed south. Just south of K-55 Lieutenant Trim caught up with me, called me on the radio, made with some small talk, passed me by, and disappeared into the haze in front of me. It was just a matter of minutes before I saw a Beaver approaching me almost head-on. It was Lieutenant Trim. He radioed and said the weather was too bad for him to continue to A-37 and that he was returning to K-16.

Although I had been in Korea only a short time, I had already determined that to RON in Seoul was highly desirable and accomplished whenever the excuse arose. I assumed that Lieutenant Trim was using the weather as an excuse to return to the "sinful city" of Seoul. I radioed back that I intended to continue on because as far as I could see the weather wasn't that bad. Lieutenant Trim, who had been circling around me, headed south again and disappeared into the haze for the second time.

The ceiling was getting lower and visibility decreasing, but to me it was still good VFR with "no sweat." By this time I was almost halfway back to A-37 and, low and behold, there came the Beaver again. Trim and I went through the same bit. He said the weather was too bad for him to continue and suggested we return to K-16. With practically the same words as before, I told him it wasn't too bad for me and that I was going to keep on going. Well, Lieutenant Trim turned around and headed south again, and for the third time disappeared into the haze. I guess he figured if

Col Barnes is Chief, Flight Operations Division, U. S. Army Aviation Test Board, Ft Rucker, Ala.



could do it he could too. The difference though was that he was getting "short," having had over a year of flying in Korea, and was pretty well familiar with Korea flying.

It wasn't too much longer, and there came the U-6 again. This time he said the weather ahead was just too much for him, that he had had it, and this time was really going back to K-16. Well, I allowed as how I still wasn't in trouble and since I had flown in much worse weather, I elected to continue south. All the while the ceiling was getting lower and lower, but by this time I was in the flats south of Iri in the vicinity of Kumje and wasn't at all worried. My only problem was to cross the saddle at Mongnan where the railroad goes through the tunnel, and I'd have had it made.

But the wicket began to get sticky. By the time I reached the pass at Mongnan the ceiling had dropped right into the lowest part of the saddle. I decided to make the 180. My experience of flying in Europe, especially Germany, was doing me no good.

There, one could always land on the autobahn or in a cleared field and wait out any bad weather. Here, I was frantically trying to find a rice paddy large enough to at least give me a chance to make a safe landing. When I realized there wasn't any, I headed to an auxiliary strip, but couldn't make it as the doors and windows were rapidly closing. Pawing over my map I found an Air Force field at Kunsan—K-8—and headed for it. I was flying as close to the ceiling as I could, my altimeter was indicating 200 feet, and visibility was less than half a mile.

I hit the coastline just south of Chigyong and started following it, knowing that I could get lower and figuring the coastline should take me right to the field.

I gave K-8 a call.

"Kunsan tower, this is Army triple 8, 10 miles east your station. Landing instructions please. Over."

"Army triple 8, this is Kunsan tower. Enter left traffic runway 6; call downwind. Army triple 8, what are you doing out there?"

"Kunsan tower, this is Army triple 8. I am flying east your station and want to land at K-8. Over."

"Army triple 8, this is Kunsan tower. K-8 is closed; we will try to pick you up on radar. What is your altitude and heading?"

"Kunsan tower, this is Army triple 8. My altimeter reads 100 feet and my heading is westerly, but varying as I am following the coastline. Over."

"Army triple 8, this is Kunsan tower. We have you in sight; you are cleared to land runway 6."

At this time I thought I saw what looked like a runway just off my right wing tip.

"Kunsan tower, this is Army triple 8. Was that runway 6 I just passed? If it is I'll circle 360° and land. Over."

"Army triple 8, this is Kunsan tower. That *was* runway 6; make an immediate 180° and land. Over."

When I landed and taxied up to operations a major (the weatherman) met me and wanted to know why the X%X#@X I was flying in that sort of weather. My only excuse (to myself) was that I was trying to impress my new section with my prowess as an aviator. Of course I brazened it out and put the blame entirely on the elements, at least for the major's consumption. Needless to say, I was lucky to be a guest of the Air Force that night.

I listened from then on to the young pilots who had acquired their experience in the "Frozen Chozen," and accepted flying in Korea as something entirely new and different from that which I had experienced before.

I think the moral of this tale is obvious. It is an example of overconfidence, overextending, and of an old soldier with an overinflated ego who knew it all. I, for one, certainly learned fast from this rather demoralizing experience.

Long Camp-Out for K K

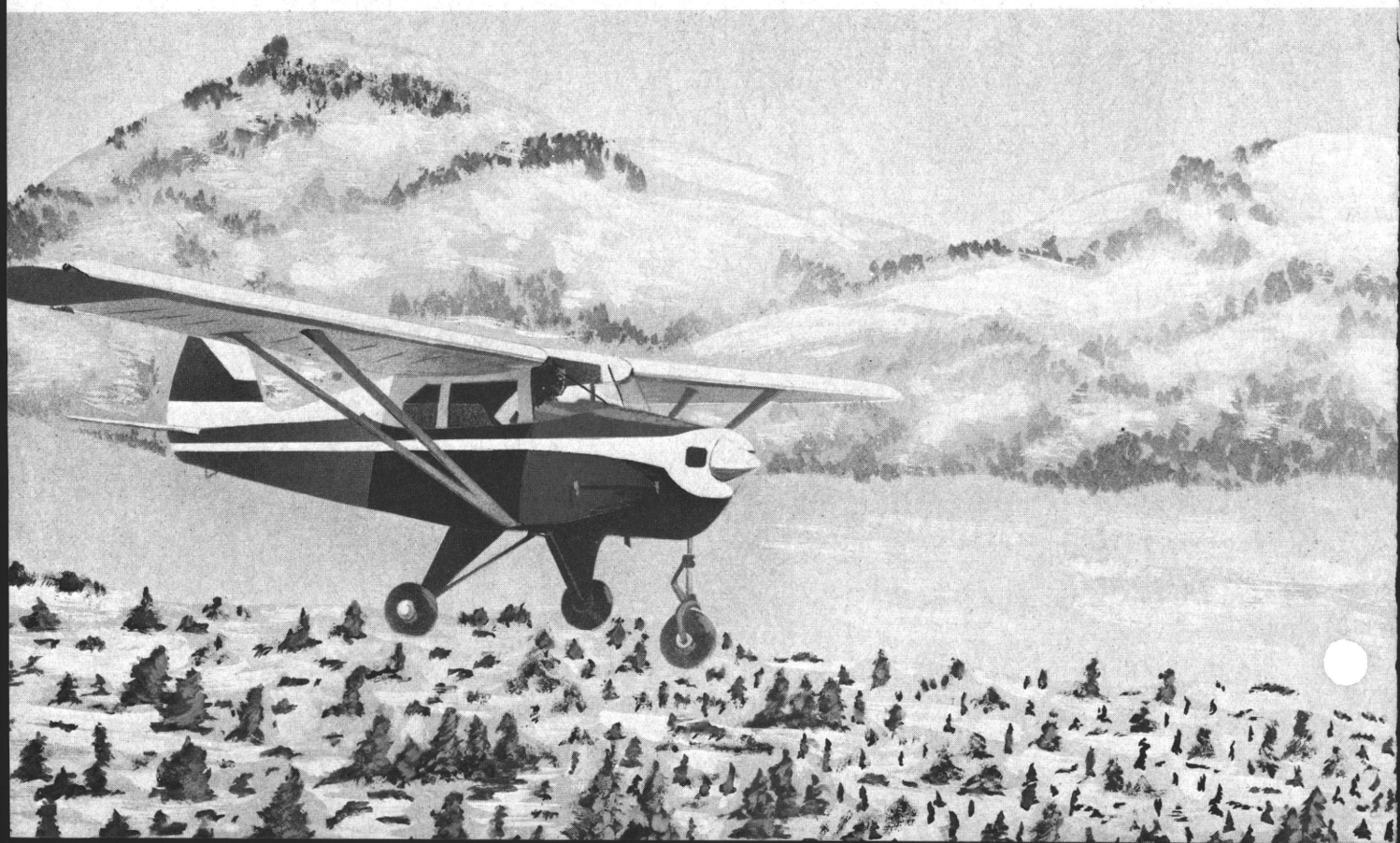
Reprinted from COMBAT CREW

ROUTINE, the way it is most of the time, was the way the morning had started for Sergeant Keen. KK, as he is affectionately known around his small unit, had gone to the "lower 48" to pick up a Piper Tripacer he had bought from a friend in Moses Lake, Wash. He had arisen early that morning at Fort Nelson, B.C., in preparation for his flight to Watson Lake, Yukon Territory, and Alaska, but two other pilots were ahead of him as he approached the counter with his flight plan. One was flying a fully instrumented Bonanza, the other a Cessna 172. It was agreed upon by the three that the Bonanza owner would take off first and, as soon as he was well settled on course, would radio back a weather report. The Cessna would take off next. KK would be last. They felt that they would be making the best use of their equipment in this way.

KK felt no trepidation at his trip through the Canadian Rockies. If the weather was bad he would just sit it out. No use in hurrying, he thought; that's how people get into trouble in these light airplanes. While waiting for the Bonanza to radio back, his thoughts turned to his family. He knew that with any kind of luck he would be home by evening, or noon tomorrow at the latest.

The radio in the dispatch office crackled and the voice of the Bonanza pilot could be heard loud and clear: "This is Bonanza N1646E. No sweat. I'm down track about 60 miles. The weather looks good. The snow stopped about five minutes ago and the visibility is getting better. You'll have no trouble making it through the pass."

A few minutes later the Cessna roared down the strip and disappeared to the west. After waiting a short time KK followed. He leveled at 3,500 feet and everything felt good. He wished he had a "bird dog" in the plane; the only navigational aid he had was the VOR. The Canadian stations had range facilities but no omnirange. He knew the whole trip would have to be navigated by pilotage. He plotted his position on the map, and felt secure now that the weather was going to be good. He sighted the Cessna out in front of him and to his left. Soon he heard the Cessna pilot calling him: "Looks like a snowshower ahead. Think I'll swing back left." KK thought about



this for a few seconds, then said: "It looks clear to the right. Think I'll check it."

"Roger, I'll give you a call if I run into anything" was the Cessna's reply.

KK then altered course to 340°. From his knowledge of weather movement in the area, he knew that the weather was moving into the area from the southwest. He reasoned that the best course would be to reverse course and skirt ahead of it. He tried to reverse directions and go back to Fort Nelson but the weather had closed in behind him. He knew he was getting off course, and he took the only action open and flew a heading of 340°. For the rest of the flight KK kept track of the time on each heading he flew. He climbed to 11,000 feet and leaned the engine as much as possible to save the precious fuel. Never once did he lose sight of the ground and the landmarks. He knew approximately where he was at all times, and also knew he was in a bad situation with about an hour of fuel remaining.

IN APRIL of '65, MSgt Kenneth K. Keen, a KC-135 boom operator with the 4157 Strategic Wing, Eielson AFB, Alaska, was lost in the wilds of the Yukon Territory when bad weather and lack of fuel forced him to make a landing in his private plane. Following a successful emergency landing he managed to survive for a week, living mostly on boiled grass and withstanding subzero temperatures. Teaming up as coauthors of this report on Sergeant Keen's survival experience were Capt William C. Howell, Director of Safety, and Capt Wallace S. Marsh, Flight Medical Officer of the wing.—ED.

Then it happened—everything became clear, clouds disappeared and visibility was perfect. He immediately changed his course to 210°. From his approximate position on the map this would take him to Watson Lake. The fuel indicators were getting low. Less than an eighth of a tank of gas was left.

A little later, at about 4 hours and 30 minutes after takeoff, KK realized he wasn't going to make Watson Lake. He estimated his position and tried to raise Watson Lake on the radio. There was no answer. He began broadcasting his heading, altitude, airspeed, and assumed location in the blind. He wobbled the wings to see if the needles on the fuel gauges would come up. They didn't, not a bit.

KK looked below. He was now over the western foothill region of the Canadian Rockies. He had passed around the high peaks. He saw a river running down a valley between two of the hills. "Got to get this baby down while I still have power," he mused. "That spot down in the valley beside the river looks like the best place around." He set up a spiral descent, keeping the place he had picked out in sight.

When he was about a thousand feet from the terrain he leveled out and set up a left rectangular pattern. His best spot turned out to be the ice and snow covering the river. This would have to be a full-flap landing. He turned base leg. Everything looked good. He turned final approach and set up the glide path. Everything looked okay. Then he saw it! A little clump of trees was directly in front of him. Gently he eased the throttle forward. He wasn't sure if the engine would take or not. It did! He broke the glide until he was sure he would clear the trees. The wheels touched down gently on the crusted snow and ice. He shut the engine down with the mixture, ignition, and master switch. Everything was fine. The aircraft had almost come to a stop when the snow crust gave way under the wheels. The gear sheared and the aircraft slid about 2 feet further on the fuselage.

Well, here I am, but where am I? He unfastened his seat belt, opened the door and crawled out of the airplane.

The first sensation he had when he emerged from the aircraft was the cold wind. He was in a fix, but it wasn't as bad as it might have been; he wasn't injured. He had a survival kit and he meant to use it. He had been through survival schools at Stead Air Force Base, Nev., at Fort Carson, Colo., and at Malmstrom Air Force Base in Montana. He also had been a licensed guide in Colorado and had done much "packing in" in Montana. In short, he was "no new kid of the block" when it came to living in the wilderness.

KK's first thought was to keep his feet dry. He was wearing flight crew quick-don boots. He knew his feet would be soaked

soon unless he did something to protect them, so he drained some oil from the crankcase of the aircraft engine and worked it into his boots.

The snow was about 40 inches deep and he was immobilized. His survival training now came into play. With the ice saw from the survival kit he cut down two small pine trees. He doubled each one into an oval shape and bound the ends with cord from one of the airplane seats. He attached his "handy dandy" snowshoes with more cord from the seat to his boots. Now he could move about fairly easily.

Next, he decided to inventory exactly what there was in the way of equipment. He opened the survival kit and laid the contents on the wing of the aircraft. He found he had two chocolate bars, four pemmican bars, four bouillon cubes, two packages of instant coffee, one package of tea, two sleeping bags, one L-2 summer flying jacket with the distress orange on the reversible inner liner, one civilian dress jacket, one suit of thermal underwear, several pairs of heavy wool sox, one compass, the ice saw, one switch blade survival knife, one signal flare, 43 matches, a 1-gallon bucket that had been used to mix airplane dope, miscellaneous wrenches and tools in a toolbox, and one MAN OF THE WORLD magazine. Not bad at all, he considered.

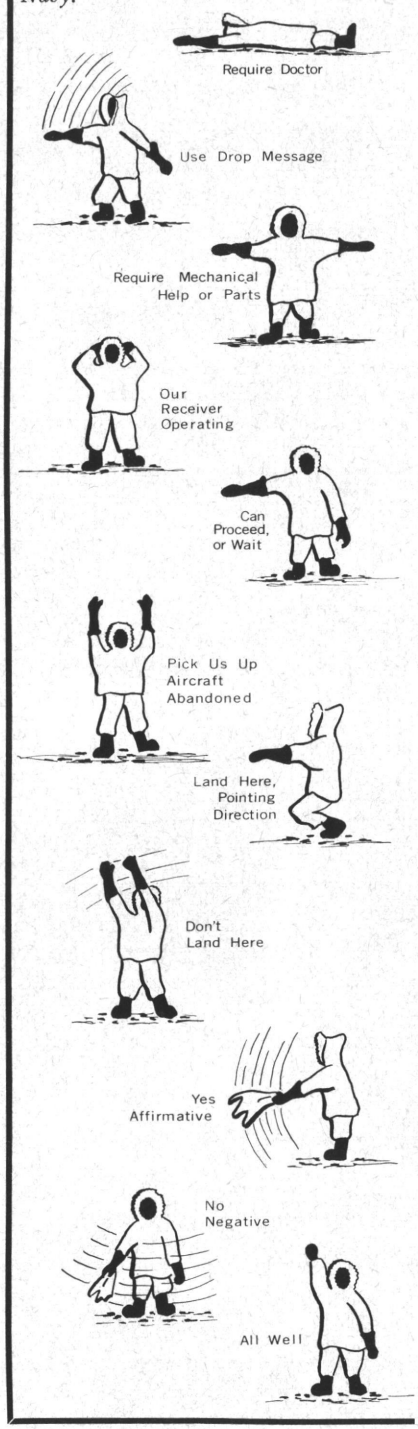
KK's next thought was of a shelter. Hacking pine boughs from the scrubby trees nearby he was able to partially construct a lean-to, and got some dry rotten wood with which to make a fire. He drained the gas from the tanks of the aircraft. When he was through draining, this amounted to about a teacup. It was a good thing he had landed when he did; otherwise it would have been a deadstick approach. A clump of trees, like the ones he had passed over on final approach, would have been disastrous without power.

Again he was conscious of the temperature. He checked the thermometer in the aircraft. It read −10°. The wind made the low temperature even more miserable. It was just a plain, bone-chilling cold.

Darkness wasn't far off. He thought of the food situation. There wasn't very much. He didn't know how long it would be before the rescue party would reach him. He counted the rations again, and as he was counting he thought, moose and other animals survive on grass and twigs from the trees. If they can do it, so can I. He found grass under the trees where there was no snow. Also, there was grass under the overhanging bank of the river's edge. He gathered what he thought would be enough. Next, he cleaned the one-gallon bucket that had contained the airplane dope. He chopped the grass into fine pieces and mixed it with about a gallon of water obtained by melting snow. KK let the mixture boil over the fire for one hour. The results were not delicious, not even tasty, but they were filling. When he was through drinking the broth he forced himself to eat the grass. He did not get a great deal of nutrition but did get rid of the hunger headache that had been plaguing him. After eating, he busied himself with stamping a huge SOS into the snow on the river. By the time he had completed this, he was thoroughly exhausted.

That evening KK's thoughts turned to his family as he sat in his lean-to. He wondered how long they would be able to live in their military apartment at Eielson. He had no idea how long it would be before rescuers would find him, since he was so far off course. If they gave up the search, the authorities at Eielson

Signals used when rescue aircraft is approaching. All signals (below and right) are from "Polar Manual," U. S. Navy.



would move his family back to the "lower 48". He would miss his daughter's graduation from high school. Why, when he returned, he wouldn't even have a house or a family in Alaska anymore. He would have to find them. They would worry and wonder if he was all right. It was on this uncomfortable note that he fell asleep.

Trampled ground to air signals for use in open areas. Brush or any other dark substance may be used.

Require Medical Supplies

Require Doctor

Require Food and Water

Require Clothing

Require Fuel and Oil

Require Map and Compass

Require Arms and Ammunition

Require Engineer

Require Signal Lamp

Aircraft Badly Damaged

Unable to Proceed

Will Attempt Take-off

We Proceed This Direction

Show Direction to Proceed

Don't Land Here

Land Here, Pointing Direction

Yes, Affirmative

No, Negative

Not Understood

All Well

When he awoke, it was cold; there was no sun. From the clouds, heavy snow was falling. He walked to the airplane and looked at the thermometer. It read 25° below zero. For breakfast, he allowed himself nothing but some more grass broth. Again he felt filled but not satisfied when he finished.

The next thing to do was to finish building the lean-to shelter. He took the saw and again started cutting boughs from the scrubby trees. He was finished with the lean-to a short time before noon. It was a good thing, because the snow was really coming down. The skies opened up and deluged him with 8 inches of snow that day.

His thoughts turned again to distress signals. He had drained the oil from the aircraft engine and gathered pine boughs which would give off a dense smoke—if they would ignite. He began to consider the equipment on board the aircraft. Why not? The landing light, when removed and hooked to the aircraft battery would make an excellent signalling device. He finished dismounting the landing light and battery in about an hour. He connected them and was rewarded with a flash of light. Now he was ready if the searchers flew over at night.

He spent the afternoon looking for grass, chopping it, and boiling it. Now was the time to work on that distress signal. He took his ice saw and cut some more of the 10- to 20-foot trees that grew along the river. He built tree letters some 200 feet high and 100 feet across. He sawed down some 30 trees that afternoon and was about half finished when darkness came. Again he fell exhausted into the sleeping bag. Getting to sleep was no problem for KK. The storm passed that second night.

On the third morning there was more grass broth. By noon he had finished building the distress signal from the pine trees. In all, he had cut 60 trees to build this huge SOS. They would surely see that when they flew over.

That afternoon he started thinking of a weapon. The boughs of the pine trees gave him an idea. A sling shot! He got the rubber from the nose gear inner tube. A bough from the pine tree was whittled down to a forked shape. Cord from the seat and a small piece of the plastic material that covered the seat finished it. With this and his survival knife he was a formidable foe for anything—if it wasn't too big.

That night he heard sounds of animals around the camp. They were close but not uncomfortably close. His thoughts turned to what he would do if a wild animal did come into camp. He had his switch blade survival knife, but this would not be too much help against a bear or large animal. He decided that a fire would be his best protection. He then fell asleep.

On the morning of the fourth day he awoke to see the sun shining. He breakfasted on a chocolate bar square. There was to be no fire this day; KK had wasted a match trying to light the fire. The mental discipline from the survival training and his guide experience made him realize that he could not waste matches. He punished himself by not having a fire. Fortunately the weather was now warmer. When he checked the thermometer in the aircraft it read 25° above zero.

LONG CAMP-OUT FOR K K

He noticed wolf tracks in the snow. He followed them and could see where the animals had circled the camp the night before. They had approached to within about 100 feet. This was what had caused the noise. A fire will be built tonight, thought KK. He was struck by the thought of how silent it was, and decided he must be a great distance from his intended course. He had not heard the sound of an aircraft in the three days since he had landed. In fact, the silence was appalling. Winter was still in this area. The black and white contrast between the snow-covered mountains and the valleys was stark and depressing.

He forced these thoughts from his mind as he gathered wood for the fire. He also found some grass for broth, and by this time dusk was approaching. He fixed the broth and drank it. Again he ate the boiled grass. Again it was filling. He wondered if the wolves would be back. He didn't have to wait long. Out of the shadows two canine figures approached. First they employed stealth; then they became bold. They circled the campfire at a distance of about 25 feet. KK said nothing and did not move a muscle. He just kept watching them. They retreated a little, snarling as they went. They retreated a little more, out of the light of the fire, when no fear was evidenced by the man. It was an uneasy sleep for Sergeant Keen that night.

The fifth day was spent reading and thinking. KK worried about whether the searchers would be looking for him anymore. Somewhere in his World War II experiences he had heard that searches were called off if the victim was not found after the fifth day. Tomorrow he would start walking if no rescue aircraft was heard today.

On the sixth day, KK built a pack and put all of his survival equipment in it. He started walking to the northeast to get out of the foothills. He thought he was going downhill. Actually, he discovered later, he was walking uphill. When he discovered that he was confused concerning the terrain, he was about 5 miles from the Tripacer. He decided to turn back, and was about three-quarters of a mile from the aircraft when he decided to set up camp. He had broken through the snow several times and was getting tired. He had also gotten his feet wet when he broke through the snow. He built a fire. Then he took off his wet boots and socks, unrolled the sleeping bag and got into it to get warm. Darkness came. KK went to sleep.

On the seventh day Sergeant Keen moved back to the Tripacer camp. The day was consumed while he read and thought and waited. He moved his signalling gear closer to the camp. Again there were the routine chores of fire building, gathering grass, boiling it and eating it. As an extra luxury he allowed himself a square of the chocolate bar. The tension created by the waiting was almost more fatiguing than the work of building the signals and the shelter. When dusk came he was ready to rest. He crawled into the sleeping bag and fell sound asleep. He was awakened late that night by the sound of an aircraft passing overhead. He scrambled out of the sleeping bag. In the surprised confusion he forgot about the battery landing light signal. There were only a few precious seconds. Finally, after an eternity, he was able to get a pine tree ignited and burning. The aircraft had passed without seeing him.

KK was discouraged when the aircraft missed his signal, but he soon cheered up when he realized that they were searching this area now and probably would be back. He went to sleep. His thoughts, as he drifted off, were happier than they had been for a week.

It was mid-morning on the eighth day when he heard the sound of an aircraft. It was low, and it passed by without seeming to see him. He ignited the flare and waited breathlessly. The airplane flew on. Then it happened! Within 3 hours, KK was rescued and on his way to Fort Nelson. Later, at Eielson, he was given a brief medical examination and was found to have lost 12 pounds with no other ill effects.

"I was lucky," he said, "lucky to have been through the survival training. I never once lost my head. This is the most important thing in a situation as this. I was also very fortunate in that I was not injured or in shock when I landed." Asked what he thought his most valuable piece of equipment was, he answered without hesitation, "It was the ice saw. I would want it more than the sleeping bag or the rations."

KK also stated that the only piece of equipment he really missed was a cord or line. Of course, the USAF flight crews have these in their parachutes. KK was right when he said, "If you just use what you know you will survive until help comes." For light aircraft fliers, particularly aero club members, emphasis is placed on two points: 1) If you get into weather, turn around and get out of it; 2) if you have to land, do it while you still have power and can pick your spot. Above all, keep your head and use what you have.

In July the DIGEST published an article entitled "A New Kind of War" which proposed a new tactic for guerrilla type conflicts. The article below was written in response to the more critical comments on the "destroyer concept" proposal.

More New Kind of War

Major Frederick L. Clapp

IN LIGHT of the Vietnam escalation in recent months, I feel justified in repeating my original question from "A New Kind of War": "Should the decision be taken to fight in Vietnam, the first logical question is, fight with what?" So far, our military effort appears little changed from that which proved disastrous to the French in 1954.

It is true that our economical, psychological, and political policies in Vietnam are considerably different from those of the French. While an improvement in the stability of the Republic of Vietnam government has been noted recently, I cannot subscribe to the argument that a stabilized government is the first concern in Vietnam and, therefore, must receive first priority.

I don't believe there can be stable government unless there is first an acceptable degree of law and order. The same argument holds true when applied to economic, social, and psychological programs. Without law and order, such programs are denied the necessary time to become effective. In the absence of an effective police force, it becomes the duty of the military to maintain order, and the success of that effort must be the first priority.

Although this article is devoted only to military countermeasures, military measures *alone* will not provide a solution in a guerrilla war. Counterinsurgency must be applied against the total spectrum of insurgency, which includes military, political, economic, social, and psychological programs.

To date the military too frequently has failed in its responsibility to reestablish or maintain law and order. Even in those instances where western military forces have been successful in containing or defeating communist guerrilla movements, e.g., Greece and Malaya, the resources brought to bear were completely disproportionate to the resources expended by the communists.

In the destroyer concept I call for a troop of 44 men and 5 helicopters. A single troop would be assigned an area of 2,500 square kilometers and would be expected to conduct an "itinerant" sustained type occupation throughout its assigned area.

Two points of contention have been raised concerning my troop proposal. The first is that a 44 man force is too small, and the second is that the idea has already been tried, with larger forces, in "Eagle," "Bumblebee," and "Hummingbird" operations in Vietnam.

I accept the fact that 44 men represent little more than a platoon when considered in the traditional military sense. However, when considered in light of the economy of force potential made possible by helicopter mobility the same 44 men become a much more imposing force. To

The views and opinions expressed herein are the writer's and are not to be considered as an official expression of the Department of Defense.

A destroyer troop would expect its best performance at night

illustrate, assume a single destroyer troop successfully occupied for short times ten different, widely separated locations in a 24 hour period. The same drill using ground mobile forces would require a separate 44 man force for each of the ten locations, or 440 men. To this figure must be added the number of backup personnel required to maintain 440 men in the field. By this equation a 44 man destroyer troop becomes considerably more than just another platoon.

I consider Eagle, Bumblebee, and Hummingbird operations all to be basically the same. The original Eagle concept was bold, indicated imagination, and has resulted in a great deal of valuable information. The destroyer concept differs greatly in both mission and method, but does draw heavily on the experience and lessons learned as a result of Eagle. In fact the destroyer troop is the next logical step in the evolution of helicopter tactics.

The major difference between the two concepts lies in mission. Eagle can be best described as a heliborne combat patrol. Initially the mission was either to overfly a given area looking for enemy forces to attack, or to land and sweep suspect locations or areas where intelligence reports indicate an enemy force might be located. At first, the concept had good success. However, because of a number of built-in disadvantages, such operations met with increasing cost in both men and equipment.

To begin with, Eagle was a daylight only operation. A destroyer troop would expect its best performance at night. Any action against an enemy guerrilla that is based on an intelligence report must be suspect, especially when the report is over a few hours old, and the source of the report is subject to possible enemy influence. A destroyer troop would use intelligence reports for little more than nice-to-know purposes. At the same time a troop would be an excellent and reliable source of intelligence information.

The proposition of overflying an area until being fired on or until spotting an enemy force to attack leaves a great deal to be desired. Ground vegetation provides ample concealment in most areas of Vietnam. Therefore, if the enemy does not want to be seen the chances are he won't be. On the other hand, if the enemy feels he has the advantage and wants to fight, he need only fire on our helicopters and the battle is joined.

In such a situation, all advantage was with the enemy. The enemy decided where, when and if to fight. He knew almost to the man the strength of an Eagle force and he knew where it was. If there was any surprise advantage it belonged to the enemy. The strength of an Eagle force was normally that of a small infantry company or less. Because of its limited strength an Eagle force had to be selective in areas of operation. Those areas suspected of harboring relatively heavy enemy forces had to be avoided, and such action was by no means always possible.

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Once committed to a fire fight an Eagle force sometimes found it had a tiger by the tail. Most essential information relevant to the enemy's strength and position was denied an Eagle force until after contact had been established. When it was fired on, moved to the attack, and then discovered the enemy force was a reinforced hard core Viet Cong company, the outcome was often disastrous.

Hummingbird and Bumblebee operations normally were smaller forces than Eagle and were employed in jungle areas rather than the delta country. In addition to the same disadvantages inherent to Eagle operations, the problems of Hummingbird and Bumblebee were further compounded by lack of adequate landing zones in jungle areas.

A destroyer troop would avoid these disadvantages because its mission and method of operation are entirely different. The Eagle concept envisioned flying to the location of an enemy force and immediately attacking same. The destroyer concept would avoid

landing where the enemy is and attempt always to land where the enemy is not. In view of the guerrilla enemy's constant need to keep moving, it is reasonable to assume that promiscuous interdiction of likely avenues of movement would adversely affect enemy operations.

Unlike Eagle, a destroyer unit would fight only when it enjoyed the advantage. If a detected enemy force were small, the troop would destroy it. If the enemy force were large, the troop would use mines and its limited firepower only to the extent necessary to disengage and run. The troop would evacuate the area by a preplanned withdrawal route. At the same time it would call for tactical airpower to subject the general area of the enemy's location to bomb and rocket attack.

I fully realize there will be a delay time between the request for tactical air and the actual strike. I also appreciate the fact that pilots of the fighter bombers would not be able to see the enemy because of concealment on the ground. This simply means they will have to be employed as an area weapon, like artillery, rather than "point target" to which fighter pilots are more accustomed.

Bomb and rocket attacks under such conditions would miss more often than hit, but they would not miss by very far. I, therefore, ask you to imagine the effect on the morale of an enemy force that has been subjected to a near miss bombing attack four times in the past 30 days, and has nothing but the next four attacks to look forward to.

During the conduct of what I call itinerant occupation or promiscuous interdiction, the majority of troop landings will be seen and reported to the enemy. Five helicopters do make a lot of noise and if people are within a few miles of where they land, the odds are that they are going to know and report it to the enemy. The odds are equally good that these same people will report to the enemy if the helicopters take off again. Knowing this, the destroyer concept is designed to take advantage of the fact by making 10 or 15 landings within a few hours over an area of many square miles. A seven man destroyer team would be intentionally left at one or two of the 15 landing sites.

It then becomes the enemy's problem to determine which of the 15 sites are safe if he wants to use any of the area. Two logical methods are available to the enemy for making this determination. One would be to assemble a reasonably sized combat force and sweep the area. This would be the method we would most like the enemy to use, but it would be wishful thinking to expect him to do so. The second and more logical method would be to send one man, or better still a small group of noncombatants, through the area to see if it is occupied.

In such an event the destroyer team would attempt to avoid detection by taking maximum advantages of available cover and concealment. The odds are the team would avoid detection more often than not, but if they were spotted, the team leader would recall his chopper, evacuate the area in accordance with his preplanned withdrawal procedure, and hope for better luck next time.

In "A New Kind of War" I said: "Normally, the helicopters would remain immediately with the troop while on the ground. When personnel are intentionally left in an area, or the helicopter cannot land due to terrain, pri-

Landing and taking off at 10-15 sites over several square miles and within a few hours confuses the enemy, denies him "secure" terrain, restricts his mobility—especially when one or two 7-man destroyer teams are left at one or more of the sites

mary and alternate pickup areas would be designated beforehand."

I have been challenged on two points in this statement. The first is that the helicopters cannot be shut down outside of secured areas because the VC will destroy them. Here, I think the correct answer lies in what constitutes a secure area. The five helicopters would always be together while on the ground and a minimum of 30 men would be available for securing the area. Two helicopters would carry AN/PPS-4 short-range radar sets for use during all ground time. Personnel would be placed in pairs around the perimeter of the landing zone to maintain a listening watch, and antipersonnel mines would be extensively employed.

At the first sign of enemy activity, the area would be evacuated. Normally, evacuation would be to a location already occupied by one of the troop's seven man destroyer teams. Such action would be equally possible at night. If, due to terrain, no landing site were available for many miles, the ships might fly to or operate from one of our large bases. This would be a last choice, but it would be an available course of action. If such action were to take place, the leader of any team left in an area would be advised to predicate his actions on the assumption that pickup could require as much as two hours and to act accordingly.

The second question raised at this point concerned methods to be used in placing teams on the ground and extricating them when landing sites are not available. A destroyer troop would use a method of rappelling only to the extent necessary to land limited numbers of men in otherwise inaccessible areas. The same methods would be unsatisfactory if the mission required the landing of large numbers of men.

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movement through incess

Standard rappelling methods proved inadequate during testing because of difficulty in deployment of ropes in heavy vegetation and the requirement that rappellers use both hands for guiding and braking during descent. These problems were corrected by the simple expediency of rappelling into the top of the tallest tree in the area and then climbing down the tree to the ground.

This procedure employs the standard "Swiss saddle system," but all descent and braking is controlled by a rope master, who retains the free end of the rappelling rope inside the helicopter. As a result, there is no need to deploy the rope and the rappeller has both hands free for making his way into the top of the selected tree. Extrication is accomplished by loading back into the helicopter from the top of a tree by a 7 foot rigid metal ladder which is easily attached to the skid of a hovering helicopter.

I know the above procedures sound difficult and dangerous. However, this simply is not true. During demonstrations of the reloading procedure at Fort Bragg, we frequently loaded volunteers from the audience into helicopters from the tops of 80 foot trees.

It has been suggested that destroyer troops might be used for gathering intelligence and performing reconnaissance duty, but the real need is for large, immediate reaction forces capable of closing with and destroying the guerrilla once he has been located. Of course, such immediate reaction capabilities have been employed. In fact, what continues to be called Eagle operations have for more than a year been reconnaissance elements for much larger, heliborne or immediate reactions forces. The arrival of an airmobile division in Vietnam will most surely greatly increase our immediate reaction capabilities. However, before our expectations result in too much overconfidence, we should review the position.

Large heliborne forces are basically a daylight only operation. Most guerrilla work is at night. Like much of the underdeveloped areas of the world, well over half of Vietnam is inaccessible to large heliborne operations due to ground vegetation. A reaction force is defensive by nature in that its reaction is predicated on an enemy action. As such, it becomes subject, on a grander scale, to the same disadvantages that affected the original Eagle concept.

The concept of reconnaissance forces finding and of immediate reaction forces fixing and destroying a guerrilla force is a fine tactic only if it can be made to work. So far the tactic has been singularly unsuccessful. It has repeatedly been tried employing forces up to several battalions, and repeatedly the results have been negligible in relation to the resources and effort expended in carrying out the operation.

Most enemy casualties during such operations are a result of airstrikes, not ground action. Like

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ground operations, air actions are equally discouraging when measured in terms of results versus resources expended. On many occasions enemy confirmed casualties have numbered less than one killed per fighter sortie flown. This phenomenon can only be the result of inadequate intelligence concerning the enemy forces and a failure to appreciate the extraordinary logic of guerrilla tactics.

The guerrilla has been described as a coward because he will run rather than fight, and has even been known to abandon his family to the gentle ministrations of an advancing enemy. As unchivalrous as such actions may be, they do prevent what would otherwise be the annihilation of the entire guerrilla force in question.

Terrain in underdeveloped areas lends itself very well to guerrilla retreat whenever necessary. Guerrilla tactics dictate that area evacuation plans be available at all times. Due to ground concealment the guerrilla can avoid being spotted from the air if he wants to, and he moves so often that any other intelligence as to his location is normally too late to be of much value.

From the communist guerrilla point of view there is no such thing as a significant terrain. Therefore, he is seldom willing to mount a determined defense of any given piece of real estate. As a result, when the guerrilla finds his area infested with 2,000 or 3,000 enemy troops, he can easily deploy 50 or 100 snipers to delay the enemy advance while the bulk of his forces evacuate the area according to plan. It is seldom possible to block this evacuation because of ample concealment in the area. I maintain that it is not reasonable to expect to engage a retreating guerrilla with a force greater than 20 men. This is because a larger force can enjoy little hope of deceiving a retreating guerrilla as to its location, which means the advantage of surprise is lost.

We cannot expect a retreating guerrilla to attack a blocking force if he has any other choice. His whole tactic is predicated on avoiding contact whenever he lacks the advantage. Indeed, why should he fight? After our 2,000 or 3,000 men have thrashed about in the bush for a few days, we will evacuate the area and the enemy wins it back by default. In the meantime, we have exhausted our troops, expended tons of ordnance, both air and ground, and we have killed or captured 70 or 80 of the enemy. We have also lost a number of men because we cannot expect 100 snipers with 3,000 potential targets to be altogether ineffective.

I believe large immediate reaction forces, which are, in effect, nothing more than tactical air assaults, would prove highly successful against a conventional ground force but not a guerrilla enemy. The objective of the guerrilla is to employ mobility, concealment and surprise for however long is required to provide a political situation conducive to complete communist takeover. Normally, such a favorable political climate can be expected immediately following an overwhelming military victory, such as that enjoyed by Hanoi at Dien Bien Phu in 1954.

Dien Bien Phu was a deliberate attempt on the part of the French to draw the Vietminh forces into open battle, in place of the guerrilla tactics on which they had hitherto concentrated. The fortress was to be supplied by air and the French were confident they could stand up to any onslaught. Dien Bien Phu is now history and we know the Navarre Plan, named for the French commander in Indochina, was wrong.

Had Dien Bien Phu had access to the sea for resupply, or had the French forces in Indochina included an air assault division, I doubt that Dien Bien Phu would have ever occurred. The preponderance of advantage would have been with the French not the Vietminh, and the communist guerrilla never reveals himself until he is sure of the advantage. By virtue of this fact, the communist would have continued with guerrilla tactics until the balance of advantage had shifted further to his favor.

The concept of employing thousands of conventional troops to defeat a guerrilla movement is based on the proposition that with such overwhelming power it is possible to close with and kill, or capture, the enemy guerrilla, thus ending the war. I feel this concept cannot work, simply because troops in large numbers cannot find the enemy. In addition, such a policy is very expensive and can result in nothing but unqualified disaster for any government lacking access to the United States mint. Even the resources of the American treasury become questionable if the com-

munist elect to perpetrate two or three simultaneous Vietnams at other locations in the free world.

Contrary to the mass conventional force theory, the destroyer concept is based on the assumption that it is not possible to kill or capture all members of a guerrilla movement; in fact, it is not even desirable. The object of the destroyer theory is to neutralize a guerrilla movement through incessant ambush harassment and bomb and rocket attack. Guerrilla operations and tactics are particularly vulnerable to this type tactic because of the constant need to keep moving.

Unlike the overland movement of conventional forces, guerrilla forces must move to assembly areas in small groups by many diverse routes. Much of this movement is at night, is time consuming, and should be extremely vulnerable to destroyer tactics. Guerrilla assembly areas are always located within a reasonable distance of intended objectives. Attack follows as soon after completion of assembly as is possible. This is because the guerrilla must avoid maintaining large concentrations of troops at any given location for very long periods.

Now let's consider a hypothetical situation. Assume a destroyer troop working a given area made contact at 2300 hours with a small number of men moving along an obscure route. When challenged, the men bolted. In the ensuing fight one of the enemy was captured and was persuaded to tell the location of an assembly area at which his group was due to arrive at dawn.

At this point the conventionalist theory dictates that large numbers of heliborne troops, abundantly supported with tactical air, converge on the suspected area in an attempt to close with and kill, or capture, the enemy. Such a plan requires time, during which there is a very good chance the pending attack would be compromised to the enemy. The hope of retaining the element of surprise would be questionable in either respect, and the effort wouldn't be worth it if we suffered so much as one casualty.

The destroyer approach to this problem would be different. The suspected assembly area would be subjected only to bombing attack. In fact, we would ask for B-52s and a 500 ton operation, if possible. If immediate reaction heliborne forces were available, they might be used, but only to reinforce possible enemy objectives in vicinity of the guerrilla assembly area. In this event, even if the bombing attacks failed, the enemy would still be forced to call off his intended attack because the reinforcements would shift the balance of advantage, including surprise, away from the guerrilla.

At this juncture, imagine the position of the guerrilla commander. He commands a 1,200 man force of hard core and irregular troops. He has just been subjected to a heavy bombing attack which missed him by a half mile, but it's very possible the bombers may soon return. His forces are all carefully rehearsed in a planned early evening attack on a 400 man enemy garrison 7 miles away. He is convinced that his plan is at least partially compromised in view of the bombings. To further ruin his day, he learns his intended objective is being reinforced by an unknown number of enemy regulars. At this point, he rules out the attack and orders evacuation of the assembly area.

The evacuation, or disassembly, must be accomplished in the same manner as was the assembly. The guerrilla force breaks up into small groups. The men begin to make their way back to their jungle redoubts or to the villages where they live or are garrisoned.

In the meantime, Destroye Group Headquarters, having anticipated this enemy action, has not been idle. Two destroyer squadrons consisting of five troops each, which normally operate in areas up to more than 200 miles from the enemy assembly area, have been contacted. Group has assigned squadron quadrants of responsibility ranging to within 3 miles of the suspected enemy assembly area. By daylight ten 44 man troops have commenced interdiction operations along all logical enemy withdrawal routes stemming from within 3 miles and up to 15 miles of the suspected enemy location.

Destroyer troop c the premise that mobility, maxim ment, surprise, it is possible to ta away from a gue

This operation will last for at least 48 hours. Then the troops involved will return to their normal assigned areas of operation. Will the operation be a success? By conventional standards, it will not, because the enemy force will not be killed or captured to the man. By destroyer standards the operation will be a success even if our teams never see a guerrilla. This is because the enemy's intended attack will be prevented, and if the guerrilla is successful in avoiding ten destroyer troops he can only do so at considerable inconvenience.

The odds are the enemy could not avoid all of our teams working the area, which means that some of the guerrillas would be killed. What happens if the guerrilla moves in larger bands and is therefore more than a match for a destroyer team? In such a case the destroyer team runs. After all, the guerrilla holds no franchise on the right or ability to hide in a jungle. Pursuit at such a time would be very unlikely, in that the enemy himself is running.

If the size of the enemy force warranted tactical air attack, coordination should not be too difficult to arrange. Otherwise the troop has eight airmobile 7.62 mg to liven up the enemy area. Again, neither tactical air nor a troop's machineguns stand a fair chance of being effective, but they do not have to be. Place yourself in the position of the individual guerrilla. You are scared, tired and hungry. You failed in your objective and you know it. You have almost walked into an ambush twice in the past 12 hours; you have repeatedly heard helicopters, jets, bombs, and gunfire since you departed the assembly area. Imagine the war stories such man might tell if and when he makes it back to his village under such circumstances. Such war stories become rumors, bad rumors for enemy morale.

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Are we going to send a force into the area bombed by our B-52s? Maybe, in a week or so. We will know soon enough if the bombs were effective. If they were, destroyer teams will encounter enemy wounded being evacuated from the area. Indeed, to attempt entry immediately following the attack would be foolish, since it would force the guerrilla commander to meet our entry with snipers and result in unnecessary casualties. Our objective was to disrupt the enemy's plan and cause him to move. Of course, we would like to score with our bombs and we can't be so unlikely as to miss all the time. However, in either respect, the bombers could be expected to accomplish our intended objectives.

It is to be hoped that constant harassment of the guerrilla movements will, in time, force the enemy to give up overt guerrilla actions. This should lead to covert and passive type resistance. Once this goal is attained, the possibility of a stable government becomes more a reality. With stable government, the prospects of success for economic and social programs are greatly increased.

The destroyer troop concept is based on the premise that through superior mobility, maximum use of concealment, surprise, and tactical airpower it is possible to take the initiative away from a guerrilla enemy. Constant harassment all over the country should demoralize the guerrilla and cause him to lose confidence in both his leaders and the movement. The theory is that seven men and a helicopter can succeed where a 700 man force would fail. If true, it would be fully possible to reverse the currently accepted position, that it is necessary to outnumber the guerrilla by a 10 to 1 ratio. Successful employment of the destroyer concept could reasonably result in the much more satisfactory ratio of one antiguerrilla for every 100 guerrillas.

It has been said that air assault organizations are fully capable of employing destroyer tactics. I agree. However, I feel it would be equally true to say that any group of aviators and infantrymen equipped with helicopters can employ the tactic, if they are first trained in the procedures.

I have said that there are few principles that apply to destroyer tactics, and that the aviators and infantrymen who would make up a destroyer troop would require only limited additional training. I still feel the principles are few and the training is simple, but both are very essential.

"All military science becomes a matter of simple prudence, its principal object being to keep an unstable balance from shifting suddenly to our disadvantage and the proto-war from changing into total war." I'm sure when Clausewitz wrote that statement he did not have guerrillas in mind. Nonetheless, I feel his quotation finds ample application in Southeast Asia today. For hundreds of years, armies have been seeking an adequate solution to guerrilla tactics. In view of the communist threat during the past 20 years, western armies have devoted a great deal of attention to the guerrilla problem. Even so, we seemingly have yet to find an answer.

In my opinion, surely there is as much reason to believe that the destroyer concept will work as to believe that it will not work.

In view of the current buildup of tens of thousands of men and the expenditure of hundreds of millions of dollars in Vietnam, surely we can afford what the testing of one destroyer troop might cost.

"Oh my, another personal survival kit article"

"Sure I made up a survival kit but I don't recall where I put it"

"It's not my job to make up a survival kit. That's the Army's responsibility!"

Passport to Safety

Captain John J. Spisak—Member of the Survival, Escape and Evasion Committee, Dept. of Tactics, USAAVNS, Ft. Rucker, Ala.

TOO OFTEN the experienced and overconfident aviator disregards his shortcomings or those inherent in the aircraft that he operates. He fails to realize that he can become a statistic and need medical, emergency, or survival assistance.

Contrary to popular opinion, the standard aeronautic first aid kit which we check for a safety seal during preflight is not a survival kit, and it was never intended to be used this way. It is a first aid kit and only that.

Each crewmember needs to have an individual personal survival kit as part of his regular flying gear. It is quite possible that standard issue kits may be lost or abandoned, or not even be carried in the aircraft. Therefore, this personally prepared kit must be capable of *replacing* rather than supplementing the standard kit.

The kit must be compact and lightweight to ensure that it does not use excessive cockpit or cargo space or exceed weight limits of the various aircraft flown by the aviator (fig. 1). It must be adaptable for use in the terrain and climatic conditions to be encountered. The flight gear worn by the individual aviator and his personal preferences will determine the exact contents of the kit.

Obviously, the contents of each kit will vary to some degree, but the primary items for consideration will include:

Medical needs—bandages, disinfectants, painkillers.

Game procurement — cutting edge, snare wire, gill nets, fish line and hooks.

Cooking and heating needs — fire starter, tinfoil, matches, water containers, purification tablets.

Foods—soups, sugar, food seasoning, morale factors (i.e., candy, soluble coffee or tea).

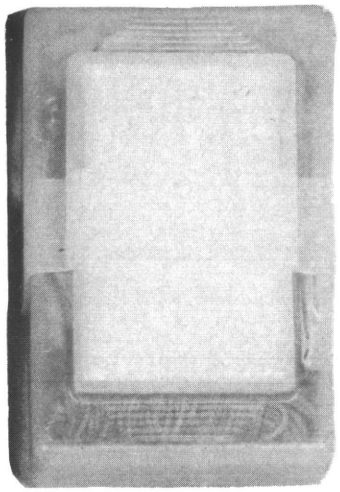
Navigation aids—compass, tactical maps.

Signaling — flashlight, flares, mirror.

The real crime of it all is the aviator's act of omission in his failure to carry the survival kit on every flight in which he participates.

Here's a new way to be sure you'll always have a survival kit with you

Figure 1. Survival kits are bulky and awkward and fit uncomfortably in flight suits. Usually two are carried, which increases discomfort.



Even though these prepared or homemade kits are lightweight, durable, waterproof and compact, they present an awkward and bulky mass when stuffed into the flight suit or jammed into the flight jacket. The one item a crewman does have which is the ideal carrier for this kit is the helmet cover or helmet bag. With only a minimum of time and expense this bag can be altered to accommodate the kit.

Modification is made by cutting a piece of fatigue cloth as shown in figure 2 and sewing it to the helmet bag. The resulting pockets are large enough to accommodate the PSI-2 or the newly developed Survival Evasion, and Escape Kit (SEEK). These extra pockets can be used to carry additional maps, a flashlight, or a signaling device such as the Mark 13 flare. When the helmet bag must be turned in for any reason, the modification can be removed without damage to the bag.

Final modification (fig. 3) is the snaplink or other device which will enable the airman to attach the bag to a D-ring on the parachute. The bag, minus the helmet, now becomes an easily stowed package which will be accessible to the crewman and attached to the chute in event of bailout.

Why not get together your survival kit, and have that change added to your helmet bag so you too can walk more confidently to your aircraft, really prepared for flight. After all, whose life are you trying to save?

Figure 2. Diagram of survival kit holder for helmet bag

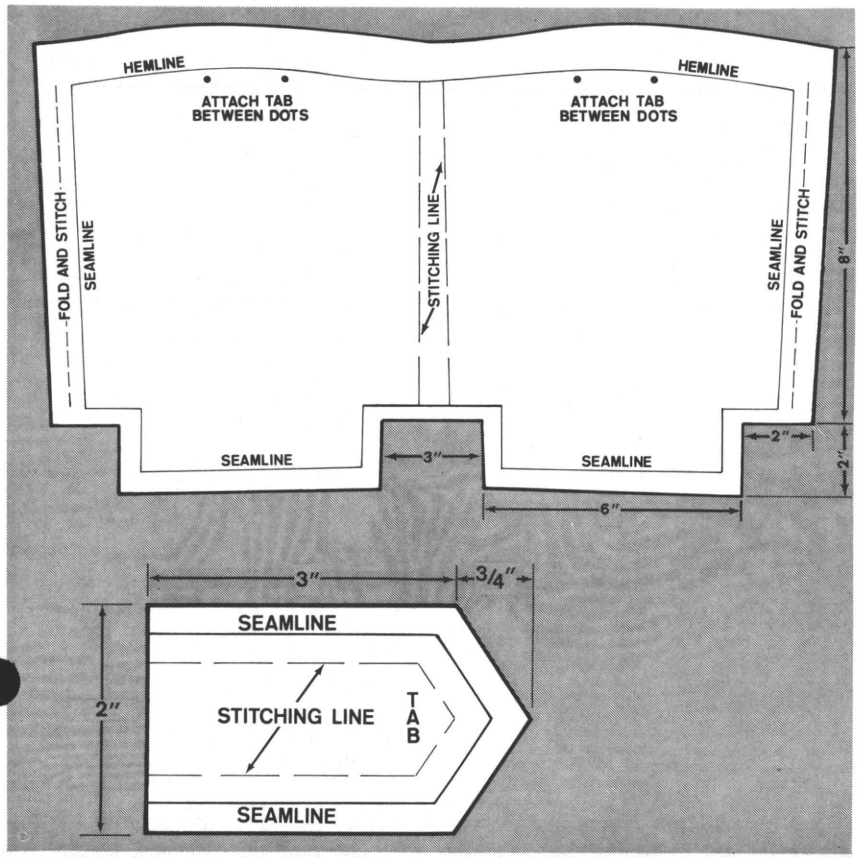
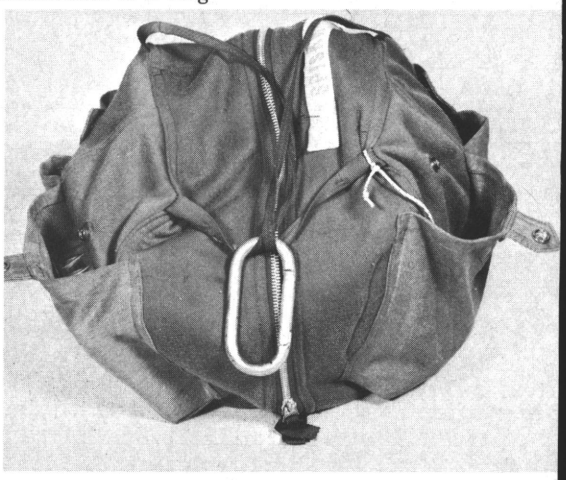
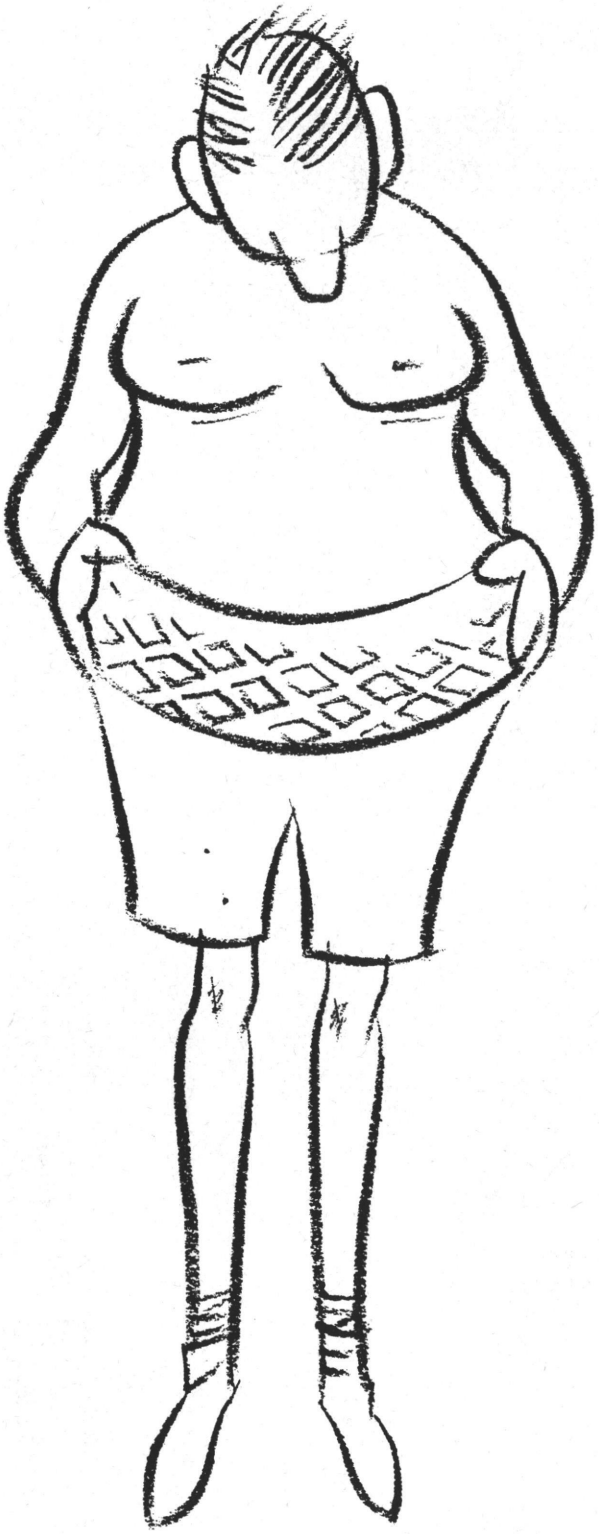


Figure 3. Modified helmet bag showing survival kit pockets and snaplink for attachment to D ring



From the United States Navy Medical Newslette



Reducing Figures

LCdr K. H. Dickerson

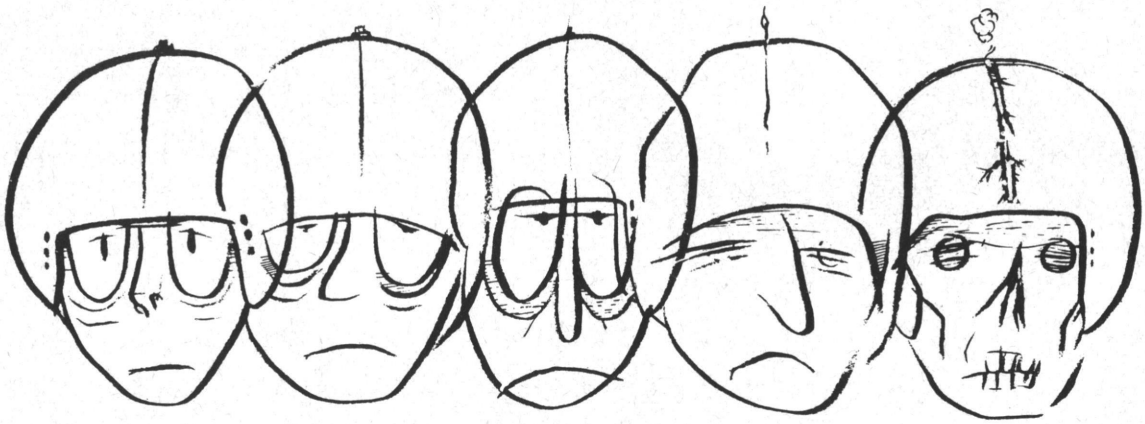
THE TABLE AND CHAIR trembled, rumbling noises came from the depths, there was a rush of air and the dripping of water, metal clashed, and grunts rent the air, onlookers stood aghast—and a big fat man finished his soup. Have you ever wondered why fat people are the object of so many jokes and receive the brunt of so much fun-poking? Or perhaps you find refuge in the fact that others refer to you as portly, stocky or stout. Well, fellows, here comes the bitter blow. Those are synonyms for fat, obese and corpulent.

Actually adiposity is no laughing matter. If yo don't believe being fat is an unhealthy sign, take a look at what it does to your life insurance premiums. If you are overweight, your chances for a premature one-way trip to the marble garden are increased by: 149% as a result of cardiovascular disease, 206% from gall bladder disease, 223% from appendicitis, 383% from diabetes. Expressed in VITAL statistics: for every inch your belly exceeds your chest, scratch two years from your life expectancy.

Carrying around 25 pounds excess fat is like a person of correct weight going around with 25 pounds of rocks strapped on his back. If you saw someone doing this, you would no doubt think he also had rocks in his head. Well, if you are overweight and doing nothing about it, then your own cranium is not exactly pebble-free.

You aviators have additional difficulties if you are a bit fatty, such as additional hazards in safe ejection and escape from your aircraft, discomfort due to a tight (mis) fit in your cockpit, and your increased proneness to aeroembolism (decompression illness, bends, chokes, etc.). So now is the time to do your part to lighten the load for easier hot-weather takeoffs.

Medical authorities still agree that the greate



every inch your belly exceeds your chest, scratch two years from your life expectancy

single cause of obesity is overeating. Although heredity and glandular malfunction occasionally play a contributory role in obesity, there is only one immediate cause: *a caloric intake persistently exceeding the caloric output.* In other words, you are eating or drinking too belly-splittin' much. The great majority of military personnel are in relatively good internal condition. So the factor of glandular disease presents a minimal problem. And this business of "hereditary obesity" can be boiled down mostly to an "inheritance" of faulty eating habits; handed down from hand to mouth you might say.

The capacity of the body to store protein and carbohydrates is strictly limited. So excess food in any form, be it steak, peanuts, whisky or a sandwich, is converted into and stored as fat. Of course this fat is a structure that is highly adaptable and capable of being molded into more attractive arrangements. It can be elevated, stretched, flattened, depressed, pointed, minimized, maximized or borrowed to conform with current more suitable female images. The most suitable male image is and will probably continue to be a slim and trim form. So the best thing you can do with fat is get rid of it and avoid it like the plague.

To help you, we have come up with the following suggestions: You can eat all you want—just don't swallow! Or with the combined help of all the drafting shops, for a nominal cumshaw arrangement, we will prepare a series of neatly lettered mottos for your use. For example, you sit down for supper, and a slip of paper falls out of your napkin saying: "This little piggy had roast beef." You reach into the box of candy and there is a notice: "Better you should get lung cancer." You sneak off the kitchen for a slice of ham and pinned to it is a sign indicating it was baked by your favorite mother-in-law.

Our fatman's special is designed to be sewed into your coat and reads, "I am a compulsive eater, a real 'foodoholic.' Anybody finding me in a candy store, at a soda fountain, or a bar, please notify my wife. Until she arrives, open my collar, tighten my belt, give me nothing but water, and physically restrain me if necessary."

You may not find these suggestions very useful, but it's very important that you do *do something* about your overweight condition. But don't ask your neighbor what to do. There's too much bad advice about obesity and reducing going around these days, and you might catch it. And don't go overboard on reducing either. You have spent several months or years adding that maximus to your gluteus, so don't try to remove it in three days. Weight reduction generally is a relatively slow process, but like the turtle, you won't get anywhere until you stick your neck out.

Stick it out, and see your physician! Weight reduction requires medical supervision. Radical reducing diets are often dangerously deficient in essential nutrients or can cause metabolic upsets that will sort of wreck your "machinery." The aim in dieting is to obtain *proper nutrition* without getting a large economy size dose of calories. Your doctor can help you do just that. See him. Then do what he says (even if he himself tends to be a mite plump).

Only three people stand to gain from your being overweight: 1. The man who will move up into your job sooner than he expected. 2. Your insurance beneficiary who will collect sooner than he expected. 3. The friendly undertaker, Digger Odell.

crash sense

PREPARED BY THE U. S. ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

one

UH-1D TEST PILOT: "The aircraft had come in on a work order for an engine change. As a result, the final inspection consisted of only the engine installation.

"I conducted a preflight inspection of the aircraft but, due to the leading edge of the tail rotor blade being pointed upward, I did not see nor did I know that the aircraft had sustained a tail rotor blade strike.

"When I was completely satisfied with the preflight inspection, I proceeded with the ground runup for the test flight. I noted during the runup that the acceleration time on the engine seemed very fast. I made several checks and determined the acceleration time to be 3 seconds or less. I brought the aircraft to a hover and all flight controls seemed to react normally, so I took off.

"I went through the phases of the test flight for an engine installation, such as the vibration check of the engine, power check for green run, engine gauges, etc. At this point, I had not encountered any abnormalities in the aircraft or its flight characteristics. I climbed to an absolute altitude of 1,700 feet with the intention of doing an autorotation with a power recovery and climbout to check the rotor rpm.

"I nosed the aircraft into the wind, rolled off the throttle, and started slowing from 80 to 60 knots. At 60 knots, the rotor rpm checked within limits and pedal control seemed normal. At approximately 100 feet, with the airspeed still at 60 knots, I rolled on the throttle. At this time the pedals became wobbly and mushy. I checked the pedals further and seemed to have some directional control. However, the pedals were not responding normally. I changed my mind about climbing out and decided to either make a running landing or bring the aircraft to a hover in the open field below.

"I applied slight aft cyclic and the nose of the aircraft came up abruptly and abnormally to approximately a 70° nose high attitude. At that point, I applied full forward cyclic and pulled collective pitch. The aircraft did not respond to cyclic control and continued forward in a nose high attitude, striking the ground with the tail boom at an airspeed of approximately 30 knots. The aircraft leveled and I skidded forward, pulling power as needed to cushion the aircraft. After noting that all instruments were normal and the engine was at 6600 rpm. I shut down."

Aircraft accident investigation board analysis: "Although some evidence was found to indicate that damage or malfunction of the antitorque control system may have existed prior to the aircraft striking the ground, such a malfunction is not considered the cause for the accident, as no loss of directional control was encountered.

"Examination of the wreckage failed to reveal any malfunction of the cyclic controls or synchronized elevator system. The pilot's last-minute decision to bring the aircraft to a hover rather than effect a normal power recovery from the autorotation was based on his detection of abnormal operation of the antitorque controls. This decision necessitated a rapid change in his planned action and is considered responsible for the subsequent abnormal flare which was introduced. This excessive nose high attitude, together with the power and collective pitch which were applied, decelerated the aircraft sharply, permitting the descent rate, already fairly high during autorotation, to increase. Considering the low altitude at which this maneuver was started, there was not enough time to level the aircraft before ground contact."

During the investigation one tail rotor blade was found some distance from the aircraft. A cracked blade grip, still attached, had allowed it to separate from the tail rotor hub. Although the blade showed little evidence of damage due to the accident, a small piece of wood was imbedded in the leading edge, indicating a possibility of prior damage whi

ay have weakened or cracked the blade grip.

In its letter of transmittal, the major command headquarters stated: "Poor judgment appears to be a contributing factor. This is indicated by the aviator allowing the aircraft to descend to a low altitude before attempting power recovery and inducing the nose high attitude prior to a high altitude check. The narrative of the accident investigation indicates possible prior damage to the tail rotor blade grip. If true, this would indicate that:

"a. The safety of flight inspection recorded as completed on the DA Form 2408-13 was not a thorough inspection.

"b. The preflight inspection was incomplete. The aviator's statement substantiates this belief.

"It is noted that the Test Flight Check Sheet required by TB AVN 23-16 was not included in the accident report.

"It is recommended that increased emphasis be placed on:

"a. Complete and thorough safety of flight inspections in accordance with appropriate maintenance technical manuals.

"b. Compliance with TB AVN 23-16 during test flights and operational checks."

two

Seven months later, the same aviator in the same unit was assigned another UH-1D test flight.

Pilot: "I checked the flight handbook and found that the aircraft was to be test flown for installation of the drive shaft from engine to transmission. Upon completion of the preflight inspection, I found everything to be satisfactory except the tail rotor, which had to be tracked.

"I ran the aircraft up three times for the tracking crew to make proper adjustments. Prior to takeoff, I noticed that the aircraft had long range auxiliary fuel tanks installed and full, making the total fuel on board 520 gallons.

"The wind was generally out of the east at approximately 6-8 knots and the nose of the aircraft was pointed westerly. As I pulled power, I noticed the aircraft was taking 40 pounds of torque to hover. I hovered to a sod area and thoroughly checked the aircraft characteristics at a hover. At a steady hover, with the aircraft into the wind, the torque required was between 38 and 39 pounds. All gauges and instruments read normal, and the flight controls responded normally.

"After hovering for approximately five minutes, I requested takeoff instructions from the tower, was cleared, and started the takeoff.

"I applied power to the extent of a slight bleed off of the engine rpm and determined that maximum power for the aircraft was 41 pounds torque. I then decreased power for a normal takeoff.

"At approximately 100 feet and an airspeed of 60-65 knots, I heard a very loud snap from the area of the transmission or engine compartment. Simultaneously, I felt feedback in all flight controls. The

Last-minute decision—excessive nose high attitude—high rate of descent—low altitude

aircraft veered slightly left and went into a very fast rate of descent. I decreased collective pitch in a milking effect and discovered that I had no power, though the engine was running at full rpm.

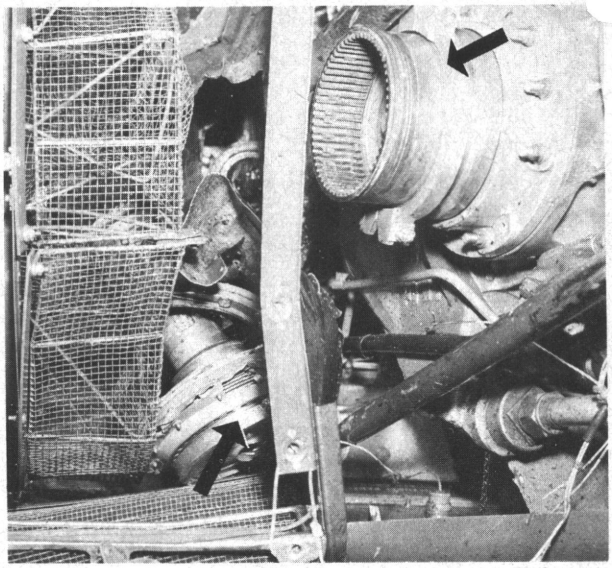
"I tried to turn to the right but the aircraft would not respond to right pedal. The cyclic seemed to have some response. My only alternative seemed to be that of following the aircraft to the left, even though it meant further sacrifice of rotor rpm. I had hoped for a 150-180° turn in order to avoid the trees and river. My airspeed and rotor rpm continued to dissipate.

"I attempted to regain rotor rpm by nosing the aircraft downward and flaring prior to touchdown. I tried to straighten the aircraft with right pedal but it continued to incline to the left approximately 270°. I leveled the aircraft and pulled all available collective pitch. It made level contact on the ground with severe impact and rolled over on its right side."

The aircraft accident investigation board found that the engine transmission drive shaft was installed backwards. Correct inspection procedures were used following maintenance but the inspector failed to recognize the reverse installation. The board stated: "Because of the reverse installation and the high gross weight (approximately 8,558 pounds), plus the maximum amount of torque required to hover, the splined coupling next to the transmission became extremely hot in a relatively short period of time. This extreme heat caused the grease to lose viscosity and the O ring seal around the grease retainer to fail.

"Failure of the O ring seal allowed the grease to be thrown out by centrifugal force. The resultant heat and lack of heat dissipation caused the 'cooking' and shearing of the inner coupling splines. It is felt by the board that the pilot's performance after the failure of the short shaft was outstanding. Only his immediate reactions and well trained instincts allowed this to be a survivable accident...

"It was brought out under questioning that the pilot did not inspect the installation of the drive shaft prior to flight. While it is realized that the pilot is not a technical inspector, and a thorough and searching inspection of an aircraft prior to test flight is the duty of the inspector, it is felt that the pilot should make an inspection and pay particular attention to critical areas such as drive shafts and flight controls when it is known that the aircraft is being tested for the proper function of these items...



Arrows point to engine, to transmission drive shaft and coupling. Note "cooking" and shearing of inner coupling splines

"... The following errors were noted on the DA Form 2408-13: Number 1 inspection due and not signed off; no entry to reflect a test flight requirement for completion of the no. 3 inspection; safety of flight inspection due and not signed off; removal of the clock not entered; and tail rotor track due and not signed off..."

In its letter of transmittal for this second accident report, the major command headquarters stated that the major contributing factor to this accident was improper maintenance supervision. It listed these items:

"Apparently inexperienced mechanics, without proper supervision, installed the short shaft incorrectly.

"Complete and thorough safety of flight inspections were not conducted in accordance with appropriate technical manuals.

"Noncompliance with TB AVN 23-16 by not having a test flight sheet for this test flight.

"An unrealistic sense of urgency apparently existed in completing the maintenance on this aircraft.

"Numerous errors on DA Form 2408-13."

This letter stated that failure by the test pilot to perform an adequate and complete preflight inspection indicated extremely poor judgment. It also stated that if the unit had accepted the Army headquarter's recommendations made after the previous accident involving this aviator, this accident may not have happened.

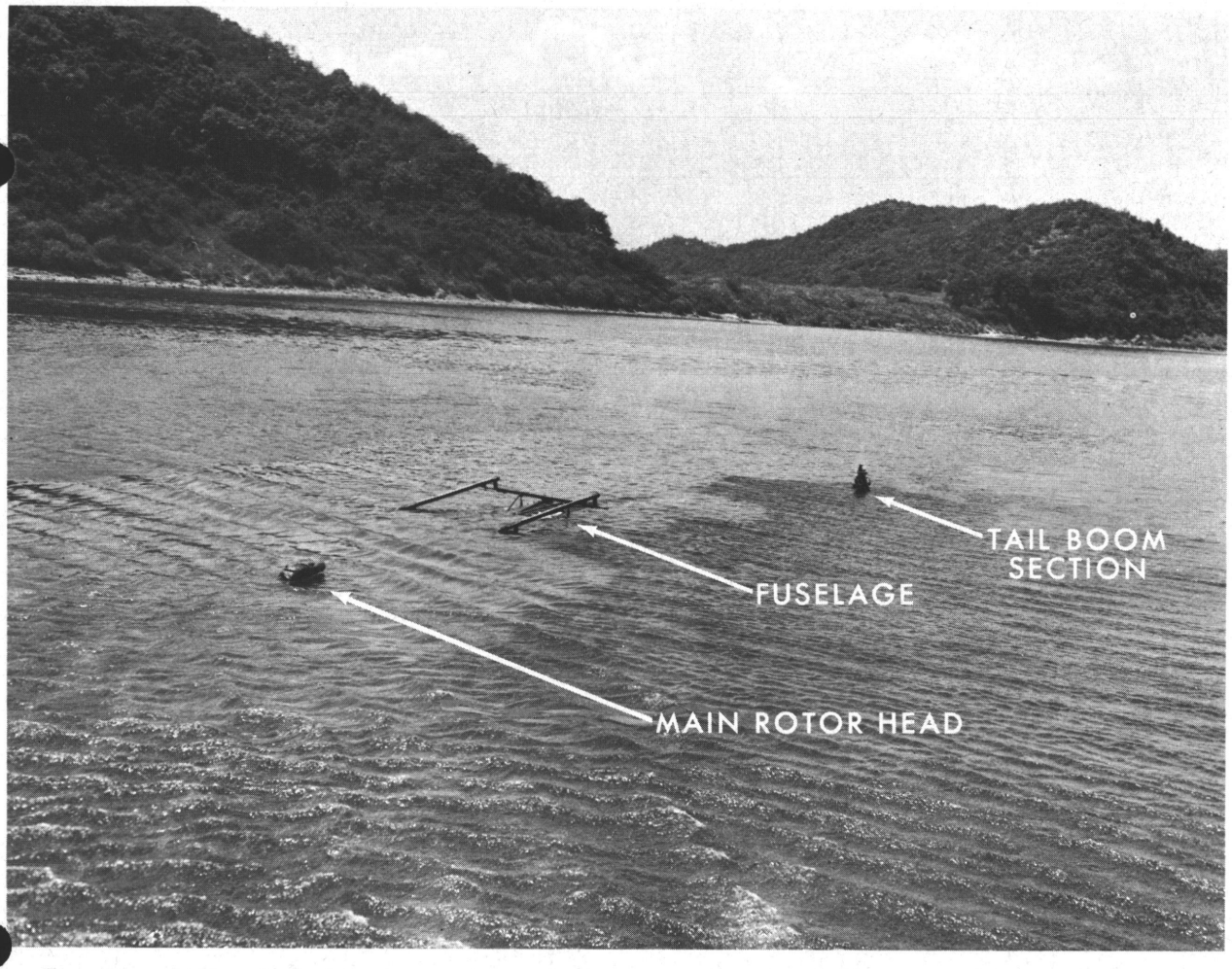
smooth water

An OH-23D pilot was assigned a reconnaissance flight along the north bank of a river to check for possible trespasser tracks. The area he was to cover lay between two bridges and the river ran from west to east. With a passenger aboard, he took off at 1000 hours on a Sunday morning and flew to the river where he landed on the south bank to check a tail rotor hanger bearing. Finding the bearing in good condition, he took off, crossed the river, and reconned the north bank. At a point where the river turned to the northeast, he flew away from the north side because of steep banks and navigated along the center of the river, flying at approximately 10 feet.

Pilot: ". . . while traveling at approximately 50 knots, 10-15 feet above the water, I suddenly realized the aircraft was settling into the river. I immediately tried to flare and pull up. However, we hit the water in a nose high attitude, appeared to skip a short distance, then rolled end over end, and the aircraft settled on its back in about 10 feet of water . . ."

Passenger: ". . . We were going down the center of the river bed because the sides of the banks were steep and rocky and no tracks would be visible. I was leaning forward and looking out at the shallow bottom. We were approximately 6-10 feet above the water. Suddenly, I could see the water coming closer, but the descent was gentle enough that I didn't sense alarm. We hit the water, rolled over, settled, got out, and swam to shore.

Poor choice of visual reference points over smooth water caused loss of depth perception



crash sense

The craft was in a nose-up or level attitude when it hit because I first sensed the water at my feet and not on the bubble in front of me."

Aircraft accident investigation board analysis: "The primary cause of this accident is considered to be that the pilot was flying low over the water and, through a poor choice of visual reference points, lost his depth perception."

A contributing factor was listed as the gener lack of awareness on the part of pilots to the inherent hazards of low altitude flying over smooth water surfaces. Questioning of other pilots indicated many were aware of the hazards, but they were vague about the techniques that should be used and had never received specific instruction in low altitude flying over blending surfaces such as snow, sand, or calm water.

soft asphalt . . . low rotor rpm

Arrow points to soft asphalt where right skid dug in

The flight was a UH-1B checkout with an IP, two pilots, and the crewchief aboard. The IP made a takeoff with the pilot following through on the controls and demonstrated a straight-in autorotation to the ground, again with the pilot following through on the controls. The pilot then took control, made a takeoff, and flew a 700 foot traffic pattern for another practice autorotation.

Pilot: "The pattern was flown at 700 feet indicated and entry airspeed was 80 knots. I made a smooth reduction of pitch and closed the throttle. A short time later, I assumed a 60 knot attitude and continued the descent. At approximately 75-100 feet, I started a slight flare to reduce the airspeed. At approximately 10-15 feet, I started pulling pitch and applied forward pressure on the cyclic to level the skids. We made a smooth level touch down and began the landing slide. The first portion of the slide seemed normal to me. After approximately 10-15 feet of slide, we heard a loud crack, then another, and another. The helicopter became unstable during this period. I could not feel anything in the controls that indicated what the difficulties were. We slid to a stop and the IP shut the engine down."

Instructor pilot: "The entry into the autorotation was excellent—directional control was maintained with the runway and the airspeed was slowly reduced to 60 knots at approximately 100 feet. Rotor rpm was well within the green and the gas producer was approximately 64 percent. At about 75 feet, the pilot assumed his landing attitude and a final check of the rotor rpm indicated it was normal.

"At approximately 30 feet, in a landing attitude, the first pitch application was made. The rate of descent was broken and the aircraft was brought into a level attitude. As it settled toward the ground, pitch was slowly increased to cushion the touchdown. The aircraft continued above the ground at approximately 6-12 inches.

"No ground contact had been made up to this point. Here, I realized that complete loss of operational rpm had occurred. I pushed forward on t

cyclic control and the aircraft made ground contact in a flat attitude. At this point all effective rotor rpm was gone and the aircraft was at a complete stop. The main rotor hub hit the mast and a bump was heard and felt. . .

"The autorotation was excellent all the way through. My movement on the cyclic started the mast bumping at touchdown. Better judgment on the condition of the runway on my part could have prevented the accident."

Aircraft accident investigation board findings: "All members of the board agreed that the primary cause of the accident was that the instructor pilot allowed the pilot to increase collective pitch until all effective rotor rpm was lost in the final touchdown stage of the autorotation. At that time, it was too late to take corrective action. A contributing factor was the soft surface condition of the runway which caused the right skid to dig in and created a shock which resulted in mast bumping."

Pilot heard thump and thought gear had hit rock and collapsed

"You Know What?"

Copilot: "We took off on a routine service flight to deliver two passengers to another airfield. Our flight was slightly delayed when the flaps failed to extend. After the pilot operated the flap switch approximately six times, the flaps extended when power was added. We arrived over our destination from the west at 10,000 feet and the pilot came off on the power and started descending 360° to our left into the valley. He attempted to lower flaps and had to activate the flap switch two or three times before the flaps finally extended. Because we still had considerable altitude to lose, he retracted the flaps to about 15° and started another 360° turn over the field. This turn was to end in our approach.

"During the letdown, I attempted to contact the airfield tower four or five times. The first intelligible transmission we received was on final approach for runway 34. The first part of the transmission was garbled, but I believe it was the altimeter setting, followed by runway 34, and I think the length of the runway. I answered, 'Roger, we are on short final for 34.' I am not absolutely sure of the transmission as I was concentrating on seeing that the pilot had the poorly marked threshold and runway in sight. It was important that he be lined up with the centerline as the runway was approximately 140 feet wide with large 10-12 inch white rocks marking the edges.

"At touchdown, I heard a thump and thought a gear had hit a rock and collapsed. My mind confirmed this when I saw a bent propeller which had almost stopped turning. However, the aircraft then settled softly to the ground and I saw the warning lights were out. The pilot turned to me and said, 'You know what? I forgot the gear!' I said, 'So did I!' "

crash sense

helpful passenger

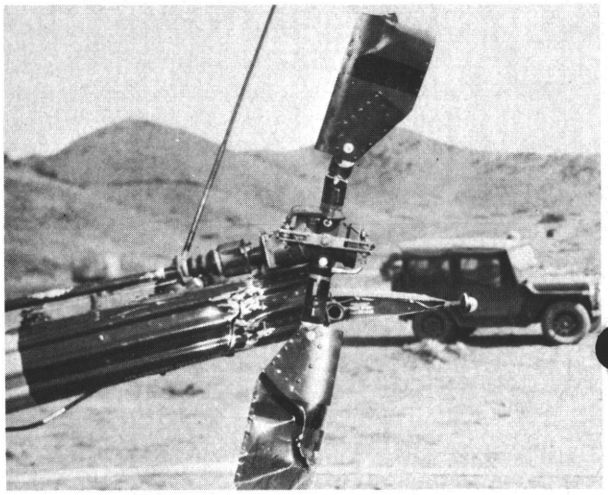
Pilot: "Our unit was placed on alert to proceed to an unknown location to conduct our annual Army Training Test (ATT). At approximately 1600 hours, I was advised of the general location of the battalion area in the field and was told that the ATT required a night displacement of vehicles and aircraft. A recon of the area was made and an area for helicopter night landings was selected.

"I left at approximately 2130 hours and when I arrived at the field location, I made a normal approach to a lighted T and hovered forward to the parking area designated by a crewchief with light batons. I did not use the landing light as its use restricted visibility.

"There was no moon, ground reference marks were difficult to distinguish, and the hovering chopper was raising a dust cloud off the dry rice paddies. The aircraft running lights offered the most dependable illumination.

"Just prior to reaching the touchdown point, we hovered across a dirt road. A denser cloud of dust was kicked up, and the crewchief who was guiding me to the touchdown point fell down. I applie aft cyclic to stop forward movement and my passenger, simultaneously and without warning, turned on the landing light. Due to the light reflecting off the dust cloud picked up by the rotorwash, I lost all visual reference to the ground. At the same time, I heard and felt the tail rotor strike the ground and immediately started a modified hovering autorotation. I reduced manfold pressure, maintained rpm, and applied forward cyclic to keep the main rotor blade from striking the tail boom. We sat down gently and skidded forward approximately 4 feet."

Combination of dust and helpful passenger caused loss of visual reference



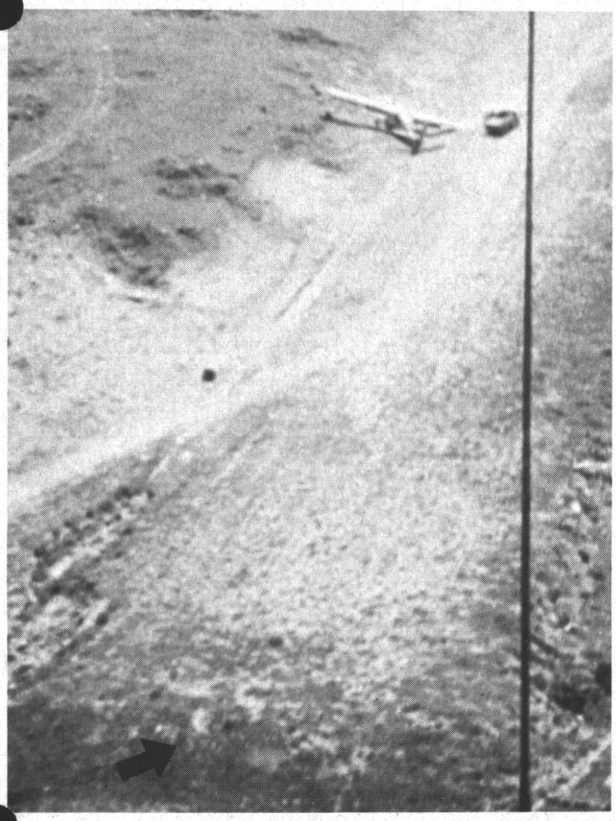
short landing

With 700 pounds of cargo, pilot, copilot, and crewchief aboard, the U-1A took off for a 40 minute flight to an unimproved tactical airstrip.

Pilot: "We approached the strip, made radio contact, and requested smoke. The smoke indicated the wind was from the west at about 5 knots. I began my approach from 2,700 feet on the north side of the strip.

"I circled around the strip while letting down, put down full flaps on base, and turned to final at 600 feet. I rolled out wings level at 400 feet, carrying 11 inches of manifold pressure. On short final, I reduced throttle and rotated. The tail wheel hit extremely hard. I had good control of the aircraft except for an unusual pressure pulling to the left. I applied full right brake and pulled the yoke back hard. The aircraft rolled straight for about 400 feet, then entered a swerve to the left which I could not stop with full right brake. It rolled over the ditch on the south side of the strip and up the bank. It nosed down momentarily, and the engine stopped as the prop dug into the bank and the tail settled back down."

Unimproved, rutted, and sloping, the strip measured 1,035 feet long, 64 feet wide at the east end, and 80 feet wide at the west end. The west end was 18 feet higher than the east end. At the east end of the strip, there was a dropoff of 10 feet. On the south side, there was a 3 foot ditch and 20 foot hill running the length of the strip. Hig



rrow points to 10 foot dropoff where main gear and tail wheel hit

terrain surrounded the immediate area of the strip. Due to the high terrain, the dropoff at the east end, and the general upslope when approaching from the east, there was a definite illusion of being higher than normal when approaching the strip from that direction.

The aircraft accident investigation board found that the primary cause of the accident was the short landing. The main gear hit approximately 8 feet up the 10 foot dropoff on the east end of the strip and the tail wheel hit 6 feet up the embankment. Judging from the impact made on the ground, the tail wheel hit with such force that it was driven up into the fuselage and canted to the right approximately 5°. As the aircraft continued its rollout and the pilot applied more back pressure on the yoke, more weight was distributed to the tail section and the cocked tail wheel. This caused the aircraft to swerve to the left and strike the ditch and embankment.

The board found that the crew of the aircraft were not sure of the landing distance of the U-1A, considering wind, density altitude, and weight factors. The board stated that this information was available in the —10. The need to make the end of the strip the primary and overriding factor in the landing would not have been present if the crew had been aware of this information.

The board recommended that unit standardiza-

U-1A hit ditch and slid up bank

tion procedures regarding airspeeds for short field approaches be revised to conform to the procedures listed in chapters 3 and 14 of the –10. It stated that the applicable forms and charts in the manual pertaining to airspeeds, landing distances, density altitude, etc., should be used by unit instructor pilots in transition training and standardization checks. The board also recommended that the strip be closed to fixed wing aircraft until improvements were made.

25 hours in 27 months

Aircraft settled into the trees at almost zero airspeed

An OH-23B Army Reserve pilot was assigned a flight to carry a passenger over the intended path for a VIP flight the following day. The flight involved flying in and out of confined areas. He landed and remained in the aircraft with the engine idling while his passenger made a ground reconnaissance. When the passenger returned, he made a pretakeoff check, brought the aircraft to a hover and started his takeoff.

As the aircraft rose over the trees, he noted that the airspeed was between 15 and 20 knots. He attempted to gain additional airspeed by easing forward on the cyclic stick, saw that he was losing rpm, and attempted to open the throttle further, only to find the throttle already wide open. He then attempted to lower the collective pitch and allow the engine to regain rpm. He continued to lose rpm until the aircraft arrived at treetop level, where the rpm was noted at 2500. The helicopter settled into the trees at almost zero airspeed and came to rest on its left side 100 yards from the takeoff position.

This pilot did not make a clearing turn before takeoff. As a result, he did not use all the available area for takeoff, attempted a maximum performance takeoff and lost rpm and airspeed. Checking his flight records, the accident investigation board found that he had flown a total of 25 hours during the 27 months before his accident. He had not been given a check flight in more than a year, though he had gone for one 9-month period without flying at all. Because rotary wing aircraft were not available to his unit, he was not given the tactical training or confined area training that he needed to attempt this type of flight.

$41,000 transition

A U-1A instructor pilot was conducting shortfield landing and takeoff transition training at a field strip.

Instructor pilot: "After completing three successful landings under maximum gross weight conditions, I decided the pilot was proficient enough to fly solo from the strip. We taxied off to the east of the strip approximately 25 yards and I instructed the pilot to make two landings and takeoffs.

"I got out and walked off to the left front of the aircraft. I made a cursory survey of the area in front of the aircraft but did not physically walk over the area. I walked down the side of the strip to where another officer was standing and talked to him. We were both standing with our backs to the aircraft, watching the approach of another aircraft into the strip. After the other aircraft landed and took off, I heard the engine of my aircraft accelerate for a few seconds and then heard a sound which resembled a backfire. I turned and saw the aircraft in a wing low attitude, with the ft main gear sheared."

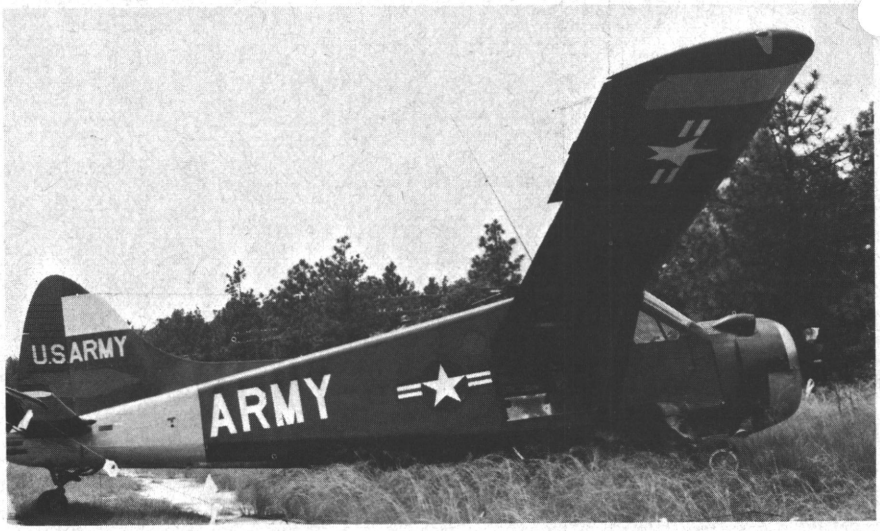
Pilot: "I taxied straight ahead for a few feet and turned 180° to the right and stopped. I contacted the other plane that had just landed and the pilot said he was going to take off again, so I decided to wait for him to take off. After he took off, I taxied straight ahead to get to the strip. I taxied about 10 feet and hit a ditch which was approximately 10-15 feet from the strip. The ditch was covered by grass approximately 2 feet high. It was 2 feet deep with sharp sides. The left gear went into the ditch and hit the west side, shearing the left drag strut and folding the left gear to the rear. The prop dug into soft sandy ground for approximately four revolutions and the engine stopped."

Aircraft accident investigation board analysis: "It is recognized by the board that operations into field strips in either actual or practice conditions involve a greater degree of danger than normal operations. From this standpoint, it is felt that both the pilot and instructor pilot should have been more alert to hazards. The aircraft was taxied into an unknown area without first conducting a ground reconnaissance.

"After a thorough examination of the area surrounding the strip, it was found that other hazards existed to aircraft that might taxi off the strip. Several ditches and mounds of dirt were a short distance from the side of the strip. These ditches could be filled or marked to eliminate the hazards. However, it is felt by the board that extensive preparation of an area to eliminate all dangers reduces the value of training received from strip operations."

The board recommended that emphasis be placed on ground reconnaissance in all phases of training and transition. It recommended the aviation safety officer make a ground recon before the start of any transition training program in which field strips are to be used.

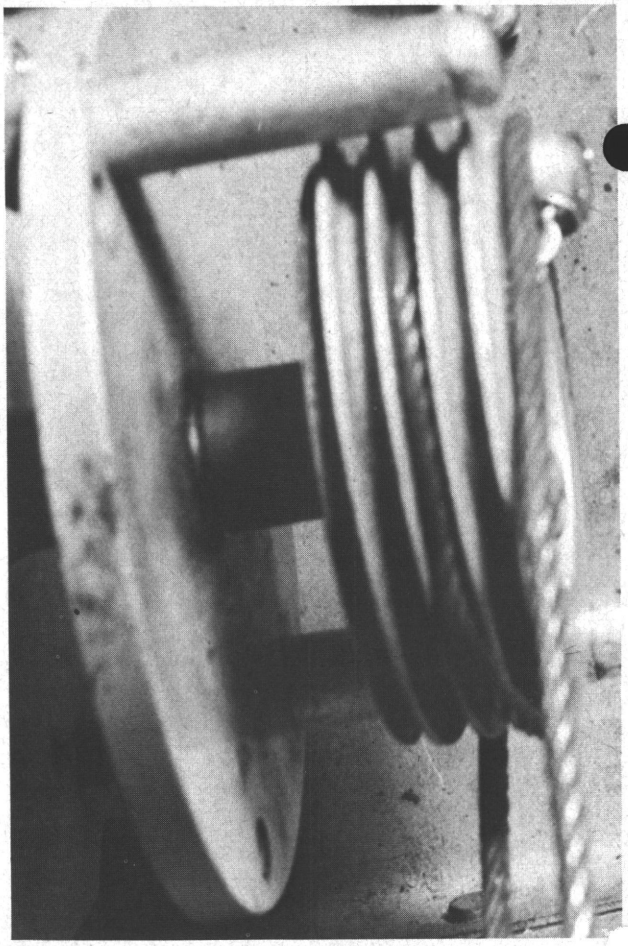
The airplane was taxied into an unknown area without first conducting a ground reconnaissance



Roof shade fell across pilot's face and aircraft came to rest on side of road

rigged for failure

Cable off pulley with fuel selector on front tank



Pilot: "At about 0935 hours, I started the U-6A on the front tank and taxied on the rear tank to the extreme west end of the strip. I lined up for an east takeoff and ran the rpm up to 1500 to wait until the cylinder head temperature was in the green. Four sky divers boarded the aircraft, two sitting with their backs to the firewall, and two facing the firewall, as diagramed in the –10. When the cylinder head temperature was in the green, I made a complete engine runup. After the runup, I opened the throttle to 37″, released the brakes, and started my takeoff roll.

"Approximately 50 feet above the trees, the engine sputtered and continued to run normal for a few seconds. I switched the fuel selector from the center tank to the front tank, then the rear tank, and back to each tank once more. The fuel selector lever turned as if a spring was forcing it back to the original position. It would not stay where it was turned. The engine failed completely.

"I was high enough to see the road and utility poles with wires bordering each side. I was holding the strip heading and elected to land on the road

ther than in the trees. I began a slip to the left, called range control, and told them I had an emergency and was going in. I turned off all switches and prepared to land. I had to sacrifice a little airspeed to clear the trees and wires bordering the south side of the road. After clearing all obstacles, I pushed the nose down, lined up with the white line on the road, and immediately began my roundout. The aircraft landed in a three point attitude.

"As I landed, the roof shade fell across my face, blocking my view. I felt the aircraft go to the left and pushed right brake and rudder. When I got the roof shade off my face, the aircraft was sliding to a stop on the north side of the road."

The investigation board checked the fuel selector and associated cables and pullies for proper rigging and operation. A kink was found in the cable and the cable was off the pully connected to the fuel selector handle. The cable was reinstalled and found to frequently unwind from the pully because of the kink. Further operation of the fuel selector handle revealed that the cable did not completely unwind from the pully each time the fuel selector handle was moved. Also, the only position in which the kink was readily visible was with the fuel selector handle rotated fully clockwise.

With the full selector handle indicating rear tank, the kink began to ride up out of the groove. With further counterclockwise rotation, the cable would frequently unwind and slip from the pully.

Maintenance records indicated that a discrepancy appeared on DA Form 2408-13, listing "fuel selector binding." This discrepancy was noted two months before the accident. Corrective action taken was "fuel selector pully lubed." It was further noted that considerable work and inspections took place in the cockpit area during the 60 day period before the accident.

In its letter of transmittal, the Army command headquarters stated: "It should be noted that items 9 through 11, TM 55-1510-203-20 PMP (Preventive Maintenance Periodic Inspection Checklist) require inspection and adjustment, as required, on the fuel selector system. If this is not accomplished, the cable will develop slack over a period of time. This will cause slippage or a kink. This condition can be recognized by a springy feeling when operating the fuel selector handle."

rned OH-23G. Note broken cable across tail boom.

didn't look, didn't see

An OH-23G pilot, with two passengers aboard, was on a photographic mission.

Pilot: "I had made numerous landings during the day to permit my passengers to take pictures of Army construction sites. At about 1430 hours, I made a few passes over a bridge for aerial photographs and then landed in the river bed. One of my passengers got out of the helicopter and took some pictures of the bridge superstructure. I did not shut the engine down and waited until he returned and was strapped in before I ran the engine up for takeoff.

"When we reached about 30-40 feet, I heard a loud noise and lost control. The aircraft fell to the ground, landed on the skids, and bounced over to its right side. One of my passengers and I were still strapped in when the helicopter came to rest, but the other passenger had been thrown out. The aircraft caught fire immediately."

Passenger: "We took off facing to the southwest. As we reached a height about level with the deck

of the bridge, I heard a sound overhead which is best described as 'clunk.' The aircraft developed a moderate shudder and began falling.

"I believe that the right skid hit the ground first. At impact, I was thrown out of the right door. I can only recall tumbling and seeing part of the aircraft above me silhouetted against the sky.

"I did not consciously unfasten my seat belt, nor can I recall brushing the latch with my hands. I do not recall any sensation of pain when I was thrown from the aircraft. When it came to rest, it was lying on its right side with the nose still facing to the southwest. I was lying on my back with my head facing southeast, looking at the bottom of the aircraft. I did not have my flight helmet on and can only surmise that it came off when I was thrown out.

"I still had no sensation of pain. I tried to get up, but discovered my left leg and right foot were pinned under the right skid. I saw that the other passenger had unstrapped himself and was helping the pilot out of the aircraft. One of them stated that a fire had started. I looked toward the rear of the aircraft and saw flames. In a fit of panic, I retracted my right foot and used it to push on against the skid to extract my left leg. The other passenger and pilot did not see me and fled. I do not remember calling out. When I freed myself I was able to walk, but I had considerable pain between my right knee and groin. The pilot joined me and said the other passenger had gone for an ambulance."

What the pilot described as a loud noise and the passenger as a "clunk" came from the aircraft striking two wires (steel alloy double strand cables, 3/32″ diameter). The main rotor struck the wires first. When the wires broke, they became partially entangled in the tail rotor. The cause of this accident is very simple. The pilot did not make a reconnaissance of his takeoff route—he didn't look, and he didn't see. A look in this case would have saved $56,791 and prevented three injuries.

Despite all the publicity and advice about wearing gloves that has appeared in all aviation safety publications for the past several years, none of the occupants of this aircraft were wearing gloves. The pilot left his in his quarters and the two passengers were not issued gloves. The pilot and one passenger sustained laceration injuries to their hands.

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fog

"At approximately 0615, I checked the weather and filed a 1080 flight plan for a local flight in an OH-13H. My mission was to transport a passenger for an aerial inspection of a railyard. We lifted off at 0710 and flew approximately 45 minutes to the railyard. We spent about 10 minutes making passes over the area, and then headed for home.

"Shortly afterwards, we encountered light rain and saw numerous patches of ground fog. I estimated visibility to be ½ to 1½ miles. I looked down at my map and when I looked up again, we were in the fog. I immediately checked my heading (260°), indicated altitude (1,400 feet), and airspeed (70 knots). I maintained heading and altitude but slowed to 60 knots, going to 3,200 rpm. I then remarked to my passenger that I did not like this—referring to the fog.

"Suddenly I saw trees straight ahead. I immediately pulled collective and applied aft cyclic. The cabin section cleared the trees but the tail rotor struck one and set up a severe vibration. There was only one small partially cleared area available and it was located on a steep slope. I turned right approximately 270° and tried to land on that portion of the slope having the least number of trees. I did not make it to the center of this area as the main rotor blades began striking trees, and I flared the aircraft in order to set it down as gently as possible. I then told my passenger that we were going to be OK.

"The aircraft touched down easy and rolled over to the left. I switched off the magnetos, generator, and battery switches and told my passenger to hold on while I unfastened his safety belt. After he had crawled out, I handed him the fire extinguisher and held on while he unfastened me. I got out and we cleared the aircraft. Then I disconnected the battery. The time was 0830."

Q. "Who assigned you the mission?"

A. "It was assigned by the general support platoon leader."

Q. "Did you, as the pilot, experience any mechanical difficulties prior to striking the trees?"

A. "No, none at all."

Q. "What mechanical difficulties did you encounter after striking the first tree?"

A. "The tail rotor set up a severe vibration, but the controls still functioned."

Pilot looked down at map and flew into fog

Q. "In what position were you holding the map when you flew into the fog?"

A. "The passenger was holding the map for me."

Q. "Were there any wind gusts or downdrafts that might have contributed to the accident?"

A. "No."

Q. "Did you contact the weather forecaster by radio en route?"

A. "No."

Q. "What time did you check weather?"

A. "0715-0730 local time."

Q. "What was your actual weather en route?"

A. "Rainshowers, patches of ground fog, and haze. The ceiling was approximately 1,500 feet indicated."

Q. "Was it raining at the time of the accident?"

A. "No, but the bubble was covered by a light mist."

Q. "How long did you look at the map before going into the fog?"

A. "From 15 to 45 seconds."

Q. "What was your airspeed when you hit the trees?"

A. "Below 60 knots."

Q. "Did the operations officer brief you or sign your clearance before takeoff?"

A. "No, I was my own clearing authority."

Q. "Did you actually check terrain clearance for the route?"

A. "No, just glanced at the general area."

Q. "Do you think your local area checkout was adequate?"

A. "Yes, it was thorough and complete."

Q. "Why were you flying at 1,400 feet indicated?"

A. "I don't know. I normally fly 1,000 to 1,500 feet above the ground."

The accident investigation board arrived at the following conclusions:

- The pilot entered IFR conditions while on a VFR clearance.
- The pilot failed to slow to an airspeed that would enable him to recognize and avoid other traffic or obstacles as required by regulations.
- Insufficient attention was given to terrain elevations along the flight route during preflight planning.
- Supervisory error was involved in assigning a mission involving somewhat marginal weather conditions to a newly arrived, inexperienced rotary wing pilot.

The investigation board also pointed out that the major responsibility in accidents of this nature ultimately rests with the pilot in command. It is his responsibility to maintain VFR flight conditions at all times when not properly cleared and equipped for instrument flight.

Water in fuel

The pilot of an O-1A airplane had just completed a flight to another airfield and was making preparations for his return trip.

Pilot: "I went to the airfield to check on the refueling of my aircraft. It had not been serviced because the gas nozzle of the 115/145 tanker had to be replaced. After installation of the gas nozzle, my ship was serviced with 19 gallons of 115/145 fuel. My aircraft was the first ship to be serviced from this tanker. I then made a preflight inspection, checking the security of the gas caps, and paying particular attention to the oil level of the engine because of a slight oil cooler leak. After finding that the ship was all right, I departed at approximately 1000 hours.

"My flight started uneventfully. I was flying at 2,000 feet, approximately 700 feet above the highest terrain, and was on a flight path that was more easterly than usual because of weather and a very strong west wind. This placed me over an area which was not as familiar to me as my regular route. After flying for 45 minutes, the engine began to run rough. I checked my instruments and all indications showed normal. I then switched to the auxiliary tank, but the engine continued to run rough and began missing. After 10-15 seconds it quit. I looked to my front for a forced landing area. I knew that landing into the wind would be best but due to loss of altitude, I knew I would have to pick any open area which I thought suitable and free from obstacles. The field I chose was to my right. I dropped 60° flaps and slipped the aircraft in an attempt to land short enough not to run into the line of trees at the end of the field.

"Due to a quartering tailwind, I missed my touchdown point. In order to avoid the trees, I changed my course. This put my touchdown point on the side of a hill. I again missed my touchdown point and headed toward a cut that separated two fields. I changed course again, but this abrupt change caused the aircraft to touch down. Almost immediately, the aircraft flipped on its back. I released myself and got out. Seeing there were no signs of fire, I returned to the ship and turned off all power and fuel switches."

Engine failure was caused by fuel contamination. Approximately one-half gallon of water was drained from the airplane's fuel cells. Water was also found in the fuel strainer. Investigation showed that the aircraft had been serviced from a 1,200 gallon tanker. This 1,200 gallon tanker had been completely empty before being serviced from a 5,000 gallon resupply tanker.

Refueler: "Before the pilot arrived, I made a daily check on the tanker for possible water. Upon engaging the pump, I noticed that the nozzle was stuck and that water was coming out of it. Before changing the nozzle, I started filling two 5 gallon gasoline cans to determine how much water was in the truck. I also drained the filter separator. After filling one can and a little over half of the second can, I noticed that only fuel was coming out of the nozzle and filter. I changed nozzles and got ready to refuel the aircraft. Before servicing it, I made one last minute check to be sure there was no water in the fuel. I checked both the nozzle and the filter."

Q. "Where was the tanker parked when you made the check for water on the morning that you refueled the O-1A?"

A. "The truck was parked out on the pad next to the 5,000 gallon tanker."

Q. "The pad where the tanker was parked slopes slightly toward the front of the truck, doesn't it?"

A. "Yes."

Q. "Is it possible that some water could have been trapped in the forward portion of the compartments, due to the angle the truck was sitting, and not be drained out when you checked for water?"

A. "Yes, I guess so."

Q. "When you refueled the aircraft on the parking ramp, wasn't the tanker sitting at an angle that would have caused the water, if there was any, to run to the rear of the compartment and be pumped out?"

A. "It is possible."

Q. "When you made your check for water, did you drain all three compartments?"

A. "I don't think so. I only remember opening the 600 gallon rear compartment."

Q. "When you refueled the aircraft, which one of the compartments did you take the fuel from?"

A. "I don't remember if I opened all the valves or not. Sometimes I open them all to equalize the level in all of the compartments."

Q. "According to the pilot, while the aircraft was being refueled, the pump on the truck was acting up and one of the other ramp men went to the rear of the truck and moved the levers that open the valves to the other compartments. This was done in an attempt to smooth out the flow of fuel. Do you know anything about this?"

A. "I don't remember anyone doing that."

Q. "But is it possible that there could have been water in the forward two compartments that was not detected when you drained off the water in the morning, and that this water was released into the aircraft when you refueled it?"

A. "Yes, it is possible."

Further investigation showed that the pilot had not used a checklist during preflight and had failed to drain and examine aircraft fuel for contamination. In addition, the pilot had taken off immediately after the aircraft had been serviced. Had he checked the fuel, he would not have noted any contamination as the water would have still been held in suspension.

The terrain the aircraft was flying over offered few good forced landing areas. Open areas were under cultivation and were extremely soft due to recent heavy rains.

The investigation board recommended that all compartments of fuel tankers be drained daily and fuel checked for contamination; supervisors of POL operations make frequent unannounced spot checks to ensure that correct contamination checks are being complied with; and that commanders ensure that aviators are properly draining fuel tanks and completing thorough preflight inspections. In addition, it was recommended that a fuel sample from all aviation tankers in the division be taken weekly for laboratory analysis.

One-half gallon of water was drained from fuel cells after accident

Maintenance Organization Concepts

CWO Lindy D. McTier

WHILE THE AIRMOBILITY concept—Army style—has been accepted, some attendant logistics, supply, and maintenance areas have burrs which need honing down before a smoothly operating division results. These "nuts and bolts" problems, especially the aircraft maintenance support system, need overhauling and updating.

Our present maintenance system and support equipment are pre-World War II and are obsolete. Some consideration is being given to new equipment for the airmobile concept, but there seems to be no change in sight concerning the maintenance structure. The Army is placing new and sophisticated aircraft in the field without trained maintenance personnel, without special tools, and without sufficient spare parts. Without these, a very costly aircraft will soon be grounded and unavailable for missions.

The problems that have existed for years between A and B level maintenance* must be eliminated. This could be done by combining these two levels of maintenance and placing both under the aviation unit commander.

Under the present system, many of these problems arise daily:

There is always room for argument as to the dividing line between A and B maintenance.

Great distance is involved.

Many times when A is working, B is off, and vice versa.

Training schedules seldom coincide.

There is often disagreement on work orders and records.

Manhours are lost performing acceptance inspections and inventorying aircraft equipment.

Aircraft are often rejected because of discrepancies.

A consolidated maintenance system could eliminate or at least partially resolve many of today's problems.

There could be no argument about who was to accomplish what.

Manhours lost traveling between A and B could be turned into productive hours.

The commander could dictate when and who would train.

Working hours could be fully utilized.

The skill level of men in A and B varies little today.

Duplication of special tools and spare parts could be eliminated.

Present personnel requirements could be substantially reduced.

Maintenance officers and aviators used in present maintenance units could be used to fill slots in the aviation company.

With modern mobile equipment available, no great burden would be placed on the aviation company.

Crew assignments could vary depending on type of aircraft. A Chinook, for example would require a crewchief, flight engineer, and qualified maintenance mechanic. These three people would work as a team on the helicopter and accompany it wherever it goes. They would accomplish all A and B maintenance, including periodic inspections and component changes.

Specialists would probably still be needed in the aviation company for certain jobs. A highly trained specialist for complicated engine repairs and a sheet metal repairman could still be used. However, the number needed could be drastically reduced from present requirements. If flying hours and maintenance hours were high, a number of mechanic's helpers could be added to the maintenance section. These people could also be used for other details within the aviation company.

No one will deny that a need exists for a base type maintenance. For example, units of the 11th Air Assault Division were given backup support by the 14th Depot Battalion, Atlanta. The Army has also prepared a floating type maintenance support ship which will soon deploy to Vietnam (see "Project Flattop" DIGEST, Apr 65). With A and B maintenance consolidated, and with a base type maintenance mentioned above, the intermediate maintenance support could be eliminated.

Resupply of aircraft parts has been a constant problem for years. It is my belief that if parts were constantly available, half the man hours presently expended on aircraft maintenance could be eliminated. Cannibalization at best is a poor system to keep aircraft flying. Unless the aircraft is a total loss, all parts removed must be replaced before cannibalized aircraft can be flown again. Under the present system, A and B levels of maintenance are constantly burdened trying to keep the maximum number of aircraft flyable. It is also impossible to gain a true picture of maintenance hours versus flying hours.

This article is not intended to solve current aircraft maintenance problems; it is presented to stimulate some interest in this field. Perhaps a survey of the systems being used by our sister services could help solve some of the problems we are encountering.

When he wrote this article, CWO McTier was with Co A, 611th Maint & Supply Bn, 11th Air Assault Division, Ft Benning, G

*The Air Assault Division developed a maintenance system consisting of three levels: A (user—1st echelon), B (direct support—2nd and 3rd echelon), and C (general and depot support—4th echelon).

Basic Requirements of an Officer

General Harold K. Johnson, Chief of Staff, U. S. Army

WHAT DOES THE Army expect of you? I have boiled the basic requirements down to what I call the Four I's —an admitted gimmick I use to make them easier to remember. They are—Intelligence, Imagination, Initiative and Integrity. An officer who possesses and practices the Four I's can only go one way in my book—up.

In the category of Intelligence, I would include the development of intellectual curiosity, something which I am sure has been emphasized throughout your career. You must challenge assertions and not blindly accept assumptions. In preparing your staff work, for example, collect all the facts—not just those favorable to your point of view. Make a clear, logical analysis of these facts, and when appropriate present the available alternatives.

Under Imagination, I would ask that you project beyond your own experiences—search for new ideas. It was Frederick the Great who said: "Of what use is experience if you do not reflect?" This is not to say that all the experience you have picked up over the years is of no value—it certainly is—but there is always danger of making a broad generalization based on a very narrow experience. Today's world is proof that man's imagination can create new wonders, year after year. We still have many unanswered questions about the nuclear battlefield because there is no precedent to fall back on, except basically our imagination. We have an open season on ideas and here I add a caveat from a quote by Erich Fromm: "An idea never becomes a cliche merely because it is repeated."

Intelligence and imagination are of no value unless you use your Initiative to give them substance. We always need someone to pick up the ball and run with it, but of course, in an intelligent manner and straight for the goal line, not just back and forth across the field. The old cliche about the lowly turtle who only progresses when his neck is out still has a lot of meaning for us today. Too often people tend to quote regulations to prove why something can't be done instead of trying to find out how it can be done. Regulations are a guide and they are necessary, but they are not always sacrosanct. Any commander can submit a letter to higher headquarters pointing out where changes should be made when the conditions warrant. The "can do" spirit is a wonderful thing to see and it often moves mountains that seemed immovable at the start.

I consider my last point—Integrity—the most important, since without integrity the other qualities I have listed would function in a meaningless void. Integrity is simply honesty, and like loyalty it is a two-way street. Diligent application of the Golden Rule on the same two-way street is a good guidepost to follow. One must be honest with one's self, with his subordinates and with his superiors.

I have observed a somewhat strange condition in staffs over the years; perhaps it might be more aptly termed a phenomenon. In most staffs, particularly at levels where the diversity of activity spreads the staff capability pretty thin, only one man has the time necessary to thoroughly research a problem. That individual is you, the action officer. Your immediate superior may check your work very carefully; again he may not if his time is limited, but he is unlikely to know whether or not you have explored all of the factors bearing on your problem—not facts—factors.

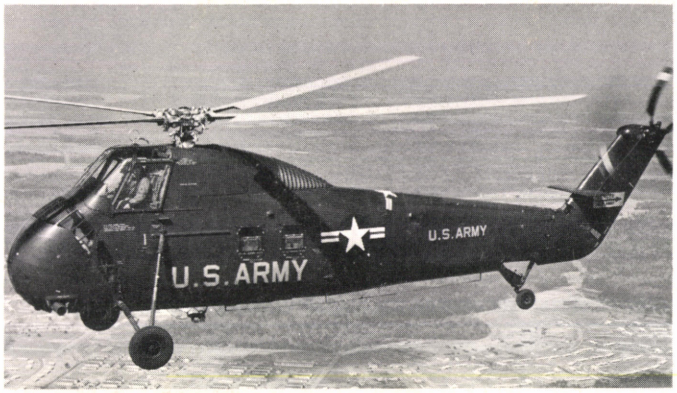
At each succeeding echelon of review, to the point that authority exists for a decision to be made, you will find that time is more precious and consequently more limited. This throws a tremendous responsibility on the first action officer. His research must be thorough, his analysis must be complete, his conclusions must be objective, and his presentations must be completely honest, regardless of personal prejudice.

Your integrity starts out with an honest day's work, speaking figuratively, an honest approach, an honest analysis, an honest recommendation — and honest presentations up the line. Your integrity will be respected. Protect that integrity and treasure it, because it is your most valued possession. I believe Newton D. Baker, the Secretary of War in World War I, expressed it well when he said: "Men may be inexact and even untruthful in ordinary matters and suffer as a consequence only the disesteem of their associates or the inconvenience of unfavorable litigation, but the inexact or untruthful soldier trifles with the lives of his fellow men and with the honor of his government."

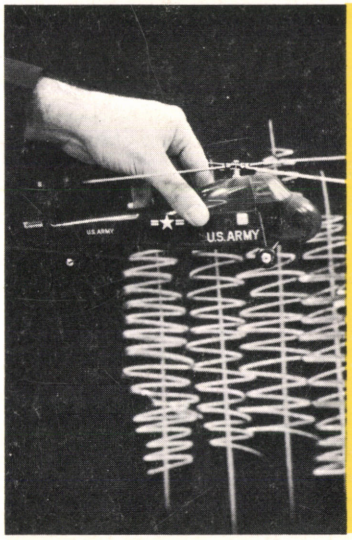
—Supplement to the Air Force Policy Letter for Commanders

WITHOUT WARNING

A CH-34C, with 12 passengers and a crew of three aboard, took off for a cross country flight. Shortly after takeoff, over a heavily wooded area, the engine coughed and failed.



"The pilot autorotated and attempted to restart the engine. It would not respond and he called the crewchief to prepare the passengers for a landing in the trees. He flared and zeroed his airspeed at the tree tops, pulling pitch as the aircraft settled into the trees."



"The tail boom hit the trees first, then the fuselage hit two trees, bending them and breaking the fall. The right forward fuselage hit a third tree and the CH-34 slid down the tree to the ground."

Major injuries were sustained by the crewchief and one passenger. Another passenger had minor injuries and the aircraft was a total loss.

"This $359,000 accident was caused by failure of the connecting rod bearing and connecting rod of the Nr. 5 cylinder due to oil starvation at the bearing. There was no prior warning of engine failure and the pilot's quick response and proper execution of emergency procedures saved the lives of his passengers and crew.

"A large quantity of metal fragments were found in the engine oil sump. *If an engine magnetic chip detector and cockpit warning light had been installed, this accident could have been prevented!*

"The Modification Work Order for installing these items had been entered in the aircraft's Form 2408-14 as not being complied with 14 months prior to the accident. A work order for installation of chip detectors and cockpit warning lights was issued six months before the accident. No follow-up action was taken!

"Modification Work Orders and kits for installing chip detector warning lights have been issued for many months, yet we continue to fly a large number of aircraft without this vital equipment. As long as this condition exists, we can expect more accidents like this one!"

PREPARED BY THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH