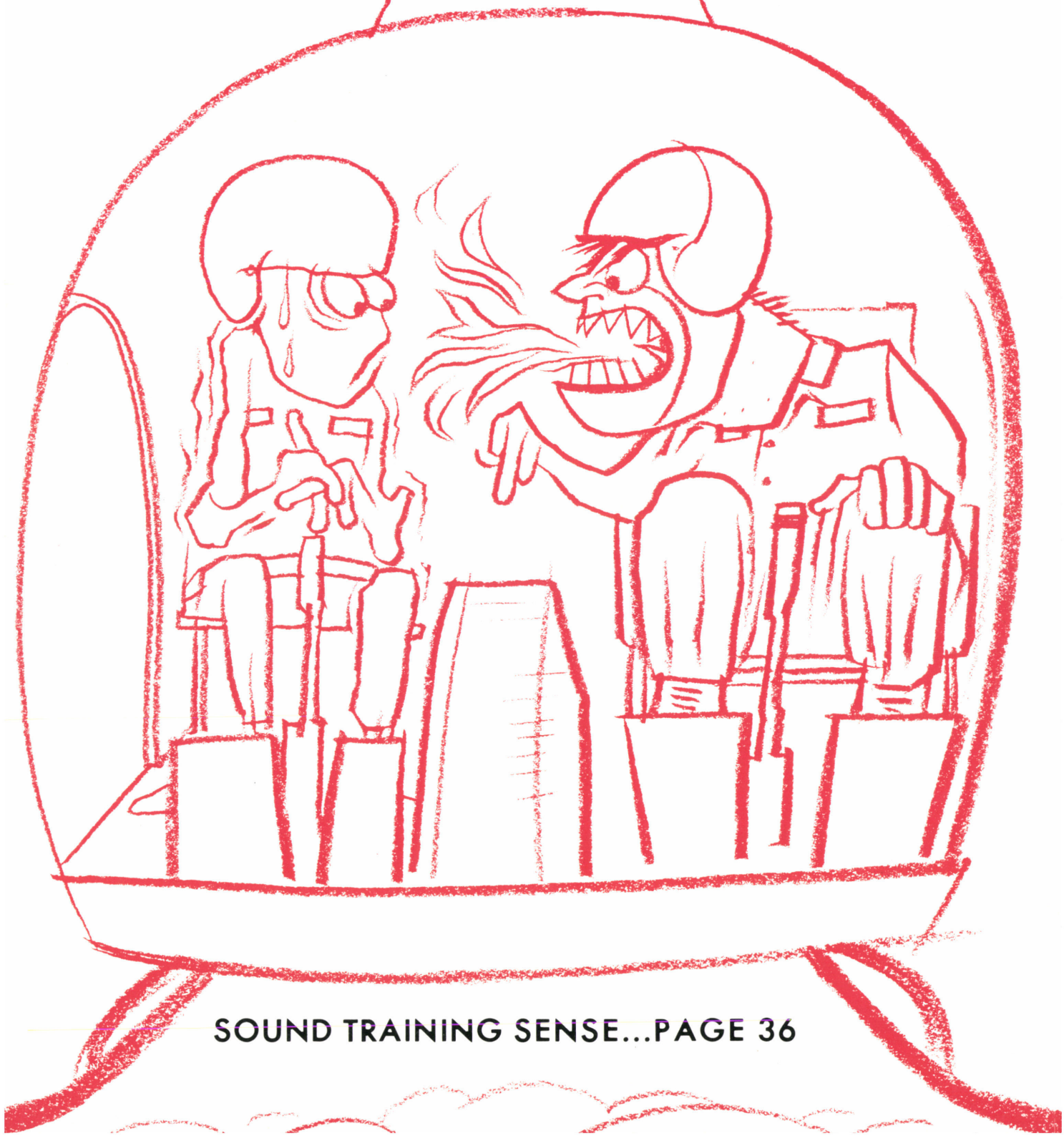
UNITED STATES ARMY SEPTEMBER 1966

AVIATION DIGEST



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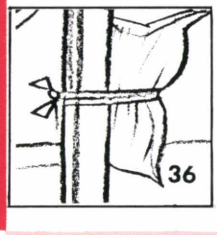

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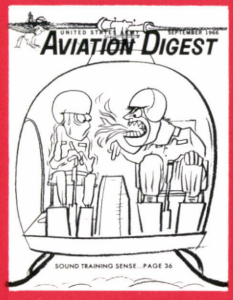

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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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

Sir:

Some articles are allowed to be printed which may give nonaviation commanders a false impression of our capabilities, etc.

For example, there is too much nonchalance in articles concerning tactical employment of aircraft at night and in night weather. Of course it is feasible to employ helicopters at night in certain types of missions, such as landing a small recon force, resupply, aerial med evac, speaker and leaflet missions, and using a team of armed ships and a flare ship to suppress an enemy attack on an outpost. However, a night landed air assault in a contested area is *not* feasible as a rule. And a low-level night formation flight would almost definitely not be worth the risks involved. I feel qualified to speak on this subject as I participated in many of the air assault tests and was an aircraft commander on one of the first night landed assaults in RVN with the 114th Aviation Co.

Also the DIGEST should point out the hazards of certain types of training of ground troops using aircraft. I will cite rappelling as one example. I think there have been many instances where aircraft were used for this purpose when a tower would have been sufficient. Here again I speak from experience with the 11th Air Assault, having been involved in several incidents (one fatal) while conducting this training.

In closing, I think the DIGEST is doing an excellent job in promoting safety and good operating practices. The article titled "Mid-Air!" in this issue [June 1966] was very timely and should really provoke some thought for anyone who likes to overlap rotor blades.

CWO CARL L. HESS
Dept of R/W Tng
Ft Rucker, Ala. 36360

Sir:

A great deal of recent research and attention seems to be devoted to improving the Lightning Bug mission against the Viet Cong. Lightning Bug was originated by the 197th Aviation Company over a year ago and has been used to sink hundreds of enemy boats and kill untold numbers of Viet Cong on the large rivers and canals in the III Corps area, Army of the Republic of Vietnam. The 197th Aviation Company (AML), part of the 145th Aviation Battalion, uses a large searchlight, utilizing C-123 landing lights for illumination. When boats or sampans are discovered in unauthorized areas at night they are immediately attacked and destroyed by the armed helicopters escorting the Lightning Bug. This night attack mission has seriously interdicted the otherwise smooth flow of Viet Cong supplies. Although the Lightning Bug was the original "baby" of the 197th Aviation Company, it has also been very successfully employed by the 13th Aviation Battalion in the IV Corps area.

Recently many other units are being equipped to fly Lightning Bug and new ideas to increase the effectiveness of the mission are being combat tested. Generally, these new ideas pertain to night detection and night viewing devices which will increase our ability to see the enemy. A lot of money and effort are going into these tests, some of which show a great deal of imagination. For the most part, however, this money is being spent to little avail because of one tremendous oversight. To make our night attack missions more effective we must devise methods of surprising "Charlie" before he can hide and take cover. If we construct a surprise effectiveness graph from 0 to 100, the best we can ever hope to achieve with the UH-1 series helicopters is about 5. All Hueys, probably even including the new Cobra, make a loud and distinctive noise which can be detected at least one or two kilometers distant. Even though a Huey gun ship can attack at night blacked out, it still announces its presence by sound far enough in advance to allow the Viet Cong to hide. If we want to achieve *real* surprise, we must have ratings of up to 95 on the graph! We need not only a blacked out helicopter but a silent one! There is such a helicopter available at this time, the Kaman HH-43 Husky, owned by the US Air Force. If some of our new night devices and techniques were employed with the Husky we would be able to surprise "Charlie" at night so effectively that we could virtually stop all illicit river and canal traffic. I recommend that three Husky helicopters be given to the 197th Aviation Company, and a like number to the 13th Aviation Battalion, for night experimentation in combat. As long as Lightning Bug is receiving more emphasis and command attention, let's go all the way and do it right with near-silent helicopters.

CPT GLENN A. SMITH, II
Dragon Platoon Leader
197th Aviation Company
APO San Francisco 96227

• *We'd publish an article on this if we had one. How about it?—Ed*

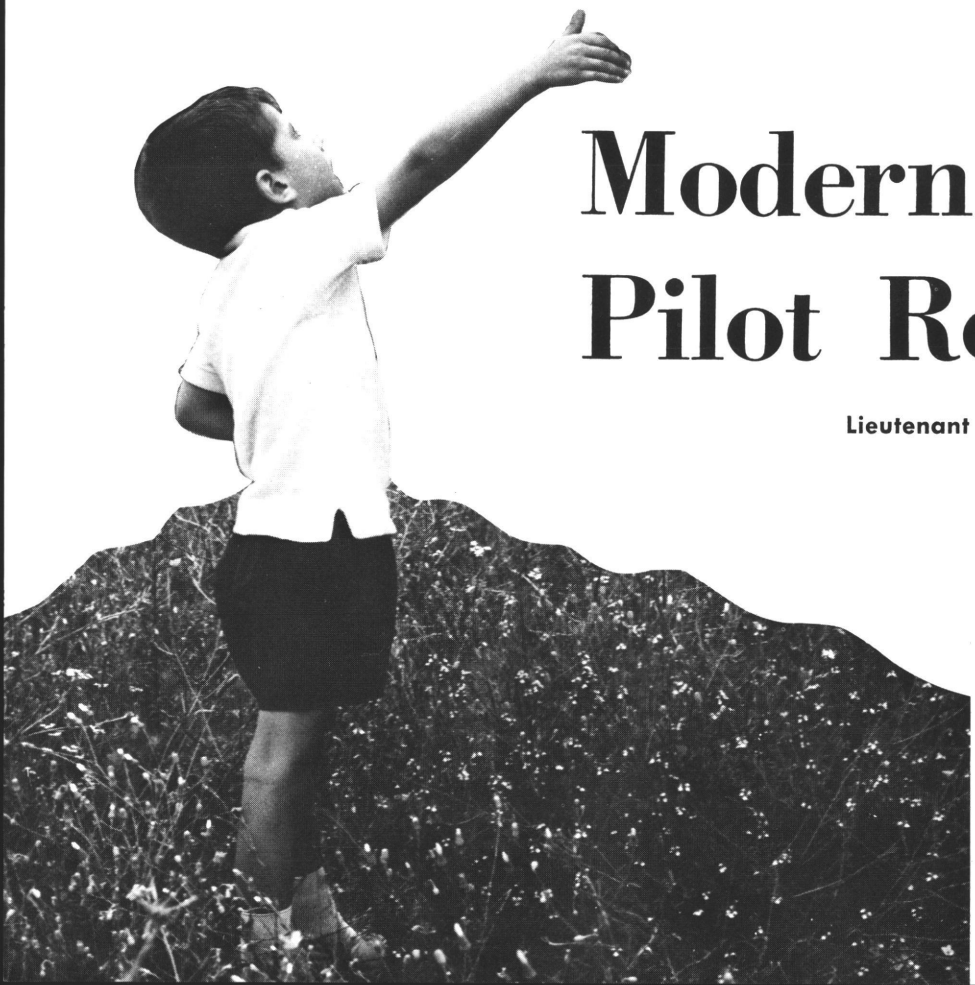
Sir:

Rather than disappoint some of our Armor friends wanting a lift for their M-48 tank, may I please offer a correction for a photo caption in the "Flying Cranes" article of the July issue of the Digest. This picture was taken during our military potential test of the YCH-54A at the U. S. Army Aviation Test Board. The crane was not carrying a tank as indicated but a 10,000-pound experimental aluminum armored assault vehicle. The maximum load for the CH-54A is presently 15,000 pounds on the main hoist and 20,000 pounds on the four-point suspension system.

MAJ ELDRIDGE W. BROCK
U. S. Army Aviation Test Board
Ft Rucker, Ala. 36360

• *Many thanks.—Ed*

Recruiting programs should reflect the excitement and romance of rotary wing flying



Modern Chopper Pilot Recruiting

Lieutenant Scott A. Clark

IT IS AN all-too-obvious fact that in recent months the Pentagon has reached a decision that the demand for helicopter pilots in Vietnam will soon exceed the supply. The signs are all over and ever-increasing: the ever-present rumors, the continually increasing size of rotary wing aviator classes, and now, even advertisements in our leading magazines designed to

recruit high school graduates into the Warrant Officer Rotary Wing Aviator Program. Yes, the signs are all there, but have the best possible solutions been tried to alter the situations? Not altogether.

Those high school graduates who could be interested in the aviator program will consist mainly of two groups: those who do not plan to attend college, and those who will but have a military obligation after graduation. These men are not won over by magazine ads. They need to be introduced to aviation in such a way that they can see and feel the excitement and romance of rotary wing flying. These men are ripe for picking now; only the right kind of program is needed to produce a rich harvest.

The following plan is proposed as a possible solution to our recruiting problem.

At 1020 on a bright sunny morning in April, a UH-1D cruises over Manchester, Iowa, at an altitude of 500 feet. The pilot, Lieutenant Allen, spots the local high school and a few seconds later his copilot, Warrant Officer Fant, spots the landing area east of the school gym on the practice track field. As prearranged with the school, the students have laid out a landing pad with white cloth strips. Lieutenant Allen makes a high reconnaissance over the intended touchdown spot, then turns on base over the school, and skillfully sets the Huey down on the pad.

Immediately after touchdown the crewchief, Specialist-5 Hanson, swings into action. Even before the rotor blades stop turning, he has a bundle of lightweight canvas and six tent poles on the ground beside the aircraft. Within another 30 seconds ten eager young students come running out the south gym door and assist Hanson in erecting the canvas "roof." Hooking one side of

It takes more than magazine ads to spawn interest in Army aviation careers

the canvas to the special hooks on the side of the helicopter, they unroll it to its full length of 40 feet, erect the tent poles, and attach the supporting ropes with the aid of some metal tent stakes. The roof is completed within 5 minutes, and the students return to the gym to bring back folding chairs. Meanwhile, Hanson and WO Fant erect the podium and displays. Lieutenant Allen reports to the principal.

By 1050 the display is complete and the entire area is roped off. At 1100 a group of interested upperclassmen file out (charge out would be a better description) to the makeshift auditorium and take their seats in a somewhat orderly manner.

For the next 30 minutes, with the aid of a short film and some models, the lieutenant and warrant officer pour forth the glories of chopper flying. The next 15 minutes are used to answer any questions the students have, and an additional 20 minutes allow the students to inspect the displays and aircraft. It is now 1205 and the school is due to dismiss for lunch at 1215. With the aid of the original ten students, the roof is struck and the chairs are returned to the gym. Then at 1215 the Huey is open for display to the entire student body during lunch hour. Lieutenant Allen, WO Fant, and Specialist Hanson stand by during this time to answer questions.

Thirty-five students indicated a definite interest in the program. They are scheduled for rides aboard the Huey between 1300 and 1500. During this time they are shown various helicopter maneuvers and are afforded a much more intimate look at the machine in operation.

With the last ride completed at 1500, the crew heads for the football field to recon the area for a public demonstration to be held in one hour. Arriving at the field, they lay out a landing pad, erect a portable windsock, shoot several approaches, and then head back for the school. There they pick up the high school principal and town mayor at 1600.

By this time, a crowd of around 900 people has gathered at the football field. At 1610 the Huey arrives at the field for the demonstration. The principal and mayor exit the aircraft, step to the microphone, and make a few hastily prepared remarks. Then on with the show!

Lieutenant Allen talks first at the microphone and then from the pilot's seat in the Huey via a wireless broadcasting rig to the P. A. system. The audience is treated to normal and max takeoffs, normal and steep approaches, and several other aerial maneuvers (depending upon terrain conditions). The entire show lasts around 40 minutes and is over much too soon for the crowd. However, the helicopter is set up on display with WO Fant and Specialist Hanson answering questions for the crowd. Lieutenant Allen has a final meeting with the recruited students, answering some final questions about the aircraft and the forms he gave them to fill out. Finally, at 1830 that night, the last of the crowd has left the field, and a tired but satisfied crew packs up the Huey and departs Manchester for the Cedar Rapids Municipal Airport, 20 minutes away, to refuel.

LT Clark was a student at USAPHS, Ft Wolters, Texas, when he wrote this article. He is now serving in Vietnam.

Recruiting

It had been a surprisingly difficult mission for these men, requiring long hours, tight schedules, and hard work, but every town they leave is richer for their having been there. Not only does the Army gain pilots but it also gains understanding. The effect of this one trip will last for many years to come.

This, of course, is only the basic plan. It was presented in this manner to make it more easily visualized as a working idea.

The following items should also be considered to make the most effective program possible:

• The crew should be chosen for this assignment because they have the necessary qualifications for the mission. It is suggested that pilots not long out of school be used. They should be intelligent, have the ability to get along with all types of people, love to fly, and be sincerely interested in recruiting young people for pilots. These men should be young enough that they can talk to high school students on their own level and be able to show their enthusiasm and love for flying without mixing in too many war tales, which might tend to put doubt in the mind of the high school student of today who has never known war.

It is better that these young men learn about the romance of flying now, and let the role of an effective fighting machine be shown to them later when they are better equipped emotionally for war. This is not saying that the military aspects of the helicopter in war should not be discussed; on the contrary, that is the Huey's primary function. However, sell the student on rotary wing flying, not winning a war. He'll have plenty of time to learn that later.

• In keeping with the youth aspect, it is further suggested that the pilots be junior grade officers, as the students would find it easier to communicate with someone nearer their own level.

• Use area pilots; that is, a midwestern pilot for the midwest, an eastern pilot for the east, and so on. Here again, the result will be better contact with the students.

• More than one day should be used at bigger schools to ensure adequate time with each interested student.

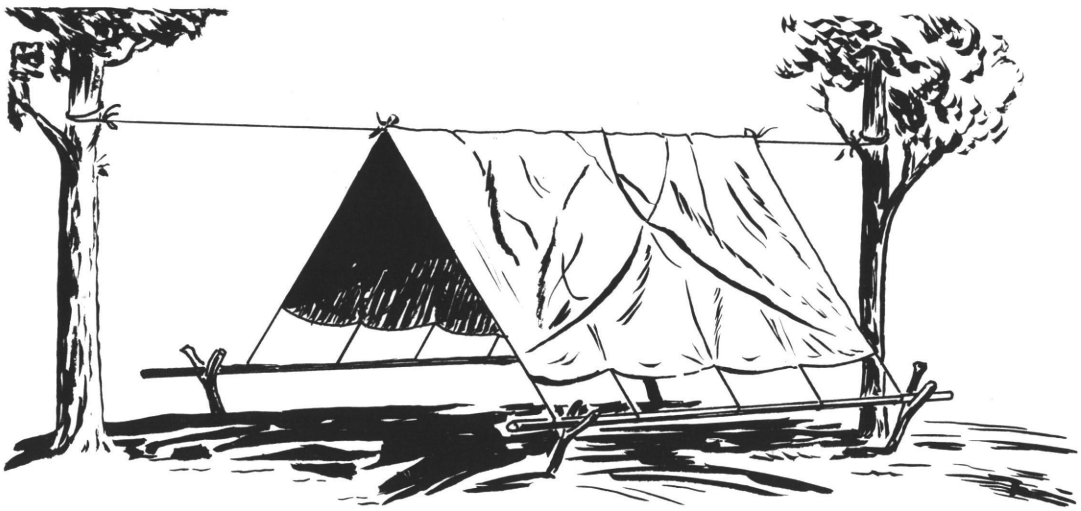
• The UH-1D was used because it was thought to be the best aircraft for the job, and fuel should be available at most large municipal airports. In some parts of the country, however, it may be necessary to use a smaller aircraft, one that uses regular aviation gasoline (which would be readily available at even the smallest airfields).

• It is also suggested that well in advance of the crew's arrival the students be given forms for their parents to fill out, giving consent for their sons to be given a demonstration ride.

These items, along with the day at Manchester High, constitute the author's idea of a workable, highly effective recruiting program. Although it is merely an idea, it is indeed a feasible one and therefore merits consideration.

Parachute Survival Sense

A simple A-frame type shelter can be made from the parachute. Tie a shroudline (or rig a pole) between two trees and throw the chute over it. Fold panels back until the shelter is the desired length. Use shroudlines to secure the chute to tie poles lashed to stakes. Tie the top of the shelter to the shroudline or pole rigged between the trees.



Look Out for the Rocking Chair!

Experience and complacency are dangerous when mixed

AN ATLANTA, Ga., newspaper reported recently that for the last 20 years a man had walked around a rocking chair that sat in the same spot in his bedroom and he never once bumped into it. Then a few nights ago he forgot, fell over it, and landed in the hospital.

After walking around that chair for so many years it seems incredible that he should forget. But he did.

This accident illustrates a problem that gives safety experts no end of trouble. When you are forced to live with a dangerous situation for a long time your mind becomes complacent and you lose your fear. The danger is forgotten but, of course, not eliminated, and an accident is ready to happen.

Automobile insurance companies apparently worry about this habit. Drivers with accident-free records brag about it. "I've never had an accident and I've been driving for 20 years," is often heard.

But look at your insurance application form. It doesn't ask if you had an accident 20 years ago. It wants to know if you have had one in the last 3 or 4 years. Insurance companies are well aware that the memory of an accident is enough to make a man worry about the details of driving, and he is a better risk as a result of it.

Safety experts worry as much about the aviator with 2,000 flying hours as they do about the new one with shiny wings. Many aviators believe that the experience factor will prevent them from making mistakes. Fledgling aviators know their shortcomings and make their moves with care, while the experienced pilot is apt to forget some small but important detail.

After proficiency is gained a certain amount of letdown follows. The job becomes a do-it-in-your-sleep operation. That keen edge of safety honed by the flight school has worn off and complacency moves in.

This doesn't mean that the experienced aviator is not the safer pilot. Not by a long shot. Experience counts a great deal, but most experienced aviators need to get rid of their complacent attitude and consider themselves less the "hotshot."

Mechanics also forget the little dangers they live with. Safety men have learned that when mechanics become thoroughly familiar with their jobs, they tend to lose some of the caution and precision they once had. They rely on memory or try to do a job too quickly and fail to give it the full attention it deserves. They make a slip on an important detail and an accident is on the way.

Whenever an accident is caused by pilot or mechanic error, we tend to picture the culprit as a young eager beaver. We think that the Old Pro would never, never commit such an error. It's time this idea is changed. Experience just can't take the place of careful attention to details. It's time we start thinking about the rocking chair.

Huey Airmobility Training in the 10th AVIATION GROUP

While this article covers the initial methods used to train airmobile companies, the Army's future plans call for issuing units their TOE aircraft for training. This will not all be carried out at Fort Benning, but at several major garrisons in CONUS.

ONE NIGHT a year or so ago an Army Aviator landed his UH-1 in a small clearing near a friendly outpost in the Republic of Vietnam. He was to pick up a seriously wounded South Vietnamese soldier.

Pilot and copilot peered anxiously into the area illuminated by the helicopter's landing light. "Hustle," the pilot thought as he watched those who were preparing the wounded man for evacuation.

It was taking entirely too long. The crewchief hopped out of the back of the Huey, leaving that area empty, and trotted over to help expedite the loading.

The pilot was fully aware of every vibration of his idling helicopter as he looked at his watch. "Two and a half minutes! Too long," he thought. Then movement in the back of the helicopter brought a feeling of relief, but it was instantly shattered by the crack of rifle fire.

Pandemonium erupted as two figures bolted from the helicopter for the nearby jungle after having traded shots with the returning crewchief. The remainder of the evacuation was accomplished without further interference from the Viet Cong.

More recently an Army Aviator —call him Bill—landed his UH-1 near a tree line in a small clearing at Fort Benning, Ga. He was part of a formation of aircraft delivering troops to an LZ during a night training problem conducted by the 44th Aviation Battalion (Provisional), 10th Aviation Group.

The troops debarked, assembled, and began moving down a dirt road. An instructor made a mental note as the four aircraft passed the three minute mark on the ground.

Just short of four minutes, the formation began lifting off—all except Bill and his crew. They were detained by two smiling aggressors who had simply walked out of the woods, approached Bill's Huey from behind, and hijacked it.

The hijack incident is one example of the many combat lessons that the 10th Aviation Group's Vietnam veterans are weaving into tactical training they give to personnel preparing for deployment.

The 10th Aviation Group evolved from the 10th Air Transport Brigade (Test) which supported the 11th Air Assault Division tests (see "1st Cav Div (Airmobile)" Aug 1965 DIGEST).

When the 11th was disbanded, the 10th remained at Fort Benning as a group and was given a mission that read like this:

• To provide command, staff planning, and control of operations of attached aviation battalions and separate aviation companies.

• To provide support for contingency plans as directed by higher headquarters.

Special missions were not slow in coming. The Army was permitted to activate a substantial number of new airmobile companies and medium companies. The 10th Aviation Group was given this mission and it quickly resulted in a significant Army aviation "first."

Never before had the Army activated aviation companies with individually trained personnel and then provided tactical unit training by an experienced cadre before deployment. Previously, aviation companies were assembled and then self-trained before deployment.

In all, the 10th Aviation Group's special training mission covers:

• Activating, organizing, equipping, training tactically and deploying UH-1 airmobile companies and CH-47 medium helicopter companies.

• Conducting transition training in the UH-1 and CH-47.

• Conducting individual training of air traffic controllers.

The 10th Aviation Group differs from other Army aviation groups (see "The Aviation Group," Dec 1965 DIGEST). It is broken down into various cadre companies to accomplish the training missions listed above.

Initially, training was conducted directly under these companies without the organization of provisional battalions. When this proved unwieldy and inefficient, the 10th Group was reorganized

The 44th Aviation Battalion's mission resulted in an Army aviation first

to include the 44th and 37th Aviation Battalions (Provisional) to facilitate training. The 44th was made responsible for the airmobile companies while the 37th was given the remainder of the special missions listed above.

44th Organization

In August 1965 the 44th was activated along with the two airmobile companies it was to train. It had the same TOE as the airmobile companies, but was set up as a battalion (see chart).

The heart of the training is vested in three committees: advanced flight, aerial gunnery, and ground. They receive support from aircraft maintenance, medical and avionics detachments.

Twenty-five UH-1s are organic to the battalion and do not deploy with trained airmobile companies (aircraft are picked up en route). Nine of the battalion's helicopters are armed B models located in the armed platoon. Six are armed with XM-16 kits and three with M-5s. (Some experimental work has been done with XM-3 and M-5 combinations on the same aircraft and with the XM-22 kit.)

The remainder of the battalion's helicopters are D models divided among the two lift platoons (slicks) and other elements of the battalion. To date, the 44th's maintenance detachment has been able to maintain an average of 64 percent flyable aircraft enabling the battalion to log about 2,500 hours a month.

Simultaneously the 44th can assemble, train, and deploy two airmobile companies. Actually, everyone puts in much more than the conventional 8 hour day to accomplish this.

From the beginning the 44th has had much leeway in modifying the POI to meet the Army's requirements. For example, some enlisted men assigned to newly formed airmobile companies were not required to report to their units until after deployment. The battalion felt this greatly weakened development of a combat-ready company. They requested and got this changed so that everyone reported and trained as a unit. Now, over 90 percent of the company is on hand when training begins.

Officers report before the enlisted men and when required receive transition training in the UH-1 before beginning unit training. This is not handled by the 44th, but by a transition training committee under 10th Group. Rotary wing rated aviators not qualified in the Huey must successfully complete this course before being assigned to an airmobile company. The course consists of 28 hours of ground instruction and 25 hours of flight (10 if the individual is rated in a cargo type helicopter).

Most of the aviators in the first two companies trained were UH-1 qualified and two had at least 3,000 hours in helicopters. In the second two companies, two had at least 300 hours in the Huey and eight needed only 10 hours of transition flight. With these exceptions almost all have needed the full transition.

Two-thirds of the time in the training cycle is used for tactical training. The remaining time is for POM (preparation for overseas movement) and POR (preparation of replacements for overseas movement) training. POM/POR training is handled by the ground school committee and scheduled during the first part of training.

Aviation training comes under the advanced flight and aerial gunnery committees. The companies in residence alternate flying every other day until each accumulates enough advanced aviation tactical flying days, including time for aerial gunnery. Considerable variation results in the amount of flight training accomplished because of weather and availability of aircraft and firing ranges. However, each aviator has been getting about the same number of hours.

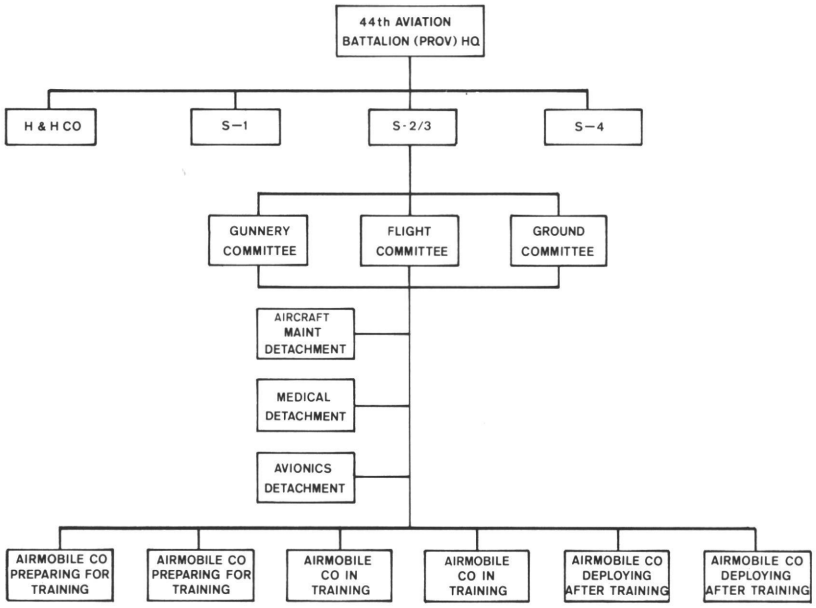
During the first half of the flying phase the company commander decides which aviators shall make up the gun platoon. Then the gunnery committee and gun platoon begin work. Training differs from that where the POI sticks to principles and fundamentals aimed at individuals. The 44th's POI centers on the tactical employment of an aerial gunnery platoon. A similar difference exists in flight training—school training emphasizes fundamentals and principles of flight to individuals while the 44th covers tactical flight operations as a unit.

Part of the 44th Battalion's aircraft maintenance training is conducted under the Army Aviation Maintenance Technical Assistance Program (AAMTAP). Four airframe and two engine classes composed of 25 students each are taught by contract technical maintenance personnel (usually factory representatives). This, like POM/POR training, is sometimes continued during deployment.

Personnel not under the AAMTAP receive training from supporting maintenance units. Other supporting elements provide on-the-job training for signal, medical, armament, air traffic control, POL, and crash rescue personnel.

Training climaxes in a 24 hour field problem in which the entire company supports a "maneuver" battalion in an operation against the "aggressor." The S-3 of the 44th plays the role of the supported commander who believes in helicopter support and continually asks for more than is available. The airmobile company commander must orient him and get him to make the best use of what's available.

Throughout training an observer notices a gradual development of unity within the company. During the field problem he sees the entire company jell into a fighting unit ready for deployment.



TRAINING PRINCIPLES

"If timing had been just a little sharper, Bill's aircraft would not have been hijacked." These were the words of an instructor during a critique of an airmobile company that had just completed its final field exercise.

Just six weeks earlier this company had been organized. Then it began to grow. It developed teamwork, timing, capability and esprit de corps. It became combat effective under the guidance of the 44th, and more important, under its own initiative.

A well known television commercial blurts, ". . . I'd rather do it myself." Few disagree with this being the best way to learn, and this is the main principle upon which the 44th's flight, gunnery, and ground training committees base their guidance.

A commanding officer of an airmobile company being trained remains in full command of his unit throughout training and has great latitude in determining the content of the program.

When a company commander reports in, he is thoroughly briefed on the program his newly formed unit is about to undergo. As training progresses, he can—and it is hoped he will—modify the POI to fit the needs of his particular company. For example, after a week or so of training he may feel his company needs less formation flying and more low-level navigation. Or, as occurred during a recent field problem, a company commander may feel his aircraft should begin the problem from an area nearer to him than the scenario requires. The commander requested the change and got it.

The *method* by which this commander got his aircraft moved, and by which other requests are

The hijack is discussed during the critique

handled, is significant. Everything possible is done to maintain the integrity and authority of the company commander in the eyes of his men. The 44th's cadre also protects and builds the airmobile company's integrity by applying this principle when working with officers, NCOs, and others of the company.

If an individual in a company becomes a problem, he is handled by his immediate superiors. If the company's commander is the problem he'll meet (unknown to his men) with the 44th's commander behind closed doors. The matter will be settled, one way or another.

While the 44th's instructors help build and protect the integrity of the company, they also strive to stimulate initiative and encourage personnel to do as much as possible on their own. Unless it spells certain disaster, instructors do not "butt in" to point out mistakes. Sometimes they have to crank something extra into the program, but the mistakes always come to light and leave a vivid memory.

It is better to laboriously bungle through mistakes at Fort Benning than in an overseas area. During a problem at Benning an Army Aviator major from an airmobile company being trained was coordinating a personnel air move with a lieutenant who was a student at the pathfinder school. (The pathfinder school, OCS, the airmobility department and many other units benefit by participating in the 10th Group's tactical training program.)

Although a seasoned veteran, the major was not familiar with the basic techniques of airmobile operations. Neither was the pathfinder lieutenant. Consequently, they were doing a poor job of communicating as they stood face to face in a spitting rain and biting cold wind. The environment was not helped by a scowling audience consisting of 44th and pathfinder instructors, umpires with menacing white bands around their hats, an observer (colonel) from the Infantry School, and a civilian taking notes. But it didn't provide near the pressure an enemy could have exerted without even being in sight.

It turned out that the major and lieutenant each were setting up an Army aviation personnel lift for the first time. Despite mistakes by both, the instructors did not interfere. Even if the move had fallen flat on its face, the operation would have been a success because it taught something to both men.

LESSONS FROM COMBAT

During a critique one of the 44th's instructors described his personal encounter with the Viet Cong who entered his aircraft during the medical evacuation mission in Vietnam. He pointed out his errors of having brought only a crewchief and not a gunner on the mission. He stressed the importance of timing and substantiated it by reading a portion of a letter from a commander of an airmobile company deployed by the 44th:

> "Timing cannot be overstressed. In flight training, start early by giving a 'pull pitch' time to the minute. Enforce by command pressure. This will pay off . . . in actual operations. Practice repeatedly determining time from IP (initial point) to RP (release point). When this timing can be attained to within 30 seconds, timing is satisfactory."

Occasionally information gained in combat seems startling, but it is carefully noted to determine if it reflects a newly developing trend or just an isolated incident. If any or all is significant it is worked into the POI. For example, the gunnery and flight committees teach that flights should be at or above a certain height to be safe from most ground fire. They teach that on low, fast runs the force trim should be kept on. When a man is hit, he'll either throw his hands up and release the controls or he'll clutch them. Force trim will hold the aircraft in some degree of level flight if

The 44th Aviation Battalion (Prov) incorporates much information received from the experiences of airmobile companies it has trained and deployed. Below are some of the more significant points:

When equipment is off-loaded, have enough people ashore to stay with each truckload until it arrives in the company area.

Ensure that ground transportation is with the main body aboard ship.

Work up a good training program for shipboard use to present to small groups (under 50). Have personnel bring everything the supply point issues (overshoes, flight jackets, etc.).

Bring as many of the following items as possible to jungle areas: building materials and tools, office supplies and expendables, yellow bug lights, mosquito netting, water cans, plywood, 2 x 4's and lumber, screen wire, tentage plastic tarp material, a blackboard and various training aids, extra telephones and typewriters, flypaper and insect repellent, density altitude computers and E6Bs.

Some nice to have and extremely helpful items are refrigerators, ice freezers, water coolers, electric fans, dehumidifiers, a handcranked stencil machine with equipment and plenty of stencils and paper.

Get a complete file of all pertinent publications and the necessary binders before departing CONUS.

Fabricate any charts such as manning board charts, aircraft status boards, maintenance scheduling boards, etc., before departing CONUS.

If area of assignment is known before departure, put one set of 1:500,000 maps together and send with the advance party. These maps are hard to come by.

the controls are released. If the wounded man clutches the controls, he'll have to override the force trim. In addition, both pilot and copilot should have their hands on the controls.

One commander wrote back, "Emphasis should be placed on fire team training at Fort Benning. Platoon training is not necessary if the fire team concept and techniques are fully developed." He also recommended, "A minimum of 5 days should be devoted to company-sized airmobile operations using the armed aircraft in an escort and suppressive fire role."

New techniques are tried by members of the 44th as a result of information funneled from the combat area. For example, a need exists for an emergency takeoff procedure for the UH-1 which is subject to surprise mortar, artillery or concentrated small arms fire while shut down.

After considering the safety aspects of an accelerated start/takeoff procedure, the 44th came up with a plan of assigning pilots and copilots to aircraft by tail number. After each flight (in possible emergency situations) they perform a complete preflight inspection to the point that the only requirements remaining are to turn the battery switch on, press the starter button and take off as soon as operating rpm is attained. During experiments the UH-1 has been flown up to ½ mile in 45 seconds from the "warning" of incoming artillery. Of course, this procedure is recommended only for emergency situations.

Significant combat information that can't be disseminated through the flight and gunnery committees is woven into the ground school committee, which covers subjects ranging from sanitation to air ambush.

A class on perimeter defense may not seem overly important, but one airmobile company was under attack its second night in Vietnam. The commander wrote back stressing the specifics that should be covered in the perimeter defense class. He also stated that the personnel in the company should be able to field strip, blindfolded, the M-60 machinegun and that aviators should *know* the -10. *"Make aviators know the aircraft!"* he wrote.

From a maintenance point of view one commander advised that prepackaged spare parts be checked. "About 15 percent of our prepackaged parts are usable only on A model engines or early B model helicopters."

Some of the information concerns equipment in short supply (see box). One commander urged, ". . . extra wire and equipment to install more headset jacks in the aircraft as follows: doorgunner, forward air controller (these can have intercom capability only), and ground unit liaison officer (he must be able to transmit on FM from the passenger compartment and use the intercom)."

Some advice concerns techniques. "Teach radio procedures *again* to pilots," a commander advises. "Stress *brevity* . . . frequencies are crowded. Teach how to remove radios from aircraft. This procedure is followed as part of downed aircraft SOP rather than automatic aircraft destruction."

More information reads, "Assign complete crews to aircraft early . . . Close and smooth coordination within crews *imperative*—work together . . ."

The same commander writes, "Enforce fire discipline early—response to commands by gunners to 'fire' and 'cease fire' *mandatory*. Stress avoidance of indiscriminate firing."

Perhaps the most heartening bit of information came from a commander who related a detailed description of his airmobile company's arrival. It reflected a great many trials and tribulations that his men has been through but ended, "American soldiers never cease to amaze me. I have not had one disciplinary problem and not one weapon has been accidently fired."

Dead Reckoning

Captain Leonard H. Burroughs

There's always room for improvement

DOES ARMY aviation have a *reliable* capability to perform low level navigation missions in tactical situations?

Consider that if you answer yes you should also be able to explain how. If your answer is no, you should be concerned enough to offer suggestions to improve existing capabilities.

Perhaps before answering one should "kick around" some of the factors that make low level navigation a sticky problem.

Navigation aids. Will the enemy allow a system of radio navigation aids to be established behind his lines? Hardly! And since hyperbolic navigation systems are not always available, it would appear that pilotage—or visual reference—is the only reliable system to accomplish tactical low level flight missions. But what about missions requiring flights over flat, sparsely populated areas, especially at night or in reduced visibility? Pilotage loses its effectiveness since ground checkpoints are extremely difficult to locate. Also consider that many Army aviation flights are made at or below treetop level at high speeds. Then it becomes impossible to pick up ground ref-

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Dead Reckoning

erence points unless you hit them right on the nose.

Accuracy. Though this point is largely a matter of opinion, a valid need exists for Army Aviators to be able to fly a helicopter on a 75 nautical mile mission at 100 knots at treetop level and locate a landing zone (LZ) 1,000 meters in diameter. Can you do it without overhead aerial guidance, without making cobra-like popups to verify position, and decrease airspeed at the proper time for a straight-in approach to the LZ? Compound the problem by lowering the ceiling to 100 feet, or perhaps flying the mission at night. The problem gets sticky.

Terrain. Army Aviators may find themselves flying low level missions over enemy controlled water, jungles, deserts, plains, and in arctic and subarctic areas. Each lacks abundant visible landmarks which might aid in position fixing.

Weather. What are absolute weather minimums for tactical operations? Highly successful 11th Air Assault Division operations involving as many as 100 helicopters were conducted in maneuvers in weather conditions down to 75 feet and ¼ mile. A few years ago this would have called for grounding. But intensive training and rigid flight discipline paid off. The Army needs this capability, but pilotage alone will not supply it. Dead reckoning, time distance navigation helps. But cumulative error originating from turns, fluctuating airspeed, errors in seconds, wind and the like add up and too often cause the aviator to miss the LZ completely.

After considering these major factors ask yourself the question again: Does Army aviation have a reliable capability to perform low level navigation missions in tactical situations?

My answer is *no,* and I recommend a three-point system to improve dead reckoning, time-distance, low level navigation capabilities.

Point 1 is the elimination of *cumulative error* originating from turns, fluctuating airspeeds, errors in seconds, wind, and the like while navigating without radio aids. This error can be made negligible through detailed flight planning.

Cumulative error can be slashed by plotting the turns on a flight route before measuring each leg. This enables an aviator to roll his aircraft out of each turn on the next flight leg and to begin that leg with a specific visual starting point from which to measure time. Though this is a simple procedure it does not seem that it is used extensively.

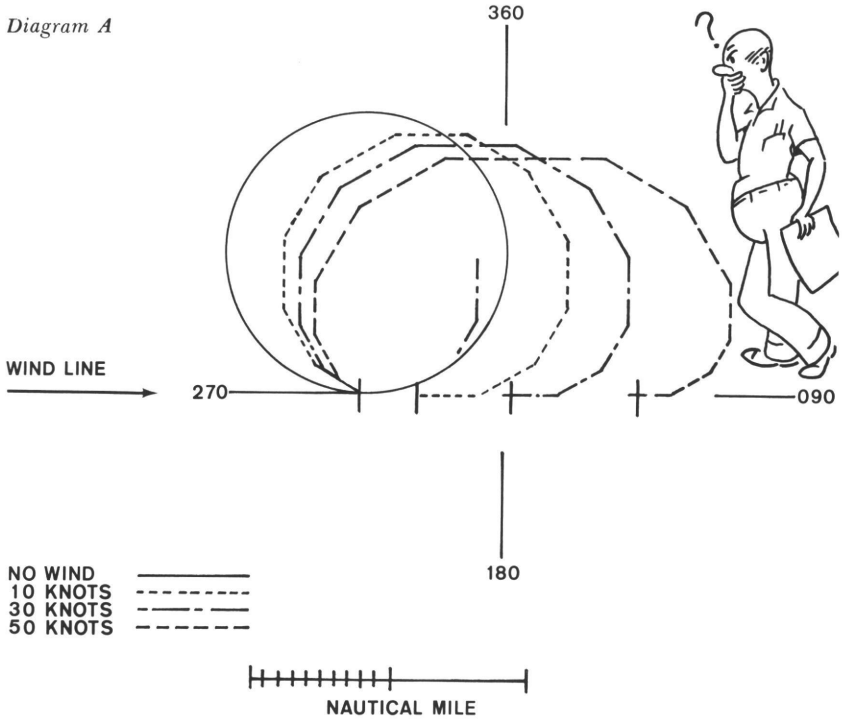
Specific techniques for plotting these turns were covered in "Low Level Location of an LZ," an article appearing in the May 1965 issue of the DIGEST. Two related articles, "Navigation Without Aids," and "Low Altitude High Speed Navigation," appeared in the November 1961 DIGEST.

Wind is another factor to consider under point 1. The computation of simple wind vectors and drift correction is common in every day flight planning and presents no new problem to low level navigation. However, what effect does wind have on turns?

Diagram A shows the effect of wind on a 360° turn drawn to the scale indicated at an airspeed of 90 knots. Note that a no-wind condition provides a perfect circle. As wind increases, an eclipse appears and rapidly increases in distortion as wind speeds increase. To present this factor in usable form for low level navigation would require a table of logarithms to cover all airspeeds, wind velocities, and angles of turn. Although I lack the mathematical ability to translate this data to a simple representation, I'm sure it can be done.

Meanwhile, the only answer I have is that the error will be negli-

Diagram A



gible with winds at 15 knots over distances up to 50 nm, providing the number of turns is limited. Perhaps some talented individual can work out a probability scale or simple turn-correction scale to ease this problem. It should be noted that drift error in turns will increase rapidly with wind velocity increase. As the number of turns en route increases, error will either multiply or cancel itself depending upon the direction of turn as opposed to wind direction.

A simple plastic low-level navigation plotter (diagram B) can be made to provide the aviator with a handy en route planning system. It serves for scales 1:50,000, 1:100,000 and 1:250,000. A folding or telescoping extension can provide a ready reference to compute time-distance at any of several true airspeeds.

The second point to improve dead reckoning accuracy is the stressing of well-established crew duties. The pilot *must* fly *pure* instruments with maximum attention to constant airspeed, precise headings, timed, standard

A simple plastic low-level navigation plotter is a great aid and easy to make

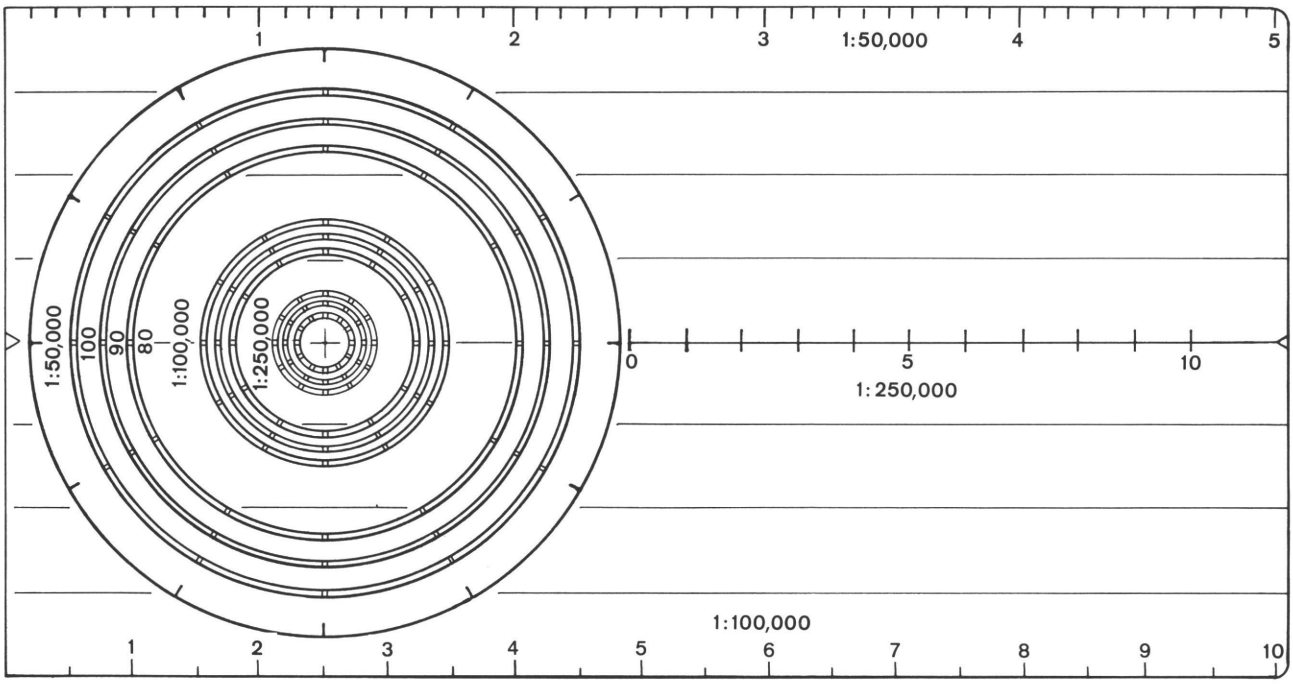
rate turns (or half standard rate turns for formations) and time checks to the second of time. The copilot must control altitude adjustments; cross-check visual checkpoints (when available) and make adjustments; monitor flight and engine instruments; and call off the flight plan in detail, i.e., "in 10 seconds turn to 381°," "climb 30 feet and turn left 1°—drift correction."

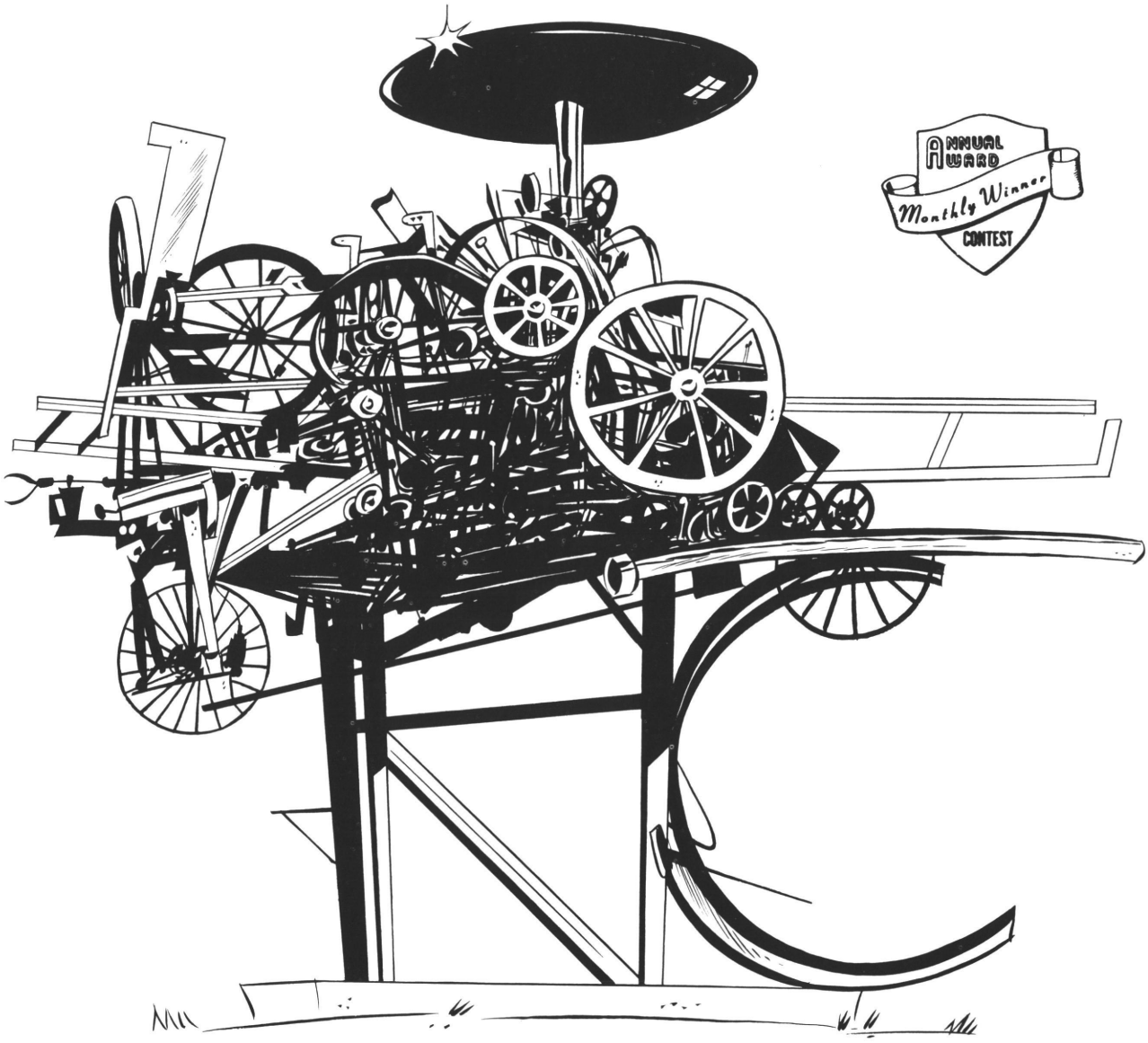
My third point, and perhaps a sorely neglected one, is the maintenance of accurate, operational instruments. A compass with a 2° error or an inoperative rate of climb indicator will not provide acceptable results.

Of course, the ideal solution to the low level navigation problem would be a reliable, self-contained low level navigation system for Army aircraft. It should be a digital computer-type system, perhaps similar to Doppler, with an accuracy greater than 1 to 100—that is, 1 mile error in 100 nautical miles. Perferably, it should be around .05 to 100. Of course, as accuracy is brought to the vicinity of .05, cost soars proportionately. The system must allow for changes of route while en route without sacrificing accuracy. The presence of a graphic display is also helpful and a great "assurance" to the pilot. This may sound like "shoot-in' for the moon," but it is not. Industry *can* provide this capability. Development of packaging or configuration is the sole major barrier to overcome. [The Army has approved a stated requirement for a Doppler or a self-contained navigation system and evaluations are under way.]

Until a suitable self-contained, low-level navigation system is available, the combination of time-distance navigation procedures and the three point program stressed will provide amazing accuracy. Give it a try!

Diagram B





GREAT SAFETY MACHINE

Lieutenant Colonel Theodore S. Ferry

HOW ABOUT THAT sports fans!!! A magnificent, gold plated machine guaranteed to turn out safety. Now available at a reasonable cost.

Although not a new development the machine is just now coming into its own due to advancements in management and command techniques. Imagine, if you can, a machine that automatically turns out safety (accident prevention, if you please). You put in a variety of ingredients at one end and many goodies come out the other end—with an amazing amount of safety coming along as a by-product.

There is only one catch to the machine: it requires a skilled operator. As a matter of fact, it requires not only a skilled operator but one who is on the command/management ladder. The top man in your organization op-

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erates this machine, and he sees that other members on the ladder operate it also.

Here is how our machine works. You put your ingredients in at one end. These ingredients are such things as planning, training, men, personnel actions, time, standardization, etc., and then you turn your machine on. After a respectful period, the product comes out of the machine. Several items actually come out, such as efficiency, mission accomplishment, job satisfaction, reliability, zero defects, and many others. Mixed throughout is safety. By putting the right ingredients into our machine in the proper amounts, then mixing the ingredients properly we get the desired results.

"But," you say, "you told us we were going to manufacture safety." *You are exactly right. If you put the right ingredients together in the proper amount and mix them properly, then you get the product or operation you want with safety automatically built in.* All we did was do everything we could to make a good product come out of our machine and safety came out also. You don't put safety into an operation, you get safety out of an operation. Now we have the answer: safety is not injected into the operation; the operation manufactures safety.

SAFETY FIRST—NEVER!

Heresy? In most circles you bet it is. Probably amounts to insubordination, treason, and hints of fellow traveling. But I'll say it again: Stop putting safety into aviation (or anything else for that matter). Of course, those of you who received the message loud and clear realize that what was really said was: Stop putting safety in the operation and start getting it out. Or to say it yet another way, if the job is done the right way, safety is an automatic result.

Safety first is out the window?

Is the message clear yet? If not, try this old DA proverb, "An operation well done is safely won." Not yet? Well then, let's say that if you plan your operation as carefully as you possibly can, take all possible steps and precautions to assure success, you will get the best product and highest assurance of a successful mission.

A lot can be said for the old axiom "You can't argue with success." Some of the things you can say are:

- The most successful missions are accompanied by the lowest accident rates.
- The highest states of readiness are characterized by the lowest accident rates.
- The most efficient production processes are characterized by the lowest accident rates.
- The training organizations and installations that turn out the highest quality trainees or students have lower accident rates.
- Nearly all outstanding operations are characterized by lower accident rates.

Certainly we can draw conclusions from that listing. Decide the best way to do a job, take all possible precautions to see that it is accomplished, and the safest possible operation will result. Notice we didn't say a thing about putting safety into our operation. There wasn't a word about doing the job safely. What we did talk about was getting safety out of the job.

"Okay," you say, "so you have told us about a big machine that manufactures safety. Are you trying to tell me that the time tested slogan 'Safety First' is out the window?" Well, to tell you the truth I am a little short on moral coverage at this point. Who am I to say that we should throw good old dependable Safety First out the window? But it does seem that if we let safety be a product of a good job, well done, that a new slogan could well be "Safety Last."

THE MACHINE

By now, the secret is out. The machine is only our normal command/management structure. To ably perform the mission, be operationally ready, make the product or train the soldier, we want to do our jobs so well that up and down the line accident prevention is not a major factor. When it is a major factor, it means that the management structure has broken down. This directly infers that to have a safe operation our management must be tops.

In recent years we recognized that doing a good job of commanding is indicative of good management. With our present military structure, the most able commanders are not only retained

Take all precautions

Safety Machine

but promoted to ever-increasing positions of management responsibility. Nowhere does there exist a better system of making good managers and keeping them good through technological and administrative schooling. These are the people who originate safety.

When we influence our managers to do a good job, we get safety. The higher the level at which this influence is applied, the greater the influence. To sum it up a little plainer—the higher the management is that insists on a job being done right, the greater our chances of more safety being manufactured. The more that management up and down the lines sees that the right ingredients go into our machine, the better our results. The first line supervisor, platoon leader or crewchief is the key man, but when the top dog barks (the commander speaks) more first line supervisors go into action, more platoon leaders get the word and move, and many more platoon leaders and crewchiefs are motivated to do their jobs the right way.

Of course it's not that easy. It never is. The boss can't just speak and get the job done right. He has to see that the ingredients get put in and mixed right. He has to see that a total program is carried out. A complete effort involving the right amount of planning, equipment, procurement, organizing, budgeting, and manpower management is needed.

Here is a hooker we sometimes forget: good command/management cannot be delegated. Wherever we are in the chain, it applies to us. Since good command/management cannot be delegated, doing a good job falls on our shoulders.

Are things adding up now? Do you see how doing the best job is going to be the safest way to do it? The highest state of operational readiness, the best soldier, the successful accomplishment of the mission, and the best product can only be achieved through top command/management. All those achievements are done with economical use of equipment, manpower, and money. In other words, they are accomplished safely with minimum loss in these areas due to accidents.

MANAGEMENT

As a pretty hep type, you probably realize that in aviation the above applies to you all the way. Since we are ready for action, let's get down to business by seeing how this applies to Army aviation. First, how do we approach the safety business in Army aviation? For one thing, aviation people often have that extra spark that makes them want to do a better job. They are used to doing a little extra, working a little harder, looking a little further, doing some more preplanning.

It's an ideal setup for manufacturing safety, but what do we often do when we have an accident? It is a rare thing when we look at ourselves first to find where we fell down. We yell for the safety officer and tell him to get down there and straighten out the trouble. Well now, commander, he might find the trouble. But *you're* in charge; you have to straighten out the trouble. Where did you fall down? Poor personnel actions, failure to provide equipment, failure to provide for standardization, inadequate contingency plans, improper SOP, lack of training, haphazard budgeting, poor maintenance?

Just look at it, Mr. Manager, or Unit Commander. Is there a single item there that you can blame on the driver, the pilot, the mechanic? All of these and many more are your responsibility. No one else, regardless of the size of your domain, has this responsibility. This is why you cannot put safety into your structure. You must manufacture it by sound procedures throughout your area of responsibility. Then you'll get safety automatically.

But don't fire or transfer your safety officer. He can really help you. Specialists of all types should do their work for you before trouble comes up and so should your safety officer. He is your advisor, your consultant, *but he can't stop a single accident.* You do it by the way you do the job. A good job gives you mission accomplishment, minimum losses through accidents, high mission capability, low accident rate—SAFETY at LAST.

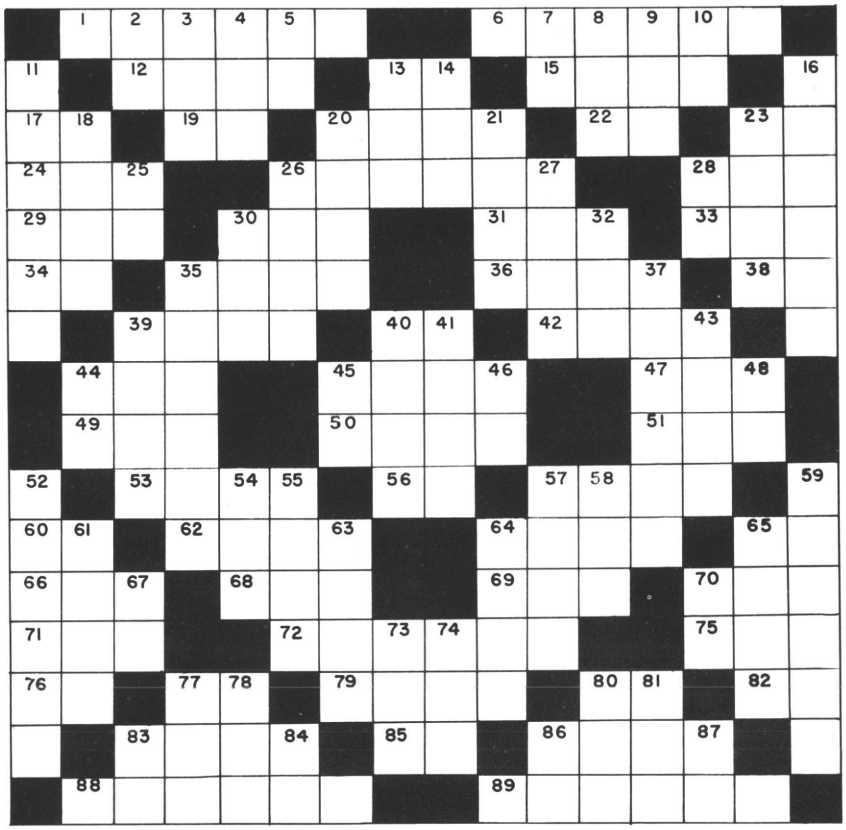
It's your responsibility to crank in safety ingredients

Army Aviation Puzzle

Submitted by

WO1 Shannon D. Lehman

How does your knowledge of code, terms, and abbreviations check out? Test yourself; then turn to page 25 for the answers.



ACROSS

1. Dominion of B. C.
6. Rotating.....
12. . — — . — . . — . — . — — —
13. Wx time (abbr.)
15. Middle
17. ....., MF
19. — . . . —
20. Abn radar
22. Reporting point (abbr.)
23. Laugh
24. Dog bark
26. USAAVNC CG
28. Pentagon (syn.)
29. Instrument approach
30. .....officer
31. Luminous celestial body
33. Aircraft instrument (abbr.)
34. — . . — . .
35. To search
36. 0-1A capability (abbr.)
38. Each (abbr.)
39. Lateral wing member
40. .....homing
42. North.....
44. Resident of 53 across
45. Required to penetrate ADIZ
47. Soaked
49. — — . . . . — .
50. Air Force Communications Service (abbr.)
51. Pitch, bank, roll, ...
53. Thailand (syn.)
56. Right (abbr.)
57. Undistilled liquor
60. Worldwide organization (abbr.)
62. Pronoun
64. Loud sound
65. Technical Inspector (abbr.)
66. Field bed
68. . — — . — . — . . . —
69. Paddle
70. Sack
71. Voice pitch
72. Navigation facility
75. Suffix signifying of
76. The (Spanish)
77. Bench mark (abbr.)
79. To study
80. Father (slang)
82. . — . . . . .
83. Morse ————
85. Instrument (abbr.)
86. ———— pilot
88. Strip
89. Radar control (abbr.)

DOWN

2. Airport (abbr.)
3. ADF facility (abbr.)
4. To perform, play
5. To produce
7. Enlisted man (abbr.)
8. Army fund
9. Headgear
10. Reciprocal of off
11. Our business
13. Everyone
14. Type of airspeed (abbr.)
16. VOR beam
18. Season
20. Wind indicator
21. Aviation contractor
23. Family residence
25. Letter addition (abbr.)
26. Excessive aircraft weight
27. Exclamation of disgust
28. Military violation (abbr.)
30. Oriental product
32. Expressing negation
35. ..... of St. Louis
37. Attorney
39. Back talk
40. Flight following (abbr.)
41. — — . . — . — . — . —
43. Last army unit
44. Army manual (abbr.)
45. Department of the Army (abbr.)
46. . — . . . .
48. Uniform material (abbr.)
52. Ft ....., Army Aviation home
54. Army heliport (abbr.)
55. Military Advisory Command Vietnam (abbr.)
57. English airline (abbr.)
58. Listening organ
59. Aviation publication
61. Christmas carol
63. Terminal omni (abbr.)
64. New ..... Division
65. Lofty
67. Suffix denoting ten times
70. — . . . . .
73. Color (emergency)
74. Dog ..... (slang)
77. Good (French)
78. Military District of Washington (abbr.)
80. Small dog
81. Tower operators (abbr.)
83. Cloud type (abbr.)
84. . . —
86. Arrival angle (abbr.)
87. — — — — — —

The Problem Of Human Error In Maintenance

Jerome Lederer

Director, Flight Safety Foundation

Reprinted from a speech contained in a recent Flying Safety Officers' Study Kit

THE VAST cooperative and coordinated conspiracy to defeat the law of gravity is one in which maintenance is of prime significance. I don't think I need to belabor this to you.

Several recent reports on airline accidents point to the need to take a fresh look at that very intangible factor: human error in production, overhaul and maintenance. The problems faced by maintenance technicians are not entirely foreign to me as I have followed them very closely since receiving my Mechanics License while working as aeronautical engineer for the United States Air Mail Service. Incidentally, the tremendous progress in air safety from that time to the present is most evident in the fatality rate of the man most exposed to the hazards of flying: the pilot. In the air mail service over the period 1920-1926 one in every four pilots was killed each year. On the threshold of modern air transportation – about 1932 – one in every 50 pilots was killed each year. Now it is one in every 1,600. In some years it has been much better than that and a professional pilot can secure life insurance at the same cost as a piano tuner.

Of course the reasons are many: powerplant reliability, duplication of critical systems, ability to fly under instrument and icing conditions, better navigation aids, improved communications, better training, etc. By and large maintenance has done an outstanding job but lapses have occurred which cannot be ignored. The operation of aircraft presents the greatest safety challenge in the history of transportation. There are at least 7 reasons for this:

• It is three dimensional, subject to the hazards of the atmosphere and of terrain.

• It is bedeviled by limitations of weight and space which compound the economic and operational problems which you face.

The challenge of human error cannot be ignored

• It is continuously fighting the unrelenting law of gravity which instantaneously takes advantage of any failures or weaknesses in this struggle for survival.

• Mistakes and failures are likely to be more catastrophic than in any other means of transportation.

• It requires the coordinated cooperative efforts of a greater variety of associated facilities than any other system of maintenance —ATC, airports, weather, medical services, dispatching.

• It encompasses many more scientific disciplines and technical variables than any other system of transportation and these are required in a highly precise or refined form.

• Air transportation is more sensitive to manmade safety problems than other systems of transportation (noise, nationalism, labor/management, general aviation versus airline transportation, political, legal).

Probably no other activity has as many organizations trying to help it solve the safety problems as the air transportation. However, I believe that FSF is the only organization devoted entirely to safety with no other axe to grind, that focuses on maintenance, especially *attitudes* of maintenance personnel towards their responsibilities.

The format and philosophy emphasizes professionalism and the mechanic's responsibility to the public and also that the mechanic is a person, not a cog in a great machine. He is a person subject to emotional, spiritual and intellectual forces which determine the character of his work. His motivation to do the job expected of him should come from a deep inner conviction or compulsion that permits no individual indifference or surrender to expediency or taking anything for granted in carrying out his responsibilities. Furthermore, though privately employed, he is a public servant in the sense that he has an obligation to provide the highest degree of care in the public interest. The law requires this. He is part of a team including management, employee, and government expected to meet the most difficult

challenge in the history of transportation.

And while government as a partner in this great effort provides the basic rules, air traffic control, weather services, monitoring, etc., the responsibility for the safety of day-to-day operation rests squarely on management (even though occasions arise when it seems that government attempts to take over the prerogatives of management).

It is perhaps not generally known that the basic rules required by the Federal Aviation Agency for the operation of air transports were formulated and used by a domestic airline before the government got around to copying them in the early 1930s.

The government attempts to provide a safe environment for you to operate in. There is one area in which government even with able, intelligent inspectors cannot function successfully because it lacks the combination of know-how and the close affinities with people and because of its regulatory punitive powers which often induce interference rather than cooperation. This is the area of continuous relationships between management, supervisors, and mechanics.

It becomes ever more important as aviation progress becomes more dependent on the higher levels of *skill and intelligence* required to maintain and operate modern aircraft. At one time a good draftsman with some handbooks could design an airplane. Today we have men with PhDs and DSc degrees making life difficult for the maintenance technician by creating ever more sophisticated problems for him to solve.

But increased skill and intelligence are not enough. A good safecracker has those qualities. Unless they are combined with integrity they can be wasted.

Integrity in aircraft maintenance includes:

• An awareness not to undertake a job for which the person is not qualified and competent, and the guts to admit this to a supervisor. This should be possible without adverse effects on the technician's status.

It can be stated succinctly: When in Doubt—Don't.

• Another aspect of integrity is to take nothing for granted. Don't "assume" what a manual says—read it! Check and double-check, invite inspection, be proud of ability to hold up under inspection.

• Responsibility to communicate. Integrity requires the man to be sure that his successor is adequately informed of the status of the work which is left to him to finish. To trust that the next shift will be able to finish up a job without briefing will inevitably result in trouble and possibly disaster. Communication also includes a willingness to admit mistakes (but this need not be followed by punishment).

In some places there is a conviction that the threat of punitive measures will assure all this. This is not the view taken by Prof. Kenneth Andrews of the Harvard School of Business Administration in his study titled "Crime and Punishment." This study was prepared for the Flight Safety Foundation. It is being used by the Air Force Academy, by several universities in their business management courses, by a number of large corporations. It discusses various kinds of punishment and their effectiveness. The weaknesses of applying punitive measures in the hope of assuring compliance with procedures in civil society are:

• Punishment can be self-defeating if a man is punished for admitting an error, because this will discourage him and others from admitting their errors or mistakes.

• The usual effect of punishment is a feeling of injustice; that others would have made the same mistake in the same circumstances or that others have made the same "goofs" and gotten by. Therefore except for willful misconduct, punitive measures may serve no useful purpose.

Discipline must be maintained in other ways and this is the reason why supervisors are exposed to so many courses in leadership. If punishment is of doubtful value what can be done to assist leadership?

The advent of missiles, nuclear bombs and space exploration has focused attention on the need for an organized method to reduce human error. How can human error be defined? Mr. George A.

Be sure the next shift knows the status of the job

Peters of Santa Monica, California, presented a paper, "Human Error and Goof Proofing," in which he says: "The basic question to be explored is: How may we identify and control sources of human error which might affect the design, development, fabrication, test, and operational reliability of complex systems?" Human error has been defined in AFBM Exhibit 58-10, the "Reliability Program for Ballistic Missile and Space Systems," in terms of "human initiated failure" which is "any system failure, the cause of which is traceable principally to a faulty human act or actions (either of omission or commission)" and includes "such things as *incorrect wiring, rough handling, incorrect adjustments, activation of wiring control, etc.*"

Difficulties should be openly discussed

Rather than allow such a clear-cut definition to stand, we could define human error as "any deviation from a previously established, required, or expected standard of human performance that results in an unwanted or undesirable time delay, difficulty, problem, incident, malfunction, or failure."

Now some human errors are straightforward and simple as to their identification and their cause, but the vast majority of human errors only appear to have simple causation and corrective action remedies. In regard to corrective action, for example, reports of excessive human error could be termed a manifestation of personnel carelessness and indifference which should be corrected by greater detailing and enforcement of procedures or by more discipline and "running a tighter ship."

Such simple solutions might seem effective as the reported malfunctions or difficulties quickly decline. But the cure may be more apparent than real, if the difficulties are just not reported or not openly discussed; that is, if the campaign to "do better" merely restricts, screens, masks, or recategorizes the same recurring problems. This is but a variation of the general principle that intelligent workers can "beat any system" of arbitrary or paperwork controls which might create some difficulty or unpleasantness for them or which seeks to impose upon them what they feel are unrealistic requirements.

Various types of human errors can be classified so that more effective steps can be taken to prevent them. One method is to prepare statistical summaries of human errors in the same way that statistics are completed on mechanical malfunctions. This is expected to uncover critical areas and develop solutions to the human error problem. One such classification may be helpful to supervisors if you feel that there is merit in this attack. Mr. Harold R. Willis of the Human Factors Group of the Martin Company at Denver has prepared the following classification:

HUMAN ERROR CAUSE CODE

- Human Error
- Workmanship
  - Improper installation of an item
  - Failure to install an item, or incomplete operation
  - Installation of a wrong item
  - Poor quality (sloppy workmanship, etc.)
  - General manipulative carelessness
  - Incorrect adjustment, calibration
- Procedural and Handling
  - Failure to follow prescribed procedures, blueprints, specs, wrong tools
  - Prescribed procedures inadequate (wrong tools specified, inadequate, or missing labeling and coding)
  - Handling carelessness
  - Failure to follow procedures in handling
  - Inadequate procedures in handling
  - Gross movement carelessness
  - Inspection error

Imposes hazard to personnel or equipment; breech of safety

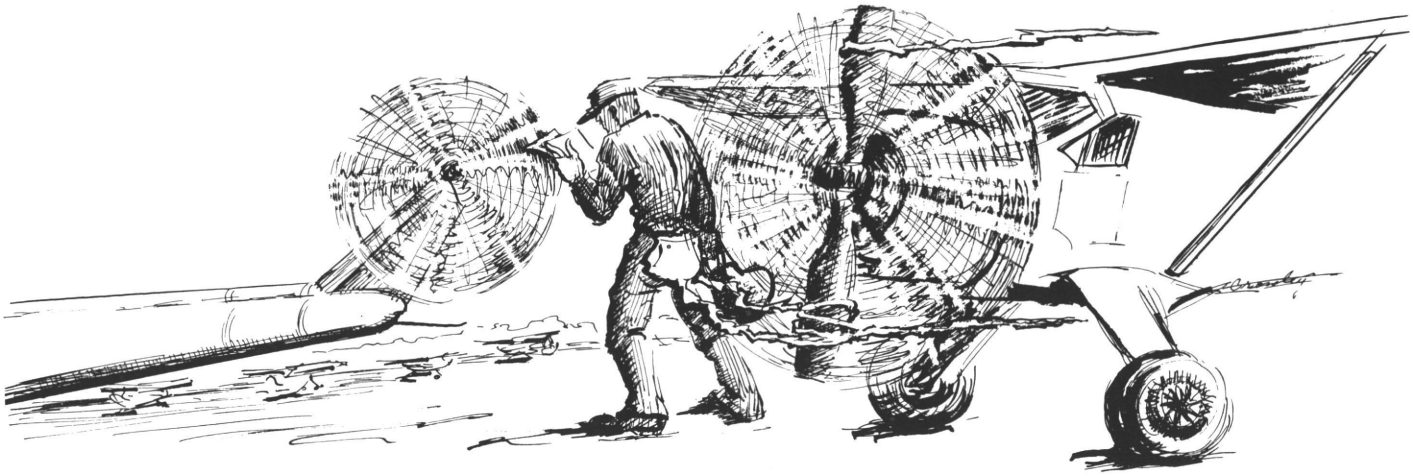
- Control
  - Excessive force required
  - Excessive rate of response required
  - Excessive reach required
  - Excessive number of responses required (overload)
  - Poor arrangement of control, reach location, operator position
  - Configuration of control
  - Incorrect operation of control
- Supervision and Administrative (direction and control)
  - Wrong instructions given
  - No instructions given
  - Failure to provide necessary and/or adequate items (logistics)
  - Inadequate supervision
- Manning
  - Insufficient number of personnel
  - Wrong personnel assigned
- Communications, verbal and written, excluding formal documents (including feedback)
  - Information received only partially correct or late
  - Incorrect information received, supplied, or used
  - Information received not understood
  - Too much information, or overload
  - Insufficient communication facilities
- Environmental (contributing to human error)—excessive or inadequate
  - Temperature
  - Humidity
  - Moisture
  - Atmosphere (toxic or noxious)
  - Noise
  - Lighting
  - Vibration
  - Workspace (and accessibility)
- Behavioral
  - Fatigue
  - Stress
  - Attitude
  - Abnormal
- Engineering or design inadequacy, including Human Engineering
  - Insufficient facilities
  - Insufficient or inadequate equipment, or controls
  - Arrangement of equipment, or controls
  - Arrangement or design of display, or displays
- Near error involving the designated categories of
  - Workmanship
  - Procedural and handling
  - Control
  - Supervision and administrative
  - Manning
  - Communications
  - Environmental
  - Behavioral
  - Engineering or design inadequacy
- Human error, cause unknown, or insufficient information to assess cause
- Potential human error—not a human error in itself but condition such as to be conducive to human error

In closing let me summarize by saying that supervision, coupled to skilled, intelligent maintenance technicians is the hard core of safety in airline maintenance: that useful techniques to reduce unwitting error can be gleaned from the missile/space program, that the development of highly sophisticated modern aircraft creates ever greater problems for the supervisor and the mechanic, that integrity is fundamental and can be encouraged by appeals to a person's pride rather than through punitive measures.

The supervisor has to be a master technician, psychologist, analyst, teacher, organizer, and a leader of men. An article on "Wisdom" in LIFE, Sept. 14, 1962, by Ernest Streeter, contains a pertinent paragraph:

"The experienced man knows that if he is going to accomplish big things he must do so, perforce, with the assistance of mediocre men, prima donnas, self-seekers and, unless he is unusually lucky, a smattering of idiots. The measure of his success is based on his ability to blend this unpromising amalgam into a working team which will get the job done with a minimum of mayhem."

Supervision alone will not bring good maintenance



Don't be Afraid . . .

Those Are Friendly Aircraft

Captain William H. Estep

DURING a particularly heated battle in the Korean War three Allied fighter pilots became disoriented on a strafing run in the vicinity of the MLR. In the midst of the confusion, a trooper bolted from behind a rock. Feverishly waving both arms he shouted, "Don't be afraid—those are friendly aircraft!"

Of course we can have a good laugh at the trooper's naivete. Certainly all of us are smart enough to stay out of the way of an aircraft on a strafing run—friendly or otherwise. But a friendly aircraft does not have to be spitting bullets to hurt someone.

Recent field exercises indicate that helicopters especially have become such common sights that troops consider their presence as routine as that of other vehicles. Consequently soldiers are unwittingly walking and driving *too close* to rotating main and tail rotor blades. Here are a few cases based on actual incidents that oc-

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Look Out! Those Are Friendly Aircraft

curred in exercises held by the 4th Infantry Division.

"Right down there, son," the brigade commander's voice rasped over the intercom of the OH-13E. The pilot decided an approach down the logging trail was the only possible way in. With solid banks of trees on either side and the way the trail turned to the right, there was no other way. Luckily the wind wasn't much of a problem down among the sheltering pines. Now if there were adequate room for blade clearance, the Old Man would be talking to his battalion commander in less than a minute.

Too bad the radio wouldn't communicate. The PRC-10 loosely sitting between the pilot and the colonel didn't seem to be on channel this morning. Anyway the colonel disliked trying to speak over the hand mike while wearing a flight helmet.

The pilot began a normal approach with intended touchdown at the widest spot in the road, not far from the waiting battalion commander's jeep. Adequate blade clearance was obvious all the way down, and a turn-around spot could be seen. The approach would have to be terminated on the trail, however – not enough room to get off. The road was clear and everything was going smoothly as the pilot reduced power slightly to maintain rpm as the collective went down.

Then it began. The helicopter was at treetop level, without room to turn in either direction, when a Scout was spotted coming around the corner. No room to pull up; the way the road turned to the right made this a one-way approach. The driver of the Scout looked up and smiled at the colonel, as the pilot blinked away the sweat and dumped the nose to regain forward motion to complete the approach.

A big smile was on his face as he approached

A COMMAND VISIT

The battalion CP was located on the reverse slope of the windy ridge. As the pilot attempted to find a level spot for the skids within the very limited area, an officer from battalion was spotted running toward the helicopter. A big smile was on his face as he continued toward the churning rotor blades. The pilot was torn between "dumping" the aircraft, taking the best he could get for a touchdown, or hovering away from the quickly approaching officer.

The colonel in the passenger's seat could be heard yelling to stay clear of the ship; however, the sound of his warning didn't travel far above the noise of the hovering machine. A jerk on the collective, a backward movement, and a turn was immediately made. The battalion officer's face fell in disappointment as the helicopter flew away. The colonel's remark from the passenger's side would have caused a far different reaction.

THE MAP READER

As the helicopter touched down near a group of men around the platoon leader, not a head turned. Perhaps they didn't hear the roar, or see the dust that blew toward

them and rustled the platoon leader's map. One man bent away from the dust and others were seen holding onto their helmets. Certainly one man would soon look toward the helicopter and report to the passenger.

No one looked up from the briefing. The pilot increased rpm several times and still was unable to attract their attention. In desperation, he friction locked the controls, and climbed out of the bubble to walk the few feet to the platoon leader.

The driver smiled brightly and continued on his way

A COOLING FAN

Before boarding the helicopter the pilot had selected three volunteers to assist the crewchief in controlling traffic along the busy, dirt road in front of brigade headquarters. After a normal start and runup, the crewchief indicated to the pilot that all was clear to hover and move the short distance away from the surrounding trees to the intended takeoff position.

Just as the helicopter broke ground, a Scout drove around one guard (who was probably watching the OH-13) and came directly toward the hovering machine. The pilot came to a halt and tensed himself for possible contact. The Scout continued to move and drove *under* the main rotor blades. The driver looked eyeball-to-eyeball with the pilot and smiled brightly as he continued on his way.

A FLYING JEEP

Has the helicopter become nothing more than a flying jeep to our soldiers? Is it so common a sight during today's maneuvers that it can be ignored? Or do many people imagine that if they ignore the noisy, troublesome machine it will go away? These questions remain unanswered for many pilots. Through education of the dangers involved in walking or driving too close to a rotating main or tail rotor blade, perhaps we can prevent unnecessary accidents among soldiers.

Have aviators become too flight safety oriented at the expense of the ground soldier? It is a point for thoughtful consideration for any pilot flying near ground troops.

Army Aviation Puzzle Answers

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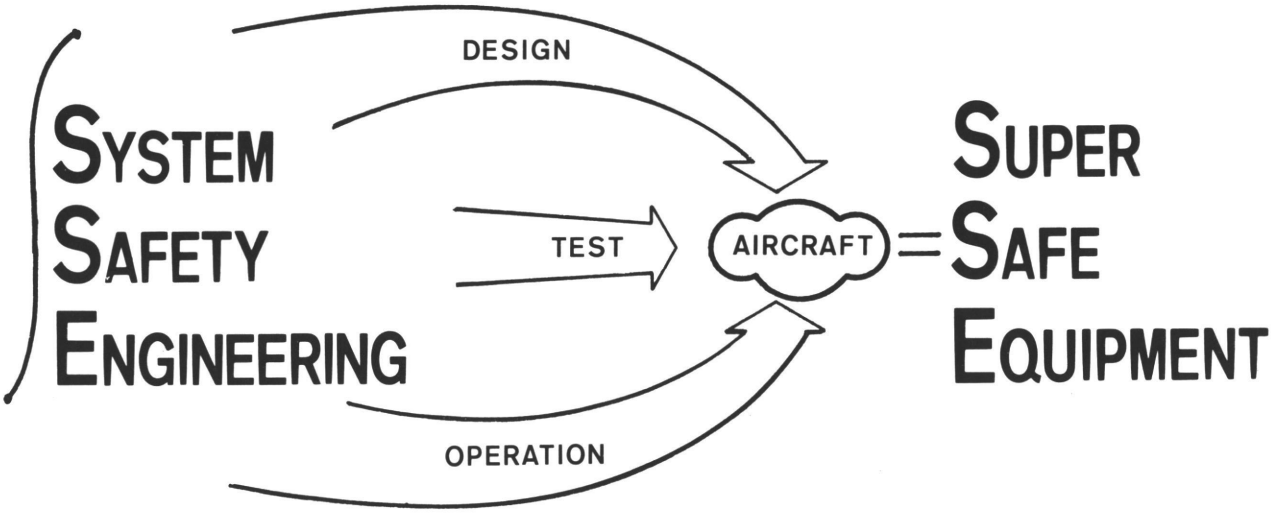

Under SSE, industry intensifies preventive safety efforts during aircraft design phases

Major Gary R. Heffner

THE PERFECT Army aircraft —free of safety hazards and malfunctions—is the ultimate objective of industry and the Army. Practical achievement of this goal will remain virtually impossible unless preventive safety thoughts on aircraft design can be freely and systematically exchanged between the Army and industry.

Consequently, the Army is implementing System Safety Engineering (SSE) —a program which requires industry to intensify preventive safety efforts on aircraft design phases. SSE has a two-fold objective:

The timely determination of potential hazards and those engineering actions necessary to preclude their occurrence within the system.

To provide an environment which shall minimize injury to occupants during survivable crash conditions. SSE helps industry by spelling out the Army's preventive safety requirements and allowing an exchange of views.

The need to integrate these safety efforts of contractors with those of the military may be traced to the late 1940s when the U. S. Air Force "in-house" engineering concept underwent a change. With increased complexities of aircraft and systems, the magnitude of the task dictated that technical know-how be solicited from specialists. Consequently, industry's talents were used to satisfy this important engineering responsibility.

Later, the Air Force underwent a change in management philosophy and occasionally asked one industry to provide system engineering and technical direction while contracting with another for system development. As a result, it wasn't long before relia-

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bility and maintainability people found it essential to define requirements in the form of military specifications.

Since the Army then relied on the Air Force and Navy to do its contractual work, it followed the same course. With respect to pure safety, the primary tool for uncovering hazards and deficiencies was the safety analysis—when the aircraft had been delivered. Cases occurred where aircraft were delivered with hazards designed into them. This was done unintentionally, but nevertheless resulted in mishaps during certain maintenance and operational conditions. Under these circumstances, the using unit had to live with a potential accident until some kind of retrofit action could be initiated. The Army, though not directly involved in purchases, has seen the ill effects of this procedure time and again.

A method was (and is) available to guide designers in producing a safe product. The Handbook of Instructions for Aircraft Designers (HIAD) provides a form of safety engineering. The HIAD assists materially in minimizing built-in-hazard in aircraft. As the Army begins to assume complete procurement and maintenance responsibilities previously shouldered by the Air Force and Navy, it recognizes (as the Air Force has done) that something more than HIAD is needed in its current safety efforts. First, much of HIAD is strictly applicable to Air Force aircraft and systems and provides a minimum of guidance for rotary wing aircraft. Second, HIAD is most generally modified and/or corrected *after* an accident has occurred.

By definition, any retrofit or modification program is an after-the-fact proposition, usually accompanied by a large price tag. Often the modification only alleviates a hazard but does not eliminate it. The contractor should not be expected to bear the full responsibility for this; he is not expected to do something he does not know is desired. Thus, the Army is implementing SSE through MIL-S-58077 which requires the application of safety engineering to all phases of system and subsystem design, development, test and operation. The heart of systems safety engineering is the Systems Safety Engineering plan.

Years ago, units lived with potential accidents

The SSE plan is prepared by each contractor. It must be approved by the Army and it describes the procedures and criteria the contractor will use to incorporate safety into the system as a result of the work performed during the term of the contract.

First, all contractors are required to identify the focal point within their organization having primary responsibility for safety engineering.

Second, each contractor will prepare milestone charts indicating the time sequence of his safety actions.

Third, each contractor is required to list applicable safety requirements and other criteria peculiar to his subsystem or system.

In addition to these three sections, each system and subsystem safety engineering plan must contain requirements for a series of safety analyses.

An *identification* will have to be made of major components which can degrade the functioning of the system. This will be followed by a *failure mode analysis* to indicate the ways in which each component can fail. Next will come a *malfunction effects analysis,* in which the contractor classifies the damage or injury which might occur as a result of the malfunction. Finally, a section is included to describe the *actions proposed* to reduce the magnitude of the hazards disclosed by the foregoing analyses.

Note that all these tasks apply to *both* the subsystem contractor and the system contractor. These analyses will be performed by the organization initially responsible for design of the system or subsystem. This could be a design task group within the primary contractor's engineering department, an associated contractor, or a combination of both.

When the system is considered as a whole—an integrated entity consisting of all its combined subsystems—additional problems must be faced: *interface safety, operational safety,* and *maintenance safety*. Consequently, the SSE plan must be enlarged by the system contractor to include these factors:

First, an engineering analysis of the integrated system will be accomplished to identify interface safety problems for the combined subsystems. Then, an operational safety analysis will be made of hazards that might be encountered in the procedures for operating and maintaining the system. This analysis will be closely coordinated with the maintainability requirements. Hazards likely to be encountered during the test programs of the system are to be included in both the operational and maintenance analyses.

Finally, based on these studies, the system contractor will provide data on emergency procedures, to minimize hazards where design cannot completely do so, for inclusion in the system technical orders.

Most of the people in the industry and the services who have

SSE is being initiated with the AAFSS program

discussed the problem of designing hazard-free and malfunction-free aircraft feel that the need for safety engineering during design, development and test is justifiable and necessary. But, some think that once a system is fielded, further safety engineering is no longer required—but it is.

Safety engineering cannot be turned on and off like a water faucet. It should continue into the operational phase of our systems. In-service disclosed deficiencies need safety engineering to avoid occurrence of accidents and also to make the fix truly effective.

Some engineers contend that reliability and maintainability requirements will automatically provide safety. This is not necessarily true.

Current contractual requirements in these two areas may very well provide a safer product, and they should. However, not all hazards are brought to light by maintenance and reliability analyses. The fuel cells on one observation helicopter, constructed of 40 gauge duralumin material, proved to be far too fragile for use in the field. U. S. Army Board for Aviation Accident Research (USABAAR) tests and recommendations have resulted in a program to replace all saddle tank equipped models of this aircraft with crash resistant cells. Only a safety analysis early in the development cycle of the aircraft could have precluded this very costly experience (in lives lost, injuries incurred, equipment lost and retrofit).

The Army is currently in a program to change the windows of a cargo helicopter to a pop-out configuration and devise means to manually operate the cargo ramp —all to provide an adequate egress potential for aircraft occupants. This is a difficult, costly, and not the most ideal approach; however, it is now the only one available. Safety analyses would have precluded this procedure.

The background of the SSE, how it came about, the objectives of the document and, in general, what it requires, have been briefly reviewed. What about the future? SSE is being initiated with the Advanced Aerial Fire Support System (AAFSS) and preliminary indications are that it is working well. Additionally, the Department of Defense, recognizing that this management tool is equally applicable to all Services, directed that a common DOD mil spec be developed. The new specification, which is currently undergoing administrative review, will be MIL-S-38130 (A), General Requirements for Safety Engineering of Systems and Associated Subsystems and Equipment. The document will provide continuity and strength to DOD's effort to ensure procurement of safe equipment by the Army, Air Force and Navy. It is expected to be published later this year.

How is industry being affected? This depends upon the present organizational structure, and functional methods within various companies. The mil spec requires that the contractor identify the organization and persons responsible for safe design. Some contractors have safety engineers on their staff or structure. Most contractors have some sort of safety organization, although they occupy different positions in the organization and have widely different functions.

The Army believes that the achievement of industry's system safety activities will be much greater if the safety group reports directly to top level management. The efforts of those involved with safety engineering will be less diluted if they are so placed in the organization.

Combat effectiveness is of prime concern to the Army. It cannot be undermined through unnecessary loss of life, and materiel. To preclude the deterioration of combat effectiveness requires action on the part of both the Army and industry. It requires a management philosophy which emphasizes aircraft design safety, especially now that the Army is turning to airmobile concepts. The designed—in safety must be preserved during all manufacturing processes. The successful operational employment of the system demands adequate training, proper maintenance and operational procedures which, in turn, will favorably contribute to the accomplishment of the Army's mission.

Contractors must designate employees responsible for SSE

Preflight Fright

Lieutenant Gary R. Watson

I OPENED MY car door and felt the cold bite through my flight jacket. I hurried a little to get into the warm building that housed airfield operations and the coffee shop. I met Ted in the coffee shop and we discussed our planned flight over breakfast. Ted was going to fly first and he wanted to shoot some takeoffs and landings, so we decided to head for a local stagefield.

I checked the weather and was informed it was forecast to be *clear* and *cold*. Ted filed a local flight plan and we crossed the apron to the aircraft.

Together, he and I completed a thorough preflight on the aircraft; being well satisfied, Ted fired her up. The runup checked out and we broke ground and headed for the stagefield.

Ted turned the heater on and as my body warmed I sat daydreaming in the back seat. I recalled how short months ago I was a student pilot and now I wore the coveted wings of an Army Aviator. The long months of training had been tough, but they sure paid off.

Two and a half hours later we decided to return to the field to swap seats and get a cup of coffee. I headed for the warm coffee shop on the run, hearing Ted yell to a refueling team, "Fill'er up" as he followed me into the building.

Deciding we had wasted enough time we returned to the aircraft. Ted said, "Let's give her a quicky; she's okay." Thanks to my training I allowed better judgment to rule and began a normal preflight. I opened the cowling on the right-hand side. Something didn't look right! I reached down into the wiring and extracted the foreign object. I breathed a sigh of relief as I visualized the outcome had I not decided to make a second preflight.

I located the ramp attendant and returned his windshield washer and rags asking, "Is this standard equipment on the newer models?" I then thanked him for leaving the warmth of his office to wash my windshield.

It seemed a bit warmer as I returned to the aircraft. Perhaps the diversion of my attention to reviewing events of the past few minutes caused me to be less aware of the intense cold.

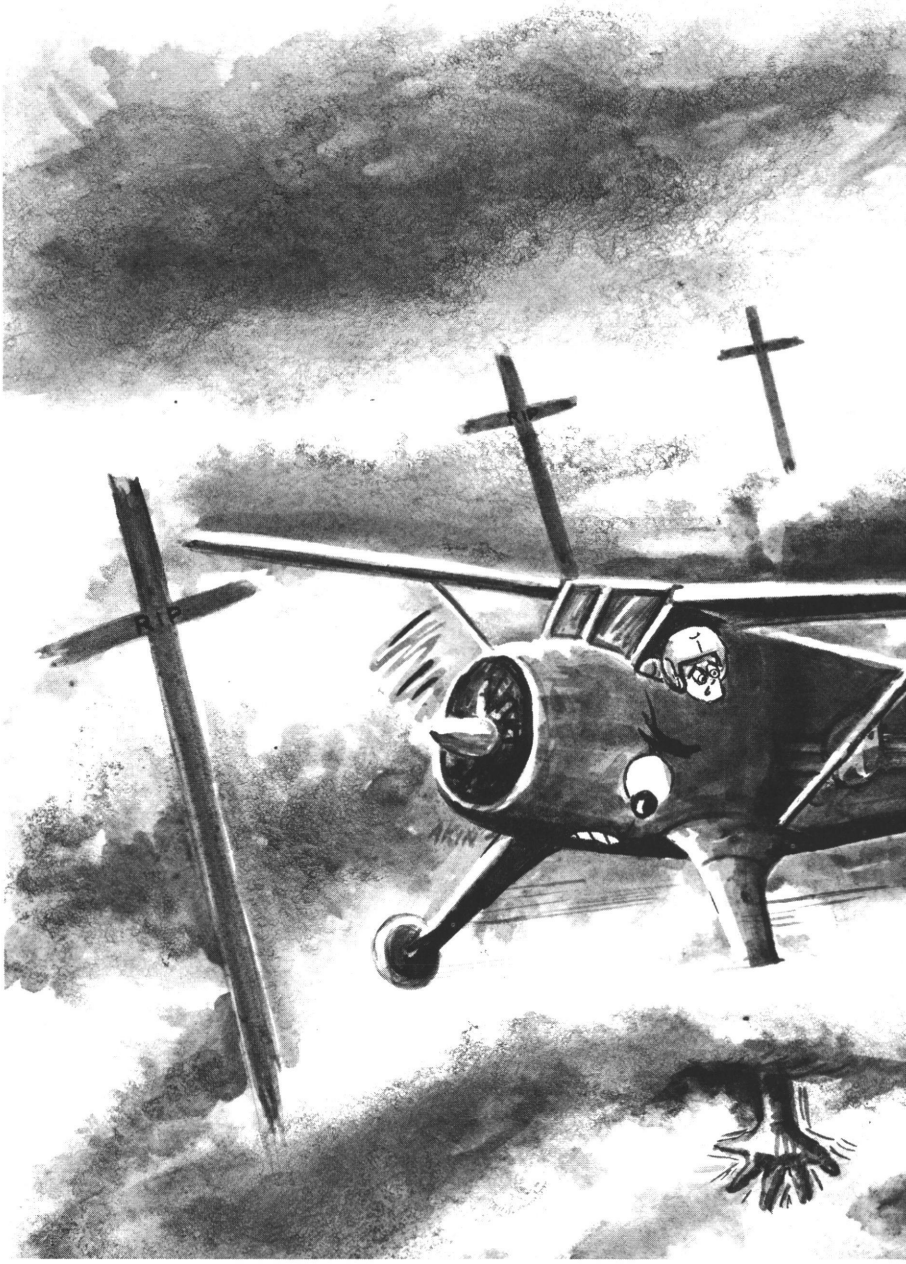
During periods of intense personal discomfort, i.e., cold weather, the safety factor drops and hazards become more prevalent.

Professionalism will not only reduce the hazards, but with the associated concentration on the job at hand, it will also reduce the personal discomfort.

LT Watson was Supply Officer, Instructional Support Division, Department of Maintenance Training, USAAVNS, Ft Rucker, Ala., when he wrote this article.

A *little* weather plus *little* thought can bring out

That Sticky Factor



Lieutenant Larry G. Schlotfelt and Lieutenant Marshall Kuhr

AN AVIATOR with 1,316 hours, most of which was in the aircraft type he was flying, attempted a flight one winter from Grand Island, Nebr., to Edgemont, S. D. In his weather briefing he was advised that light snow existed in the area of his destination and was cautioned against getting blocked off by an area of reduced visibility in snow-showers en route.

The pilot stated he would attempt the flight and return if he found the weather bad. He returned to earth about 26 miles north of the airport in an area of 400 foot ceiling, while on a VFR flight plan.

This accident need never have happened if the aviator had used good judgment during preflight activities and en route after departing his home airfield.

As an Army Aviator, you need to know the hazards of flying in marginal weather and you must realize your capabilities to perform in areas of low ceilings and reduced visibilities. No doubt this winter you will be called upon to fly in just such conditions.

When summer officially ends, aviators soon begin thinking cooler thoughts in expectation of denser air, cooler cockpits and generally somewhat better flying conditions. Actually cooler conditions bring many other limitations. Cloud layers become more numerous, cold fronts form more

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LTs Kuhr and Schlotfelt were assigned to the Qualification Flight Division, Department of Fixed Wing Training, USAAVNS, Ft Rucker, Ala., when they wrote this article.

Winter means denser air and cooler cockpits, but also brings ice, fog, cold fronts and other frigid hazards

frequently, fog becomes more likely with the temperature dipping towards the dewpoint on early mornings and late evenings, ice and frost form at lower altitude, and snow is always a possibility.

In short, cockpits will be cooler and the air will be denser, but these are the only two reliefs we as Army Aviators may expect from our old friend, the weather.

At this point we might do well to pause for a moment and reminisce of past experiences, ours and our friends, with weather.

Vertigo, the name of an Alfred Hitchcock thriller, is even more of a thriller when encountered in flight. Doctors tell us that it may take as long as 20 to 30 seconds to completely transition from visual flight references to full instrument flight. When flying in marginal weather, the chances of flying in and out of clouds or very dark areas is greatly increased and visual references are momentarily hazy or completely obscured.

At these times the chance of disorientation is most probable. If you are fortunate enough to have a copilot or observer, you should have him observe and you should go on the gauges even if you're not in a cloud. This will keep you from having to divide your attention between hazy ground references and the instruments, which you would have been checking pretty close anyway. There is no such thing as partial instrument flight, so either get on the gauges or get into the clear.

We've all been lost at one time or another and we remember that strange feeling when nothing looks familiar. Perhaps we don't want to remember that feeling or the circumstances surrounding that type of situation. But when flying in marginal weather when visual references are obscured and landmarks are limited to those within a very short radius of your position, you are asking to get it —fast.

Caution and good flight planning is a big help in this situation. Perhaps you plan to rely on dead reckoning, which is quite reliable where winds are well known. Dead reckoning will require a higher degree of accuracy, especially if you find it necessary to detour around cloud formations, towns, or industrial areas. In this event, good pilotage technique is essential.

So you say use the radio to help with navigation. Remember how static on the LF receiver makes reception and communication difficult and sometimes impossible? VHF navigation is restricted to the higher altitudes due to the line of sight characteristics of VHF transmitters.

Another hazard when operating in marginal weather is the always present possibility of flying into severe weather conditions. Take for instances turbulence, icing, low clouds, or fog. Heavy turbulence can cause structural failure or loss of control. Have you ever flown into a thunderstorm hidden by those clouds and haze while you tried to sneak through VFR? Ice on an aircraft presents several potential hazards. These hazards are brought about by changes in the shape of the airfoil as well as increased drag and added weight of the ice.

Frost on an aircraft puts you, in a sense, in marginal weather even though the sky may be totally clear and visibility is 15 miles. Take, for instance, one hot pilot who removed the frost from his aircraft windshield but didn't bother to remove it from the wings. Taking off from the airfield, the aircraft made what appeared to be a normal climbout until he was over the field boundary. At this point, the aircraft banked sharply, dived, and crashed in an open field. Cause of the crash: loss of control resulting from a frost induced loss of

lift. Reason for the broken aircraft and pilot: inadequate preflight.

The rapid formation of fog presents a very dangerous problem to the pilot already flying in restricted visibility. Snow, heavy rainfall, or blowing dust is exceptionally effective in reducing air-to-ground visibility. With reduced visibility, the danger of mid-air collision increases. You can't take evasive action if you can't see them coming.

Two Army Aviators departed Fort Rucker en route to Kansas City in an O-1. En route weather, as obtained from Cairns weather and en route from FAA Flight Service Stations, was to be scattered thunderstorms; ceilings outside thunderstorms were to be from 1,200 to 2,000 feet, and visibility 7 to 10 miles. They landed in Batesville, Ark., in the eastern foothills of the Ozark Mountains due to deteriorating weather which was not forecasted. Weather remained IFR for two days with ceiling of 100 to 300 feet and visibility 1/2 to 1 mile.

There was a happy ending to this story for one reason: these two aviators recognized the dangers of deteriorating weather and took action which possibly saved their lives and saved the aircraft from major damage. They got on the ground and stayed on the ground.

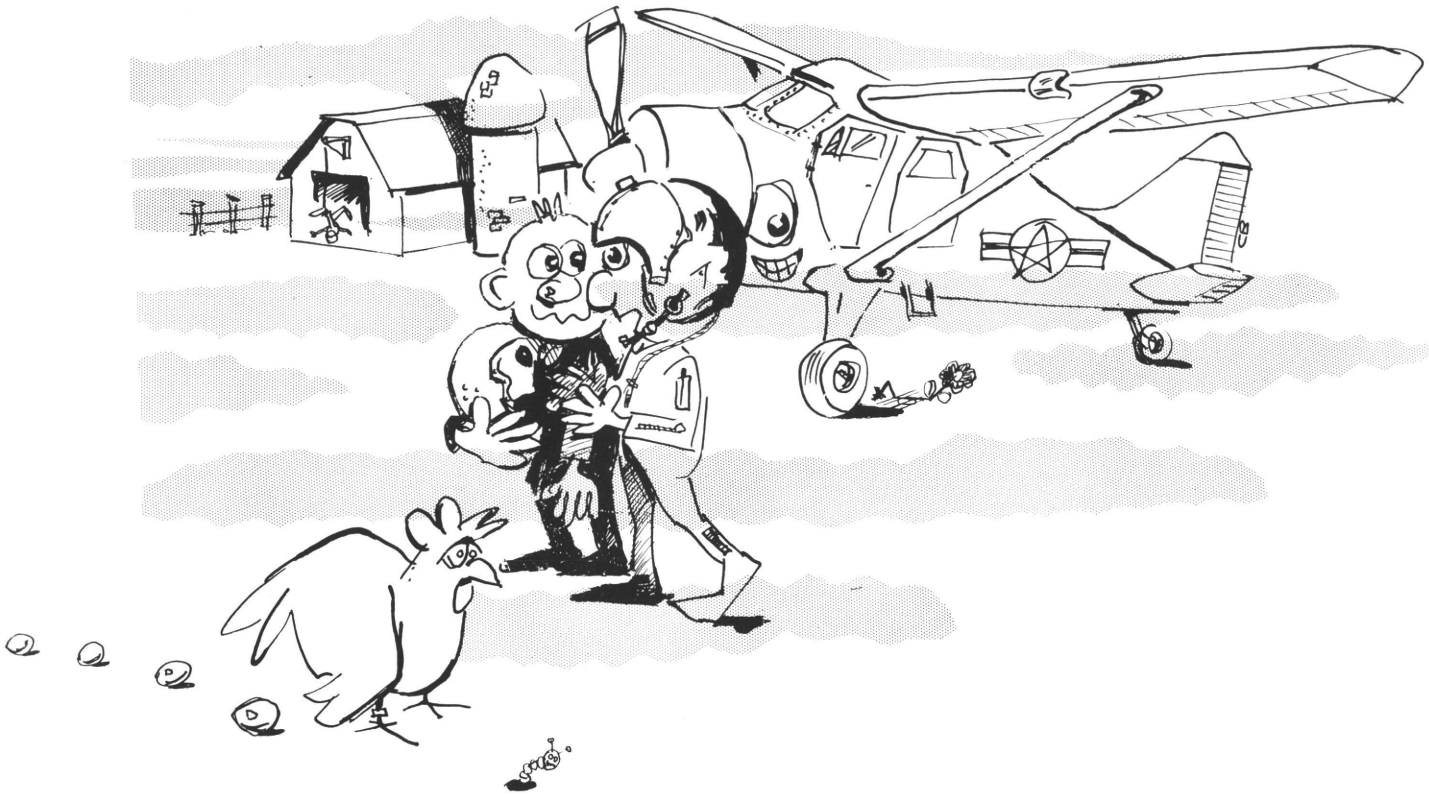
Now that you have been reminded of the possibility of such a thing occurring, let's look at some of the common sense rules which will serve to keep you from becoming entangled in this weather web.

As should be the case with all flights, your preflight planning will prevent your flying into hazardous conditions.

How many times have you walked into the weather detachment and asked, "Is the weather going to be about the same in the local area for the next few hours?" without any real knowledge of what weather exists. You're assuming it will be all right simply because it looks clear outside. Don't allow yourself to be caught in this situation. So you're going only to Tallahassee or Columbus. Know before you leave what exists now, what will probably develop, and—to go one step further—what may develop. Terminal and area forecasts should be checked carefully. A comparison of old and new sequence reports will show you what trends are developing. Discussion with the forecaster of en route and destination weather will always pay big dividends.

Study your charts carefully for intermediate points with airports that you could stop at if need be.

In the fog, any farm will do—just don't buy it



It's much better to spend the night in Podunk, Tenn., and be a day late than to press on and not arrive at all.

Take adjacent charts to your intended route in case you are forced to fly around bad weather or become "temporarily misplaced."

After takeoff, keep in touch constantly with en route radio for weather advisories. They are more than willing to assist you anytime you ask. Also scheduled weather is broadcast at 15 and 45 minutes past each hour by all flight service stations.

Keep an accurate flight log and know where you are at all times. Good weather may be along your route but this may not be true should you stray very far off.

Avoid turbulence at all times, but if that isn't possible, follow the recommended procedures in the pilot's handbook for your type aircraft.

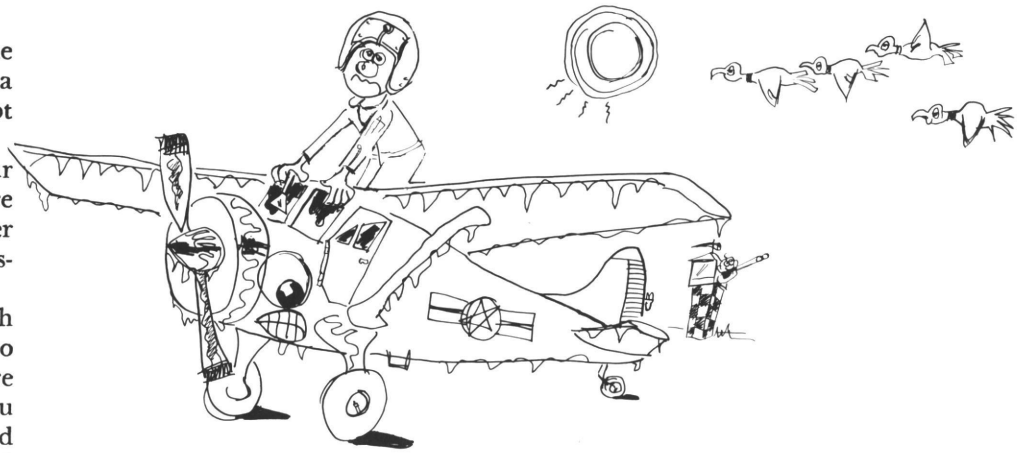
Some signposts are visible to the pilot which, if observed, can be invaluable. Clouds are excellent for this purpose. Cumulus will indicate convection currents with light to heavy turbulence. Stratocumulus ceilings are usually adequate for VFR flight below them, except in hilly or mountainous terrain. Stratus often are too low for VFR flight below them.

Smoke will restrict your vision, but is usually localized around cities or industrial areas.

Fog and precipitation usually indicate that the visibility is going down to stay.

If you are flying at near freezing temperatures with visible moisture, keep a constant check on the leading edges of your aircraft wings and on wing struts for ice formation.

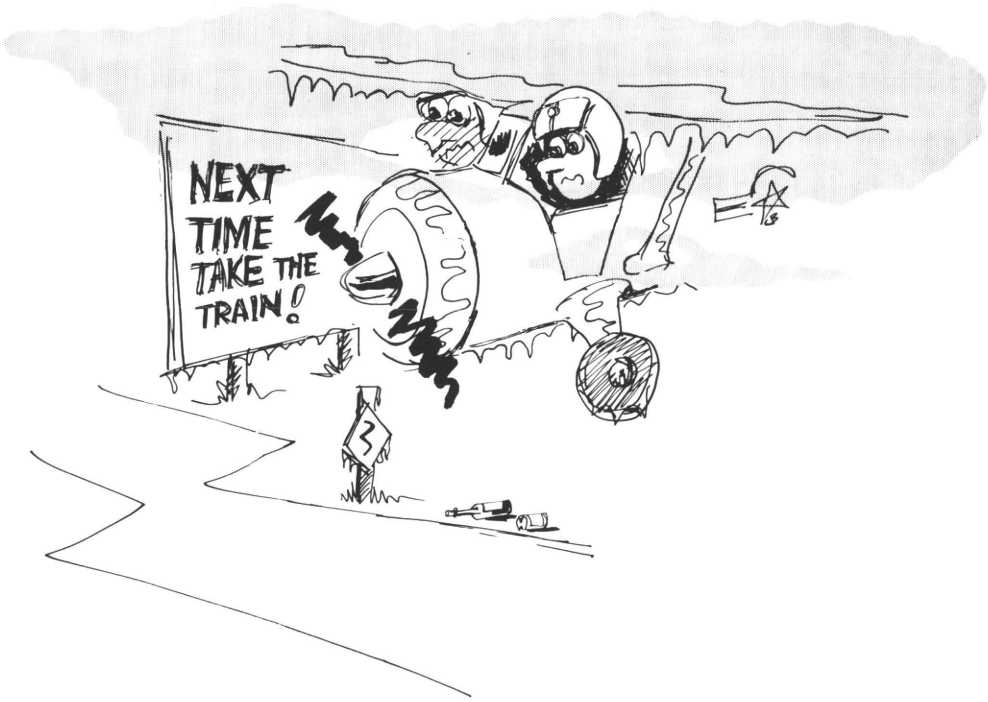
These are a few of the more basic steps to take in attempting to avoid marginal weather conditions and the possible worse conditions it brings.



Careful there—there's frost in the air

The pilot who must limit his flight to visual operations has a very different problem than a seasoned instrument pilot. He must at all times be able to see the ground and other reference points well enough to maintain his attitude, and see far enough ahead to avoid collision with obstacles.

The next time you hop into your flying machine for a VFR jaunt, ask yourself, "Do I really know what to expect out there?" And if it isn't what you expect out there, follow these three rules. Remain calm. Use good judgment; size up the situation and take the safe course of action. Rely upon yourself; take prompt action in the absence of advice. You are in command and responsible for the lives of all occupants.



Don't bank heavily on road signs

Commanders and Staff Officers Aviation Safety Orientation Course

Aerospace Safety Division
University of Southern California

a one week course designed to orient major commanders and staff officers in the command aspects of aviation safety . . .

"THIS HAS BEEN TIME well spent and I believe it will be of continuing benefit to me as a senior commander." This was the comment of a general officer who completed class 66-2 last June of the Army Commanders and Staff Officers Aviation Safety Orientation Course conducted by the Aerospace Safety Division of the University of Southern California. It is typical of comments made by 24 other commanders and staff officers who attended the course.

Designed to orient major commanders and staff officers whose function includes supervision of aviation units in the command aspects of aviation safety, this one week course has the following objectives:

—To present principles applicable to aviation accident prevention.

—To present technical and human problems encountered in Army aviation operations, together with a discussion of solutions which will provide safe and effective aviation operations.

—To review selected aviation accidents which involve supervisory deficiencies.

—To outline some management tools and techniques currently available to help solve aviation safety problems.

—To review the curriculum of the Aviation Safety Officers Course so that graduates may be more effectively used by commanders.

Classroom subjects include:

—Aircraft accident prevention, including the principles, techniques, and tools for management, supervision, and dynamic support of accident prevention activities.

—Aeronautical engineering, emphasizing critical areas of flying and maintenance operations for fixed wing and rotary wing aircraft.

—Aviation physiology as it applies to aircrews, including human stresses such as vibration and noise; nutrition; illness; the effects of drugs, alcohol, and tobacco; and the need for adequate crew rest to prevent fatigue.

—Aviation psychology, including the prediction of accidents from psychological characteristics and facts about motivation, emotions, sensations, attention, and perception.

—Aviation law as it applies to aircraft accidents.

An orientation briefing on the organization and functions of the U. S. Army Board for Aviation Accident Research (USABAAR) is given at the beginning of each course by COL Warren R. Williams, Jr., USABAAR Director, or his representative. This briefing explains the USABAAR position as a DA staff agency of the Assistant Chief of Staff for Force Development. It outlines the services available to major commanders, including aircraft accident investigation assistance, aviation safety presentations, airfield surveys, and aviation safety education publications.

Mr. George Potter, M.A., is the division director and Mr. Jerry F. Detwiler, M.S., is coordinator of undergraduate programs. The faculty includes professional personnel with extensive backgrounds in aviation safety. Among these are flight surgeons, aviation psychologists, aeronautical engineers, and former military aviation safety officers. Mr. Richard Powers, L.L.B., lecturer on aviation law, is counsel for Associated Aviation Underwriters and a member of the American Bar Association Committee on Aviation Law.

Details of the two courses to be conducted during January and June 1967, may be found in DA Circular 350-38, dated 6 April 1966.

crash sense

Major Chester Goolrick

". . . what I say is, you can lead a horse to water, but you can't make him drink"

SOUND TRAINING SENSE

EPH TUTTLE, best remembered as the sage of East Maplesap, Vt., is generally credited with having coined one of our oldest sayings. Eph and some of the boys were sitting around a hot stove in the store one snowy day back in 1814 when word came that a local lad had flunked out of a Down East college called Yale.

"Wal," Eph observed, "what I say is, you can lead a horse to water but you can't make him drink."

"By crackey," a crony said respectfully, "you've done gone and hit the nail on the head agin, Eph. I wish *I'd* said that."

Time may have taken some of the shine off Eph's remark since that historic occasion. Its common sense is still as rock-hard as New England granite. Nobody has yet figured out how to make a horse take so much as a swallow out of the old oaken bucket if he sees no reason to. When it comes to human beings, generations of hard-pressed teachers have found out, at the cost of premature falling hair, peptic ulcers, and a loss of faith in mankind, that the same thing applies if the people they are trying to instruct (a) have no driving desire to learn, (b) fail to cooperate, or (c) once they've been led to the academic trough won't start to drink and keep on drinking until they have all the knowledge they can load aboard.

As far as human, as opposed to horses, learning goes, the oaken bucket which concerns us is Army aviation's training program in all its many-sided phases. It is a complicated business and can seem bewildering for the new hand being made to jump through one of its hoops. At bottom, it is no different from what anyone faces when he sets out to

learn how to speak Choctaw or balance an eel on the end of his nose. It is a system designed to take intelligent, eager, uninstructed greenhorns and make them as expert on the subject—in this case, aviation—as their capabilities and their interests allow.

Here's where what Eph knew about human nature gets in the way. Army aviation's training program has a batting average year in and year out which would be the envy of Willy Mays, but there is still room for improvement. What makes it fall short of the near-perfection it could attain is that some people fail to acquire a firm grasp of what the training program really means, how it operates, and what it is intended to do. Accidents happen—in flying, maintenance and elsewhere—which are clearly the fault of men who have done something, or have failed to do something, their training should have prepared them for. The conclusion, which is about as hard to overlook as a beatnik in a daisy chain, is that these unfortunates did not take in and put to good use important knowledge they were given every opportunity to acquire.

The easy excuse anyone can offer himself for not absorbing all the training he can get is that it is often dull, tedious, monotonous, and wearying. Granted. Given a choice, little Willie would rather go fishing than learn geography, every red-blooded college student would sooner be viewing the sights from Observatory Hill with the Sweetheart of Sigma Chi than trying to fathom higher math, and there are times when an afternoon in the cockpit with a tough IP breathing down your neck cannot be counted as one of Life's Golden Moments.

Still, as even little Willie will grudgingly admit, school is a necessary evil if you want to wind up as president of the firm some day. What's more, when approached in the right spirit, a training program can become an adventure, stimulating and exciting from start to finish. The happy fellow in this frame of mind is the one who

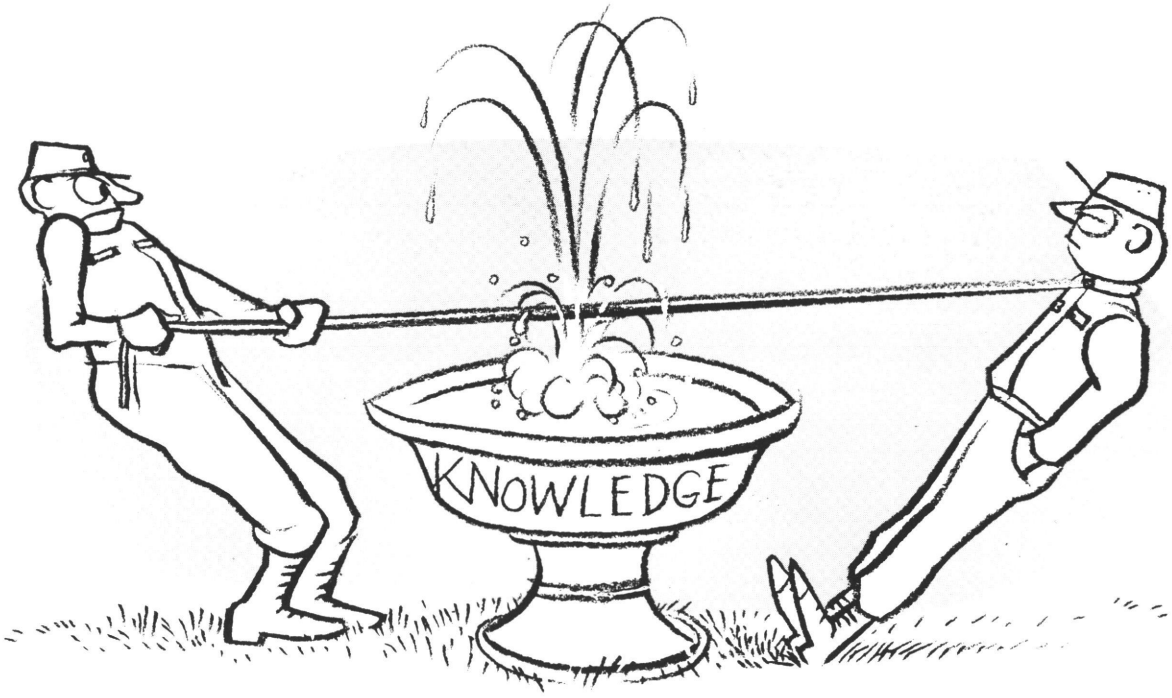
- is properly motivated,
- appreciates the need for training,
- has the right attitude toward the training process, and
- keeps plugging.

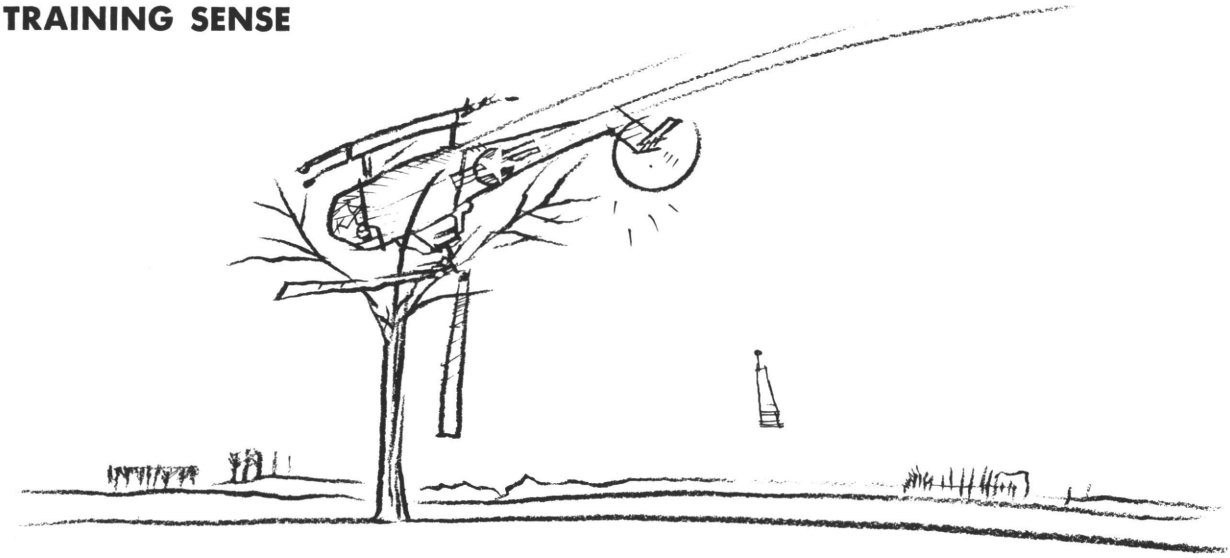
Unless you have a banquet-sized serving of all four, you are headed for trouble. When the payoff day comes, your training won't fail you. *You'll* fail your *training*.

THE BASIC URGE

Talent scouts comb the college campuses at the end of each football season for topflight professional prospects. The quality they call "desire" stands at the top of the checklist. A fullback might pack more beef than a Texas longhorn and run the hundred in a flat 10 seconds, but unless he wants to play so bad he can taste it, he'll never make the team.

Real desire is not confined simply to wanting something; otherwise, everybody would be in clover. It carries the willingness to work like a one-





. . . accidents happen which are clearly the fault of men who have done something, or have failed to do something, their training should have prepared them for . . .

man beaver colony and put up with enough hardships to discourage an early Christian martyr. Pro football players in the starting lineup have desire oozing from every pore. They are also realists enough to accept the fact that making the team involves hours of relentless drilling conducted by coaches who regard Simon Legree as a sissy, Sundays being pounded black and blue by oversize gents who could have handled a World War I tank, and discouraging afternoons when everything goes wrong. They know it is all part of the game and they are ready and willing to pay the price.

If the Army could employ talent scouts to beat the bushes for budding airmen, they would also look first for desire or, to use a fancier term, proper motivation. The word "proper" here is the element they would want to take a long, eagle-like look at. The chap under observation seems to want to fly, sure, but does this stem from an honest fascination with flying, the thing that has been growing inside him since he was knee-high to a Bird Dog, or has he bought himself a set of hazy, hopped-up notions formed from watching old movies about the Lafayette Escadrille? What is worse, is he undertaking a career in aviation because he has a deep-seated feeling of inadequacy and is trying to prove something—to himself, his girl, or the world in general. Nobody will deny these are motivations—of a kind. They just happen to be the *wrong* kind. We'll never know how many people are led by them into hazardous undertakings they've no business being in.

Until somebody devises a handy gimmick to open up people's brains and read what is going on inside, there will be no way of telling whether a man is in Army aviation for the right or wrong reasons. This is the basic responsibility of the intelligent man who knows he must level with himself and get some honest answers before undertaking anything important – piloting aircraft, choosing a bride, or deciding whether to risk his inheritance in blue chip stocks or race horses. In the end, he's the only one who will ever know the whole truth.

Lacking positive evidence to the contrary, an Army talent scout would have to play it by ear and assume a prospect's motives for entering aviation were of the best, all wool and a yard wide. But, aside from the outward desire to fly and a seeming fascination with aviation, the scout would look for more. In the end the rookies who would get the highest marks and who would be signed on as sure-fire prospects to become the kind of professional fliers the Army wants would be those who

- wanted a military career,
- had a good idea what they were getting into,
- could stand up under a real challenge,
- relished hard work and asked for more, and
- who took pride in a sense of accomplishment.

VISUAL FLIGHT

Nobody can ever have a full appreciation of what waits for him over the horizon until he has been there and seen it for himself. If a Columbus hadn't been willing to sail off into the unknown the Indians would still be living in happy ignorance of the palefaces.

Just the same, all of us like to peer ahead as much as the weather permits. In the case of Army aviation, a canny man starts by making a hard appraisal of the hurdles he will be called on to go over. He'll have no trouble reaching the conclusion that they are (a) high and numerous and (b) placed there for a purpose. From that handy starting point he should have no trouble grasping the basic fact around which all training revolves:

> TRAINING IS THE MEANS BY WHICH A MAN LEARNS TO ARRIVE AT CORRECT, INFORMED DECISIONS WHICH ENABLE AUTHORITATIVE ACTION

The *means* of training depends on the subject at hand. When you were younger and Mom wanted to get across a point, she walloped you with a hair brush until the light began to dawn. When you started to learn to play the piano, you practiced scales until they ran out of your ears. You burnt enough midnight oil in college chemistry to fuel an ocean liner.

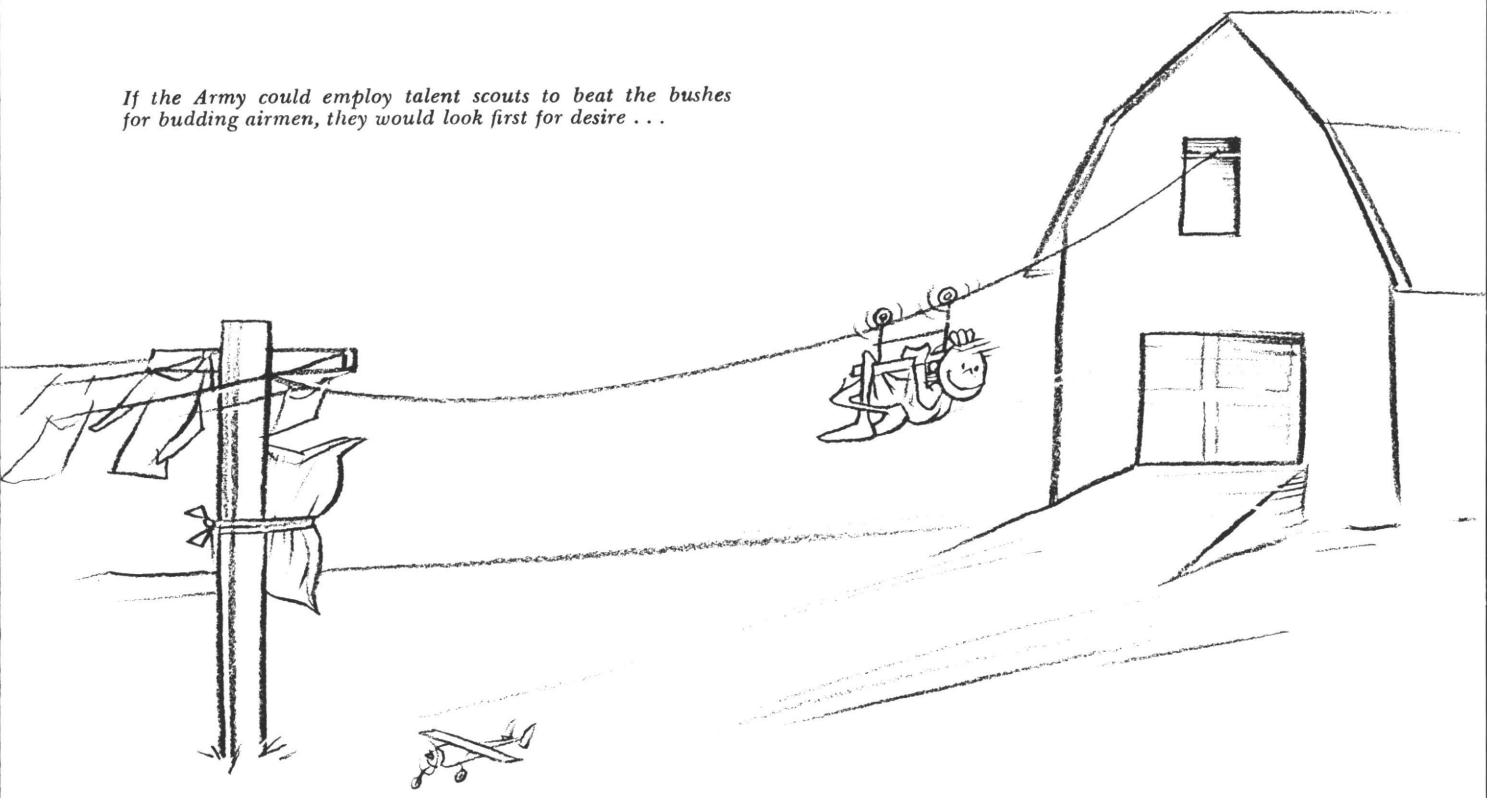
The more involved the subject — in the case of aviation, the more hazardous — the tougher and trickier the training. Whatever the means, training in any phase of aviation is designed to provide instruction in the fundamentals and sufficient practice to provide a sound basis on which a student can build greater and always increasing proficiency.

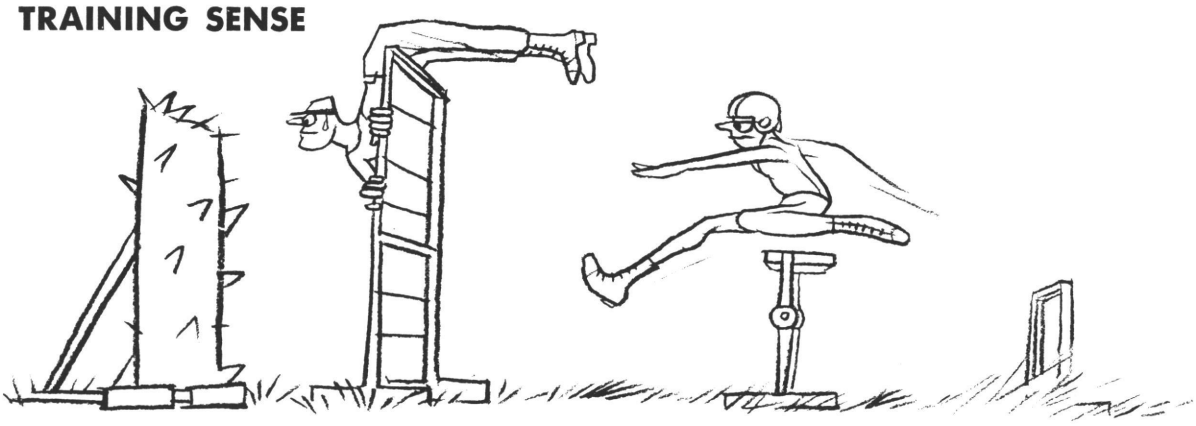
It is a large order. In Army aviation, the road a man travels from the time when he is still wet behind the ears to the point where he is a qualified expert, as sure-footed as a mountain goat, is long, winding, and planted with thistles rather than primroses.

But every foot of it is worthwhile. The sooner the beginner appreciates that sober truth the better off he will be.

There's something else a fledgling should know before he is led out to shake hands with his first Bird Dog or Raven. Training is not a process which ever comes to an end—for novices, veterans, test pilots, maintenance men, IPs, or housewives trying to keep their husbands from complaining about the food. If you are undertaking to learn Choctaw, the object of the game is to speak it like a native and then to keep brushed up in case you are ever faced with an argument with Old Chief Rain-in-

If the Army could employ talent scouts to beat the bushes for budding airmen, they would look first for desire . . .





In the case of Army aviation, a canny man makes a hard appraisal of the hurdles he will be called on to go over . . .

the-Face. If you have in mind being heavyweight champion longer than John L. Sullivan, you have to face the fact you'll spend a lot more time in the gym, learning new ways to deliver a left hook, than you will in night clubs. If you are in Army aviation, as the men in Vietnam know well, there will never be a day when you will not be presented a chance to learn something which will sharpen your skills.

Skill-sharpening, like putting a fine edge on anything else, is a process requiring patient, willing hands. Just how sharp your skills become depends, when it comes right down to brass tacks, on you yourself. What counts is your attitude, the frame of mind with which you look at training. If you approach it with the general enthusiasm of No. 224608 breaking rocks in the Big House instead of that of a robin going after the first worm of the day, you may—just may—get by for a time and even survive to a ripe old age.

You will never develop your full potential.

You will never become the kind of full-fledged expert the pressures of Army aviation demand.

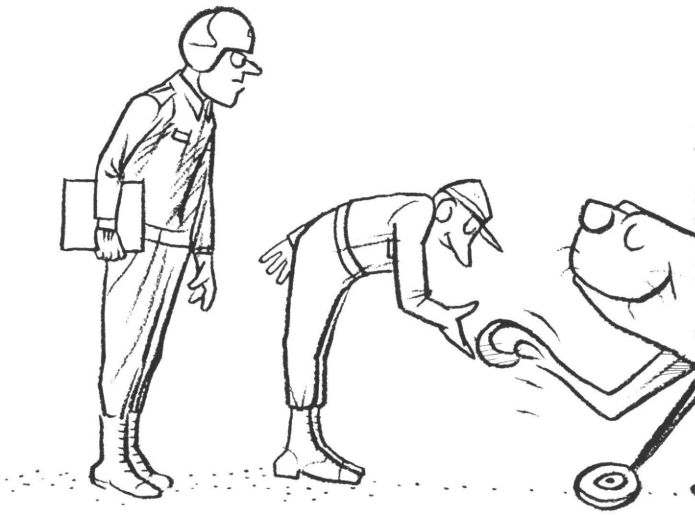
CHIN UP, CHEST OUT

Never kid yourself into thinking everybody does not have his moments of bleak discouragement. Even Daddy Warbucks, the world's richest man, probably accuses himself at times of being a failure because he hasn't managed to lay his hands on all the money instead of just most of it. It is on record that Casanova once considered retiring to a cave in the woods after being handed a flat turndown from Miss Europe of 1750.

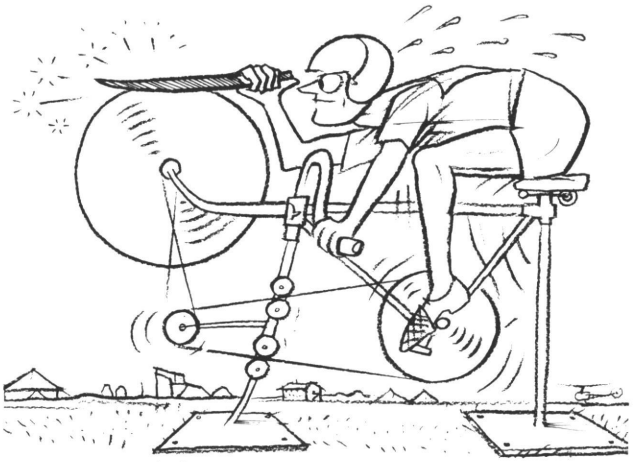
Discouragement, the blues (droop-mouth syndrome), the tendency to want to hide under the bed until the sun comes out, affects lesser mortals as well. What makes it worse is that a man is particularly susceptible to mental saddle sores when he has stubbed his toe on something, or when he is being subjected to demanding pressures he doesn't fully understand and appreciate.

A properly motivated aviation student who has taken the trouble to find out as much as he can about training in advance will not escape days when he will find the routine and the pressures beginning to wear down until he can feel his knees buckling. Unlike the occasional thoughtless lad who starts out blindfolded, our man knows occasional setbacks are part of the game. He has a healthy appreciation of the fact that the only way to lick the blues is to maintain a cheery spirit and forge ahead with the determination of a tenderfoot scout out for his first hike up Old Smoky. The view from the top is more than worth the grizzlies along the trail.

The plain truth is that a properly motivated, balanced beginner always has an easier time than



training is the means by which a man learns to arrive at correct, informed decisions which enable authoritative action . . .

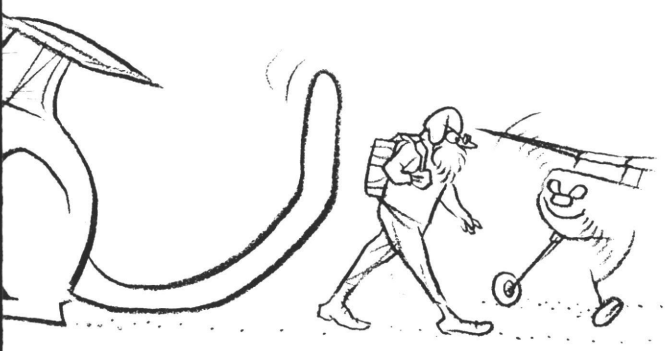


Skill-sharpening requires patient, willing hands

the man who has not tried to figure what the shooting match is all about. A little reflection is enough to bring anybody to the sound conclusion that training is not a matter of forced feeding, the way you spoon spinach into a 6-month-old who has decided he would rather have chocolate pudding. A real learner knows how green he is and is anxious to ripen on the vine in the shortest possible time. He soaks up knowledge the way Alabama lawns soak up rain during July and is always thirsty for more. He is an expert at brain-picking. Given half a chance he will pump an instructor drier than the Mojave Desert in a shorter time than it takes to run a TV quiz show. A meat and potatoes man, he is just as much interested in the fundamentals—the nuts and bolts of aviation—as he is in the more stimulating aspects of his craft.

This happy soul, men, is a *learner* who can no more stop acquiring the tricks of his trade than a compulsive eater can stay away from the pastry counter. A well balanced lad who appreciates girls as well as the next man, there are plenty of times when he welcomes an opportunity to kick up his heels and fling care to the winds. When he *is* in training, he is all business.

There's something a fledging should know before he shakes hands with his first Bird Dog . . . Training is not a process which ever comes to an end . . .

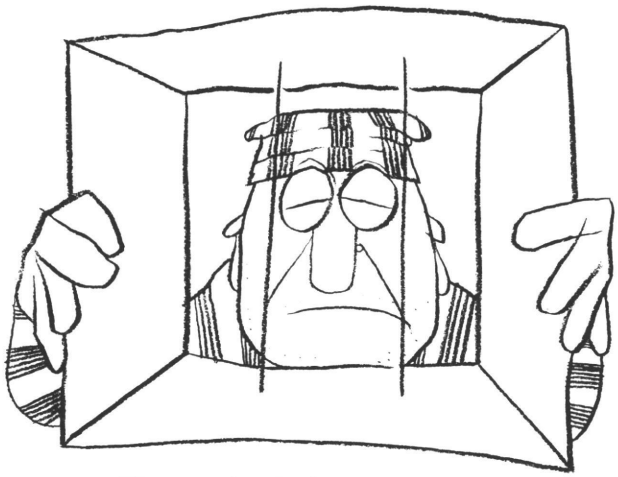


An attitude like this not only builds knowledge in a hurry, it also adds to confidence the way breakfast foods convince scrawny teenagers they can turn into major leaguers. When a student falls behind because he is not making the most of his training opportunities, he begins to be assailed by self-doubts which wind up as full-fledged heebie-jeebies, straight out of Dracula, guaranteed to haunt him by night and chew holes in his efficiency by day. The more he is spooked, the further he falls behind. He is in a kind of mental graveyard spiral so vicious that only something just this side of a miracle can rescue him.

A man who has confidence in himself and in his training and is willing to let his skills develop the hard way, slowly but surely, is maturely proud of his progress without stepping over the edge into overconfidence. At any stage of his development, he has a keen and accurate self-estimate not only of what he *can* do, but of what he *can't* do—not yet at least, not until he reaches the next rung up the ladder. He also knows that he can stay in the Army until the men in the white coats come to take him off to the Old Soldier's Home and there will still be a rung he *hasn't* reached. There will always be somebody around with more experience, somebody with a new set of brains to be picked.

As many a spry oldster knows, so long as there is something fresh over the horizon, new worlds to explore, you stay young. Everybody slows down physically. There comes the day when the idea of

TRAINING SENSE



The general enthusiasm of No. 224608

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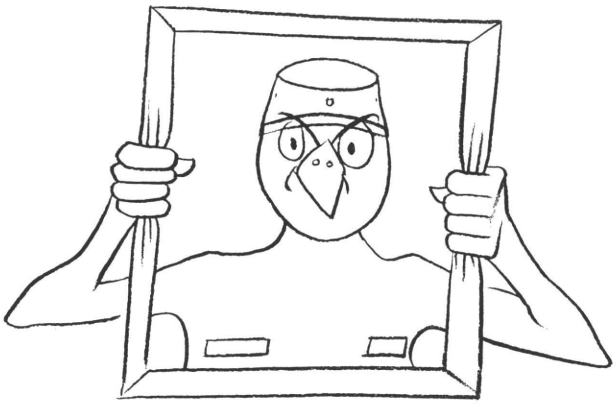

. . . or a robin going after the first worm

an evening at home with a good book beats going out on the town with the boys, but a chipper veteran always ready to learn never finds himself yearning for the good old days when William McKinley was president and the airplane was only a gleam in the Wright Brothers' eyes.

That business about an old dog not being able to pick up new tricks is one for the birds, provided the dog in question has been trained to hang on to the eagerness he had when he was a puppy. Sure, the older you get the more caution you develop, the less inclined you are to take unnecessary chances. That is part of maturity which comes with experience. The true airman, who has profited from his training and has survived to become an old dog, is as alert and as ready to absorb new learning when he retires as he was the day he had his first encounter with Smilin' Jack, his friendly instructor in basic training.

TWO TO TANGO

Some wise old gent once said the ideal school is a log with a student on one end and a teacher on the other. One thing's for sure. Despite film strips, TV, tape recorders, and other assorted electronic gear, there is still no better way of imparting information than a simple transfer of knowledge from the man who *has* the straight dope to the man who *hasn't*.

If that were all there was to it, everything would be fine and dandy and we would all wind up as human encyclopedias. But since Adam first introduced himself to Eve, human beings have had trouble putting their ideas across. Like most relationships, including marriage, tango teams, and bridge partners, the effectiveness of the arrangement between teacher and student can be good, fair, or a total flop, depending on what the people involved put into it. Put the best teacher in the world down on the end of a log and he will fail to score if the man on the other end stows his mental plant in mothballs for the duration of the class, is hostile, resentful, or just plain dumb. What is worse, indifferent students in the long run make for indifferent teaching. Prof doesn't enjoy ramming his head against stone walls any more than anybody else.

At the heart of the Army's aviation training program is its desire that its instructors be topnotch, Grade A, 100-proof *teachers*. The Army looks for and gets men who are not only expert at their trade themselves but who have a quality about as rare as purple cows—the ability to pump what they know into other people the way the attendant at the gas station puts a tiger in your tank.

Like any master craftsman, the aviation instructor is ready and willing to go to any lengths to turn out a finished product in which he can take honest pride. No two instructors are alike and no two employ exactly the same methods. Their aims are identical. Anything short of the best in a student is not enough.

If a student is properly motivated and fully understands the reasons behind the training system, he appreciates what his instructor is trying to do. He will also take into account that instructors are human beings, like everybody else. The quality of their teaching can be affected for better or worse by the man they are dealing with. If a student seems indifferent or teaching him is about as easy as opening oysters with a ballpoint pen, his instructor can be forgiven if he occasionally seems to have the disposition of a man wearing a hair shirt. Nobody can suffer in silence very long.

It hurts any instructor to know a man is not measuring up to his capabilities. The alert, eager learner is another matter. No instructor ever dis-

training is not a matter of forced feeding . . . the real learner knows how green he is and is anxious to ripen on the vine . . .

TRAINING SENSE

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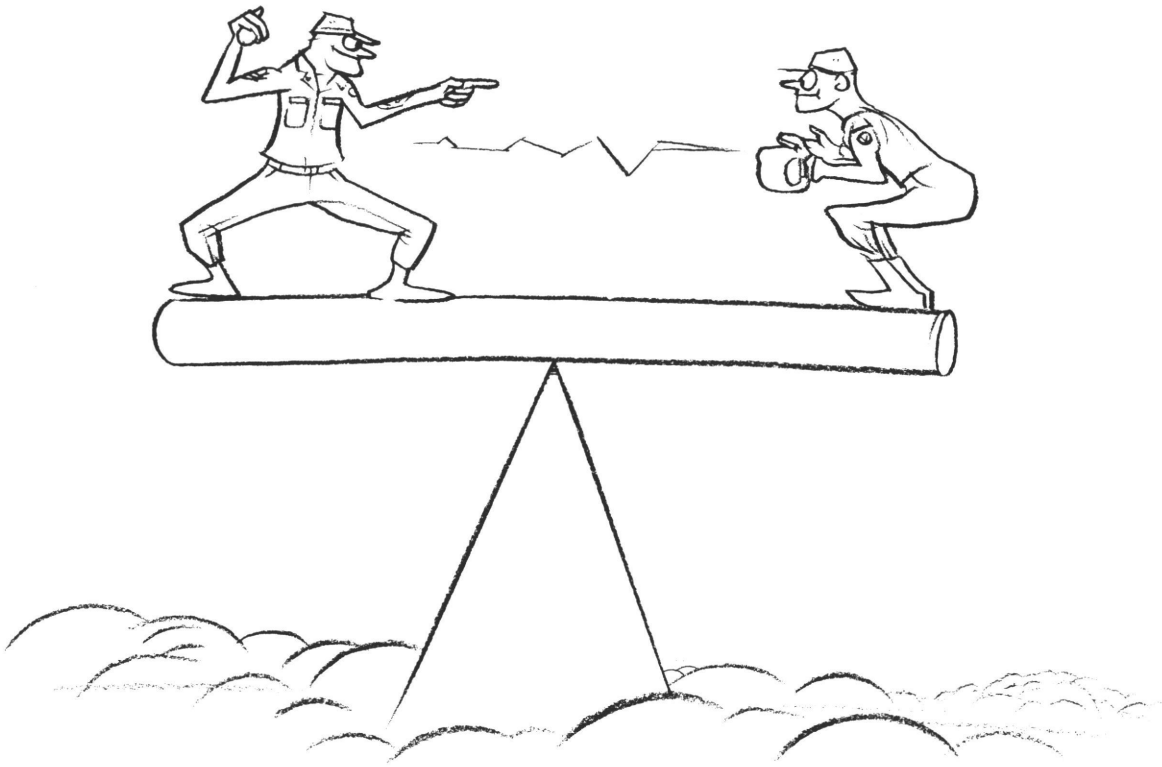
penses special favors, but there is something about a teacher-student relationship which makes things go smoother and more successfully when the man under the gun seems to know where he wants to go and how to get there by the shortest route possible. Ideas get across better. The instructor finds himself remembering things he might not have thought of if his student hadn't asked. It is a happy situation and the result is just what the Army needs and wants – an aviation specialist who has achieved maximum results from his training.

But even with his best students, an instructor never lets up on the pressure. His philosophy could be boiled down to one simple creed:

AN INSTRUCTOR MUST BE FAIR
– BUT HARD

He is supposed to test a man to the limits of his capabilities, to light a fire under him and keep it going until he has satisfied himself his boy can handle the job he is being trained to do. He never deliberately discourages anybody by deliberately throwing curve balls, either in academics or in practice. On the other hand, an instructor would be letting both his student and himself down if he left gaps, overlooked imperfections, excused mistakes, or allowed slipshod practices. Henry Ford didn't make his billions by turning out Tin Lizzies which occasionally had square wheels. You can bet your boots that every instructor watches his own assembly line with the same vigilance Henry did. If his student sometimes gets home in the afternoon with the feeling that he has got mixed up in the



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blades of a Huey, he can find consolation in the fact that some day in Vietnam or some other hot spot he may have cause to look back on his instructor as the dearest friend a man ever had.

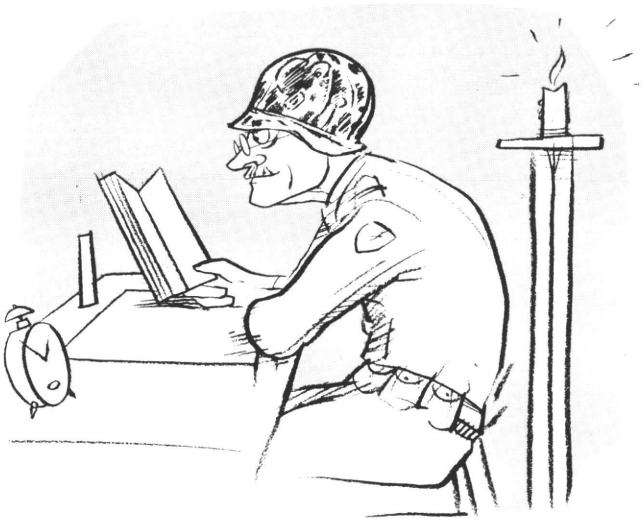
BLUE BLADE

Which brings up the point we have remarked before – training does not come to an end the day your admiring wife stands by while somebody pins a pair of wings on your chest. If Old Doc Quackenbush was still using the techniques he learned in medical school back in '01, his patients would be going around full of sulfur and molasses and dropping over with assorted ailments nobody else had had for years. Doc has kept up with the times by constantly studying new techniques, learning from fresh situations, and sharpening the skills he already knows. He may be the oldest practicing M.D. in history. He is about as rusty as a stainless steel scalpel.

What Doc knows about skills is that even after they are once absorbed they will never be fully effective unless they are

expanded,
used, or
kept on a standby alert.

Every man in Army aviation is in the same boat. When an airman stays as sharp as one of those blades they keep telling you about between rounds,



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TRAINING SENSE

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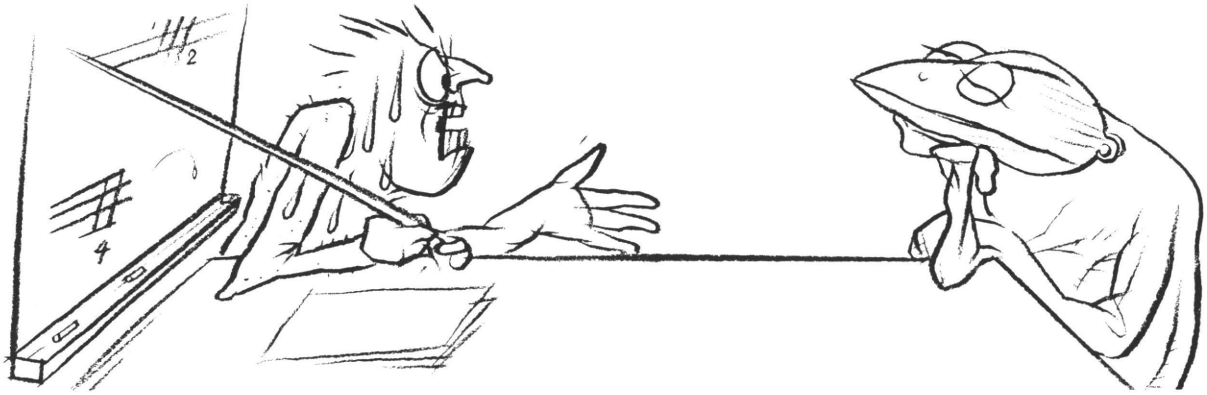
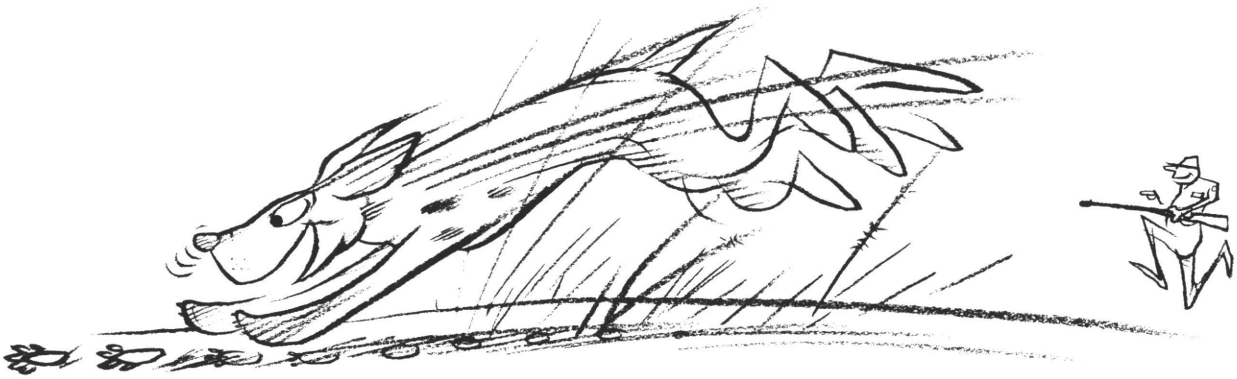


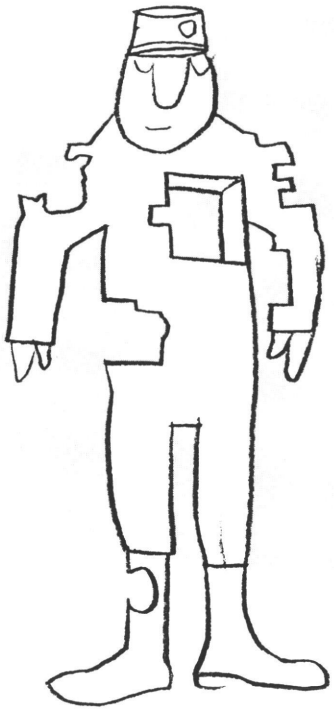
he will never be overwhelmed by a situation his training equipped him for at the beginning. It is another story for the chap who has grown as flabby as a retired wrestler.

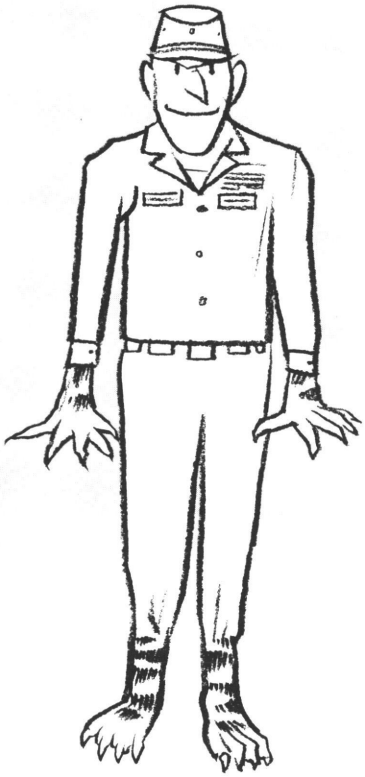
None of this will come as an astounding revelation to the men in Vietnam, where simple survival provides all the motivation anyone needs to stay at the peak of his game. In other areas where the heat is not always at blowtorch temperatures, lessons learned and skills acquired in training are easier to overlook.

The results can be disastrous. As an illustration of what failure to absorb training can do, consider the ten — that's right, ten — accidents, cost $62,000 of the taxpayers' money, involving attempts to shake or bump the gear down by bouncing it on the runway when pilots had an indication of unsafe gear in Seminoles. As every pilot who has checked out in one knows, or should know, bumping an unsafe U-8 landing gear can only result in damaging gear components, usually the gear actuator or a drag brace. Once these are on the blink, you wind up with a free-swinging gear that collapses when the weight of the aircraft is placed on it. It cannot be bumped or shaken into a down-and-locked position.

The alert, eager learner is another matter . . .







So, over a fairly short period here were these ten accidents, all caused by pilots who ignored the one correct landing gear emergency extension procedure as written down in plain English in the -10. About the only conclusion to be reached is that these chaps had either never read that part of the -10 at all or had read it and promptly forgotten it. They failed their training.

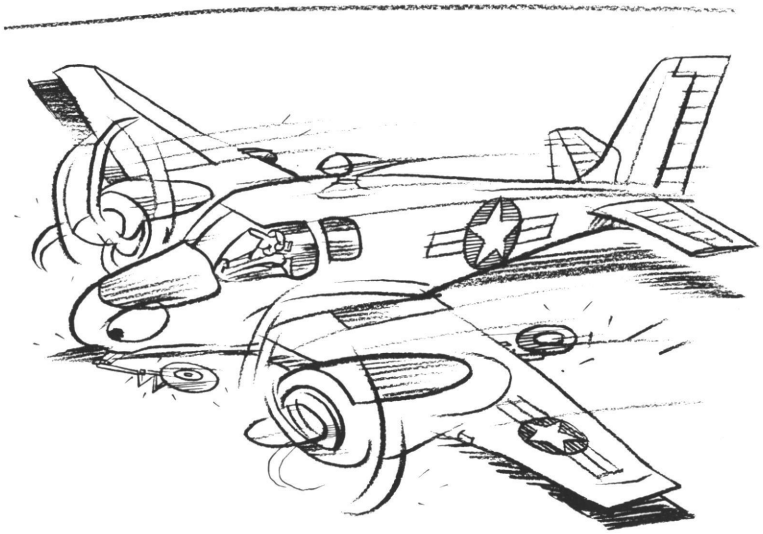
MAKING HAY

There is one golden fact for certain sure about Army aviation's training program. You will never get one thing more out of it than you put into it. In fact the payoff for slighting training, when it comes, is likely to be the kind of $62,000 jackpot our friends in the Seminoles pulled down. They were lucky, at that. It was only money.

To be sure, nobody is perfect and nobody can be expected to know everything. The human tendency to fail to learn, to overlook, to ignore, to forget under normal circumstances is so high that it is a wonder most of us survive past the ripe age of ten. The real point here is that an appreciation of training based on proper motivation, a sound attitude and a healthy respect for the consequences of failing to absorb your lessons and do your homework can narrow the gap between what you *do* know and what you *should* know. You may never

. . . an instructor would be letting both his student and himself down if he left gaps, overlooked imperfections, excused mistakes, or allowed slipshod practices . . .

TRAINING SENSE

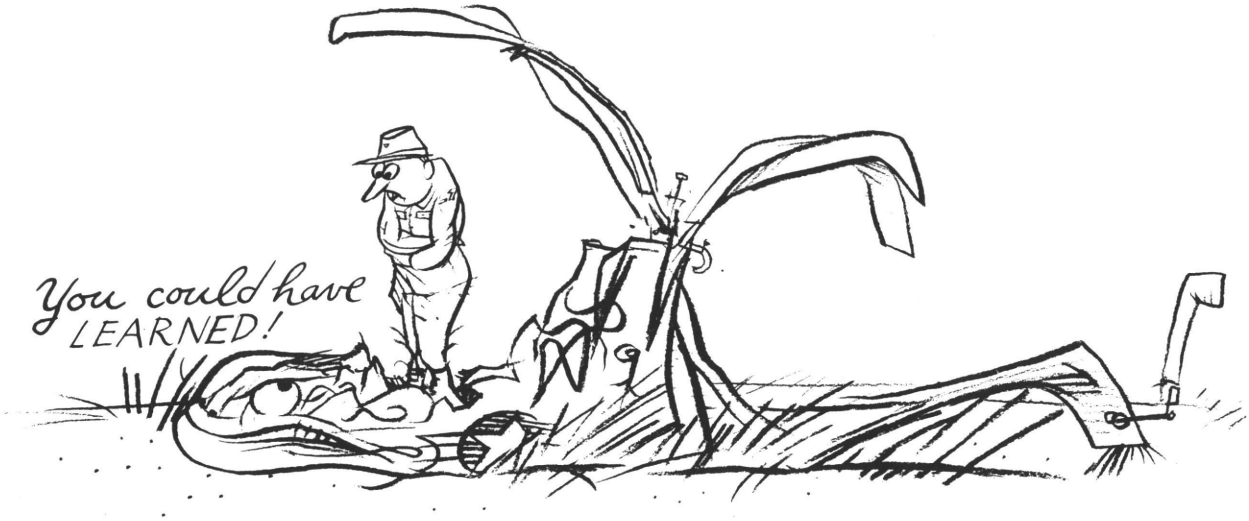


Failure to absorb training caused ten accidents costing $62,000 in bumping unsafe U-8 landing gear

catch up all the way, like greyhounds chasing rabbits at dog tracks, but you will finish several furlongs ahead of where you started. With the right attitude, you never tire of learning. The greyhound probably knows by now he will never catch the rabbit. He goes on chasing it just the same.

In the end, it is a matter of self-discipline. If an aviator ever finds himself sitting in the middle of a junkheap that used to be a perfectly good aircraft, he can never console himself that he missed training for the emergency because he did not have the opportunity. The fact is that the opportunities are all around for the man who wants to take advantage of them. The first instructor who takes him in tow regards him as a special challenge to be developed to the hilt. Later on, IPs are always available to help him add to his skills. There is enough reading material available to cram the Library of Congress. Unit commanders make sure every aircraft has its -10 handy for easy reference. The machinery exists, ready to be used at any time, night or day.

Let's face it, the extent to which you use it depends in large part on you — you will be as qualified as you need to be, and then some, in your particular aviation job *only* if you know what you want and are determined to get it. Training may be tough and sometimes tiresome. To the real professional who is out to be tops in his trade, it is more than worth the price of admission.



NOTICE!

PLEASE DON'T SHOOT OUR CHARLIE!

THE SECOND platoon of the 74th Aviation Company, 145th Aviation Battalion, has a VC "friend" named Charlie. He lives about 2 kilometers off the end of their runway at Duc Hoa. Charlie is a nice sort of fellow except for one bad habit – he likes to shoot at airplanes!

For the past year Charlie has fired some 300 rounds at the 74th's 0-1 observation aircraft as they land and take off from Duc Hoa. To date he hasn't hit one!

At first the irritated pilots shot back, but were never able to pinpoint his position. As Charlie's impressive miss record began to swell, he was soon ignored by all and life went smoothly. He would shoot and the pilots would take some sort of evasive action to give Charlie a thrill.

Then one day it happened. Charlie missed an 0-1 so far he inadvertently hit an armed helicopter from the 197th Aviation Company. The pilot, being new to the area, was unaware that it was all an accident, so he turned his rocket-bearing helicopter on Charlie and returned the fire. Fortunately Charlie escaped with minor injuries.

Now the pilots who live and fly out of Duc Hoa are asking transient chopper pilots not to shoot their Charlie. The VC may replace him with someone who can shoot straight!

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