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UNITED STATES ARMY AVIATION DIGEST

THE UNITED STATES
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FORT RUCKER, ALABAMA

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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.

Manuscripts, photographs, and other illustrations pertaining to the above subjects of interest to personnel concerned with Army Aviation are invited. Direct communication is authorized to: Editor-in-Chief, U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Alabama.

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For explanation of abbreviations used, see AR 320-50.

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The War Between the Branches

Colonel William G. Van Allen, CE

IT WOULD BE AN exaggeration to say that a civil war is raging in Army Aviation, but it is fair to state that there is an insidious competition among those branches of the Army which have an interest in Army Aviation. This deep-seated competition is aimlessly trying various approaches to the same end goal: central control of Army Aviation, in lieu of the present "coordination" of the loosely knit confederation of seven branches to which aviators are now assigned.

This struggle for Army Aviation is actually one of the most serious organizational problems we face in the next several years. It is more than friendly competition; it is a struggle for power—the power to control all Army Aviation. Like most struggles for power, it is having harmful effects. In this case it is hampering the proper development of the mobility which the Army needs so critically.

So far the war has been a limited one, confined to the Transportation Corps on one side and the three purely combat branches, Infantry, Artillery, and Armor, on the other.

The only overt actions have been attempts to redesignate the helicopter companies as branch immaterial rather than Transportation.

The branch-immaterial arguments for such a redesignation are:

a. These units are tactical units, not service units, and should be identified with the combat arms. This view stems not only from the DA policy established by letter on 18 June 1954 but also from the actual tactics, techniques, and doctrines applicable to these companies.

b. The logistical function of these units is being overemphasized at the expense of their primary function of tactical support.

c. It is considered of paramount importance that the officers assigned to tactical helicopter units fully understand and appreciate the tactics and techniques of infantry, armor, and artillery. It is equally important that the combat arms develop in their assigned aviation officers an understanding of the capabilities and operational characteristics of helicopter units.

d. The present and proposed helicopter companies can be redesignated as branch-immaterial aviation units within existing policy without any expenditure of Army resources.

e. The redesignation of these units will materially increase their operational usefulness by providing a broader base of command, combat experienced personnel from which their officers may be obtained, and by integrating the units themselves in the combat echelon of the Army.

Colonel Van Allen was Chief, Operations and Requirements Div, Office of the Director of Army Aviation, ODCSOPS, at the time this article was written. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.—The Editor

The opposition to such a redesignation is based on the premise that the primary role of transport aviation, including helicopter companies, is to provide priority transportation for the responsible ground commander. The transportation provided by these units might be for troops or for cargo and might be performed under either tactical or nontactical conditions. The fact that such units will frequently carry combat elements onto the battlefield or that vehicles in these units might be armed for their own protection en route does not invalidate their logistical basic role. Thus, it is reasoned, their assignment should be to the Transportation Corps.

Whatever the final decision may be, the important consideration is not what these helicopter companies are called but that they retain their combat flavor. The real value of Army Aviation lies in its ability to improve the combat capability of the Army. The usefulness of Army Aviation during peacetime by providing administrative transportation is only a byproduct which should always be subordinate to training for combat and maintenance of a high state of combat readiness.

The foregoing schism is cited to highlight the danger to Army Aviation at a time when the Army has a critical need for the mobility and observation which aviation alone can provide. To state the problem concisely: the progressive development of Army Aviation is taking second priority to the determination of who shall control Army Aviation.

It is important that all Army Aviators understand the potential danger of continuing this "civil war." It is high time they awaken to the necessity of consolidating their common interest in flying and working for the *over-all* development of Army Aviation. Even though it is easy to point the finger of blame at another aviation activity, we should forego such egotistical action and strive instead to help improve the situation by sympathetic understanding. Instead of an attitude of letting the maintenance activities "stew in their own juice," every effort must be taken by Army Aviators in the operational field to reduce the maintenance and supply problem.

Some specific actions which operating personnel can take are:

a. Advise, on a timely basis, maintenance and support activities of new or changing operational requirements.

b. Program operations to the extent necessary to avoid breakdown of those support activities which cannot be expanded because of shortages in funds or personnel. This means emphasis in tactical units on availability of aircraft rather than utilization.

c. Consider aviators of *all* branches as first-class citizens. Work for aviation first, confining branch loyalty primarily to ground duty in those branches.

d. Remember that Army Aviation belongs to the Army and not to a single branch. We must fight, not for control, but for a comradely expansion of aviation which will enhance the *combat potential* of the Army.

LEBANON REPORT

Mobility Through Helicopters

Philip S. Bergman

WHEN THE UNITED STATES ARMY organized the American Land Forces Aviation Section for service during the Middle East crisis in Beirut, Lebanon, it made history.

With less than 300 men, 82 of them pilots, and 45 mixed aircraft, the Task Force 201 unit cast a new mold for organization and performance in Army Aviation. Their record, according to Lt Col Lester McCants, commander of the section, may well prove that, "by fitting the mission with the aircraft, you can get greater flexibility and operating capability out of available resources and thus accomplish the Army's goals more effectively."

After the U. S. Forces were alerted for service in Lebanon, ten Choctaws anxiously whirled into the sky above Augsburg, Germany in an attempt to reach the *USS Corregidor* off the coast of Brindisi, Italy. The trip was to be a long one, 1,084 flight miles, with 7 refueling stops. At an average speed of 80 knots, they flew the route in approximately 12 hours spread over 2½ days.

Their route went from Augsburg, Germany; to Mulhouse, France, to Lyon, to Cannes; to Pisa, Italy, to Rome, to Naples, to Brindisi; and finally to the aircraft carrier which was lying off the coast of that city. At that point, all ten aircraft were packed away for the sea voyage to Beirut. Not a single major mechanical failure marred the trip.

The American Land Forces Aviation Section controlled more than just the Choctaws. For the first time in the history of U. S. Army Aviation, a unit with seven different types of aircraft organized all of its talents and capabilities into a well-coordinated unit and thrust them into an emergency situation. In Lebanon they did not operate as they did in World War II and Korea, where they were considered as more or less separate entities, but as a consolidated organization capable of effective operation 24 hours daily.

According to Major Otto W. Huebner, the 24th Airborne Brigade Aviation Officer, the organization of the American Land Forces Aviation Section represents a great stride in the field of military air. Regarding helicopter flight he said, "Now we have proven that the chopper gives a unit flexibility, and therefore it must continue to be an integral part of U. S. Army operations, coordinated in a

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Mr. Bergman was an Information Specialist with the Office of the Chief of Information, American Land Forces, Middle East, in Beirut, Lebanon, during August and September 1958. Upon completion of his military service in November 1958, he resumed his civilian newspaper career. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.

—The Editor

manner similar to that accomplished here."

TROOPS MOVED

The aviation officer explained that during recent operational procedures it was possible to transport large numbers of troops from area to area, regardless of terrain—"and this is something we couldn't do in Korea."

Landing in a rice paddy isn't quite the same as setting a whirlybird down on the sandy hills of Beirut, and you can't use the same methods.

HOVER OR RUN

The two standard procedures for landing the chopper were: bringing the aircraft to a hover over the intended landing spot, then lowering the helicopter gently to the ground, or continuing the approach all the way to the ground without bringing the aircraft to a hover over the point of intended landing. In Korea it was possible to land by either method, but preferably by hovering. However, in the heavy sand and dust areas of Lebanon, this was virtually impossible.

If a pilot were to attempt this type of landing there, he would quickly find that rotor blades and engine would be smothered with sand and his visual reference lost, ending in probable destruction of the aircraft, and possible injury or death to the passengers and crew.

QUICKER THE BETTER

Due to this concentration of dust and sand, the aviators found it advisable to make the the fast approach or direct landing. In this method the pilot picks a spot from a distance and makes a continuous approach to the touchdown point, without bringing the aircraft to a hover over the point of intended landing.

Photo courtesy STARS AND STRIPES

Supplies are unloaded from helicopter for unit in field

As a result of the turbulence, strength, and changeability of the winds in Lebanon, crosswind landing was often necessary. The solution, the commander found, was to ensure the pilot's knowledge of the terrain and capabilities of the aircraft.

Another essential difference between chopper flying in Korea and Lebanon is in the field of communications. With radio equipment built into the aircraft for contact with ground troops and control, the helicopters could be diverted or alerted to positions, depending on the situation. Prior to this innovation, it was necessary to carry ground radio equipment as extra baggage and use a "catch-as-catch-can" method. This advancement also made for greater flexibility within the unit.

Colonel McCants pointed out that one of the more serious problems encountered by his pilots was due to the unique

U. S. Navy Photo

Beaver takes off from Navy carrier Corregidor

situation in Lebanon and the peculiar terrain characteristics of Beirut's limited area.

"Each of our pilots had to be extremely cautious, calculating, and exact in his work. Errors on boundary violations could lead to international incidents. This was also true of sections within Beirut in which rebel bands were concentrated." Each of the crewmen was thoroughly oriented on the topographical and geographical area peculiarities, in addition to the elements of coordination needed between ground and air units.

With proper use of the unit any member of the American Land Forces in Beirut could have been evacuated to hospital facilities in less than 15 minutes. The group used five Chickasaws, with a staff of seven Army Aviators, each well qualified as first aid men.

In addition to the ten Choctaws and the five Chickasaws, the Aviation Section had five Sioux, three Beavers, seven Otters, seven HRSs (H-19 Marine), and eight Bird Dogs.

Included with their nearly 400 flights and transport of more than 300,000 lbs of supplies was a heavy schedule of reconnaissance, photo, command support, evacuation, troop resupply, sling transport, and radio relay.

While the American Land Forces were "keeping 'em flying" through their Aviation Section, the unit also advised the Joint Staff and Commanding General of the capabilities and limitations on all matters concerning air, scheduled the aircraft activities, supported the ground troops, maintained a pilot's training program, and arranged and supervised the building of the only heliport within the city limits of Beirut.

The Polished Product

CWO Fred O. Bell, TC

THE READY ROOM squawk box broke the suspense of the horse opera on the TV set: "The CO wants two volunteer 'copter pilots to report to him immediately for an early morning low-level cross-country flight." As a hot pilot from the old school, I shook my copilot out of sound sleep and we headed for the Old Man's domain.

"The people up at the Head Shed want to know if we can fly a chopper at treetop level from one point to another," said the CO, "up to distances of 100 miles."

This, I figured, was right up my alley. Then he added, "You'll use only a DG and a magnetic compass." This shook me for a moment but, undaunted, I told him we'd bring it through.

My copilot was fresh out of 'copter school, so I told him to navigate and I'd fly the windmill.

ROUGH COURSE

At the briefing we found that our course was from a crossroad to a ridgeline 75 miles away. Now I've seen some rare courses plotted in my time, but this one should have been extinct.

The first 30 miles were straight as the crow flies, over some of the roughest terrain I ever saw, to a bend in a creek. The last 45 miles were to a saddle on the ridgeline. Adding insult, they also changed the direction of the last leg 100° with altitude restricted to treetop level. With this information, my able navigator proceeded to plot the course while I caught up on some sacktime.

Promptly at 0500 hours the following morning we pulled pitch and headed north to the initial point which was 20 miles away. Luckily, we could fly at any altitude until reaching the crossroad, then we went down on the deck for this simple test of skill.

I said we were lucky because there was a little ground haze around 100 feet which hindered our visibility; so we climbed above it.

MISSING CHECKPOINT

After cruising along at 70 knots for a while, my CP said we should be near the IP. A quick check on the DG told me I was on course, but no crossroads were in view. So we proceeded on our heading and soon flew over a river. Realizing we had overshot the IP, I asked the CP where we were. Blithely, he told me to do a 360 so he could get his bearings. After completing the turn, he cheerfully informed me we had flown completely off the map. I immediately picked up a course to take us back south near the IP. Recrossing the river, the haze seemed to be getting heavier and lower, but we were still well above it.

DISAPPEARING ROUTE

Some five minutes later I noticed we were passing over a

CWO Bell is an aviator in the 33rd Trans Co (Lt Hel), Fort Ord, California. He wrote this article while instructing in the Department of Rotary Wing Training, USAAVNS, Fort Rucker, Alabama. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.—The Editor

highway and brought it to my navigator's attention. He promptly ordered a 90° right turn and added, "Follow the highway until we come to the crossroads." We followed the highway until it disappeared into a tunnel in a mountain.

Now I knew that the route from the crossroads didn't cross any mountains, so I put this question to my buddy in the other seat: "First we lose the crossroads, then we lose the highway; what gives?"

His ready reply, "Let's go back to the field and start all over."

"Now," I reflected, "this is a good solid decision, but how do we get back to the field when we don't know where we are?"

On this question my old pro shrugged and advised, "Simply tune in the loop until we get a null and bore on in." That sounded good to me. I watched him tune in the LF station near our field and rotate the loop until we got our null.

He folded the map, put it away, and nonchalantly lit up two smokes. We sat back to enjoy the return trip.

After 30 minutes of flight with no field in sight, I rotated the loop a few degrees and, lo and behold, no sound. Right then I suspected the terrible truth, but I forced a casual tone in asking, "You ever operated a loop antenna before?"

He hadn't; and about all I knew was that when you rotated the loop, music came in more clearly. I made a 180° turn and started back—to where, I didn't *exactly* know.

About then I checked our fuel. We still had 500 pounds—enough for an hour's flight. The short hair on the back of my neck began to creep. We'd been in the air nearly an hour already, and we were off course at that. I finally decided to call our tower and get a practice DF steer. With little or no effort, they obliged and started to transmit headings.

The first one brought us back to the river, and now we had a fog bank lying as far as the eye could see in front of us. I called the tower and informed them we would like to get below the fog. Getting a quick affirmative, we let down to about 100 feet and continued to steer the headings they gave us. The fog was soupy, but by looking straight down we could identify objects.

A quick check of our fuel pulled my stomach muscles into a knot—100 pounds of fuel left and no airfield! I glanced at my heading; I was off course. I looked at my artificial horizon; it had the attitude of a cocked hat. My airspeed was 90 knots.

"Do something, old pro," I said to myself. "Ease off on the airspeed; get the bar back where it belongs. What was that heading? Holy Cow! What was that we just missed?"

The tower operator's calm voice broke through, "No need to ram the buildings; just set it on the ground."

I did just that. Sure enough, our friend in the tower had brought us home.

Nowadays, you don't smell gunsmoke, or hear loud snores and the riffle of pasteboards around the ready room. We're having ground school on aerial navigation and basic instrument flight.

Publications Help

'Keep 'em Flying'

Russell O. Hucker

THERE WAS A TIME when pilots flew their planes "by the seat of their pants."

Now modern instruments have almost replaced this pioneer "gauge," so today's pilot must spend long hours in learning "the book" before he can fly.

The same is true in maintenance. There was a time when the maintenance man was graded by his ability to fabricate needed parts "on the spot." Some mechanics were admired because they were able to patch the aircraft with baling wire. Now all use "the book" as a constant maintenance guide.

What is "the book"? Who writes it? What is its function?

Answers to these and other questions will explain why the Army spends thousands of man-hours and millions of dollars "bird-dogging" the answers to maintenance problems and putting these answers in "the book" so the maintenance man in the field has at his command the know-how of the best maintenance men in the business—inside and outside the Army.

THE HOW OF IT

Here's how the system works.

One balmy day, a helicopter materialized out of the fleece-lined blue sky and descended gracefully to an Army airfield. The huge machine settled to earth and the pilot "cut" the engine, allowing the blades to rotate to a stop.

Out stepped the pilot. He returned the salute given by a ruddy-complexioned sergeant who was anxiously awaiting the return of his chopper.

"How was the flight, Captain?" inquired Sergeant Joe Doaks, the craft's crew chief, who was holding some printed matter in his left hand.

"Pretty good, Sergeant," was the reply, "but this 'copter could stand some rigging of the tail rotor controls."

"OK, Sir, we'll check the rigging immediately," replied Sergeant Doaks. "Incidentally a TM just came in which calls for the installation of redesigned tail rotor blades on the Choctaw."

"Good deal," the captain remarked. A smile of satisfaction crept over his face. "I was hoping we'd get instructions to re-

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Mr. Hucker is an editorial clerk with the Directorate of Administration and Personnel, Printing and Publications Division, U. S. Army TSMC. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.

—The Editor

place those blades. When does it call for the work to be accomplished?"

Sergeant Doaks began scanning page 1 for the familiar phrase, "When work will be accomplished."

The captain and sergeant were speaking in a vernacular very familiar to airmen. It was indicative of long years of service, years which not only increased their vast knowledge of aircraft maintenance, but also made them prime examples of the best men to be found in Army Aviation.

Upon finding the requested information, Sergeant Doaks read it very carefully and then called to the captain. "Sir, it says that the work is to be done upon receipt of the redesigned blades, which are to be issued when the supply of the present blades has been exhausted."

"OK, Sergeant," answered the captain. "How is our supply of blades?"

Without hesitation, Sergeant Doaks replied, "Just have four more on hand, Sir."

"Good. Let's order some redesigned blades right away. But first, check the records on this chopper and let me know how many hours those tail rotor blades have been used. You know, the limit is 100 hours."

"Yes, Sir," and a snappy salute came simultaneously from Sergeant Doaks. He left to carry out the captain's orders. Checking the aircraft records, he found that, including this flight, the present tail rotor blades had been used for 89 hours. He relayed this information to the captain, and then listened to his instructions.

"Keep a close check on this chopper," said the captain, "and change the blades as soon as the 100 hours have accumulated."

His orders were followed explicitly. Redesigned blades were requisitioned and installed per TM 1-1H-34A-539, which provided for the current blades to be replaced with blades that would extend the service life and eliminate the frequent replacement now required, thus reducing maintenance time.

The foregoing illustrates just one method in which publications are used in the maintenance of Army aircraft. To further understand this program, let's find out more about this printed matter referred to as a "TM."

INSIDE THE TM

TM is the abbreviation for Technical Manual. Technical Manuals are defined as publications which provide instructions on items of equipment, such as: initial preparation for use, operational instructions, maintenance instructions, overhaul instructions, parts list or parts breakdown, and other related technical information or procedures.

In the case of the aforementioned TM 1-1H-34A-539, the original tail rotor blades were the best designed blades available when the helicopter was manufactured. But frequent necessary replacement of those blades proved quite costly; so, after extensive research, the blades were redesigned.

"Time Compliance" Technical Manuals may call for immediate accomplishment of work or compliance by a certain time.

In addition to time-compliance factors, technical manuals contain written material explaining the step-by-step procedures, with drawings and figures to fully illustrate the instructions. Also contained are data showing just what parts are needed and how they can be requisitioned.

HOW TM'S ARE MADE

Technical manuals come into being either by conversion from Air Force Technical Orders or initiation within the Army itself. Authority to convert technical orders into technical manuals, as well as to write original technical manuals, has been delegated to the Chief of Transportation, and in turn to the U. S. Army Transportation Supply and Maintenance Command in St. Louis, Missouri.

The Directorate of Engineering at U. S. Army TSMC is responsible for careful scrutiny of Air Force Technical Orders and their revision for Army application. However, in some cases to get "the book" to the field quickly, technical manuals are only reprinted as an Army publication. Technical manuals initiated by the Army are written by technicians of that directorate. Both types are then forwarded to the Directorate of Administration and Personnel, where they are edited to comply with Army Regulations concerning format. They are then printed and distributed to all echelons of Army maintenance which they affect.

VARIETY OF BOOKS

The term "the book," mentioned at the beginning of this article, does not refer to just one publication, but rather to a very large group of various types of printed material. While technical manuals are a very important and integral part of "the book," these publications alone could not "keep 'em flying."

Each type of aircraft has several handbooks applicable to operation, maintenance, and overhaul of the aircraft and its components. Some of these are: Flight Handbook, Maintenance Instructions Handbook, Structural Repair Handbook, and Illustrated Parts Breakdown Handbook.

Supply and requisitioning procedures are prescribed in Army Regulations. However, maintenance activities must also utilize various Supply Bulletins, Supply Letters, Technical Bulletins, and Supply Manuals; these publications further clarify Army Regulations, or furnish additional information. Technical Bulletins disseminate various technical procedures; Supply Bulletins and Supply Manuals delineate supply and requisitioning procedures. Some of these publications are printed in Washington, D. C.; however, many of them are initiated by U. S. Army TSMC.

SUPPLY LETTERS

Supply and requisitioning is a complex system under the control of the U. S. Army TSMC. To ensure that all maintenance activities, within its logistical responsibility, receive the parts they need, U. S. Army TSMC publishes supply letters, when required, to implement other publications, clarify procedures, or disseminate pertinent information relative to supply.

All of these publications represent the combined efforts of the various directorates of U. S. Army TSMC with the Directorate of Administration and Personnel.

The foregoing publications are important in improving Army aircraft maintenance, but they do not complete the picture. There is still another important publication which is vital to Army aircraft maintenance.

UER PROGRAM

Realizing that the men closest to the equipment are the ones most likely to note defects and deficiencies, the Army has initiated the Unsatisfactory Equipment Report (UER) program.

Defects and deficiencies may occur at any time. In many cases, corrective actions are not covered in any applicable publication. Therefore, anyone discovering defects or deficiencies can take advantage of this program and forward a UER to U. S. Army TSMC. This report gives a brief and detailed account of the difficulty and requests corrective action.

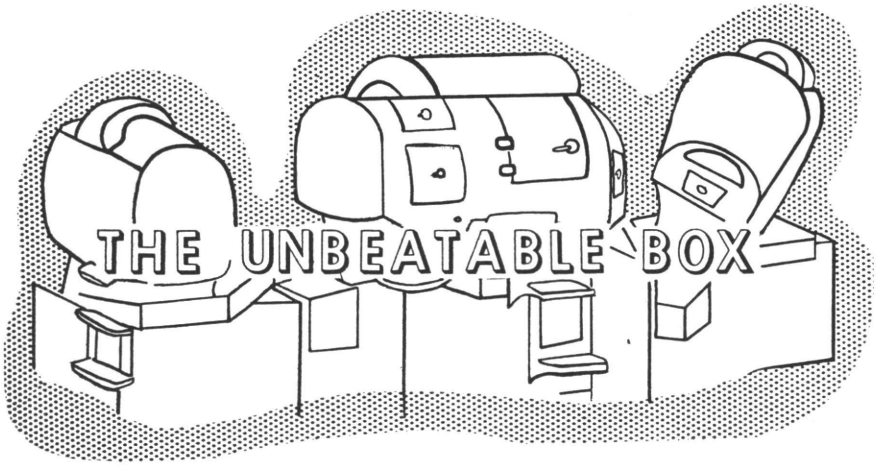
Through its facilities, U. S. Army TSMC analyzes the difficulty and the cause, and then determines what corrective action should be taken.

This UER, plus all others received during the preceding month, results in the publication of an *Unsatisfactory Equipment Report Digest* in the TB AVN 23-5 series distributed to all maintenance activities of the Army.

In this manner, all such activities become familiar with difficulties encountered during the preceding month, along with causes and recommended corrective actions. Therefore, not only does the reporting activity receive the requested information, but all other activities are made aware of these difficulties.

The *Unsatisfactory Equipment Report Digest* is a cooperative effort whereby all maintenance activities assist each other, through U. S. Army TSMC, in the successful maintenance of Army aircraft.

The importance of publications in the Army aircraft maintenance system cannot be overemphasized. But there is another equally important factor which should not be overlooked. That factor is the cooperative effort of all personnel concerned, both military and civilian, who have a part in the many steps necessary for publication and distribution of "the book" that "helps keep 'em flying."



Lieutenant Calvin A. McGee, *Inf*

HOW MANY TIMES during your career in Army Aviation have you heard the expression, "that thing has me whipped," when referring to the Instrument Flight Trainer, more commonly called the Link?

The concept of teaching man to fly an airplane in a trainer that never leaves the ground—which today is called simulated flight—began in the early 20s as an idea in the mind of Ed Link. The first Aviation Trainer, as it was called, was introduced in 1929 and was basically a preflight trainer with no hood and a very limited panel of instruments.

Except when undergoing a formal course of instruction which requires him to obtain a certain amount of time in the Instrument Flight Trainer, many pilots steer clear of the "idiot box." This is a tag unjustly hung on the Instrument Flight Trainer. It is a valuable piece of equipment to both noninstrument and instrument rated pilots.

VALUABLE AID

Where else can you stall out or spin in from an altitude of 100 feet or less with no more disastrous result than knowing that if you had been in an actual aircraft, it may have cost your life? Where else can you receive the personal instruction and con-

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Lieutenant McGee is presently attending the Advanced Infantry Officers' Course at Fort Benning, Ga. He wrote this article while instructing in the Department of Fixed Wing Training at the U. S. Army Aviation School, Fort Rucker, Ala. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.

—The Editor

stant correction afforded by a good instrument flight trainer instructor? Where else can you trace your exact ground track with a line, get out of the ship, recognize and discuss your mistakes? Where else can you fly for hours with the full benefit of instrument flying and not use an ounce of gas?

There is only one place where all of these advantages, and more, may be attained—the Instrument Flight Trainer. Ask any instrument rated pilot and he can point out the many advantages of a well-rounded instrument flight trainer program.

TAKE TEN

Army Regulations specify that 10 hours of instrument flight simulator time may be logged against your 20 hours annual instrument requirement. This should be taken as a bare minimum and not a maximum. A good instrument flight trainer program is as valuable to a pilot as flying hood time. There may be a tendency on the part of many pilots who are "buddy" riding under the hood to raise the hood and fly VFR if anything goes wrong. These small difficulties are a part of instrument flying and should be resolved as they arise—not put off until the air smooths out, or until another time.

Under actual instrument conditions, it is too late to iron out these trouble spots, and there is no lifting the hood or coming out of the weather when the going gets rough. These problems should be cleared up in the Instrument Flight Trainer with the assurance that you have a competent instructor sitting at the desk just outside the trainer to give advice and directions when necessary. Techniques may be practiced, and any "bugs" in your flying can be cleared up with full confidence that there will be no dangerous mishap.

ALL WEATHER

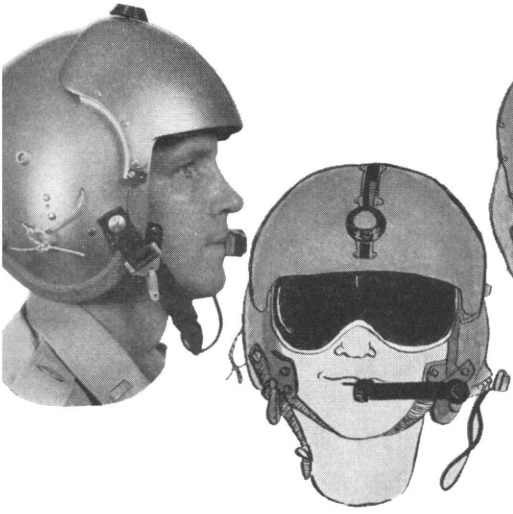
The Instrument Flight Trainer is truly an all-weather trainer. When the weather is so bad that a Type 1 instrument rating is required for takeoff, the flight simulator may still be flown to attain the much needed practice. However, because of its intricate mechanism, a constant temperature must be maintained in the building.

The new improved type 1-CA-1 trainers are being used for pilot training at the U. S. Army Aviation School and in each army area. The 1-CA-1 trainer is far superior to the 1929 version, and even to the ANT-18 which it replaces. With the new devices incorporated in this trainer the pilot can receive more realistic indications from both instruments and radios. These devices include automatic Omni, ADF, and LF indications. Also rough air may be introduced for realism in training. This rough air is not as turbulent as you might encounter in a thunderstorm, but it will give you a basic understanding of how to handle the aircraft in rough air. These are but a few of the improvements in this new trainer, and further improvements are being made.

CONFIDENCE BUILDER

Except for solo IFR, where else can a pilot better build confidence in his ability than in an

(Please turn to page 24)

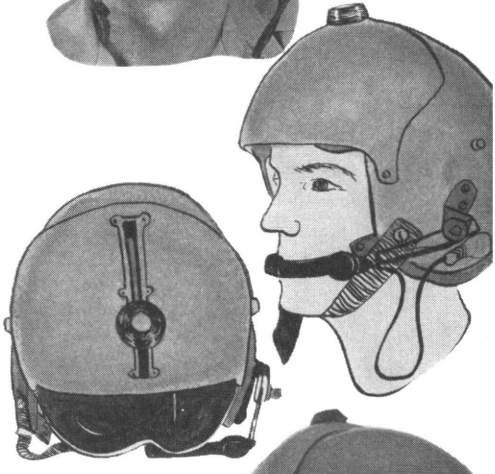


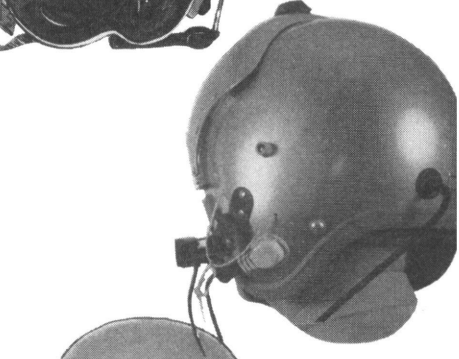
NEW HELMET

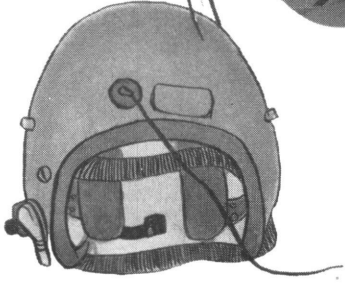
The APH-5 helmet recently adopted by the Army grew out of research and development, testing by field activities, and modifications based on specific question-and-answer comments from users. The problem was to get a helmet capable of ultimate protection and yet comfortable. Sounds simple, but surprising differences in head shapes prevented a simple solution. The APH-5 solves this problem through its 3 sizes—small, medium, and large—and the set of 6 different sponge rubber pads (replaceable) that ensure individual fit. Fitting techniques were developed to accommodate those knobs and bumps peculiar to every skull.

The earcups are adjustable and exert an even pressure all around the ear. The special housing for the transparent visor, which protects it from scratches, requires a double thickness for the front of the helmet. This provides additional protection for the forehead and front part of the skull, an area which accident statistics prove to be particularly vulnerable to injury. The visor is also a good indicator of a proper fit. If it extends beyond the nose or rests on the nose, the helmet is improperly fitted.

Delivery of these helmets to Army Aviators is expected to begin in March at the rate of 3,000 per month.







MY AMATEUR FRIENDS

Captain Theodore S. Ferry, *Arty*

SOME OF MY BEST friends are amateur Army Aviators. They are all fine fellows, and I wouldn't trade them for any other friends. These men pride themselves in being real professional type soldiers (troop duty, advanced schooling, staff MOS, etc.).

Give one of them a staff study to do or Infantry company to get in shape and the working day will see no end. He'll burn the midnight oil and skip church on Sunday. But ask him, "How about a little night flying to keep our proficiency up?" This makes the professional turn amateur like a chameleon changing colors. Excuses flow like wine at an Italian wedding.

The same applies to instrument flying and review of fundamentals. He likes flying and flying pay, but seems to think it doesn't really deserve any extra effort on his part.

PRO WANTED

The professional approach to Army Aviation has never been as important as right now. Larger, faster, more complicated aircraft; transportation and maintenance problems; all-weather capability; atomic concepts; and a host of other things all create a need for professional type aviators. This applies to associated ground problems such as communications, weather, and logistics. As aviation gets more complicated, it becomes more difficult and requires more of our time to maintain a professional approach.

Since most flying jobs in aviation do not require a field grade officer or a captain, the desk-type aviator predominates after one passes the lieutenant ranks. This is where the problem grows. Lieutenants don't present much of a problem. They are young and "gung ho," and, generally, can devote themselves to flying. It's the older, balder, types who slip so easily into the amateur class. You've heard it often: "I can't get away from the desk." . . . "Uncle Sam doesn't pay me to fly after regular working hours." . . . "I have my four hours in. That's all I'm sweating." They go on and on in like vein.

HOW-TO-DO-IT

Flying is an art and a science. Being a good professional pilot calls for hard work, detailed study, and extensive practice. Attaining 100 hours flight time a year and passing the annual

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Captain Ferry was formerly a staff member of U. S. Army Board for Aviation Accident Research. He is now en route to a Far East assignment. He is a Senior Army Aviator, a veteran of 16 years of military flying, with approximately 5,000 flying hours. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.

—The Editor

Memo from Flight Surgeon

ARE YOU FIT TO FLY? Every Army Aviator should ask himself this question. If the answer is yes, fine. If your physical condition is average or above, you will want to remain that way; if not, you should take corrective action, so read on.

Sitting behind a desk and sitting in the cockpit of an airplane require a similar basic physical fitness. Both demand a minimal amount of muscular activity and expenditure of energy. Circulation and respiration must be functioning, along with a certain amount of muscular effort, to accomplish this simple procedure, but only in a moderate manner.

DESK OR PLANE

Here the comparison ends, because once the pilot prepares for his flight he becomes active both mentally and physically to accomplish his takeoff, become air-

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written examination will not guarantee professional stature unless a systematic plan is followed. That's just enough to keep a man in the Army Aviation league as an amateur. The professional reads every book that he can concerning flying. He listens to other professionals and flies as skillfully as he knows how. Being a professional calls for advanced schooling, thought, and reading — the same as for the ground soldier.

If you are a four-hour-a-month amateur, and if you'd like to attain professional standing, here are some tips that will help you: Read all the aviation periodicals you can (that's no excuse! subscribe to them!). Get your own copy of the "dash one" for the aircraft you currently fly. Put it on the table beside *Life* and *Playboy* and read it as often. If you're desk-bound, forget golf for one Sunday a month and get as sharp with the aircraft as you are with a nine iron. When you fly in field-grade moonlight, try to hit those check points exactly on ETA. Practice short field work. You'll be surprised how rusty you can get. Cross-country hood flying in good weather is easy; anybody can do it. Instead, try some tight approaches and work up a little sweat.

THE PAYOFF

Hard work? Longer hours? You bet it is! But it will pay off. Being a professional in Army Aviation is life insurance for you, and just what the Army needs.

See you for cards and beer tonight?

Say, let's put that off until Tuesday night. I haven't flown the Sioux at night for a month, and tonight's a good time to get caught up. See you later, pro.

borne safely, and get on his proper heading. To do these things successfully under all conditions requires good visual acuity, reaction time, muscular coordination, judgment, planning, and mental alertness, all of which are, to a marked degree, dependent upon a satisfactory state of physical fitness. It is obvious then that the pilot must have a higher degree of physical fitness for his job than is required for the job of "flying a desk."

LEVEL OF FITNESS

One who is fit to run a mile in 4 minutes is also fit to run it in 8 minutes. The pilot who is physically fit to fly a T-37 has an adequate level to fly the L-19, but the reverse is not necessarily true. Although the basic physical requirements for the two jobs may be similar, because of the greater stresses encountered in flying jet aircraft, a higher level of physical fitness is required.

The ability to accomplish a given task does not necessarily indicate an adequate level of physical fitness for the job. A man may be sufficiently motivated by fear or the heat of competition to run a 5-minute mile which he would be unable to do under normal circumstances. If at the completion of the run he collapses or suffers some other form of violent physical upset, it is plain that he was not physically fit to run the mile at this speed. The word "fit" implies that the body adapts or adjusts rapidly and efficiently to the work at hand with a minimum of disturbance. The man who is fit recuperates rapidly after his efforts, with a quick return to normal.

The pilot who sprints across the ramp for an urgent mission and "loses his lunch," or who is unduly tired after an average flight is not physically fit to carry out his duties properly.

If this be you, take stock of yourself and initiate a program of corrective action, notably a buildup of your physical fitness. The level to which you can develop this is influenced by such factors as the type body you have, the presence or absence of disease, the food you eat, the regularity and amount of rest you get, but especially by the manner in which you work for this development.

HEALTH PLUS

Although dependent upon your state of health, physical fitness is much more than simply keeping free from disease by being healthy in the ordinary sense. You should be healthy on the plus side, which implies activity, vitality, and reserve, and is reflected in the performance of whatever you may be required to do.

Physical fitness is related specifically to what you can do. You may be fit, for example, to run a mile but not to swim 400 yards; you may be fit for either of these but not fit to fly, and vice versa.

You are not just "physically fit," but fit to do something in either a poor, satisfactory, or excellent manner. Obviously

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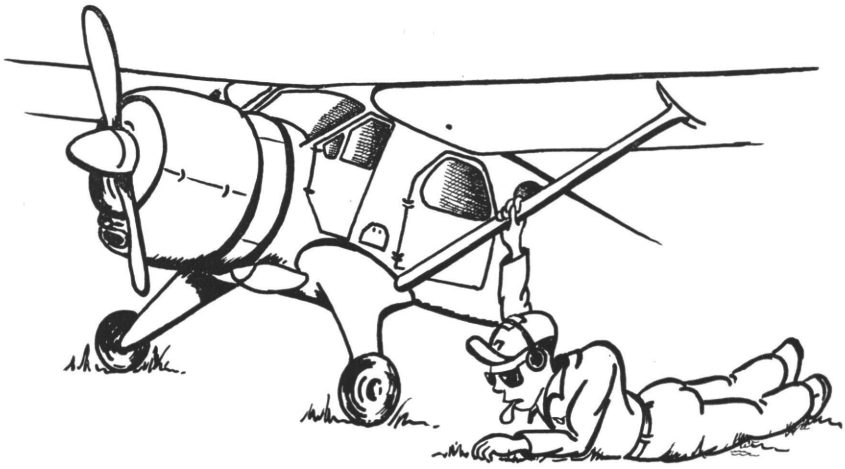
—The Editor



aviators cannot devote long hours to a physical training program, nor is there necessity for so doing.

Selection criteria for flight training ensure that future pilots are physically fit at the beginning of their flying careers. During the training period a daily supervised period of physical training is in operation for maintaining a high degree of physical fitness.

Once the individual has graduated and receives wings, he is assigned to duty with some unit as an Army Aviator and may be removed from the controlled training environment. In the new assignment he may well have additional duties to that of flying and in all probability there is no regularly conducted P.T. period in which he is required to participate. As a consequence, depending upon the individual, varying degrees of his physical fitness are lost and, although he is able to pass his annual physical examination for flying, he has, without doubt, lost some of the stamina and sharpness that he possessed during his training period.

BEST APPROACH

A practical and simple approach to correct this trend is the development of a well planned and supervised program of daily physical exercises which supplement flying activities. Such a program requires no special equipment or sports arena for success.

Fifteen or twenty minutes of supervised and progressive calisthenics daily will do more to reduce tension and build up general physical fitness, with improvement in circulation, respiration, digestion, and elimination, than any other one thing.

Although it should be obvious, it seems appropriate at this time to remind you that in addition to participating in the above mentioned program, it is essential to avoid excesses of all kinds, such as eating, drinking, and smoking, for the best results.

ARE YOU FIT TO FLY?

Aircraft Fueling Facts

M/Sgt Raymond A. Dix

AVIATION GASOLINE IS a derivative of crude petroleum and synthetic hydrocarbon blending agents. Small amounts of chemical agents such as tetraethyl lead, inhibitors, and dye are added.

Aviation fuel permits a high compression, supercharged engine to develop maximum power without destructive preignition or knocking. This results in an increased payload through reduced engine weight.

Aviation gasoline is highly flammable; it has a flash point below 0°F. and vaporizes at even lower temperatures. Thus fire and explosions are the principal *hazards* involved in servicing operations, but no less important are those causing physical damage to aircraft, people, or servicing equipment. Technical Orders (TOs) provide guides for safe handling and servicing techniques. The fuel industry and manufacturers of aircraft and servicing equipment also provide excellent information. *The principal causes of accidents during servicing operations are ignorance and carelessness.*

Because gasoline is volatile, fuel vapor is always present during refueling operations. Volatility is the tendency of a liquid to evaporate or change into a vapor. It is measured in terms of vapor pressure, i.e., the pressure exerted by vapor at a specified temperature.

Vapor pressure increases as temperature rises. The vapor pressure of an engine fuel must be reasonably high, i.e., there must be some vaporization at low temperature to assure a cold start. But the vapor pressure cannot be too high or it will cause vapor locks in the fuel system. Aviation gasoline contains vapor pressure not greater than 7 pounds per square inch at 100° F.

Volatility directly concerns the safety of aircraft fueling. Because fuel must be volatile to make starting easy and to improve combustion, fuel vapors are always present. Fuel vapors are always a fire hazard, so stringent precautions are necessary to prevent fire.

Since fuel vapor and air are

M/Sgt Dix is Air Safety Technical Advisor for the U. S. Army Board for Aviation Accident Research, Fort Rucker, Alabama. The views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.—The Editor

always present during fueling operations, the first precaution is to *avoid a flame or spark that could ignite these vapors.*

NO SMOKING RULE

Smoking is an invitation to disaster. It should not be necessary to mention it here; yet, year after year, smoking in danger areas brings death, injury, and destruction. The no-smoking rule *must* be rigidly obeyed. Flammable vapors released during fueling are heavier than air, and may settle and spread along the ground, and collect in depressions. This is especially likely when there is no wind. If it is possible for spectators or pedestrians to come within 50 feet of the fueling operation, NO SMOKING signs should be posted. Personnel in the vicinity should be warned against striking matches or using cigarette lighters. No fueling should be done while flare pots, welding, cutting, or blow torches are in use within 50 feet of the aircraft.

HAZARD CONTROL

Skill and knowledge on the part of the mechanic is essential. He must be aware of the hazards and know how to control them. Static electricity is a constant threat to safe fueling. When two dissimilar materials make physical contact and then are separated, a charge of static electricity is produced. Steel tools, when dropped, can cause a spark and ignite fuel vapors. Nylon gloves, plastic combs, and wool clothing are potential producers of the dangerous spark.

The presence of static electricity is not readily apparent until a discharge or spark occurs, which increases the danger during fueling. It can be generated by the flow of fuel through the nozzle. It may accumulate on an aircraft during flight or on the ground. Particles of rain, ice crystals, or blowing dust may produce a heavy charge of static electricity. The servicing truck may become charged. It can also be induced from an electrically charged atmosphere.

BOND NECESSARY

Like water, electricity flows to points of lower pressure or lower potential. If all metallic elements are "bonded" or connected electrically, the flow will continue until the potentials are equalized. If no easy path is provided, the charge builds up. When the charge is great enough or the distance to the point of lower potential is small enough (as when the fingers touch a door handle or the hose nozzle nears the wing) the charge *jumps the gap* as a static spark. Under favorable conditions this spark can ignite the fuel vapors.

This discharge can be prevented by providing an easy path for the electricity to flow, a "ground," and by bonding the truck and hose nozzle to the aircraft. Some hose are metal-lined, and seating of the fuel nozzle and the filler neck were meant to provide a suitable bond, but this is not sufficient.

Proper grounding will drain off the static charges. Proper bonding will equalize the potentials. If both are accomplished, no spark will result. A drag chain on the mobile fuel truck

does *not* constitute an adequate ground.

With mobile fuel trucks the following procedure will, if accomplished before fueling begins, provide maximum safety:

1. Connect a *grounding* cable from the truck to a satisfactory ground.
2. Connect a *grounding* cable from the ground to the aircraft.
3. Connect a *bonding* cable from the truck to the aircraft.
4. Connect a *bonding* cable from the fuel nozzle to the aircraft *before the tank cover is opened.*
5. When disconnecting, reverse the order: 4, 3, 2, 1.

At the lowest point of both fuel trucks and trailers there is a water segregator and petcock drain. This segregator should be frequently opened to allow the water to drain out.

Some isolated or maneuver units fuel from drums or cans. Bonding and grounding are extremely important in this case, too. As with other equipment, tank covers should not be removed until all static connections have been made. Sequence should be:

1. Drum to ground.
2. Ground to aircraft.
3. Drum to aircraft.
4. Nozzle to aircraft.
5. When disconnecting reverse the order.

HAZARDS OF THE DRUM

When fueling from drums, remember that gasoline stored this way contains rust. Straining through a chamois will remove these particles, but there is danger here! The U. S. Seventh Army issued a pamphlet discouraging the use of chamois because excessive static electricity is created by fuel passing through the chamois. Also, fine lint particles will enter the fuel system if the chamois is used with the smooth side up, particularly when it is new. These particles have been known to clog fuel systems.

Only filters and traps used at active airfields, where gasoline is constantly drawn through a pressure system, provide gasoline which can be safely run into aircraft tanks. On maneuvers or operations in remote areas, this poses a problem. If a chamois is used it must be bonded to the system. The filter should be held between two metal screens which contact the funnel, and the funnel must be bonded to the aircraft with a wire.

HAZARDS OF TERRAIN

When fueling on ice, sandy or desert terrain, a compromise procedure is necessary. It may not be practicable to get a satisfactory ground under these conditions. Since draining the static charge is not possible without a good ground, equalizing the potentials must be relied upon to prevent a discharge. Thus the *bonding* procedure becomes the only safeguard.

The delivery of pure, clean fuel of the proper grade into aircraft tanks is the greatest responsibility of the fueling crew. Water, dirt, and even a mixture of fuels of different grades can cause an engine failure.

Mechanics can do nothing about accumulation of water through condensation in storage

tanks. But they can prevent fuel contamination by dirt and dust. When it is necessary to fuel aircraft during or after a dust storm, or if there is reason to believe the hose nozzle is dirty, it should be flushed with a small quantity of fuel before it is placed in the opening. Nozzles should not be dragged about, left on the ground or stowed in such a manner that dirt or moisture can collect in them.

Suitable screens should be placed in hose nozzles. These should be examined regularly in accordance with established procedures and kept hospital clean. Any unusual accumulation of dirt, rust, or rubber particles should be reported to the supervisor so the source can be found and corrective action taken. Defective screens should be replaced.

When fueling during dust conditions, or in rain or snow, the tank opening should be shielded with the body or with the skirt of an open raincoat.

FOREIGN OBJECTS

No loose objects should be carried in the breast pockets because they may fall into the tank. If any object does fall into a fuel tank, it should be removed immediately.

The aircraft fuel tank caps should be opened individually. After fueling, all caps and cover plates should be properly closed and secured. The inflight airstream over an open filler neck will pull fuel from the tank and create enough negative pressure to stop flow of fuel to the engine.

On the Seminole, care must be taken to prevent the fueling hose from contacting the deicer boots. These are easy to damage and expensive to repair.

OTHER PRECAUTIONS

Fueling personnel should be constantly alert to the importance of servicing aircraft with the grade and amount of fuel requested. They should know the number and location of all fuel tanks and the order in which they are filled.

All aircraft fuel servicing should be done outdoors and as far away from buildings as practicable.

Fuel tanks are equipped with vent lines to allow for air circulation and fuel expansion. If the hose connection within this vent line deteriorates, the vent line will clog.

Fuel expands at a rate of one percent for each 14° F. of temperature rise, so on a hot day a tank should not be completely filled. Spillage and overflow are apt to occur, but quick rinsing and wiping will prevent staining the finish. Fuel spilled on plexiglass should be rinsed off with clear water and the surface wiped clean to prevent damage and restriction to vision.

A fuel truck should be positioned so it can be driven away from the aircraft without backing. A clear path should be maintained to aid rapid removal in case of emergency. Spills on the wings, and vapors, flow toward the trailing edge, so park the trucks forward of the wing. Service only over the leading edge of the wing; the trailing edge is not designed to support the weight of a hose.

Never drive a fuel truck in close proximity to an aircraft without a directional guide.

After servicing is completed, a check of the fuel quantity gauges should be made with the aircraft battery switch on. A visual check of fuel level in the tanks should also be made. This will indicate whether a discrepancy exists in the gauges. Dip sticks should be used when provided.

The servicing mechanism on both fuel trucks and trailers is of great importance. A strict preventative maintenance procedure should be followed to maintain proper lubrication of equipment. Close inspection for leaking gaskets, seals, and fittings is also important.

Careful observance of the precautions outlined here will greatly reduce the risk of fire. It is poor practice to assume that all fires will be prevented. Therefore it's important that fire extinguishers be kept in readiness and all members of the crew be familiar with their use. Knowing how to use them may save lives. All members of the crew should practice extinguishing flammable liquid fires whenever possible.

The importance of the service crew is sometimes overlooked, sometimes minimized. Yet a mistake on their part can cost equipment and lives. They are hurried by the cry for more and more fuel in fewer minutes, while required to work with the utmost care and caution. They are harried by wind and weather, heat and cold, darkness and glare of lights, but they must guard with unwavering vigilance against the ever-present threats of fire and fuel contamination.

THE UNBEATABLE BOX . . .

(Continued from page 14)

instrument flight trainer? When a pilot is flying the trainer, he must rely on his own ability when the going gets rough. Under the hood in an aircraft, a pilot may tend to rely too much on the copilot to handle the charts, tune the radios, or take the controls should a difficulty arise.

The value of a good individual flight simulator program cannot be overrated. Each pilot should evaluate his own needs, then set himself a definite goal in time and proficiency to be attained in the Instrument Flight Trainer. This program should be set up to give a good review of all phases of instrument flight. This review should begin with the basic then advance to the more complex. Just as practice is needed to maintain the desired proficiency in VFR flying, the same applies to an instrument flight trainer program. The program should not be set up as a one-time project but as a continuing review of all instrument phases.

The purpose of the Instrument Flight Trainer is to train pilots in the basic interpretation of instruments, in radio navigation, and in procedures through a closely supervised instructor-student relationship. Great savings in time, money, and lives may be gained if each pilot uses the trainer sufficiently during his Army Aviation career.

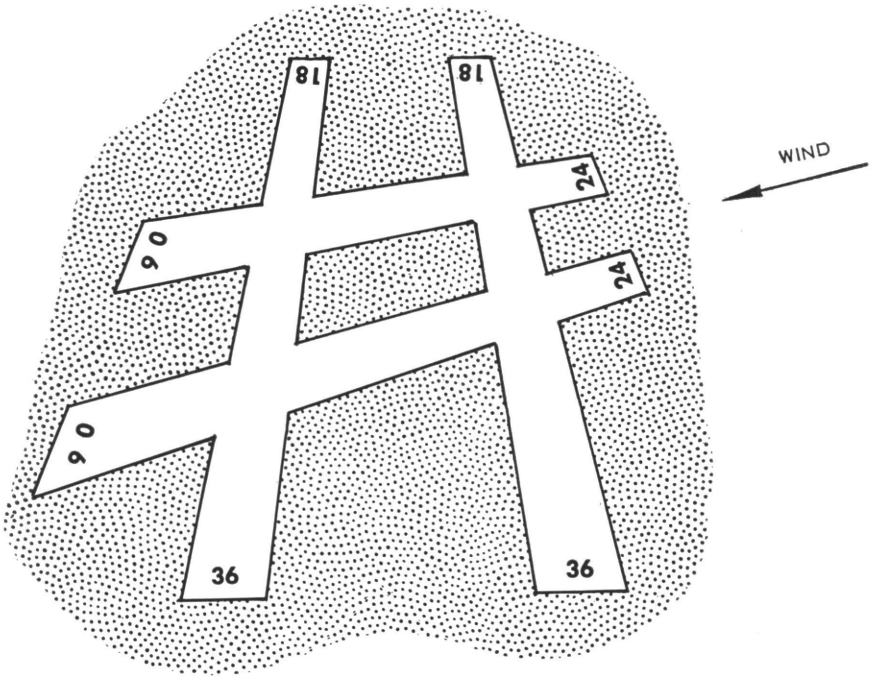
PUZZLER

AN ARMY AVIATOR in a Bird Dog is forced to land with a flat tire on the left main gear. The wind is northeast at 10 to 15 knots. Which runway would be best for a landing in order to minimize the possibility of damage to the aircraft?

Indicate by a √ the solution or solutions which you think would best fit the situation.

- ☐ **Land on runway 06 into the wind.**
- ☐ **Land on runway 24 so groundspeed will be greater, giving better control.**
- ☐ **Land on runway 18 to give a crosswind from the left, which will probably cause a ground loop to the left, putting most of the weight on the good tire.**
- ☐ **Land on runway 36 with a right crosswind.**

The recommended solution to the PUZZLER may be found on page 28.



ROUTINE TEST FLIGHT is a phrase often heard. Yet, by definition, the words routine and test can never be properly used together: *Routine* is any regular procedure adhered to by habit; *test* is subjection to conditions that show the real character of a person or thing.

Test flights are directed when there is any possibility that aircraft will not perform in a routine manner. The job of test pilots is to determine whether aircraft are safe for other pilots to fly.

Accident files contain many reports of accidents that occur during test flights. Among common cause factors responsible for these accidents are:

Lack of pilot proficiency for a particular type aircraft.

Failure to inspect work performed on aircraft to be tested.

Violations of flying regulations.

Errors in judgment.

It would seem reasonable to select the most experienced pilots available for test flights. This is not always done. Recently graduated aviators have been assigned to test flights; others have been assigned with only 2 or 3 hours flight time during the preceding 6 to 8 months in the type aircraft to be tested.

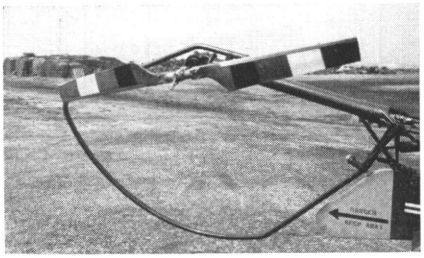
INEXPERIENCE

A Bird Dog was written up by several pilots as "right wing heavy." The crew chief attempted to correct the condition, and the discrepancy was written off as "right wing washed in." The pilot selected for the *routine* test flight had a total of 222 hours. He was one of the least experienced pilots of the unit. During final approach for landing, the aircraft drifted to the right, continued drifting through the roundout and then groundlooped.

FAILURE TO INSPECT WORK

A time change for the tail rotor retaining bolt and bearings was due for a Sioux. After the tail rotor blades, bolts, and bearings had been removed, the bearings were replaced in the hub and the hub was placed on the shaft. Mechanics experienced difficulty getting the cotter pin

The Gray Hair Department is prepared by the U. S. Army Board for Aviation Accident Research with information from its files. Views expressed in this department are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.—The Editor.



Rotor blades installed in reverse

through the tail rotor retaining bolt. When the pilot arrived to perform the required test flight, the helicopter had been started. He entered the aircraft and brought it to a hover. A rapid, uncontrollable turn to the left developed and the aircraft was landed in the turn, causing major damage. Inspection revealed that the tail rotor blades had been installed in reverse, with trailing edges in leading edge positions. Another *routine* test flight.

VIOLATION

A Chickasaw test flight, to be flown by the commanding officer of a field maintenance unit, was scheduled to check the tail rotor controls. The aircraft was loaded with fuel, pilot, crew chief, and *five passengers*. After take-off, the pilot requested a low pass across the field as a farewell gesture for four of the passengers, who were departing the unit. The Chickasaw crossed the field at approximately 100 feet and the pilot executed a climb to 450 feet. At this altitude, a right pedal turn was attempted with zero airspeed. The pilot was unable to stop the turn and the aircraft lost altitude rapidly. The right front gear struck a ditch and the helicopter nosed over, caught fire and burned. Crew and passengers were able to evacuate. This was to have been a *routine* test flight.

End of test flight

Test flights are not occasions for disregarding regulations, carrying passengers, or ignoring preflight procedures. All test flights must be carried out in a professional manner, with complete adherence to established procedures and extra caution. There are no *routine* test flights!

DON'T FENCE ME IN

"Lest thou maintain adequate clearance, the earth will surely rise up and smite thee." Flatland aviators seldom experience the fenced-in feeling that can trap their upland brothers. Mountain flying requires special alertness to avoid the hazards of high terrain.

The Bird Dog pilot was scheduled to make a paradrop resupply flight into mountainous terrain. He flew to the area and found the ground patrol atop a cloud-hidden crest. Radio contact was established and the ground party was advised that the drop would be made on a lower ridge.

The pilot began his descent to

Don't fence me in

the west to cross over the selected ridge. The paradrop was made at an altitude of 75 feet above the terrain. Then the pilot applied power and started to make a right climbing turn. Suddenly, he realized the aircraft would be unable to clear the terrain directly ahead. The pilot elected to turn left in order to crashland directly uphill to avoid cart-wheeling after impact. He maintained a steep angle of climb and pulled the aircraft up just prior to ground contact. The aircraft pancaked into the hill in a three-point attitude and slid to a stop.

The passenger in the rear seat suffered a broken vertebra, and the pilot sustained a slight cut above one eye. The aircraft received major damage, estimated at $9,000.00.

The lesson to be learned from this accident is *alertness*. Too much concentration on any one item can leave aviators wide open for fatal errors. Division of attention is a basic flying requirement which must be developed and maintained. When sparring with mountains, watch for lefts and rights!

Solution to PUZZLER

On the basis of the factual information contained in the PUZZLER on page 25, the recommended solution is as follows:

A landing on runway 36 would permit a touchdown on the right gear, with normal crosswind technique, and when this wing-low attitude could no longer be maintained, the weathervaning tendency of the aircraft into the wind would help overcome the turning tendency induced by the drag of the flat left tire.

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Aircraft Fuels, WO Roger L. Eichelberger	May	13
Aircraft Maintenance Supervision, Lt John W. McKinney	Feb	10
AOCP Requisitions and Reports, Brig Gen William B. Bunker	Apr	10
Army Aircraft Maintenance in the Pentomic Army, Col Frank G. Forrest	Sep	14
Helicopter Maintenance Trouble Shooting, CWO Lawrence W. Bender	Oct	9
Never Sweep Sioux Blades Forward	Nov	28
Night Attack, Lt Charles D. Kingsley	Feb	19
Otter on Fire	Feb	16
Publications Help "Keep 'em Flying," Russell O. Hucker	Dec	9
The Numbers Racket, Lt Col Richard A. Hansen	Aug	10
Why Torque?, M/Sgt Raymond A. Dix	Aug	25
MASTER ARMY AVIATOR		
Goodwin, Maj Norman W.	Sep	9
Hiatt, Capt Fred	May	42
Kilmer, Maj William G.	Aug	28

MASTER ARMY AVIATOR (Continued) Month Page

Marinelli, Col Jack L. . . . . Jun-Jul 12
Wiltse, Capt Harry W., Jr. . . . . Oct 8

MEDICAL

Army Aviation Medicine Program
(Section X, The Last Three Years of Army Aviation) . . . . . Mar 34
Memo from Flight Surgeon . . . . . Jan 23
Feb 22
Apr 31
May 20
Aug 16
Sep 23
Oct 22
Nov 23
Dec 17

MISCELLANEOUS

Army Aviation in Seventh Army
(Section XIII, The Last Three Years of Army Aviation) . . . . . Mar 55
CAA—Twentieth Anniversary . . . . . Jun-Jul 11
Disaster and Emergency Relief Operations
(Section VII, The Last Three Years of Army Aviation) . . . . . Mar 26
Functions Defined (Section V, The Last Three Years of
Army Aviation) . . . . . Mar 17
How Airspace Problems Affect Pilot Technique,
Sylvester L. McElroy . . . . . Nov 20
Kaleidoscope (Section XII, The Last Three Years of
Army Aviation) . . . . . Mar 38
New Helmet . . . . . Dec 15
Officer Career (Section IX, The Last Three Years of
Army Aviation) . . . . . Mar 31
Problems (Section IV, The Last Three Years of Army Aviation) . . Mar 12
Straight and Level . . . . . Feb 2
May 2
Jun-Jul 16
The Last Three Years of Army Aviation,
Maj Gen Hamilton H. Howze . . . . . Mar ----
The Soviet Helicopter Program, Theodore A. George . . . . . Sep 4
The U. S. Army Aviation Board
(Section VIII, The Last Three Years of Army Aviation) . . . . . Mar 27
The War Between the Branches, Col William G. Van Allen . . . Dec 2

NAVIGATION

Army Aviation's New ADF, A. W. Parkes, Jr. . . . . Aug 21

NAVIGATION (Continued) Month Page

A System for Tracking with the ADF, Capt O. B. Bivens . . . . . May 31
How to Start on IFR, Wolfgang Langewiesche . . . . . Jan 6
The Polished Product, CWO Fred O. Bell . . . . . Dec 7
The Whirlybird on Instruments, Maj Oran B. Jolley . . . . . May 6

NOTES FROM THE PENTAGON
Brig Gen Ernest F. Easterbrook

Army Electronics . . . . . Feb 3
Boy Scouts of America . . . . . Jun-Jul 2
Carbon Monoxide as It Affects the Aviator . . . . . Apr 2
Guide for Speakers . . . . . Nov 2
Pros Are Made Not Born . . . . . Sep 2
The Army Aviator's Crown . . . . . Aug 2
The Increasing Requirement for Army Aviation Staff Officers . . . May 3
The Numbers Racket . . . . . Jan 2

Electronic Configuration of the Mohawk AOM,
Capt George Rizor . . . . . Oct 2

PROFICIENCY

How's Your Proficiency?, CWO Gordon L. Coles . . . . . Sep 10
My Amateur Friends, Capt Theodore S. Ferry . . . . . Dec 16
What to Do Until the Ground Arrives, Lt Vaughn R. West . . . . Feb 12

PUZZLER

Jan 13
Feb 15
Apr 23
May 23
Jun-Jul 6
Aug 27
Sep 13
Oct 24
Nov 26
Dec 25

RESEARCH AND DEVELOPMENT

Progress (Section VI, The Last Three Years of Army Aviation) . . Mar 20
STOL/VTOL (Section III, The Last Three Years of Army Aviation) . Mar 11

SAFETY

An Accident Talks Back, CWO Raymond L. Bandy . . . . . May 16
Army Aviation Safety Course Stresses Accident Prevention,
Dr. Louis Kaplan . . . . . Apr 4
Aviation Safety (Section XI, The Last Three Years of
Army Aviation) . . . . . Mar 36

SAFETY (Continued) Month Page

Carburetor Icing, John S. Maltrotti . . . . . Jun-Jul 4
Crash Design from Crash Injury Research,
Capt William R. Knowles . . . . . Oct 12
Flat Hatting, CWO Richard K. Brown . . . . . Jan 16
Gray Hair Department
Jan 27
Feb 25
Apr 43
May 43
Jun-Jul 13
Aug 29
Sep 27
Oct 25
Nov 29
Dec 26
How to Survive a Forced Landing, Jack Gaty . . . . . Apr 39
Is This Your Airfield? . . . . . Aug 4
On Blaming the Pilot, Maj Oliver Stewart . . . . . Feb 5
Pride Kills Local Pilot, Maj Jerome B. Feldt . . . . . Oct 19
What's the Plan? . . . . . Sep 19

SENIOR ARMY AVIATOR OF THE MONTH

Jolley, Maj Oran B. . . . . Feb 24
Oswalt, Lt Col John W. . . . . Apr 42

TACTICAL EMPLOYMENT

Development of "Sky Cav"
(Section XIV, The Last Three Years of Army Aviation) . . . . Mar 58
Field Activity
(Section II, The Last Three Years of Army Aviation) . . . . . Mar 7
Helicopter-Borne Operations, Brig Gen Carl I. Hutton . . . . . Oct 5
Hey! You Forgot About Us, Lt Clare F. Beames, III . . . . . Jan 20

TRAINING

Army Contract Training Successful at Camp Gary, N. G. Howell . Apr 18
One Year of Helicopter Training at Camp Wolters,
Col Wayne E. Downing . . . . . May 26
ROK Aviation School . . . . . May 24
School and Higher Echelon
(Section I, The Last Three Years of Army Aviation) . . . . . Mar 4
The Unbeatable Box, Lt Calvin A. McGee . . . . . Dec 13

WEATHER

Beware the Mountain Wave . . . . . Nov 14
Winter Is Here . . . . . Nov 6

A review of the year just ending combined with a few quick glimpses into the coming months should convince all Army Aviators that there really is a Santa Claus.

The long-awaited "hard hat" is due in the spring. Exhaustive testing of the Iroquois brings the delivery date of this first turbine-powered helicopter specifically designed for the Army closer to reality. In the fixed wing category, the successful maiden flight of the Caribou indicates a not-too-distant arrival date for this aircraft which will provide the Army with a much-needed boost in its resupply mission capability. Work progresses favorably on the Mohawk, the Army's new reconnaissance aircraft equipped with the latest electronic surveillance devices.

Mighty Mojaves can transport Honest John missiles from storage areas to firing sites in minutes. Adoption of electronic data processing equipment in the supply field should simplify and speed up the requisitioning of sorely-needed parts to keep our aircraft flying.

In addition to expanding his flying skills, the Army Aviator must also maintain his branch integrity. With the advent of the experimental aerial combat reconnaissance unit, the role of Army Aviation on the battlefield of the future is taking a recognizable shape. Complexities of modern warfare demand that the aviator be fully aware of the needs of his partners fighting on the ground. Only by constantly maintaining his branch proficiency will he be able to discharge his duties in an exemplary manner.

If the events of the past crowded 12 months are any indication, the challenge of the coming year should be as exciting as the fulfillment of its promises will be rewarding.

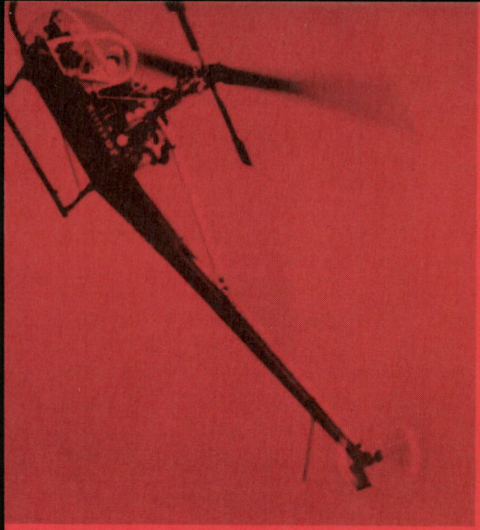
To all Army Aviation personnel everywhere a

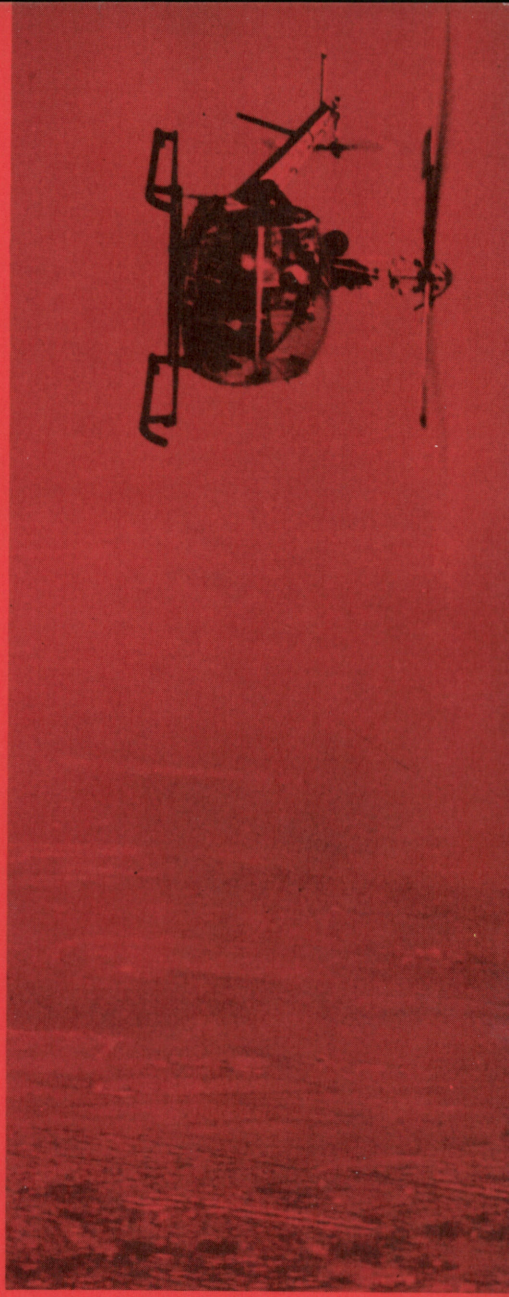
Merry Christmas

and a

Safe Flying New Year

6400





UP, OVER, DOWN

Hiller Aircraft Corporation's new 12E helicopter, a higher-powered commercial version of the Army's Raven, goes through its paces. The three-place utility aircraft with its 305 hp engine is claimed to be 24 percent more powerful than any helicopter in its class.