JUNE 1959

UNITED STATES ARMY AVIATION DIGEST

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AVIATION DIGEST

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Take It Off

Lt Colonel David M. Kyle, Arty

IF THE NUMBER of gadgets on Army aircraft today are indicative of aircraft worth or efficiency, we have indeed reached the apogee of aircraft design. Unfortunately, closer examination of the penalties we pay each day by gadgetizing our aircraft to keep the poorly trained pilot safe and the spoiled pilot happy is horrifying. We must release the poor old airframe from the penalty of excess and unnecessary weight that is not chargeable against combat capabilities of the aircraft. Why should we penalize the manufacturer as well as the aircraft by loading down the machine with gadgets? Let us train Army Aviators to fly aircraft and stop designing aircraft to fit the inadequacy of the poorly trained pilot.

Throughout the years, we have specialized in particular areas of overgadgetizing. These gadgets fall into two categories —safety and nice-to-have.

SAFETY GADGETS

Some of the better known gadgets in the field of safety are best illustrated in the L-23D. The landing procedure includes pulling throttles back to check the landing gear warning horn. After the horn blows, you can then press the button to silence it. This means it works and the gear isn't down, which should be obvious. In

order not to be caught short on gadgets and to further complicate the matter, there are lights to indicate the position of each gear. To insure that the pilot is thoroughly confused, the gear handle is lighted with a red light to indicate when the gear is down or partially down while the handle is up, or vice versa. Now check three green against one red to insure all is down and then as a last check stand on your head to check the small floor window up or down indicator for the nose wheel. All that remains to be done is to recover from vertigo, and prepare to land the aircraft with full confidence that the gear is extended. Perhaps it would be advisable to add a circuit to test tire pressure after the gear is extended.

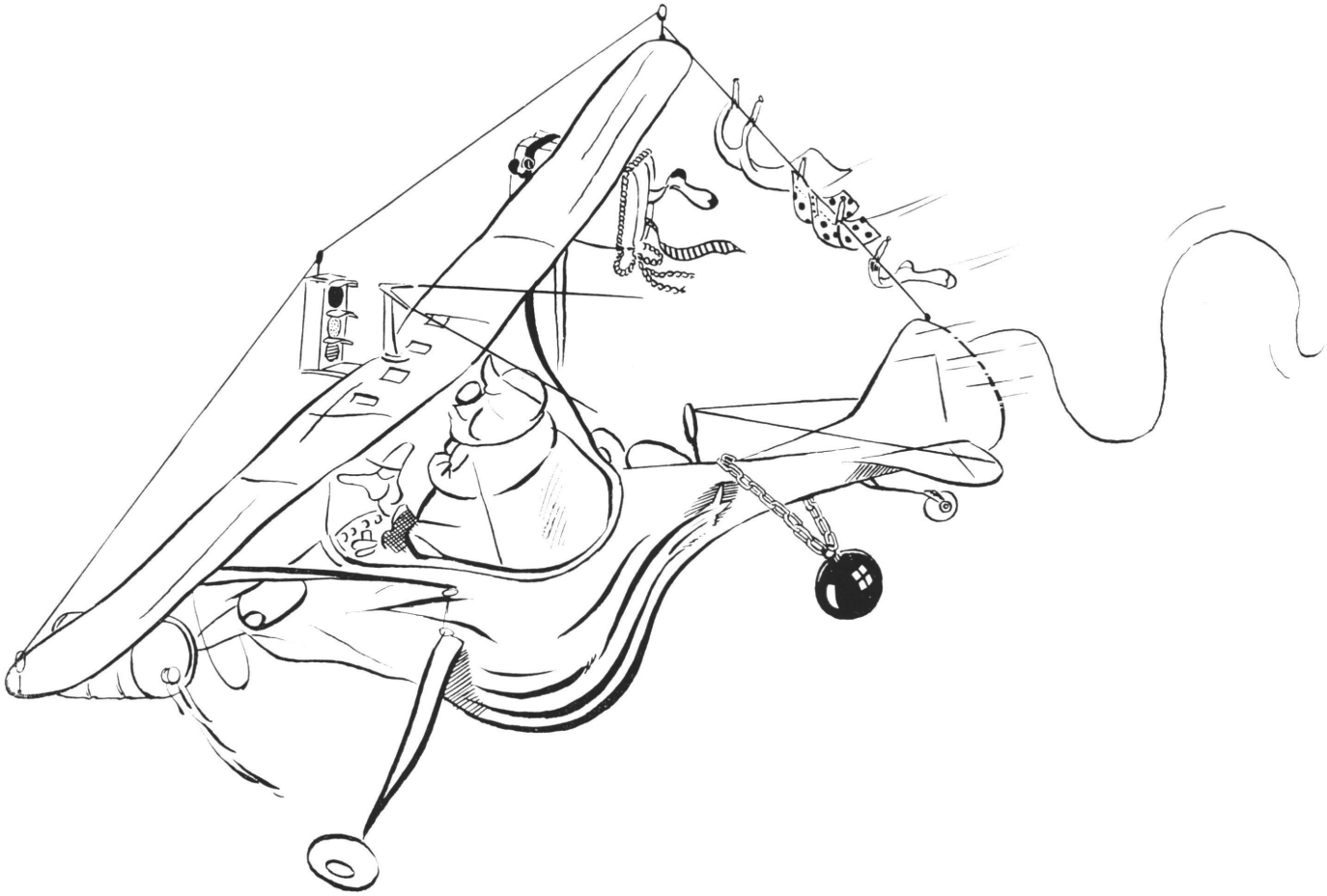
NICE-TO-HAVE GADGETS

Some of the better known gadgets in the line of nice-to-have are such items as electric flaps in the L-19. It is true they may be easier to use, but most aviators didn't have much trouble pulling the old fashioned handle. The addition of the nice-to-have electric flap control necessitated adding a position indicator, a complete electronic circuit for the motor, and an activation switch nicely positioned behind the throttle lever. All this is accompanied by enough noise during activation to scare the aviator half out of his wits. This particularly monsterous gadget cost the government approximately $1400 per copy.

Another added nicety found on aircraft today are these very tricky and very useless individual signal distribution panels. This gadget gives the pilot the opportunity to pretend it is

Colonel Kyle is in the Programs and Analysis Division, Office of the Director of Army Aviation, DCSOPS, Department of the Army.

Are all the gadgets on Army aircraft really necessary?



necessary to turn on another five switches or so to start the engine. Since they are non-labeled switches, it is difficult to determine whether up is on or off, or vice versa. This fine gadget makes it possible for the pilot to regulate what comes into his ear phones. It must be assumed that pilot and observer generally don't agree as to what is necessary as to the volume required, so the single on-off switch and volume control on the radio in question must be improved. If the pilot is deaf, which he shouldn't be, he can increase the volume to such a level as to introduce some comprehension, even into a wooden block. During this maneuver, the bell-eared observer may turn his volume down as low as possible to avoid the unrestricted blast of noise into the aforementioned blockhead. The key to this gadget is that if the pilot-observer team can't agree, give them individual controls and to each his own.

DECREASE IN PERFORMANCE

Gadgets push the takeoff run ever higher, and decrease the payload to eventually put the aircraft in the "dog" category. These aircraft eventually become unsuitable for operation with troops in the field, because they are unable to meet the performance standards required.

The L-19A initially weighed 2100 lbs and could clear a 50 foot obstacle in 640′. Now our improved L-19E weighs 2400 lbs, requiring 1000′ to clear a 50-foot obstacle, and is a more difficult aircraft to maintain while accomplishing the same mission.

The L-20 initially weighed 4800 lbs and could clear a 50 foot obstacle in 840′. The take-off distance has not increased appreciably in the past years, in fact only to 900′, but landing roll has increased from 1000′ to 1200′ without increasing the combat capability.

The L-23A that originally grossed at 5500 lbs would clear and land over a 50-foot obstacle in 1500′. Now the D model will take off in 1300′ due to increased power, but requires 2100′ for landing. This results in a net decrease in performance.

An example of an aircraft that has continued to increase in weight and complications is the H-13H. The present 145 lbs of radio equipment in the H-13 and the additional power necessary to carry it is indicative of our ability to gadgetize without benefit a small aircraft meant only for the visual mission.

Why does the eyeball require so much more assistance than before? We must stop this foolish gadgetizing and establish what the aircraft is to be used for. Then we must determine the minimum machinery necessary to accomplish the mission and stick to the basic requirements in order to produce an aircraft that is less complicated and easier to maintain in the field.

This de-gadgetizing philosophy will find great support in industry, particularly with the good engineers and designers. It is more difficult to design and build a simple functional aircraft for a well trained pilot, than it is to assemble a junk-ridden airframe to protect the poorly trained type who must have at least two of each gadget for no apparent reason.

It takes a better engineer to produce a functional machine. The aircraft industry has many good engineers who are eager to build this type of aircraft for the Army. They ask only that we cease to insist on the severe gadget penalties in weight and configuration which have typified Army Aviation development for the last ten years.

In the 17th year of Army Aviation we are due to turn professional. Give industry the opportunity to design the best, and insist on minimum payload junk. Only through more concentrated effort in analyzing our requirements and the minimum airframe to meet these requirements can we hope to move into the realm of practicability in design. A continuous and conscientious effort is required by all of us to avoid over-complicating our aircraft with nice-to-have gadgets such as flap lights in three colors, blowing horns, double safety warning devices, and other sublime but operationally ridiculous gadgetry.

Only through determination and the power of our own convictions can we hope to de-gadgetize the fleet.

Our by-word should be, IF IT'S NOT NECESSARY, TAKE IT OFF.

Aviation Training

THE ADAGE THAT Army Aviation is limited only by aviator skill and the ingenuity employed while true is used constantly to justify additional school training. On every hand is heard the cry for every aviator to be branch, desk, mountain, Arctic, jungle, instrument, fixed-wing, rotary-wing, ski, wheel, float, and submarine qualified upon arrival at his initial duty assignment. Opinions as to where the line should be drawn are as wide and varied as Army Aviation today.

There is, and rightly so, a cutoff place for school training and a beginning for unit training. We all realize that each unit has its own mission to perform within the capability of assigned aircraft, the type of parent organization, and the geographical locale of assignment. A flight detachment in support of an Army headquarters would not function as a topographical unit. To this end, school training has been developed to teach the student the capability of the aircraft, to operate it proficiently, and **some** of the considerations for operations in the areas mentioned above.

For some time now, only the helicopter companies have had an Army Training Program (ATP) and an Army Training Test (ATT). These Department of Army publications, prepared under the direction of United States Continental Army Command by the United States Army Aviation School and the United States Army Transportation School, contain general guidelines for specific units. They can be modified locally, however, to train any aviation unit. The first ATP (ATP1-7) for aviation units with both aircraft categories has just been published and is available through normal supply channels. Though designed primarily for the aviation companies of the Infantry, Armored, and Airborne Divisions, ATP1-7 might well be an excellent guide for TD type units. ATPs for all aviation units have been prepared and can be expected in the field in the near future.

Unit training logically is based on the unit needs. It is not practical to spend school training time to check out students on floats when they may never see them. Hence the ATP or local training plan, as the case may be, should provide for aviator proficiency and transition. Each local problem could be resolved similarly.

No commander wants to be without his aircraft, and no staff in our modern Army can function properly without aviation support. So, we are faced with a serious problem of time. Most aviators can maintain annual proficiency requirements while accomplishing administrative missions. Some tactical type flying might also be accomplished when aviation has been integrated into the training of other units. But **when** does the aviation unit train as a unit?

Some units perform the bulk of the field exercises and tests, which provide an excellent opportunity to integrate aviation training. The unit whose primary mission is basic training, support of special units, or supporting a higher headquarters will find it more difficult to conduct tactical training. Flexibility of the ATP is the answer.

Each ATP provides specific subjects to be accomplished in specific hours and weeks. This is because the ATP has been prepared to fit both peace and mobilization times. It also represents the minimum time considered possible to achieve the desired goal during mobilization. It is obvious that a unit activated in the autumn in Washington cannot be expected to complete the same training in the same time as one in Florida. Each commander has the prerogative of establishing the lapsed time in which any training program will be accomplished. This will also provide for additional drills, ceremonies, and other activities considered normal on any military installation, and the accomplishment of the mission by the parent organization.

Some excellent points to be considered by any commander, operations, or training officer when preparing a local training plan, whether based on an ATP or other guidance, are discussed below. They may not completely answer the requirements of every unit, but they will provide a basis for planning.

MISSION

This consideration must always be foremost. Aviation units will always be required to support their parent organization. The mission will also determine training emphasis. Consideration toward depth of training should also start at this point.

STATE OF TRAINING

Here an analysis must be made of all personnel and their

proficiency levels. If the majority of the mechanics are neither school trained nor have considerable experience, it may be necessary to start at the basic level. It might be well also to secure service school quotas for some. From this analysis, the amount of training in the individual training phase can be determined. The unit training phase, usually broken down into basic and advanced periods, will be determined primarily from an analysis of previous unit activities. A newly organized unit will by necessity devote more time to training than an older unit with fairly stable personnel.

It is impractical to use school training time to check out students on floats when they may never use them

PROGRAM CONTENT

With the mission in mind, the starting place and rough time allocation established, actual subjects are selected. They should be listed, given a priority, and estimated times for classroom and practical exercise established. It should be noted that USCONARC, major command, or CONUS Army establish certain minimum training requirements. These must be included and usually represent a small but important part of the training program. Also local requirements cannot be overlooked. Annual POR requirements, weapons qualifications, and combat courses are only a few to be considered. Here also, the essentials are separated from the "nice-to-know" in accordance with priority and state of training.

TIME

With every facet of Army life demanding time, this perhaps is the most talked about problem. One answer is for all of us to become efficiency experts and get the most out of the 24 hours we have available.

Let's assume that the program we have arrived at envisions 14 weeks time. We have provided for concurrent aviator, mechanic, administrative, and operational training of officer and enlisted personnel. The program is "solid," and now comes the real task: this program must be "sold" to the G3 for implementation. Together with the G3, and other staff officers, an estimate must be made of the aviation requirements for perhaps a year. The program must be so integrated into unit mission as to provide continuity, sequence, and completion in a minimum of time. Support in the training program from staff agencies should also be obtained at this time. After all, the signal and engineer personnel available can be invaluable as instructors and advisors. It may be necessary to make adjustments, too! Perhaps they can be made, resolved, and coordinated immediately, or they may require considerable time. From this staffing the time length or lapsed time required to accomplish both the program and the mission can be determined.

IMPLEMENTATION

As in all training, preparation must begin early and be thorough and well coordinated. A successful program will depend on the availability of aircraft, so direct and positive coordination between the operations officer and the maintenance officer is mandatory. Guidance in the preparation of lesson plans may be obtained from appropriate manuals and SOPs.

Two important considerations for aviation training programs emphasize the need for alternate plans: weather and geographical location. For aviation units the term "alternate plan" is perhaps better than "inclement weather plan." Some aviation training may require inclement weather. Alternate plans should be written to provide for continuance of ground phases for **all** personnel and not resolve itself to aviators in the coffee shop and mechanics in classroom. Should it be undesirable to advance ground training beyond flight training, it might be an excellent time for depth in training. Why not have two, even three, maintenance officers, technical supply specialists, or communications officers? Flexibility can and will provide continuity and accomplishment of the training goal. In the face of adversity, the training officer should have faith, keep smiling, and never lose his sense of humor!

INSTRUMENT ATTITUDE FLYING among army aviators

Captain William P. Brake, CE

AS ARMY AVIATION progresses in types of missions and development of aircraft, it becomes impossible to fly by feel alone. Knowledgeable reference to the flight instruments must be made to determine the aircraft's attitude and performance. This system of controlling the attitude of an aircraft by means of flight instruments is known as attitude instrument flying. Naturally, the word "attitude" is really not necessary, as all instrument flying concerns attitude control. However, it is the "attitude" about attitude instrument flying that brings this discussion to point.

Possibly it is because attitude instrument flying is somewhat similar to visual flying (in that reference points are used to determine the attitude of the aircraft in both methods) that some Army Aviators today are slipping into dangerous habits, developing a warped "attitude" towards instrument flying.

Of course, these Army Aviators are only fooling themselves and the form 759 with their so-called "hood" and "actual" weather time. If this were not true, why does the following example happen again and again? An Army Aviator presents himself to the Instrument Examiner for an instrument check. His form 759 neatly shows his requirements filled, sometimes to 20 hours over the minimum. Then he climbs into the plane, puts on the hood, and tries to demonstrate to the Instrument Examiner (under actual or simulated instrument conditions) just the bare amount of knowledge necessary for safe flight. What happens?

He gets highly nervous.

He doesn't remember procedures.

He completely fails to make the grade.

Why? There can only be two answers: first, the minimum time prescribed in AR 95-32 is not satisfactory, or, second, the pilot who has logged this minimum time has not placed himself under the necessary actual or simulated instrument conditions.

Captain Brake is Commanding Officer of Headquarters Company, 168th Engineer Battalion (Combat) (Army) in Germany.

Many of us have heard these all too common expressions: "Don't bother with the hood; I'll just lower the seat a little," or "Log me some hood time; I'm running low for this 6 months," or "Here's some good copilot time going to waste."

How many of us after logging 2 to 4 hours hood time on a straight and level cross-country, just don't have the time to make an ILS approach or a GCA when arriving at our destination? How many of us put off such maneuvers until just before the instrument check?

The question needn't be asked concerning how many of us think we can really fool the instrument examiner.

Common sense tells us that during a check we won't, or shouldn't, be permitted to just "lower the seat" without a hood, or take the check on a straight and level cross-country and not even attempt a range letdown or a GCA.

"Shouldn't be permitted" was inserted because it's no secret that this occasionally does happen. Sheer honest conscience shouldn't permit the logging of PH or PW without actually having been at the controls under the hood or in the soup. Think it over.

During 1941 and 1942, Army Air Corps regulations permitted instrument checks to be given in a link trainer. There were several pilots who received their instrument ratings by merely doing a satisfactory orientation and beam problem. Regulations also permitted any pilot who held a current card, regardless of how it was obtained, to check another pilot and issue him an instrument rating.

Let's face it: times have changed. Just because it was done then, or better, got away with then, is no sign that we should try to get away with it or anything that approaches it today.

The number of lives lost and aircraft wrecked because of faulty instrument flying during that period was evidence enough that a more up-to-date effective instrument and training system was necessary.

The program has been established. AR 95-32 is adequate, but only if the pilot who logs just the minimum number of hours conscientiously flies every minute of it in actual or simulated instrument conditions, rehearsing his emergency procedures and making letdowns.

With this kind of effort, the Army Aviator won't be fooling himself or the form 759; nor will he sweat out bluffing the instrument examiner. The old timers won't be slipping into dangerous habits, and the 500-hour boys, who mimic these old timers, will not be developing any "warped attitudes." Your instrument flying will become more than just safer—it will be smoother and more enjoyable.

Let's all recognize the right "attitude" toward instrument flying!

A PILOT EN ROUTE to Jacksonville, Fla., received the following clearance: "ATC clears R72572 to the Bryceville intersection via Victor 22; maintain 3,000. Contact Jacksonville approach control over Bryceville on 119.3 megacycles (radar arrival frequency) for further clearance."

On arriving over Bryceville, the pilot enters a holding pattern and gives his position report to Jacksonville approach control. Jacksonville is reporting an overcast that extends from 600′ to 6,000′. They direct him to depart Bryceville on a heading of 160° and to descend to 2,000′.

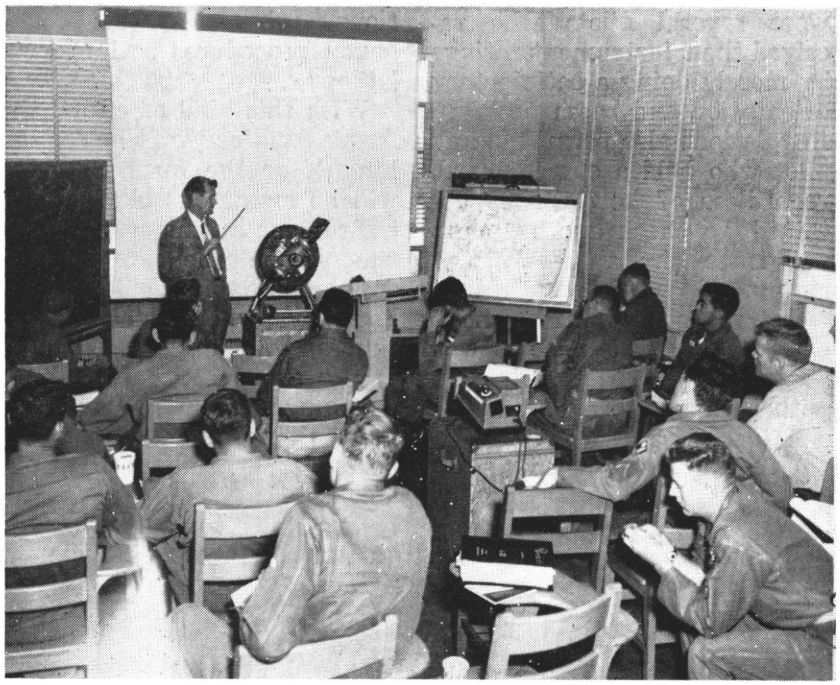
Immediately after departing Bryceville the pilot realizes he has lost 2-way communication. He is expected to

- ☐ a. Return to Bryceville and fly a triangular pattern to the right to indicate the receiver only is operative.
- ☐ b. Proceed to Savannah (his alternate) where clear skies exist and land VFR. Maintain 3,000′ en route or MEA, whichever is higher.
- ☐ c. Proceed direct to the ILS outer marker / compass locator, or to an approach facility serving Jacksonville, and execute an instrument approach.
- ☐ d. Climb to VFR conditions at 7,500′ and proceed VFR on top to Savannah and land VFR.

The recommended solution to the PUZZLER may be found on page 30.

Our Product: Assistance

Irvin J. Wagner



Above: AAMTAP technician explains propeller mechanism to Army personnel

Below: Contractor maintenance technicians set up training aids at an Army post

IN APRIL 1957, the U. S. Army Transportation Supply and Maintenance Command introduced a form of technical assistance known as the Army Aircraft Mobile Technical Assistance Program. This program, later designated AAMTAP, was designed and activated to augment the existing technical assistance program and minimize personnel deficiencies in the aircraft maintenance field.

The introduction of AAMTAP, comprised of six mobile assistance units, each representing a different type of aircraft was the answer. Each unit is composed of a station wagon, fully equipped with cutaways, accessories, components, films, charts, graphs, and allied instructional media, manned by two highly skilled contractor maintenance technicians; as such, it is capable of rendering on-site technical assistance. The services performed by the members of the mobile units are designed to continually promote maintenance proficiency and eliminate the necessity of assigning activity personnel to attend formal school training away from post. These services consist of condensed factory courses covering all aspects of specific equipment represented; they

Mr. Wagner is an Aircraft Equipment Advisor (Maintenance Training) at the U. S. Army Transportation Supply and Maintenance Command.

Left: Technical representative instructs maintenance students at special classes held at Libby Field, Fort Huachuca

Center: Technical representatives giving instructions to civilian and military personnel at Army Aviation Section (Monmouth County Airport) Fort Monmouth

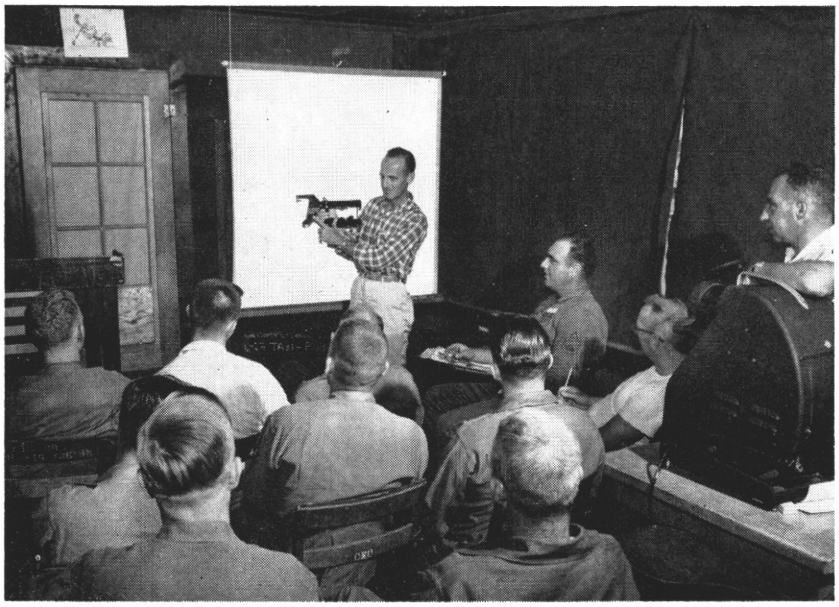
Bottom: Technical representative explaining the function of the helicopter's prop shaft to class of civilians and military personnel, Army Aviation Section, Fort Monmouth

are keyed to an adjustable ratio of classroom theory, practical demonstration, and complex maintenance problem-solving during a scheduled visit. The curriculum for each mobile unit has been developed from the applicable current Maintenance Allocation Chart, each capable of being changed to meet the immediate requirements of the activity visited.

This program has been in operation more than a year. During this time using activities have continued to express satisfaction in the services performed and a desire for continuation and expansion. AAMTAP success is attributed to two major factors: one, the excellent co-operation extended to the units during their visits, and, two, the outstanding capabilities of the instructor personnel.

A composite evaluation of past performance and the material benefits attained, together with using activities' desire for its expansion, dictated the necessity for additional mobile units to cover a wider area of maintenance functions.

Under the initial operating



concept of AAMTAP, the services were directed primarily to organizational maintenance personnel performing first and second echelons of maintenance functions, with a partial void to be filled by services directed to higher echelons of maintenance personnel. Planning was effected in early September 1957, with this latter objective in view, resulting in the implementation of Phase II mobile units in AAMTAP.

With the inauguration of Phase II, the services performed by Phase I mobile units are now specifically directed to organizational maintenance personnel performing first and second echelons of maintenance; Phase II mobile unit services are directed specifically to field maintenance and depot activity personnel performing third and fourth echelons of maintenance. This is the only major distinction between the two phases in AAMTAP. Other minor differences include a deviation in curriculum development, types of training aids employed and, naturally, an increase in visit periods allotted for Phase II mobile units. No appreciable change in previous operations has been effected with Phase II implementation, since all mobile units follow the same accepted procedures to accomplish their mission.

Services in the program have recently been further expanded to provide overseas assistance to various theaters, on request. In fulfilling these requests, there is a period of loss to the CONUS for the services of the particular unit during its absence. In recognition of this condition, an effort is being made to consolidate the services of teams representing specific aircraft.

Since January 1959 the Army Aircraft Mobile Technical Assistance Program has been operating under a new concept. Under this new concept, one team will render technical assistance in both organizational and third echelon maintenance, and, in cases where responsibility warrants, in fourth echelon maintenance also.

Technical assistance by the AAMTAP teams will be conducted under the new consolidated concept in much the same manner as assistance was conducted under the Phases I and II concept, with major variances as follows:

Each team will employ three different curriculums as guidelines to impart technical assistance. They are as follows:

Curriculum I: Assistance in first and second echelons of maintenance.

Curriculum II: Assistance in third echelon of maintenance with inclusion of a sufficient amount of first and second echelons to properly encompass third echelon.

Curriculum III: (Available only to TC Sections of Atlanta General Depot, Fort Worth General Depot, Sharpe General Depot, and New Cumberland General Depot.) Assistance in third and fourth echelons of maintenance.

Requests for the services represented in AAMTAP may be forwarded at any time from Department of Army activities in CONUS to Headquarters, U.S. Army Transportation Supply and maintenance Command, P. O. Box 209, Main Office, St. Louis 66, Missouri, ATTN: TCSMC-FAT. The type of aircraft upon which assistance is desired should be stipulated.

Further definitive information may be obtained by consulting the AAMTAP brochures previously published and widely distributed to all CONUS Department of Army activities, major Army area headquarters, and chiefs of technical services.

Men from East Coast area with instructors during training course at Fort George G. Meade

HU-1A IROQUOIS

Designed for Frontline Service

One of the Army's cleanest aircraft, the Iroquois, said by some Army Aviators to be "too easy to fly"

HISTORICALLY, the introduction of new weapons brings about new concepts in tactics and doctrines for waging wars. The crossbow, gunpowder, tank, and airplane are examples. In 1945 atomic energy was harnessed, which added another chapter on the subject. Inherent with nuclear warfare are new concepts and the need for new vehicles to aid Army commanders charged with scanning, detecting, and identifying an aggressor force in tactical situations. Mobility and flexibility became the byword for Army aircraft specifications.

The problem facing the Army called for a utility helicopter specifically designed for frontline service. With an eye to the future and the dynamic demands of modern warfare, the Army found its present utility helicopters either too large for operation in anticipated conditions or hampered by inadequate performance. Simplified maintenance and logistics in the field were other goals. Also, litter storage and handling difficulties made some helicopter configurations unsatisfactory as aerial ambulances.

SPECIFICATIONS

Just what constitutes a helicopter with frontline service capabilities? Here's what the Army specified: a lightweight helicopter that could deliver an 800-pound payload over a 100-mile radius, cruise at 100 knots, climb 1,500 fpm, and hover at 6,000 feet with the thermometer reading 95°F. It must be constructed to permit operation under combat conditions with as little maintenance as practicable; must have provisions for rapid unit replacement of major components under field conditions; must have ease of maintenance in field conditions with a minimum of special tools; must have provisions for rapid assembly and disassembly and be readily transportable by air or other means. Such a helicopter would be used for transporting personnel, equipment, and supplies; medical evacuation; battlefield ambulance service; general utility missions; and as an instrument trainer.

Although the need for such a new frontline service helicopter was recognized three years ago, the first production model H-40 (final designation HU-1A)

Iroquois was delivered to the U. S. Army in July, 1958. In the words of one project officer, it "exceeded all expectations. Of course, there have been certain problem areas in the ship, but Bell has come up with a solution to these problems . . . The problems were not unexpected—you just don't build a new machine and not have problems."

The story of the development of the H-40 is an interesting one.

Generating its own duststorm, the Iroquois goes on the gauges in the Arizona desert testing

DEVELOPMENT

After considerable research and evaluation of existing helicopter designs, Bell Helicopter Corporation decided that an all-new configuration utilizing a turbine-powered engine would best meet the requirements. It was this approach which won the design competition in June, 1955 in what one authoritative aviation trade magazine called the hottest aircraft competition in Army history.

Since then, the Army has ordered and received three experimental XH-40s and six service test YH-40s. Nine HU-1 preproduction models are now being built and delivered. The "follow-on" production model will be designated the HU-1A.

The Iroquois is a single-rotor helicopter with conventional tail rotor. It is powered by a Lycoming T-53 turbine engine currently rated at 860 hp but derated for the Iroquois to 770 shp (shaft horsepower) at 6,400 rpm, or 700 shp at 5,800 rpm.

The H-40 features a dual control system with the equipment console between the pilot and copilot stations. A medical attendant's seat and a cargo compartment of 142 cubic feet are behind the pilots' seats. Sliding doors open on each side of the cargo compartment in addition to a hinged door by each pilot's seat. Provisions are made for four additional passengers across the back of the cabin. This area also can be quickly adapted to accommodate two litters or an extended range ferry fuel tank. A single point, 3,000-pound capacity external cargo suspension hook is built in at the helicopter's center of gravity, providing substantially improved stability for external cargo operations.

"Designed for the pilot" is what most aviators say about the Iroquois panel

The Iroquois lifted and transported a jeep . . .

PRELIMINARY TESTING

During the 16 months that elapsed between winning the design competition and the first exploratory flight, the H-40 underwent rigorous operational and functional tests. Included were all tests required by current military specifications, plus checks of:

a. hydraulic function of the booster control systems,
b. control system proof load,
c. engine throttle system,
d. ground vibration.

Next, the H-40 was placed on tie-down and the ground run program started. Initial operation was made without the main rotor installed to familiarize the pilots with engine starting procedures and operating techniques. The simple operating characteristics of the T-53 free turbine required a minimum of indoctrination by pilots. Several more hours of tie-down tests followed before the Iroquois was given a brief flight test to investigate its handling characteristics.

At this early stage of development it was apparent that performance specifications for this frontline service helicopter would be exceeded. For example, the final test, before the Iroquois could be released to start performance tests, was a grueling 50-hour preliminary flight approval run. This test for new helicopters usually requires several months, allowing for redesign, replacement, and rerun. But on the Iroquois, the test was completed in the remarkably short space of two weeks, without the necessity of replacing a single prime component!

STATIC AND FATIGUE TESTS

Since the H-40 heralds a new era in helicopter operating economy, serviceability, reliability, and performance, extensive test and development programs seldom experienced prior to production were necessary. Following are some of the tests set up to ensure the Army an optimum helicopter at the earliest possible date:

a Raven . . .

a. Twelve specimens of each component of the main rotor and tail rotor, together with the mast and all rotating controls, are being fatigue tested. Upon completion of these tests, it is expected that reliability data will substantiate fatigue life in excess of the anticipated life of the aircraft.

b. All components of the drive system including the main and tail rotor transmissions, and all accessory drives are being tested for 1,500 hours under loads more severe than encountered during normal flight operations. During these tests, all gears will have exceeded 10 million cycles of tooth loading, the endurance limit of steel. Also, two simultaneous rotor whirl tests are being conducted. Each will achieve 1,000 hours at maximum flight loads.

c. Static test to a limit load factor of 4½ g's has been completed.

Development testing included familiar aircraft type tests, such as landing gear drop tests, fuselage static and flight tests, systems proof tests, extensive dynamic component tests, and fatigue tests where parts were subjected to vibratory loadings far in excess of those anticipated in flight.

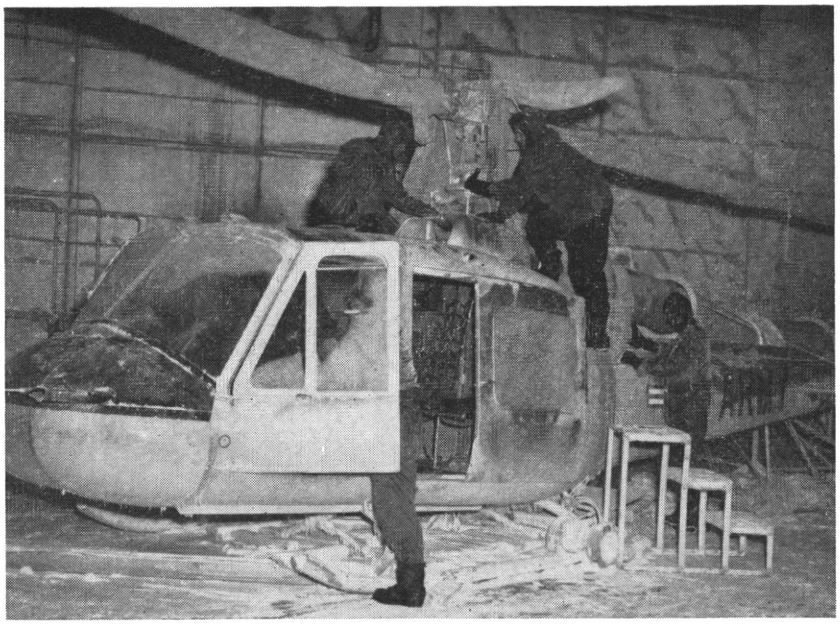
This expensive preproduction experimental test program is justified; it ensures the dependability of H-40 production models by minimizing the normally long evolutionary product perfection process based on field service experience.

Fatigue testing should be a continuous process. It can be used as one effective method of quality control. Under such a plan, random sample parts are tested and, basing deductions on the laws of probability, engineers gain a good idea of how

and a Bird Dog

all parts of that particular type will stand up. During fatigue tests, parts such as rotor blades, blade grips, hubs, bearings, pitch links, and other control system components are subjected to oscillatory deflections and static loads for millions of cycles. The number of oscillations tolerable at various load levels determines the service life of a part under loads encountered in flight.

Though time consuming, this phase of the H-40's laboratory testing yields a great amount of information to the helicopter design engineer. Only on the basis of fatigue tests can a component be declared capable of a 1,000-hour service life in advance of actual field service experience. The 1,000-hour overhaul period expected to come from the H-40's extensive testing background will exemplify this machine as a significant advancement in the state of helicopter development.



In –60°F. climatic hangar at Eglin AFB, the Iroquois set the stage for the Arctic tests that were to come

SERVICE TESTING

Perhaps the most important program the H-40 has had to meet is the Army's own exacting tests, the hardest and most realistic any helicopter ever faced. The series of tests, conducted by the United States Army Aviation Board at Fort Rucker, cover every phase of performance, supply and logistics, maintenance, weather, combat conditions, and general military usage.

Secretary of the Army Wilber Brucker (center) is shown during an inspection of the Iroquois undergoing Arctic test

The Army Aviation Board is testing and evaluating the H-40's stamina under simulated battle conditions which will allow the factors of weather and terrain full play. At the U. S. Army Desert Test Center, Yuma, Arizona, the Iroquois underwent tests in desert temperatures of 115° and extreme dust conditions. Included in those tests were the H-40's tactical capability for troop transport, medical evacuation, and emergency resupply.

At the other temperature extreme, the Army Aviation Board used the climatic hangar at Eglin Air Force Base, Florida to punish the Iroquois. Here performance and operations were checked under simulated conditions in the deep freeze at –65°. At present, the Board has the Iroquois in Alaska for extensive tests under actual weather conditions. At Edwards Air Force Base, California, skilled engineering test pilots will "wring out" the Iroquois for performance, stability, and control data. It is their task to determine that the Army's newest frontline service helicopter lives up to all the rigorous performance specifications guaranteed by the contractor.

With special test instrumentation and under carefully controlled conditions, the Iroquois will be flown through its paces at all altitudes under all loading conditions. Ground and recording equipment will help evaluate takeoff, hovering, climb, level flight, and autorotative performance. Data from these tests will be compiled into aircraft characteristic charts and the pilot's handbook.

Meanwhile, at Fort Rucker the U. S. Army Transportation Aircraft Test and Support Activity (TATSA) has completed one of the toughest obstacle courses—a 1,000-hour logistical evaluation. TATSA developed an accelerated 1,000-hour test

program for two aircraft that was completed in six months. The Iroquois was flown a minimum of 10 hours daily, leaving all maintenance and upkeep to be done at night. While performing the missions for which it was designed under various field conditions, TATSA will compile information on maintenance manhours, parts usage, operating costs, and other miscellaneous support requirements.

This information on logistical support of the H-40 series under operating conditions will serve an important function. Since it will be compiled ahead of delivery of the production models, the required tools, spare parts, and knowledge of maintenance manhours can accompany early deliveries of the utility helicopter into the field prepared for maximum operating availability.

When all the tests have been completed, the H-40 Iroquois will be the most thoroughly tested helicopter in the world —ready for frontline duty. One of the chief benefits of this extensive field service testing is the tremendous savings to the government in providing the Army with a tried and proven aircraft, fully capable of meeting all the requirements for which it was procured.

Sound leaders are reluctant to carry a fight from fixed positions. They seek to offset increased hostile firepower by superior mobility, maneuverability, and flexibility, by surprise, and by retaining freedom of action rather than digging in and waiting. With the first 49 production model HU-1A Iroquois added to Army aircraft inventory in fiscal year 1959, it is believed that mobility and flexibility will become more meaningful to U. S. Army commanders.

Another configuration permits the air transport of eight soldiers instead of the six shown here

Memo from Flight Surgeon

SHOULD YOU wear gloves when you fly? They provide excellent fire protection and keep your hands warm in case of a bailout in cold weather. So wear them. And talking about personal equipment, take a new look at your own gear, such as key cases, watchbands, and pencils. In one mid-air collision, the pilot's metal watchband gashed his wrist on bailout. It took six stiches to close the wound. In another, the pilot received four badly bruised ribs when his parachute harness pulled tightly across a mechanical pencil in his breast pocket. This same aviator was stabbed in the leg by keys protruding from a leather keycase in the leg pocket of his flight suit. If you don't use it, don't fly with it.

SUNBURN

This condition is described technically as "a common affection characterized by a superficial inflammation of the skin caused by actinic rays from the sun." The ultraviolet rays are responsible for this reaction.

There is considerable variation in the reaction and sensitivity of persons to ultraviolet rays. Generally, blondes and red-haired individuals are more susceptible than brunettes, men more reactive than women, and infants more than adults.

Not only are direct rays instrumental in producing burns, but reflections from snow, sand, ice, or water tend to increase exposure. One must be especially careful on an overcast day because ultraviolet rays are not necessarily filtered out by cloud or haze, and the individual may be lulled into a false sense of security because the sun is not shining brightly. Extended exposure on an overcast day can produce severe burns.

The individual reaction to sunburn covering large surface areas of the body may be the same as from burns of a similar degree produced by any other agent. Constitutional symptoms of chills, fever, and weakness may develop; in more severe cases even delirium and collapse may ensue.

The best treatment for sunburn is prevention. This is an individual problem and is dependent on the use of common sense. Avoidance of prolonged initial exposure to the sun is most important. Two 5-15 minute exposures on the first day may be followed by gradually extended exposure times until the skin becomes tanned. This regime should prevent the development of any severe burns or reactions.

Illness or incapacitation from sunburn is not considered LOD.

THE AGE OF REASON

Our old pros who get all steamed up at the prospect of turbine powered aircraft, pure jet or just plain higher performance, can relax. According to a study by Dr. Kenneth G. Burgin, the ideal pilot for jet aircraft is "one who is methodical and clear thinking, has a mobile mind, and who fits in readily with a team."

Dr. Burgin studied the operation of the **Comet** series pilots for a period of eight years to obtain his facts. In describing the characteristics of the successful jet pilot he said, "A previously held conception that pilots for jet aircraft should be of the fighter pilot mentality has been proved to be misguided and, by the same token, any arbitrary age limit of those competent to fly is not supported by experience. In this connection, it is important to remember that while reaction time may be slower in an older person, in the final analysis of reaction to conditions, due weight must be given to the value of experience in any set of circumstances — the older and more experienced pilot carrying out his task with an economy of thought and action which is not available to his less experienced colleague."

Other characteristics of importance, the doctor said, are adaptability and acceptance of new techniques. He must be mentally alert; he must be unusually ready to think and plan ahead.

MORE ON THE MIND

Combat flying is hard on pilots. Everyone admits this, especially the flight surgeon. During World War II combat flying caused many an individual to crackup. Noncombat military flying is not usually the cause of psychotic disorders such as those seen by the flight surgeon in combat. But it can be a modifying factor.

A young pilot had been flying military aircraft for more than a year. During that time he had experienced several emergencies and handled them with skill and courage. His superiors considered him a good pilot.

While piloting an aircraft carrying a passenger, he noted failure of a tiptank to feed. He jettisoned both tanks and exe-

cuted a long, straight-in approach. During final the tower operator informed him there was a fire in the nose wheel well. He shut down the engine and elected to attempt a crash landing because he feared his passenger would be unable to bail out at such low altitude.

The airplane struck the ground and caught fire. The pilot left the cockpit but returned when he saw the passenger still in the wreckage. He and other officers rescued the passenger, who later lost a hand as result of burns.

The pilot reported to the flight surgeon a week later, complaining of severe depression and insomnia. He held himself entirely responsible for the accident and doubted his ability to fly again. He was excused from flying, but was seen daily for a short time. Psychotherapeutic efforts were directed at helping him restore his threatened ego-defense. He asked to be returned to flying about two weeks later. After several hours of dual, he was returned to operational aircraft and had no further difficulty.

LISTENING WIVES

Dr. John B. Armstrong, a Los Angeles orthopedist, conceived an unusual plan to combat obesity. He enlisted the aid of his patients' wives in a unique manner. Each overweight individual in the group invested $100 in a common fund. It was stressed that the agreement be well publicized, so that, in addition to the monetary pressure, the competitive urge was emphasized. Monday was the weigh-in day because it took all the joy out of a "food binge" over the weekend. Anyone failing to lose a minimum of two pounds per week had to add an additional $10 to the fund. At the end of four weeks, the money was divided among the wives of the contestants who met the weight loss schedule successfully. If all had failed, the money would have gone to charity. With this plan you either lose weight or money. What wife will allow the latter?

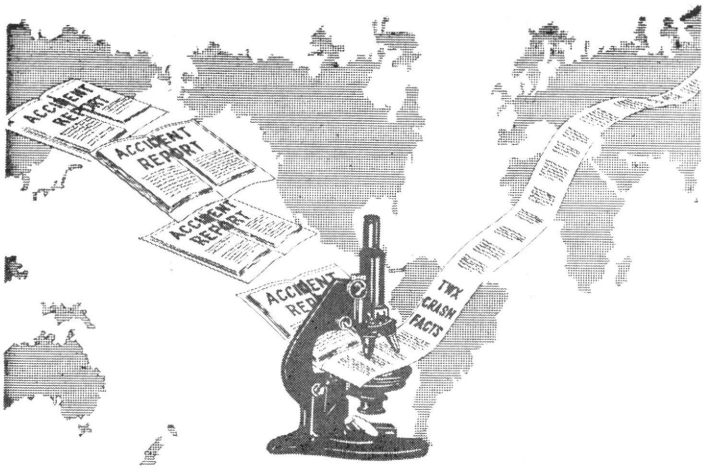
TRAINING THE ARMY ENGINE MECHANIC

THE SERVICE SCHOOL of Curtiss-Wright Corp., Wright Aeronautical Division, Wood Ridge, N. J., conducts an engine training course for U. S. Army personnel. This is the company responsible for the Army R1300-3, R1820-84A, and R1820-103 series engines used in H-19D, H-21C and H-34A helicopters.

Each course designed to acquaint skilled mechanics with these engines is of 2 weeks duration, 5 days a week, 8 hours per day. An R1820 engine is utilized for disassembly and first-hand study of all components and their related systems. Every malfunction a mechanic might encounter in the field is fully covered and proper maintenance actually performed by the student. Personnel become familiar with all functions of the engines by disassembly and study of main components. This includes removal and installation of cylinder and piston assemblies, complete detailed procedures on valve adjustments, different piston and ring arrangements, disassembly of oil pumps both front and rear and the complete lubrication system. The supercharger rear housing cover is removed so that personnel become familiar with the two-speed impeller drive on the –103 engine and the roller clutch drive unit on the –84A engine.

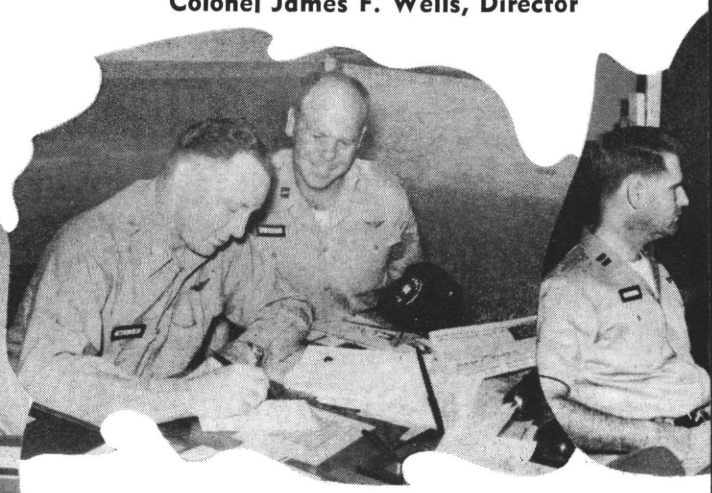
Not only do the personnel learn the mechanical aspects of performing a certain job, but they learn what to look for in related components that may affect the immediate job at hand. In order to accomplish proper maintenance, it is important to understand HOW and WHY a particular unit or system operates. This is well covered in the section dealing with theory and operation of the magneto and ignition system, carburetion and fuel system, and basic engine operation. Ground checks and troubleshooting procedures are covered in great detail, both in the classroom and on the engine.

Success of the course is evidenced by the increased capability and higher quality of maintenance performed by personnel who have graduated and by their favorable comments on the course. TSMC sets the general quota for the school and each post requests needed spaces through TSMC.



TWX, Crash Facts messages, and accident reports are the raw material for aviation accident research.

Colonel James F. Wells, Director



Liaison Division maintains direct liaison with other agencies engaged in aviation accident research, including U. S. Air Force, U. S. Navy, FAA, and others.

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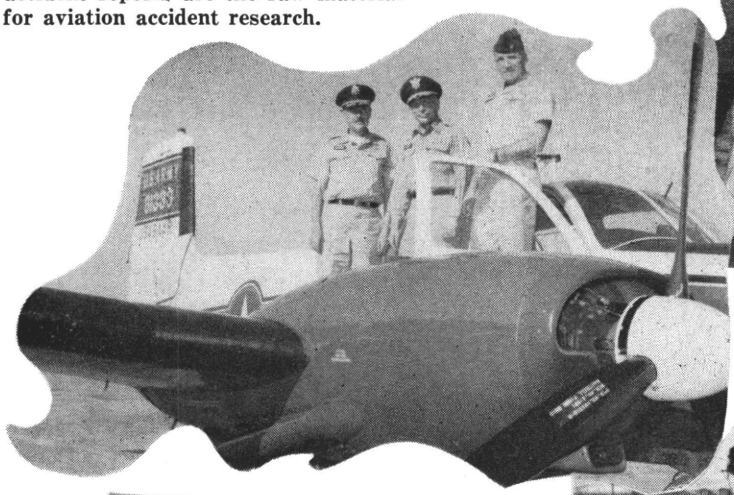

Automatic data processing is used to store the vast knowledge gained through accident research.

Have passports, will travel — Investigation Division is ready at an instant's notice to assist in aircraft accident investigations anywhere.

Microfilm equipment is used to permanently record all major accident reports.

USABAAR

Improved Army Aviation through Accident Research is the mission of the United States Army Board for Aviation Accident Research. USABAAR conducts research of aviation accident experience, particularly Army experience, to determine improvements to enhance the durability, reliability, and efficiency of Army Aviation, and to reduce the lethality of aircraft accidents.

Analysis and Research Division is the laboratory of USABAAR. Here, all aviation accident information is assembled for scientific analysis.

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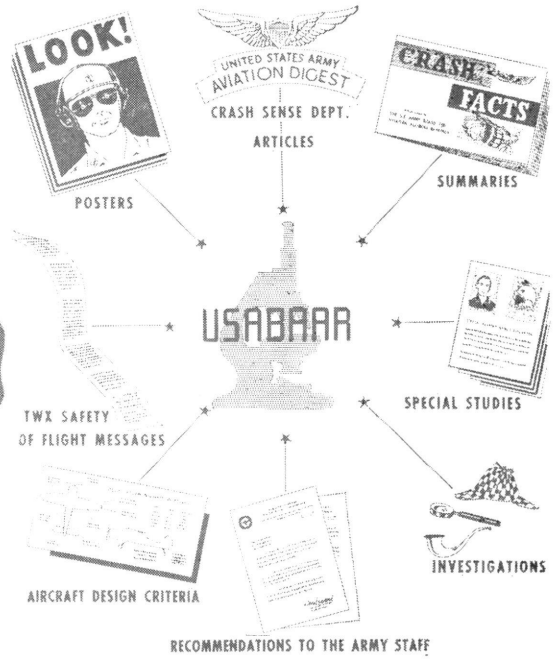
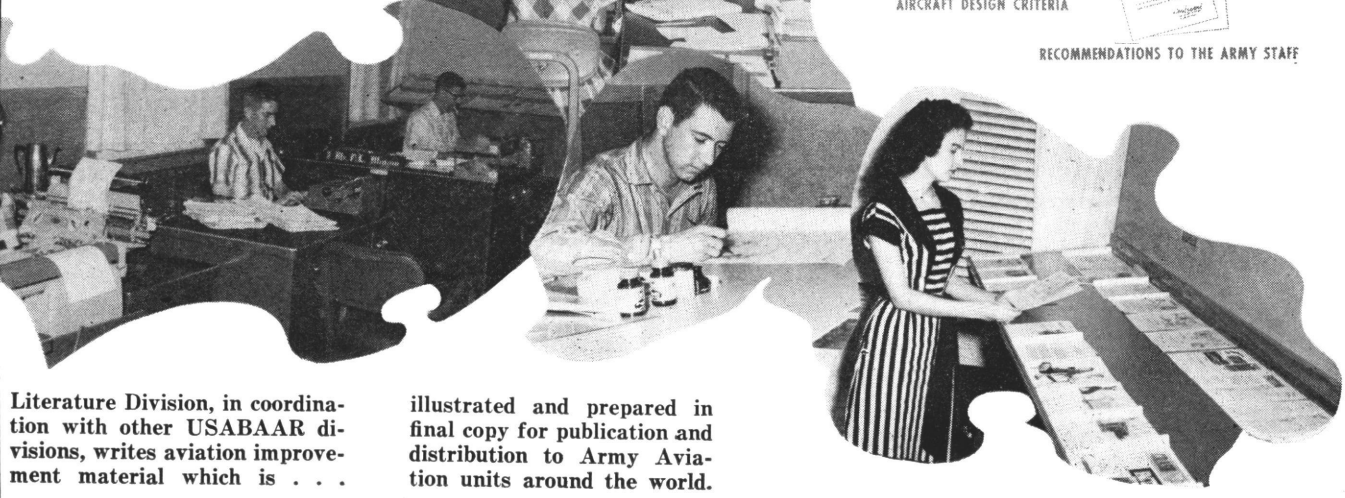
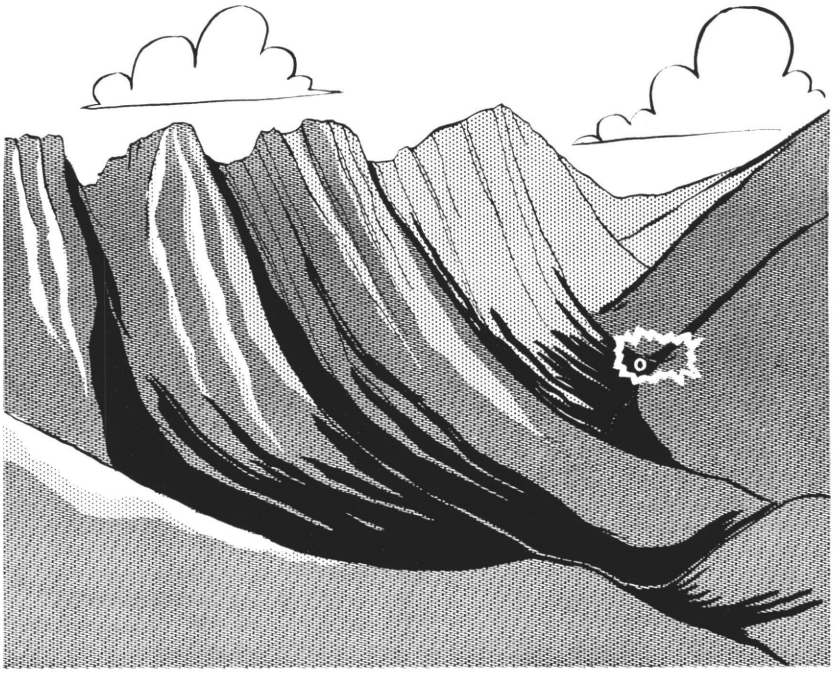


Administration Division is the housekeeper for USABAAR.



Literature Division, in coordination with other USABAAR divisions, writes aviation improvement material which is . . . illustrated and prepared in final copy for publication and distribution to Army Aviation units around the world.

To Stay Or Not To Stay?-II



Fred M. Montgomery

• Number Three of a Series

THE HISTORY OF Army Aviation is marked with accidents in which the survivors had to decide whether to remain with or leave the crashed aircraft. This survival story, permeated with courage, frustration, physical discomforts, initiative, and most important of all, the will to live, provides one answer.

The Saturday mission of this Bird Dog pilot, accompanied by a native Columbian engineer, included flights over the jungles of Columbia, South America, to map and survey the terrain. Their task was to mark triangulation stations and directions with aluminum strips dropped from the air for ground crews. Their objective was a mountain peak 6,000 to 7,000 feet high some 60 miles inland and 100 miles northeast of their station. They took off at 0600 hours in bright sunshine with unlimited visibility. There was no trouble en route to the mountain top, and the first phase of their job was quickly accomplished without incident. After marking the top, the pilot noticed a canyon a few hundred yards to the east, which seemed to be about 7 miles long and about 2,000 feet deep. It was uncharted, so he decided to mark it with the strips.

As he dropped the Bird Dog over the crest and started down into the canyon to place his markers alongside a small stream, he noticed that the walls were precipitous and offered no refuge for an emergency landing. He was confident, however, that the 213 hp engine was sufficient to get him out of trouble, even in the still air of the canyon floor.

He dropped his markers and pulled back on the stick to start his climb out. Nothing happened! Either a sudden downwind had caught him, or the engine was not powerful enough. Suddenly, straight ahead appeared the sharply inclined wall of the canyon. He

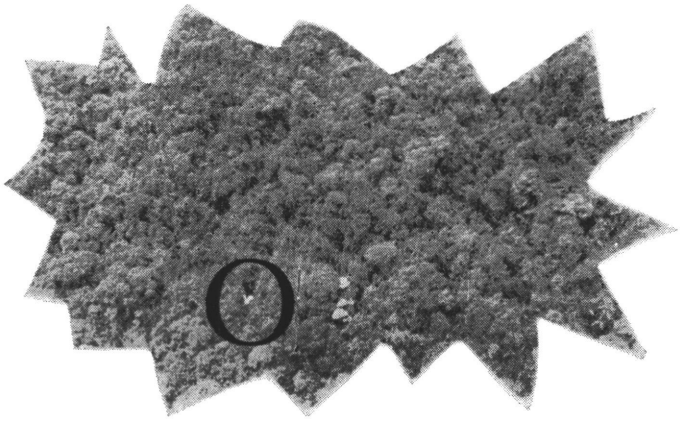


Photo taken about 1,000 feet above jungle. It was possible to sight wreckage only from this angle. The trees were over 100 feet high.

was flying in a blind alley! He frantically searched for an opening through the thick jungle trees below. He had only one chance: throttle back to stall speed and, just at the last possible moment, set down in the treetops. Maybe with a lot of luck he could make it! His angle of climb was about 45° as he cut the switches. At about 55 mph the right wing struck a tree, and the aircraft spun 180° back to the right. Now the nose was pointed downward at a 45° angle. The aircraft momentarily came to rest in the treetops, about 100 feet above the ground; then it plunged through the branches to the earth below. As if to hide this interloper that had so brazenly invaded the serene majesty of the jungle, the tree branches closed over the aircraft, and it was almost impossible for its two occupants to see the sky above; in fact, the plane was never found.

The impact ruptured the fuel tanks. As they smelled the gas fumes, the two survivors quickly abandoned ship, neither man suffering injury. As soon as the danger of fire was over, they returned to the aircraft and removed equipment and survival kits. The time was 0730 hours.

For an hour they sat in silence, each man engrossed in his own thoughts. The native spoke only broken English and was not much help as a conversationalist. The pilot realized that he would have to take the initiative and make the decisions. Even though this was his first flight of this nature, he had been briefed carefully before leaving base. He was reasonably sure about their location. Although his ETA at base was 1000 hours, he realized that it might be the following morning before rescue planes could begin search. Later he stated that his subsequent rescue was due in large measure to his crew chief who, when he realized the Bird Dog was overdue, had demonstrated unusual initiative in helping get rescue operations underway.

The pilot had not sent out emergency calls before the crash, and now, because of the leaking gasoline, he feared that any attempt to transmit over the aircraft's radio would cause static electricity and possibly a fire. A check of their survival gear showed they had: A .45 caliber pistol with an ample supply of birdshot ammunition; signaling mirror; utility jackknife; machete (the pilot had been on base less than a month, but he had already instructed his mechanic to attach a machete scabbard to the door of the Bird Dog); mosquito headnet; canteen assembly, emergency sustenance, plastic; two vest assemblies, emergency sustenance type C-1; wrist compass, type L-1 (this never did work); first aid kit; book matches (that he could never get to burn); Halzone tablets for purifying water; two railroad type flares (that he could never ignite); two packages of candy in each kit and two bars of candy plus gum; insect repellent; radio set AN/URC-4; fishing kit, survival ; and a whistle.

In addition to the above survival gear, each man had his parachute. The pilot was wearing a lightweight flying suit and low-quarter shoes, clothing which proved inadequate for his 4-day survival in the jungle.

The pilot's decision not to remain with his crashed aircraft was based on the following factors:

1. He was familiar with the area. At least he had studied the area of operations to the extent that he knew his approximate location.

2. His physical condition

(and that of his companion) was excellent.

3. The overlapping branches of the 100-foot high trees made it extremely unlikely that the aircraft could be seen from the air.

4. At that particular season of the year, visibility was good for a relatively short period each day. Already, at 0830 hours, big cumulus clouds were appearing overhead. Before long he could expect zero visibility and slashing rain. Such conditions limited effective search to 3 or 4 hours per day.

5. If he stayed with the aircraft and was located, there was no place for a helicopter to set down. Those 100-foot high trees with entwined branches would obstruct any rescue attempt.

6. He felt that their food supply was ample for three or four days. Plenty of fresh cold water was available from the mountain stream.

WATER ROUTE EASIEST

The easiest way to get through jungle country is by water. This is the route the pilot used. Also, since there is habitation along water routes, he hoped to find a native village the following day. As they left the scene of the crash, each man carried his parachute; but after 2 hours of difficult walking in knee-deep water along the river bed and the stifling heat, they discarded these weights. They popped the chutes and spread them out along the stream, using limbs of trees and rocks for tie-downs, but unfortunately these usually excellent markers were never seen by rescue teams. Each man had time to regret leaving the chutes during the extremely cold nights when they had no way to keep dry or warm except to sit back-to-back.

The rains came every night and added to the discomfort of a million stinging, biting gnats, flies, and mosquitoes. The insect repellent was a blessing to the exposed parts of their bodies and the hat with mosquito net helped protect face and neck, but huge green flies bit through the lightweight flying suit. The low-quarter shoes were not made to give support to the ankles when walking through rough, stony mountain streams; consequently, after 30 minutes of slipping off hidden rocks, the pilot's feet and legs were bruised and painfully sore.

As they traveled down the stream, the pilot placed pieces of his underwear on rocks and embedded logs in the stream. These markers were never seen, and the clothing would have helped keep him warm at night. Occasionally, the stream became so turbulent that they had to leave it and hack their way with the machete through the heavy jungle growth. Crawling on hands and knees proved the fastest method of traveling on land. Even when traveling in the stream, progress was slow. Their estimated rate was 2 or 3 miles per day. Huge spiders gave them many a frightened moment, but they never saw a snake or other predatory animal.

Their first night in the jungle is typical of the discomforts they suffered. They found a cave alongside the stream and crawled up under its protecting overhang. For a while they were cozy. Soon the rising stream, caused by heavy rains, flooded their sleeping place and forced them to seek shelter under the roots of an overturned tree. To keep warm they sat back-to-back. They slept fitfully and wished for their parachutes.

Each man ate two, sometimes three, pieces of candy at mealtime. At first the pilot used the Halzone tablets to purify the water from the stream, which he carried in the plastic bags. Later he realized that the danger of its being impure was not great, since there was no habitation along the stream. Finally he drank water straight from the stream, just as the native had been doing all the time.

RESCUE FRUSTRATED

Late in the afternoon on the second day, they heard and saw aircraft through the tiny openings in the trees. They tried to build a fire, but the wood was so soggy that it was impossible to ignite. The two flares were too wet to be ignited either. There was not enough opening through the trees for the pilot to use the signaling mirror. These frustrating events made him more determined to move on downstream to a wider point where they would have a better chance of being seen.

Late Sunday afternoon they reached a place where another small stream entered into the one they had been following. This merger created a wider and deeper stream; here they could actually see the sky above. They scanned through the fading light for rescue aircraft, but again the clouds were forming for the nightly deluge. They were so exhausted from the day's journey that they were unable to cut limbs and fronds for a lean-to shelter. That night was spent huddled

back-to-back in a torrential downpour. The temperature must have been in the mid-fifties.

As the pilot sat there he recalled the heartbreaking trip of the past few hours. The stream was waist to shoulder deep, and at one time he had thought of using a log to float downstream on. He had rejected the idea immediately. The stream was a succession of swift, vicious rapids that suddenly plunged over waterfalls up to 300 feet high. They would walk over the stony bottom for a few yards and come to a place where the stream cut through solid rock. It was either crawl through the jungle or risk being swept away, so through the jungle they had hacked their way around the protruding rocks.

Monday morning was bright and sunny. As they stretched, each grimaced with pain as their bones and muscles, sore and stiff, rebelled against this unnatural treatment. After munching some candy, they started their third painful day on the slow march out of the jungle.

They were so intent on picking their way over the rocks that they were almost upon the hut before they saw it. It was an old abandoned shack, just about 100 yards from where they had spent such a miserable night. No one was around. They blew the whistle and shouted until they were hoarse. The pilot was now convinced that his decision to leave was justified. This was the first sign of habitation; surely others were in the vicinity. Sight of the hut gave them renewed strength and confidence.

What was that? Faintly, the sound of an aircraft was caught on the still air — and there it was! Quickly the pilot started talking on the radio from his survival kit. Why don't they answer? Don't they know the emergency frequency? Several times the plane circled, and the flashing signal mirror must have hit the pilot of the plane smack in the eyes. Rescue was near; but no, not this time. Exhausted, the two stranded men watched unbelievingly as the Bird Dog disappeared. The excitement left them limp, so, earlier than usual, they ate the last candy from the ration kit. If they were not rescued before the day was over, they would have to forage for food.

About 3:00 in the afternoon, they came upon a native panning for gold. He did not speak English but, through the native Columbian engineer, they were able to tell him what they needed and wanted. Soon they were eating baked bananas and drinking cocoanut milk. How deliciously different from their late menu of candy bars and water! Later, about dark, the golddigger took them by dugout on a hair-raising trip down the river to a mining camp at the confluence of a larger river. The pilot contacted authorities by telephone who informed him rescue helicopters would arrive that night at his home base. Tomorrow, after four days in the jungle, they would be packed up.

Early the following morning they started by boat on a half day's journey to the nearest airstrip. As the pilot left the mining camp, he asked the personnel to make a huge arrow on the ground, pointing in the direction of the airstrip. This signal would tell the rescue team where to pick him up. Two hours later, while he was still on the river, a Bird Dog appeared and dropped a message to him in a waterproof container. He was able to contact the rescue people with his radio, and within a short time there were several aircraft overhead. A Chickasaw lowered a sling, and shortly afterwards the two men were safely on their way back to command headquarters.

Since the aircraft crashed in an almost inaccessible spot, no attempt was ever made to salvage it. Several times while flying in that area, the pilot tried to locate the exact point where the Bird Dog had crashed through the trees, but to no avail. Had he remained with the aircraft, would his fate and that of his passenger have been that of the Bird Dog?

Four-day jungle ordeal about over

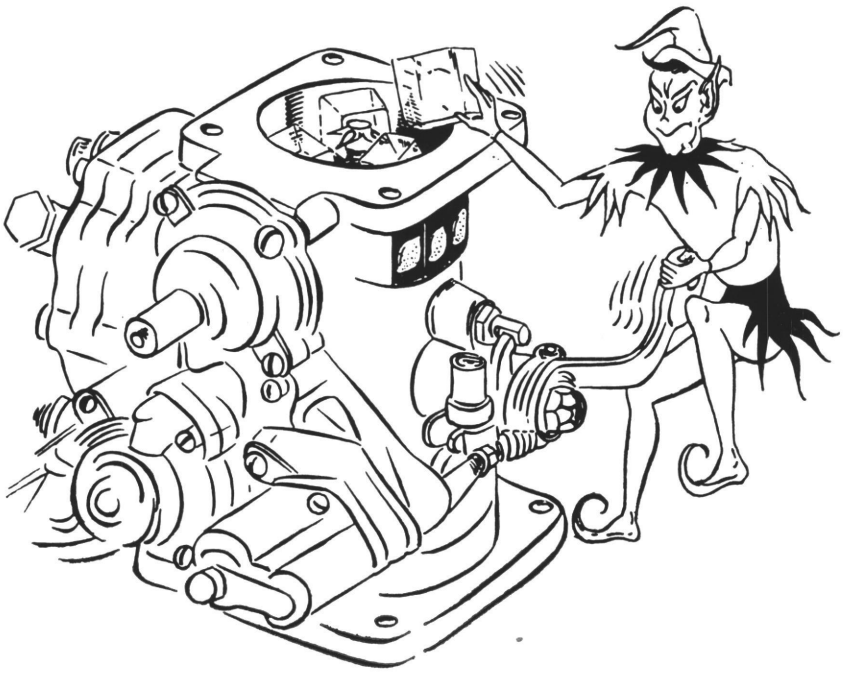
BABY, IT'S COLD

INSIDE!

THE STORY IS TOLD of a penniless artist living in an icy Paris garret. In desperation one frigid night, this man dreamed up a fool-proof system for cheating the gas company. He made a clay mold in the exact shape of the coin required to operate his gas heater. Filling the mold with water, he placed it outside on the window sill until the water froze. He then used his ice coin to turn on the gas and warm his room. Through the rest of the winter, this artist enjoyed the cheery warmth of free gas heat.

Officials of the gas company soon became suspicious when the collector returned time after time with no money from the coin box. They called in their most efficient inspectors, checked for leaks, and took the metering device apart. But all their efforts were in vain. The artist continued making ice coins, and enjoyed his heater.

Aviation gremlin at work on carburetor



The gas company inspectors grew apoplectic in frustration. Finally, in desperation, the gas company offered the artist a large sum of money to reveal his secret. Otherwise, they would never have been able to prove how the system worked.

Unfortunately, aviation gremlins learned the secret of the young French artist. To this day, they have applied it to the carburetors of unwary airmen. Like the gas company inspectors, aircraft accident investigators have been continually frustrated by attempts to prove carburetor ice as a cause for accidents. The evidence always melts and disappears before it can be seen and photographed.

Aircraft accident reports still list **SUSPECTED** carburetor ice.

An ingenious method for providing absolute proof of carburetor ice was once devised at Fort Sill. Aviators had been experiencing symptoms of carburetor ice in L-17 aircraft. It had been claimed that the carburetor of the L-17 was so designed that ice could not form. On a day when atmospheric conditions made icing strongly probable, an aviator took an L-17 up and stayed over the field until icing symptoms occurred. He then landed the aircraft and taxied quickly to where mechanics waited with CO_2 bottles. These men opened the cowling, sprayed the carburetor with CO_2 to keep it cool and removed it. Sure enough, there was no ice in the carburetor. **But in the induction tube,** ice had formed to a thickness that would not allow the

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This article was prepared by the United States Army Board for Aviation Accident Research.

passage of a thin pencil. Here at last was proof positive!

After this, doubting Thomases could no longer disclaim carburetor ice as an accident cause factor. Ice has formed and will form in the induction system of any aircraft under certain conditions of temperature and humidity.

A Bird Dog pilot retarded his throttle to 1,500 rpm and let down to 300 feet to look for a ground party. He located the party and applied throttle to climb. The engine continued to operate at 1,500 rpm. All efforts to increase power failed, and the pilot went through normal forced landing procedures. He chose an abandoned railroad, the only open spot available, for an emergency landing. The aircraft was heavily damaged during the landing.

"It would appear that reported loss of power . . . would be from fuel restriction . . ."

All engine components were checked in the subsequent inspection. The carburetor operated in a normal manner, within limits, on a flow bench test. **WATER WAS ALSO PRESENT IN THIS UNIT.** The engine inspection report stated: "It would appear the reported loss of power on this engine would be from fuel restriction, probably in some other location in the fuel system or **from ice accumulation** in the induction system."

In another accident, a Sioux was found crashed and heavily damaged in a wooded area. Wreckage evidence proved that the helicopter crashed while no power was being delivered to the rotor blades. A complete teardown inspection of the engine revealed no malfunctions in any component. Statements from several pilots flying in the same type aircraft nearby indicated they had found it necessary to use carburetor heat to prevent ice formation during the time of the crash. The carburetor heat control of the crashed aircraft was found in the full cold position.

Here are two instances in which carburetor ice most probably caused the accident. There is no concrete proof because the ice melts and the small traces of water residue are usually hard to find. Many other instances indicate the same cause.

What can you do to stop this cause factor from becoming an interruption to your flight?

Your foremost thought concerning carburetor ice should be of "prevention" rather than "cure." Carburetor ice which has already formed is like a horse in the woods—it is a little late to think about heat or locking the barn door. You can sometimes chase down a horse or burn out the ice, but if either has gone too far, you're in trouble. Your heat was designed to prevent, not to cure!

Then it logically follows that your next interest should be in determining what conditions cause carburetor ice. Here, temperature and humidity are your keys. Carburetor ice can form at any temperature above —10°C. if there is enough moisture in the air (this includes 80-90°F. summer heat). Ideal conditions for the formation of carburetor ice are high relative humidity and free air temperature near 15°C. to 20°C. Below —10°C., carburetor heat is your enemy. If you use it, you may raise the temperature to a point where ice will form. Humidity is the amount of moisture in the air. The dewpoint temperature is the temperature at which the air becomes saturated with vapor, and at which moisture content condenses out. The higher the humidity and the more moisture in the air, the more likely is the formation of carburetor ice.

Carburetors are, in effect, small but very efficient refrigerators. Their function is to change gasoline from a liquid

Carburetor heat control was found in full cold position

state to a vapor. This process requires a great deal of heat. Some of this heat comes from the liquid gasoline but most of it comes from the air passing through the carburetor.

The average temperature decrease in an aircraft engine carburetor is about 40°. Reduction in temperature squeezes out the moisture from the air just the same as you might squeeze water from a sponge. This moisture is cooled by the low temperature and forms ice. Under the right conditions, ice can form in less time than it took you to read this paragraph.

We can divide carburetor air into two classes: air with a temperature/dewpoint spread which is greater than the temperature drop in the carburetor, and air which has a temperature/dewpoint spread less than the temperature drop in the carburetor. With the first type of air, carburetor ice will not form. With the second type of air, carburetor ice will form if the temperature in the carburetor is below 0°C. Carburetor heat for all carburetors is designed to raise this temperature above freezing and prevent the formation of ice. Since most aircraft do not have equipment for measuring dewpoint temperature, the best rule is: **WHEN IN DOUBT, USE CARBURETOR HEAT!**

ICE DETECTION

In spite of all previous warnings, if you should someday find your carburetor giving you the cold shoulder, there still isn't too much sweat if you detect it soon enough. In this event, get the heat on to melt the ice and prevent more from forming.

What are the clues which tell you that carburetor ice is forming?

For fixed wing aircraft with a fixed-pitch propeller, you'll note a loss of power and drop in rpm, followed by engine roughness and eventual fuel starvation if permitted to progress. In those fixed wing aircraft which are equipped with constant-speed propellers, carburetor ice will gradually steal away your manifold pressure. Any time it is necessary to keep opening the throttle to maintain a constant manifold pressure setting is a good time for you to become suspicious.

Contrary to popular belief, ice may form in the 0-480-1 engine induction system **without causing any noticeable drop in manifold pressure.** The first indication of induction ice in this case may be rough engine operation.

Ice in helicopter carburetors is more acute. Where fixed wing aircraft have propellers which tend to keep the engine turning, helicopters are equipped with freewheel one-way drives. The whirlybird engine has no inertia to keep it running. Thus, the chopper driver has a reason for being even more cautious.

Icing indications, in their probable order, are: loss of rpm when flying with throttle and collective at constant settings; engine roughness; decrease in manifold pressure; sticking throttle valve and surface icing of the aircraft. The best way to get rid of ice is by using full carburetor heat. If this is done soon enough, ice will melt in a short time. From then on it is up to you to keep the carburetor air temperature high enough to avoid ice formation.

In the event you fail to recognize conditions likely to cause carburetor ice formation, we earnestly recommend that you select a nice level open spot!

Army Aviation

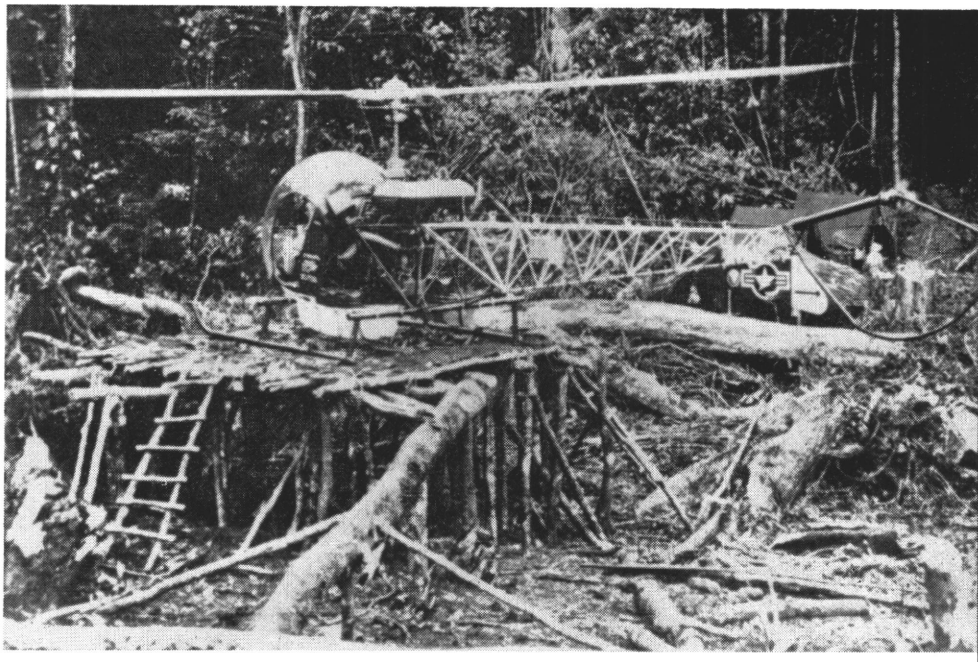
SUPPORT

for IAGS

FROM MEXICO to near Cape Horn on the tip of South America—an area of over 8 million square miles—is the "beat" of pilots and aircraft of the 937th Engineer Company (Aviation) (Inter - American Geodetic Survey), with headquarters in the Panama Canal Zone. Forty-two authorized fixed-wing aircraft and helicopters range over this huge area, providing aerial support for the Inter-American Geodetic Survey's collaborative mapping program.

Because of the far-flung activities of the organization, logistical support is a constant challenge. Aircraft assigned to the company daily fly throughout Latin America transporting survey crews, supplies, and equipment to remote and nearly inaccessible mapping areas. With the limited landing facili-

Aircraft operate from airstrip (?) at sea level . . .



This article was submitted by the Public Information Office, Headquarters United States Army Caribbean.

to altitudes in excess of 10,000 feet

ties available in most areas of operation, this type of flying requires considerable skill and courage.

Aircraft of the 937th Engineer Company operate from airstrips at sea level to altitudes in excess of 10,000 feet. For example, in Ecuador a pilot may take off from Esmeraldes at sea level and less than two hours later be landing at Quito at an elevation of 9,236 feet. In Peru, a pilot may take off from an arid desert strip at sea level and in crossing the Andes reach a flight altitude of over 15,000 feet to let down again to sea level in the hot, steaming, rain forests at the headwaters of the Amazon. These conditions are not restricted to South America, for in Guatemala a pilot can take off from Puerto Barrios at sea level and may reach altitudes in excess of 10,000 feet before landing at 4,929 feet in Guatemala City.

One can easily see that with the diversified terrain and climatic conditions, plus the inconsistency of weather, to say nothing of the dry season's smoke hazards, pilots of the 937th Engineer Company certainly encounter almost every flight condition imaginable.

The normal workday activities of the unit have at times been lengthened to include such missions as medical evacuation and search and rescue. As a matter of illustration, a malaria-stricken soldier on the Island of Coiba, Republic of Panama, was evacuated by an L-19. The plane took off late in the afternoon en route to Coiba, made the pickup, and by 8:00 p.m. that same day the soldier was in a Canal Zone hospital for treatment.

The 937th Engineer Company (Aviation) was originally organized as the 537th Engineer Aviation Detachment at Fort Belvoir, Virginia, on 26 May 1952. Its mission: to provide air support for IAGS (which had been in operation in Central and South America since April 1946).

Since the unit was activated to furnish air support to IAGS, as IAGS grew so did the unit. The unit began with nine officers, ten enlisted men, and seven aircraft. Today, the organization numbers 50 officers, 109 enlisted men, and 42 aircraft.

The types of aircraft used by the 937th Engineer Company (Aviation) are L-19, L-20, L-23, and U-1A "Otters"; H-13H, H-23 and H-19. The H-13H aircraft were only recently received by the unit.

During the past few years, the mission of the unit has been greatly accelerated. Its aircraft now accomplish low-altitude photography, picture point control, rapid movement of precision instruments from one area to another, vital supply drops, and enable the project officer-in-charge to be physically in contact with his ground forces at all times.

Because the unit operates its aircraft over such a wide area, encompassing such a large number of countries, it is quite obvious that it can be of great assistance to host countries in cases of emergency or national disaster.

Medical, food supply, and evacuation missions were flown for Honduras, Colombia, and Costa Rica during times of national disaster when portions of these countries were overrun by flood waters.

On two occasions in Guatemala, two missing aircraft were located by aircraft of the unit. In the case of a downed Guatemalan airliner, not only were the unit's aircraft stationed in Guatemala utilized, but also a H-19 from the Nicaraguan project was flown to

Conditions for minor maintenance spans the gap from "good" . . .

Guatemala for survivor evacuation.

More recently, a missing civilian helicopter with three Americans on board was sighted by one of the unit's L-20s stationed in Guatemala. In South America, when an American Navy aircraft was reported down, a H-19 stationed 150 miles away was on the scene to assist in evacuating survivors within hours after the wreckage had been sighted.

Aircraft of the 937th Engineer Company assigned from San Antonio, Texas, (in support of the IAGS Mexico project) to the far reaches of South America are maintained in the field by enlisted mechanics. When more than minor maintenance is required, aircraft are returned to the Canal Zone where they are turned over to specialists of the Transportation Section, United States Army Caribbean, who perform all fourth echelon repairs.

Major rebuild and overhaul work is accomplished on all aircraft every two or three years by SALA, a civilian contract firm located in San Jose, Costa Rica.

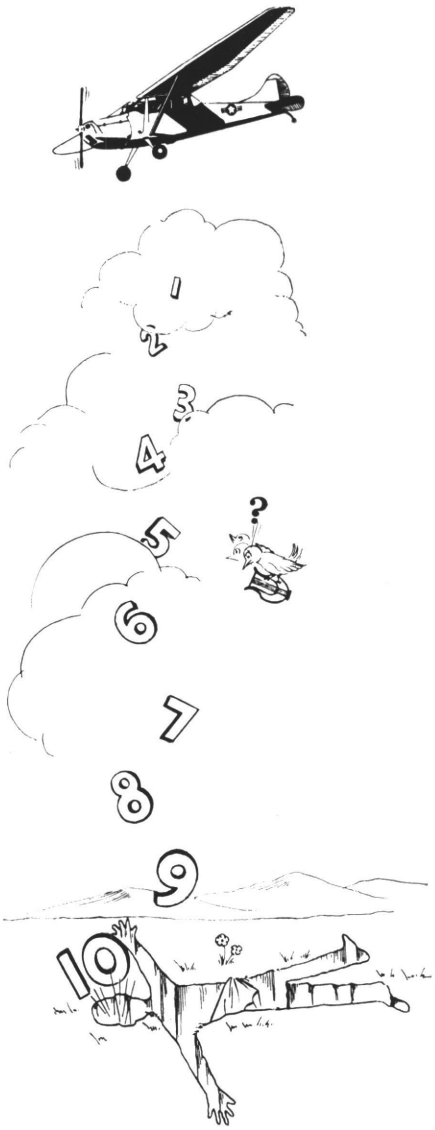
Constant communication is maintained with most of the projects through a radio network whose main station is located in the company's headquarters at Fort Kobbe. Operational orders, requisitions for supplies, and flight control are but a few of the items which comprise the traffic of this busy network.

While any member of the unit readily agrees that the U. S. Army Aviation School training is a rough course, it can never compare to the flying ability needed in Central and South America. The fact that these pilots accomplish their jobs proficiently speaks well for their fundamental training. The members of this organization, like most Army Aviation units everywhere, are close knit, despite the great distances which separate them most of the time.

Flying in Central and South America is not easy work. Maintaining the aircraft under the world's worst conditions is a never-ending battle. But, the members of the unit are keeping pace with IAGS—giving that activity the aerial support it needs when it needs it.

to just a little bit better

How BRUT-al Can We Get!



Re "Don't Be A Brute With Your Chute" in our April issue, page 22, paragraph 1, column 3 should read, "The average rate of descent for a person weighing 200 pounds **WITH OPEN CHUTE** is 1,000 fpm or 16 fps."

The FREE FALL rate of descent is about 32 fps. The following formula is used to get the distance of a free falling body: $d=16\ t^2$ in which "t" is the time in seconds. In our problem we find that 16 multiplied by 10 (seconds) squared equals 1600; therefore, the man who waits 10 seconds to pull the ripcord after bailing out at 2,000 feet would have 400 feet under him when he pulled the ripcord. He would have precious little time to prepare to hit the ground.

Thanks to Mr. Jack E. Fairchild, Aviation Safety Division, University of Southern California, and to Capt John B. Keeley, Department of Social Sciences, United States Military Academy, for their letters spelling out our error.

Congratulations also to all the "chute-wise" flyers who called us about this matter. We believe they will never be troubled about bailing out, how to use their chutes, or when to jerk the D-ring!—The Editor

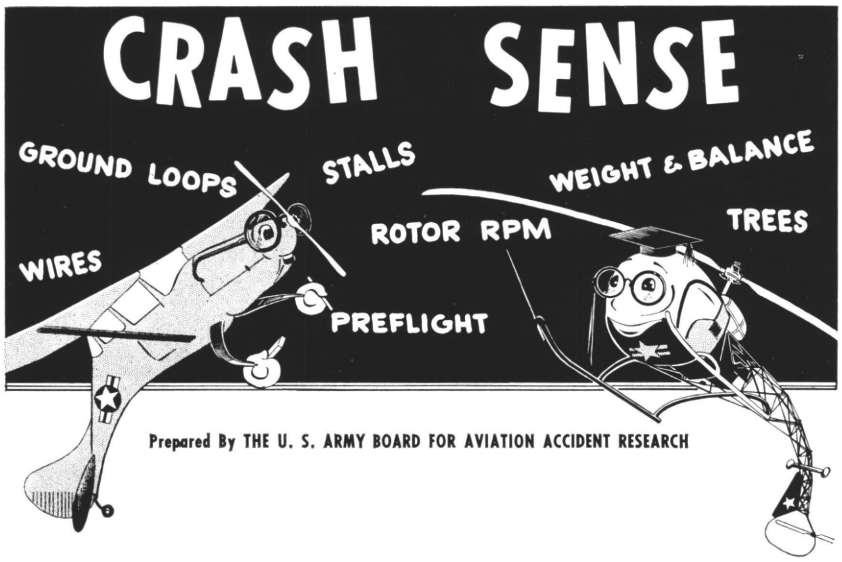
Solution To Puzzler

On the basis of the factual information contained in the PUZZLER on page 7, the recommended solutions are as follows:

c. LOSS OF COMMUNICATION — ARRIVAL AIRCRAFT UNDER RADAR CONTROL: If the pilot experiences loss of 2-way communication after leaving the outer fix **under radar control,** the pilot of such arriving aircraft will be expected to proceed direct to the ILS outer marker/compass locator, or to an approach facility serving the airport, and execute an instrument approach. The required separation between such aircraft and other aircraft in the area will be provided on the basis that the aircraft which has experienced the radio failure will effect a landing as soon as possible and radar will be used to control other aircraft accordingly.

If the instrument approach cannot be successfully completed for any reason (such as weather), the pilot will be expected to comply with any instructions issued previous to radio failure or execute a missed approach. **Standard radio failure procedures shall apply in any case of 2-way radio communications failure other than those outlined in this paragraph.**

For further discussion, see Airway Traffic Control, TM 11-2557-1, page 20.



SHORT SLEEVE WEATHER is fine for open-air living, bringing swimming, picnics and tops-down convertibles. Shorts, halters, and bikinis bring exciting and pleasant viewing along the water fronts. For aviators, this is the season that brings the clouds with bumpy linings.

A Shawnee flew into an unreported thundershower shortly after takeoff. The pilot turned in all directions, seeking a route that would take him out of the showers. He was unable to find a clear area in any quadrant. He faintly saw what appeared to be a level field below, and attempted to land. As he neared the ground, visibility became worse and the aircraft gained excessive airspeed. The pilot aborted his landing attempt, began a climb through a low cloud bank and saw trees directly ahead. He jerked the Shawnee's nose up with aft cyclic, and immediately the aft rotor blades struck tree tops. The aircraft rolled to the right and the forward rotor blades struck other trees and began to disintegrate. The aircraft continued rolling to the right and struck the ground; it was completely demolished. The pilot was killed; the copilot and crew chief were severely cut and bruised.

Scratch 1 pilot and 1 aircraft

A Bird Dog pilot, flying to make a passenger pickup, encountered severe turbulence and rain. He called a nearby airfield tower and was advised that a 180 would carry him into a clear area. He was given a heading to another airfield where the weather was expected to clear. The aviator turned to this heading and called the other airfield. He was advised that weather at this airfield was below minimum; so he turned to a reciprocal of his original course. He acknowledged directions to report his position when clear of the storm. This was the last word transmitted. The aircraft was found destroyed in a wooded area; the pilot was killed.

A 3-3 Bird Dog aviator found himself surrounded by weather during a cross-country flight. It became impossible to continue VFR flight, and the aviator climbed into rain and low scud hoping to get enough altitude to clear the hilly terrain and make a 180. He saw the ground again in a few moments, just as the right wing struck a tree. The right wing and nose dropped; the aircraft hit the ground, cartwheeled, and came to rest. The Bird Dog was a total loss, and the passenger received serious injuries. Fortunately, the pilot escaped unhurt.

All morning the weather had been holding fairly constant

"Pilot was advised that weather was below minimums . . ."

with a 1,200-foot ceiling and 3-4 miles visibility. Suddenly, the Bird Dog pilot found that the ceiling and visibility were dropping rapidly. The clear area in which he had been flying closed in on all sides; he flew first in one direction and then another, attempting to avoid the turbulence and showers. He found a small valley where the possibility of a landing seemed good and announced that he was landing. He made a left base, turned final, lowered 60° flaps, and chopped his power. The aircraft approached the ground, and the pilot began his roundout. His next clear impression was of hanging upside down in the wrecked aircraft.

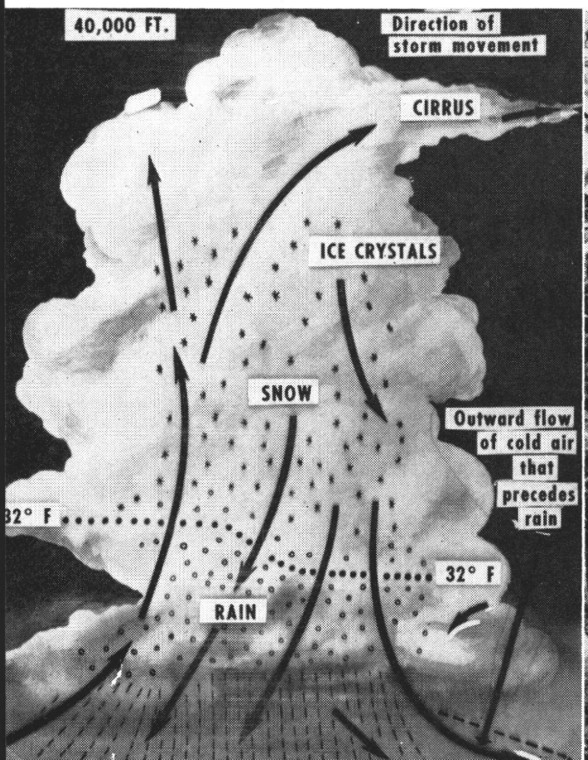
Thunderstorms are treacherous. A few puffy cumuli clouds can rapidly build into a 6-mile wide, 40,000-foot trap of violent turbulence. When several of these traps get together, the unwary aviator is caught. The dangers in thunderstorms are many: sudden wind shifts can destroy lift momentarily, and sudden drops in temperature will affect engine performance; updrafts, downdrafts, heavy rain and low scud are a few of the dangers. The most important thing to learn about thunderstorms is to stay away from them.

PILOT ERROR?

DA Form 285, 7a Primary unsafe act: **PILOT ERROR.**

The accident: Winds were gusting north northwest 22-30 kt. There were scattered clouds at 7,500 feet and visibility was unlimited. The

Thunderstorms? Stay away from them!



Pilot flew first in one direction and then another, trying to avoid turbulence

Raven pilot made his approach for landing on the leeward side of the ridge. He began his flare and the tail rotor struck the ground and began to fly apart. The pilot applied power and pitch as he felt the vibrations. The helicopter remained airborne and started to spin. He quickly closed the throttle and released pitch, but the aircraft continued to spin and landed violently on the skids after two turns. One main rotor blade struck the hillside. The Raven was heavily damaged and the pilot suffered cuts and bruises.

A tired pilot . . . gusty winds . . . a heavily damaged Raven

PILOT ERROR?

Now, let's look further into the accident report. We find that this aviator had risen at 0400 hours and flown for 4 hours with only a fuel stop. The flight surgeon stated that the aviator showed a marked degree of fatigue before and after the accident.

DA Form 285, 7a Primary unsafe act: **PILOT ERROR.**

The accident: A Beaver pilot planned to land as near as possible on the end of a 1,500-foot strip. He applied full flaps on final and set up a power approach. The aircraft passed over the pine trees at the end of the strip and began to settle. The pilot immediately shoved his throttle forward, but too late to prevent the stall. The aircraft hit the ground 100 feet short of the strip and bounced back in the air. The pilot chopped his throttle; the Beaver settled to the strip, rolled 25 feet, and ground-looped.

PILOT ERROR?

Looking further into this accident, it was found that two helicopters had been parked at the far end of the strip during the Beaver's approach. The psychological effect of two aircraft on the strip might not bother the experienced aviator. It can be reasonably assumed they would have a definite effect on this aviator whose only previous practice in power approaches had been on 3,000-foot fields with clear approaches.

DA Form 285, 7a Primary unsafe act: **PILOT ERROR.**

The accident: Another Beaver pilot was cleared to the runway to hold for takeoff. The runway had 1,500 feet of usable space with snow banks on both sides. The pilot received the takeoff clearance, pushed the throttle, and the aircraft began to roll. It veered to the right until the right wheel was at the edge of the cleared portion. The pilot applied left rudder and the aircraft moved back over the runway, crossing the center line. At this point, the left wing came up and the aircraft continued in a right wing-low attitude. It became airborne and the left wheel struck the snow bank on the left side of the runway. The propeller began striking the top of the snow bank and the right wheel dug in. As the wheels sank further into the snow, the aircraft nosed over and slammed into a Shawnee parked near the runway. Damages to the two aircraft totaled $40,000.

PILOT ERROR?

Before his accident, this aviator had accumulated only 12½ hours of Beaver time, half of which had been dual. His last dual flight had been given a month before; he had not completed a check flight or night checkout.

PILOT ERROR — the two most overworked and misunderstood words ever used in describing aircraft accident causes. Accidents labeled in this manner, with little or no effort directed toward finding the reasons **why** pilots erred,

are useless as sources of material for aviation accident prevention. There is a deep prejudice against error, particularly pilot error, in the field of aviation. This prejudice causes errors to be regarded as shameful, to be hidden away instead of being brought out into the open, examined and eradicated.

Error is always a human failure to conform to ideal performance (see "Perfect Pilot," U. S. ARMY AVIATION DIGEST, March 1959). It should always be regarded in the same light as material failure and subjected to the same rigorous examination. There are no **PERFECT PILOTS!**

BUNT OR HIT AWAY

Many are called but few are chosen—to play major league baseball. The star of the high school nine may glitter brightly on the local diamond and dim completely in the majors.

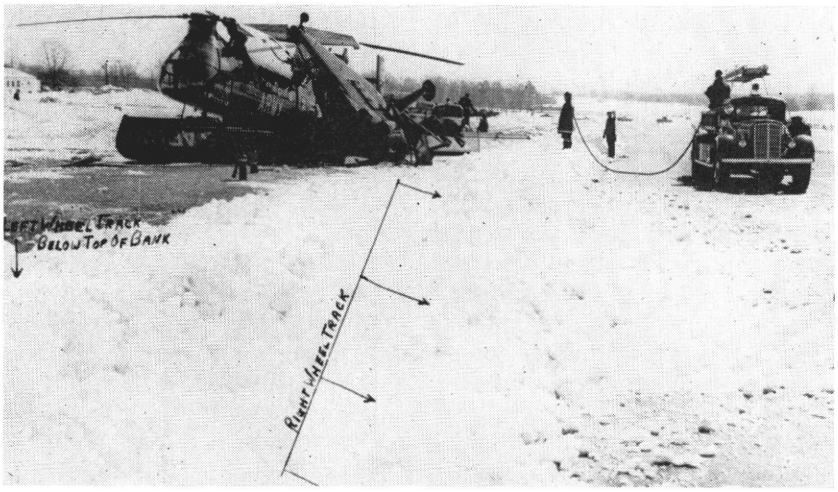
Major league managers usually get the cream of the crop of professional ball players. These are the players who can lay down a bunt, slam a ground ball past second base, or smash a long fly. They are the men who can be called on in a clutch to do what's expected of them. Major league players are real pros.

What makes professional ball players? The answer is training, knowledge, hours, hours, hours and more hours of application and practice. A true professional who is not completely devoted to his field is extremely rare. There are no short cuts to this result.

THREE UP — THREE DOWN

A Beaver pilot was on a local flight to test radio equipment and load meter. After about an hour's flying, he noticed an rpm drop and corrected back to 1,800 rpm. As he pushed the propeller control, oil began to spray over the windshield and other parts of the aircraft. He noticed smoke beneath the aircraft and immediately called the local tower, evidencing excitement by his voice tone and failure to identify himself. He stated that the aircraft was on fire and that he was going to land it.

Inexperienced pilot . . . snow topped runway . . . $40,000 damage



The aviator flew over the installation, determined his wind direction from a flag, and selected a parade ground for his landing. He lowered his side window and attempted to wipe the oil from the windshield with his handkerchief, while setting up a left base leg for the parade ground. On base, he pulled the fuel and oil cutoff, but failed to turn off magneto and master switches. He pumped down approximately 15° of flaps and locked his shoulder harness.

The aviator slipped the aircraft to the left on final approach, touched down hard about half way down the field, bounced back into the air, and continued into the trees at the edge of the parade ground. The left wing caught in a tree and the aircraft spun to the left, struck another tree, and crashed to the ground.

Struck out through loss of composure?

The Raven pilot, with one passenger aboard was flying at 200 feet above high tension wires when tail rotor failure occurred. The aviator could not go into autorotation because of the wires below, and the helicopter began a series of flat rotations. The aviator decided to attempt a running autorotation to the highway beside the wires, but lost complete control when he lowered the collective pitch (probably because of damage to the control rotor system as it was struck by the torque tube). The aircraft made an almost vertical descent to the highway, struck hard, bounced forward, turned over, and came to rest on its right side. The aircraft was a total loss.

Caught off base?

A Seminole aviator was un-

able to get a safe indication for his nose gear in flight. He cycled the gear several times and manually pumped it down, then made two low passes over the field for ground personnel to check the nose gear. It was determined that the nose gear was not in the down locked position, and the pilot was directed to another airfield where better crash rescue equipment and runways were available.

The aviator flew to the other field, entered normal traffic, and made his landing approach with main gear down and locked. He made the approach with power and touched down on the main gear. After rolling 500 feet, the nose gear touched down and collapsed. Sudden stoppage of both engines resulted when the propellers struck the runway. Damage to the aircraft totaled $19,000.

Too much power for a soft bunt?

These are three examples in which prior knowledge and practice could have minimized damage to the aircraft.

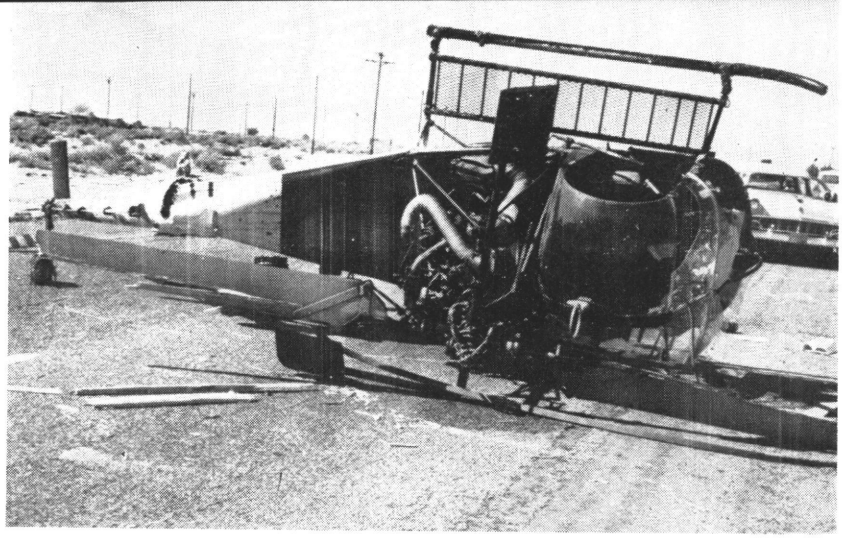
The Beaver pilot became excited from oil spillage and smoke. He selected a small parade ground for his landing, yet used only 15° of flaps and failed to complete a cockpit check. Actually the aircraft was never on fire. He had ample time to select a better landing spot and complete a safe landing.

The Raven pilot was on a service flight which did not require flying at 200 feet above high tension wires.

The Seminole pilot did not comply with emergency procedures as specified in the handbook. Landing with power caused unnecessary damage to both engines.

Any average ball player can play on a winning team. But when the chips are down in the last of the ninth and the opposing team is two runs ahead, the manager calls on the old pros. He knows that their actions at the plate and on the base lines will be precisely what he calls for.

How will **YOU** fare when **your** chips are down in the last inning? Are you prepared to slam one over the left field wall and slide safely home with the winning run, or strike out?



Pilot attempted running autorotation . . .

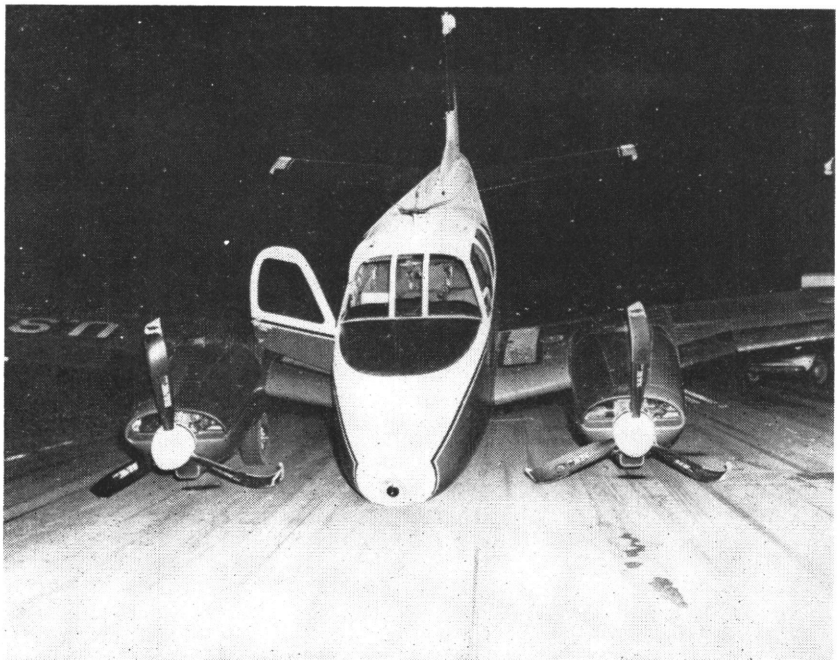
NEAR MISSES

"I was acting as IP and gave a pilot in the front seat of the Bird Dog a simulated forced landing. The approach was made to the west in late afternoon and I failed to see telephone wires. Luckily, we came out with only a nicked prop and a cracked reflector."

Simulated forced landings over unfamiliar terrain, without a reconnaissance, are bad for the nerves. Into the sun, they're bad for longevity.

"I planned an IFR flight to an airport 35 miles away. ATC cleared me to an intersection near the airport and I took off. Arriving over the intersection, I experienced radio trouble and was unable to contact approach control. I set up a holding pat-

Too much power for a soft bunt?



tern and continued calling. After approximately 30 minutes, I was able to contact approach control and was cleared to the field for landing. When I got on the ground, I found another pilot had been cleared along my same route at the same altitude, taking off 20 minutes behind me. When he arrived at the intersection, he was cleared directly to the field at the same time I was holding.

"WHEW!"

"I had just received clearance from the tower for takeoff and was approximately 100 feet from the ground when the left wing began to fall out. I immediately applied right aileron but it did not seem to take effect. I was certain a control cable had broken because I had the stick all the way to the right and the aircraft was still falling off to the left. I dropped 75 feet before the control took effect and I was able to recover and maintain a stable attitude. I wiped the sweat from my eyes and saw a C-130 turning out of traffic."

(See Gray Hair Department, U. S. ARMY AVIATION DIGEST, June-July 1958 issue, for article on wingtip vortices.)

Comment On February Puzzler

TO: EDITOR

Dear Sir:

Reference is made to the article entitled "Puzzler" and the solution thereof, contained on pages 18 and 25 respectively of the February 1959 issue of the *United States Army Aviation Digest*. I take violent and specific exception to the solution and therefore am accepting your invitation to comment.

First, let me state my position. I am a firm believer in aviation safety, but I believe that aviation safety is second to getting the job done in combat.

Your "Puzzler" situation is that the 20th Division has been actively engaged in combat for the past 27 days and is now mounting an offensive with three battlegroups on the line and two in reserve. Considering this basic element (to wit: mounting an offensive), this means to me that the 20th Division certainly will need and require all the aviation support that the aviation company can give them. Therefore, it is not possible at this time to ground all Sioux helicopters for a safety-of-flight modification. My solution to your problem is none of the choices which are given but is as follows:

After learning about the grounding order, I would immediately telephone, TWX, or radio the Army aviation officer to find out exactly why these aircraft were being grounded. I would then use my own judgment as to whether safety of flight was involved. (I say this at this point in time because it is some 12 years and millions of flight hours of operation after the introduction of the Sioux into the US Army, and it is extremely unlikely that any part failure could occur now which would completely justify grounding the helicopters in the heat of battle.)

It is true that we might have a failure which could cost us the life of a pilot and/or passenger. I must also consider, however, that by taking the calculated risk of using these helicopters during this battle hundreds of lives may be saved.

After having satisfied myself that somebody went off half-cocked in grounding these helicopters (or else we wouldn't have received a grounding message under such circumstances), I would then immediately report to the Chief of Staff—and, if necessary, the Division Commander—and recommend strongly that we do not ground the Sioux helicopters. If the Division Commander were not willing to accept this responsibility upon my recommendation, I would then ask him to go to the Army Commander—either by TWX or telephone—and directly request specific permission to disregard the grounding order to the extent necessary to meet essential combat requirements.

* * * * *

Perhaps my exception to your solution would not be so drastic had you stated why the safety-of-flight modification was required and what type of failure had caused the safety-of-flight condition. I feel very strongly, however, that a great deal of judgment must be exercised before action is taken in the field, for any reason, to ground arbitrarily an aircraft that is urgently needed for combat duty.

JACK L. MARINELLI
Colonel, Artillery
President, USA Avn Bd

ARMY'S NEW TRANSPORT HELICOPTER

The U. S. Army has selected the Chinook (YHC-1B) as its new transport helicopter. In announcing its choice in March the Army stated, "The Chinook will be a tandem rotor, turbine-powered craft with rear loading ramp. It will eventually replace the Army's current inventory of obsolescent piston-engine-powered transport helicopters . . .".

Because of changes which may result from continuous research and development prior to delivery of production models, the following information about the Chinook is tentative.

The Chinook is a multiturbine, twin-rotor transport helicopter which fulfills the Army's latest requirements for an advance battlefield mobility vehicle. Features of the Chinook which are lacking in current transport helicopters include:

The reliability and other features of multiturbine engines.

An unobstructed 30-foot long payload compartment with straight-in loading.

Rear loading ramp which can be left open or partially opened, or can be removed for flight. This feature permits transporting of extra-length cargo internally. It also facilitates inflight parachute or free-drop delivery for specialized missions.

All-weather, day-night capability.

Ease of maintenance.

Adaptability for simple installation of special-purpose kits.

In addition, the Chinook retains all the features which have proved desirable in Army operations with the current generation of tandem-rotor transport helicopters, such as:

Large c.g. range, permitting indiscriminate personnel seating and regrouping in flight.

Low rotor downwash velocity.

Excellent hovering characteristics regardless of wind direction.

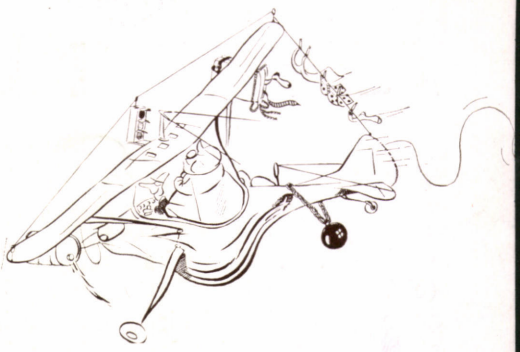
Pilots seats are low in airframe for ease in judging clearance above obstructions.

Rotors high on airframe to permit landing in brush.

Excellent towing characteristics.

It is anticipated that in normal mission capabilities the Chinook will carry 3 tons of cargo 100 miles at speeds above 125 knots at 5,000 feet.

Have We Overgadgetized Army Aircraft?



Learn how one aviator feels about this particular problem and its consequences

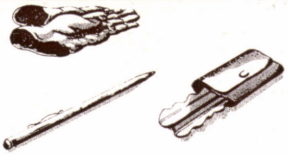
READ "TAKE IT OFF!" PAGE 1

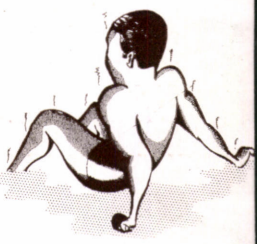
What Went Into The Design Of Army's New 'Copter

The story of time-consuming research and development to produce a modern helicopter is described in

"DESIGNED FOR FRONTLINE SERVICE" PAGE 1

Gloves? . . . Sunburn? . . . Listening Wives . . . ?





You'll be surprised what "Ole Doc" has to say about such sundry subjects in

"MEMO FROM FLIGHT SURGEON" PAGE 16

Flights From Sea Level To 10,000 Feet Are Commonplace For IAGS

You might volunteer for a job with IAGS

PAGE 27

"Perfect Pilot"? Or Was It "Pilot Error"?

These are two overworked descriptions. Does either actually exist? See USABAAR'S comments in

"CRASH SENSE" PAGE 31