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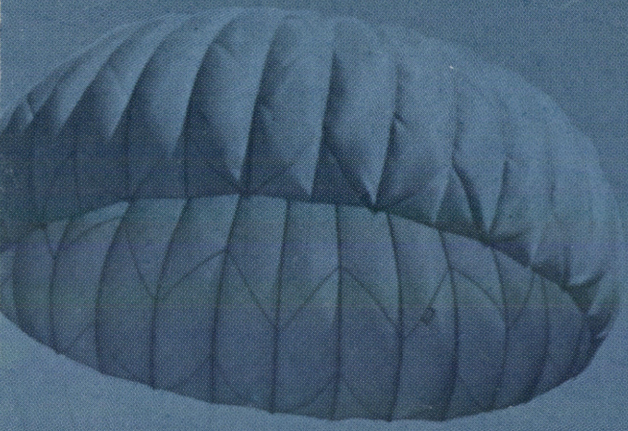

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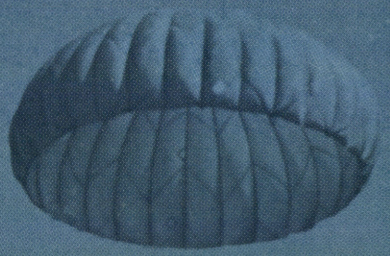

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United States Army

AVIATION DIGEST

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Annual Writing Awards Contest

The U. S. ARMY AVIATION DIGEST will again sponsor an Annual Writing Awards Contest during the coming fiscal year. The prime purpose of the contest is to encourage people interested in the Army Aviation Program to present their ideas or experiences on safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

The contest is open to everyone, but material submitted must be original, and not previously published or submitted for publication in other periodicals. Articles should be approximately 2000-2500 words in length (about 6-7 double spaced typewritten pages). Entries will not be judged on length, typing, or neatness, etc. Only those articles selected as monthly winners will be eligible for the annual cash awards.

Manuscripts will be judged on accuracy, completeness, originality, readability, reader appeal, soundness, substance, and overall merit. Send inquiries or entries to Editor-in-Chief, U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Ala.

Don't forget . . . the new contest starts with the July issue. Get your entry in as soon as possible!

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

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

Unless otherwise indicated, material in the U. S. ARMY AVIATION DIGEST may be reprinted provided credit is given to the U. S. ARMY AVIATION DIGEST and to the author.

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RESERVE COMPONENT ARMY AVIATION

Brigadier General George B. Bennett

A FOUR-ALARM fire does not permit the local fire department time to recruit personnel, procure equipment and train firemen. Bank robbing would become a profitable business if the police departments had similar problems in selecting and training personnel and were required to place their orders for equipment after the bank robbers had made their presence known. Today the Army, and particularly Army Aviation, finds itself in a situation similar to these hypothetical fire and police departments.

Ridiculous analogy? Perhaps not so ludicrous as it sounds, in light of our present worldwide conditions. We have several smoldering sparks on the world scene which could trigger a four-alarm fire very quickly. We have international bandits "casing the joint," so to speak, who have announced their intent to commit larceny and murder the first time they catch our police force looking the other way.

Fortunately, most of our city, county, and state governments have found it provident to recruit and train personnel and procure equipment for their fire and police departments in advance. Our military planning should look at our Army Aviation program in the same light, with proper consideration for the leadtime required in both training of qualified personnel in increasingly complex equipment and in having on hand the required organizations, aircraft, tools and test equipment required for operation.

The "One Army" concept announced in 1959 by former Secretary of the Army, Wilber M. Brucker and pushed so vigorously by General Bruce C. Clarke, former USCONARC commander, and his successor, General Herbert B. Powell,

General Bennett is Chief of Staff, Idaho Army National Guard. He is the only Army National Guard general officer on flight status.

paved the way for a new era in military planning which has not yet been exploited to its fullest. This concept emphasizes the requirement for reliance on *all* components of the Army in planning for and meeting future conflicts. Certainly, it brings with it additional responsibilities for the Army National Guard and the Army Reserve which must be met promptly if this plan is to be valid.

Army Aviation, in the opinion of the writer, offers the one tangible tool now available to our tacticians to ensure survival of any force on the nuclear battlefield. The ability to disperse, reassemble rapidly for specific strike missions, and redisperse is a sound plan which will test Army mobility to its extreme. Currently, Army Aviation provides the best answer. If this concept is true, Army Aviation is truly in its infancy in size, and plans must be laid now to organize and *support* an Army Aviation force capable of meeting increased responsibilities.

A critical examination of the reserve components would reveal an area for growth of the Army Aviation Program without jeopardy to our peacetime defense budget. Advance plans can be made which would ensure the Active Army a mobilization base capable of deployment in days or weeks to rapidly expand the Army Aviation Program.

It is always well to profit by the experiences of others, and now might be a good time to look at the recent experience of our sister service, the United States Air Force, in the recent mobilization of Air National Guard and Air Force Reserve Units. Eleven of our Air National Guard squadrons were actually deployed in Europe less than a month after their mobilization dates.

Although their problems are not identical, certainly many of them are similar as to technical qualifications in maintenance and operation of complex equipment. This early deployment potential of these Reserve component forces certainly did not just happen. It was planned, programmed, and supported by the United States Air Force as a result of their experiences incident to the Korean mobilization.

Any such future program for rapid expansion of the Army Aviation Program, with greater reliance placed on Army National Guard and Army Reserve aviation units, would require specific action in the following areas:

- Allocation of organizations.
- Selection and training of personnel.
- Training and utilization of organizations.
- Procurement of proper equipment for use in training and/or mobilization.

Analyzing the four requirements above, it is difficult to say that one should take precedence over another. Actually, all of these actions should be forthcoming concurrently. The allocation of organizations and a continuing review of such organizations, however, would be required as a basis for completing the next three steps. A discussion in general terms on these four areas of consideration follows.

ORGANIZATIONS

Currently, the majority of our Reserve Component Army Aviation units are organic to divisions, armored cavalry regiments, or aviation detachments in support of nondivisional battalions and groups. It is not proposed that these divisions be stripped of their organic aviation, but rather, if this thesis is correct, that consideration be given to the allocation of substantially more nondivisional aviation units which could be blended together in support of a rapid military build-up and expansion program. The numbers and types of units required certainly would have to be determined by our top military strategists. The important aspect is that the Army, aided by the Reserve components, must fight for an increased Army Aviation Program in our troop structure if we are to support our defense force either on a nuclear battlefield or in conventional warfare.

SELECTION AND TRAINING OF INDIVIDUALS

The selection of individuals either for flying duty or as maintenance technicians in the Army Aviation Program is more critical than in most other Army activities. The individuals must have the desire, capability, and the technical qualifications required to successfully complete either the flying training or maintenance training offered. The time required for the training and qualification of our aviators, observers, and skilled mechanics is considerably greater than the development of most other military skills, thus requiring a longer production lead time.

A definite program required of the Army National Guard and Army Reserve aviation units would permit the early selection of individuals by the reserve components and training of these individuals at Active Army installations according to Active Army standards. Upon completion of this training, the individual would revert to his Reserve component for unit

training and periodic refresher training to keep abreast of latest techniques.

Another factor allied with the individual training program is the fact that each year the Active Army loses thousands of well trained and qualified individuals from the Army Aviation Program for various reasons. These personnel could be assigned in the Reserve component aviation program under present law and regulations and kept active if the numbers of these Reserve component Army Aviation units were considerably expanded to provide unit TOE vacancies. The increase in numbers of organizations would also tend to spread them over the country geographically so the Reserve component units would be within reasonable commuting distances.

Programming and procurement schedules should be developed to provide both the Active Army and Reserve component units the latest aircraft and allied equipment.

TRAINING AND UTILIZATION OF ORGANIZATIONS

If we have the appropriate number of Army Aviation organizations and are pursuing a program for selection and training of individuals, we must then consider training to develop the overall skill of the organization. This is normally done through armory drills and field training periods under the current Reserve component training program. Certain budgetary limitations imposed by the Department of Defense or the Secretary of the Army restrict the numbers of these unit training assemblies which may be held annually.

The Air Reserve Forces found that it was not possible for an individual aviator to keep at his peak proficiency on the allotted 48 annual armory drills and 15 days field training. An additional 36 annual drills devoted solely to flying were authorized and have been used with great benefit, as witnessed by the overseas deployment schedule recently met by the Air National Guard squadrons.

Currently, each Army National Guard and Army Reserve aviator is required to maintain *exactly the same* minimum requirements established for the Active Army Aviator by AR 95-32. This requirement is met even though the Reserve component aviator is only entitled to pay for a total of 63 (48 drills plus 15 days field training) paid assemblies each year.

The important thing is that with an additional 36 paid training assemblies, similar to that employed by the Air Reserve Forces, demands for certain types of proficiency training could then be made on the individuals concerned in increasing both unit and individual efficiency in meeting mobilization schedules.

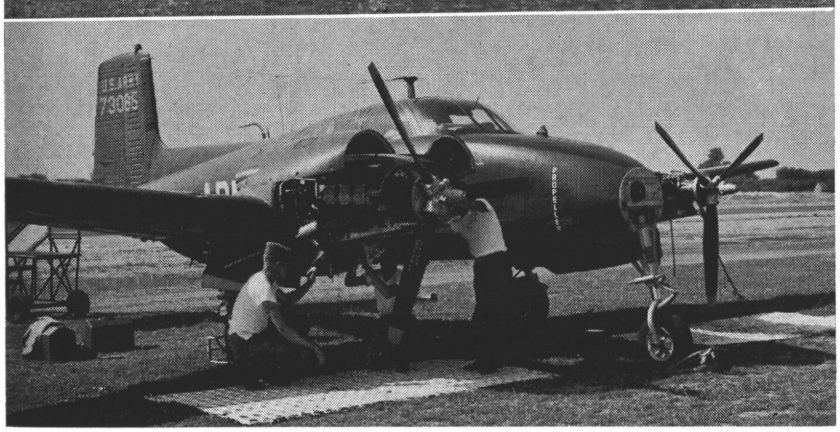
Additional organizational training could be provided Reserve component Army Aviation organizations by using them in conjunction with scheduled Active Army maneuvers and exercises. Again, this method has been used by the Reserve components of the Air Force with a high degree of success, not only in organizational training of the units concerned, but in providing an excellent testing vehicle to determine the validity of the training program.

EQUIPMENT

This is probably the most complex area in consideration of costs of both procurement and maintenance. Therefore, these subareas should be considered separately:

• *Procurement of adequate equipment—*

Programing and procurement schedules should be developed to provide both the Active Army and Reserve component units the latest aircraft and allied equipment. It is realized that limited funds will always require assignment of priorities which, logically, must go to the Active Army units. However, it is noted that, except for the Korean War era, apparently the procurement of the latest equipment is programed solely for the Active Army, with a resultant shift of



Qualification of personnel in operational and maintenance procedures on the latest aircraft should be established before M-Day.

the obsolescent equipment to the Reserve components. This planning does not make it possible for any Reserve component to meet an early deployment schedule if retraining, both in flying and mechanical skills, is necessary on the latest equipment before deployment.

The use of obsolescent equipment further complicates the maintenance problem of the Reserve component organizations and the Army supply system. Procurement costs would be higher, but the main point of this consideration is that if any Army Aviation unit, either Active Army or Reserve, is to be capable of delivering support within hours or days, the latest standard equipment for both qualifications of personnel and operational use is required prior to M-Day.

• *Maintenance—*

It is firmly believed by the writer that Reserve component organizations are able to provide better maintenance at a cheaper cost than is now being accomplished in the Active Army. Without a doubt, this will raise questions in the minds of many of our excellent Active Army organizations. Personal experience over 15 years with the Civilian Technician Program now being employed by the Army National Guard is the basis of this comment.

In the first place, each of the Army National Guard civilian maintenance technicians is highly qualified through experience and training. He has been trained at Active Army schools in the same maintenance procedures and standards as expected from the Active Army.

Second, the Army National Guard Civilian Maintenance Technician Program is a profession. Therefore, the personnel are not subject to rapid turnover but are stabilized in their jobs and communities. This same individual is also required to be a member of his National Guard organization, performing the same MOS skills that he would perform in the TOE vacancy of his military unit and is subject to mobilization to perform the same job in the field.

Third, the same individual can devote his entire working time to his profession and is not absent from his job due to parades, fatigue detail. I&E programs, and other activities which will reduce his time as an effective maintenance technician.

These same maintenance pools should be located strategically throughout the Nation in direct support of the Reserve Component aviation units. With standardization of equipment between Active Army and Reserve components, they could also effectively support Active Army aviation units in 4th and 5th echelon maintenance areas, as is now planned in three areas by the National Guard.

Before we arbitrarily discard this proposal as being too costly

or unfeasible, a review of our requirements and the objectives of this proposal would be in order.

Army Aviation offers the best solution now available to the responsible field commander for mobility, either on the nuclear battlefield or in conventional warfare. Combining speed and ability to traverse natural or artificial barriers, Army Aviation, in proper strength, could revolutionize our tactical concepts as surely as the advent of gunpower.

The limiting factor to date on Army Aviation support to the Armed Forces has been the number of organizations authorized in the troop basis with a resultant lack of equipment, personnel, and a firm basis for long-range fiscal planning.

Given the proper organizations, costs could be projected and programs developed for methods of meeting the requirements.

Reserve component Army Aviation, as an interested partner in the "One Army," has not been properly considered in the development of its potential to support the Active Army. Other services have given the necessary support to their reserve component units and have found qualified units alongside the regular component in a matter of days after mobilization. This support has been rendered at a fraction of the cost of supporting a fulltime active unit on duty during peacetime.

The Honorable Elvis J. Stahr, Jr., Secretary of the Army, in a recent address to the Corps of Cadets, the Citadel, Charleston, S. C., outlined six major considerations concerning the subject of national security. His first consideration is quoted, in part: "First of all we have come to recognize that there is no substitute for preparedness. We realize, at last, that we will never again have the opportunity to get ready to fight after the first shot is fired." To this all members of the "One Army" subscribe.

In consideration of the greater length of time required to procure both qualified personnel and hardware, emphasis should be placed now on having the adequate Army Aviation organizations in being before the first shot is fired.

Reserve components have demonstrated the capability of supporting the Active Army; and the Army Aviation field, specifically, should be fully exploited.

Give us the units, the modern hardware, and the training support and we will deliver in short order qualified units to augment our Active Army.

The question is not, *Can we afford it?* but rather, *Can we afford to be without it?*

Huachuca Unveils Completely "Blind" Landing System

A "blind" landing system that enables helicopters to fly to any area of a battlefield and land without the "talk-down" assistance of a ground operator has been successfully demonstrated at Fort Huachuca, Arizona.

Representatives of the Army, Navy and Air Force gathered at the U. S. Army Electronic Proving Ground for a recent day-long conference on a "blind" landing system. Following the conference the representatives and a Canadian Army observer viewed the landing, a first in military aviation, at Libby Army Airfield.

The system is nicknamed M W RAILS, a shortened version of its formal title, Microwave Remote Area Instrument Landing System.

To make the demonstration realistic, all lights on the airfield were turned off. Only the navigation lights of the H-34 helicopter were visible. After a short flight away from the field, the helicopter returned and landed within 100 feet of observers.

Fort Huachuca officials said it was the first time that a helicopter had made a completely blind landing without talk-down from the ground, with the exception of test program landings leading to the conference.

The M W RAILS is a product of Army - Navy cooperation through a program for improved instrumentation in aircraft. This program, known as ANIP (Army-Navy Instrumentation Program), has been underway for approximately six years. Its objective is to support research and development aimed at improved instrumentation for fixed- and rotary-wing aircraft.

M W RAILS is expected to provide combat aviation with a greater potential for flight in conditions of poor visibility. It will find particular use in landings at night or under cover of poor weather behind enemy lines.

From "Army Research and Development."

Commander Frank L. Danowski, U. S. Navy

UNDER THE FEDERAL Aviation Act of 1958 military flight violations are processed against military pilots by investigating inspectors of the Federal Aviation Agency's district offices in all those cases where the available evidence is believed to support the charges of violations of the air traffic rules by military pilots, as submitted by a complainant in incidents involving military pilots (including near midair collisions).

By law, Section 1002 (a) of the Federal Aviation Act of 1958 authorizes *any complainant* to file a complaint in writing to the administrator of the FAA with respect to anything done or not done *by any person* in contravention of any provision of the act. For example, passengers aboard commercial airliners have filed complaints against the pilots of military aircraft for coming too close to them while they were a passenger aboard the aircraft. The administrator's broad powers include the authority to prescribe air traffic rules and regulations for the navigation, protection, identification and flight of aircraft, and *for the protection of persons and property on the ground.*

It should be quite obvious to military pilots that such provisions have been, and are being, enforced. With radar tracking capabilities of most controlled airspace areas, the tremendous increase in traffic density, and the increasing demands of persons on the ground for flight safety, that once carefree flight must now be superceded by the pilot's meticulous attention to, and compliance with, the air traffic rules.

It should also be quite obvious to military pilots that to maintain an unblemished military record, they must be truly professional in their knowledge and

Commander Danowski is assigned to the Federal Aviation Agency and attached to the Safety Evaluation Division of Flight Standards Service.

application of the Visual Flight Rules and Instrument Flight Rules of Part 60 of the Civil Air Regulations, any new Special Civil Air Regulations, and the latest amendments issued to the air traffic rules of Part 60.

In cases of complaints by *any person* against a member of the Armed Forces of the United States acting in the performance of his official duties, Section 1002 (a) of the Federal Aviation Act of 1958 also requires the administration to refer the complaint to the secretary of the military department concerned for action. Within 90 days after receiving such a complaint, the secretary is required to inform the FAA administrator of his disposition of such complaint, including a report of any corrective or disciplinary action taken.

It has been observed during the review of such reports within the Agency that many military pilots cited for flight violations of the Civil Air Regulations are holders of FAA Airman Certificates, such as an Air Transport Rating (ATR), Instrument Rating, Multi-Engine or Single Engine Rating. Military pilots should realize that in violations processed against civilian pilots holding such civilian airman ratings, that Agency is authorized such enforcement action as suspension or revocation of an airman's certificate, a civil minimum, medium or maximum penalty (fine), or a written letter of reprimand, depending upon the circumstances and the public interest in the case. The military pilot's civilian ratings are thus protected behind the cloak of military review and action provided for in the Federal Aviation Act of 1958. However, continued obvious flight violations by military pilots flying miltary aircraft could result in a reappraisal of the procedures for the review of military flight violations relative to the civilian airman ratings held.

ARMY AVIATION VIOLATIONS

In the review of military flight violations filed against U. S. Army pilots it has been my observation that the alleged violations occurred under the following flight conditions:

- Operation of an aircraft on or in the vicinity of an uncontrolled civil airport.
- Operation of an aircraft at a low altitude over persons or property of others on the surface or over congested areas, which, in some cases, can be interpreted as "buzzing."
- Operation of an aircraft under Visual Flight Rules in controlled airspace when the weather is below VFR minimums, without prior approval from the appropriate air traffic control facility.
- Operation of an aircraft in prohibited areas unknowingly and in restricted areas without prior approval from the controlling authority.
- Operation of an aircraft in reported near midair collision cases.

Isolated cases of failure to close a flight plan, failure to comply with air traffic control instructions, and failure to adhere to an air traffic control clearance have been reported.

With respect to the failure to properly close a filed VFR flight plan it should be emphasized that the functions formerly performed by Military Flight Service have been assumed by the FAA's flight service stations. Every pilot who files a flight plan is required to file on arrival a notification of arrival (CAR 60.20) with the nearest FAA communications station or tower. The Airman's Guide urges all pilots to file these reports with flight service stations. Failure to do so may result in the pilot being cited for a violation of CAR 60.20 and in disciplinary action for the pilot.

The Civil Air Regulation violation most often alleged was Careless or Reckless Operation (CAR 60.12): "No person shall operate an aircraft in a careless or reckless manner so as to endanger the life or property of others." It was usually associated with an alleged violation of some other Civil Air Regulation or was directly alleged by a complainant in reports of near midair collisions. When weather conditions were directly involved in the violation incident, an alleged violation against CAR 60.11, Preflight Action, could be expected since, "The pilot in command of an aircraft shall familiarize himself with all *available* information appropriate to the intended operation." A typical incident follows.

At an uncontrolled (no tower) midwest airport a service aircraft was taking off on a northeast runway at the same time that a civilian aircraft was approaching to land on the *same* runway, towards the southwest (opposite direction), with light and variable winds. The pilot of the landing aircraft spotted the aircraft taking off and executed a waveoff. The pilot of the aircraft taking off observed the landing aircraft too late in his takeoff run to abort. He continued his takeoff until he could get airborne and then maneuvered to avoid the landing aircraft. The aircraft missed each other by "several hundred feet." A midair collision was narrowly averted by prompt action on the part of both pilots.

APPLICATION OF THE LAW

In applying the law it becomes evident that an aircraft, while on

final approach to land, or while landing, has the right-of-way over other aircraft in flight or *operating on the surface*. From this obvious violation of CAR 60.14e, Right-of-Way, Landing, the following could also be alleged: a violation of CAR 60.12 (Careless or Reckless Operation), CAR 60.15 (Proximity of Aircraft), and CAR 60.18 (Operation on and in the Vicinity of an Airport).

Incidents such as the one above are not intentional but do reflect a pilot's lack of awareness, a lack of training, a lack of knowledge of the Civil Air Regulations, or an incorrect application of the air traffic rules. I am sure that such incidents can be duplicated from Army files. It is time to take the "Administratively Restricted" cloak from flight violations and reacquaint the pilot with the rules that he has taken for granted.

A typical fallacy is the belief by some pilots operating under instrument flight rules at an assigned altitude that they have first claim to such altitude, that any aircraft climbing through, descending through or crossing this altitude should remain clear. They acquire a false sense of security that they were cleared to this altitude by air traffic control and there is a tendency to be less vigilant. This erroneous impression still persists even though the note under Civil Air Regulation 60.30 says:

"When operating in weather conditions equal to or above the basic VFR minimum weather conditions specified in section 60.30 of Part 60 of the Civil Air Regulations, irrespective of the type of flight plan an aircraft may be operating under, i.e., *IFR* or *VFR*, the primary responsibility for the avoidance of collision rests with the pilot."

The greatest safety device in aviation today is the pilot in command. This aircraft commander has had to demonstrate his basic knowledge of the requirements of his job—to know his aircraft, its flight characteristics and its systems, and the handbook service rules prescribed for its operation.

To fly his aircraft in the safest possible manner requires the pilot to achieve and maintain a high state of air discipline and safety awareness. If he consistently applies the air traffic rules correctly, the only errors resulting in alleged violations would be errors in judgment, which should be as small as our training is thorough. Neither excessive FAA regulation nor excessive enforcement action will correct these errors of judgment.

KNOW THE LAW

I believe it is now time to reacquaint our military pilots with the air traffic rules in Part 60 of the Civil Air Regulations concerning VFR and IFR flight and with the latest amendments to these rules, including the special civil air rules affecting military pilots. Of particular interest is published Amendment 60-24 to Section 60.18 entitled "Airport Traffic Area Rules." This amendment became effective 26 December 1961 and established more detailed requirements for operating aircraft on and in the vicinity of an airport.

To ensure that all our military

The Ten Airspace Commandments

1. Thou shalt be vigilant to observe other traffic, especially under instrument flight rules, lest thou precipitate a near midair collision and be tagged with careless or reckless operation.
2. Thou shalt conduct thorough and meticulous preparation, whether for visual or for instrument flight, lest thou be guilty of poor preflight planning and drop from the "professional" ranks.
3. Thou shalt avoid prohibited areas and restricted areas, unless the controlling authority has cleared thee over or across.
4. Thou shalt adhere to the right-of-way rules, whether climbing, descending or cruising, and alter thy course when passing, to obtain distance clearance of thy choosing.
5. Thou shalt adhere to thy air traffic clearance and air traffic instructions, unless thou hast cleared with air traffic control to veer left or to veer right of thy course.
6. Thou shalt avoid aerobatics over airways, persons, towns, most especially in low visibility and 1,500 feet over the ground.
7. Thou shalt avoid proximity of aircraft, especially with passengers for hire, except by proper arrangement, thus avoid collision and ire.
8. Thou shalt maintain the minimum altitude over water, city, anywhere, near persons and property below thee, and safeguard those in thy care.
9. Thou shalt observe the rules at the airport, by voice signal, and light, and maintain thy sequence in landing and be safe with all thy might.
10. Thou shalt maintain two-way communications, under visual or instrument flight, or voice an emergency instruction, and seek assistance to correct thy plight.

pilots maintain their knowledge and correct application of the "Rules of Airspace" we should provide in our training program a regular and frequent review of the Civil Air Regulations of Part 60, including the latest amendments and the special civil air regulations affecting military pilots. Achievement of this goal will materially reduce reports of incidents, near midair collisions and flight violations, and result in achieving the truly "professional" military pilot.

One additional point. Section 60.2 (Authority of the Pilot) specifies that the pilot has final authority for operation of his aircraft and provides the pilot with a means of deviating from the air traffic rules in the interest of safety, *provided he files a written report of such deviation.* This is commonly referred to as the "pilot's emergency authority."

From my observation of cases, military pilots have been reluctant to invoke this authority when confronted with an emergency situation which requires such deviation from the rules. This rule was promulgated to protect the pilot. Incidentally, as a matter of practice, air traffic control will not talk the pilot into declaring an emergency. It remains for the pilot to declare an emergency at the time of the incident. Such previous hesitancy to declare an emergency appears to result from the anticipated embarrassment to the pilot relative to the circumstances surrounding the incident. But any actual embarrassment is easily forgotten and cannot compare to the stigma of a military flight violation recorded in an aviator's otherwise perfect service record.

* * *

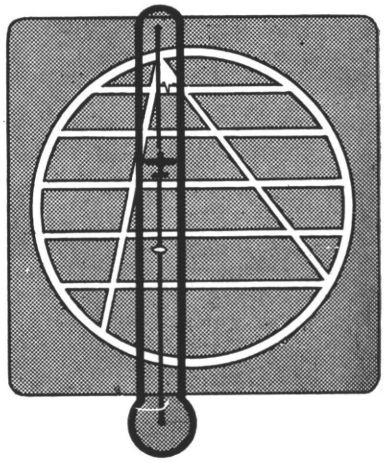
Through an administrative error the winning article of the month for April "Pop Up" was credited to Colonel Raymond P. Campbell, Jr., Director, Department of Tactics, USAAVNS. The author is Lieutenant James B. Morgan, Dept. of Tactics. The DIGEST regrets this error and is happy to give credit to the rightful author.

* * *

An Unauthorized Flying Lesson

A pilot received takeoff instructions from the tower, taxied to the runway and decided that it would be so easy he would let the soldier-passenger in the back take off in the Bird Dog. He gave him instructions on how to do it and said he would follow through lightly on the controls. The novice "student" applied approximately half throttle and the aircraft began to roll. The tail began to rise, so the aviator advanced the front throttle to the full open position. The Bird Dog rolled approximately 600 feet and began veering to the left. When the aviator attempted to regain control he found that the passenger had panicked and "frozen" to the controls. The craft came off the runway and hit some trees 165 feet away. This unauthorized flying lesson is prohibited by par 20, AR 95-5.

THE GCA ANGLE



EPI SCOPE ASIMUTH

Reprinted from FLYING SAFETY magazine.

THAT'S GCA; it's an approach system and not a blind landing system. The equipment was designed to get you to the established minimum and continuing below this minimum should be accomplished only under emergency conditions.

Of course, you've flown some actual IFR precision GCA runs that you really grooved. In these "no sweat" runs you had the feeling you could have flown right onto the concrete slab, and then there have been other runs . . . remember?

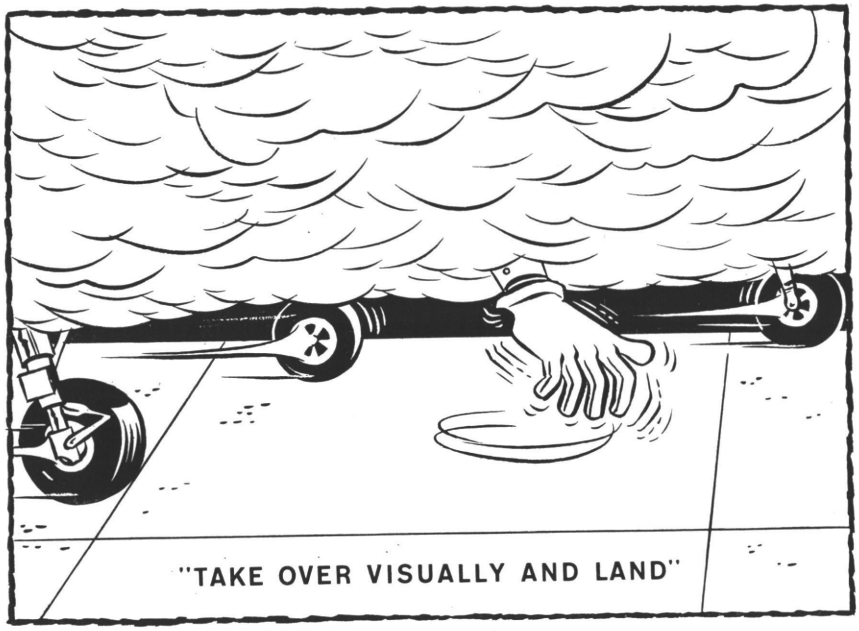
Even under the best conditions, radar is not yet a perfect system but it serves satisfactorily for making safe low approaches and we couldn't very well do without it at this game. It is not intended to put you on the runway in zero-zero weather. It has earned its keep when it places you in a position from which you can land your aircraft visually.

The GCA final controller will continue to give instructions until the aircraft reaches the touchdown point. However, as pilot, you fly the gauges down until the runway is visible, then you make a visual approach and terrain clearance is your responsibility. When the established minimums are reached and the runway is not visible, that's the time to call off the dogs (there'll be other parties anyway) and make for your alternate. You've just had the best offered by a radar approach system.

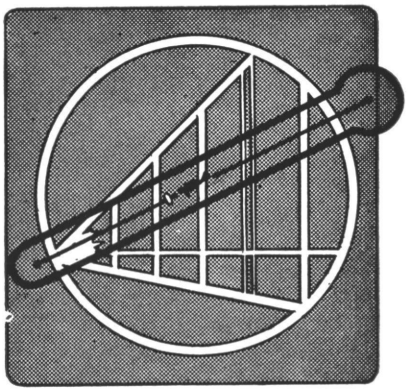
Okay, you may say, "If I poke my nose down just a little more, that runway may pop out at me." Look out, son, you may never make another party. Here's why.

A precision approach radar glide path has an optimum setting of 2½ to 2¾ degrees. The minimum is two degrees and normally the maximum is three. Now to obtain the minimum clearance for the final approach, an average glide path (2½) intersects the runway 750 feet from the approach end of the runway. This point of intersection is referred to as the GCA touchdown point. This particular glide path clears the threshold by some 33 feet, and at the 500-foot mark it is 12 feet above the runway. Now that doesn't sound particularly alarming, but here is the pitch:

What clears the threshold by



"TAKE OVER VISUALLY AND LAND"



EPI SCOPE ELEVATION

33 feet? The landing gear? The nose of the aircraft? The tip of the verticle fin? This we gotta know before we go poking our nose down any more after passing through GCA minimums.

The radar blip that the controller sees on his scope is a reflection from your bird. The radar responds best to sheer mass and external activity.

So, let's take a big aircraft, say a C-124, on a GCA precision approach. You're on glide path, on centerline. You break out, runway's in sight and you round out and land. Did you notice how high you were over the threshold? Probably not, but remember, on a 2½ degree glide path and a 750-foot touchdown point, the center blip passed just about 33 feet above the runway threshold. Of course that is assuming the operator had a good target, the equipment was working right and was properly aligned, the controller was skilled and you were flying exactly as instructed.

Okay, the controller tries to keep the middle of the target in the centerline and on glide path. With most of the return coming from a point where the wings intercept the fuselage, where does that put your wheels? About 15 feet above the green lights.

Now if you are flying a 2 degree glide path with a 500-foot intercept, things are even worse. And, try this on for size—you never know what glide path angle a particular unit uses.

But let's get back to a nice, safe 2½ degree glide path and a 750-foot GCA touchdown point. In the above discussion you will note that your wheels clear the threshold by 15 feet. This is the figure only if you and the controller are doing your jobs perfectly, and the equipment is functioning properly.

Let's goof things up a bit. Depending upon the individual controller (particularly how he uses his gain control), your target may vary from the size of a pinhead to that of a skinny peanut. A good average would be the size of a grain of rice appearing vertically on the scope. The controller has to watch two pictures, one above the other on one scope. One is for azimuth, the other for elevation. You, in your 70 ton mass of hurtling machinery, will appear as a spot of light and you won't hold still. You just keep rolling along. He has to give oral directions to you as best he can to keep these little spots centered on the centerline and glide path.

When he says you are 10 feet low on the glide path, that's his honest conviction. But he can't be positive because the equipment does not provide the capability. That's what his interpretation of the scope tells him and he's doing the best he can with what he's got.

HOW ABOUT YOU

Next, let's talk about you, the pilot. We've already told you that neither the radar equipment nor the controller is perfect. Let's face it, you're not either.

The smoothness and finesse with which you handle your airplane can make a big difference. Remember, that boy on the ground is a sort of electronic-age parking lot attendant. He can tell you where to put your bird, but it's up to you to put it there.

Don't let yourself get so engrossed in his directions that you disregard his remarks upon reaching minimums. Or that you forget to fly your own aircraft. Don't be timid about using power in glide path corrections, if necessary. If you slip a little low, you can usually ease it back with a little back pressure, but there's a limit to this easing back on the wheel. Without warning you could find yourself nose-high and hunting for airspeed on the backside of that infamous power curve.

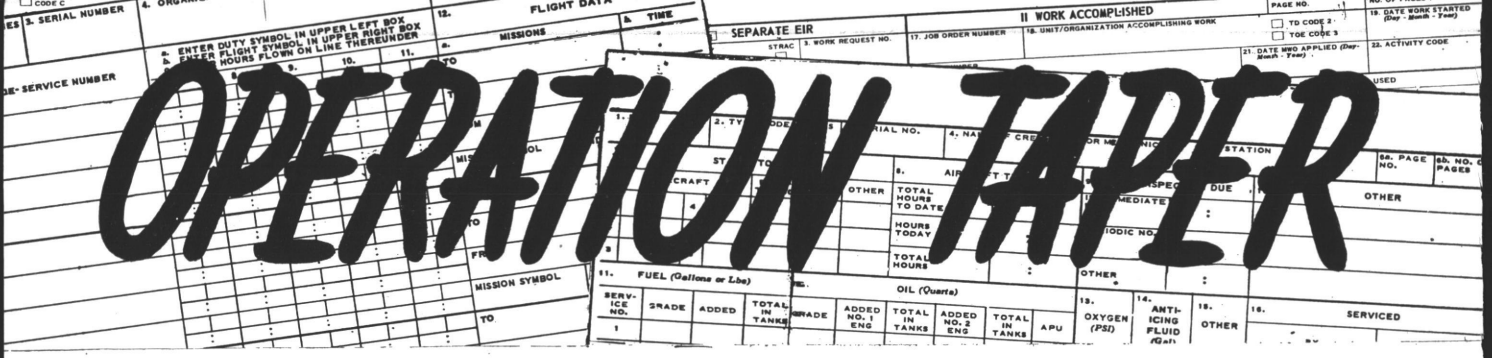
I think by now that 33-foot threshold clearance has shrunk considerably. Between dangling wheels, equipment limitations and the controller/pilot inherent incapabilities, taking her down to the concrete just isn't the thing to do.

Incidentally, this also applies to an ILS approach, depending upon where the glide slope receiver antenna is positioned on the aircraft. If it is located on top of the vertical stabilizer, your wheels will be a fair distance below the glide slope.

ILS or GCA are fine approach systems but are only intended to get you to a certain point on the approach to the runway. From there on, you have to land VISUALLY.

So when the man says "passing through GCA minimums," take over and complete your landing visually or give 'er the needle . . . make for the wagon . . . and here's hopin' you've picked New Orleans as your alternate.

OPERATION TAPER



Lieutenant Thomas J. Marshall

AN EQUIPMENT records system is comparable in many respects to a vast communications system made up of telephones, switchboards, directories, operators, and linemen. Regardless of its extent or complexity, a communications system is made up of single parts designed to do a particular job. Similarly, an equipment records system is made up of forms, records, and reports designed to accomplish a particular requirement that will enhance the system as a whole.

A telephone is meaningless if you dial the wrong number or break the connection. Similarly, an equipment record which is inaccurate is also meaningless or contributes little to the use of the record system. Essentially, the degree to which the equipment record system serves the Army's needs depends upon how well operators and maintenance personnel prepare and use the forms and records.

Over a period of years the Army recognized that the maintenance records system needed revision. To satisfy expanding reporting requirements on a greater inventory of complex equipment, additional forms and records were developed. Quite often these were developed without consideration of existing reports, and without providing necessary information for all levels of command and all echelons of maintenance. As a result, the reporting and recording of maintenance data expanded over the years. This system propagated itself until a condition existed entailing unnecessary requirements, inadequate inspection and preventive maintenance practices, the inability to produce requisite maintenance information at all levels and echelons, and a duplication of effort.

Operation TAPER, the Army's plan for equipment record revision, was begun in January 1961 with the objective of revising, as necessary, the Army's current equipment records system to provide a simple, effective, standard procedure. This system would:

- Provide necessary controls for each successive level of command and supporting echelon, starting with the equipment operator and his unit. TAPER was designed to rectify imperfections in the records system for *all* equipment throughout the Army. The U.S. Army Maintenance Board, a field agency of the Deputy Chief of Staff for Logistics, was given responsibility for the successful development of TAPER's objectives and the implementation of the modernized system.
- Produce essential maintenance management information.

A study of Army Aviation forms and records, used at the first and second echelon, disclosed 23 forms and records and numerous directives in use. An average of 22 DA Form 2391s, Aircraft Flight Report and Maintenance Record, and DD Form 829s, Historical Record for Aeronautical Equipment, are required per aircraft. This varies from 14 on the L-19 to 32 on the H-37. Requirements are excessive and creates a heavy burden on a unit when the activity attempts accurate and conscientious accomplishment.

It is essential that the combat readiness of air items be rapidly and accurately determined at all times. Tests have proven conclusively that this information cannot be collected under the existing system. Under the new system forms have been designed to generate accurate and current information for all levels and echelons.

In the past, Air Force forms have been modified in an endeavor to satisfy the requirements of Army Aviation. The result is a system that incorporates a conglomeration of unnecessary data. Before the end of this year, Army Aviation personnel will be using a system that positively accommodates Army Aviation's requirements for the first time in 20 years.

Many of the forms designed to meet TAPER's objectives are applicable to Army Aviation as well as other types of equipment.

In the new revised equipment records system, one Equipment Inspection and Maintenance Worksheet, DA Form 2404, will replace 35 such forms in the current system. The technical manual, for a specific aircraft, contains the procedures and instructions for both servicing and

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Lt Marshall is assigned to the DA Maintenance Board. He will tour Army units worldwide to instruct on this new system.

inspecting that item of equipment at first and second echelons of maintenance. When the appropriate TM number for the equipment is entered on the form, the form then becomes peculiar to that aircraft. Faults found will be described in column 10 and the corrective action described in column 11 of the form. The appropriate status symbol will be entered in block 9. This block was provided specifically for Army Aviation. Therefore, maintenance personnel at these echelons can now follow the procedures in the technical manual and use the worksheet for the purpose its name implies. Thus, this new worksheet can be used with *any* item of equipment for which the Army provides a TM.

A significant improvement was also achieved in the development of the Maintenance Request, DA Form 2407. This form has been engineered to provide maximum information to facilitate better control and management at all echelons of maintenance. Requesting maintenance or repair action and using this form for recommendations involving equipment improvement are only two of the basic uses of this form. It is also used for the following purposes:

- To definitively record repairs performed and the reason parts or components were removed.
- To report and record accomplishment of modification work orders.
- To determine total manhours (direct labor) and maintenance repair costs by job order.

This one new form will not only perform the functions of eight forms currently used for these purposes, but will also provide the information in a more meaningful and timely manner. An important asset of the form is that it can be processed manually to obtain consolidated information for management and control purposes at the support echelons in the field Army without waiting for sophisticated data processing hardware. However, the DA Form 2407 has been engineered for maximum application to machine processing if this equipment is (or becomes) available.

The Maintenance Request, DA Form 2407, is submitted at the organizational maintenance echelon when work is beyond the capability, skills, or tools authorization of the requesting echelon. Section I provides information concerning the deficiency together with conditions under which the deficiency or malfunction occurred, along with other essential data pertaining to make, model, type, hours ownership, etc.

Section II is completed by the supporting echelon as work is accomplished. The reason for removal of parts is indicated by selecting the appropriate number from the Department of Defense Failure Code, which is printed on the reverse side of the form; thus it is readily available during the corrective action phase of maintenance.

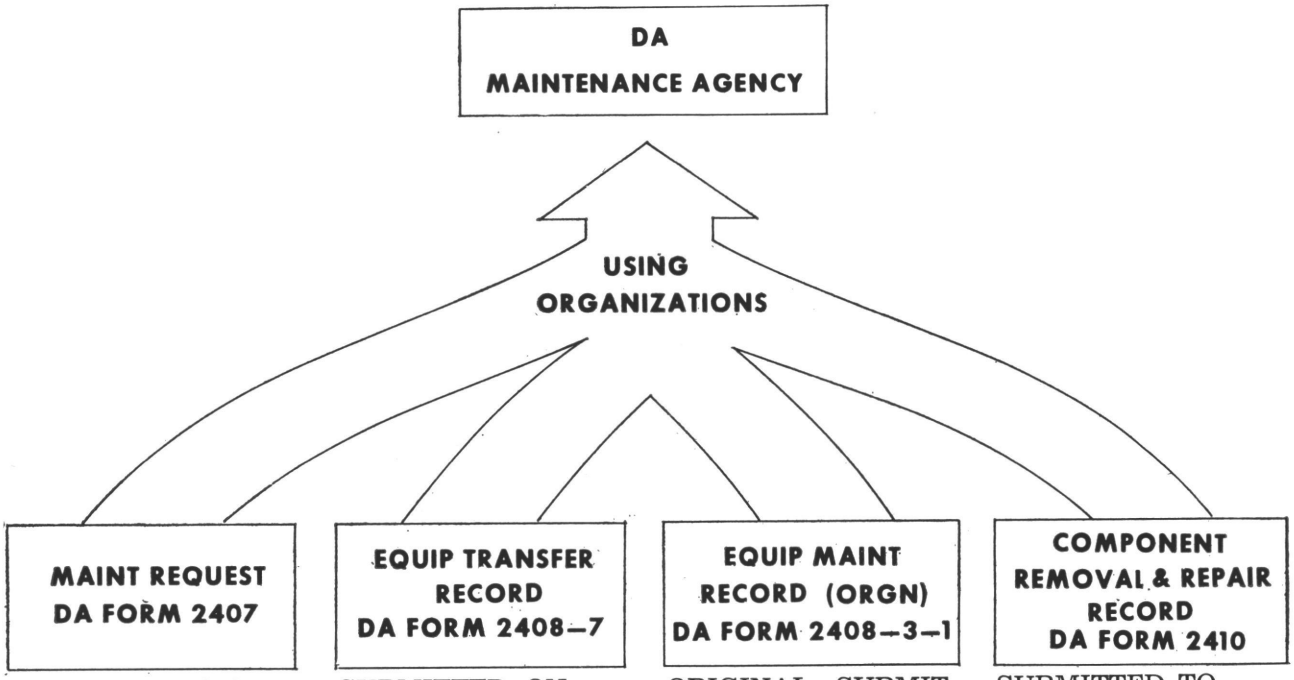
The use of this code will contribute to better control and productivity at the support echelons of maintenance. The code will also provide the national echelons specific data for product improvement and other maintenance engineering purposes, to include establishing definitive repair rates by make, model, and type in the Army provisioning system. Thus, the gap between user echelons and the national echelons has been closed. This "feedback" system makes every operator and mechanic a partner in the Army-wide effort to improve maintainability and reliability of Army equipment.

This form is also used to control and report the accomplishment of modification work orders. This procedure provides information essential for better control of modification work order application at all echelons, and especially for the national echelon concerned with major item status of the Army inventory.

It is mandatory that an Equipment Improvement Recommendation (EIR) be included (Section III) on each DA Form 2407 when the repairs or services recorded in Section II are due to *abnormal wear* or *abnormal part* or *component failure*. Thus, maintenance personnel at all echelons are now required to submit data for product improvement during the normal maintenance cycle. Sections I and III can be used separately to submit EIRs by any member of the Army establishment when he considers it a valid improvement recommendation. This is an Army "first." Until now UERs (Unsatisfactory Equipment Reports) have been on a voluntary basis.

The Equipment Log is the *heart* of the new system. The Department of the Army will specify what maintenance records will be maintained on designated items of Army equipment. When assembled in a single binder these records become the Equipment Log for that item. The Equipment Log used by the Army is as important to all levels of command as the ship's log is to its captain. The Log Book Index, DA Form 2408A, will denote the inserts that shall be kept for Army air-

RECORDS PREPARED AT ORGANIZATIONAL LEVEL WHICH ARE TRANSMITTED TO DESIGNATED DEPARTMENT OF THE ARMY AGENCIES



SUBMITTED ON:

1. EIR's to be submitted direct to NMP.
2. DA MWO's completed by using organizations.

SUBMITTED ON:

Equip. for which log books are required and which is:

1. Received through a common carrier or trans. agency.
2. Laterally transferred.
3. Turned-in or lost and not recovered.

ORIGINAL SUBMITTED ON ALL SELECTED ITEMS OF EQUIPMENT LISTED IN APP III:

1. Mech. type equip. quarterly or when all lines are filled (whichever is) sooner).
2. Msl. and Elect. weekly or when all lines are filled (whichever is sooner).

SUBMITTED TO TMC:

1. Carbon copy when time-change components are removed from aircraft.
2. Original copy after repair time - change components are reinstalled on aircraft.

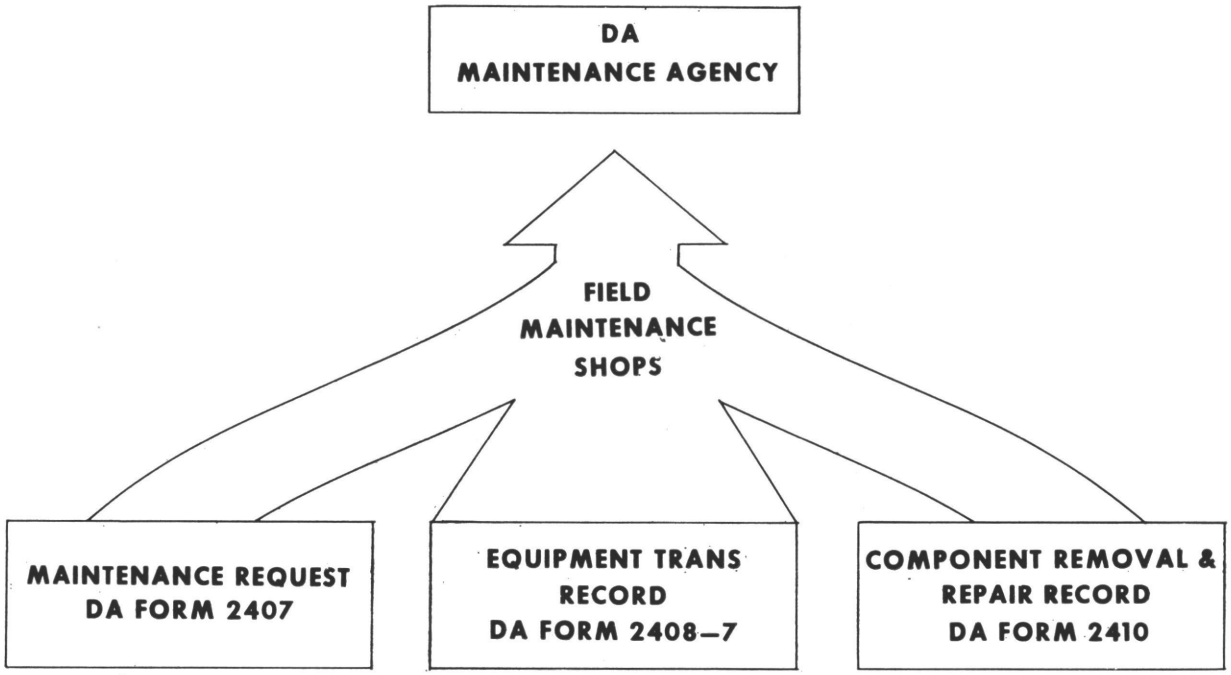
craft. The forms that are applicable to Army Aviation are as follows:

The DA Form 2408-12, Army Aviator's Flight Record. This form replaces the 2391-1. It has been reduced in size and improved. The crewchief is no longer required to enter his name, for this information can be found on other forms. From the pilot's point of view, the most noticeable modification is space to record a round-robin flight in block 12 and enter four crew members in block 6.

The DA Form 2408-13, Aircraft Inspection and Maintenance Record, will replace the -2. The modernization of this form has long been required for Army Aviation. The fact that space is no longer presented for service entries for eight engines demonstrates that this form was designed with our problems in mind. The pilot is no longer required to sign an "exceptional release." If he noted the reason for the status symbol, fine—this is what is desired. If he did not, signing his name to the form is not going to do any good.

The DA Form 2408-14, Uncorrected Fault Record, which replaces the -3, is almost unchanged. The system entry requirement has been deleted, again for common sense reasons. The entry written in block 4 will always be descriptive enough that aviation personnel

RECORDS PREPARED AT FIELD MAINTENANCE LEVEL WHICH ARE TRANSMITTED TO DESIGNATED DEPARTMENT OF THE ARMY AGENCIES



SUBMITTED ON:

1. Repair and services completed on selected items listed in App III.
2. DA Modifications Completed.
3. Equipment Improvement Recommendations.

SUBMITTED ON:

Each item of equipment transferred for which a Log Book is maintained (DA Form 2408).

SUBMITTED TO TMC:

1. Carbon copy when time - change components are removed from aircraft.
2. Original copy after repaired time - change components are reinstalled on aircraft.

will know where the fault is located without having the crutch of a system number.

The DA FORM 2408—15, Service Record for Aircraft, replaces DD Forms 829 and 829-2. This form provides a record of all activities receiving and shipping the aircraft, aircraft time when shipped or received, and historical data pertinent to the aircraft throughout its service life. Historical data is extremely important. If the aircraft is involved in an accident, overhauled, or there is any other vital information, such as one time inspections, appropriate remarks will be entered. This information or data will be useful in determining future operations.

The DA Form 2408-16, Component Installation and Removal Record, replaces the 2391-5. It provides a means for maintaining essential information on time change components and condition items while installed on the aircraft. Years of research, engineering, and experience have resulted in life expectancy for certain components. Thus, careful and exact records must be maintained on these components and condition items.

The DA Form 2408-17, Aircraft Inventory Record, replaces the 780 series. Its application has changed mainly in form reduction. This one form eliminates three forms now in use and has the added advantage of requiring the signature of the person making the inventory entered on the same page as the inventory is recorded.

The DA Form 2410, The Component Removal and Repair/Overhaul Record, is the one form peculiar to aviation that provides feedback information to higher echelons and necessary information to include in the -16. A record of all time change components is initiated for each

Continued on page 33

For Eager Beaver Pilots and M/O's

Lieutenant Raymond M. Swinton

CHANGE 1 to AR 95-16, dated 18 September 1961, "Weight and Balance—Army Aircraft," has several new items of interest. As Army Aviators and maintenance officers we should not only be aware of these changes but should also be implementing them.

No longer can we, as eager L-20 pilots, joyfully file a flight plan without written regard to weight and balance. Certainly, most of us know what the L-20's max gross is, but are we all aware that we can load the L-20 at max gross and still create an unsafe flight condition?

Change 1 has reflected this possibility by reclassifying the Beaver as a class II aircraft.

The basic AR groups Army aircraft into two distinct classifications: class I and class II.

In class I are "those aircraft whose weight and balance limits can be exceeded *sometimes* by alternate loading arrangements." The AR, with change, lists these aircraft series as class I:
L-19, L-23, L-26, AO-1, H-13, H-19, H-23, HU-1.

Class II aircraft are "those aircraft whose weight and balance limits *can readily be* exceeded by loading arrangements usually employed."

These aircraft series are:
L-20, U1-A, AC-1, H-21, H-34, H-37, HC-1.

The critical area in the definition of classes is "those aircraft whose weight and balance limits *can be exceeded sometimes*" (class I) as opposed to aircraft whose weight and balance limits *can readily be* exceeded . . . " (class II). [Italics ours]

Clearance procedures for the Beaver will now be the same as for any other class II aircraft.

The following clearance procedure is quoted directly from AR 95-16, Change 1, paragraph 2e: "When an aircraft clearance (DD Form 175, DD Form 1080 or FAA Flight Plan) is filed, a DD Form 365F will be filed with the clearance form, or a certification made on the clearance form to the effect that a DD Form 365F has been filed for an identical load. One of the following entries will be made in the appropriate block of the clearance form:

(a) NR—for class I aircraft if weight and balance clearance is not required.

(b) Attached—if DD Form 365F is attached to clearance form.

(c) Filed at _____.
(Station at which filed)
Dated _____.
(Date filed)
when DD Form 365F has been previously filed for an identical load.

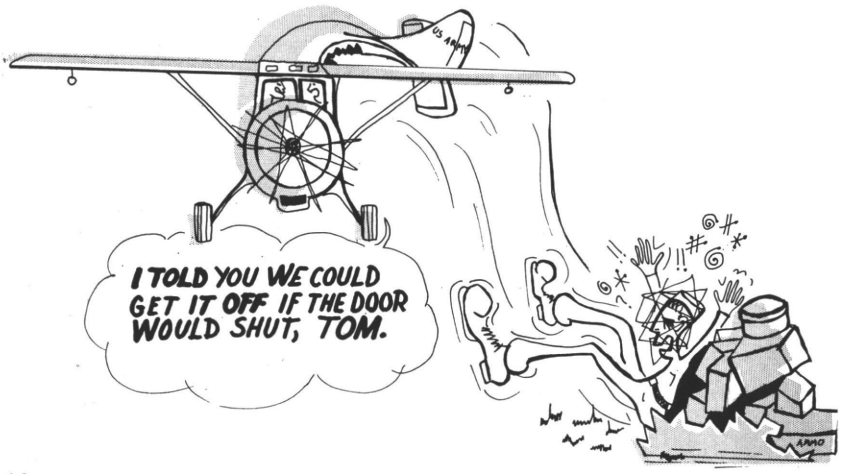
(d) When an FAA Flight Plan is filed, precede whichever of the above entries is made with 'Form F Attached.' "

In conjunction with the above clearance requirements, clearance officers will retain a duplicate copy of the DD 365F in the Weight and Balance Appendix IV of the appropriate Organization Maintenance Manual (-20) for possible future reference.

Maintenance officers in field maintenance activities who have weight and balance technicians working for them will be responsible to see that the basic weight, moment and index, where applicable, of each aircraft will be entered on DA Form 2391-2 and located in the 2391 binder. [DA Form 2408-13 and located in the Equipment Log Book with new Taper forms.]

Maintenance officers at field maintenance activities will also be responsible to see that *all* aircraft under their jurisdiction have the proper station number markings. All aircraft not currently marked will be marked at the next periodic following the effective date of change 1 to AR 95-16.

This article has not attempted to cover every new item in change 1. The AR should be used as the basic source of information. Army area and local aviation SOPs should also be checked for possible implementation.



CREEP

Lieutenant Richard L. Irons

THE ARMY has a new CREEP! No, we don't mean the beatnik kind of creep or the kind a private eye uses to shadow an errant spouse. We're talking about the new creep that came with turbine engines.

This new creep is a name that describes a phenomenon which takes place in metals when they are subjected to constant stress under high temperatures. These conditions are common to turbine engines. Have you ever wondered why a *hot start* or *over-rev* is considered harmful to a turbine engine and why it should be written up?

A metal stress is defined as the amount of load put on the metal. In figure 1 you see a metal bar 1 inch square and 10 inches long. To this, we add a 1,000-pound load.

The metal stress can now be defined as the amount of load acting on the shaded cross section, or

Lt Irons wrote this article while attending the Army Aviation Safety Course at the University of Southern California.

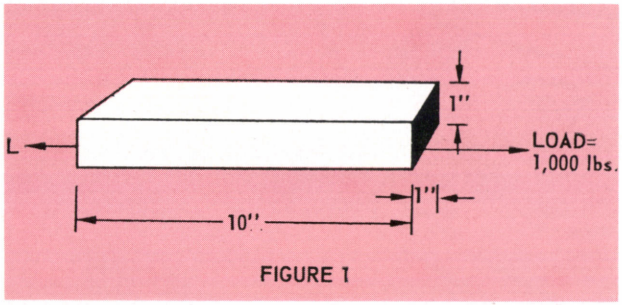


FIGURE 1

$$\text{Stress} = \frac{\text{Amount of load}}{\text{Cross Sectional Area}} = \frac{1{,}000 \text{ lb}}{1 \text{ sq in}} = 1{,}000 \text{ psi}$$

Increasing the load on this same bar also increases the stress. Stress (pressure) will increase or decrease in proportion to the load.

If the load is large enough, the metal will eventually stretch. In figure 2, we see our original bar stretched from 10 inches to 10.01 inches. This is called strain.

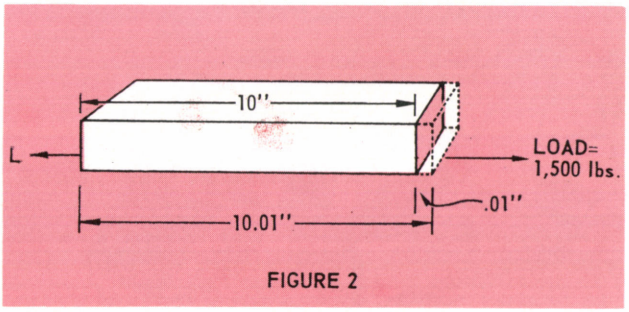


FIGURE 2

Subtracting the length of the bar in figure 1 from the length of the bar in figure 2, we find the amount of stretch is .01 inch. Strain, therefore, can be defined as the change in length compared to the original length of the material, or

$$\text{Strain} = \frac{\text{Change in Length}}{\text{Original Length}} = \frac{.01 \text{ in}}{10 \text{ in}} = \frac{.001 \text{ in}}{\text{in}}$$

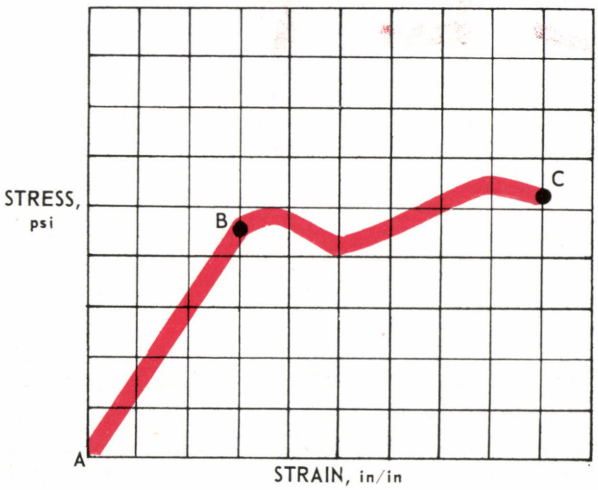


FIGURE 3

Looking at a stress-strain diagram for a typical steel alloy, we can see why stress and strain are important when we discuss creep. This diagram shows how strain changes as stress (or load) changes.

The portion of the curve between A and B may be called the "elastic range" of the material. If the stress is not increased above the level at point B, the material will show no permanent deformation or elongation when the load is released. To a certain extent, the metal acts like a rubber band; it will stretch when we pull it, but shrink back to its original size when we let go. This is a desirable characteristic for a metal to have. Without it, all metals would stretch permanently under load. It's not hard to imagine the problems this would cause in close tolerance structures. This is the type of permanent deformation known as creep.

To understand when and how we get permanent deformation, let's go back to figure 3 and examine that part of the curve from point B to point C. This portion is called the "plastic range" of the metal. If the stress is increased above the amount at point B, a certain amount of permanent deformation will occur. Because of the close tolerances required in turbine engines, these engines must operate in the elastic range to prevent permanent changes in the dimensions of engine components.

It is in the plastic range that creep occurs. But there is another factor, common to turbine engines, that must be considered: temperature. Even with a constant stress, some deformation of material will result from operating with high

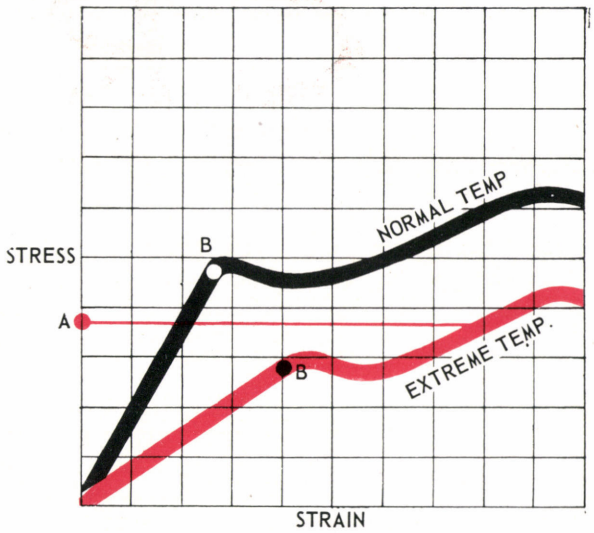


FIGURE 4

temperatures. This, also, is creep.

Let's take a look at how we get into the plastic range and the effect of high temperatures.

The two curves in figure 4 illustrate how the stress required to get to the plastic range becomes much less when the metal is subjected to extreme temperatures. Note that the stress at point A is well within the desired elastic range for normal operating temperatures. However, when the material is subjected to extreme high temperatures, the same stress at point A brings the material into the plastic range. Thus, we can go from the elastic to the plastic range simply by increasing temperature.

How do we get these high temperatures? This is where *hot starts* and *over-revs* enter the picture. They create the extreme temperatures that bring engine components into the plastic range.

Creep usually starts with small microscopic cracks that weaken the material and cause it to stretch. These microscopic cracks create stress concentrations. Figure 5A shows how the stresses in a normal piece of metal flow.

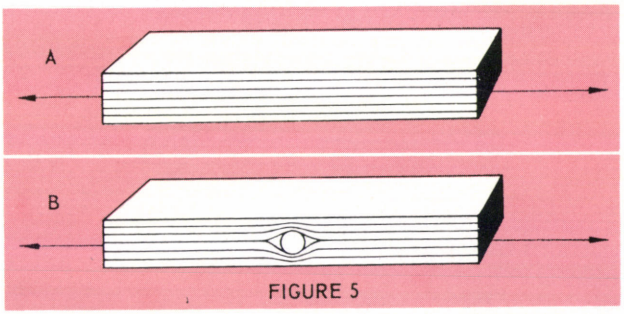


FIGURE 5

Figure 5B shows the same piece of metal with a hole drilled in it. Note how the stresses are now forced to concentrate on either side of the hole. These concentrations greatly increase the value of the stresses around the hole. The amount that a stress of this type is increased is governed by the *stress concentration factor*. Enlarging the hole in figure 5B illustrates how the value of a stress concentration factor may be determined. We will call this factor K.

The value K may be defined as:

$$K = 1 + 2\left(\frac{a}{b}\right)$$

Where A (fig. 6) is the same as B, then:

$$K = 1 + 2\left(\frac{a}{b}\right) \text{ and } \left(\frac{a}{b}\right) = 1, \text{ and } K = 1 + 2\,(1) = 3.$$

This means that the hole caused stress concentrations that were three times the value of the stresses before we cut the hole.

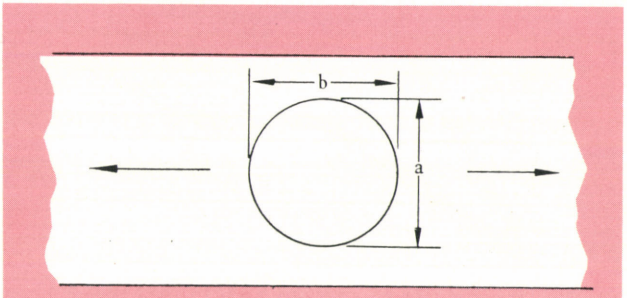


FIGURE 6

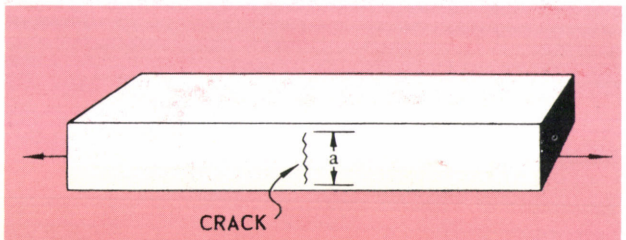


FIGURE 7

Figure 7 illustrates a crack that is perpendicular to the applied force. In this case, there is no B dimension. Therefore:

$$K = 1 + 2\left(\frac{1}{0}\right) = 1 + 2 = \infty = \infty$$

In this case, K is infinitely large. The smallest crack perpendicular to the applied force will increase the magnitude of the stresses in the material an infinite amount. We will soon see how this plays an important role in turbine engines.

To properly analyze creep, we must consider a final factor, centrifugal force. This is the force which acts outward from a rotating body such as rotor blades or turbine blades.

Figure 8 has a radius (R) rotating at a given rpm. Centrifugal force is acting outward from the circle, tending to pull the circle apart. The value of this force depends on the weight of the object, the length of the radius, and rpm. The

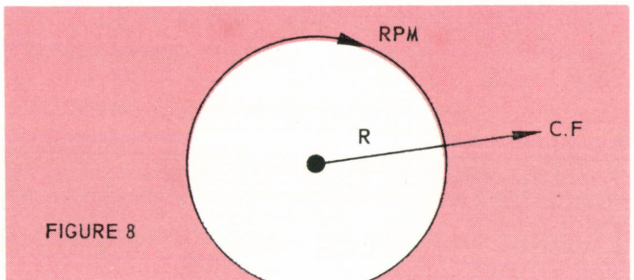


FIGURE 8

specific value is obtained from the equation:

$$C.F. = \frac{R \times W \times RPM^2}{2920} \quad \text{WHERE: } R = \text{radius, ft.} \quad W = \text{weight, lb.}$$

Note that as rpm increases, the force acting outward (centrifugal force) increases as the rpm^2. This may be stated in simple terms by saying that a *little* increase in rpm results in a *great* increase in centrifugal force. This illustrates the importance of *over-rev*. Turbine blades may actually be torn out by centrifugal force from *over-revving*.

Now, let's see how these various factors interact on one another and cause creep.

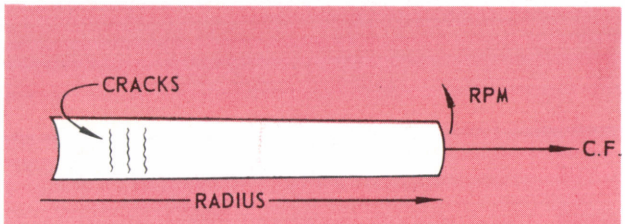


FIGURE 9

The turbine blade in figure 9 is turning at normal rpm. Add a couple of *hot starts* and the turbine blade enters the plastic range. Each time, microscopic cracks may have started a little deformation. These cracks form perpendicular to the applied centrifugal force and cause a stress concentration factor of $K = \infty$. The material the blade is made of has already been weakened from operation in the plastic range and creep has begun to form small cracks that will cause large stress concentrations. Remember that creep is cumulative.

To the above, let's add an *over-rev* and see what happens. First, we get more high temperatures, which cause more creep and more cracks. The cracks cause even higher stress concentrations. Second, the high rpm resulting from the *over-rev* greatly increases centrifugal force. Already weakened by creep, the turbine blade will tear off if the *over-rev* creates enough rpm. When this happens, our turbine is no longer balanced. Vibrations begin, and the engine literally tears itself apart.

The first and most obvious way to avoid the ill effects of creep is to prevent *hot starts* and *over-revs*. Unfortunately, this is not always possible. So, for your own sake, and for the aviators who may fly the aircraft after you, *write up hot starts and over-revs*. Guard against creep!

What's Your Safety Caption?

Send Reply to: Editor,
U. S. ARMY AVIATION DIGEST

Are YOU Ready?

William H. Smith

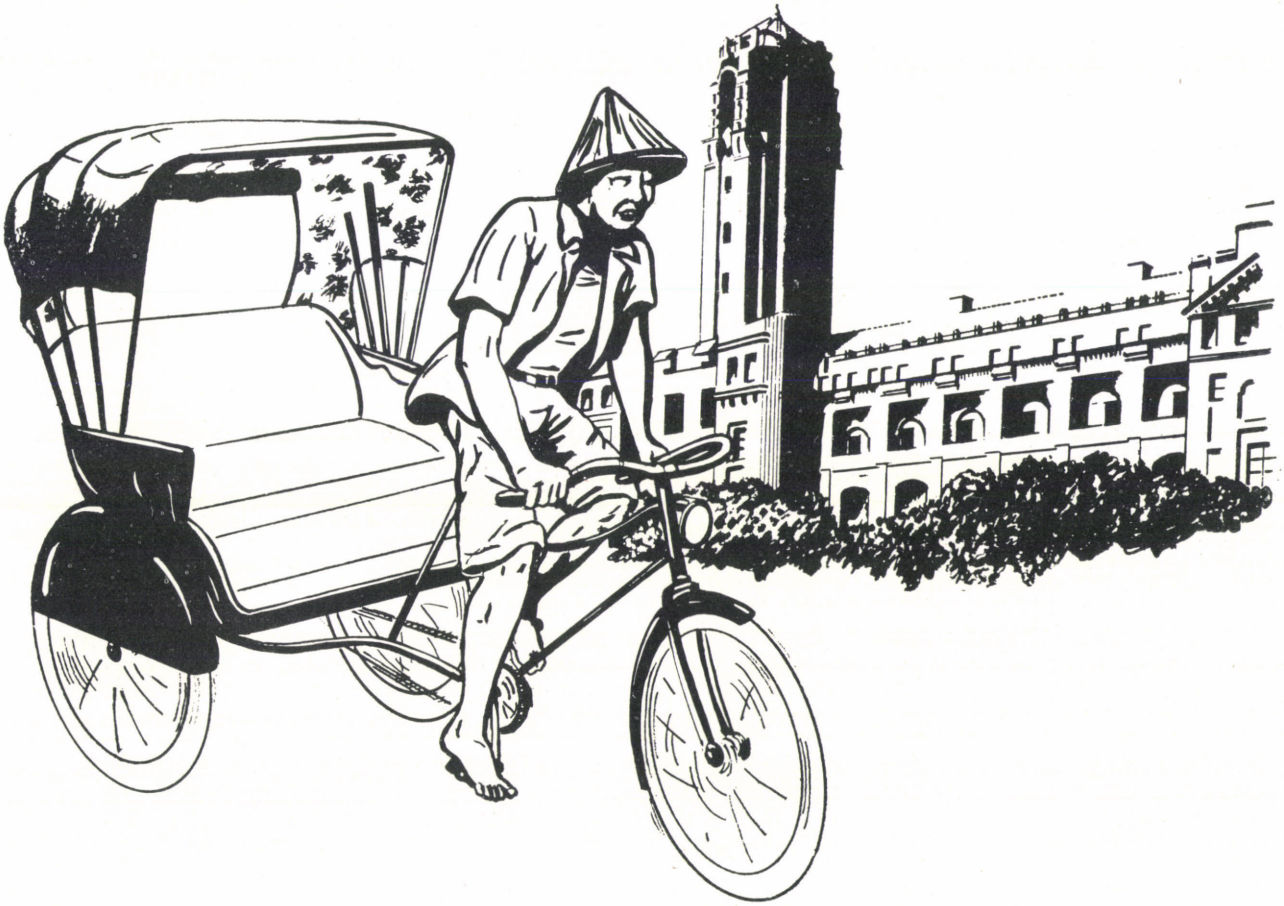
This fictitious story has a purpose: to help Army Aviators, mechanics and others flying in Army aircraft to become aware of their abilities and obligations in a survival situation.

The dictionary defines survival as (1) to outlive or (2) to continue to live in spite of adverse circumstances. But to the military survivor, just staying alive may and probably will not be enough. He must in some way, tangible or intangible, minute or great, improve his situation and the situation of those around him.

During World War II and Korea it was found that while air crew members generally knew how to administer first aid, there was a marked deficiency in the capability of the individual to go beyond this point. Furthermore, medical care beyond first aid was not taught to air crew members, despite the fact that many of them were on their own long periods of time before medical attention was available.

The survival medicine advocated in this story is more than first aid in the conventional sense. It approaches final definitive treatment in that it is not predicated upon the availability of technical medical assistance within a reasonable period of time.

The procedures and techniques are based upon condi-



tions reasonably expected to be encountered in a survival situation. Many of the more technical procedures should not be attempted by nonmedical personnel except in dire emergencies and in the absence of qualified medical personnel.

The other survival techniques, finding food, building shelters, emergency signals, etc., are not new to many readers of the AVIATION DIGEST. They are old and time tried ways. But they have been found to be the best means of survival in a wild and unknown country. They are repeated here in the hopes that they will help some future survivor to live in relative comfort and safety until help comes.

SPURGEON H. NEEL
Colonel MC

SOMEHOW I just can't stand being in one town for very long. And here I had been in Taipei three months already. The mysteries of the Orient which I had heard so much about didn't seem to be in the capital of Free China. Taking a ride through downtown traffic in pedi-cabs, though hazardous, was tame compared to "tree-top flying" in an L-19. Even the beautiful Chinese girls with their revealing slit skirts had begun to lose their charm. I was just bored.

So when Captain Schmidts had said, "Sarge, how would you like a ride down island?" I was pleased, even if it was just a flight with no stops. Of course, I was aware that the good captain was not asking me along for my wonderful conversational ability. In this part of the world it is smart to have a good mechanic on board. Except at the major fields, there are few Chinese mechanics who have learned how to repair an L-20. A trained mechanic can mean the difference between a ride back and a long walk.

We had the mission of escorting an H-37 to the point of land just south of Hengchun. Once it had landed we had no further responsibility; so the plan was to just turn around and come back without stopping. Even if we had wanted to set down, no landing field in the area was large enough to accommodate an L-20.

At first the trip was uneventful and there was plenty of time for me to study the others aboard. There was Captain Schmidts. He was an able and experienced aviator with a stack of flying hours. His balding head made him look almost middle aged, and he was a little stocky. His copilot was a young lieutenant whom I had not met before. The captain kept calling him Dick and his flight suit showed his last name to be Leber. On the seat next to me was Sergeant Allen, who had been assigned to MAAG long enough to earn the "Old China Hand" title. Like me, he was going along for the ride.

Down below, the island, whose shape on the map looks like a long sweet potato, seemed to move slowly by. It was easy to see why the Portuguese when

The dramatic story of an Army helicopter operation that saved seven lives was revealed recently when three U.S. soldiers each received the Distinguished Flying Cross.

The operation took place in Taiwan during Typhoon Sally last September. Three U.S. soldiers were stranded on a wrecker boom in the middle of the swollen Wu-Lo-Chi River. They had apparently tried to ford the river, a common practice in this area, when their vehicle stalled.

All aircraft had been secured for the duration of the typhoon. Captain Keith Jacob Rynott with 1st Lieutenant Leonard Burroughs as copilot, and Staff Sergeant James E. Riley, crewchief, immediately took off in an Army helicopter.

After a flight of 18 miles the pilot maneuvered the helicopter over the truck and rescued the soldiers by means of a looped rope.

After the rescue the pilot was told of another soldier who had been swept away. He flew downstream, found the man lying on a small sandbar, landed the helicopter in foot-deep water and rescued the fourth victim.

When the group had returned to the air base, Captain Rynott was told of three Chinese National military policemen stranded on a sandbar in the middle of the same river. Although conditions were much worse by this time he turned and rescued them also.

they first saw the island back in the fifteen hundreds named it Formosa, "Isle Beautiful." The Chinese have given the island their own name, Taiwan, or "Terraced Bay." That suits it too. The broad plains sweeping toward the west, the rugged mountains that more than fill the eastern half, the mile-wide riverbeds, and the straight sandy beaches gave it all a storybook look. But looks are deceiving. The rice paddies on the plains make a beautiful geometric design pleasing to the eye but they are pretty dangerous if you try to land in them.

The mountains have peaks over 9,000-feet high. Chances of making a safe landing here are practically nil. To make it worse, the mountain range is the home of some 185,000 aborigines. These semi-civilized natives, far different from the Chinese and Taiwanese of the flatland villages and cities, resent strangers. And I had been told that until a few years ago these tribesmen engaged in headhunting. There are nine tribes, most of whom live in primitive fashion.

The mountains are so rough that they have defied all attempts to build modern roads through them. Even the Japanese during their 50 years of occupation before World War II failed. But the Chinese Nationalists are more persistent. They are working on a cross-island highway that will go right through the center of this rocky mass. Combining modern machinery and ancient hand labor they hope to succeed where others have failed.

When we left Taipei the skies were clear, with only a few scattered clouds. By the time we reached the Hengchun foothills a solid blanket of clouds was below us. This was a bit surprising because in Taipei the weather had been given as VFR for the flight.

At Hengchun the H-37 went below the layer and we hung around until we got the word that it had landed. Captain Schmidts turned our plane northward and we headed home.

It was when we started back that we first began to have troubles. To our front were some innocent, fluffy looking clouds. Captain Schmidts turned to the lieutenant and said, "Looks like a thunderstorm up front."

"What'll we do?" Lieutenant Leber asked.

"Can't go through it; that's for sure. These Beavers were not made for it. We don't have enough fuel to go around to the right. Look at that thing! Runs for miles. And on the left there is Communist China, and their feelings might get hurt if we fly that way."

"And so?" Lieutenant Leber asked.

"And so we turn around and go back. Maybe we can go through a hole, get below this blanket and find a place to land."

By this time the air had gotten rough. It was turning dark and a few scattered hailstones began to crash and bang against the windshield. Captain Schmidts immediately started a 180 and in less time than it takes me to say it we were moving away from the storm.

I leaned back in my seat and began to relax. But not so Captain Schmidts. His trained ear had detected something wrong with the engine. In a few seconds I could tell there was trouble up front. The engine began to run very rough and there was an apparent loss of power. Captain Schmidts was fighting to maintain altitude above the cloud bank.

"Get Taipei," he told the lieutenant.

Ours was one of the older model Beavers in which all communications and navigation equipment was operated from the CSA-10 radio control panel located on the righthand side of the cockpit. Lieutenant Leber turned the switch and began fiddling with the other dials. He tried another switch and then the other two. A little white around the ears, he turned to the captain and said, "It's dead!"

Captain Schmidts leaned over and tried the switches, but with no luck. "The hail probably knocked off our antenna," he said, making no attempt to conceal his anxiety.

By this time the engine began showing signs of quitting altogether. We were just above the clouds and when the engine acted its worst we dropped into them. Captain Schmidts was doing everything possible to maintain our altitude.

And then it happened. Suddenly, everything was quiet. The motor had stopped. The captain was very busy, though, trying to get it started. He switched

Emergency Treatment of Wounds

Arterial Hemorrhage

When bleeding is from an artery, there is a rapid flow of bright red blood usually escaping in spurts with each beat of the heart. Because blood is lost rapidly, *this is the most dangerous type of bleeding.* It demands prompt and efficient treatment. The wounded part must be elevated if possible and direct pressure applied to the wound. If these measures fail a tourniquet is applied at once.

This finger pressure is applied directly over the main artery supplying the bleeding part. Pressure is applied between the wound and the heart and at a point where it is possible to press the artery against a bone. Proper finger pressure is useful in controlling arterial bleeding for a short time. It is used only until a better method can be applied. The major pressure points for controlling external bleeding are discussed below.

TEMPORAL. Pressure on the temporal artery helps control bleeding from the scalp. Apply pressure over the artery at a point just in front of the ear on the side of the head where the wound is.

FACIAL. Pressure on the facial artery will usually stop bleeding from the face. The pressure point for this artery is on the lower edge of the jaw bone, in a groove about one-third of the way forward from the angle of the jaw.

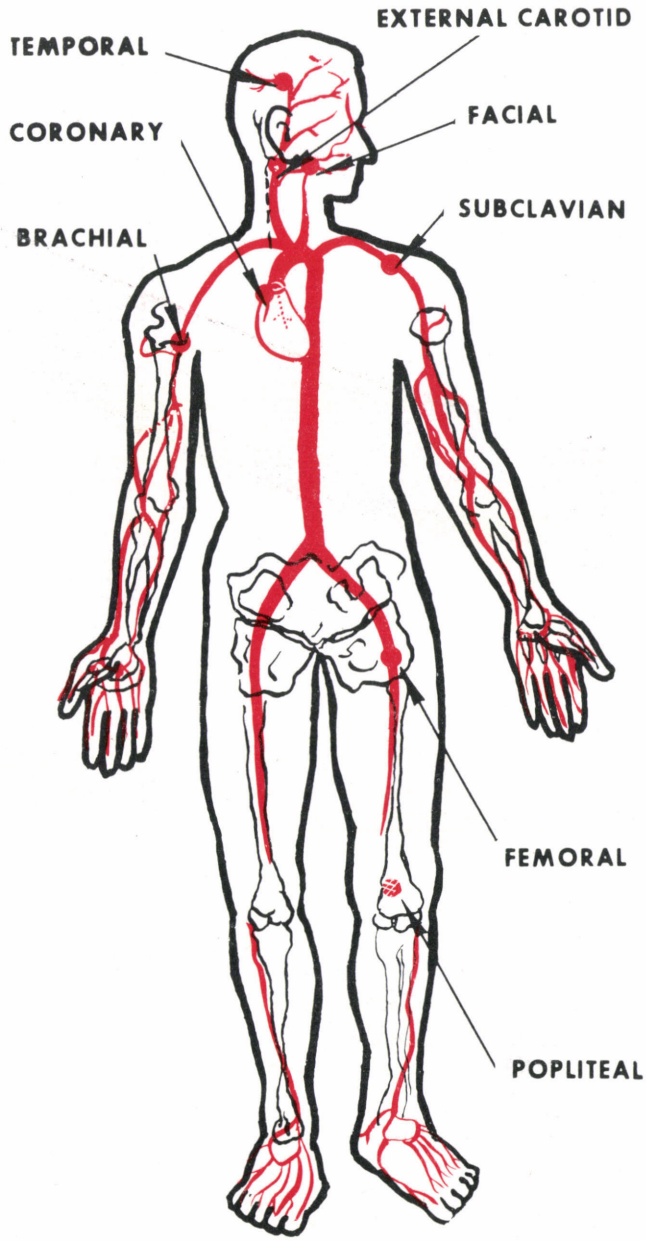
BRACHIAL. Pressure on the brachial artery is used against bleeding in the arm. Apply pressure on the inner side of the upper arm, in the groove behind the biceps muscle, about halfway between the shoulder and elbow. Press artery against bone of upper arm.

SUBCLAVIAN. Pressure on the subclavian artery is used to stop bleeding from the shoulder. The artery is pressed against the first rib in the hollow just above the clavicle (collarbone).

FEMORAL. Pressure on the femoral artery reduces bleeding from the thigh, leg, and foot. Pressure is applied at a point in the middle of the groin (the inside of the thigh) where the artery can be pressed backwards against the pelvic bone.

EXTERNAL CAROTID. Carotid pressure directed posteriorly and superiorly against the carotid artery will lessen bleeding on the same side of the head.

POPLITEAL. Pressure applied against the popliteal artery collapsing against the lower end of the femur will ease bleeding below the point of pressure.



the fuel selector switch to our fullest tank, mixture control full rich, and all that sort of thing. But no luck.

He turned to the lieutenant and said, "Get the passengers ready to jump."

We immediately released our safety belts. The lieutenant began to get out of his seat and said, "Each of you jettison your cabin doors."

The captain was busy trimming the aircraft.

"When we get down, everybody assemble on me," he said in a firm but calm voice. "Alright; jump."

I kicked the door and it immediately seemed to disappear. Without giving myself time to think I dived out. The cool air whipped around my face. My chute opened and with a jolt I seemed to stop falling.

When I broke through the blanket I could see Sergeant Allen almost level with me. He was swinging lazily under his chute. Above me and to my right were the two chutes of the captain and the lieutenant. The airplane had disappeared.

As the ground got closer, I went over in my mind all the things I had been taught about jumping. When I hit, I tried to make a roll as I had seen the paratroopers do it. But I goofed. I felt a sharp pain in my right leg. Fortunately, by this time the wind had died down and my chute settled without pulling me along.

With a considerable effort, I got up and untangled myself. My ankle was hurting pretty badly but there seemed to be nothing broken.

I heard someone cry out, and looking up I could see Sergeant Allen sitting up but making no effort to get out of his chute. Thinking he might be in trouble I limped over to where he was. He had landed in an area of sharp rocks and had cut his wrist pretty badly. Blood was spurting out, so I helped him stop it by putting his forefinger on the pressure point behind the elbow. I had read in a first aid booklet that this was the thing to do, and it worked.

Then I heard a shout. It was from Lieutenant Leber. Looking up I saw him over by a clump

of trees. He had landed in a cleared spot and freed himself. But the captain had landed in a tree and was hanging unconscious. The lieutenant was trying to free him.

I limped over to them. By the time I got there the lieutenant was already in the tree and was sawing on the captain's shroud lines with a knife. After a considerable effort, we managed to get the captain down.

There were bruises on his neck, and his lips had a strange blue tinge. Lieutenant Leber squatted, Chinese style, next to him and inserted two of his fingers in the captain's mouth.

"Captain Schmidts is in a bad fix," he said. "I think his windpipe has been closed some way. I'm holding his tongue back to give him a little air, but it's not enough. I'll have to help him some way."

The lieutenant ran his fingers around the inside of the captain's mouth to be sure there was no foreign matter there. Then he raised Captain Schmidts' shoulders a little and told me to put my coat under him. This had the effect of holding the captain's head back slightly and should have made it easier for him to breathe.

But it did not help much. The captain was making strange noises in his throat and the lieutenant said, "We'll have to work fast. Hold his tongue down like I'm doing and let as much air as possible go through."

From one pocket of his flying suit he took out a bottle of iodine and from another he produced, to my surprise, a short length of rubber tube.

He rubbed the iodine on the rubber tube, even poured some through it. He took out a small sharp knife and smeared it with iodine. His own hands were next; and then he bent over to the captain and rubbed iodine on his neck.

"Sergeant," he said, "I'm going to try a tracheostomy technique. In other words, I'm going to make an artificial airway so that he can breathe."

I had my doubts about him performing such an operation, but I said nothing.

As if to bolster himself, he began to lecture me just as though we were in the classroom. "To do this," he said, "I must first locate the Adams Apple and the small projection just below it."

He pointed to these two spots and continued, "Between these

two projections is the desired point to make the incision."

With the little knife, he made a deep cut in the exact center. "Ah, yes!" he said, half to himself. "Must cut into that."

"That's gristle," he said. "See, you can feel it with the end of your finger. Don't worry; there won't be much bleeding at this point."

To my surprise there wasn't.

"Now I must take this hose and insert it slowly." Holding the trachea open, he inserted the tubing.

Immediately there was improvement in Captain Schmidts' breathing. His chest made slow but deep movements. As we watched, his lips gradually changed from their strange purple to a more normal red.

"Now, all we can do," the lieutenant said, "is to bandage up the area and anchor the tube securely."

This he proceeded to do, finishing up his surgery by removing his own flying jacket and placing it over the captain.

Picking up the end of the tube the lieutenant said, "We must watch him carefully to see that he does not stop breathing. If he does, we must, of course, administer artificial respiration. You can't give it to him with the so-called mouth-to-mouth way because he is not breathing through his mouth. You must use this tube. Just place the tube in your own mouth and slowly exhale. Watch his chest and abdomen and you will see them expand. As soon as you have a little air in his chest, remove your mouth and he will exhale on his own accord. I think though he will be OK."

"Now, let's see what's wrong with Allen."

The two of us moved over to where Sergeant Allen was sitting. He was still holding his finger on the artery that led to his bleeding hand.

Sergeant Allen was looking and acting like a good soldier. That he was in great pain, I had no doubt, but his courage seemed to wane as we approached him.

Lieutenant Leber went up to him and felt his pulse. Turning to me he said, "I'm afraid he's going into shock. While I fix a tourniquet you get his chute moved over here."

By the time I had pulled his chute over, Lieutenant Leber already had the tourniquet on the sergeant's arm. It was obvious that the sergeant was in shock. He was lying on the grass now and his breathing was shallow and irregular. His skin looked pale, the "cold sweat" quite evident.

Lieutenant Leber had me open up the parachute and spread it on the ground. With my help he eased Sergeant Allen onto it and covered him to keep him warm.

"Now," the lieutenant said, "he should be coming around soon. Let's take care of his hand. I took a quick look at it and I think it will be possible to tie off the bleeding artery."

"Wouldn't it be better to just leave on the tourniquet?" I asked.

"No," he said. "A tourniquet is helpful for a while. It stops the blood. But by stopping the blood from flowing out of the artery, it also stops the blood from getting to the rest of the arm. We could be days in getting out of this place and by then Sergeant Allen's arm might be dead. Sometimes needle-nosed pliers are useful in these cases. Do you have any?"

"No," I said. "They are all in my toolkit on board the plane."

"Too bad," he said. "But perhaps we can do without them."

The lieutenant raised Sergeant Allen's wounded arm and began to look at it closely.

He said to me, "Get me the iodine."

He then began to rub iodine over his already reddish-brown hands. He also rubbed a little on some thread and a needle that he took from one of his pockets.

While I held Sergeant Allen's arm he began to explore the wound looking for the artery.

"This will be easy," he muttered to himself. In a louder voice he said to me, "This is the one time that it is permissible to touch a wound, but you must be sure your hands are clean. See, there's the bleeder. It's not cut all the way through. Release that tourniquet just a little so I can be sure."

I eased the tourniquet just a little and there was a gush of blood.

"That's it," he said. "Tighten it again."

"Now we must tie it," he said, picking up the thread and needle.

When he had finished tying the artery, he said, "Now release the tourniquet."

This I did while the lieutenant watched the wound intently.

"We're in luck," he said. "Sometimes there are more than one."

With some gauze he proceeded to bandage the wound.

Sergeant Allen slowly began coming around. Lieutenant Leber asked him how he felt and then told him what he had done about his cut wrist.

Fascinated by the actions of Lieutenant Leber, I began to see that there was a lot to this business of being a survivor. "What would happen," I asked, "if there was more than one bleeder?"

"Well, you try to tie them off. But sometimes there are too

many. Sometimes you have to pass a needle into the tissue around a group of bleeders and tie up the whole bunch. This is not good surgery but it is far superior to leaving the tourniquet in place."

Then I thought about the pliers. "What did you want pliers for?" I asked.

"Sometimes when the bleeder is completely cut off, its ends may retract so as to be invisible in the wound. In a case like that the pliers can be used as a surgeon's hemostat to help locate it and hold it out for tying."

"Oh." I said.

"Ok, Sergeant," the lieutenant said, "now let's get our friends under cover."

"What do we do?" I asked.

"If you can get around enough with that sprained ankle, let's whack down some bamboo poles and put up a couple of lean-tos."

And right in the middle of the road we built the two lean-tos, facing each other, using two parachutes for cover. Under each we spread straw and bamboo leaves. On top of this we put the other parachutes and moved our patients in. I was all for building the lean-tos in the woods where there would be more protection but the lieutenant said that it would be better to put them out in the open where they could be seen from the air.

"After all," he said, "they'll be looking for us soon and any help we can give them will be to our advantage."

Then the lieutenant gathered up a lot of fire wood and proceeded to build three fires. "Three fires are a signal," he said. "Perhaps someone will see them."

The captain was quiet. He appeared to be sleeping. The lieutenant seemed to be satisfied. He would go over to the captain and the sergeant and check their pulses and foreheads but otherwise did not disturb them.

Turning to me he said, "Hungry?"

I had not thought about food. Up to now I had not had time to think much about our situation. Suddenly a sort of let-down feeling seemed to come over me. It was getting dark and I felt that the rest of the world had deserted us. And what about those aborigines? Were they still hunting heads? Of course I didn't tell the lieutenant what was flashing through my mind.

"Here, eat this," he said, handing me a candy bar from his pocket. I sat down on the ground and slowly began eating the chocolate candy. The lieutenant gave the fires a couple of pokes and sat down too.

"Ever hear of psychogenic shock?" Lieutenant Leber asked.

"No, sir. What's that?"

"Well, that is what you are going through. You see you have passed through three major emergencies almost simultaneously: the storm leading to the landing, the crash, and the emergency of fixing up our friends there. It's not strange, then, that some psychogenic reaction occurs. Sort of like the let-down feeling after a long awaited leave has come and gone, only worse. Think of it that way and you will feel better."

And I did begin to feel better. I began looking on our situation in a different light. Wasn't it strange that with me here was a young "shavetail," 15 years my junior who was far wiser in many ways than I would ever be. Take all those medical supplies. I would have laughed if at the beginning of the flight I had known he was carrying them. Yet within a few hours they had saved the lives of two men. And how, I wondered, did the lieutenant learn all this medical stuff?

"Lieutenant," I asked, "how did you find out so much about medicine?"

"I was a medic in Korea," he said. "Later I went to OCS and then got my wings. In Korea I saw so many things done to save men's lives that I just can't get away from it. Whenever I am flying in a place like Taiwan I load my pockets up with medical supplies. I'm a sort of walking survival kit."

And from his pockets he began pulling out the most amazing assortment of medical supplies. As each came out he commented on them.

"Besides such standard items as water purification tablets, gauze, I have some APCs, salt tablets, charcoal tablets, vaseline, antiseptic soap, safety pins, needle and thread, a hack saw blade, and iodine. There is one item I think I will add—some sort of antibiotic. It would help the sergeant there at this time."

"What's the soap used for?"

"I should have used that on my hands before operating on the sergeant and the captain. But I didn't have time to find water. The captain was within minutes of dying."

"What about the rubber tubing?"

"Oh, yes. Forgot about that. Normally I carry it to use as a tourniquet. But this time it came in handy in the captain's case."

"The captain sure is lucky you came along on this ride."

"Oh, yes! We helped," he said, ignoring my reference to him alone. "But both Sergeant Allen and Captain Schmidts helped a lot. There is an old saying among explorers that the success or failure of an expedition is made before the expedition starts. A

well-nourished human being, in good physical and mental condition, can tolerate a great deal before becoming incapacitated, and can recover satisfactorily from relatively severe injuries. Both of those two are old soldiers and know the importance of protecting their health."

I made a mental note to cut down on my cigarettes and drinking. All these things the lieutenant was explaining sort of fascinated me.

"What do you use those charcoal tablets for?"

"They help relieve stomach upsets. If I had to leave an item out, I think this would be it. Charcoal is available anywhere you can build a fire. The vaseline is used in making dressings for the protection of burns. These salt tablets are very important. No matter how healthy you are the body cannot store up enough salt, like it can fat and other materials. Also salt and water can be used in the management of many other conditions, such as vomiting and diarrhea. The saw blade can be used for amputation purposes. I hope I don't ever have to use that, but I don't think I would hesitate when it means the trading of a limb for a life. The soap, well you know about that. I should have used it, but I didn't know water was so close. And you never can tell about water in a place like this. Sometimes urine may well be the most nearly sterile of all fluids available, and in some cultures it is preferred for wound cleaning."

"I see one thing missing."

"What's that?"

"Snake bite kit."

"Yes, I suppose so; but mouth suction, aided by deep massages with the teeth, is much more effective than devices contained in snake bite kits."

By now it was dark. The only light was from our fires. The stars above showed that the sky, in typical Taiwan fashion, had already cleared and we would be blessed by one of those beautiful clear nights.

Lieutenant Leber said, "I guess we had better get some sleep. One of us will have to stay awake to watch Captain Schmidts and Allen. Suppose I take the first half of the night and you take the second half."

"I don't feel much like sleeping."

"Rest is rather important to a survivor. Sleep when you get the chance; later on you might not be able to."

While Lieutenant Leber sat by one of the fires, a faraway look on his face, I lay down to rest. The night and our situation seemed to drift away and . . .

It seemed that I had slept only a few minutes when I was awakened by Lieutenant Leber. Actually it was well past midnight and my turn to pull guard.

Lieutenant Leber said, "Wake me at dawn and I'll see about getting some food. Let our patients sleep as long as they can. Captain Schmidts was awake a while ago and he is not in much pain. Call me if you need me."

With that he closed his eyes and within a few minutes was sleeping like a baby.

I sat in the dark, with nothing to do but stay awake, watch, and think. Lieutenant Leber, though, had apparently made himself busy. I could see that he had dragged a lot of brush onto the cleared spot where we landed. Limping over to it, my ankle still hurt, I saw that he had pulled green bamboo leaves from the nearby woods and arranged them on the ground into two designs. The first was simply a straight line, about 10 feet long and 1 foot wide. The second was a big X. They looked something like this.

I did not know what they meant but guessed they were some sort of signal. I made a mental note to ask the lieutenant.

Also I could see that he had been busy cutting up the parachutes. He had torn up one of the ripcords and from another chute had removed a strap and buckle.

After making the inspection I settled down for the rest of the night. I kept thinking about this strange stretch of land we were sitting on. It was a road, there was no doubt of that, but it started at the edge of a ravine, ran a few yards and ended the same way. Of course it was not paved.

The thing that worried me most was the stories I had heard of the aborigines. Were they true? Did they really chop off the heads of strangers? Must be true though, because in the University Museum in Taipei, I had seen a wicker basket that dangled from a long bamboo pole. This basket, the guide said, had been used to hold the heads cut off by the aborigines.

And in the still of the night I began to hear noises. A rustle of the grass would make me start. The soft call of a night bird sounded just like signals to me. After each of the noises, the woods would again settle down and I would come to my senses. But twice I am sure I heard sounds that were definitely not

my imagination. Once there was a clear thump. It sounded like a tree falling but not quite that loud. And at another time I was positive I heard a scraping and thrashing sound. In my imagination, I could see some wild and ferocious man pouncing on a rabbit or some other small animal and eating it alive.

Finally the sky began to get brighter. From the east, the direction of the good old USA, I could see signs that the sun was about to rise. The west was still dark, but there were indications that it, too, was beginning to wake up. To my great surprise I heard a faint sound like roosters crowing. Even more pleasant to my ears was the far away whistle of an old fashioned steam locomotive, puffing its way through the countryside.

It made me feel much better to hear these noises. I realized that help must not be too far away. I decided that as soon as the lieutenant woke up I would talk to him about going to get help.

About that time he got up and, rubbing his scrubby beard, came over to where I was sitting.

"How'd things go, Sergeant?"

"Fine," I said. "Both of them slept quietly all night."

As if he were just remembering the injured men, the lieutenant jumped up and went over to the captain. He felt the captain's pulse and forehead. He seemed pleased with what he found because he smiled. In checking the captain, though, he woke him.

I heard him ask the captain if he were thirsty. The captain did not answer, his throat was apparently hurting, but he did indicate yes by nodding his head. From over in the bushes the lieutenant produced an old No. 10 can. It was filled with water.

Holding it up towards me he said, smiling, "Someone's been here before us, probably the workmen on this road."

Holding the captain up with one hand he put the can to his lips and allowed him to drink a few sips. It is hard to express the way I felt as I observed this scene. I was impressed again with the way this young officer managed. I also wondered how the captain could drink with that rubber tube in his throat. But it did not stop him, except that it must have hurt.

After seeing to the captain, the lieutenant went over to Sergeant Allen and repeated the procedure. Sergeant Allen, though, was feeling much better. He sat up and managed to smile a little as he talked with the lieutenant.

When Lieutenant Leber came over to me, he said, "Well, Sergeant, let's see about some food."

"You got food?" I asked.

"Nope," he said, "I'm afraid I fell down there."

"Ah, me!" I said, "and here I am hungry enough to eat ten fried eggs. We could get real hungry before we get out of here."

"Now don't you worry; I'm going to treat you to a meal that would cost you a pretty penny if you were back in civilization," he declared.

Going over to the thicket, the lieutenant began removing a pile of small stones. In the center of this pile he reached in and held up by the hind legs two very large frogs!

"Stoke up that fire, and before you know it we will have some barbecued frogs and some frog soup. I caught them last night with the help of my flashlight and that pointed stick over there."

While the lieutenant was cleaning the frogs, I began telling him about the roosters and the train whistle. I told him of my plan to go get help.

He said, "You wouldn't get far with that bum ankle and I think I should stay here with our friends."

I still thought I was right though. To drive home the point, I said, "I think we had better try to get out of here as soon as possible. Last night I know there was something over there just past that bamboo thicket. Maybe aborigines. 'Cause I heard a definite thump like a tree falling and a little later a rustling like somebody or some animal."

With that he jumped up and said, "You did!"

But he did not wait for an answer. He ran right into the bamboo.

Thinking he was beginning to crack up I followed him and found him kneeling down in a small path in the middle of the thicket. At first I thought he was praying or something. But when he stood up he held a rabbit by its ears. "Meat on the table!" he called.

"How did you catch him?" I demanded.

"Made a noose last night with a wire strand from the ripcord. Nice, eh? Now, let's investigate that thump you heard."

Leading the way over to a small wooded spot he stopped by a log. Underneath the log was another rabbit, quite dead. I was dumbfounded.

"This is a little trick I learned in Boy Scouts," he said. "It's called a dead fall and, in my opinion, one of the best ways of catching small game. It's very simple: just lift one end of a heavy log or something like that and prop it up so it will fall when a bird or animal hits it. It

sure worked this time. Let's get to cooking."

"But how are we to cook with no pots?"

"Oh that simple," he said. "Tidbits of meat skewered on a green stick taste good."

With that he proceeded to skin the rabbits. When he had finished removing all their innards and cutting off their heads he took the largest and fattest and started to pound it with a clean stick. This he put in the No. 10 tin can and set it over the fire. Next he went over to the bamboo grove and cut off some tender bamboo shoots. These went into the soup. He even found some small wild onions. He also put in a salt tablet.

"There now," he said, "this soup may not be the ideal breakfast, but it is full of what is needed for sick folks."

Handing me a hind leg of one of the rabbits he said, "Ever cook this way before?"

"No, Sir. This is the first time I was ever stranded on the side of a mountain."

"Well, you just put the meat on the end of a green bamboo sliver. Stick it in the flames for a minute to seal in the juices, and then allow it to finish cooking by the coals."

This I proceeded to do. While the meat was cooking we naturally started talking about food.

"Boy, this sure smells good," I said. "And to think I figured we would practically starve before a search party found us."

"It's next to impossible to starve in a wilderness," the lieutenant said. "These woods are full of game. Later on we can see if there are any fish in that stream down there."

After deciding that his own meat was cooked, he let it cool and brought it over to Sergeant Allen to eat. By now the soup bucket was steaming. He gave it a stir and then fixed another bit of meat.

And so we ate, alternating between rabbit meat and frog legs. We did not have anything but salt tablets for seasoning but this did not matter very much. When the soup was finished and a bit cool, he gave some to the captain. It must have tasted good because the captain ate quite a lot. Even Sergeant Allen had some, though he had eaten several pieces of the meat.

As we ate, we talked, just as though we were at the club, dining with close friends. I made the remark that I had really never considered frog legs as fit food for human consumption.

The lieutenant laughed and said, "So do many people in the U. S. But that is because we have so much food that we are able to indulge in taste prejudices. Other peoples of the world are not so fortunate. But when food is scarce you will find many Americans can change their habits. All around us, for instance, are things that we would not touch under ordinary circumstances, but would gladly eat to stay alive. Insects, for instance. They are nutritious food, being mostly fat, and are far more strengthening than the meat we are eating."

I turned up my nose at the thought of eating insects. But the lieutenant did not drop the subject.

"Don't be squeamish about eating insects," he said. "It's entirely uncalled for. In parts of Mexico, the most nutritious flour is made from the eggs of small insects found in the marshes. In Japan, dragonflies are a delicacy," he continued.

"Moths, mayflies, grasshoppers, in fact about all the insects found in the woods are very palatable. The only ones I have found that I did not care for are ants. They contain formic acid and have a bitter taste.

"A small light at night will get you all the insects you need. If the weather is too cold for flying insects, kick open some rotten logs or look under stones for grubs."

"I've heard that you can eat snake meat," I said.

"Yes," the lieutenant said, "and it's good, too."

In the area where the woods began to slope down to the ravine, there was a large patch of wild roses growing. When the lieutenant had finished eating, he got up and went over to this patch. He began picking off some of the hips formed by the spring flowers. These he ate.

I joined him, because by now I had complete faith in his ability to find food. To my surprise, the rose hips I ate had a delicate taste. They reminded me of apples.

"These good for you?" I asked.

"You bet. They contain vitamin C, which prevents scurvy. Take some to Sergeant Allen and see if he doesn't like them."

After we had eaten and had secured the remainder of our meat for a later meal, the lieutenant started gathering up a lot of wood.

"I think we should keep our fires going real strong. The smoke might be seen," he said. "Throw on some green bamboo leaves; these make lots of smoke."

While we were moving brush into the cleared area I suddenly remembered the bamboo bushes the lieutenant had placed on the road during the night. I asked him what they meant.

"Well," he said, "the straight line means that we have serious injuries and need a doctor. The X means that we are unable to proceed. There are others that

could be of help in a situation like this. For instance, an arrow would show the direction we would proceed if we travel; a broken square would say that the aircraft is badly damaged; and an F would indicate that we need food. They are on the back of the sectional charts if you want to look them up."

Shortly after our conversation, I heard a rustle in the nearby woods. Looking in that direction, I was horrified to see two men step out of the bushes. They just stood there and looked at me and all I could do was to stare back. Good heavens, they must be aborigines! Were they the head hunting kind?

Lieutenant Leber also saw them. I can't tell what he thought, but he immediately smiled and walked over to them.

For a moment I thought to cry out and warn him, but the two men smiled broadly, bowed, and extended their right hands in friendship.

Immediately all fear left me and I rushed up to them, shaking their hands and patting them on the back. The only Chinese words I had learned were "sag-wa-tow." That means "water-melon head!" Not the right thing to say at this time.

They could not speak English and their language was nothing like I had heard before. The older man said something to the other, who immediately ducked into the woods and disappeared. For a moment I wondered if we had been too hasty in our trust.

The lieutenant turned to me, though, and said, "I hope he is going for help."

And so for what seemed at least an hour we stood facing our visitor, he talking in some Chinese dialect and we talking in English. Neither understood what the other was saying. I decided that he was not like any of the native people I had seen around Taipei. He was small but obviously very muscular. He wore what appeared to be cast off clothes. His hair, short and black, looked like a bowl had been placed on his head and the hair that stuck out had been cut off. On his forehead was an odd rectangular tattoo mark.

Just as I asked the lieutenant what he thought about this mark, four men appeared from the same part of the woods where the first two men had come. All had the black marks on their forehead. One was the man who had left. For the most part they were all alike in appearance, except one had a more professional haircut and seemed a bit larger than the others.

He came up to the lieutenant and said in flawless English, "How do you do. I am chief of the tribe. My name is Chen. We live here. Can we be of help?"

The lieutenant recovered sufficiently to shake hands with him and say, "Glad to know you. Yes, we need some help. We have two badly hurt men. We should send someone to notify the Americans where we are."

"I have done that," the chief said. "You see we found you last night and I sent a man packing right away. He should be at Sun Moon Lake by now. There are telephones there."

"I want to apologize to you," he continued. "My men should have tried to help last night but I am afraid they are still shy when strangers are concerned."

We were amazed. First, because of his foresightedness and, second, because he spoke with a British accent.

"In the old days," he said, "when we knew there was a boar on a ridge we drove him into the open by burning the brush. This of course destroyed much valuable timber and is now against the law. When I saw your fire I thought it was a burning so I sent men to investigate."

"Oh, I see," said the lieutenant. "We are very glad you did. Does your man know whom to notify?"

"I told him to tell the local police and to make sure that the word was passed on to MAAG."

The lieutenant turned and introduced me to the chief.

In an effort to make conversation I said, "I'm sure surprised to hear you speak such good English. Have you been to the States?"

He laughed and said, "No. "But I have been taught by Canadian missionaries. You see, I am the leader of the southern tribe of what you call the aborigines. The missionaries and the government are helping us. Right now we are poor but we are coming up, and with the help of this highway we will probably all be rich farmers!"

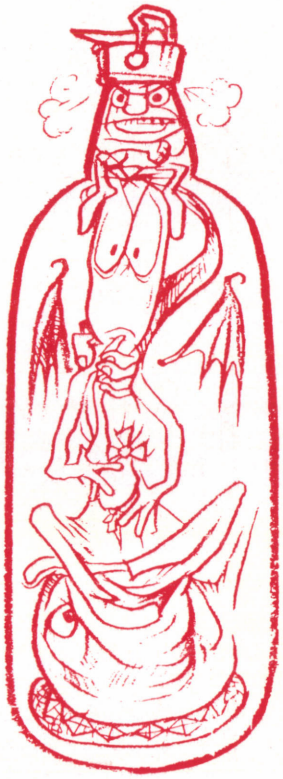
"Is this clearing part of the cross-island highway?" asked the lieutenant.

"Right in the middle of it," Chief Chen said.

With that I heard the most wonderful sound—the whirring of a nice large helicopter. And there it was settling down on our own private road.

We soon loaded up everybody, waved goodbye to the friendly tribesmen and headed towards Taipei. Thanks to Lieutenant Leber's medicine and his know-how, both Captain Schmidts and Sergeant Allen are alive and healthy, and I am a little bit wiser.

Overnight I had a first rate course in first aid and survival tactics. It occurred to me that anybody who flies could and should learn same.



ETHYL ALKY IN FLYER

From U.S. AIR FORCE SAFETY KIT

THE TITLE of this article might seem to imply some peculiar relationship between the rated airman and his favorite tranquilizer but none is intended. In fact, I hope to point out that the only unique relationship is possibly that of proximity, for the flyer reacts exactly the same as anyone else, in spite of many bar-thumping speeches to the contrary. At this point, 90 per cent of our readers have probably pushed this off as just another temperance lecture and have headed back to the bar, but for those of you unfortunate enough to be forced to read by duty, distance, or sheer lethargy, we will continue.

Alcohol beverages have been around for some time and it is safe to assume they will be for quite a period to come; especially as a number of our aviators are very fond of the stuff, not addicted of course. But they do regard it as one of the essential nonessentials of life. This view is supported by the fact that the word "whiskey" is derived from a Gaelic word "usquebaugh" meaning "water-of-life." (If you are wondering what usquebaugh has to do with flying, it was merely inserted to add a scholarly tone to our article.) Since we accept and even welcome liquor in our society, it becomes necessary to understand its effects and their duration, and plan our activities accordingly.

Alcohol is primarily a central nervous center depressant—this depressing effect includes several reflexes and trained responses considered essential for flying. This depression finally attacks the higher centers of inhibition and control and later spreads to centers for speech and equilibrium and eventually will even depress the center of respiration and cause death. This progression of loss of inhibition, slurred speech, faulty equilibrium, impaired control of fine movements and finally stupor is familiar to all and can be readily observed most any Saturday night. The individual who feels he can adequately handle an airplane while in this sequence is probably too far gone to be helped by mere magazine articles, so we will spend the rest of our space discussing the delayed effects of imbibing.

Alcohol is burned up in the body at a constant rate which is not affected to any great degree by exercise, vitamins, fruit juice, cold showers, etc. The size of the individual is a factor but this is limited by flying regulations; so for our purposes we can set the rate for metabolizing alcohol at not greater than 1 ounce of whiskey per hour. In most circumstances it is less than this. Thus for example, if you start drinking at 2000 hours and have 10 ounces in the next few hours, your body will still contain some alcohol at 0600 on the following bleary dark morning.

The type of drink, contents of your stomach, and other factors have a lot to do with how rapidly the alcohol is absorbed after ingestion. Likewise, the fact that a given level of alcohol will affect an individual less when the blood alcohol is falling than it will when the concentration is rising influences the degree of intoxication and impairment. The experienced guzzler develops a certain tolerance to alcohol and, as is well recognized, can handle more without incapacitation than can the neophyte. From the above, you can see that a few drinks in an old, overweight, habitual bar hanger is quite a different situation from the same number in a young, slim, college girl tasting her first Purple Passion.

In any type of individual, however, regardless of the immediate effect, this alcohol must be eliminated prior to return to normal and you can't beat the rate of one ounce per hour. But before you start calculating the hours between ten cent drink time and your takeoff time and squeezing in the maximum number of shots, let's consider the old hangover bugaboo.

The chances are if the interval between burning the last ounce of alcohol in your blood and trying to assume normal function is at all brief, you still won't reach peak efficiency; because a hangover persists for some time after the point of zero blood Bourbon. If there are a lot of variables in the absorption and effects of alcohol, there are considerably more in the duration and effects of the resulting hangover. Certainly the amount and type of booze, the time during which it was ingested, the amount of sleep afterwards and the damn fool things you did while you were drinking all play a part. Coffee, go pills, cold shows, a little hair of the dog, tooth picks under the eyelids and all the other cures will make you feel and look better but none of them will replace rest and time in restoring your efficiency. Those symptoms of bird cage mouth, butterfly stomach, rock quarry head and bleeding eyeballs can't help but impair your ability to concentrate and perform at your peak. The dangers of accepting yourself for flight in less than top condition are just as real as the dangers of accepting a plane in less than top condition. I don't think the dire effects of either need more emphasis.

It is well recognized that many people have flown with hangovers and even with some of the previous night's highballs still circulating in their blood stream and gotten away with it. The old "I have flown with worse hangovers" philosophy is all too frequently used in place of good judgment. I have often wondered how many of the accidents on cross-countries are actually due to unfamiliar terrain, strange airfields, etc., and how many could be blamed in large part on the extra partying and lack of sleep that frequently accompany these junkets. The actual incidence of this will never be proven but everyone can recall a close call or two directly related to these factors.

The obvious moral is to drink, if you like, but do it wisely. This requires some planning as wisdom and drinking usually have an inverse relationship as the evening progresses. It all boils down to the fact that the man with the intelligence, character, and judgment to fly safely and well should be able to handle alcohol the same way. If he can't, he needs help before—not after—the impending disaster.

Continued from page 15

item listed on the DA Form 2408-16 when that component is removed from the aircraft and is repairable. This will serve as a source of data for product improvement programs at USATMC.

The maintenance officer will ensure that DA Form 2410 is correctly accomplished in two copies for each component listed on the DA Form 2408-16, *as soon as it is removed.* All entries will be based on information recorded on the -16 for that component. All entries will be typed if possible; if a typewriter is not available, use ink. The carbon copy will be forwarded to Transportation Materiel Command (TMC) within 5 working days from the time the component is removed. The original form will be placed in a waterproof envelope and placed in the shipping container along with the component.

If the container is too small to place the envelope inside, the envelope will be attached to the outside of the container in a manner that will afford protection from exposure and rough handling in shipment and storage. The original copy will *always* accompany the component until it is re-installed on an aircraft. At that time the information will be transposed to the DA Form 2408-16 for that aircraft.

This is only a brief treatment of these new forms. Complete information for their use, as well as for the use of other equipment forms, will be found in TM 38-750, the Army Equipment Record System and Procedures.

Operation TAPER was not inaugurated solely to reduce the amount of forms and records; nor was its mission to redesign existing forms. These benefits are by-products of a system calculated to standardize and simplify the existing system so it becomes a usable tool rather than an encumbrance. Through the need to redesign aviation forms to accomplish this mission, TAPER has provided a set of forms and records that truly meets Army Aviation's specific requirements. It took 20 years and Operation TAPER, but today for the first time we have *Army Aviation* forms and records. Further developments of this system will be published in the U.S. Army Aviation Digest.

PUTTY In Your Hands

Lieutenant Forrest H. Williams

I FEEL these men we get from Fort Rucker are helpful, but really they don't have experience enough to help us on the line."

This is strikingly similar to a remark made in an aviation company regarding the 670 aircraft maintenance crewmen. The duties of a 670 mechanic are defined: participates in periodic inspections, removes and replaces parts under supervision, inspects and cleans aircraft and components, assists in ground handling and mooring, refuels and lubricates and acts as member of crash rescue team.

Our training of these men has one factor in common with all institutions which deal specifically with imparting knowledge which will lead to a career or a profession. That is this: all institutions do not pretend to prepare a graduate to a degree which will make him skilled enough to immediately enter a developed field of endeavor or profession and compete effectively with seasoned professionals. Internships, apprenticeships, and training programs are established in practically every profession or large corporation which feels that their success depends upon the personnel they have on their team.

How then does Army Aviation differ, except in the matter of mission?

Let's deal specifically with the aircraft maintenance crewman. This man, after having been through the 670 course has been given a foundation for *becoming* an aviation mechanic. He has proved to have an interest in aviation and a capacity for learning the basic requirements for participation in the program.

Now, when he reaches your unit, what is his reception? His experience, in most cases, is this: he received basic and advanced individual training. All too often, without remembering the purpose of academic instruction, it is easy to imagine that this man is just barely a soldier and not quite a mechanic.

This man has been recently reminded that he has been given a foundation upon which to build, that with his MOS and the training he has received to date, he has the right, not the privilege, to expect supervision when he gets out on the line.

Is he going to get this supervision? Or is he going to become what he has been taught is a dirty word maintenancewise, a bubble-washer? This is up to you, the commander and supervisor. Do you have a training program that will give this man the experience he needs to shoulder his share of the load? Or is he going to remain status quo, filling a slot on the morning chart for a specified period of time until he is awarded a 671 or 675 MOS which he hasn't earned?

At this level of technical skill learning is not a simple matter of passive absorption of facts. The man has to be guided and directed toward a worthwhile goal, one he knows he is capable of attaining.

Let's review some of the courses that have made up his Army Aviation mechanical education. Initially he receives a portion of instruction which deals with forms and records which are kept on the aircraft (in the DA 2408 series). Additionally during this period, he receives instruction on publications, including practical exer-

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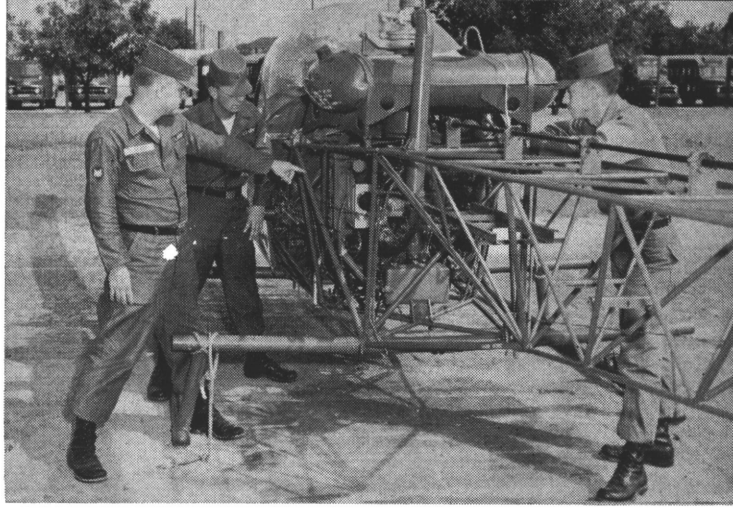
Lt Williams is on TDY from the Department of Maintenance, USAAVNS, to Camp Wolters, Texas for helicopter training.



In 5 weeks we have attempted to give students an introduction to Army Aviation and aviation in general; to give him instruction in theory of various mechanical and physical laws; and to create a stirring interest in him to be associated with Army Aviation.

cises on their use.

He then receives basic fundamentals of electricity and electrical trouble shooting. He is taught theories and laws of electrical physics, hydraulics and various other systems found in Army aircraft (approximately 40 hours).

Our student then moves to the powerplant phase of instruction, which lasts approximately 82 hours. This instruction includes the basics of engine principles as well as a background for understanding fuels, helicopter powertrains, and sheet metals. This phase includes a 32-hour practical exercise on reciprocating engine troubleshooting. He also learns how to correct the troubles detected.

After completing these classes and having been tested on his ability to perform satisfactorily, the student then receives instruction on sheet metal repair, which includes a 6-hour practical exercise.

Upon successful completion, our young mechanic-to-be is awarded his 670 MOS. In 5 weeks we have attempted to give him an introduction to Army Aviation and aviation in general; to give him instruction in theory of various mechanical and physical laws; and to create a stirring interest in him to be associated with Army Aviation. All this while we have tried to keep him aware that he is also a soldier.

Now here is our "product." If we have done our job, he has drive to become an integral part of a unit and start to work becoming a valuable member of a team, although he is aware that his training is not complete.

At this point the man is valuable and his attitude and his intellect are still geared for a challenge of reasonable proportions. While his aptitude for his training thus far has been proved, it still hasn't been thoroughly tested and he knows it. He is ready to enter a phase of on-the-job training or "work-producing-instruction." He is vulnerable in attitude and potential. The first few days with his new aviation unit are spent doing what anyone else in any new and somewhat strange place would do. Mainly he is adjusting and forming opinions—opinions which can be valuable and lasting, or corrupting and lasting.

This is largely up to the commander. Now imagine yourself in the commander's position. Are you going to accept realistically the fact that you have a man here who can help you. Or are you going to shrug your shoulders and try to ignore the fact that it is up to you to further train this man?

Let's take 2 examples of two ex-students, Joe Doakes and John Doe. Imaginary names and cases, but I think you will agree that they are not only common but typical of different units, depending upon one factor for differentiation: the CO.

As a matter of background, Joe and John were from the midwest. They both evinced an interest in mechanics (not necessarily aviation mechanics) and after high school decided to join the Army to gain a little experience and training in the field. The recruiting sergeant mentioned aviation mechanics. To both Joe and John this was appealing because it offered refreshing new opportunities that neither had considered would ever really be open to them. When they heard the Aircraft Maintenance Crewman's Entry Course could be guaranteed them, they both eagerly accepted.

Joe and John met during basic training and formed, through their mutual interests and similar backgrounds, a friendship.

After 8 weeks of basic training they were sent to Fort Rucker, Ala., to attend the 670 Aircraft Maintenance Crewman's Entry Course. Here they continued their association and managed to stay very close together in academic standing.

At the end of the course, both Joe and John, along with the rest of their class, were assigned to separate TOE units, rather than continue in the 671 (fixed wing) or 675 (rotary wing) course. Both men were disappointed but were consoled by the fact that there is no learning experience quite like actual application.

So, having been awarded a 670 MOS, the boys bade Fort Rucker and each other farewell. They did not know it at this time, but they were soon to be involved in a totally dissimilar set of circumstances.

John reported to his unit and was told by his First Sergeant that an interview with the company commander would be arranged and he could report back to the orderly room at a specified time and meet his CO and section leader.

At his interview John was impressed by the CO's logical explanation of the unit mission and by his particular interest in the extent of John's experience, which was admittedly very limited. After the interview he was told he would be working with Sp-5 Smith, who was then crewing two L-19s.

Sp-5 Smith took Pvt Doe on his first duty day and showed him around the maintenance area and told him that, whenever possible, Doe would be his shadow.

While working under Smith's supervision, Doe learned the extent of his responsibilities and the full range of jobs he was to perform. Because of the over-the-shoulder type of supervision by Smith, he gradually gained more confidence and began to seek more knowledge and responsibility. In other words, Pvt John Doe developed an interest and a drive to become a full-fledged, effective member of a team.

Now let's take a look at Pvt Joe Doakes. Joe was comparable in attitude, training, and initiative. When he reported into his new unit he was greeted with: "A new bubble-washer, huh? Okay, go to building umpteen and stow your gear and draw your field equipment from Sgt Bloty, and don't leave the Co area. The old man may want to talk to you." He was still not too discouraged, even though as he left the orderly room he heard a remark to the effect that "there was new meat for the duty roster."

Joe never did have an interview, as such, with his CO or section leader, but was told by his first soldier that he would be working on H-13s.

With this welcome-to-the-rat-race attitude of his new unit, a confused Joe Doakes started his life in an aviation unit.

His first duty day he was told he would be working with Sgt Jones on the H-13 flight line. In the maintenance area he looked for Sgt Jones and was informed he would be back from leave in about two weeks.

Joe was finally told to see Sp-4 Johnson and eventually discovered that Sp-4 Johnson was on KP. Finally, Joe was sent to the line chief and was told to draw a toolbox and "clean up those two H-13s on the end of the line."

Joe drew his toolbox and, after wandering around trying to find something to wash bubbles with, he finally got to work at about 1030 hours that morning with a vague idea about what he was supposed to be doing. So, with the idea of "do something even if it's wrong" he started—just in time to be interrupted by some officer whom he had never seen, asking if the aircraft he was working on was flyable.

Joe started to explain that he didn't really know. Whereupon he received the information that he was addressing the maintenance officer and that he, Joe, should always be familiar with the status of his, "Joe's," aircraft. He was further informed that in this unit maintenance comes first and last and that nothing will interfere with the performance thereof. Finally Joe was able to explain that he was new on the job and this *was* his first day.

The maintenance officer asked Joe who his supervisor was and Joe told him Sp-4 Johnson. At this point he got a lecture about the chain of command, heard a few regrets about the vagaries of the "New Army" and was told to shape up.

Joe was confused, but after thinking it over he decided when things became normal he would be given a specific goal. After all, it was a good thing that he was in a unit where "maintenance comes first." At 12 o'clock it was time for chow and Joe went to the mess hall. After chow he was told to report to the orderly room.

Joe went to the orderly room with a light heart, realizing that it couldn't be too bad because he had hardly had time to foul up. The first soldier told him that he was detailed to be an aggressor for one of the units taking their AIT. He was to get his field equipment together and report back at 1330 hours.

With 3 days in the field and approximately an hour of aimless work on an aircraft, Joe came

Does your unit have bubble washers or professional type mechanics? It's up to the CO.

back to his unit and was promptly called on the carpet for having left his toolbox in the aircraft he had been working on the first day.

He was also informed that because the unit had an inspection coming up they had to have a number of the personnel exempt from duty on the duty roster and his name was on the duty roster for guard and KP.

With the "brass band" reception and the general inconsideration of Doakes as an individual, his outlook towards his job, his unit, and the United States Army became somewhat jaded. He soon found out his associates had been treated in the same manner upon their arrival in this unit. He began to accept this as the standard procedure throughout the Army.

He soon began to accept the fact that if he did his job and kept his mouth shut, he could get along. Certainly he hadn't been inspired to achieve anything more than make Pfc or Sp-4. His job was secondary in his attainment of this goal. Although his supervisors and commanders would have been surprised, Joe Doakes felt that as far as his MOS was concerned, he was a misfit, good only for pulling company details.

* * *

What were the differences between the units to which Doakes and Doe belonged? Outwardly there was nothing that could really be detected. The difference was not so much in personnel within the units, or maybe even the ability to perform its mission.

But the attitude of the commanders was something else again. One commander took a realistic view of a man's training and potential and his own responsibility to continually train and supervise personnel. He realized that with proper handling by himself and people throughout his unit Pvt John Doe could become an asset. Although Pvt Doe had distinct limitations of knowledge and experience, he had the potential to develop that quality of interest in his job which we refer to as professionalism.

Doakes, on the other hand, had been looked upon by his CO as a Murphy-in-the-making. He looked upon Doakes as a liability to the time and effort of his already trained and experienced personnel.

This commander overlooked three things:

- He had a responsibility to train his people.
- By the individual's very job description, he required supervision.
- The man's attitude as a result of the lack of consideration of the first two points was contageous.

In summary, both men were awarded a higher MOS the same day and they both made Pfc the same day although in different units. Here again the similarity ends.

Pfc John Doe had *earned* his MOS and rank because he had a goal in the performance of his duty, he had garnered knowledge and experience for acceptable performance of his duties and responsibilities toward maintaining aircraft.

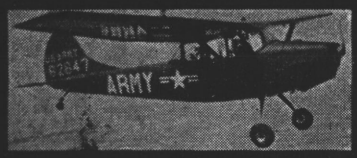
Pfc Joe Doakes, a man of comparable initial experience and intelligence has been *awarded* his MOS because he had "kept his nose clean." His professionalism as an aircraft mechanic was completely nonexistent. His normal healthy appetite for gaining knowledge within his field of endeavor was destroyed and in its place was an unhealthy and dangerous indifference.

Here was a diamond-in-the-rough not utilized. Here was a man who was not *allowed* to develop to the limit of his potential. Why?

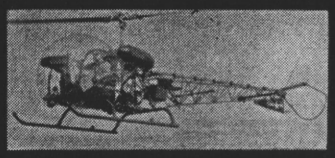
Neither USAAVNS nor any other school can take the responsibility nor can anticipate their students' future employers requirements. No school can take the responsibility for the success or failure of any corporation, profession or military unit. No school can finish a man to the extent that he can be as effective the first day or week on the job as he will be the day he leaves.

What is this man? It's up to you because he's putty in your hands.

L-19 BIRD DOG



H-13 SIOUX



U-1A OTTER

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THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

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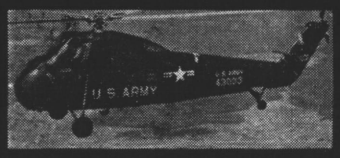
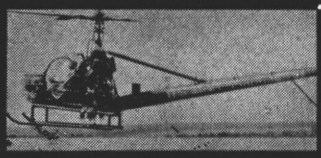
HU-1 IROQUOIS



H-34 CHOCTAW



H-23 RAVEN

H-19D LOST OIL PRESSURE during training flight. Aircraft completed forced landing with no damage. Valve guides failed in No. 5 cylinder, causing engine to consume all oil through combustion chamber.

H-13E ENGINE BACKFIRED and ran rough in flight. Aircraft completed forced landing with no damage. Two spark plugs fouled and compression check of No. 5 cylinder revealed no compression.

L-19 STRUCK TREE during landing approach. Minor damage to right wing. No injuries.

L-23D LEFT ENGINE FAILED in flight. Left propeller was feathered and aircraft completed precautionary landing with no damage. Connecting rod in No. 1 cylinder failed, breaking holes in both sides of upper engine case.

L-19 STRUCK POWERLINE during low reconnaissance. Major damage to aircraft. No injuries.

U-1A LANDED HARD during practice power approach. Left main gear pushed through fuselage, causing major damage. No injuries.

L-19 BLEW OVER while taxing behind Air Force C97. Incident damage to right wing, right wheel, and propeller. No injuries.

H-21C CHIP DETECTOR LIGHT came on in flight. Aircraft completed precautionary landing with no damage. Metal particles found on oil sump plug. Suspect internal materiel failure of engine.

H-13G SKID SHOE STUCK in PSP mat while aircraft was hovering downwind. Major damage to skids, bubble, antennas, landing light, and bottom of forward section. No injuries.

L-19 DAMAGED during message pickup training flight. Weight on message pickup cord struck ground, bounced up, and came down through windshield. Incident damage. No injuries.

H-21C STRUCK TREES during attempted takeoff from confined area. Aircraft sheared left gear and rolled on left side. Fore and aft rotor blades destroyed. Major damage to left main gear, rotor heads, stabilizer, power train, and fuselage. No injuries.

H-23F CAUGHT FIRE in flight. Fuel funnel and chamois filter stored in baggage compartment on tail boom caught fire through spontaneous combustion. Fire was not discovered until aircraft had completed flight and landed. Hole burned in top of baggage compartment. No injuries.

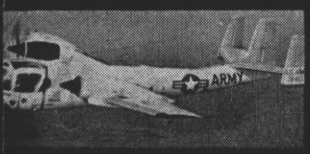
H-37A CARGO DOOR CAME OFF during entry to straight-in autorotation. Upper half of rear cargo compartment door passed over and to rear of fuselage, striking three tail rotor blades. Aircraft landed with no further damage. No injuries. Caused by failure of door latch.

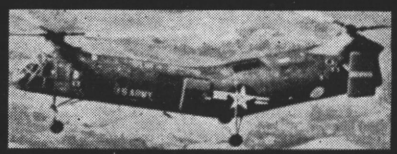
H-13G ENGINE FAILED in flight due to fuel starvation. Aircraft had flown 3 hours and 3 minutes. Major damage to main rotor blades, tail boom, and front support tube occurred during attempted autorotation to rutted road. No injuries.

H-13H STRUCK WIRES during takeoff. Incident damage to main rotor blade. No injuries.

HU-1A ENGINE OVERSPED in flight. Aircraft was placed in autorotation and governor switched to emergency. Power recovery was made and aircraft landed with no further damage. Overspeed governor failed to high side.

AO-1 MOHAWK H-21 SHAWNEE L-20 BEAVER





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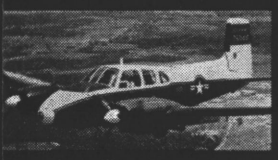
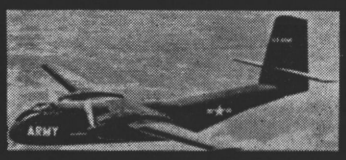
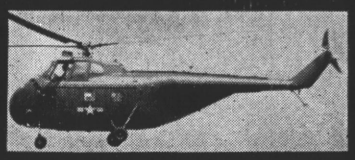






L-23 SEMINOLE H-37 MOJAVE AC-1 CARIBOU H-19 CHICKASAW

H-34C AUXILIARY HYDRAULIC pressure dropped to zero in flight. Control pressures increased. Aircraft completed precautionary landing with no damage. Caused by ruptured hydraulic line.

L-19 LANDING GEAR SANK while aircraft was taxiing on soft sod. Aircraft nosed over and was later blown on back by gusty surface wind. Major damage to propeller, engine cowling, both wings, and vertical stabilizer. No injuries.

H-37 SERVO PUMP FAILED in flight. Aircraft completed forced landing with no damage. Caused by materiel failure of axial piston in second stage servo pump.

H-13 ENGINE FAILED in flight. Aircraft was autorotated to road and struck tree while flaring. After striking tree, aircraft turned counterclockwise and struck building. Major damage. No injuries. Cause of engine failure undetermined pending investigation.

H-13G ENGINE BACKFIRED and lost power in flight. Aircraft crashed in thickly wooded area during autorotation attempt. Aircraft destroyed. No injuries. Cause of engine failure undetermined pending investigation.

L-23D LANDED WHEELS UP due to failure of nose gear to extend and lock. Minor damage to propellers, UHF antenna, and air scoop. No injuries. Cause of nose gear malfunction was failure of actuator support brackets.

HU-1A STRUCK BY SLING LOAD in flight. Sling load (three salvaged wall lockers) oscillated and struck underbody of aircraft. Incident damage to underside of aircraft in vicinity of tail boom attaching points. No injuries. Wind, gusting 14-27 knots, was a contributing factor.

AO-1 YAWED AND ROLLED to near inverted position during attempt to simulate single engine performance by placing the No. 2 power lever in ground idle. Recovery was effected and aircraft completed precautionary landing with no damage. Suspect reversal of No. 2 propeller due to possible improper rigging of propeller controls.

H-23B ROTOR BLADE FLEXED into tail boom during engine shutdown. Major damage to main rotor blade, tail rotor drive shaft, and empennage. No injuries. Gusty surface wind considered a factor.

H-37B LOST OIL PRESSURE in No. 2 engine in flight. Aircraft completed forced landing with no damage. Caused by rocker oil manifold suction tube assembly vibrating loose in flight.

U-1A LANDED LONG and ran into barbed wire fence. Incident damage to propeller and engine cowling. No injuries.

H-19D EMITTED SMOKE in cockpit and cargo section during flight. Aircraft completed forced landing with no damage. Smoke caused by short circuit in main inverter.

H-13H CAUGHT DOWNDRAFT during approach to mountain helipad. Aircraft crashed, rolled downhill 400 feet, exploded and burned. Aircraft destroyed. Pilot sustained severe burns and lacerations. Extreme vertical wind components considered a factor.

H-23D STRUCK BARRACKS during attempt to hover between two barracks to static display site. Major damage to main rotor blades and aft spring tube. No injuries.

Pathfinders and Army Aviation

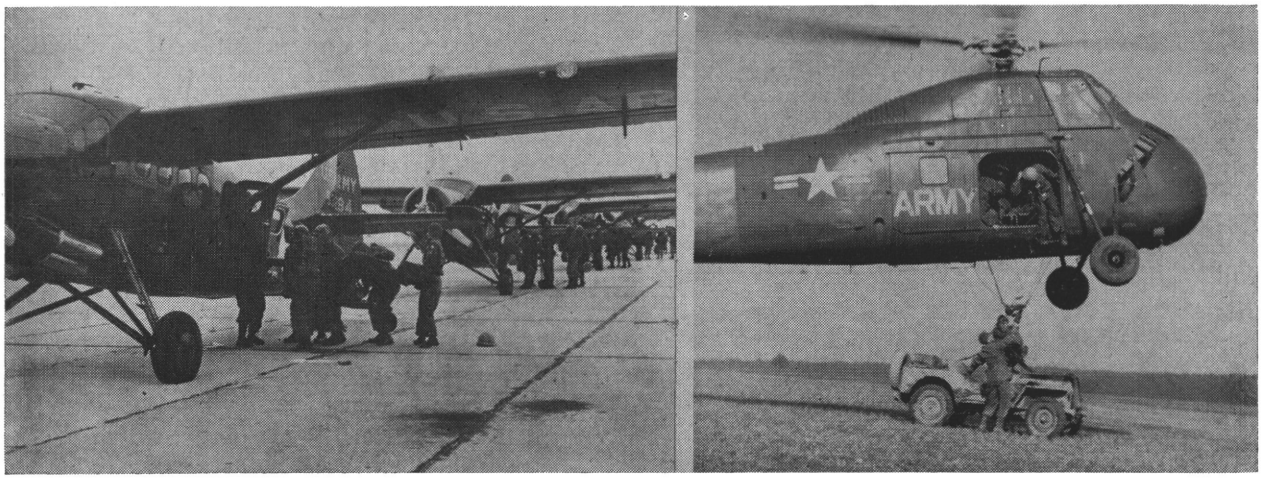
Captain Donald C. Bowman

THE TIME IS 1943; the location is Sicily. The invasion by U. S. troops is underway. Plans call for three U. S. Army Infantry divisions to land on the beaches. Just before the landings, one reinforced airborne regimental combat team from the 82d Airborne Division is to jump in the vicinity of Gela to prevent reinforcement of the German beach garrison.

As the airborne troops come nearer to Sicily, it is evident that not all is well. No navigational aids are available and reliance has to be placed on the navigators in the Air Force planes. Many of the planes missed Malta, the checkpoint; and to make it even worse, the winds over the objective area are 35 miles per hour. The jump is made. Less than one-eighth

Capt Bowman is the officer in charge, Pathfinder subcommittee, Airborne Airmobility Detachment, U. S. Army Infantry School.

Left: Pathfinders may be moved to the objective area by air delivery, helicopter, airplane, or by any other means. Even infiltration by foot may be used. Here they are loading in U1As for air delivery. Right: Heavy equipment is delivered by the most expeditious means available. Here a jeep is slung beneath an H-34 helicopter to illustrate the way this type of equipment is delivered to pathfinders.



of the force hits the assigned drop zone. The rest are scattered from 3 to 60 miles from their drop areas.

Some months and many landings later, airborne units are used in the invasion of Holland. This time the story is different. The aircraft are guided into the area and most of the troopers are pinpointed on their objectives. Deliveries of supplies are made on the exact points desired.

How was this remarkable improvement made in such a short time? Some of the improvement can be traced to more experience on the part of the navigators, but most of the credit is due to a small group of officers and men known as Pathfinders.

Even though the airborne invasion of Sicily was considered a tactical success, it was realized then that it is not always possible to get pinpoint accuracy from navigators. Going to an exact spot on the ground is not easy under good conditions and can be most difficult when visibility is poor, weather is bad, and the landing area is hard to find. In the case of Army Aviators, the instruments available do not enable them to find exact ground locations under all visibility conditions without assistance from the ground.

Once the aviators have located an area, they still face the problem of making rapid, safe deliveries. Because of the speed at which he travels, distance means relatively less to the aviator than it does to the infantryman, and terrain locations are difficult for him to pinpoint. Five hundred yards, a very short distance to the aviator, is a long way to the infantryman, if it means moving that distance under fire or while carrying a mortar or ammunition on his back. To get maximum effectiveness from air transportation, loads must be delivered at the times and places desired, not a few hundred yards away—not a few minutes late.

The landings at Sicily taught that in airdrops and in airlandings the assistance needed is the same sort of general information and control furnished by the control tower at any airfield: wind direction and velocity, traffic pattern, order and direction of landings and takeoffs, exact landing and parking points, and necessary taxi instructions.

Of course, this does not mean that aircraft cannot make deliveries without pathfinders. It has been done. Deliveries will be slower, and the possibility of accidents will be greater. Rapid, large-scale, night aerial deliver-

Left: The drop is made. To reduce the danger of discovery, pathfinders may time their jump to take place at dusk or night, or conceal their arrival by feints or other methods.

Right: Light equipment delivered to the site. If the pathfinders and their equipment can be landed by helicopter, the problem of assembly is reduced or eliminated.

Left: The communication control center has been established. Right: Panels are the best means of marking landing points for day operations. "T" panels indicate the flight leaders' landing point and the direction of approach.

ies are impractical without ground assistance.

Early in 1944, pathfinder training was started in England and resulted in the remarkable improvement noted. After World War II, pathfinders continued to be used by airborne divisions. In 1951 under a joint agreement with the Air Force, the Army turned over the responsibility of the pathfinders to the Air Force. However, in 1954 when new concepts of air mobility and Army Aviation were introduced, pathfinders were again found to be necessary.

Army Pathfinders are used only in conjunction with Army aircraft; however, Army Pathfinders and Air Force combat control teams may be used in a joint operation. Department of the Army has authorized establishment of Army Pathfinder units at field army level. In addition, many units have assigned pathfinder duties to a small group of regularly assigned personnel.

Normally, Army Pathfinders precede the assault echelon. Sometimes, however, it is advisable that they land with the first units. This is particularly true when advance arrival of the team would so compromise secrecy as to make it impractical. In such cases, the pathfinders assist subsequent aircraft deliveries.

They use every possible

Left: Helicopters guided in by a pathfinder usually land to the left and parallel to the panels on the heading given. Right: Troops are guided to their initial assembly points by the pathfinders. The assembly points are located so that the helicopter landing areas are cleared quickly and easily.

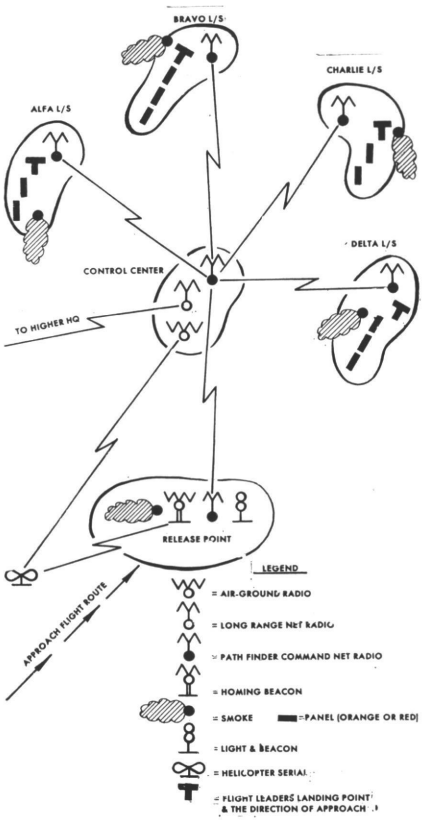
method of getting to the place where the assault is to be made. Among these are air delivery, delivery by helicopter, and landing by airplane. Even infiltration on foot is not uncommon. To lessen the risk of discovery, pathfinders may time their arrival to take place at dusk or night, or conceal their arrival by feints or other means.

The most favored method of landing is by helicopter. It is more accurate than airplane delivery, and can be made in a stronger wind. Also, the men and equipment can be delivered in a better state of operational readiness, reducing or eliminating the problem of assembly. Therefore, the pathfinders need not precede the assault echelon by as great a time margin when helicopter landed as when airplane delivered. This reduces the possibility of compromising the security of the operation. If the helicopters can remain with the pathfinders they can monitor radiological contamination in the air and evacuate the area if necessary.

An airplane landing has the same advantages over air delivery as helicopter landing. In addition, an airplane landing has the advantage in range, load capability, and speed. But it needs comparatively large, obstacle-free landing areas, which limit the use of airplanes for the delivery of pathfinders.

Army Pathfinders' ability to be transported by any means allows a tremendous flexibility of delivery and ensures maximum speed and secrecy. Officially their organization consists of two officers and 13 enlisted men but they may be augmented by other personnel, provided the aerial vehicles needed for delivery are available.

In support of Army air-delivered operations, Army Pathfinders operate electronic and visual navigation aids which guide aviators to desired delivery areas; furnish information and control by means of ground-to-air radio; reconnoiter proposed delivery areas, including radiological reconnaissance and survey of areas after nuclear weapons have been employed;



Typical pathfinder communication control setup.

and assist in the initial assembly of troops, equipment, and supplies.

In a hypothetical operation, pathfinders are landed prior to the arrival of the main force. They may be dropped by parachute or air-landed. They may move into the area in tanks or other ground vehicles, by surface or subsurface water transportation, by infiltrating on foot, or by a combination of these means.

But they do get to the area. If there has been nuclear action in the area their first duty is to determine if the area is free of contamination. They do this with their portable RADIAC (radio activity detection, identification and computation) sets. If contamination is too high, they evacuate. This is easy if they have been air-landed, as the aircraft wait for this all important count.

After determining that the operation is safe from radiation, Army Pathfinders pick out and mark exact release points and landing sites, set up ground and ground-to-air radio communication nets, and establish local security precautions. Five minutes before the arrival of the lead elements of the main body, all is in readiness for them.

The inbound serials of troop-carrying aircraft fly into, land at marked lighted sites, unload rapidly and take off to make room for other aircraft arriving minutes later. With the help of well trained pathfinders, the operation has a good chance of going off like clockwork; even during darkness there is little or no blundering. Army Pathfinders even guide the troops to their assembly sites. The speed, safety, and exactitude of the landing operation can contribute greatly towards the successful surprise of the enemy.

The operation described here is only one example of the way Army Pathfinders may operate. Under different circumstances they may be differently organized and operate differently. But with the help of Army Pathfinders, Army Aviation is capable of delivering swift and flexible day and night strikes at any critical point.

CRASH SENSE

PREPARED BY THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

Right or Wrong?

You're on final approach in an HU-1A Iroquois, flying as instructor pilot. Also aboard are a pilot and three passengers. The weather is fine—a few scattered clouds at 3,000 feet, visibility excellent, surface wind quartering from your left front at 9 knots, temperature 40° F.

Approximately 50 - 70 feet above the ground, airspeed 40-60 knots and dissipating, you hear a metal to metal noise from the rear of the aircraft and note a sluggish tail rotor response.

What would you do?

Here's what one aviator did: "I checked my instruments immediately upon hearing the noise from the rear of the aircraft. All instruments indicated normal operation. The helicopter did not increase its rate or angle of descent. I was maintaining the same sight picture that I had originally set up for a normal approach. As far as I could determine, the engine had not failed and was driving the rotor blades. I decided to use power, rather than autorotate from this altitude, because of the high sink rate in autorotation for this particular type aircraft.

"Almost simultaneously with the application of collective to slow the rate of descent and the raising of the nose to slow the airspeed, there was a muffled explosion from the rear of the helicopter. Our altitude was now about 25 feet and the aircraft seemed to be falling through. I held what collective pitch I had and completed an autorotation to the runway."

And here, in the other aviator's words, is what followed: ". . . the touchdown was harder than normal, but not excessively so. After landing.....shut off all switches and we exited the helicopter immediately. The tail pipe and the cowling around the tail pipe were extremely hot and smoking. There were flames in the tail pipe and.....got the fire extinguisher from the cabin and

used it to put out the fire."

Unfortunately, the hard landing resulted in major damage and this called for an investigation. Here is what the accident investigation board found:

"The board concludes from statements and findings that the pilot did not follow instructions contained in Safety of Flight TB 55-1520-207-10/4, in that he did not initiate an emergency landing as soon as he heard engine noises of metal to metal contact. The board concludes that if the pilot had initiated an emergency landing instead of continuing a normal power approach from an altitude of 50 feet to 70 feet in accordance with Chapter 2, Section III, TM 55-1520-207-10, a safe autorotation landing could have been accomplished without additional damage to the aircraft."

The instructor pilot did not agree with the investigation board and wrote a rebuttal stating his reasons. Here are some excerpts from his rebuttal:

"In my statement, upon hearing the metal to metal contact at an altitude of 50-70 feet, the immediate reaction was to autorotate. However, at an altitude of 50-70 feet, an airspeed of 40-60 knots, and a rate of autorotation of 1800 feet per minute, mathematical computations bear out that it would take 2.5 seconds to make ground contact.

"At this point, according to TB 55-1520-207-10/4, paragraph 2, unnecessary damage could have been prevented to the engine. It must be remembered that I had five persons aboard."

Because of the differences of opinion expressed by the investigation board and the instructor pilot, an analysis of this accident report was requested by the Department of Rotary Wing Training, U. S. Army Aviation School. Taking part in the analysis were the chief, Standardization Division, chief, Methods of Instruction Branch, and the flight commander of the HU-1 flight. In addition to reviewing the accident report, flight tests were conducted to reaffirm the emergency procedures presently taught at the Aviation School for HU-1 aircraft under the conditions presented in the accident report.

These were the results of the flight tests:

"1. During normal approaches, with airspeed 30-40 knots, as the aircraft passed through 60 feet, a simulated emergency was declared. As the collective pitch was fully depressed, as in normal emergency landing entry, the rate of descent of the aircraft increased rapidly. The aircraft descended the last 60 feet in five seconds.

"2. There was no time for any useful reaction to develop from the depression of the collective pitch, such as building of the rotor rpm. On the contrary, a negative effect was developed in that the increase in rate of descent produced an even greater downward thrust for the energy of the rotor blades to overcome."

Here are some excerpts from the School's analysis:

"_____'s statement estimates the altitude at time of first indication of trouble at 'about 50-70 feet.'

"Technical report of the appointed Board (basic report) places this altitude at 50 feet.

"_____'s rebuttal to the Board findings estimates the airspeed as 'in the vicinity of 40-60 knots, and dissipating.'

"TB 55-1520-207-10/4 states in the summary that when unusual noises are encountered in flight in the HU-1, the engine will be immediately shut down and an emergency landing performed. This document further states that if the aircraft is being operated in the shaded area shown in Figure 2-4, TM 55-1520-207-10, action indicated under Emergency Procedures, Chapter 2, Section III, will be followed.

"Figure 2-4, page 2-8, shows that at altitudes of 50 to 70 feet, and airspeed below 40 knots, the HU-1 aircraft is in a critical area, and a successful emergency landing is not probable.

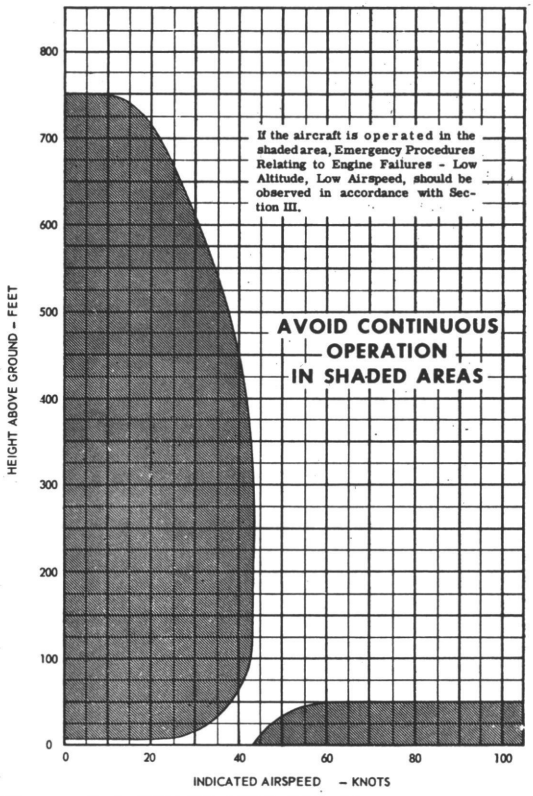


Figure 2-4, TM 55-1520-207-10

"Chapter 2, Section III, paragraph 3-8, lists procedures to be followed for Engine Failure—Low Altitude, Low Airspeed. It states that the pilot will reduce collective pitch sufficiently to maintain rotor rpm which will provide energy to cushion the landing. Full depression of the collective pitch is not indicated.

"The use of the terms 'about'

in reference to altitude, and 'in the vicinity of' in reference to airspeed, as extracted from .....'s testimony and rebuttal is considered entirely appropriate.

"In the proper execution of a normal approach, no reference is made to the altimeter or airspeed indicator during the termination phase of the approach. The flight path of the aircraft is controlled by reference to rate of closure, rate of descent, and apparent ground speed. The only instrument on the control panel utilized in the termination phase of the approach is the instrument containing the engine and rotor tachometer.

"Experience at the School has established that, as the HU-1A aircraft passes through 60 feet altitude during an average normal approach, the indication on the airspeed indicator will be 30 to 40 knots and dissipating.

"Since both [the instructor pilot] and [the pilot] stated that the approach prior to the advent of the unusual noise was entirely normal, and the quoted reference to airspeed existing at the time of the noise is an estimate made subsequent to the flight, a logical and valid assumption that the actual airspeed was between 30 and 40 knots and dissipating may be derived.

"TB 55-1520-207-10/4 was issued for the purpose of preventing *undue* engine damage to the power plant of the HU-1 aircraft from continued unnecessary operation after encountering unusual noises. This purpose is clearly stated in the TB and further confirmed by the caution relating to operation of the aircraft in critical areas. In summary, the TB is intended to prevent unnecessary engine damage, and its provisions are not intended to receive consideration over safety of the occupants and the aircraft."

And here are the conclusions of this analysis:

"The School policy in any case involving aircraft flight is that the safety of the occupants and the aircraft is of greater concern than possible engine damage following an unusual noise.

"The procedure taught at the School under the conditions stated in this case are that the pilot will *not* close the throttle and enter an autorotative descent at this critical altitude. If his engine is still operating, he will use what power is available to him and continue his descent, shutting down the engine as soon as he is on the ground. If his engine fails completely, he will *not* mechanically depress the collective pitch completely, but will depress the pitch (as time allows) only as necessary to sustain rotor rpm, and will use the rotor rpm available to him to cushion the landing.

"It is the opinion of the department that ..... properly conducted the flight in question, and proper action was taken during the events of the action."

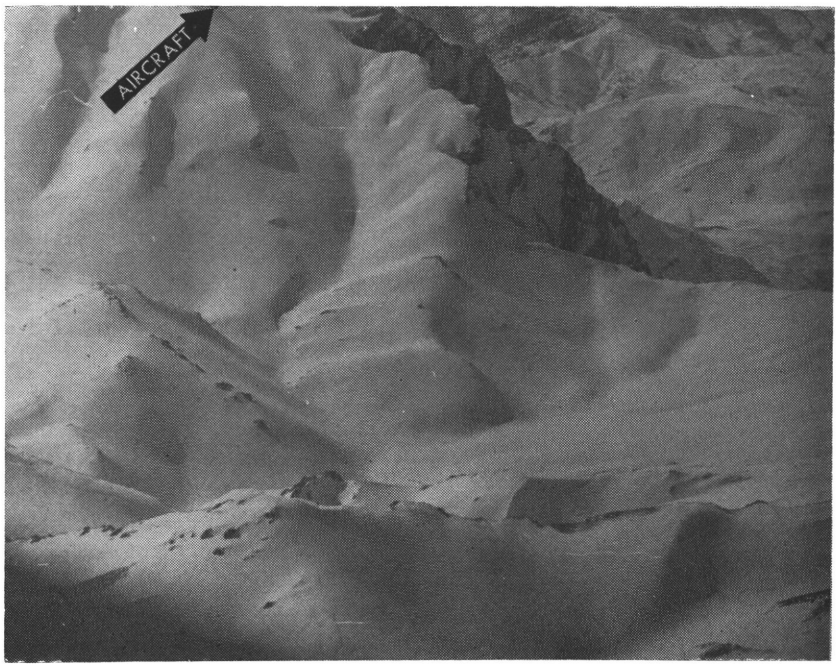
The cause of engine failure was found to be materiel failure of the rear brazed joint of the power shaft. A fix, incorporating an improved quality standard and increased braze overlap area, is now out and should prevent future engine failures of this type.

Wrong!

From this, we move to a case in which the crew and passengers appeared determined to bend or break every rule of flying and survival.

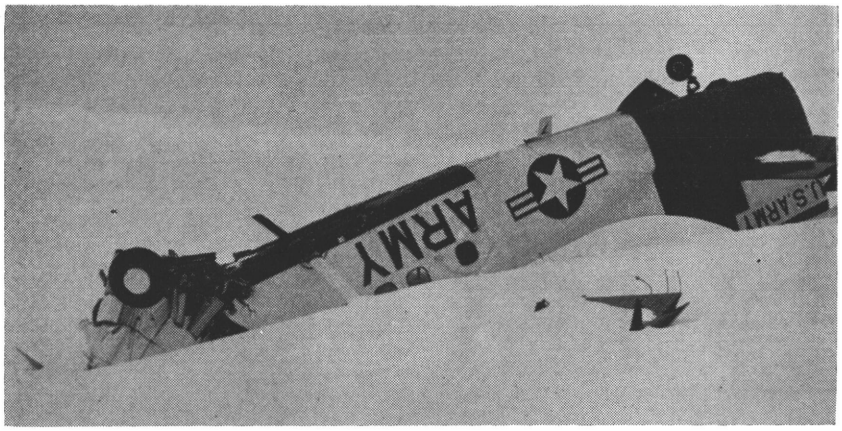
An Otter pilot filed VFR for a flight over extremely rugged mountain terrain. Also aboard were a copilot, a crewchief, and two passengers. When he encountered weather, the pilot dodged among the clouds, then climbed to VFR on top.

After flying approximately four hours on a flight he had estimated would take 3 hours



and 30 minutes, the pilot thought he was over the radio beacon at destination.

Here are the last few moments of flight in the words of the crewchief, one of two survivors: "The weather continued to get rough and we were going toward the mountains. The mountains were between 14,000 and 15,000 feet high. We had radio contact with.....and I believe I heard them ask if we were getting any turbulence in this area. The plane began to bounce up and down and all of a sudden it hit the mountain and flipped over on its back. I was not in my seat after the crash and I assisted the two passengers. They were buried in the bottom of the plane in the snow."



And here, in the words of a passenger, the other survivor, is what happened after the crash: "I found myself buried in snow. I tried to get out, but someone was on top of me. There was a piece of metal by my head and I couldn't move it. ..... moved from on top of me and .....reached down, moved the metal by my face and pulled me up.

"The plane was upside down and we were standing on the ceiling. I think the windows were all out and the doors had come off. Then I saw the copilot and the pilot in the passenger compartment. The copilot had a wound on the left side of his head which did not appear to be serious. The pilot also had a gash on his forehead and his nose appeared broken in two places. He had an arterial wound on his left arm.

"We put a tourniquet on the pilot's arm and a compress on the copilot's head. The other passenger did not appear to have any wounds, but his face was almost purple. I noticed nothing wrong with the crewchief. The copilot thought my face and head were cut, but I felt no wounds. My right leg was numb.

"The copilot and the pilot were talking to each other about how long it would be before people would know we had crashed. The copilot said they should know it right away since he was talking to.....at the time of the crash and said we were right on the beacon. I asked the crash altitude and the copilot replied 12,500. ..... said we had better get out of the plane because it was full of loose gas. I could smell gas fumes. The crew chief broke open the survival locker and each of us took rations and a sleeping bag and left the plane.

"It was snowing extremely hard. The visibility was not more than 20 or 30 yards. When we got into the snow we sank to our waists. So we all got into sleeping bags, zipped them up, and rolled down hill. The crewchief went first, then the pilot, the copilot, the other passenger, and I. The other passenger seemed to have trouble rolling, and I passed him. The copilot stopped to adjust the tourniquet on the pilot's arm. They were about 25 or 30 yards below me at the time. I looked back and saw the other passenger wasn't moving. He was about 20 or 30 yards above me. I called to him and he said the zipper on his bag was broken. I told him to come down where I was so I could help him, but he didn't move. By this time it was five or ten minutes after the crash. When I looked around the other three had disappeared. I continued calling to the other passenger, who did not move.

"After several hours, I decided to see if I could get to ..... and possibly back to the plane. I was unable to crawl in the sleeping bag. When I got out of the bag and tried to crawl, I sank immediately into the snow, so I got back into the bag and stayed there.

"Sunday morning at daylight I looked up and saw the other passenger in the same place. I called to him and he answered. He seemed unable to carry on an intelligent conversation. I kept yelling at him to keep moving and not to sleep.

"An hour or so after daylight I heard a plane. I unzipped my bag, stood up in it, and waved as the plane came over. From then on planes went over us all day long. The other passenger was not in his sleeping bag. Oc-

casionally, he stood up in the snow. I last saw him move about 1400.

"It started snowing sometime Sunday night and snowed through until early Tuesday morning. Tuesday morning at daylight I could see no sight of the other passengers. I would guess about 2-3 feet of snow fell Sunday night and Monday.

"I saw one of the rescue team at 1000 Tuesday. When I waved at him and he waved back, I zipped up my bag and rolled downhill about 200 or 300 yards. He dragged me in my sleeping bag to the protection of an overhang and put dry clothes on me."

Here are some of the factors that contributed to this accident:

- A VFR flight plan was filed, though the flight plan route was in the near southeast quadrant of an occlusion.
- The forecast available at the local weather office indicated the flight could not be accomplished VFR. However, weather from this source had often proved unreliable, and it was common practice to file VFR, then turn back if instrument conditions were found.
- Thundershowers had occurred at destination during the morning and extended east along the southwest slopes of the..... mountains. The aircraft most probably flew through thunderstorm activity immediately before the crash.
- A large portion of the flight was above a deck of clouds, preventing any visual assurance that the intended ground track was being flown.
- Navigation by ADF alone in the area of this flight was known to be unreliable. Beacons are far apart and low powered. There are numerous places throughout the mountain range when station passage will be indicated on the ADF needle when crossing ridges or peaks.
- The crew reported by radio that they could not get accurate ADF bearings.
- Some of the flight—more than an hour—was conducted at an altitude of 15,000 feet msl or higher.
- There was no oxygen aboard the aircraft.
- The heater did not function properly above 8,000 feet msl.
- The crew asked for (but did not receive) clearance for an instrument descent from..... tower. This facility has no published instrument approach.
- The aircraft entered instrument conditions without an instrument clearance and descended in instrument conditions below terrain clearance without a position fix.
- Though the crew thought they were over the destination beacon when the letdown was started, the crash occurred approximately 86 nautical miles east of the intended destination.
- Probably the most incomprehensible factors of this accident are to be found with the pilot and copilot. Each was the commanding officer of a unit. The SOP of one unit did not allow IFR or on-top flying for single engine aircraft. The SOP of the other unit required sufficent oxygen aboard for all occupants for all flights in fixed wing aircraft. These pilots not only ignored Paragraph 29 of AR 95-1, but broke their own SOPs!

It's easy to second guess what should have been done for survival, but it must be remembered that the occupants were more probably suffering from lack of oxygen, were very cold, and had just experienced the shock and aftermath of a crash.

But this is an excellent example to prove the soundness of established survival techniques. Aboard the aircraft were 15 sheets of plywood, eight bedrolls, eight parachutes, food (C rations), a five-gallon can of water, a flare gun, and fuel. It was estimated that these items could have sustained all five men for a period of at least two weeks. When they broke the first cardinal rule of survival and left the aircraft, this group took only five bedrolls and a few packets of food. One of the two survivors lost his food in the roll downhill. Completely disorganized, they then broke another rule of survival by separating, each man on his own atop a snow-covered, 12,500-foot mountain.

Credit for the two survivors must be given to dame fortune and some intrepid rescuers. However, if the group had remained with the aircraft and used the materials at hand, it is highly probable there would have been five survivors in place of two!

Operation TAPER Forms Ready for Aviation Units

Army aviation units entering the transition period of Operation TAPER will find that many of their problems have been solved by the Department of Maintenance, USAAVNS. Sample forms showing how they are completed are being prepared and should be available by 1 June. These include entries for each type of aircraft in the Army inventory. Some of the problem areas are: 1) Time Compliance Technical Manuals, Modification Work Orders; 2) TM 1 (Aviation) series manuals, TM 55 (Transportation) series manuals; 3) Calendar inspections, Daily/Intermediate/Periodic inspections; and 4) Federal Stock Numbers for components.

In the past, Time Compliance Technical Manuals have been published under three classifications: Intermediate, Urgent, and Routine. The same information is now published as Modification Work Orders and is classified the same way, i.e., I, U, & R. Army Regulation 750-5 gives the classification of MWOs as Urgent and Normal.

As yet this information has not reached all the factories, and until it does we can expect erroneous classifications on MWOs. The problem that exists is one of status symbol for an Urgent type MWO. While incorrect symbols appear on the MWOs, we must follow AR 750-5 and TM 38-750. Modification requirements that should be transferred from existing records to the 2408-5 are those that are current (both applied and those that have not been applied plus those that are not current but that have been applied. Current modification requirements for the aircraft and all components are listed in the DA Pam 310-4 (Index of TMs, TBs, SBs, LOs and MWOs).

The TM 1 (Aviation) series manuals have a different system for outlining the requirements for an inspection, as compared to the TM 55 (Transportation) series manuals. This situation does not fit the DA Form 2400, since it is designed for the TM 55 series manuals. The best solution is to use the revised -6, or the revised chapter III of the -20, whichever is applicable. These revised portions of the manuals have been published in limited number. Until they are available there are few guidelines. One guideline (TB AVN 23-67) establishes the Army Aircraft Maintenance Inspection System. Items for inspection on the eighth periodic may be missed if special consideration and adjustment of the number isn't made when inspection frequencies change. An example is an aircraft scheduled for the eighth periodic with 595:00 hours, while using a 75-hour interval for periodics. When the interval is changed to 100 hours, the number of the periodic should be changed to number *six*. Noting that 75 X 8 is the same number of hours as 100 X 6. If the maintenance officer fails to make the adjustment in numbering the periodic, this aircraft may accumulate 1200:00 hours before these requirements are accomplished.

One major change in the inspection requirements is the elimination of the calendar inspections, as such. These items have been incorporated into the Daily/Intermediate/Periodic inspections. The criterion of 25 flying hours per month for each aircraft has been used to determine on which of these inspections an old calendar item will appear.

Recording of the Federal Stock Number for components was not required on the DA Form 2391-5. It is now a requirement for the DA Form 2408-16. This, in itself, will require additional research while changing the records. Later, when components are replaced, time will be saved by having the FSN readily available. A list of components that require recording of historical data is in the -6 or applicable -20. In addition to this list, some aircraft condition components are listed in TB AVN 23-65.

More detailed information concerning the DA Form 2400 series can be obtained from TM 38-750. Technical Manual 38-750 and DA Form 2400 series apply to all Army equipment requiring maintenance forms. It will be noted, however, some of these forms apply to all Army equipment and some apply specifically to Army aircraft. Technical Manual 38-750 is written for overall application and special situations are not explained. Many of these special situations exist at the Army Aviation School, and through the experience of the Department of Maintenance these problems can be met with greater understanding if use is made of the forms with sample entries. Correspondence should be addressed to: Director, Department of Maintenance, U. S. Army Aviation School, Fort Rucker, Ala.

More About

AMERICAN and Italian paratroopers from the U. S. Army's Southern European Task Force (SETAF) brave the dangers of the Italian Alps twice a month in field training exercises. They are soldiers from the Airborne Reconnaissance Platoons of SETAF's 110th Aviation Co., and the 3d Italian Missile Brigade.

Jumping from Army aircraft at a height of 1,250 feet and carrying full field equipment, a group of 35 paratroopers viewed "enemy" activities in the Alps. Reconnaissance was carried out with ease and efficiency although the jumpers had to brave 60 to 70 mile an hour winds, snow flurries, and below freezing temperatures.

Dropped in a small clearing amid the Dolomites and separating into five-man teams, the observers radioed vital information concerning "enemy" troop movements and unit locations which greatly aided Allied target selection. After two days of ducking "Aggressor" patrols, the team members were picked up by helicopters which had stolen their way through mountain gorges undetected by "enemy" radar or ground surveillance, and hustled back to friendly lines.

Path-finders