JULY 1964

UNITED STATES ARMY AVIATION DIGEST

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UNITED STATES ARMY AVIATION DIGEST

JULY 1964 VOLUME 10 NUMBER 7

DIRECTOR OF ARMY AVIATION, ACSFOR
DEPARTMENT OF THE ARMY
Brig Gen John J. Tolson, III

COMMANDANT, U. S. ARMY AVIATION SCHOOL
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ASST COMDT, U. S. ARMY AVIATION SCHOOL
Col Robert F. Cassidy

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USABAAR EDUCATION AND LITERATURE DIV

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Charles Mabius

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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.

The DIGEST is an official Department of the Army periodical published monthly under the supervision of the Commandant, U. S. Army Aviation School. Views expressed herein are not necessarily those of Department of the Army or the U. S. Army Aviation School. Photos are U. S. Army unless otherwise specified. Material may be reprinted provided credit is given to the DIGEST and to the author, unless otherwise indicated.

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

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National Guard and Army Reserve units submit requirements through their state adjutants general and U. S. Army Corps commanders respectively.

Digest Writing Awards Contest Winners

★ ★ ★ ★ ★ ★

ANNUAL WINNERS

1st Prize $125.00
Lt Edward B. Cribb

2d Prize $75.00
Capt Robert W. McCaskey

3d Prize $50.00
Maj Milton P. Cherne

The fourth U. S. ARMY AVIATION DIGEST Annual Writing Awards Contest begins with this issue. Again all civilian and military personnel are encouraged to submit entries.

The primary purpose of the contest is to foster a broader exchange of knowledge on all aspects of the Army Aviation Program and to inspire those within our program to develop their communicative skills.

Articles accepted for publication during the previous contest periods and as yet unpublished are automatically entered in the new contest. For those who have not submitted entries, this is a fine chance to increase your value to the Army and the Army Aviation Program by improving your writing abilities. A professional military man of today must be able to express himself clearly and concisely in writing as well as in speech. By writing an article for the DIGEST you enhance your overall professional ability.

All manuscripts should be mailed to: Editor-in-Chief, U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Ala.

* * *

Appropriate pictures, diagrams, charts, etc., to illustrate articles should be backed with protective cardboard for enclosure with the manuscript. Photographs preferably should be 8 x 10 black and white glossy prints. Illustrations will be returned if requested. While good illustrations improve manuscript presentation and are desired, articles will not be judged on the artwork or photos submitted.

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ON COURSE INSTRUMENT TRAINING	MAJ THOMAS R. SMITH	SEPTEMBER 1963
WHAT ABOUT AVIATION'S FUTURE STAFF OFFICERS?	CAPTS T. J. SHAUGHNESSY AND PIERCE ROBERTSON	OCTOBER 1963
PROFICIENCY LOSS	CAPT GARY V. DENNISON	NOVEMBER 1963
DO-IT-YOURSELF SURVIVAL KITS	CAPT WILLIAM F. FLYNN	DECEMBER 1963
HUMAN FACTORS IN COLD WEATHER OPERATION	WALLACE W. PROPHET, PH.D. AND RUSSEL E. SCHULZ	JANUARY 1964
AN AVIATOR TACTICAL MISSION PROFICIENCY TEST	MAJ NORMAN P. JACOBS	FEBRUARY 1964
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I LOVE MY GOLDEN VOICE	MAJ MILTON P. CHERNE	MAY 1964
PROFESSIONALISM	CAPT THOMAS W. SCHMID	JUNE 1964

Where Do YOU Stand?

Although this piece was written for aircraft mechanics employed by a commercial company (Trans World Airlines), the salient points are applicable to all aircraft technicians. The aviator's life depends on the answer to the question, "Where do you stand?"

IN AVIATION parlance there are accidents, and there are incidents, and there are causes of accidents and incidents. They can be broadly categorized as parts failures, design deficiencies, and personnel error. It is common knowledge that the latter, personnel error, is the prime cause of damage mishap and injury. It is credited as the principal element in a high percentage of aircraft accidents and incidents. Some aspect of personnel error contributes to nearly all accidents and incidents. Aircraft and aircraft systems are conceived, designed, developed, and operated by individuals and groups of individuals. The success of the aircraft and systems is the product of personnel acumen; their faults, inefficiencies, and shortcomings result from personnel error.

It follows that aircraft accident prevention and equipment reliability can best be enhanced by an improvement in human reliability. What are the safety "specifications" for the ideal aircraft technician? Let us examine a few of the qualities and characteristics which are most desirable.

MATURITY

The responsibility of aircraft maintenance cannot be satisfied by substandard people. It is a man's job. A job which requires an adult with sufficient maturity to recognize responsibility and the consequences of irresponsibility.

JOB KNOWLEDGE

The complexity of our aircraft demands the attention of knowledgeable and expert technicians. Job knowledge is a function of education and training which, incidentally, does not end with graduation from a technical school. Any technician worthy of the name is continually training and learning through self-study and application, and through a personal desire for proficiency and self-betterment. But job knowledge by itself is not sufficient unless it is coupled with an old-fashioned craftsmanship that receives gratification and keen satisfaction in doing any job well. The technician who wishes to contribute to safety and reliability must know his specialty and must develop a fierce professional pride in the quality of his work.

PURPOSE

The untrained, inexperienced mechanic is dangerous. He is a danger to himself, his associates, and to the public. His opposite is the careful, purposeful technician who concentrates completely on his job at hand. He is constantly aware and alert.

INITIATIVE

This attribute is closely associated with imagination, and it is almost synonymous with enthusiasm and energy. The lazy man does not exert himself to find, fix or adjust safety deficiencies. He waits for the malfunction. The ideal technician anticipates the malfunction and prevents its occurrence. He uses his imagination and initiative actively and enthusiastically to detect and remedy accident causes before they occur.

INTEGRITY

The qualities of the ideal technician are not attainable unless the individual has the intelligence to recognize their desirability, and has the integrity to strive for their development within himself. The individual must have the wit to recognize that a neglected job not only invites accidents, but also reflects unfavorably upon his personal integrity. He must have the conscience which will cause him to detest any such reflection and the determination and will to prevent it.

These are but a few of the traits and characteristics of the ideal technician. It may appear that he must be a superman, but these are merely the virtues which build human reliability and prevent personnel error. These are the virtues which build self-respect and command the respect of others; virtues which differentiate between the journeyman and the incompetent, between the capable and the mediocre, and between the professional and the amateur. WHERE DO YOU STAND?

TWA Maintenance Information Letter. Reprinted from Flight Safety Officer's Study Kit.

The aviator's life depends on the mechanic's professionalism

Major Francis P. McDermott

Lost Communications Procedures

Dear Major McDermott:
Mr. Warren has asked me to reply to your letter of April 13, 1964, regarding your radio failure article.

* * *

Our review and comments are confined to regulatory and procedural accuracy.

* * *

We can neither confirm nor deny some of the opinions expressed in your article. Particular reference is made to those on pages 1 and 2. While we can neither endorse nor disagree with the opinions expressed, we do believe that the article is thought provoking and timely and we endorse the publication.

Sincerely yours,
Daniel E. Barrow, Acting Chief
Airspace Regulations and Procedures Division
Air Traffic Service

Maj McDermott is Chief, Standardization Branch, Standards Division, Dept of Adv F/W Tng, USAAVNS.

A RECENT RADIO failure survey conducted by FAA revealed that a military pilot could expect his radio communications equipment to fail once in every 590 IFR departures. How close are you to your 590th departure? Do you understand the procedure and do you have confidence in your ability to handle the loss of two-way radio communications should it occur?

Recently, while attending the Fixed Wing Instrument Examiner Course at USAAVNS, I found that many of the interpretations I supported concerning lost communications procedures under IFR conditions were incorrect. I soon realized, after discussing this subject with other aviators assigned to Fort Rucker and aviators attending multiengine transition courses at the Aviation School, that they were equally uncertain regarding these procedures.

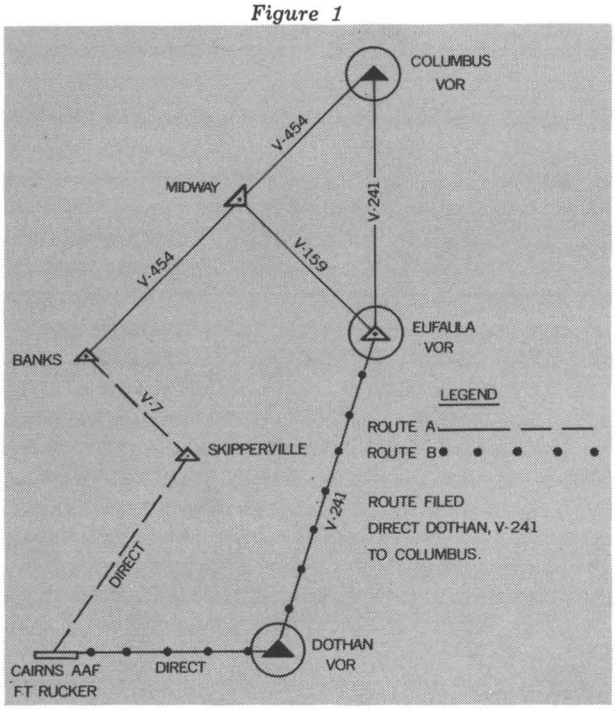
Many reading this article may feel so certain of their knowledge of lost communications procedures that they might consider it unnecessary to read further. If *you* have a complete understanding and a correct interpretation of the procedures outlined in Federal Aviation Regulations

(FAR) 91, the Flight Information Manual, or the ATC Section of the Jepp Manual, *you* can consider yourself in a very small minority. If you doubt this, assemble 10 aviators and have them read pages 25 and 26 of the ATC Section in the Jepp Manual. Then question them on their interpretation. If you find two of the 10 who agree on one interpretation of all procedures, you will have a fairly accurate indication of just what the Army Aviator's understanding of these procedures is.

One might ask, why is there so much disagreement and inconsistency in the interpretation of such an important subject? The answer to this question is a combination of many factors. The most prevalent reason is a result of *instrument examiners giving other aviators incorrect interpretations of lost communications procedures.* Examiners should remember that most aviators, when asking a question concerning this subject, treat the answer as "gospel" — and whether the explanation is right or wrong will soon pass the word to everyone within sight or sound.

Also, *center controllers often contribute to the misunderstanding of these procedures by giving their opinion to inquiring aviators rather than the official FAA interpretation.* Have you ever heard an aviator say, "I know this is the correct procedure because I asked Oshkosh Center"? Of course, everyone listening accepts it as fact since it comes from the top. But individuals at ATC centers are not the top; FAR 91.127 and the official FAA interpretation of this regulation are.

Figure 1



In an attempt to resolve some of the misunderstanding surrounding this rule on lost communications procedures, the subject was discussed with FAA authorities in Washington and the FAA and ATC representatives at Fort Rucker. FAA was especially helpful since they had recently completed a study of the problems relating to the radio failure altitude requirements and a separate radio failure survey. The most consistent problem areas discussed with FAA are listed below with FAA interpretations.

ROUTE

The procedures governing the route which a pilot should fly after experiencing two-way communications failure is probably the best understood of all the procedures. Two areas, the term "expect further clearance via" and the radar vector, need clarification.

In some cases ATC will clear an aircraft to a fix short of the radio facility serving the destination airport *on a route other than filed or requested* (fig. 1, route A). When this clearance is issued, ATC is required to specify a proposed routing beyond this clearance limit (Banks) by stating, "Expect further clearance via V-454 to Columbus." We know that we must follow this route to our destination if we lose communications.

But what if a pilot has been cleared *on the route requested* (fig. 1, route B) to a fix (Eufaula) short of his destination and ATC advises him to "Expect further clearance via V-159 to Midway Intersection, V-454 to Columbus upon reaching Eufaula." Many aviators would disregard this proposed routing since they are not on a route other than that filed or requested and would continue on V-241 to Columbus. *This would be wrong. In the absence of an assigned route, the route specified by ATC on which a further clearance may be expected takes precedence over the route filed or requested.*

The misinterpretation of the regulation concerning radio failure during a radar vector has resulted in a misunderstanding of the correct procedures. When a controller commences a radar vector, he should advise what the radar vector is to achieve. When this vector is to a fix rather than an airway, a pilot who has radio failure during the vector should proceed directly to the fix specified. When on a radar vector which has taken the aviator off his assigned route (which includes airspace 5 miles on either side of centerline), the correct procedure specifies that the

flight should return to this route by the most direct course. Some interpret this to mean literally a 90° angle of intercept.

If the aviator can determine his position as being within the assigned route, how he intercepts his route centerline is a matter of individual technique. However, if the pilot determines he is outside of his assigned airspace, he will be expected to return to the route specified in the clearance by the most direct course possible. Usually this may be accomplished by proceeding on a course which will intercept his route at a 90° angle. Upon reaching this airspace, the pilot may then correct to the course centerline by any method he desires.

HOLDING

Some misunderstanding has arisen concerning when to hold, when not to hold, and when to depart the holding fix. The following procedures should be used when cleared to a facility short of the destination and radio failure occurs before reaching this clearance limit.

With Holding Instructions

- When holding instructions include "expect further clearance time," hold until the time specified, then proceed to the radio facility to be used for the approach at the destination airport.
- When holding instructions include "expect approach clearance time," hold and depart the fix to arrive over the approach facility serving the destination airport at the expected approach clearance time. In other words, depart the clearance limit at expected approach clearance (EAC) time minus estimated time en route (ETE) to the destination facility.

Without Holding Instructions

If no holding instructions have been received, do not hold, but continue to the approach facility serving the destination airport.

If holding is necessary at the radio facility to be used for the approach at the destination, holding should be accomplished in a holding pattern on the side of the final approach course on which the procedure turn is prescribed.

ALTITUDE

More confusion and misunderstanding result from the altitude section of the lost communications procedures than from the other sections combined. If aviators do not have a clear understanding of the route structure system, they also may have difficulty understanding the lost communications procedures with respect to the altitude to be flown.

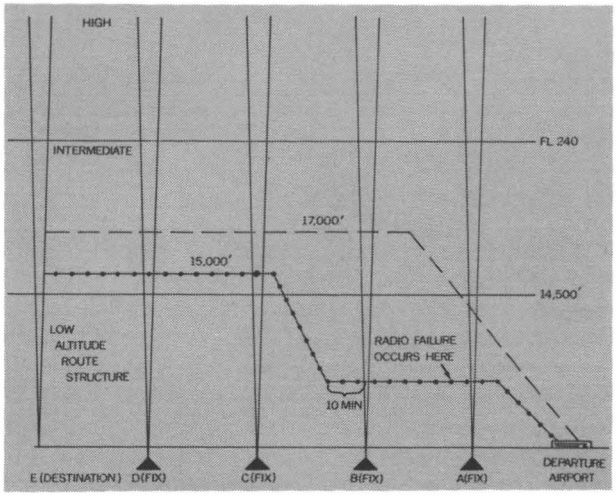
Briefly, the route structure system is the division of airspace into layers. These layers are referred to as low altitude (ground up to 14,500 feet), intermediate altitude (14,500 feet up to flight level (FL) 240), and high altitude (FL 240 and higher) route structures. Actually, knowing the location of the bases and tops of route structures is all that is required for an understanding of the correct procedure to follow.

If assigned an altitude in the route structure filed or later requested, climb and maintain this altitude or the minimum en route altitude (MEA), whichever is higher, to the radio facility serving the destination airport.

If assigned an altitude in a route structure below the one requested, ATC is required to specify a time or fix at which clearance to an altitude in the initially requested route structure can be expected by stating, "Expect further clearance at (a specific altitude) at (a specific time/fix)." If radio communications failure occurs before receiving a clearance into the requested route structure, *the expected altitude will be considered an assigned altitude and a climb to this altitude will commence at the time or location previously specified.*

However, if assigned an altitude (fig. 2, dotted line) in a route structure below the one filed (broken line) and ATC has not issued an "Expect further clearance at (altitude)," maintain the assigned altitude (8,000 feet) or MEA (whichever is higher) until 10 minutes after passing the first compulsory reporting point (B) over which radio failure prevented communications with ATC. Then climb to and maintain the lowest cardinal altitude (15,000 feet) or flight level at or above the MEA of the highest route structure requested. In nonmountainous terrain, these

Figure 2



altitudes will normally be 15,000 feet in the intermediate route structure and FL 240 in the high altitude route structure.

The term "expect further clearance" has resulted in some misunderstanding when referring to the assignment of another altitude in the same route structure filed or later requested. This phraseology is not used for altitudes *in the same route structure* but is used only when assigned an altitude *below* the highest route structure filed. If you should receive this clearance from a controller, ask for clarification.

When radio failure occurs in a situation where a higher route structure has been filed, the pilot will *always* eventually climb to this route structure. However, a pilot does not *always* descend to a lower altitude that has been filed or requested. For example, if a lower route structure has been filed or later requested for the final segments of the route, the pilot should *remain* in his route structure, maintaining the last assigned altitude, until reaching the facility serving the destination airport.

If clearance has been received to descend to an altitude in a route structure below the highest filed or requested, and if radio failure occurs, maintain the last assigned altitude or MEA (whichever is higher) rather than climbing back to the highest requested route structure.

The last assigned altitude or MEA (whichever is higher) must be maintained until reaching the radio facility which the aviator has selected for the approach to the destination airport. Therefore, the loss of two-way communications precludes the use of transitional altitudes between radio facilities within the terminal area.

APPROACH

During lost communications procedures, it must be remembered that an instrument approach begins when the descent is started from over the radio facility to be used for the approach and *not* when the aircraft is low station inbound. This descent to the initial altitude for the execution of the instrument approach should be accomplished in a holding pattern on the side of the final approach on which the procedure turn is prescribed.

If a clearance for an approach has been received, begin the approach upon arrival over the radio facility. If a clearance for an approach has not been received but an expected approach clearance time has, hold until this clearance time and start the descent from the last assigned altitude, executing an approved instrument approach to the airport. If the aircraft arrives over the facility later than the expected approach clearance time, begin the approach upon arrival. If no expected approach clearance time has been received, start the approach at the estimated time of arrival as indicated by the flight plan or upon arrival over the radio facility, whichever is later.

If an aircraft has departed an outer fix on a radar vector, the flight should proceed on a direct course to the radio facility to be used for the approach and execute an approved approach upon arrival. A straight-in approach, when approval has been received before radio communications failure, is authorized.

ALTERNATE AIRPORT

Many aviators have a hard time resigning themselves to the fact that the procedures to be used when flying to an alternate are not published. Let's assume you are inbound to the facility serving your destination airport when you experience two-way radio failure. No real problem develops until you have reached your minimums on the approach and realize you can't break out. What do you do? If you don't know, where can the instructions for the procedure be found?

The Aviation School teaches its students to proceed via the most direct airway route to the facility serving the alternate airport at the MEA of the route structure filed on the original flight plan and to execute an approach upon arrival.

The solution is not published specifically, but it is covered by the preamble to FAR 91.127. This rule states: "It is virtually impossible to promulgate a rule which provides definite action for every conceivable eventuality associated with radio communication failure. Such a rule would be too voluminous for ready comprehension and application. Conversely, it is not intended to promulgate a rule so brief or general as to be ambiguous." Also, "During two-way radio communications failure, when confronted with a situation not covered in the regulation, pilots are expected to exercise good judgment in whatever action they elect to take."

It would be well for the aviator to remember that many situations are not specifically covered in writing but are left to the individual judgment of the pilot. So, if confronted with a "What if . . . ?" realize that the solution for the most part will be based on judgment and not the written word.

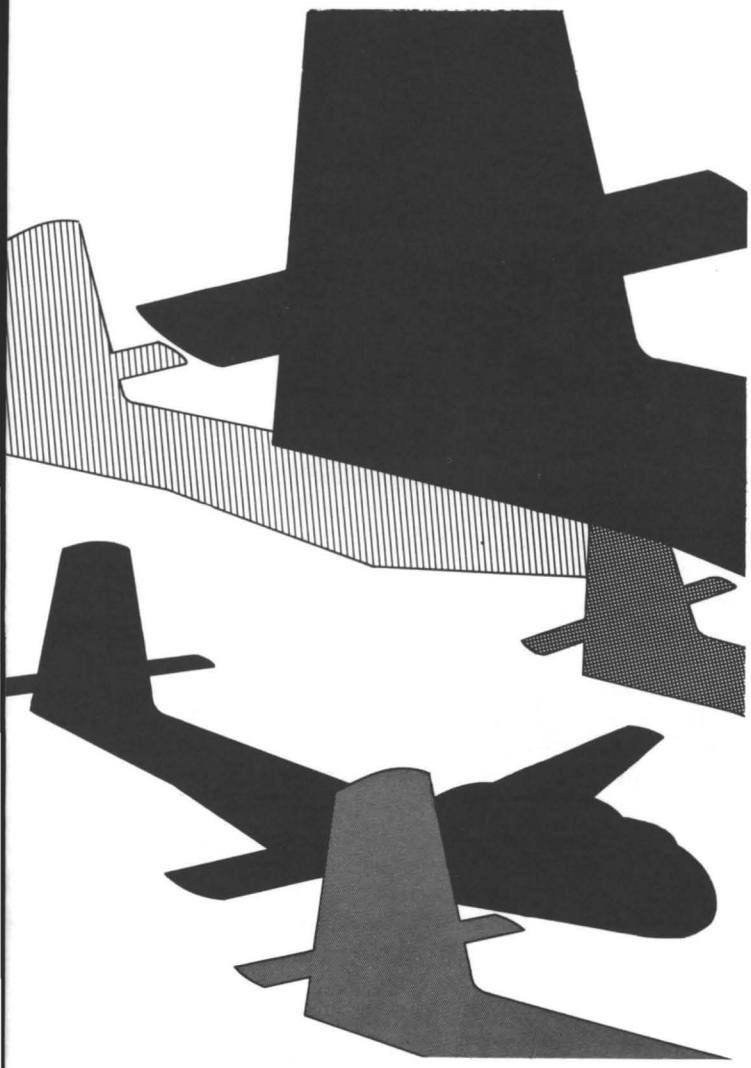
Included in one's judgment is a very important commodity — common sense. The FAA radio

Continued on page 13

Ferry Mission Part II

This article (see June 1964 issue for Part I) offers guidelines which may be helpful to units ordered to deploy one or more aircraft overseas. Information is based primarily on the deployment of the 1st Aviation Company to the Far East, but also includes data obtained from records of previous ferrying missions and from discussions with aviators having personal experience in this type of operation.

Major William G. Hooks and Captain Ernest A. Smart



AS IN ANY FERRY mission, careful consideration must be given to the condition of the aircraft. This not only includes their physical condition but also planned maintenance support that will be available en route.

Obviously, each aircraft should be thoroughly checked out before departure. If an aircraft is new it should have at least 25 hours "flown off" to enable personnel to become familiar with all systems and to ensure that they are working properly.

Flights should land at U. S. military bases whenever possible to take advantage of ground support equipment, such as machine shops. If possible a maintenance stop should be scheduled to take advantage of a third echelon maintenance facility.

Periodic or intermediate inspections must be anticipated. A maintenance team with appropriate tools, parts, and other equipment should be sent to a midway point when possible to assist in maintenance support. It is equally important to have sufficient maintenance personnel avail-

able in flight to handle unanticipated problems that develop. This is especially important when landing at foreign civilian bases where little or no maintenance assistance is available.

Flyaway maintenance kits must be available during any ferry mission. Personnel experienced in parts usage should be consulted along with those responsible for maintaining the aircraft en route.

Quick change assemblies (QCAs) should be pre-positioned en route. Exactly which QCAs to make available depends on experience factors, number of aircraft to be ferried, availability of parts and equipment en route, and similar factors. The need for special tools, ground support equipment, and qualified personnel must be considered when planning for QCAs.

Refueling en route is another factor to consider while preplanning the mission. Care must be taken to ensure that too many aircraft are not simultaneously assembled at a civilian refueling point. This places an excessive load on the installation and usually results in an inefficient and unsatisfactory operation. When in doubt about a civilian installation's refueling capability, information should be requested from the Army or Air Attache, or the consulate in the country concerned. Such problems are generally not encountered when it is possible to land at U. S. military bases.

Auxiliary fuel systems, especially in the CV-2B, require excessive time to service. If special nozzles or adaptors are required they should be carried aboard the aircraft. This saves many hours during refueling operations and proves beneficial during replenishment of the oil tank. Auxiliary fuel tanks obviously are important on extended ferry missions and should be *thoroughly checked out before departure.*

POL requirements at each base must be requested as far in advance as possible. No problems should occur insofar as payment is concerned. The use of Standard Form 44 or credit cards is generally accepted. Upon notification, embassy personnel usually make POL arrangements in advance and the pilot needs only to sign the vendor's sheet.

NAVIGATION

The Flight Information Publication (Planning) provides invaluable assistance in planning navigation procedures for a ferry mission. It is published in three sections by the Aeronautical Chart and Information Center (ACIC) of the U. S. Air Force and is found at most base operations offices.

It is quite important that all aviators participating in a ferry mission be aware of the International Civil Aviation Organization's (ICAO) rules and procedures, which are not generally available for everyday use in CONUS. This information is found in Section III of the Flight Information Publication (Planning).

After a route has been selected it is necessary to determine the time required to fly the route. This is best accomplished by preparing the navigation log sheet. The log sheet indicates all navigational aids to be used, true courses, variation, wind direction, wind speed, TAS, magnetic heading, distances, and other information which provide the pilot with an excellent means of navigating. At most bases "canned" routes are used in everyday operations; a log sheet is available to plan the next leg. But this does not preclude the requirement during initial planning to prepare a log sheet for each leg. This information is needed in requests for diplomatic clearances.

The Jeppesen Company provides required aviation charts (including approach charts) for the flight. Necessary VFR charts, the flight information supplement, flip charts, and other navigational publications are available through normal channels. Assistance in obtaining navigational publications can be obtained from the Army Flight Information Office.

Overwater navigation is a challenging experience due to the vast distances that must be flown over open sea without navigational aids. The lack of a long range navigational (LORAN) or celes-

Auxiliary fuel systems should be . . .

Ferry Mission (Part II)

tial capability on Army aircraft leaves ADF procedures as the primary means of navigation. Thus the importance of tracking cannot be overemphasized.

This is also important in areas where navigational aids may be as much as 600 nautical miles apart. Under such circumstances it is most important to hold heading and altitude and to closely monitor elapsed flying time. Along some overwater routes, ocean station ships provide aid in navigation as outlined in Section III of the en route supplement of the Flight Information Publication planning document.

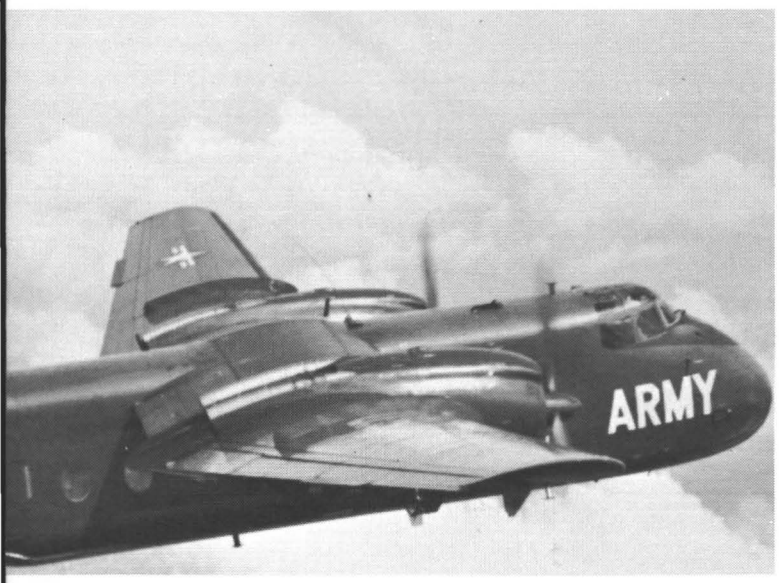
Another aid which might be available is the air-sea rescue ship (aircraft). One of these rescue planes can be used to orbit in the vicinity of the mid-range point. This aircraft can provide a fix on position, information concerning winds, and a steer in event the flight is off course.

Consol and Consolan, a navigation system not generally familiar to Army Aviators, is a *secondary* means of navigation that can be used with the ADF radio. It is considered especially useful for maritime navigation. The U. S. Air Force and Navy flight information publication, *Planning Data United States,* gives a good discussion on Consol/Consolan systems.

COMMUNICATIONS

Normal UHF or VHF communications are used in most areas to provide air-to-ground communications. Long range communications can be accomplished with ARC-59 or 618-T high frequency radios.

thoroughly checked before departure



Certain radio *beacons* must be tuned and identified with the BFO (Beat Frequency Oscillator) in the "on" position. Otherwise it may be difficult to tune in the radio beacon. Aviators should be especially alert for this type beacon in European countries.

There are many Air Force communication stations or bases around the world that may be used to pass on position reports or from which information may be requested. Additional information concerning international communications procedures is found in Sections I, II, and III of the Flight Information Publication. Frequencies are found on the navigation chart, en route supplements, and in other flight information publications.

RESCUE AND SURVIVAL

Air-sea rescue coverage usually is available during extended flights over water. Depending on circumstances, air-sea rescue coverage can be provided in the form of an escort over the water route, an aircraft orbiting along the route, or even an aircraft remaining on runway alert. *Since procedures vary from one air-sea rescue unit to another, it is recommended that the flight leader meet with the rescue aircraft commander to reach mutual understanding of rescue procedures.*

Ditching procedures should be carefully reviewed before flying over water and survival equipment must be located aboard the aircraft where it will be readily available in event of parachuting or ditching.

Inflight engine failures should be anticipated and a subsequent course of action established. If possible at least one aircraft should remain with a disabled aircraft. *In remote areas aircraft should travel in flights of at least two.*

The chances of survival at sea, or in the jungle, desert or arctic areas, are virtually impossible without proper equipment. It is recommended that the survival equipment listed in figure 2 be carried on overwater ferry missions. Appropriate additions should be made to compensate for the type of terrain to be flown over.

Crewmembers should carry a weapon during the flight. The pistol (caliber .45) normally suffices for aviators, with a rifle as a backup weapon. Care must be exercised maintaining the security of weapons and ammunition — especially while at bases in foreign countries. Reference

In remote areas aircraft should travel in flights

to the Foreign Clearance Guide assists in this matter.

MEDICAL CONSIDERATIONS

Prior to departure, all crewmembers should be briefed by a flight surgeon. While the nature of such briefings varies according to routes and destinations, they usually cover such areas as the proper use of earplugs, oxygen and drugs; health and sanitation conditions in various foreign countries; and how to prevent fatigue with proper rest and eating habits.

The flight surgeon should also be consulted regarding immunization required to leave CONUS and to enter foreign countries (the Foreign Clearance Guide and AR 40-562 should also be consulted). *Certain nations have unique immunization requirements and a few require that the Department of Defense Medical Services certified immunization stamp be placed on all sections of DD Form 737.*

Small medical kits with certain essential items should be made up for each aircraft to preclude a need to break into an MB-4 or similar emergency medical kit. A metal .30 caliber ammunition container can be used. While the flight surgeon should be consulted for a list of items to include, the following items are generally recommended: gauze, surgical tape, bandages, iodine or similar antibacteria ointment, APCs, cold and sinus tablets, nose drops and inhalers, and various medicines to relieve diarrhea and dysentery.

When planning routes, it should be remembered that RONs at U. S. military installations provide en route medical aid. If an injury or illness arises (no matter how minute) a flight surgeon or doctor should be consulted. It should be stressed that colds are especially hazardous and medical attention should be obtained as soon as possible. At airfields other than U. S. bases, the MAAG (Military Assistance Advisory Group) physician or the U. S. Embassy doctor should be contacted. Although they do not have the authority to ground aviators, their advice should be heeded.

HELPFUL HINTS

Passports and visas. Upon notification of a ferry mission immediate action should be taken to obtain passports and visas. Considerable delay has been experienced in this area in the past. Bear in mind that an application for a passport from a warrant officer or enlisted man requires a copy of his birth certificate. Units can save a great deal of time by anticipating this requirement and having warrant officers and enlisted men keep copies of their birth certificates in their units.

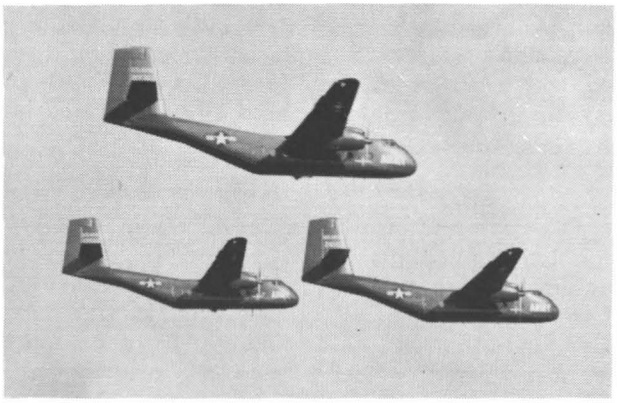
Money exchange. Money exchange problems arise if travelers checks are not carried. Usually money changers are located at airports or downtown hotels. Rates of exchange and the question of converting local currency back to American money should be ascertained before purchasing local money.

Orange flight suits. The orange flight suit now being used by many Army Aviators is excellent for survival purposes, but could be the cause of embarrassment if worn in certain Oriental countries. The suit is similar in color to the habit worn by Buddhist monks. This garb sets them apart from their brethren and in turn gives them a saintly aspect. Because of this religious implication the orange flight suit should not be worn in public in Thailand, Laos, the Republic of Vietnam, or any nation where Buddhism is a primary religion.

American Embassies. Whenever a flight encounters a problem it cannot solve in a foreign country, the leader should immediately turn to the American Embassy or consulate. They provide sound advice, make arrangements for billets, mess facilities, transportation, and provide many other services.

Oxygen. Oxygen needs should be anticipated. The exact amount and the type needed should be made known to bases along the route. When special fittings or adaptors are required they should be carried on each aircraft. Due to a lack of oxygen at certain civilian bases, the oxygen supply aboard each aircraft should be used with the utmost discretion.

Tech reps. Technical representatives are usually available to accompany larger flights. In a movement of a Caribou unit it is strongly recommended that a tech rep go along. In other



Ferry Mission (Part II)

cases it may not be feasible for one to accompany the flight, especially if they are available along the way.

Weather conditions. U. S. Air Force weather facilities provide long range weather predictions for various routes. However, weather along a particular route most likely will vary from VFR to IFR. Generally, it can be anticipated that somewhere over the Atlantic or Pacific a band of frontal weather will have to be penetrated.

In Southeast Asia the monsoon season must be considered. It is extremely difficult to fly through monsoon weather, which can range up to 600 miles or more along a route. This weather contains extremely heavy rain, low ceilings, and tops of buildups ranging to 18,000 feet or more. It may be possible to fly VFR through this weather, but it is not recommended.

Initial Planning Checklist

1. Passports, including visas.
2. Shot records, including required shots for each country and also the Medical Services certified immunization stamp.
3. Route, including alternate routes.
4. Flight itinerary.
5. Necessary flight publications, including VFR and IFR charts, Consolan charts, and approach plates.
6. Navigation log.
7. Authentication tables (picked up at the clearance base).
8. Flyaway kits.
9. 780 gear for the aircraft.
10. Small utility first-aid kit (1 per aircraft assembled by the flight surgeon).
11. Survival gear (arctic, jungle, desert, and overwater).

Disinsectization procedures. In certain countries this procedure is closely controlled and must be accomplished in the manner prescribed. Procedures are covered in the Foreign Clearance Guide.

Headsets. The APH-5 helmet should be worn during takeoffs and landings. While airborne it can be removed in favor of the lighter headset to help minimize fatigue. Headsets for the entire crew should be carried.

Flight itinerary log. This log allows all personnel involved in the mission to follow the progress of the flight. It should be made out before departure and contain such information as departure and arrival times and dates at various stations, mileage between stations, time zone factors, etc.

Authentication tables. These are usually issued at the Foreign Clearance Base before departing CONUS. They provide information to be used in case of being challenged by a ground station or another aircraft.

Altimeter settings. Use of the standard altimeter setting (29.92) during overwater flights and in some overseas areas is customary and Army Aviators should be aware of this new procedure. Other new terms include "transition level," "flight level," and "transition altitude." Such terms are defined in Section II of the Flight Information Publication.

Recommended Survival Supplies

1. Survival kit, overwater, FSN 8465-973-1863 (QM), one per person. (A different overwater survival kit is used in Army aircraft with ejection seats. A FSN has not been established for this kit. Until this kit becomes available the Navy's PK-2 overwater kit, FSN 4220-516-3496, can be requisitioned. One per seat.)

2. Life preserver, underarm type, B-7, FSN 4220-657-2197 (TC), one per person.

3. Liferaft, inflatable, seven-man, includes survival equipment, FSN 4220-245-7751 (TC), one per aircraft. (The seven-man liferaft is not used in Army aircraft equipped with ejection seats.)

4. Anti-exposure suit, Air Force or Navy item. To be used when water temperature is less than 55° F, one per person.

5. Survival knife, FSN 7340-098-4327, one per person.

6. Survival kit, PSK-2; a personal survival kit to be carried on the person. FSN 6545-611-0978 (Med), one per person.

Overwater reporting procedures. In addition to mandatory reports at positions indicated on the navigation chart, it is wise to report every 5° longitude or latitude change. (See Flight Information Publication.)

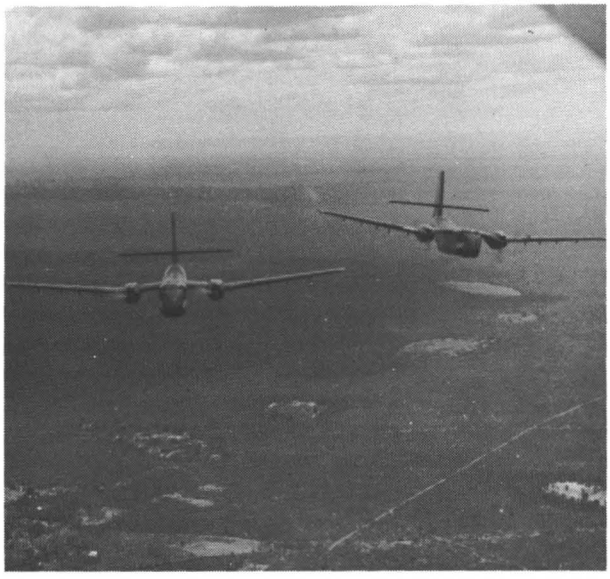
Arrival and Departure messages. Due to the large number of agencies interested in the progress of the flight, a prompt efficient means must be devised to keep all informed. On previous flights, arrival and departure messages have been sent at each stopover. Addresses vary, depending on the mission. Agencies that must monitor the flight to its destination are sent all messages. Stations are dropped from the list of addresses once the flight arrives there.

Arrival and departure messages also can be used to disseminate information concerning changes in itinerary, maintenance delays, weather delays, etc. At military bases the operations officer will assist in sending the messages. At civilian fields the Army or Air Attache or the consulate will assist.

By developing its capability to *quickly and efficiently* ferry certain of its aircraft overseas, Army Aviation can make a major contribution to the combat effectiveness of the ground forces.

General George H. Decker as Army Chief of Staff pointed out that in the next decade we can expect Communist wars of subversion and covert aggression to flourish in Asia, Africa, and Latin America. Army Aviation must be able to instantly deploy to these troubled areas to help nip in the bud Communist aggression.

Caribou arriving in Southeast Asia . . . mission accomplished



Lost Communications Procedures

Continued from page 7

failure survey brought out many instances in which it appeared common sense was not exercised. Some examples:

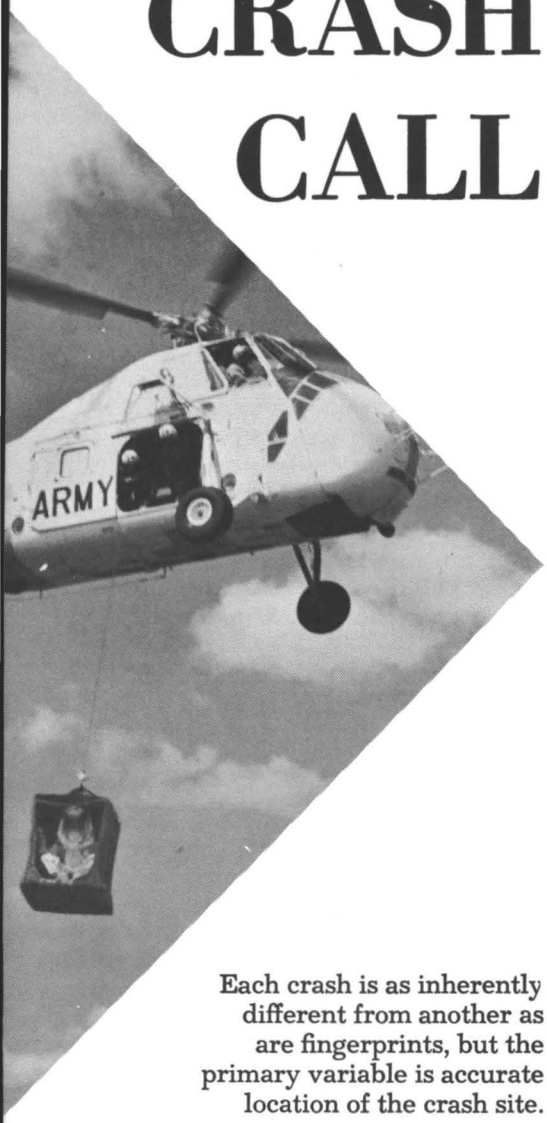
- During the survey roughly 10 percent of the 546 aircraft which experienced radio failure encountered communications difficulty in VFR conditions on departure, and instead of landing as soon as practicable continued on to their destination. Of the total of 48 aircraft which caused other aircraft delay, 42 of these were aircraft which continued on to their destination, four were aircraft which returned to the departure point, and two landed at airports en route. Aviators may not realize what problems a prolonged flight presents to the ATC system. Landing and telephoning FAA to advise them that you are on the ground is the safest and simplest solution.
- When a pilot realizes he has lost communications on his assigned frequency, he should attempt to reach the controller on other frequencies. If this fails, he should use the IFR en route (272.7) and then the VFR en route (255.4). Finally, if the pilot is unable to communicate on any of these frequencies, he should switch to guard (243.0) and make all position reports and broadcast his intentions in the blind. During the survey 62 of the radio failure reports indicated that the pilot had not lost his transmitting capability; however, very few used their equipment to make blind broadcasts. It should be clear why a pilot should "keep talking."
- Another important procedure that is sometimes forgotten is the use of navigational receivers to obtain instructions. Most en route navigational aids have the capability of transmitting voice and, providing the pilot turns up the volume, are an excellent means of gaining weather information and instructions from the controller.

Any assistance that can be given the controller when we have lost communication capability, such as transmitting in the blind, landing if VFR, and using navigational radios to receive instructions, will make the air a safer place for all of us.

Whether it is your first or 590th IFR departure makes little difference. Being aware of the preamble and the contents of FAR 91.127, checking NOTAMs and approach plates for specific procedures, having a knowledge of local SOPs, and exercising sound judgment and common sense should equip all aviators with the ability to handle any lost communications situation that develops.

Captain James A. Eberwine

CRASH CALL



Each crash is as inherently different from another as are fingerprints, but the primary variable is accurate location of the crash site.

THE BELL RINGS, lifting you out of your seat. You find yourself running down the hall, your heart racing as you dodge bystanders. Footsteps behind you grow louder as someone shouts, "Mohawk in the trees!" Out the door, across the lawn, then onto the concrete apron. You climb up the side of your CH-34 crash-rescue helicopter. As you slide through the window into the cockpit, at the same time hitting the battery switch, your medic and two firemen handle the fireguard and wheel chock duties. As you engage the rotor, ground control radio tells you the accident is 2 miles out on a 030° heading. With the crew aboard, the high magneto check is followed by an immediate 030° maximum performance takeoff. Elapsed time: 1 minute.

As you skim the treetops you can see the smoke in a heavily wooded area. You come to a hover above the trees just to the side of the crash site, and your medic and firemen descend to the ground in their hoist operated crash bag. Elapsed time: 3 minutes.

The crash scene reveals that both pilots are alive via low-level ejection, but one pilot is badly burned due to descending through the crash fireball. The medic applies first-aid, helps the injured pilots into the crash bag, and they ascend to the hovering CH-34. Elapsed time: 5 minutes.

As you touch down on the hospital helipad, a flight surgeon makes a preliminary examination and assists the patient into a waiting ambulance. Upon reaching the hospital emergency room, further medical care is provided. Elapsed time: 10 minutes.

The previous story is a sequence of truths, the isolated truths taken from actual crash calls performed by the CH-34 crash-rescue helicopter at Cairns Army Airfield, Fort Rucker. The truths, however, are compressed into a time factor achieved under ideal conditions — conditions that almost never exist! The variables that prevent the ideal crash - call - response - time are the reasons for this article.

These variables are offered so that each individual aviator may better react to the unusual circumstances that envelop a crash. Each crash is as inherently different from another as are fingerprints, but the primary variable is accurate location of the crash site.

Error is held to a bare minimum on the part of the crash-rescue helicopter team. Our CH-34 is painted white with a red cross for easy identification, has a maintenance priority over other aircraft, and the pilot-copilot-medic-firemen crash team supplement their rescue work with frequent proficiency training.

Our attention then focuses on the crash participants and personnel having immediate knowledge of the crash, its geographical location, time, and all other pertinent facts. Since the adrenalin glands pump wildly under duress, the persons having direct knowledge of the accident location may fail to locate their positions properly, resulting in delay of medical aid to injured personnel. The following examples show how the human error factor entered to slow the patient-to-hospital time.

On one crash call a UH-1 circled the crash site and the pilot located his position, initially, 16 miles from his actual location. Our white CH-34 flew more than 25 miles in search patterns seeking visual contact. Other variables in this case were twelve CH-34s and seventeen UH-1s, all flying training or search patterns

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Capt Eberwine is assigned to the U. S. Army Hospital, Ft Rucker, Ala., and has served nearly 2 years with the crash-rescue team.

of their own. Upon visual contact we learned, with mixed emotion, that the circling aircraft contained the crash victims.

Other situations, while less complicated, resulted in similar inaccurate position information being passed to the crash-rescue helicopter resulting in considerable delay. Available means of self-location, but often unused, are VOR and ADF.

Sometimes the curious can be in the way. During a treetop crash-bag operation, a UH-1 buzzed in close for a good look and its rotor downwash nearly caused the crash-helicopter to settle into the trees. Aircraft should remain away from crash rescue scenes unless they have a definite mission there.

While the majority of crash calls involve routine groundloops or damaged wing tips, occasionally we have the pure satisfaction of the positive results of speed and efficiency. Responding to a call at a fixed wing landing strip, we discovered the pilot of an O-1 still trapped in his crumpled cockpit. The wings and tail were severed by trees as it cartwheeled, and the fuselage was horseshoe-shaped from wrapping around still another tree. It took five men to untangle the wreckage sufficiently to permit rescue of the pilot.

Good fortune sometimes plays a major role in rescue operations. A crash call resulted when flares severed the empennage of an OV-1 Mohawk, sending the aircraft plummeting into the trees in the impact area of an artillery firing range. Two crash-helicopters made night landings near the crash scene for possible assistance. The crash had apparently claimed two lives. During the time used to post a guard at the crash scene and extricate the suspected fatalities for medical verification, the one aviator who had survived a last minute ejection was able to make his way through the underbrush, guided by engine noise, to the crash-helicopters. He was immediately evacuated to the hospital. A slightly different situation could have resulted in the injured pilot's spending a night exposed to the cold and elements.

In another instance, the crash-rescue helicopter was on final approach to Cairns Army Airfield when a German aircraft crashed on the field. Elapsed time from impact to the operating table was 17 minutes. The time saved in this case may have saved the pilot's badly lacerated feet from amputation.

The primary mission of the crash-rescue helicopter team is to save lives and expedite medical care for the injured. Each team member is trained for his part, but you the individual aviator can also have a vital part in this mission. Understand the ways you can help or hamper rescue operations and play *your* part.

"... Getting the facts, Ma'am!"

Crash investigators often report difficulties getting the facts from witnesses. Here's one report by the Norfolk SAR Coordinator which tops their best stories to date. It's Case 134 reported by the "Norfolk DF-Radar Net," Monthly SAR Summary.

Time of Initial Alert: 1431R
Alerting Station: Hickory
Nature of Distress: Possible ejection
Weather: CAVU

1431R Hickory advised an *aircraft* was down in vicinity of Lake Catherine (35 miles 268° from Cherry Point).

1434R Cherry Point advised that two fire towers *sighted* an airborne explosion and one parachute, vicinity of highway 53. R4D airborne to search.

1435R Hickory advised a farmer had *seen* an *aircraft* and a parachute.

1437R MCAS New River advised that at 1345R the Chinquapan Fire Tower *sighted* an airborne explosion and obtained a bearing of 079°, estimated 5 miles. T-28 and HR4S airborne to search.

1445R RCC requested all stations account for aircraft.

1449R Cherry Point launched 2 OEs and a helicopter. State Police alerted. Rescue Coordination Center requested a helicopter land and interrogate witnesses.

1514R Helicopter landed and talked to lady witness. She said it happened at 1100R.

1521R Cherry Point advised that the lady heard an explosion and saw something drop from the sky, then reported it to the forest tower.

Results:

1530R Cherry Point's investigation revealed that a whirlwind had picked up some cloth tobacco seedbed covers and at the same time an aircraft had broken the sound barrier. No aircraft overdue. Case closed.

Comments: This case is good for more than laughs. It's a lesson in the value of second and third hand information passed by word of mouth versus complete, accurate, verbatim reporting.

—*APPROACH Magazine, March 1963*

A Little Human Hide

Lieutenant Albert E. Hervey

Lt Hervey is an instructor pilot with Advanced Contact Division, Dept of Adv F/W Tng, USAAVNS, Ft Rucker.

WHEN I GRADUATED from flight school, one of my instructors told me that my new silver wings would hardly compensate for the human hide that would be knocked off me in the school of experience.

Two weeks later I had reason to remember his remarks when on a routine CR flight I encountered fog, severe turbulence, and lightning. And to top it off, the airport I was cleared to went below minimums when I was on final.

It all happened one February morning when I left New Orleans, La., in a U-6A headed for Fort Rucker, Ala. New Orleans and Rucker were both VFR. Biloxi and Gulfport, on the Mississippi Gulf Coast, were reporting fog.

The FAA at New Orleans Municipal showed me the sequences along with other weather charts and forecasts. A cold front and squall line were due in New Orleans in a matter of hours. Stations north of the Mississippi Gulf Coast were VFR.

It appeared that the fog bank extended only a short distance inland, but I waited a while to check again.

Thirty minutes later I went back to the FAA, and now things looked a bit better around Gulfport. The man's word was, "Go! If you leave within 30 or 45 minutes you can make it all the way VFR."

Hurriedly I filled out the 398 (FAA Flight plan) and filed VFR direct OZR at 2,000 feet. Mindful of the turbulent weather I might run into, I took extra care in my preflight. Several other aircraft were ahead of me, and after what seemed like ages I was at last over Lake Pontchartrain headed east.

The ceiling was a little lower than 2,000 and it was marginal weather, but Cairns at Rucker was VFR so I expected the weather to get better. I planned to stay well north of Gulfport and Biloxi to avoid the bad weather there. However, about 30 minutes out, special weather broadcasts started coming in from the omni station. Almost every five minutes some Louisiana or Mississippi station reported an IFR or thunderstorm condition. I had to keep flying lower and lower to maintain visibility. But I didn't worry, though; I was sure good VFR was just ahead.

When I hit 1,000 feet it dawned on me that the fog must have moved farther inland than expected. I performed a 180° and started back to New Orleans. Going in the opposite direction I found that I had to fly lower to maintain contact with the ground. Before I got too low to receive the VOR, I heard New Orleans had gone IFR.

I got on the horn — 257.8 for any FAA tower, 255.4 for a FSS, 272.7 in case they might receive this better, and 236.6 for any Air Force tower — but got no answer. I turned to 243.0 and received no answer after two calls.

I was circling a dual lane highway at about 150 feet and had already thought of landing there when a weak but readable voice on the radio said, "Army 12345, Keesler tower. Over."

After getting a clearance I climbed to 2,000 feet on instruments, scrambled through my Jep case to get the approach, and started to carry out the instruction. The Biloxi field was above minimum with 400 and 1. On my way up to 2,000 both ADF and VOR looked better.

On approach to Keesler the field went to 100 and ¼ with light rain starting. I began to worry. The front and squall line should have been another hour away. But the aircraft was getting harder to handle, the Jep case was sliding a bit and the shoulder harness needed to be tighter. I began to lose some hide.

I got another clearance direct to a NDB, direct to Brookley VOR for an approach to Brookley AFB, Mobile, Ala. Again I came up with charts, estimates, and approaches. It was raining hard now and the ADF needle was swinging so much to either side of zero it was almost unreadable. Even worse, I couldn't hold the wings level nor hold myself firmly in the seat.

There was a flash of lightning and I knew I was in it. The squall line had moved in around Gulfport much sooner than expected. A little more hide came off.

The ADF was useless so I got another clearance to Brookley VOR. After reaching the VOR I was given a GCA. Several times on the approach the controller lost me, but finally with drenched flight suit (and not all of it was from the rain) I broke out and landed at Brookley.

All aircraft at Brookley were grounded due to the weather. A DC-7 that landed shortly after me reported severe turbulence from New Orleans to Brookley.

During this flight I lost some human hide, but I learned one thing. Any time I have the opportunity of calling military bases or the U. S. Weather Bureau for a more complete weather picture, I'm going to do it. This little extra effort on my part may keep me from flying actual instruments on a VFR flight plan.

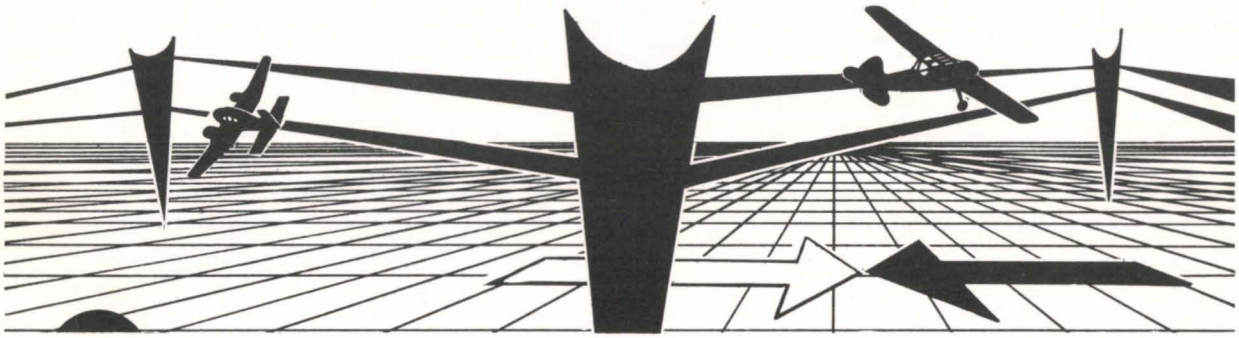
Here's a recap of services rendered by your

Flight Information and Navaids Office

TO PROVIDE a clear picture of the U. S. Army Flight Information and Navaids Office it is desirable to review the history of this organization and the reasons for its establishment. These reasons, as we shall see, remain valid today.

Before 1954 the Army did not have an agency responsible for providing the Army Aviator with current flight data. As a result each aviator was forced to use such data as he could obtain, be it Air Force Charts, Coast and Geodetic Charts, Civil Aeronautics Administration Charts, and in many cases oil company road maps. As a matter of fact, for straight VFR flying

Lieutenant Colonel Richard Albright



the road maps proved, in many instances, to be more up-to-date than did most of the other flight data available.

As Army Aviation's role increased and requirements for its use multiplied, it became increasingly apparent that the Army provide a flight information package which would satisfy those requirements peculiar only to Army Aviation. In June 1954 this responsibility was assigned to the Office of the Chief Signal Officer. He directed that a comprehensive study and evaluation be conducted to determine the parameters of Army requirements and how these could best be satisfied.

It was also directed that every source be considered and that, if possible, the Army would make use of flight material produced by another governmental agency. The idea prevalent seemed to be that an airplane is an airplane and if an Air Force pilot can use a document, then why not an Army Aviator?

The study developed the fact that the Air Force's requirements, operations, and missions dictated a type of information that would satisfy only a small percentage of the Army's requirements. These were equally serious defects in flight publications of other governmental agencies.

After a careful survey and evaluation, it was determined that to satisfy the Army's requirements worldwide it would be necessary to

1. purchase a commercial flight information package, and

2. establish at DA level an organization responsible for the determination of Army flight information requirements.

This organization would represent the Army's interest in this field with all other governmental agencies, providing a central point for all questions concerning flight information, and conflicts in airspace use and coordination. It would also represent the Army's interests in the multitude of committees, panels, and ad hoc working groups, national and international, which deal with the worldwide aspects of aviation.

As a result of these studies, the U. S. Army Flight Information Office was established on 1 May 1955 as a Class II activity of the Chief Signal Officer. At that time the Army had approximately 2,500 aviators and 3,600 aircraft. Today this activity serves over 7,600 Army Aviators worldwide, operating more than 6,200 Army aircraft. Their requirements range from the little two-man, one-plane aviation section of a small National Guard or Reserve unit to special mission requirements in the Congo; from combat requirements in Vietnam to the administrative and tactical needs of the 2,000 Army Aviators in Europe.

Present indications are that by 1970 this agency will be required to serve the needs of over 10,000 Army Aviators operating Army aircraft in every conceivable spot in the world.

OVERSEAS FLIGHT INFORMATION DETACHMENTS

The establishment of Flight Information Detachments in the European, Pacific, and Caribbean areas was premised upon the need to satisfy the flight information requirements of the Army Aviator on a worldwide basis;

the establishment of a standardized data presentation in flight documents for Army Aviation throughout all world areas based upon the CONUS format;

the provision of current flight information data to Army Aviation staff and administrative activities in the overseas areas.

These offices are located in Germany, Japan, and Panama.

NAVAIDS BRANCH

The Navaids Branch provides DA representation on various DOD /FAA working groups and panels responsible for the technical performance standards of air navigation and terminal aid facilities, and training of air traffic controllers and GCA operators. The results of these deliberations and agreements are published in the Joint U. S. Standard Facilities Ground Inspection Manual. This is the technical bible against which the performance of all air navigation equipment is checked.

On a worldwide basis, the Navaids Branch provides technical engineering assistance for the installation, operation, and maintenance of all types of Army navigational aids. All requests for technical engineering assistance are channeled to this branch. If the assistance is not available within Army resources, then the branch contacts the appropriate FAA agency and requests such support as may be required. It also budgets for such assistance and ensures payment to FAA of those reimbursable portions of NAT-127 (National Agreement, defined in AR 95-9).

This branch also budgets for and accomplishes a continuing review of the work performed by 16 manufacturers' representatives located throughout the world. These technical personnel provide Army installation commanders and Army depots DA contract technical assistance on standard Army GCA radar equipment.

Col Albright is Chief, Aviation Electronics Division of Electronic Systems Directorate, Office, Chief of Communications-Electronics, Dept of the Army.

The majority of the functions being performed by the manufacturers' representatives are basically the responsibility of the installation commanders. Therefore, as the Army develops its own capability in the operation and maintenance of permanent and tactical types of standard GCA radar equipment, the number of manufacturers' representatives will be decreased until they are completely eliminated from the program. It is anticipated that this will occur in approximately two years.

The Navaids branch will continue to represent DA in technical conferences, working groups and committees established to develop and revise joint technical manuals as Army Aviation operational requirements arise or change. The technical engineering assistance portion of NAT-127 will continue in the areas of site selection and of maintenance on nonstandard radar equipment.

AIR TRAFFIC CONTROL PROCEDURES BRANCH

This branch represents the Army in the various DOD/FAA working group and panels concerned with air traffic control procedures and criteria. It provides Army input into the worldwide flight inspection program to ensure that flight inspections will support those requirements peculiar to Army Aviation. It coordinates the workload of the DOD/FAA flight inspection program, assists in establishing priorities, and ensures that Army requirements are included in FAA planning and budgetary actions.

As a member of the DOD/FAA advisory committee on terminal flight procedures this branch is responsible for assisting in the development and currency of criteria for terminal area procedures. This branch ensures that new and revised procedures accommodate the characteristics and performance of both fixed and rotary winged Army aircraft.

Within the Army, this branch is responsible through AR 95-9 (Navigation Facilities Instrument Approach Procedures) for establishing the policy and field procedures for all Army instrument approach procedures. This branch is the final reviewing and approving authority for all proposed Army instrument approach procedures. After it has determined that a proposed procedure meets established criteria and policy, and is compatible with Army airborne navigational equipment, it approves (after coordination with FAA and other interested agencies) the procedure for publication.

Responsibility for AR 95-185, which is concerned with the relationship between the Army and FAA in establishing and controlling control towers, approach and departure control services, in a manner responsive to Army requirements, belongs to this branch. These procedures are subject to change along with improvements of the air traffic control art. AR 95-7, "Increased Military IFR Flight Program," which has been prepared in response to a DOD/FAA cooperative effort to reduce the mid-air collision and near-miss hazard, was prepared and is monitored by this branch under direction of the Secretary of Defense.

FLIGHT INFORMATION BRANCH

The Flight Information Branch provides Army Aviation elements with pertinent flight information material as directed by AR 95-14.

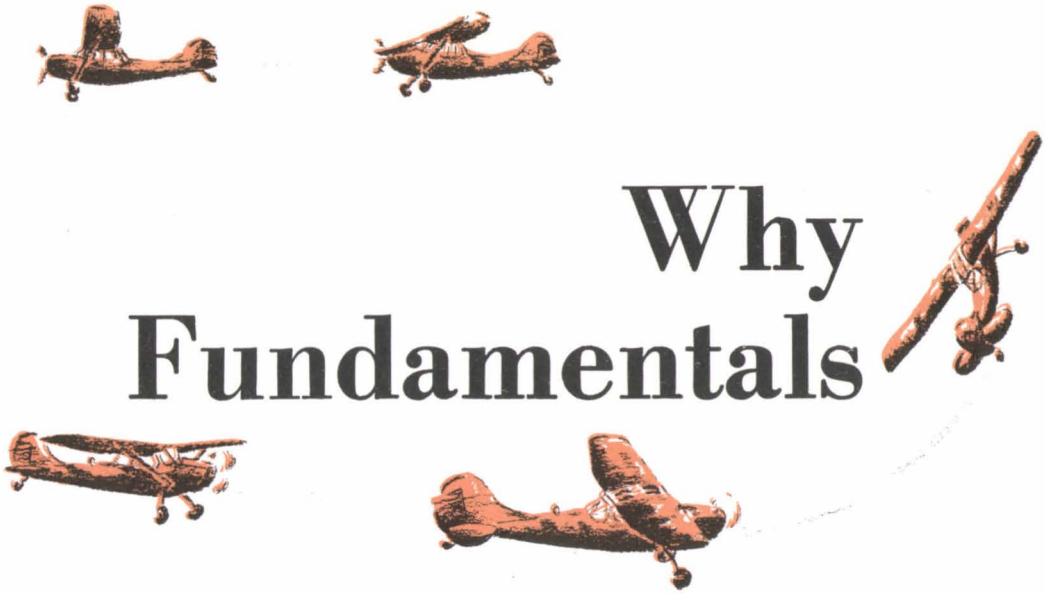
This branch implements this air navigation service to Army Aviators, worldwide, providing them with air operational data covering the day-to-day status of equipment and facilities necessary to the safe and effective conduct of Army Aviation missions under both VFR and IFR conditions. It also maintains a quality control program for the TM 11-2557 airway manual, which is the basic flight information document. This item is procured by Army through a contract with Jeppesen Company, Denver, Colo., on an off-the-shelf basis.

We provide Army Aviation with a package and service that is not available from any other source. It has been recognized as the best in its field by an extensive segment of commercial and general business aviation.

You are probably aware of a DIA (Defense Intelligence Agency) joint services project to investigate the feasibility of devising a common flight information document to serve the needs of the three services. The Army has been participating in this project and fully endorses the proposed objectives and aims.

If it is determined that a common product can be provided which will fully serve the Army's needs and can be accomplished more economically, the Army after a reasonable period for testing, certainly would be agreeable to the adoption of such a package.

I would like to make one point, however. Regardless of whether or not a common flight information document is produced, there will be a continuing need for an Army office to serve as the major focal point through which all matters previously discussed will be channeled. It has been determined through informal contact with project members of the DIA that the workload will increase appreciatively within each of the services concerned.



Why Fundamentals

This is a review of four basic fundamentals of flight that control an airfoil.

Captain James B. Carlisle, Jr.

IT IS IMPOSSIBLE to expose a pilot in any flight course to all the situations he may someday find himself in. It *is possible* to teach flight fundamentals in such a manner that he will be able to adapt and handle any situation except the most extreme.

If you will recall the early days of your flight training and look in any primary manual you will see listed straight and level flight, turns, climbs, and glides. The books and instructors will also say that all possible controlled flight maneuvers consist of either one, or a combination of more than one. If we look further it will be found that an airplane has only three axes and that movement about the lateral axis is controlled by the elevators, about the longitudinal axis by the ailerons, and about the vertical axis by the rudder. Sounds easy enough to learn, doesn't it? But, what lies between knowing these fundamentals and applying them so the airplane is always at your command?

A long list of tangibles and intangibles takes the simplicity out of good flying, but the three that seem to affect a pilot's judgment most are gravity, g-loading, and angle of attack. Without gravity we would have no use for the airplane as we know it today. In essence, whenever lift is insufficient to overcome gravity to the desired extent, a hard contact with the earth's surface is inevitable.

Like most things, the effect of gravity is not always adverse. When the airplane has no other form of thrust and with the angle of attack properly controlled, gravity becomes the means of thrust, and a gentle contact with the ground or water can be accomplished. To do this in moments of stress, a pilot must be able to maintain a safe glide by more or less subconscious feel. It takes long hours of practice in power-off maneuvers to gain this skill. Angle of attack in conjunction with speed is the means of controlling lift so the effect of gravity is the amount desired. To engineers this is a real and measurable thing, to the pilot it is an intangible unless the airplane has an instrument that will tell the pilot what the angle is.

Angle of attack cannot be seen, it must be sensed and it takes practice in many different maneuvers before the pilot can

Capt Carlisle was Chief, Standardization Branch, Standards Division, Dept of Adv F/W Tng, USAAVNS, when he wrote this article. He is now serving in Vietnam.

interpret airspeed, power and g-load into angle of attack. There are times, as in a landing, that all the pilot has is a sense of feel and vision to maintain the proper amount of lift. Control pressures and aircraft response are things a pilot learns early in his training, but it takes many different maneuvers and many hours of practice before he can apply all of this knowledge into maintaining control in all flight situations.

Give a pilot a minimum airspeed and in a 1+g flight condition it will be easy for him to stay within the proper angle of attack. With a change in g forces this minimum airspeed is no longer the same. For instance, with a load factor of 4+g the stalling speed has been doubled. This is a two-sided coin, for if the pilot produces a stall at double the 1+g stalling speed and the airplane is not stressed for a load factor of 4+g the wings will surely break off. Here again the pilot can be given a maneuvering speed and he knows that a stall produced above this speed will exceed the load factor of the airplane at a specified weight. So he stays out of trouble in this respect by never doing a snap maneuver above the maneuvering speed of the airplane.

Only through practice in +g maneuvers can the pilot learn to judge pullups, steep turns, rolling pullups, etc. to avoid stalling. The pilot learns early that an airplane's stalling speed is increased in turns. The O-1A has a power-off stalling speed of 70.3 knots in a 60° banked turn. The -10 does not say this is only in coordinated constant altitude turns. Such maneuvers as spirals, lazy 8s, chandelles, and steep turns teach the pilot the techniques that will help avoid even higher g's and higher stalling speeds in banks that exceed 60°. These maneuvers teach other things, such as control use and effect, but in doing a steep bank in other than constant altitude flying the pilot soon learns the correlation between pitch, bank, and power in maintaining safe flight.

A person could be taught only takeoffs, landings, straight and level, turns, climbs and glides, told an operating airspeed for all of these, and he could fly. I am sure that if this were done, sooner or later this pilot would be faced with an unknown situation in a normal mission and the flight would end in complete failure. Just as a piano player cannot truly learn music by memorizing a few songs without a thorough understanding of fundamentals, so an aviator must understand the basic fundamentals of flight to be a real pilot.

A Possible Cure for Stalls

A report by A. E. Larson and C. J. Litz, Jr.

ALMOST EVERY month an Army fixed wing aircraft is damaged or destroyed due to stalling while taking off or landing. Between 1 July 57 and 31 December 63, sixty of these accidents occurred and 10 lives were lost.

Stalling occurs when an airfoil is operating at an angle of attack so great that the orderly free stream of air becomes turbulent and separates from the upper surface of the wing contour. The result is usually a sudden loss of aircraft control as one wing rises or falls before the other.

One explanation for this type of accident can be found in the kind of flying done by Army Aviators. They are trained to use hastily or unprepared strips in the combat zone. Therefore, their technique of landing and taking off differs from that of a pilot trained to use long, superbly engineered runways.

For instance, when Army Aviators come in for a landing, they keep the nose of the airplane much higher than normal to use as little field as possible. In most cases the angle of attack is already at its maximum. Even the smallest increase will cause turbulence and a resulting loss of lift.

A fail-safe method of recovering from these stalls is needed. Such a method must enable the pilot to re-establish the flow of air over the surface of the wing. In addition, the method must hold the flow attachment long enough for the pilot to make corrective control actions to restore the aircraft to normal flight.

The research program was carried out by the Pitman-Dunn Laboratories, Research and Development Group, Frankford Arsenal, under the direction of Mr. Charles Litz, Project Engineer, and Mr. Agnew Larson, Chief Investigator.

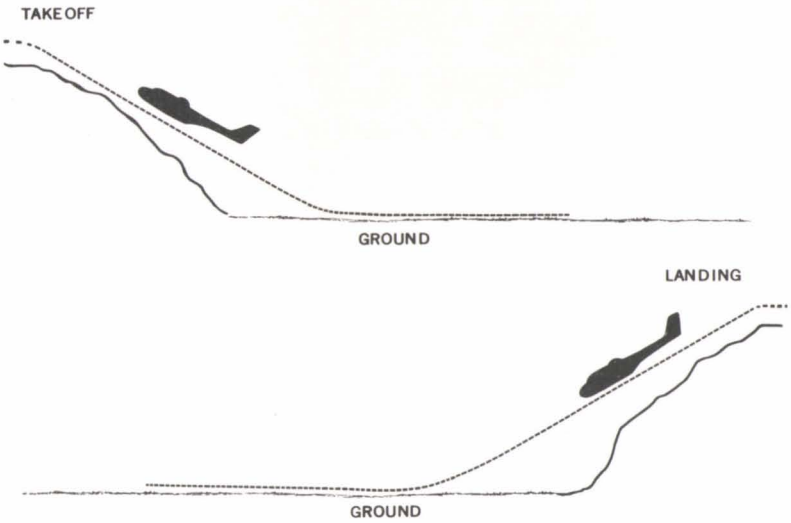


Figure 1. PAD antistall applied to Caribou. Stall condition arises during takeoff or landing.

Personnel at the Pitman-Dunn Laboratories, Research & Development Group, Frankford Arsenal, have come up with an idea that may be the answer to the problem. The idea is to apply propellant energy through short-interval ducts in the leading and trailing edge of the airfoil, inducing instant reattachment of circulation flow which in turn restores lift.

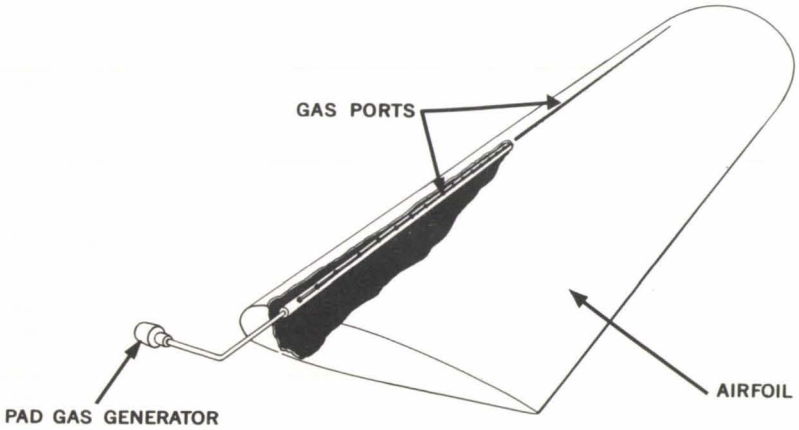


Figure 2. Airfoil with PAD antistall unit. In operation air is instantly drawn through perforation, distributed about the upper surface of the airfoil, or blown out at either the leading or trailing edge.

Figure 3. Emergency control of boundary layer on airfoil wing by propellant energy.

To make an initial test of the idea, two airfoils were placed in a wind tunnel. One was a thin-wing, sharp leading edge type and the other a thick-wing, blunt leading edge type. Both were equipped with 20-cord plane flaps and blower slots, located near the leading edge and normal flap hinge line. Results of the initial test show that the concept is well within acceptable and proper limits.

The second phase of the study used leading edge blowers in a thick-wing, blunt leading edge type of airfoil. This type airfoil is most representative of those used in lower speed Army aircraft.

The propellant energy was furnished by a Propellant Actuated Device (PAD) gas generator. Ammonium-nitrate, composite solid propellant, was used in the generators. This type propellant has a relatively cool burning temperature and is smokefree, relatively nonerosive, noncorrosive, and nontoxic.

From this phase it was determined that .842 pounds of propellant is required to reattach the flow of air to a wing in stalled condition. Thirty seconds has been arbitrarily selected as the time required for the pilot to make corrective actions to restore control. The amount of solid propellant needed to sustain the reattached airflow for 30 seconds by jets blowing on 2/3 of the total wing area of 912 square feet is 50.5 lbs.

Studies are now being conducted on a broader scale to determine the application and use of PAD to reduce stall hazards in present and future Army Aviation. Immediate efforts are to determine the pure physics involved, and weight, volume, performance and cost of the system.

AIRCRAFT
SERVICE and

A long history of accidents and near-ac
wrong fuels, oils, other fluids, etc. call
servicing. To help reduce the chances o
been developed for the U. S. services,
NATO nations. Here are the markings as o

HAZARD

Hazard

color—red no. 11136

Explosive Actuated Devices

mark both sides of fuselage
Red filled equilateral triangle with 9-inch sides and with apex pointing downward with the word "danger" on each side of triangle.

FIL

Pneumatic Starter Connection

X inscribed within a ring with notation of maximum operating pressure in English and Metric System
maximum
_____psi _____Kg/Cm²

Refueling

Filled four-pointed star with notation of NATO code number for fuel and maximum filling pressure in English and Metric Systems
NATO code no.
max filling pressure
_____psi _____Kg/Cm²

Rocket Fuels

Filled four-pointed star in crescent with notation of NATO code number for rocket fuel and maximum filling pressure in English and Metric Systems
NATO code no. _____psi
max filling pressure _____Kg/Cm²

Rocket Oxidizers

Filled crescent with notation of NATO code number for rocket oxidizer and maximum filling pressure in English and Metric Systems _____psi
NATO code no.
max filling pressure _____Kg/Cm²

Engine Lubricating Oil

Filled square with notation of NATO code number for engine lubricating oil and maximum filling pressure in English and Metric Systems
NATO code no. _____psi
mix filling pressure _____Kg/Cm²

Hydraulic Fluid

Filled circle with notation of NATO code number for hydraulic fluid and maximum filling pressure in English and Metric Systems
max filling pressure
NATO code no. _____psi _____Kg/Cm²

De-icing

Filled triangle with notation of NATO code number for deicing fluid
NATO code no.

Coolant

Two filled horizontals's with notation of NATO code number for soluble oil and percentage composition if necessary
NATO code no.
water—% soluble oil—%

Pneumatic System

Filled x with notation of maximum charging pressure in English and Metric Systems
maximum
_____psi
_____Kg/Cm²

MARKINGS
RECAUTIONS

nts resulting from servicing aircraft with
a better all-around knowledge of proper
rong servicing, standard markings have
nerican-British-Canadian nations and the
ned by Military Standard 33739(ASG):

NG

Oxygen (Breathing)

gas
_____psi
_____Kg/Cm²

Two filled horizontal rectangles with notation of filling pressure in English and Metric System. For liquid systems the word "liquid" shall be used instead of "gas" and the capacity in liters shall be added

Anti-Detonant or Thurst Augmentation

Filled chevron with notation of NATO code number and percentages
methanol% _____
water % _____
(Methanol code no. S-737)

Air Conditioning

Dot patterns

Inerting System

Filled square with a quarter arc removed from each corner, with type of gas used and pressure in English and Metric Systems
Nitrogen
_____psi
_____Kg/Cm²

GROUND HANDLING

Jacking Point

Orange-yellow filled square with two slanting legs on bottom side

Slinging or Hoisting Points

Orange-yellow filled hook on a horizontal line

Mooring or Picketing

Orange-yellow filled anchor

Towing (c)

Orange-yellow filled ring
(b) Outine symbols in black or white according to the background
(c) Optional where towing point is obvious and suitable location for symbol is not available

Fire Extinguishing System

A filled diamond with notation showing NATO code number
NATO code no.

External Electrical Connections

Servicing
Starting etc

A filled vertical bar with three equally spaced horizontal bars on right-hand side with notations to indicate characteristics and purpose
28V or 115V DC
115/200V, 400 cycles

Grounding or Earthing Receptacle

A filled inverted "T" with two parallel bars underneath which diminish in size
ground (earth) here

Inspection of Battery

A filled electric flash sign

"Knight 914" lands on the ramp completing its units record 10,000 hours in the Republic of Vietnam. Could your unit support aircraft averaging 1,500 flying hours per month?

10,000 Hours in Vietnam

THE U. S. ARMY's first airmobile unit has flown 10,000 hours in the Republic of Vietnam. The "Knights of the Air" amassed this impressive figure in only 7 months while supporting the ARVN forces in the Mekong Delta.

This unit was formed in February 1963 at Ft Knox, Ky., and upon reaching full strength in May was rotated to Vietnam.

The airmobile unit is equipped with the UH-1B Iroquois. The Hueys authorized for this unit are broken down into airlift and armed escort units and one UH-1B for maintenance.

Each transport helicopter can carry one rifle squad, giving the airmobile unit the capability of airlifting a complete ARVN infantry company in one move. This maintains unit integrity and provides the unit commander with that "extra punch" when and where it is needed. Additional missions are: re-supply, command and control, medical evacuation, and on one occasion and in one lift, five of the UH-1Bs evacuated 105 people from a Vietnamese town.

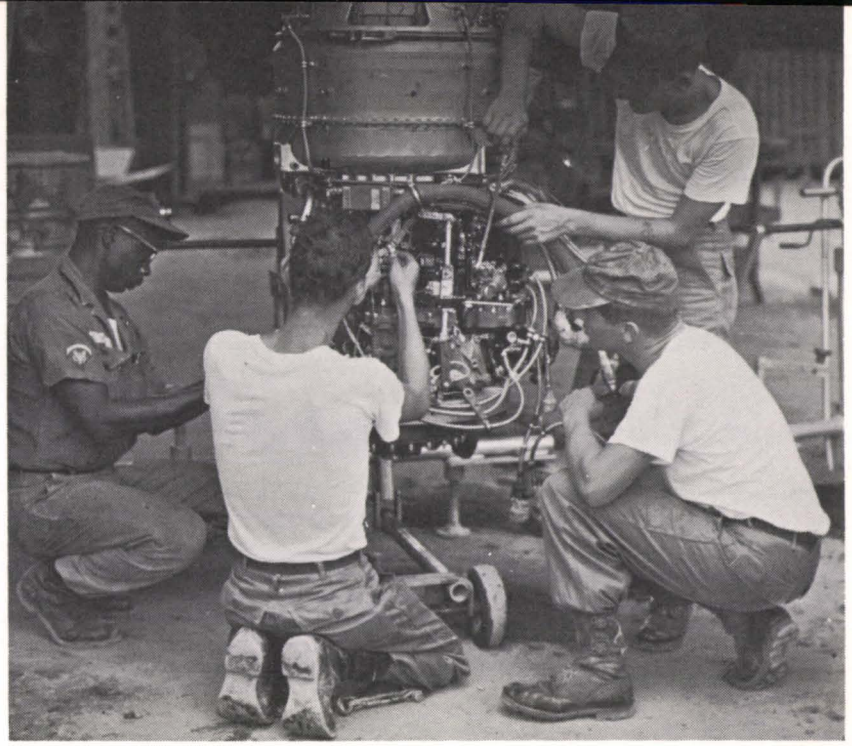
During their first month of operation only 560 hours were flown, but the men got a good idea of what they could expect during the remainder of their tour in the Delta. They learned how to navigate across the seemingly endless rice fields and canals, and one crew had the then unique experience of landing in the light of a burning pile of straw on a night med-evac. Night helicopter missions over the Vietnam countryside with its lack of ground reference lights are not common, but they are accepted without complaint when a human life is in danger.

The Knights also pioneered in supporting a night combat mission by the ARVN to reinforce an outpost which was under attack by insurgent forces. They airlifted a Vietnamese Ranger Unit to the area in less than an hour, over a distance that would have taken troops on the ground at least 8 hours — again proving the speed and flexibility of this unit.

"Cobra," the armed escort helicopter unit, is a welcome sight to the unarmed aircraft when they are on the ground unloading their troops. Cobra provides close in protection from ground fire for the troop-carriers on combat-assault missions, and single ship escort when needed. Some of the UH-1Bs in this unit are armed with the XM-6 quad M-60 machinegun, and pods for sixteen 2.75 rockets; the remaining Hueys with the XM-3 kit hold forty-eight 2.75 rockets each.

The men of the armed unit have proved their effectiveness many times. On one occasion the insurgents were deeply entrenched in the vicinity of the proposed landing zone, since their retreat was stopped due to repeated air strikes by the ARVN Air Force. Under cover of the suppressive fires of Cobra, a battalion of troops was landed in three successive lifts without incident. This airmobile assault resulted in one of the most successful operations against the Viet Cong, with 105 reported killed and many weapons captured.

Because of the high maintenance requirement per hour flown, the men of the service unit, supported by men from a field maintenance detachment for third echelon work, put in almost 2,000 overtime hours each month. This is over and above the two shifts a day, 6 days a week of normal duty time. Until recently this work was done under the open skies, or partially sheltered from the elements by canvas tents. They now have a large hangar, complete with shop facilities, which should make their job a little easier in maintaining aircraft availability to support the average of 1,500 hours flown each month.

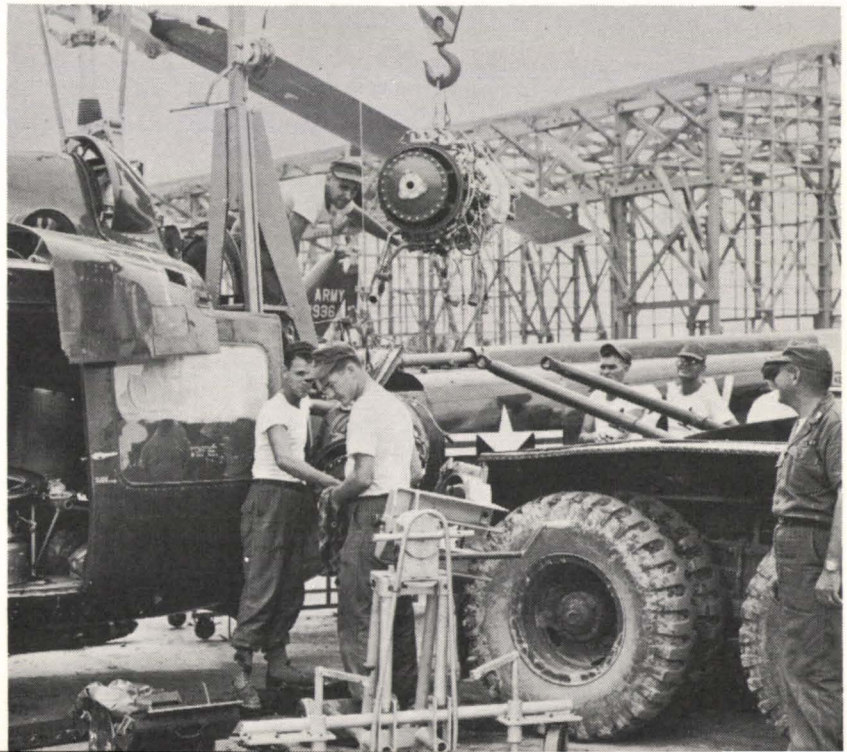


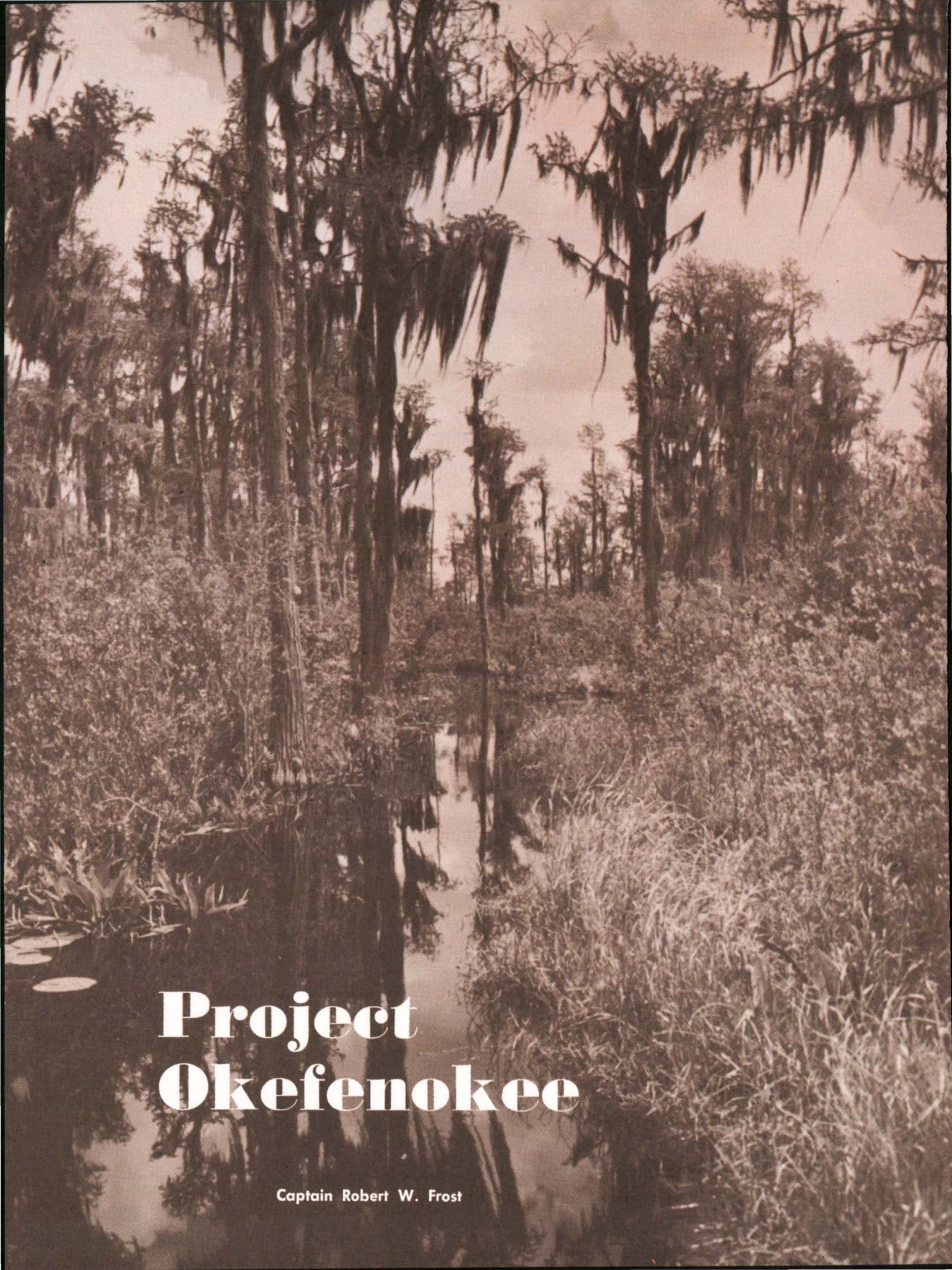
Engine repair crew of the CHFM work on a turbine

The avionics requirement of keeping all the navigation equipment and the three radios per helicopter operating is easily handled by the Signal Detachment. They have lost the use of only one aircraft for a half-day due to radio trouble since their arrival in Vietnam. This was accomplished by only six men operating out of a shop van.

The men of this aviation unit and attachments, by their hard work and professional competence, are demonstrating the capability of Army Aviation when put to the ultimate test: continued operation in the field.

Maintenance crew changes the engine of a UH-1B helicopter outdoors with the help of a 5-ton wrecker.





Project Okefenokee

Captain Robert W. Frost

The vast Okefenokee Swamp may be a happy environment for Pogo and his pals, but for an Army Engineer unit it presents some unusual working conditions.

TOPO FLYING is among the most challenging and interesting flying available. It is done in the remotest of areas where aircraft use and serviceability are entirely dependent upon the aviator/crewchief team.

The 30th Engineer Battalion received a topo mission covering 12,000 square miles. The largest portion of this project was in the Okefenokee Swamp in southern Georgia. Battalion handed the project to the Rough Riders of the 537th Engineer Company (Survey Base). Their convoy departed Fort Belvoir on 21 February 1963 and, 3 days later, closed in Waycross, Ga., the site of the base camp.

This camp was based on an old parking ramp at the Ware County Airfield, with access to a perimeter road, water and electricity. Aircraft available at the beginning of the project were one OH-13 and one UH-19C, with organizational support only at the camp site. The helicopters were maintained on a deteriorating runup stand of asphalt, which remained hard and dried quickly after a rain. Fuel was contracted for in advance and field maintenance came from Fort Benning, 180 miles away.

A spike camp was established near Folkston, Ga., right on the edge of the swamp, and the site had to be cleared of brush and palmetto so tents could be erected and a motor pool established. Adjacent to the camp was a confined area for helicopter operations, including refueling. This area also had to be cleared. The soil was pure sand and presented a dust problem with every takeoff and landing. This was partially overcome by digging pits and covering them with canvas when equipment was being stored. Fuel was stored in two 240-gallon containers, and oil was stored in 5-gallon and 1-quart cans. This spike camp contained the working parties and the main camp contained the Headquarters staff, administrative personnel, and aviation section.

The UH-19C departed the day after the convoy and arrived with the convoy at Waycross. The OH-13 was ferried down by another unit and arrived in three days. Both aircraft were down for maintenance one day and started their project support the following day. All flying was done in the local area except for maintenance flights to Fort Benning and the Naval Station at Jacksonville, Fla.

During the first three weeks flying was done by one aviator, using both aircraft. This lack of aviators caused a delay in operations when observation and cargo flights were scheduled for the same day. Aircraft were alternated whenever possible, so maintenance could be accomplished on the off day.

When an additional OH-13 arrived with an aviator, the rotary wing fleet for the project was completed. In support also was a U-6A which flew liaison between Fort Belvoir and Waycross, Ga., carrying urgent equipment and emergency leave and PCS personnel. It also flew supply missions to Fort Stewart and Fort Benning from Waycross.

Flight plans were filed locally with company operations, or with Alma FAA, by phone, whenever we left the local area. Base ops called spike camp by radio and gave them an ETA. In the event of radio failure, spike camp was called by phone. Upon arrival, spike camp called back our down time and we were now under control of spike camp, or Fort Sand Pit as it was affectionately called. When the mission was completed the reverse calling procedure was initiated by spike camp.

A brief description of the terrain will emphasize the importance of knowing the whereabouts of the helicopter at all times. The 660 square mile swamp is entirely saturated with water and is not easily traversable by foot. The "islands," patches of pine trees on palmetto-covered ground, have an elevation no greater than 5 feet above the waterline, and are in the middle of cypress stands which cover large portions of the swamp. These trees range from 60 to 120 feet in height, and often vertical observation to the swamp floor is impossible

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Capt Frost commands the Air Section, 30th Engineer Battalion, Ft Belvoir, Va.

Sand created problems with every takeoff and landing

Sign erected by engineers near Camp Cornelia

The importance of extra safety precautions while operating in Okefenokee is readily apparent. The entire swamp is saturated with water. Highest elevation is 5 feet above waterline.

Fort Sand Pit

because of the dense treetops. The similarity of the terrain made it impossible to pick out landmarks; therefore, all flying was by time and distance. On a day of broken clouds, the shadows on the swamp were the same color as the pine islands and, set against the lighter cypress stands, caused more than one mistaken approach.

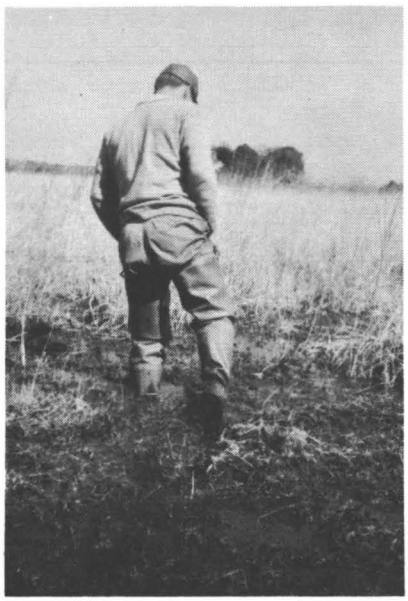
The only means of travel within the swamp was along the boat trails by airboat or motorboat. These trails, and the majority of the swamp, were controlled by the Wildlife Refuge, under the direction of the Department of the Interior. The canals were named with signposts, as streets would be, and direction arrows out of the swamp also were used.

Foot travel was possible only under very arduous conditions, with backpacks and machetes. A good example was our experience with Bugaboo Island, which sat 8 miles into the swamp and ¾ mile off a canal. It took the UH-19 10 minutes to carry four men and their equipment to this island. As happens now and then with helicopters, the aircraft was down for maintenance after retrieving the men. The next day it took these same men, plus a swamp guide and two more soldiers, 9 hours to cover the same distance.

For obvious reasons, each helicopter carried survival gear, C-rations, and water for two days per person.

The OH-13 performed recon missions for the level crews selecting new tower locations, and hot chow runs to spike camp when the mess truck was to be delayed. The UH-19C carried the clearing crews for the selected tower sites, the level crews to their vehicle and equipment linkup points, and the tower crews and survey towers. Liaison, resupply, search and rescue were secondary missions performed on occasion.

Cargo missions were flown with the aft tank empty and only 300 pounds of fuel in the forward tank. In this way a 4,000-pound Bilby tower could be moved to a new location, with



Walking in Okefenokee prairies is difficult

Shadows on cloudy days created confusion and caused more than one mistaken approach

all supporting equipment, in five trips. The tower crews were carried in two trips. On the first trip, half the crew and some equipment were carried to the new site, where the crew unloaded the aircraft. Those remaining at the old location loaded the tower to be moved, then came with the last load. This procedure was found to be the fastest and could be accomplished in an average 4½ hours flying time and 7 hours total time.

The Bilby is a tower within a tower. It is composed of bolted aluminum sections and rises to a height of 113 feet. Both towers are held upright by dug-in footings and guy wires. The outer tower supports the crew while the inner tower supports the instrument. The structural members weigh from 25 to 40 pounds apiece and the total weight of the tower is about 4,000 pounds.

In addition to the Bilby, a portable, hollow, lightweight aluminum, triangular tower was also used. This was an experimental tower made of 7 foot and 5 foot triangular-sided horizontal sections.

Travel within the swamp is restricted to canal and boat trails

This tower took longer to move than the Bilby, even though its total weight was only 900 pounds. The difference came in the delicate construction of the tubing. It could not be dropped to the ground, as it was disassembled, but had to be let down by rope. The additional work of preparing the tower for sling loads also added to the movement time.

The replacement of the UH-19 by a CH-34 enabled us to carry the portable tower in a 60-foot section 40 miles back to the base camp and on the second trip carry the other 40 feet plus the tower crew and equipment.

The biggest problem was maintenance of the helicopters. All maintenance was done in the field, except for the 8th periodical on the UH-19C which was completed at Fort Benning. The crewchiefs worked around the clock on the UH-19C and, with the duty hour help of Fort Benning Field Maintenance, the aircraft was ready in 5 days. Plugs and mags were replaced on the OH-13s as these pieces failed. Also the magneto drive were repaired on one aircraft and the #2 cylinder on the other. Both were repaired at spike camp by Fort Benning personnel who arrived by CH-34.

The UH-19C had a partial engine failure on takeoff and upon landing tore off the tail-rotor gearbox. It was towed to Fort Benning for repair and was replaced, for the last month of the project, by a CH-34C from Fort Bragg. This aircraft, with its greater payload, speeded up the swamp operation.

Four aviators did the flying for the project: 2 dual rated, 1 R/W only, and 1 F/W only. The following conclusions were made:

Field expedients were necessary to accomplish the mission.

FM support section was needed at the airfield.

OH-13s should not be used for cargo hauling beyond 300-pound loads, and then only as a last resort.

The UH-19C was not a satisfactory cargo aircraft as its payload was too small, even under the best conditions.

Sand, dust, and debris scattered from hovering were daily maintenance problems which required extra manhours in cleaning and caused extra wear on the aircraft.

Chamois should be used for all refueling from drums or 5-gallon cans.

The U-6A was an excellent liaison plane within 200 miles of Waycross.

To preclude a serious accident, survival gear had to be carried and safety practices had to be adhered to.

ETAs became vital.

Night flights over the swamp were prohibited except for emergencies.

Removing the right cyclic from the OH-13 was a good safety practice.

One CH-34 or UH-1B was needed for the entire project. Had one been available, the project in the swamp could have been completed 4 weeks sooner.

The two Bells were ideally suited for reconnaissance of the swamp and, when working in pairs, could carry as much cargo as the UH-19C and in less time.

Although the E model Bells performed well, the later model Bells or Hillers would have been much better for this operation due to their greater power and increased fuel range and payload.

SUMMER FOLLIES

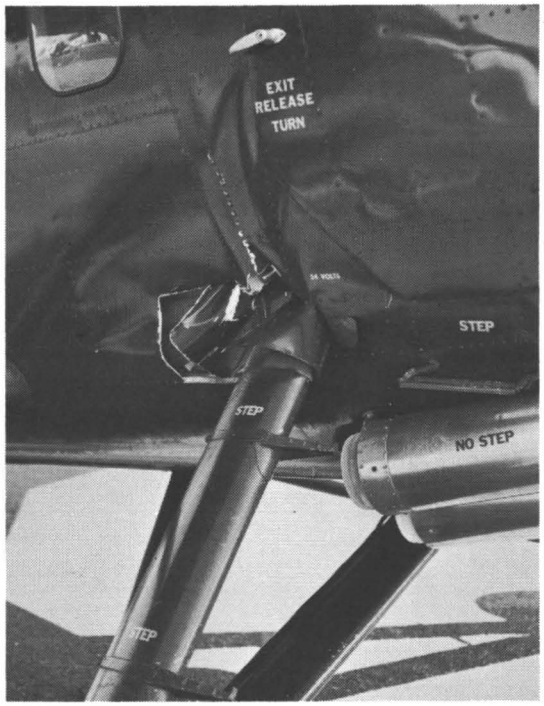
SEVERAL YEARS ago, in early May, a U-6A pilot was assigned to make an aerial survey of a proposed field strip. Hurrying to his aircraft, he cranked up, took off, and flew south on a local VFR clearance. The weather was ideal — a few puffy cumulus several thousand feet above him and a light wind from the west.

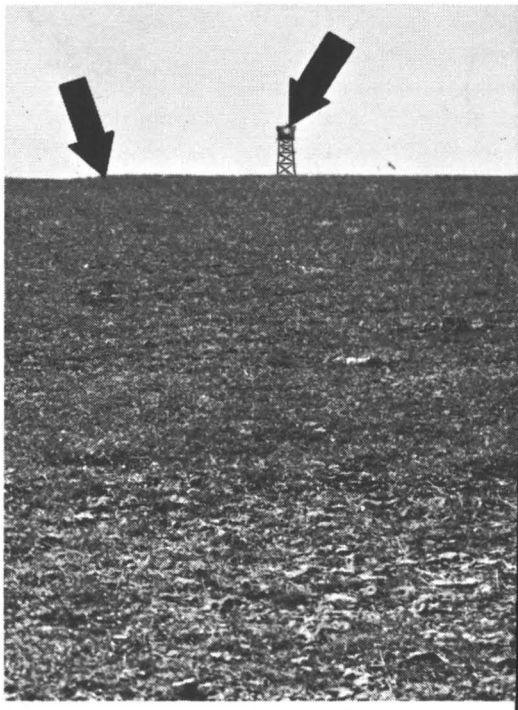
Arriving over the proposed field strip, he made two passes at approximately 100-150 feet. Halfway down the strip during the second pass, the fuel pressure light flickered and caught his attention. He switched gas tanks and checked to see if the mixture was full rich. The engine started missing and he elected to land straight ahead in a field adjacent to the proposed strip.

The landing was made without mishap, and he continued taxiing into the wind to the far end of the field. The engine appeared to be operating normal-

crash sense

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





A prevention survey and corrective action could have prevented this. Arrows show end of runway and tower atop steep slope.

ly, so he swung the tail of the aircraft around and went through a complete runup procedure. All indications were normal and he decided to take off from where he was.

With takeoff flaps, he held the brakes and opened the throttle. The wind, described as light, was on the tail of the aircraft. He released the brakes and the aircraft started its roll. It rolled, and rolled, and rolled. Approximately two-thirds the distance across the field, it left the ground in a three-point attitude, then settled back to roll some more. Ten feet from the far end of the field, it left the ground again, only to strike a barbed wire fence. The engine cowling and fuselage struck one post, and the left horizontal stabilizer took down another. Barbed wire tangled around the landing gear. The sudden jolt was strong enough to alert the pilot that he wasn't likely to get the fence airborne, so he chopped the power and stumbled to a halt.

The accident investigation board was in unanimous agreement about the cause of this one: the attempted downwind takeoff. Contributing factors were an inadequate preflight (fuel check) which resulted in fuel starvation during the low reconnaissance, and failure to use the wobble pump after switching tanks, when the warning light continued to flicker its message of low fuel pressure and the engine coughed its starvation complaint.

This kind of lesson is enough to last most pilots through retirement. It lasted this pilot slightly more than 1,200 flying hours. Several years later, this time in July, at the controls of a U-1A, he taxied out for a takeoff on runway 36. The wind was from 300° at 10 knots and the active runway was 25. A thunderstorm was approaching the field boundary from the west.

The pilot completed his runup, asked for, and received permission to take off on runway 36. He lined up and applied takeoff power. The aircraft rolled straight down the center of the runway until it reached the intersection of 36 and 25. At this point, the tail wheel came off the ground and the aircraft turned sharply to the left for 40° and rolled onto the grass. The pilot saw a ditch ahead, applied 40 inches of manifold pressure and pulled the Otter off the ground. It cleared the ditch, then settled back to the grass in three-point attitude and rolled toward another ditch. The pilot tried to get off again, but was unsuccessful. The Otter's main gear stuck the far side of the second ditch and the wheels and struts folded back along the fuselage. It slid on its belly for another 75 feet and came to rest.

Faced with the decision whether to use the

Wrong choice of runways

active 25 runway or 36, the pilot selected 36. Not only did this give him 10° more crosswind, but it also placed the crosswind on his left, where it could only aid torque. Additionally, with a takeoff gross weight of 6,700 pounds, computed data from the handbook showed that the aircraft should have rolled 800 feet before breaking ground. And with the crosswind, it wouldn't have hurt to keep it on a little longer for some control insurance airspeed. But the point at which the aircraft first left the ground was only 570 feet from the start of the takeoff roll.

Then there was the instructor pilot who took the O-1E controls away from his student to try and beat a thunderstorm that was approaching the field. Let's let him tell it in his own words:

" . . . The active runway was 06 and the wind had been light and variable. As I turned final, I noticed the wind 'T' indicating a wind out of the south. I made certain I had good airspeed and elected to land downwind.

"As I made a three-point touchdown, the tower announced a change of the active to 18. I do not remember the wind strength they gave. The aircraft touched down smoothly, then started a slow turn to the right. With the quartering tailwind from the right, I was unable to straighten the ground track with brake and rudder. Wind, or centrifugal force, or both, raised the right wing and caused the left wing to drag on the runway. The aircraft slid sideways on the left wing and gear . . .

"The total amount of turn was approximately 110°-120°. I estimate the wind was at 10-15 knots from the south.

"I used full flaps and was flying from the back seat."

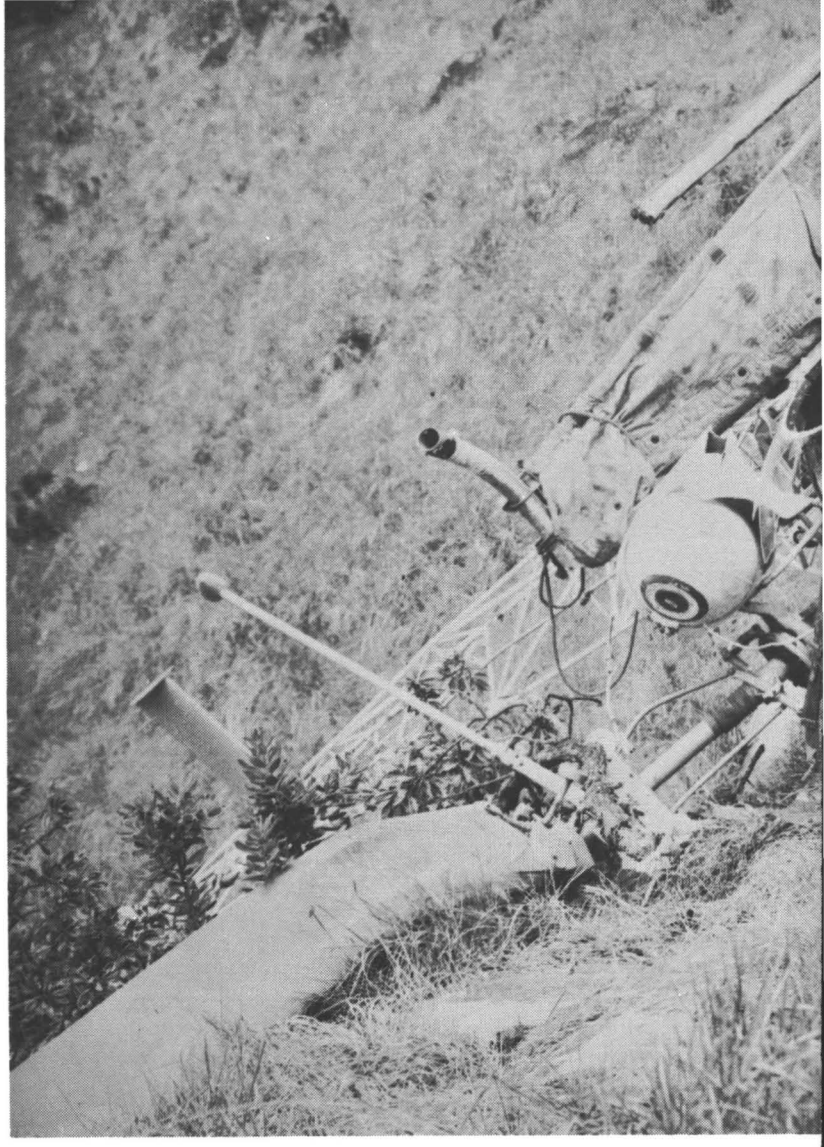
The investigation board found that the cause of the accident was the IP's misjudgment of his ability to land downwind, and they determined that the most probable reason for the misjudgment was overconfidence.

BUILT-IN CROSSWIND

With an instructor pilot aboard, the pilot was getting transition training in a U-1A. The flight was to consist of takeoffs and landings at maximum gross weight. After the first takeoff, the aircraft did not break traffic, but started an approach to runway 28. The approach was made with power off, climb flaps, and 65 knots IAS. It appeared normal until short final, when the aircraft started to sink rapidly.

The pilot immediately applied power, halted the descent, recovered approach attitude and airspeed, then chopped the power again. In a few seconds the aircraft sank rapidly for the second time. The pilot again applied power but was unable to check the high rate of descent before the

SUMMER FOLLIES



Smoke grenade recommended

main landing gear struck the ground. The right main gear hit first, followed by the left, and then the tail wheel. The aircraft bounced and a go-around was made.

The instructor pilot contacted the tower and requested a low pass over the field for the tower operator to check for damage. The low pass was made but the tower operator could see no apparent damage.

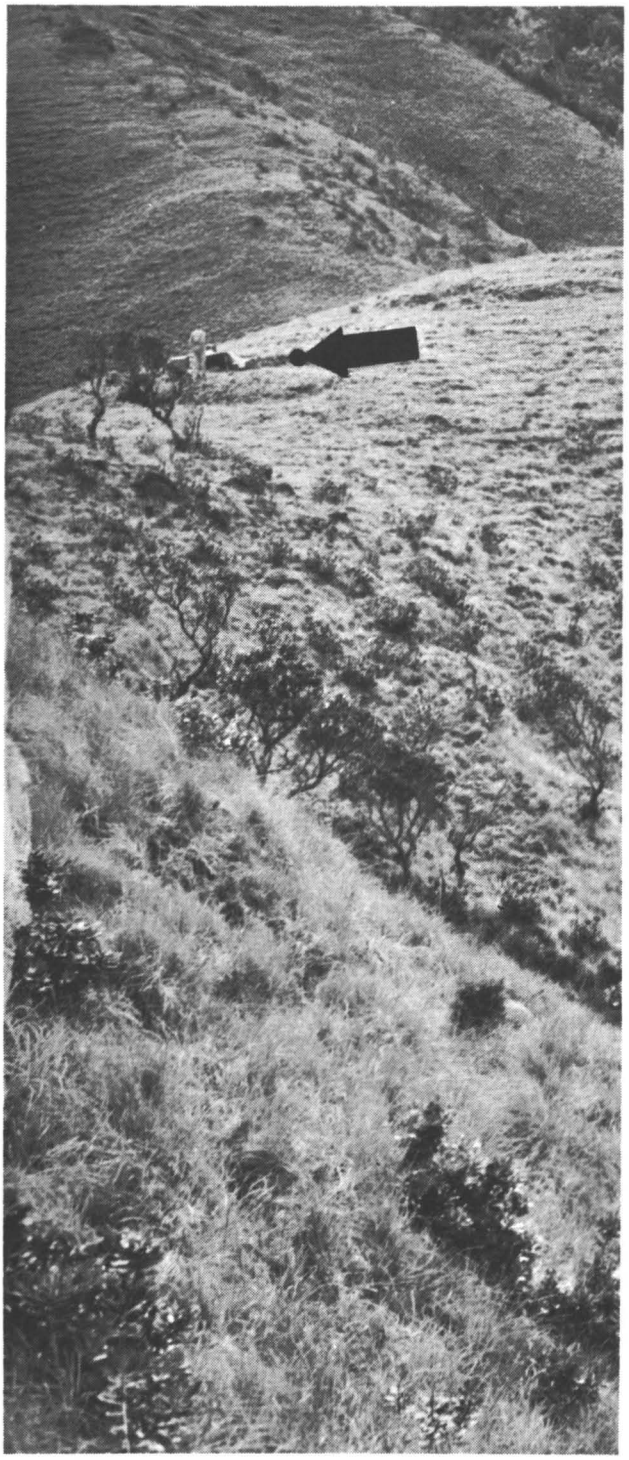
The IP then opened his door to take a look at the gear and saw the light green primer paint which indicated the gear had been damaged. He decided to land, holding the right gear off the runway as long as possible. This type of landing would be aided by the crosswind from the left. While the aircraft was on base leg, the tower operator noted a difference in appearance between the two main gear and reported apparent damage to the left gear. This was in error, but it had no effect on the subsequent landing.

The landing was made on the left gear and tail wheel and the right wheel was held off as long as possible. As the right side of the aircraft settled, the main gear strut was gradually pushed into the side of the fuselage, finally wedging against the IP's seat. The aircraft came to a stop with no further damage.

The investigation board found that the cause of this accident was the built-in-turbulence and downwind condition of the approach end of runway 28, which had been known and reported by previous pilots flying from the airfield. Located on top of a hill, the airfield was exposed to the prevailing southwest wind. This wind, passing over a grove of trees south of the runway, was known to set up turbulence and create a downdraft over the steep downward slope off the end of the runway. The runway had no overrun.

The flight surgeon summed it up admirably in his statement:

Arrow points to burial mound landing pad. Terrain is type that creates vicious wind eddies.



" . . . Our recommendations are aimed at the conditions responsible for the turbulence which caused this accident. It is felt that a potentially dangerous hazard can be eliminated at our field by cutting back the woods at the south end of runway 28 for 100 feet to minimize the turbulence and by filling and grading the slope leading to the approach end of runway 28 to provide a smooth and level 'undershoot' area. In the meantime, all tower operators have been instructed to warn approaching aircraft, especially transients, of the turbulent conditions when similar wind conditions exist.

"In summary, it is my belief that this hard landing was almost entirely due to weather conditions, influenced by the topography of our airfield. Relative inexperience of both pilot and instructor pilot *may* have played a small part."

SUMMER FOLLIES

WIND GUSTS OR ANTITORQUE FAILURE?

The pilot's account: " . . . At approximately 1100 hours, we took off for a pad approximately 20 miles north. An old Indian grave mound about 12 feet in diameter and circular in shape, the pad was located on a ridge at approximately 4,600 feet. It had a ring of rocks around the outer edge and was about one foot higher than the surrounding ground. There were no barriers or obstacles located near the pad.

"I noticed no unusual noises or vibrations and all controls responded normally during the flight. When I arrived in the area of the pad, I made a low pass over the pad to determine the wind direction and velocity. During this low pass and the high reconnaissance I saw no indication of wind.

"I started my approach from the northwest on a heading of approximately 150° and had no trouble until termination. As the skids were about 2 feet off the ground, I had approximately 3,050 engine rpm. I didn't notice how much manifold pressure. I had applied full left antitorque pedal.

"At this point, the helicopter began turning to the right and I tried to set it on the ground. After turning approximately 30°, we touched down in a level attitude, but continued to turn to the right. The back part of the skids caught something as we continued to turn. I tried to pick the helicopter up and clear the rocks, but it continued turning right and hit the dirt to the north of the grave mound.

"We turned clockwise for several revolutions and then commenced rolling over, coming to rest in an inverted position. I shut the engine down to the idle position with the throttle, and turned the magneto switch off.

"My passenger got out and asked me if I was all right. I told him I was, released my safety belt, and got out. Gasoline was gushing out of the fuel tanks."

Question: *What type of approach did you make?*

"Normal — 10°-12°."

Will you describe the last 10 feet of the approach?

"Everything was fine until I was about 2 feet above the ground and the aircraft turned to the right. I was 2-3 feet short of my intended touchdown spot."

Did you apply left pedal then?

"Yes — full left."

Did you continue to turn right?

"Yes."

What caused you to be short?

"I thought that I had tail rotor failure and stopped and tried to set down."

Did you intend to come to a hover?

"No, my approach was to the ground."

What was your groundspeed at 2 feet?

"Five knots or less. I was just coming out of translational lift.

Did you realize that you were partially off the pad when you put the aircraft down?

"No."

Did you put the pitch full down?

"No."

What happened to the aircraft when you set down?

"It started to tip back."

What did you do then?

"I tried to pick it back up."

What did you intend to do after you got airborne again?

"Fly back to a fixed wing strip."

Did you think that you could get enough altitude and streamline the helicopter?

"Yes."

Were you ever taught that?

"No."

Were you taught the emergency procedure for tail rotor failure in flight school?

"Yes — cut the power."

Do you see a point where you could have avoided an accident?

"Yes. If I had realized that I didn't have tail rotor failure, I could have made a go-around."

Do you see a point where you could have saved the aircraft from total destruction?

"Yes. If I had chopped the power when it tipped back, I probably could have."

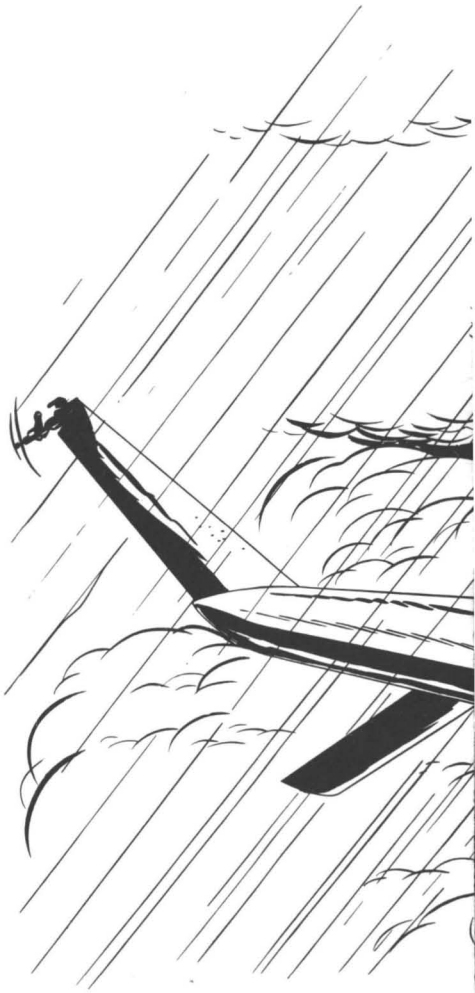
At the time of the accident the surface wind was reported as variable, northwest to southwest, 5-10 knots, gusting to 15 knots. A complete analysis of the antitorque system showed no defects or malfunction. All damage to the tail rotor occurred when the aircraft rocked back after the initial touchdown partially off the northeast corner of the pad. The destruction of the aircraft resulted from the attempt to hover after this happened.

It was considered highly possible that the pilot misjudged his wind condition because of the lack of indications on the ground (smoke, trees, flexible grass). It was recommended that smoke grenades be used as wind direction indicators when no ground personnel or other means are available to determine wind direction.

T STORMS

Of the summer follies, one is more lethal than

. . . she sometimes manages to lure overconfident or unsuspecting pilots into violent destruction.



all her sisters combined. Though her destructive character is well known and documented, she sometimes manages to lure overconfident or unsuspecting pilots into violent and turbulent destruction. Innocent and frivolous at birth, this fearsome lady quickly changes from cumulus puffballs into a shrieking witch in an atmospheric cauldron of instability. The greater the instability, the more violent is her reaction.

Recently a pilot wrote a letter requesting safe procedures to be used in flying through thunderstorms. The answer was short and emphatic: THERE ARE NO SAFE PROCEDURES.

Wind shears, severe turbulence, hail, and lightning make thunderstorms the most dangerous of all meteorological flight hazards. Lest you forget her dangers, here are some quotes from past issues of the AVIATION DIGEST:

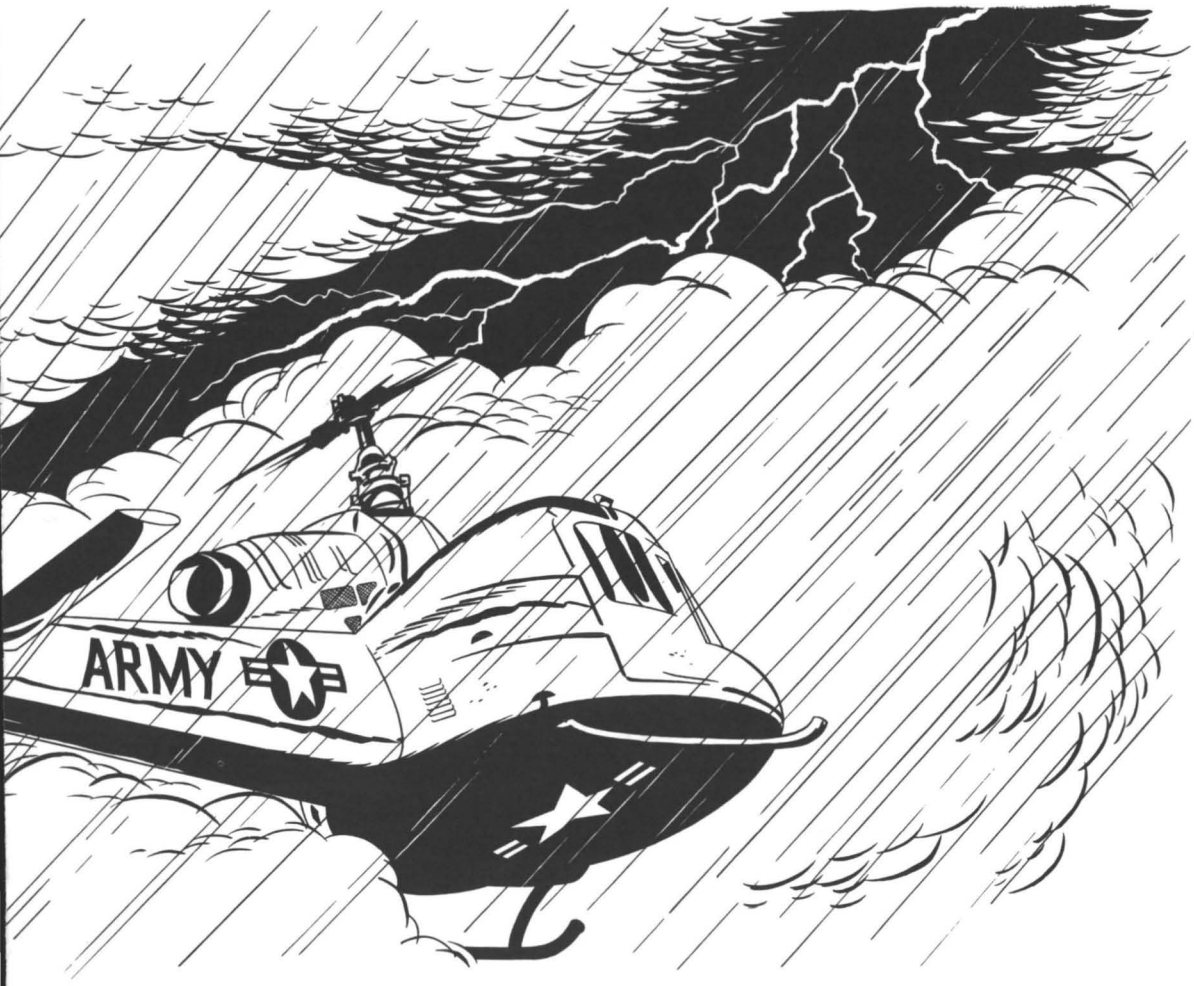
January 1960 — "The weather briefing, given prior to flight and entered on clearance form 175, listed thunderstorm activity, with heavy turbulence along the intended flight route.

"The last reported radio contact with the aircraft was approximately 1 hour and 20 minutes after takeoff and 40 minutes prior to the accident when the pilot gave a position report. At this time the aircraft was reported to be at 9,000 feet indicated altitude; the pilot was given a severe weather warning, but elected to continue the flight.

"Almost immediately prior to the crash, many witnesses reported hearing the plane's engine roaring. One witness observed parts of the aircraft descending out of the low ceiling, followed by the aircraft, 'which looked like it had no wings on it.' . . .

"1. The cause of this accident was structural failure of the aircraft as a result of receiving stresses for which it was not designed.

"2. The most probable cause of the imposition of these stresses was encountering extreme turbulence.



"3. The inexperience of the pilot may have contributing to his decision to continue the flight into known hazardous weather. This is further substantiated by failure to call available ground radar stations for aid in circumnavigating areas of heavy turbulence."

The best protection against thunderstorm flying is a thorough and complete preflight weather briefing. It's a command responsibility to see that this type of briefing is available, and it is a pilot responsibility to get it. But pilot responsibility for avoiding thunderstorms does not end with the preflight briefing. It continues with constant inflight weather observations and an open ear for radio weather advisories along the route.

Always study the clouds. They are excellent signposts of the convective air currents that build cumulus clouds. And a towering cumulus can change into a raging thunderstorm in 10-15 minutes.

Air mass thunderstorm cells build up over land during the heat of the day and usually break in the late afternoon or early evening. However, either air mass or frontal type thunderstorms may be encountered at any time. If the storms are scattered, they can generally be circumnavigated horizontally. Trying to climb over, in anything but a high altitude jet, is asking for it.

Before you decide you can slip under the base of a thunderstorm cloud, remember that violent downdrafts often extend below the base to within 300 feet of the ground in the rain cone.

Destructive hail can be tossed from thunderstorm clouds into adjacent clear areas. Bear this in mind if you're tempted to sneak between thunderstorm clouds.

Lightning poses another threat. It is more likely to strike sharp or pointed areas of aircraft, such as wing and rotor tips, elevators, rudders, etc. Theoretically, a lightning bolt should pass through aircraft metal structures without causing damage. But this theory does not fit known facts.

SUMMER FOLLIES

Wrinkled, burned, and split skin on many varied types of aircraft testify to the potency of lightning strikes.

How much more evidence will we require to buy the simple fact that thunderstorm flying should not be attempted?

June 1961 — "At that instant the full effect of the storm hit the aircraft. The aircraft was apparently flipped almost completely over and headed straight down; all gyro instruments were tumbled. The aircraft reached a speed of 195 mph before the instructor could start corrective action to reduce speed and stop the turn.

"It was necessary for the instructor to lean far over the student to try and see the turn and bank instrument. During the process of trying to get the turn stopped, the storm carried the U-6, with all power off, to 11,000 feet, immediately dropped it to 4,000, back up to near 7,000, and suddenly tossed the aircraft out of the storm ahead of the roll cloud into clear air, three-quarters of the way inverted at an altitude of only 2,800 feet above the ground."

October 1963 — "The wreckage was [found in a wooded area] distributed over an area 1,800 feet long and 200 feet wide. There was evidence of inflight fire prior to impact.

"The most probable cause of this accident is that the aircraft entered severe weather and became inverted or near inverted in flight. This attitude resulted in severe rotor flapping and subsequently caused mast separation.

"Witnesses in the area described the weather at the time of the crash as the worst storm they had seen for 30 years. Lightning, heavy winds and rain, and hail were seen.

"An 11-year-old boy saw an aircraft through his dining room window sometime between 1630 and 1700. He could not determine the type of aircraft but saw the rotating light. There was heavy rainfall and severe lightning and the boy reported seeing lightning hit what appeared to be the aircraft, then saw a ball of fire as the aircraft disappeared from his view. Due to the severe thunderstorm and short period the aircraft was seen, it was not possible to determine whether a lightning strike had caused inflight fire. Investigators found no evidence of high voltage overload in the radio equipment.

"Regardless of whether this accident was caused by turbulence, an unusual attitude, or lightning strike, it is known that the pilot flew into an area of severe weather which he could have avoided."

The third folly in our troupe of troublesome summer maidens holds one of the keys to another summer flying hazard — a thermometer. While she gaily runs the mercury up to full range with one hand, her other hand rapidly closes the atmospheric pressure valve or sprays dry air with humidity. This is the maiden who controls density altitude.

One Army post has an actual elevation that ranges from 300-500 feet above sea level. Depending on this lady's mood and the time of day, its density altitude may vary from minus 1,000 feet to plus 4,000 feet. In arid desert country, shifts in density altitude are frequent, rapid, and much greater.

APC film crews were set to film an OV-1 maximum performance takeoff under actual field conditions. The pilot and crewchief flew to the assigned strip and circled it several times before landing. It was a short dirt strip, bound by trees

on the east and a fence on the west. The wind was from the west.

Completing his reconnaissance, the pilot made a low approach over the trees and landed with no sweat. As the camera crews readied their equipment, the sun began to climb and by the time all the necessary preparations had been made, the temperature had soared.

Both the pilot and crewchief were concerned, but they had failed to bring a -10 or any performance charts. Positioning the aircraft as far back as they could on the east end of the strip, they paced the distance to the fence.

"What do you think?" asked the crewchief.

"I don't know, but I believe we can *just* make it."

They walked back to the Mohawk, climbed aboard, and started the engines. After his cockpit check and runup, the pilot signaled the film crew director. The cameras ground away as a cloud of dust shot from behind the aircraft. It moved forward, accelerating at an agonizingly low speed. Seconds passed and it still hugged the ground.

The pilot watched the fence move closer, debated whether to abort, and decided it was too late. At the last second, he lifted the nose and the Mohawk broke ground, climbed a few feet, then began to settle.

The pilot dropped the nose in an effort to maintain control and build up airspeed. Instinctively, the crewchief slammed the gear control lever to the up position.

The pilot made a shallow bank to avoid a clump of trees ahead. To the crew on the ground, the aircraft appeared to mush as it edged around the obstructions.

At length, the airspeed built up, and they were able to climb and return to base. As they dismounted, both were pale and visibly shaken.

The effects of density altitude on ground roll and control response were clearly evident in the above near accident. The effects on engine performance, while not so visible, were nevertheless

Density altitude up—
CH-37 down

SUMMER FOLLIES

Repeat performance

there. Though the same volume of air may flow through an engine at higher temperatures and density altitudes, this thin air contains less mass. Some thrust (power) is lost. A temperature of 100° F reduces the efficiency of a gas turbine engine by approximately 15 percent from that available under standard conditions of 59° F. Also to be considered is the reduced efficiency of propellers and rotor blades operating in air of reduced density. Under these conditions, a longer ground run for fixed wing aircraft is obviously needed. The same is true for landing.

While Miss DA (Density Altitude) Folly is dazzling you with temperature and pressure changes, be on the alert for her third trick — humidity. If she increases the moisture content, this further increases density altitude and complicates an already bothersome situation. As much as 12 percent of the brake horsepower of a reciprocating engine can result from high humidity alone. This loss must be accounted for when the engine is called on for maximum performance.

Since the reciprocating engine operates with a fixed displacement, all the air that enters it is directly associated with combustion. If water vapor (high humidity) enters the induction system, the amount of air available for combustion is reduced. Most carburetors do not distinguish water vapor from air, so the fuel air mixture is enriched. An increase in inlet air temperature further decreases air density and further enriches the mixture and, since the maximum power output at takeoff requires fuel-air ratios richer than that for maximum heat release, still further enrichment takes place. When this takes place, the power available is decreased.

To illustrate the effects of density altitude on rotary wing operations, here's an excerpt from "Crash Sense," March 1962 DIGEST:

"A CH-37 pilot tried to fly out of a confined area with 22 passengers aboard. It was 0930 on a warm and humid morning. Temperature was 87° F; dew point, 72; and the wind was out of the northeast at 2 knots. Density altitude was 1,500 feet.

"The pilot didn't think there was any sweat — other CH-37s with similar loads had made it out *earlier*. He figured his allowable gross weight at 31,000 pounds and estimated he'd be taking off with 30,957 pounds. He was so confident that he didn't bother to make a maximum power check or use all the open space in the clearing for his takeoff path.

"Lumbering into the air, the Mojave struggled to approximately 50 feet. Then trouble started: rpm began to drop. The pilot reduced pitch and wound on full throttle, while the copilot shoved the overhead throttles wide open. But the rpm failed to respond and the aircraft sank into trees.

"Hindsight checking of weight limitation charts in the back of the -10 showed the cause for this one. According to Chart 2-VI, Chapter 14, Section II, page 2-11, maximum gross weight for verticle takeoff should have been 28,000 pounds. And the next page shows that maximum gross weight for hovering out of ground effect should have been 28,500 pounds.

"Ten minutes after the first CH-37 crashed, another with 23 passengers aboard tried to take off from the same place. The second pilot also figured allowable gross weight at 31,000 pounds and estimated he'd get off with 31,000 pounds. He, too, was confident he could make it — so confident he failed to make a maximum power check or use all the available room for his takeoff path. What happened was an exact repeat of the first accident."

Density altitude— Your aircraft will do all it is asked to do and come home safely even on the hottest day if you (1) compute density altitude *before* weight and balance, (2) always assume density altitude to be a trifle higher than it probably is, (3) study your -10 density altitude tables, (4) act accordingly.

Summer density altitude changes are rapid, frequent, and large. The load you take off with at dawn may well be beyond the capability of your aircraft an hour later. Density altitude must not only be computed for takeoffs, but also equally important, for destination landings. This is particularly true if you're taking off from a low altitude and plan to land in high terrain. Extra caution is a must for autorotations.

PERSONNEL

The Folly with the thermometer also delights in playing her tricks on the human side of aviation. High temperatures and humidity sap the performance of personnel as well as aircraft. Lethargy sets in, reactions become slower. Tempers are more apt to flare. The exhaustion threshold is lowered considerably. When outside air temperature reaches 96°, the metal of an aircraft painted olive drab registers 136° on the ground. In one desert test, the pilot's shoulder harness buckle in a parked CH-37 reached a measured 150°. Inflight cockpit temperatures frequently average 3° - 6° above outside air temperatures. Couple these conditions with pressure to complete missions and—

At home, it's easy to cope with summer con-

high temperatures and humidity saps the performance of personnel as well as aircraft . . .

ditions by sending the kids off to the pool, turning the thermostat down a few degrees, and relaxing with our favorite cool drink. Under these conditions, our bodies and minds function at near peak efficiency, depending on the type of cool drink. We're keeping body temperature at 98.6° F by controlling the environmental factors of temperature, humidity, circulation of air, and the temperature of surrounding objects, all of which affect the body heat-exchange process.

Unfortunately, we can't carry these ideal conditions out to the airfield. But we can control the effects of body temperature and humidity to a great extent by providing an adequate supply of water and salt to prevent dehydration.

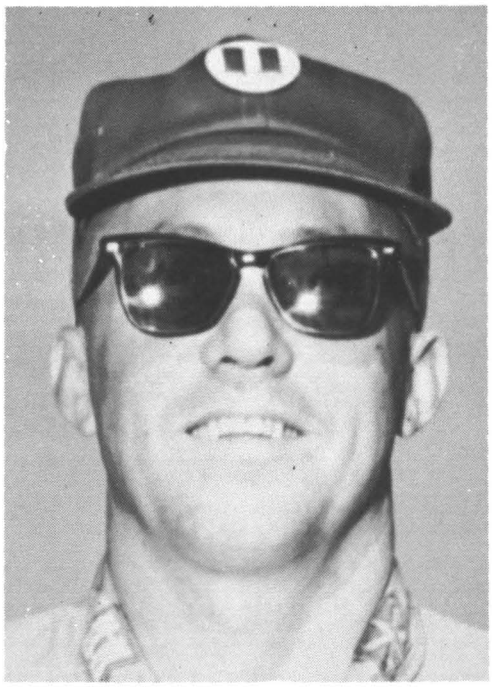
Water and salt losses cause reduced efficiency long before any sign of heat illness. Though we can recover from water losses of 10-15 percent of body weight, losses as small as 1-5 percent result in discomfort and reduced efficiency. The amount of water required depends on how much we sweat, and thirst is not a dependable indication of this loss. Water should be taken frequently, regardless of the feeling of thirst.

While the amount of salt we get in our normal diet may be enough under average conditions, additional salt is usually required for hot weather operations.

We can become acclimated to heat, but the process takes time — approximately 10-14 days. Abstaining from alcoholic beverages (the flight surgeon said it, not us!), maintaining good physical condition, and adequate rest will help. But even after we become accustomed to hot weather, dehydration still takes place. We must still replace water and salt losses.

Heat stress in military aviation is frequently underestimated. This is due in part to the limited physical activity of aviators and the cooler temperatures at higher altitudes. But airfields are extremely hot places, and heat stress during ground operations is likely to be extreme for pilots as well as ground crews.

Survival equipment must not be overlooked. It's a pilot responsibility to make sure that adequate survival gear, including water, for the crew and passengers is carried for every flight.



Sunglasses

The use of sunglasses during recreational hours is largely a matter of personal habit. However, it is highly desirable for all members of the flight line to wear sunglasses during bright, sunny daylight hours prior to night flying. This is particularly true if you plan to spend time at the beach, skiing, or golfing on an afternoon before a night flight. Prolonged, unprotected exposure to intense sunlight can have an effect on night vision. In wearing sunglasses make certain that you are equipped with a good pair, one that does not have any aberrations in the lenses. The so-called inexpensive sunglasses frequently cause eye strain because of faulty lenses.

Sunglasses are not only recommended if the outing is prior to flying but also if exposure is prior to driving a car after dark.

—*Flight Safety Officer's Study Kit*

speaking of weather, Lt Col Charles M. Terry, staff weather officer, USAAVNC, has a few words to say about weather accidents. He asks

WAS WEATHER A CAUSE FACTOR?

For every Army aircraft accident or incident someone must make a statement as to whether or not weather is involved and, if so, in what way (e.g., gusty winds, density altitude, etc.). Anyone who has been required to prepare a crash facts message in accordance with AR 385-40 should recognize this as item #8 in the list of mandatory reporting items. During calendar year 1963, 84 crash facts messages indicated that weather was a known or suspected cause factor. Forty-five of these were major accidents.

A review of the final accident reports for the 45 major accidents revealed that accident investigation boards considered weather to be a factor in only 22 of the accidents. In other words, the crash facts data was only about 50 percent reliable. It is apparent that there is a considerable variance in opinion as to what constitutes a weather cause factor. Why is it that weather is so often incorrectly reported to be a cause factor?

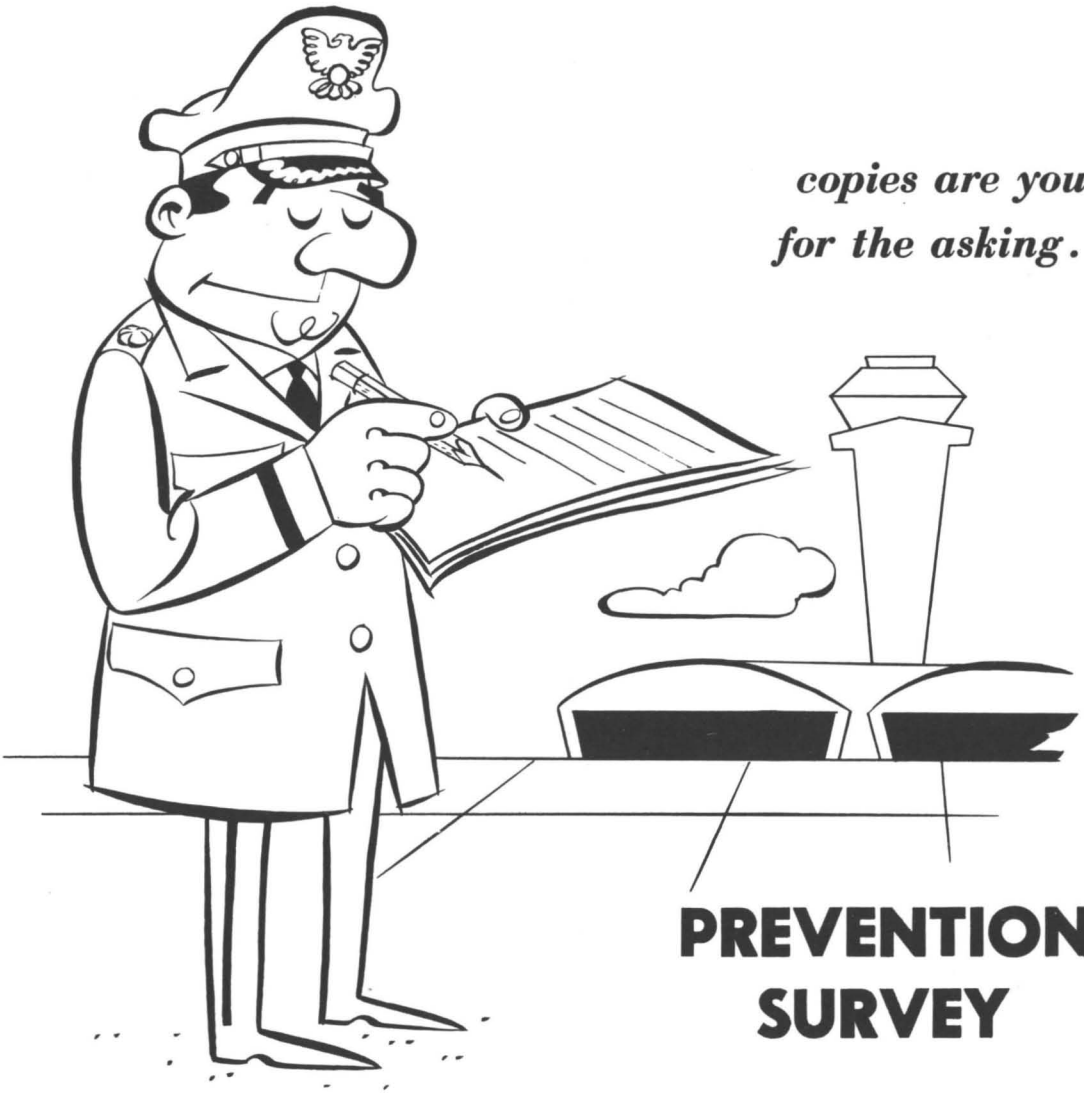
There are two primary reasons for this: (1) There is a general lack of understanding as to what constitutes a weather cause factor, and (2) weather is often listed as a possible cause factor in an effort to provide an excuse for pilot error accidents.

When should weather conditions be considered as cause factors? Obviously a weather element or condition is not always a cause factor simply because it exists. The most common error in this regard is the reporting of surface winds as a cause factor. Safe operating limits of crosswind and gust spread have been determined for the various types of Army aircraft. If the existing surface wind conditions are within these specified limits and are known to exist, wind could not be considered a cause factor, since aviators are expected to be able to make necessary compensations.

A weather element or condition can be assessed as a *primary* cause factor only when it is unexpected or unknown and when it affects the control or performance of an aircraft so that an accident is inevitable. A weather element or condition which is forecast or reported and known to exist can be a contributing cause factor when avoiding it is beyond the aviator's capabilities. For example, an aviator on a cross-country flight is aware that a portion of the route is forecast to have zero visibility in fog. Upon passing over this area an emergency occurs and he is forced to land. However, weather would not be a cause factor if an aviator is aware of a dangerous weather condition and has an alternate course of action but elects to continue the flight into hazardous weather.

When accidents are due to carelessness or failure to follow established procedure, it is human nature to look for an excuse. One of the favorite excuses is weather. In such instances saying that a weather element or condition is a contributing cause is comparable to saying that an accident is due to the ground being too high or the runway too short. This can be carried to the point of absurdity. As an example, a recent accident report listed weather as a cause factor in an accident in which the aircraft crashed into the trees at the end of the runway. A calm wind was considered a factor because the no-wind condition made it difficult to land in the short distance available!

Was weather a cause factor? A conscientious application of the guide lines set forth in this discussion should result in a correct answer in almost every instance. Then item 8 in the crash facts message can be used for its intended purpose (an indication of the involvement of weather in Army Aviation accidents and incidents).



PREVENTION SURVEY

One of the most effective tools for coping with summer follies is the Aircraft Accident Prevention Survey, with the accent on summer. Since the survey is not designed with a one-season aim, it can be effective for all seasons, depending on the frame of mind in which it is conducted.

If it is conducted in an objective manner by qualified personnel, the survey usually brings to light areas and items in need of correction. If it's done on the high side of the thermometer, and the corrections are made, you can rest assured that your unit is well prepared to escape the summer follies. Remember that to be effective the survey should be a revolving project. Followup surveys should be made to assure that: (1) corrective action was taken on recommendations made as the result of previous survey, (2) no new potential problem areas have developed since the last survey, (3) potential problem areas which were overlooked before or which were considered relatively unimportant at the time may be brought into proper perspective.

Just how detailed and how often the survey should be made will vary. Answers to these questions will be regulated by the effectiveness of a particular accident prevention program. Some commanders may decide a particular phase of the survey should be made more often than others. Another commander will find that many items do not apply to his unit.

Copies of the 1964 Aircraft Accident Prevention Survey are yours for the asking. Address your requests to Director, USABAAR, Fort Rucker, Alabama. Direct communication authorized by AR 15-76.

Survival Pays Off For Two

Survival training conducted by the 1st Bn, 187th Inf, has paid off many times over for two paratroopers of Company A.

SP4s John K. Cruce and Robert L. Bradley were manning a roadblock near St Lo drop zone following a parachute drop. A force of 30 aggressors appeared and drove them into the woods. With the enemy in pursuit, Cruce and Bradley struck out across a densely wooded area of Fort Stewart.

The two men rejoined their unit after spending two days and two nights living off wild herbs and roots and chlorinated drinking water. Both agree wholeheartedly on the importance of survival training.

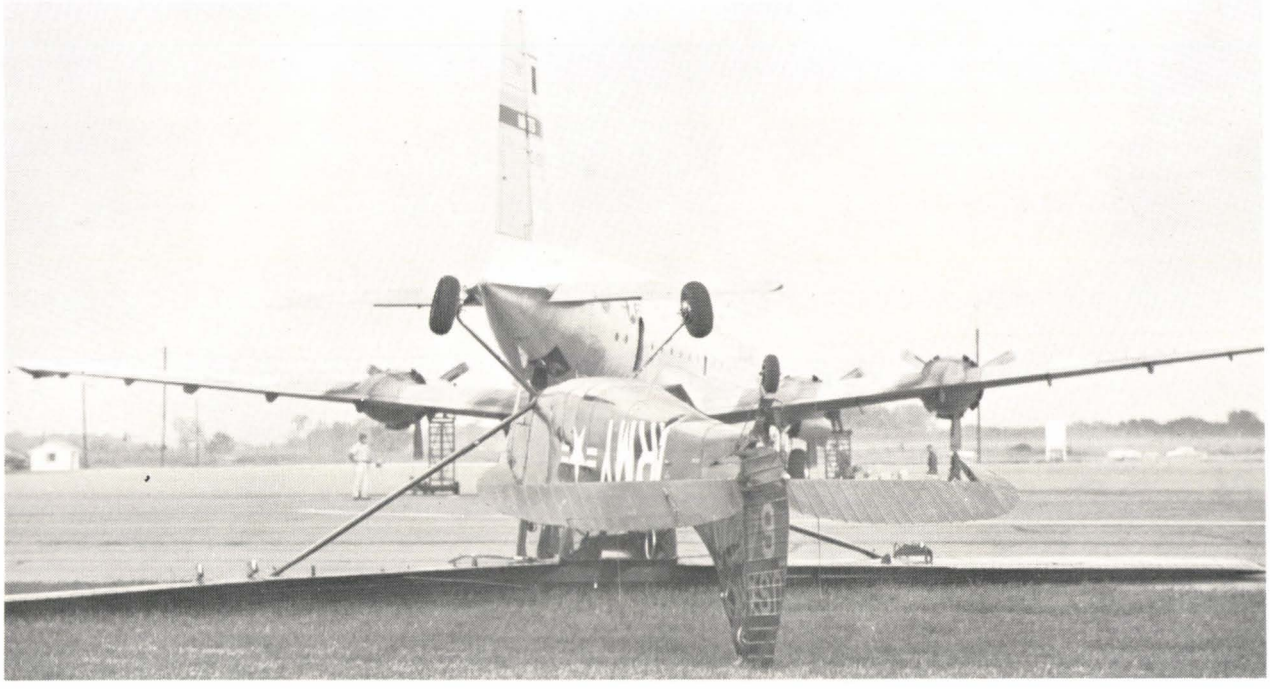
—The Sky Soldier
11th Air Assault Division

Not All Severe Turbulence Is Found At High Altitudes!

An aircraft engine is a fascinating piece of machinery. It converts chemical energy in fuel to heat energy through combustion, then converts this to mechanical energy through turbine wheels or piston-crankshaft-propeller combinations. Since the goal is to move an aircraft through the air, a great amount of thrust is produced. As a result, the air is greatly disturbed even though the aircraft may be stationary.

A C-124 crew was performing a postflight magneto check at 2100 rpm. An 0-1 was taxiing to the ramp after landing. As it passed behind the C-124, the prop wash flipped the Bird Dog on its back, carrying it 40 feet to the side. Moral: One-fourth the thrust required to propel a large bird will also propel a bird one-fourth its size. MATS Aero Club and other light aircraft pilots should be aware of the invisible air currents behind large aircraft. Common courtesy dictates that the big boys should also watch out for the little ones.

—The Mats Flyer



Army Holds 13 World Aviation Records

Maj Bertram G. Leach hovers OH-23G just after establishing a new world speed record over a 100-kilometer, closed circuit course. Skids were removed to reduce drag during performance run.

SIX NEW WORLD records claimed for a U. S. Army OH-23G helicopter last November have been officially certified by the Federation Aeronautique Internationale.

The records were set by Major Bertram G. Leach, an Army helicopter pilot for 10 years and a decorated veteran of helicopter combat support action in the Republic of Vietnam. Major Leach flew the OH-23 at nearly 124 mph while shattering two previous world records and establishing four new marks.

Powered by a 305 hp Lycoming 6-cylinder engine, the Hiller OH-23G is used by the Army as a light observation helicopter.

The six new records listed (right) give the Army a total of 13 world aviation records.

Class E-1.b Light Helicopters
(1,102 to 2,204 pounds)

1. Speed over a 3 kilometer course, 123.69 mph.
2. Speed over a 15/25 kilometer course, 123.58 mph.
3. 100 kilometers speed in closed circuit, 121.70 mph. (Previous record: 104.613 mph set by Bell 47J-2 in 1961.)

Class E-1.c Light Helicopters
(2,204 to 3,858 pounds)

1. Speed over a 3 kilometer course, 123.45 mph.
2. Speed over a 15/25 kilometer course, 123.76 mph.
3. 100 kilometers speed in closed circuit, 119.74 mph. (Previous record: 107.081 mph set by Bell 47J-2 in 1961.)