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UNITED STATES ARMY AVIATION DIGEST

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

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The Army Aviator's Crown

Brigadier General Ernest F. Easterbrook, *USA*
Director of Army Aviation, ODCSOPS

TO MANY YOUNG Army Aviators the awarding of the Aviator's badge is a symbol of release from the restrictions which bind ordinary earthlings. It is considered closely akin to the garland of victory which was placed on the head of the successful gladiator.

Only after long experience do some aviators realize that this "crown of glory" also contains some hidden thorns—that there are important responsibilities as well as privileges in being an aviator. With this realization the aviator can properly fulfill his duty to the Army, to his country, and to himself.

There are two limits within which the young aviator must chart his career. On one extreme, some aviators confine their interest or activities solely to occupying the pilot's seat without concern for development as an Army officer in the general sense, that is, as a commander or manager. Aviators on the other extreme, perhaps in the absence of any real love for flying, use aviation opportunistically only for career advancement and enhancement of personal prestige. Between these two extremes, the successful Army Aviator must try to steer a middle course — one which properly balances development of flying skill with development of military command and management ability.

Helping aviators to select the proper course is sometimes difficult. It is not always easy to influence the young pilot, for most aviators are individualists; they would not be aviators if they were not. But we can provide a climate which is favorable to proper career development. So let us see what can be done to provide such a favorable environment.

There are several policies which should be adopted throughout Army Aviation to encourage and guide the young aviator. First, we must establish an appreciation by all pilots for the true mission of Army Aviation and cherish it as our common goal. Next, we must reorient our training objectives to accomplish that mission. And finally, senior aviators must set the example and be guides for these youngsters.

The mission of Army Aviation as defined in the textbook is well known to all as:

a. Expedite and facilitate the

conduct of operations on land.

b. Improve mobility, command control, and logistic support of Army forces.

c. Provide greater battlefield dispersion and maneuverability under conditions of atomic warfare.

But is it understood? The key here is that Army Aviation is a part of an arm or service for support of the Army and not an end in itself. When we as aviators use it primarily to our own ends without giving a fair return to the Army on its investment, we are inhibiting the further growth of Army Aviation. It must be our constant aim to spare no effort to meet the needs of the user — our Army. Whenever possible every flight should have a purposeful objective.

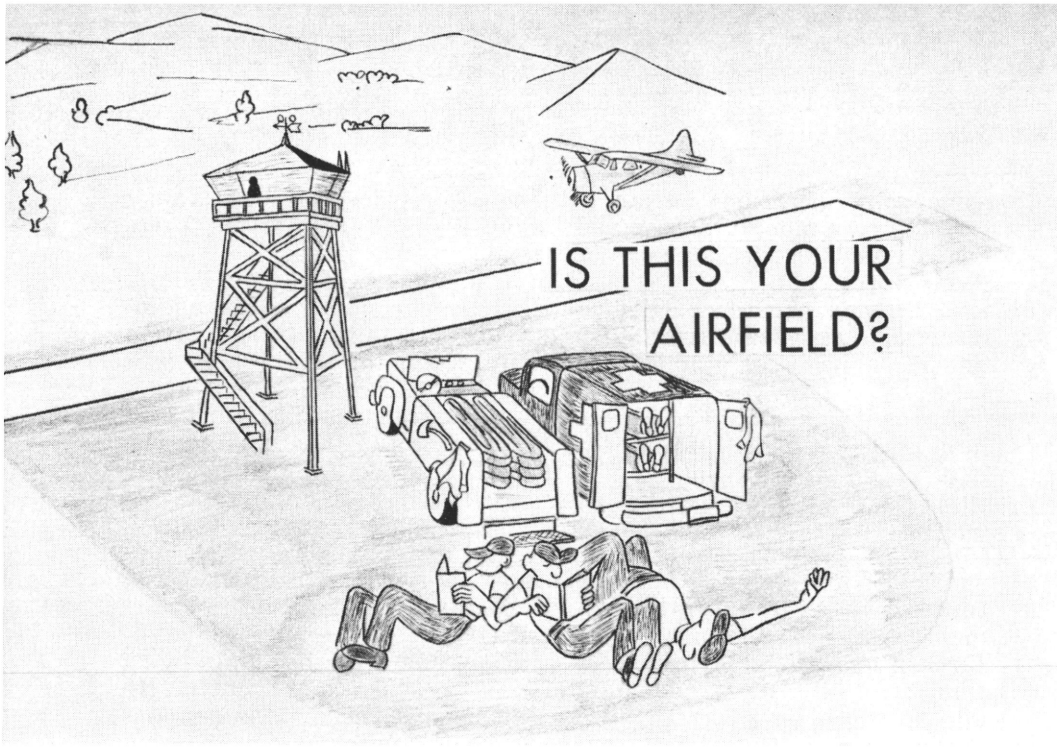
Reorientation of our training objectives also involves consideration of providing a reasonable return on the Army's investment. School requirements for branch qualification and for aviation training (including helicopter and instrument qualification) already total approximately 3 years. Rotation to ground duty may take another 3-4 years during the first 10 years of an aviator's career. An assignment to an aviator staff position where flying is not a primary duty may use up another 2-3 years. It is possible for the aviator to end up his first 10 years of service having only 2-3 years of operational flying. It therefore appears desirable to minimize the detaching of aviators from operational assignments for the purpose of transition training into new aircraft types. Instead, emphasis should be placed on local transition training insofar as practicable.

One means of accomplishing this is to conduct advanced individual training in the aviation unit, assuming that the U. S. Army Aviation School has graduated a well qualified Bird Dog pilot. Selected aviators may be sent to the Aviation School for instruction and standardization as Instructor Pilots if required. These instructors can then conduct appropriate training in the field for transition into new aircraft types, twin-engine qualification, and refresher training in various types of aircraft. By this means the aviator can improve his individual proficiency while serving in a productive position in the unit. At the same time appreciable savings can be achieved in TDY costs and in maintenance of the larger training fleet which would otherwise be required.

It is also important that transition training be conducted to meet actual requirements. This is particularly true for twin-engine qualification, which has come to assume a position of prestige out of all relation to its real value to Army Aviation. For the most part, our twin-engine training should be limited to seasoned company grade aviators who will actually serve as duty pilots in providing this premium transportation to senior commanders.

The last suggestion for improving guidance of the young pilot is for the senior aviator to set an example on which the young aviator can pattern his own career. This will be the

(Continued on page 27)



THE POST THEATRE was dark and comfortably cool inside —cool, that is, to all except the lieutenant on the stage. He fidgeted behind the lectern, standing first on one foot and then the other, mopping his forehead occasionally with a damp handkerchief, and read from a sheaf of papers in his hand. The sound of deep breathing came from the audience, with an audible grunt now and then, as someone shifted his position.

At the stroke of 1100 hours, Lieutenant Dullendry came to the end of his lecture, relaxed visibly, and walked to the wing. The audience stirred and shuffled toward the exits, stretching and yawning. Among the comments were:

"Thank goodness that's over for another month! These safety lectures give me a pain!"

"Aw, I don't know. You never can tell when all that dope about retreating blade stalls might come in handy."

"Yeah! Especially for a bunch of fixed wing pilots like us!"

"We've gone for six months now without an accident, and they show their appreciation with something like this!"

"Let's get over to the PX. I want to get this dry taste out of my mouth!"

The aviators filed out of the theatre to the parking lot. Soon, a line of cars rolled through the main gate toward the airfield where many Army aircraft were parked. There were 15 Bird Dogs parked in the grass before a small building; 10 Beavers and 2 Seminoles were on the ramp in front of operations; a line of Sioux were under the control tower; the large rotors of 15 Shawnees could be seen across the field. Two large hangars stood beside one of the two paved runways. A fire truck and

ambulance were parked before the fire station. Their crews lay in the tall grass, their shirts off.

The control tower operator was alone in the tower. He slumped back, idly watching three Beavers in the traffic pattern.

"Rubble tower, six-eight-two turning base. Request touch and go."

"Eight-two is cleared touch and go."

"Eight-two."

"Rub — towse — seven — re — troo—ulp—grsse!"

"Aircraft calling Rubble tower, you're garbled. Say again."

"Rub—tow — aircra — ning — awrk—ove!"

"Aircraft calling Rubble tower, unable to read. Check your microphone."

"Rubble tower, this is helicopter seven-eight-nine-two. There's a fire off the end of two-seven."

"Don't know. I'll advise soon as I find out."

The tower operator watched the fire and ambulance crews scramble around, pull on their shirts, then race for the vehicles. His mouth dropped open as the fire truck, leading the way, sped toward the wrong end of the runway.

"Rubble tower, this is eight-nine-two. We caught our aft rotor in a tree and we're still a half-mile from the crash. Get somebody out here!"

"Roger, nine-two!"

The operator picked up the phone and dialed rapidly.

"This is the tower. We have a crashed aircraft off the end of two-seven. One of your Shawnees hit a tree with his rotor, trying to reach the crash site. Can you get someone to go out and check?"

He slammed the phone down and jumped to the intercom.

This story is fiction. However, these same cause factors and others, equally bad or worse, are apparent in many aircraft accident investigation reports in the files of the U. S. Army Board for Aviation Accident Research.

"Roger, nine-two. Check on it and give me a call, please. Probably a brush fire."

"Rubble tower, this is nine-two. It's an aircraft. We're going down to check."

The tower operator dropped his mike and grabbed for the intercom switch.

"Operations from tower. There's been a crash. Get that fire truck and ambulance on the way. It's off the end of two-seven."

"Roger. What type aircraft is it?"

"Operations, the crash crew is going to the wrong end of the runway! Get somebody to chase 'em down, quick!"

The phone rang and the operator picked up the receiver.

"Tower, Sergeant Tense."

"This is Major Hairsplit!

This article was prepared by the U. S. Army Board for Aviation Accident Research staff with information from its files. Views expressed in this article are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.

—The Editor

What's going on up there?"

"We have a crashed aircraft off the end of two-seven, sir, and a Shawnee has hit a tree trying to get to it!"

The sergeant heard an explosion of profanity roar through the receiver before the major hung up. A short time later, sirens wailed from the post and several ambulances and fire trucks raced toward the airfield.

Two weeks later, four officers with heavy manila folders sat in the anteroom of the general's office. The door opened and a colonel entered. The four officers straightened to their feet as he spoke.

"Gentlemen, the general is ready to see you."

The colonel ushered the four officers into the general's office and closed the door. The officers saluted the general and stood at attention.

General Wiser was a tall thin man in his fifties. He looked up as the officers entered and returned their salutes.

"At ease, gentlemen. Suppose we sit around the conference table. I believe we'll be more comfortable there, and this is likely to take some time. Major Seekmore, you were in charge of investigations. Are your findings complete?"

Major Seekmore looked toward the general and opened his folder.

"Sir, we have concluded the investigations. In view of our findings, I have recommended this conference."

The general drew up his chair and motioned the other officers toward their seats.

"Carry on, Major Seekmore. I'd like a thorough briefing."

"Yes sir. At 1230 hours, 16 September, a Beaver crashed one mile west of runway two-seven at Rubble Field. The aircraft burned and the pilot received fatal injuries. Shortly after, a Shawnee attempted to land and render assistance. At a point one-half mile east of the scene of the crash, the Shawnee struck a tree with its aft rotor blades. The aircraft dropped 20 feet to the ground, buckling the fuselage and flexing the forward rotor blades downward into the fuselage and ground. There were no injuries to the crew of two. That's a brief description of what happened."

The major turned to the back of his folder and removed a thick packet of photographs. He passed them to the general.

"Here are the pictures. The Beaver crashed into a densely wooded area. From the angle of the flight path through the trees, measured as 60°, it is evident that the aircraft stalled and went into an extreme nose-low attitude prior to contacting the trees.

"The fuel cells ruptured on impact and the aircraft burned. As you can see from the pictures, there was very little physical evidence remaining.

"We have one witness report that the aircraft engine stopped soon after the Beaver began its climb-out from a touch and go landing. If you will examine the fourth picture, you can see both propeller blades bent back over the cowling at impact. An engine teardown inspection showed no internal damage from sudden engine stoppage. It's evident that no power was being developed at the time of impact.

"Fire destruction rendered determination of control action or placement impossible. The teardown inspection revealed no cause for engine failure.

"Captain English took a sample of fuel from the truck that refueled the Beaver at 1130 hours on the day of the crash. Do you have that report, Captain?"

The captain removed a paper from his folder and stood.

"Chemical analysis of the sample showed positive indications of excessive residue and gum. It was found that an underground storage tank was the cause. When the fuel level dropped below 1,500 gallons, the sediment in the tank was pumped into the fuel truck. Inspection of the other aircraft fueled by this truck revealed similar contamination."

Major Seekmore nodded.

"Thank you, Captain. The evidence indicates that engine failure was very likely a result of fuel contamination.

"The pilot of the Shawnee saw and reported the crashed aircraft. He then attempted to land and render assistance. The only available landing site was a small confined area one-half mile from the scene of the crash. In his hurry to get down, the pilot failed to note a dead tree in his approach path. The aircraft passed over the tree, but the trailing arc of the aft rotor caught the top of the tree and the rotor blades disintegrated. The aft end of the fuselage dropped to the ground and the fuselage section buckled. The forward rotor blades flexed downward and contacted the fuselage and ground.

"The medical report on the Beaver pilot gives the cause of death as crushing chest injuries received from impact. It's unlikely that rescue or medical aid would have helped this pilot, even had he been reached immediately following the crash. However, some very important factors concerning crash rescue were brought out by the investigation.

"The crash alarm system was out at the time of the accident, due to relocation of the telephones. No alternate plan had been provided. The control tower had no contact with the fire truck or ambulance, except through intercommunication with operations. As a result, the crash crews drove around the field without direction. Also, the crews of the ambulance and fire truck were away from the vehicles with their shirts off at the time of the accident. Fire trucks and ambulances from the main post reached the scene of the accident ten minutes before the crash crew from Rubble Field. The hospital was not notified of the crash until the body of the Beaver pilot arrived there.

"Investigation revealed that the Beaver pilot graduated from the Army Aviation School six months prior to the accident. After graduation, he was assigned to this post and given a desk job in supply. During the six months' period, the pilot had a total of 27 hours of flying time. He was given a checkout in the Beaver four months ago. Since that time, he has accumulated 14 hours of Beaver time. He had flown an average of 4.5 hours per month since graduation. This is not considered

enough flying time to maintain proficiency and must be considered a contributory cause of the accident.

"The Shawnee pilot's reaction to the accident, according to his testimony, was to get on the ground and help in the rescue. If the crash crews had been equipped with two-way radios, he could have helped far more by remaining in the air and directing them to the scene. He should have attempted to lead them, even without communication. The only possible landing site was one-half mile from the crash. The Shawnee pilot failed to look over this very confined area prior to making his approach. He stated that he has not been given any instructions about his responsibilities in the event of an accident since arriving at this post. He further states that he knows of no SOP concerning the subject.

"The control tower operator was alone in the tower at the time of the accident. He states that this is usually the case at Rubble Field, due to the shortage of qualified personnel. He states that he was observing the base leg and final approach at the time of the accident, and knew nothing of the accident until it was reported by the Shawnee pilot. He says that he received two garbled transmissions just prior to the accident. The board was unable to find the person who made these transmissions.

"The underground fuel storage tanks are the responsibility of the Quartermaster. Periodic checks are made for water contamination, but no checks have been made for other contamination. An investigation by Post Engineers shows that contamination couldn't have been caused by seepage and must have been in the fuel at the time it was placed in the tanks. The only checks made on fuel carriers are quantity checks made at the time of delivery. The source of contamination was found to be the storage tanks at the contractor's refinery.

"Although not considered a contributory cause in these accidents, it was found that five different aviation sections operate from Rubble Field. Each section has a different set of SOPs and no two are alike. The operations officer has made no recommendations to correct this situation. It was brought to the attention of the airfield commander on 15 July, this year, at the time when a near midair collision occurred between two aircraft of separate sections."

General Wiser's complexion darkened while the major spoke. He moved forward and rested a clenched fist on the table.

"I think you've made your point, Major Seekmore. It's obvious that supervisory error played a large part in these accidents. The complacency we've developed from six months of accident-free aircraft operations may have cost that young man's life.

"Colonel Rich, have Colonel Bushlip and Major Hairsplit report here immediately. And cancel my appointments for the remainder of the day."

The general walked to his desk and sat down. He watched the four officers leave.

"Rich, I'd like for you to talk with Major Hairsplit. Find out

why that crash alarm and crash rescue system is so fouled up. If he can't give you a satisfactory answer, get in touch with Transportation and Signal. See if you can find out why those vehicles don't have radios."

The general leaned forward.

"I'll speak to the aviation officer myself. I'd like Colonel Bushlip to explain why we don't have SOPs for that airfield. Let's not forget to check with the Quartermaster about that fuel. Those people must be slipping up somewhere. Call G-1 and see if they can give you a reason for not having qualified personnel available for airfield operations. And, Rich, let's give this top priority. From this investigation, it's evident that we've been lucky for a long time!"

AUTOPSY GUIDE AVAILABLE

An autopsy guide for aircraft accident fatalities, published by the Armed Forces Institute of Pathology, is now available on request.

The need for carrying out a full autopsy on all aircrew and passengers killed as a result of aircraft accidents is clearly indicated by past deficient aircraft accident reports. Only through such study can fatal injury prevention be advanced.

The U. S. Army Board for Aviation Accident Research recommends that all aircraft accident investigation boards secure a copy of this guide to be used by medical members.

Write to: Joint Committee on Aviation Pathology
Armed Forces Institute of Pathology
Washington 25, D. C.

Army Aircraft Maintenance Tips Featured in PS

Beginning with the lead position in Issue 64, 1958 Series, a section on Army aircraft is featured in each edition of PS, The Preventive Maintenance Monthly.

This official Department of the Army publication is well known to most maintenance personnel. With a regular section on Army aircraft now included, this colorful magazine becomes "must" reading for all Army aircraft maintenance personnel. Check with your local publications man to make sure that you receive this magazine regularly.

The Numbers Racket

Lt Colonel Richard A. Hansen, *TC*

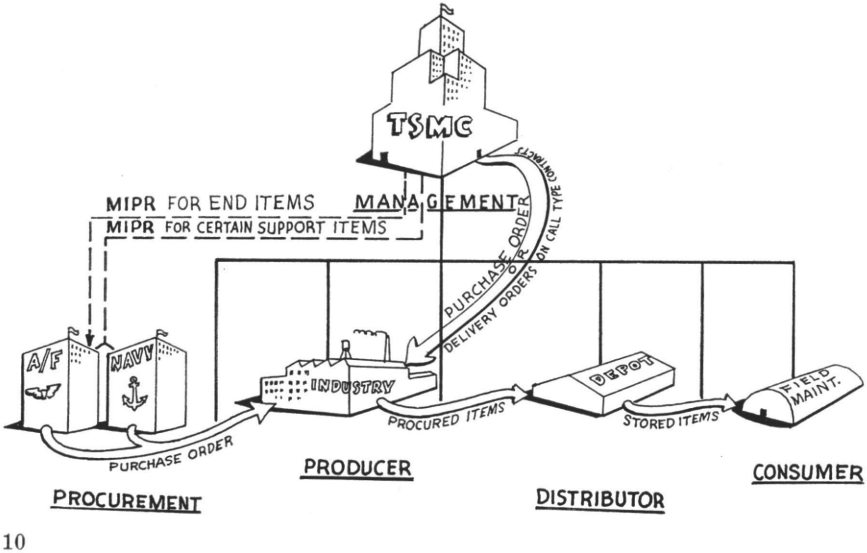
THE DEVELOPMENT OF ELECTRONIC Data Processing (EDP) equipment is introducing a new way of doing business in the logistical management field. It is the "shot-in-the-arm" needed to give proper reflex to a system now muscle-bound with papers and numbers. Herein lies the promise of a cure like that afforded the manufacturing industry with the introduction of production line techniques.

Application of this equipment within the Transportation Corps will have an impact throughout Army Aviation and will affect the entire system of supply and maintenance support. Field maintenance activities are an integral part of the system being designed. In the following paragraphs a brief outline of this system is presented to acquaint everyone with the planned application and its effect upon *your* operation.

Since 5 March 1956, the Transportation Supply and Maintenance Command (TSMC), St. Louis, Missouri, has been investigating, developing, and planning for the application of EDP in support of its mission. It soon became apparent that primary consideration must be given to air commodities, for they require a more responsive support system and represent the major TC troop support program.

The aircraft commodity, being in a state of continuous development, demands frequent changes in configuration and design. Such changes must be effected in a timely manner to assure the maximum combat effectiveness consistent with such engineer-

Elements of TSMC System



ing advances. Further, it must be recognized that economic limitations are (in effect) the counterbalance for applied judgment when considering what engineering or design changes can be reasonably introduced, and at what time.

This determines three prime objectives established for our system which EDP can make possible.

1. Reflect an immediate picture of the stock position of all unconsumed items within the system which may be affected by the change.
2. Control and regulate the system to provide effective and efficient support with a minimum number of line items.
3. Provide positive information regarding the end item distribution, programmed modification, and design change to effect proper and timely control of replenishment, procurement, and distribution of the required spare parts to properly support all levels of maintenance.

These objectives fix the limits of the system and those major operational areas that must be considered as a part of the overall program. The elements of such a system and their related functions are as follows:

TSMC: Management.
Air Force and Navy: Procurement.
Industry: Production.
Depot Section: Distribution.
Field Maintenance Activity: Consumption.

Now let us examine the internal workings of each major area of the system and study its relationship to the entire system.

MANAGEMENT

TSMC, the management element, is engaged in a mass procurement program of a repetitive nature; its products are decisions which regulate the success or failure of the supply and maintenance mission. To illustrate this, consider the more than 55,000 line items controlled by one segment. To determine what and how many of the more than 3.5 million items to buy, a decision must be made during each complete review cycle. Furthermore, TSMC must develop, assemble, disseminate, and maintain historical data regarding these items. The problem of item description and identification alone requires a file of 386 million digits of information.

The problem then is to develop systems and procedures which will regulate the flow of information within TSMC to provide the best possible intelligence to those areas affected by decisions. However, systems designed must be geared to production planning.

The EDP system may be compared to a gear box, with each major operational area a gear meshing with the other. Today the volume of data to be processed has forced an increase in the operating speed of these gears. This causes difficulty in maintaining the required close

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Lt Colonel Hansen was Assistant Director, Automatic Data Processing, Transportation Supply and Maintenance Command, St. Louis, Mo., at the time this article was written. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.
—The Editor

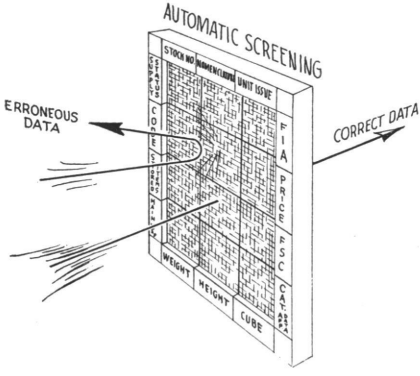
mesh, and the EDP system *must* provide the "idler" gear in the system.

The *Air Force* and *Navy,* under single-service procurement, serve as the contract agency for certain air items. TSMC's position must be geared to their systems for machine processing, if timely reporting and control are to be achieved.

Industry, the producer, must provide certain static or historical data regarding the "bits and pieces" which, when assembled, represent the end item to be procured. Today, the average provisioning parts breakdown for each end item contains approximately 100,000 individual items.

During the initial provisioning conference, the total "bits and pieces" of the aircraft are reviewed to determine which items are to be selected to support the maintenance program for a particular aircraft. Those items selected usually number about 10,000. These parts must be coded and fitted into the support program, including the initial spares support (Table II) requirements.

Today this mass of information is developed and processed



manually. Plans are underway to devise a machine record card which will bring into TSMC the total provisioning parts breakdown through a medium utilizing EDPS*. This action will provide immediate intelligence for those items common to the system within the support program.

TSMC is developing a program to mechanize the provisioning procedure so that the many decisions affecting the selected items can be integrated into a master record without delay. Once introduced into EDP this information will materially reduce the present time required to collate the required manuals.

Depot Section operations and its relationship to the inventory management function are well known. In this area, administrative lag is further reduced by utilizing the Army Communications Administration Network to transmit shipping documents, receiving reports, and inventory control data.

The *Field Maintenance Activity* generates the demands for the items in management of its stocks and provides for the regulation and application of the maintenance concepts applied to gear the supply support system to that plan developed during the provisioning action. A study of these "field demands" reflects the intelligence needed to review the maintenance concepts and its attendant supply support program and to effect changes where required.

HOW IT WORKS

We have discussed the objectives of our system, the ele-

*Electronic Data Processing System

ments and their relationship, so now look behind the "paper barrier" at the "numbers game" it represents. The "game" begins when the man in the field selects a number which represents a part required for aircraft maintenance. It terminates when TSMC can match that number against the stock balance (or its technical record) and know exactly what action is required.

The problem, in magnitude, can be represented in this manner. Today we have more than 210,000 line items in our supply system stocked and controlled using the Federal or AF Stock Number (or TC number if not converted to a Federal number). The man in the field has a selection of numbers to work from, such as the Federal, AF, Army/Navy, and Manufacturer's stock or part number. With a minimum of five numbers to be cross-referenced for each line item, we now have a requirement to maintain four combinations per number, or more than 4.2 million numbers. This means that a request could carry any one of five numbers to represent one part. If the number used in the field is different from that used to control the stock balance, then a technical edit must be performed to match the request against the balance (or known intelligence). In addition, these 4.2 million numbers *will not* include the parts (approximately 90%) not selected for support, and the numbers are subject to change by engineering improvements.

The solution of this problem is a system designed to establish a usable record for proper number identification of required parts and to control its perpetuation by mechanical or electrical means. To that end, a Master Control Record must be built which will serve this purpose.

Such a record must actually serve two purposes. First, it must regulate the flow of information required for the internal operation of TSMC. In this capacity it must serve as a screen to permit accurate information to pass, while rejecting inaccurate information, or it must convert the incorrect data to correct information to permit processing. Such a record is being built at TSMC and will ultimately be maintained with technical data direct from the manufacturer. Second, this record must be extended to the field. This extension would assure the availability of the proper parts identification for use by the field when needed.

CONTROLLED TEST

TSMC is conducting a controlled test of an extension of its Master Record at Fort Eustis' Model Maintenance Shop in station supply management and stock accounting. The system designed for station level has mechanized that operation to a maximum degree consistent with equipment presently available. This operation meets all the requirements of AR 711-16 and is designed to provide the following:

1. Automatic preparation of the issue slip or requisition with control of a "good number" (assured by its source from the Master Record) for electronic transmission and computer processing at TSMC. The mechan-

ical perpetuation of the number reduces the chance of human error.

2. Control of the Station Stockage List within the limits of TC maintenance concepts and automatic computation of the station requisitioning objective for each part as it is processed.

3. Relief of the manual maintenance of stock records and allied accounting reports by effecting automation wherever possible.

4. The production of suitable automated media as by-products of the mechanical system of required management data at TSMC.

This test system, established in January 1957, is showing good results; it will permit the further development of the program for general application.

The introduction of EDP equipment will cause a complete review and overhaul of all existing systems. Action has been under way in this area since March 1956. However, total systems development cannot be accomplished concurrently in all areas. A logical progression for the total system has been established in a three-phase program to provide for orderly development.

Phase I. The design, establishment, and regulation of an Electronic Data Processing System in support of the internal operation.

Phase II. The design, establishment, and regulation of an extension of the EDPS in support of the supply management functions to the field maintenance activities CONUS-wide, and to the depot structure in support of the distribution mission.

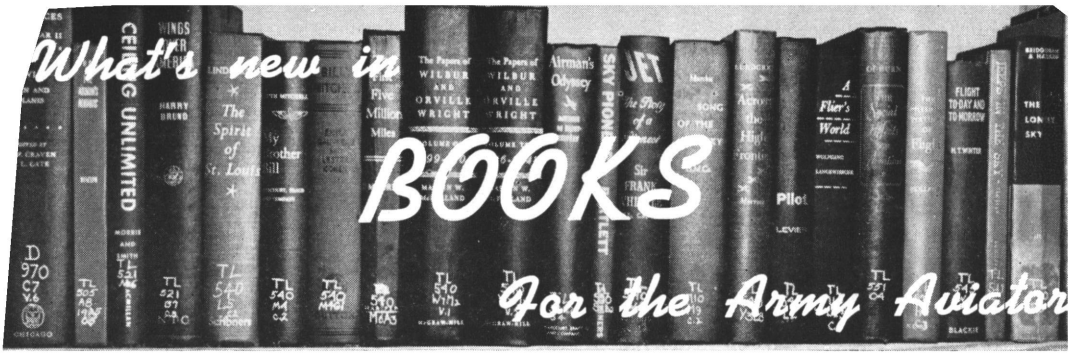
Phase III. The design, establishment, and regulation of an EDPS to provide a suitable automatic means to collect from industry and introduce into TSMC for evaluation all technical data concerning secondary items required to support TC end items.

Phase I is under way. Phase II is being tested and will require approval by the Department of the Army prior to further development. Phase III is under active development.

These areas of application are being rapidly accelerated and the effects of the EDPS equipment will soon be evident. The speed with which the system will develop is dependent upon our own ability to learn how to use these "new tools" together with our capacity to teach the electronic brain those things it must know to provide the correct answer.

In the meantime, we continue to play the "numbers game" the hard way. The field can provide assistance during this period of transition by researching the number used to identify stocks requisitioned. *First,* determine whether there is a Federal stock number for the item; *second,* if no Federal stock number is available, determine the most current AF number for the part. Using either of these numbers will reduce the time TSMC now spends performing a technical edit.

Proper development and application of electronic equipment will permit the integration of all systems of supply management into a common channel with the inherent advantages of a reduced administrative burden at all levels.



RADIO AIDS TO AIR NAVIGATION — J. H. H. Grover, (Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. $6.00)

The author stresses the performance, capabilities, and methods of operation of the different types of navigational radio equipment, including the minimum of technical description necessary for their understanding.

Navigational radio equipment has improved since the earliest days of simple transmitting and receiving sets used purely for communications purposes. Much more is now required of the student taking his civil license examination. This volume provides him with all the basic knowledge required regarding radio aids to air navigation.

For the qualified pilot, it will serve as a ready reference guide to refresh his memory on systems other than the one he is operating.

AIRCRAFT MATERIALS AND PROCESSES, Fifth Edition — George F. Titterton (Pitman Publishing Corp., 2 W. 45th St., New York 36, N. Y. $6.00)

This is the fifth edition of a highly popular text. The author's original purpose in writing the book was to present in one coordinated volume the essential information on materials and processes used in the construction of aircraft. How well he succeeded is indicated by the text's continuing popularity.

In this latest edition the author takes note of the rapid advancements that have been made in aircraft performance, structural materials, and processes. Advances in the quality of new materials such as titanium, high-temperature materials, plastics and superstrength steels indicate that these new materials should find wide use in the aircraft industries in the near future. The author has included all the latest processes, materials, and specifications.

JEEPS IN THE SKY—Lt Col Andrew Ten Eyck (Commonwealth Books Inc., New York, N. Y.)

Reviewed by
Dario Politella
Associate Editor, FLYING Magazine

Although this volume is out of print after enjoying a sellout edition of 5,000, it is available in the larger libraries.

"Jeeps" was intended as a history of the light plane in World War II and was written by an Air Force officer assigned to the historical branch. It is an extensive coverage of the subject, including anecdotes of experiences of light plane pilots, culled from the files of the Pentagon.

This is the only book extant which deals in any detail with Army air observation operations during World War II.

The book is valuable to Army Aviators because it presents a fairly extensive discourse on the early history and development of the use of light planes by the Artillery.

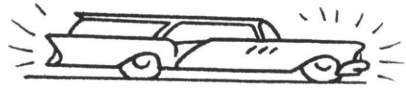
Book reviews appearing in this department do not necessarily reflect the opinions of the Department of the Army or of the U. S. Army Aviation School.—The Editor

The FLIGHT SURGEON

is a vicious ogre...

Aviators run from him because if he catches them

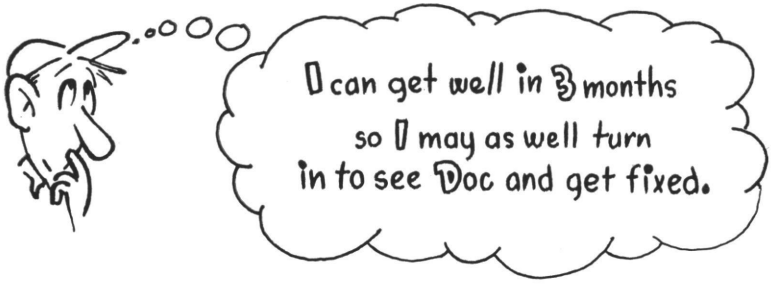
he will ground them! They will not get their flying pay next month and there goes that air-conditioned



with pushbutton windows..

The Finance Officer is to blame!

If he would pay flying pay for 3 months - even if the ogre (FS) grounded an aviator - the aviator would think



Then when he was flying, he would be happy and not worry whether or not

he had cancer or TB or something
and he would not forget to put down
his gear or switch tanks, etc...

But the Finance Officer says
it's illegal so the smart aviator
saves 3 months flying pay

and puts it in a savings account
for just such use

and if he has to use it, it carries him
until his flight pay insurance
comes into effect.

Then he
doesn't worry (and forget things)
or avoid his Flight Surgeon, and
the FS can keep him happy and
well, and he does not have

accidents and make
widows and
½ orphans.

Overwater Helicopter Pathfinder Operations

CWO Robert P. Henderson, TC

ARMY PATHFINDERS AID IN THE navigation and control of Army transport aircraft. Ordinarily they precede an assault echelon to establish navigation aids and communication nets or for reconnaissance missions. In practicing pathfinder missions I became interested in the use of the helicopter as a pathfinder in operations over water. Was this possible? What difficulties would be met that were different from a land operation? Some of the differences can be easily seen, but some came as a surprise.

In 1953, while stationed in the Hawaiian islands, I became acquainted with a Lieutenant Erickson of the Infantry. He was as interested in helicopters as I and, not being a pilot, he badgered me at every opportunity to fly in the helicopter. In talking over some of the helicopter pathfinder possibilities in amphibious operations, I discovered he was an excellent swimmer who long had nursed a desire either to jump or dive from a slowly moving helicopter. Why not, we thought? And why not put together a full set of plans combining both swimmers and helicopters in an overwater operation?

We got approval for the experiment and began to screen volunteers. At the outset I was able to get an H-19 in good mechanical condition along with a nervy little crew chief weighing about 100 pounds. We decided to run the first test in a protected lagoon where the water was deep but not too rough.

FIRST TEST

For this first test we stationed a motor launch in the lagoon containing three good swimmers and a doctor in case of emergency. Lieutenant Erickson made the first three jumps and when we met only minor difficulties we continued working with the rest of the swimmers. Besides dropping the men, it was necessary to return to the same spot to pick them up.

I expected little difficulty in setting the men up for their jumps. Before takeoff I had figured the maximum fuel I should carry for a load of four men and crew chief. On the first approach to the drop area, I found that by heading directly into the wind I was also heading into very bright sun, and the reflection from the water made it difficult

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CWO Robert P. Henderson is a flight instructor in the Department of Rotary Wing Training, U. S. Army Aviation School, Fort Rucker. A former Marine aviator, he has logged more than 3,400 hours in both fixed and rotary wing aircraft. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.

—The Editor

to judge my height above the water. On the following approaches I corrected my heading. The approaches were made at different altitudes above the water, starting at 10 feet and going as high as 35 feet, which was found to be the maximum height for safe jumps.

I used varying airspeeds up to 30 knots but the most important consideration was the groundspeed, which we found should be held below 20 knots. Beyond that speed, the swimmer had difficulty making a clean entry into the water. We decided all jumps should be made feet first and facing forward on contact with the water. Care had to be taken to jump forward from the cabin to avoid hitting the rear wheel. Another consideration was spacing the dropped men; they could not be too close for the pickup.

PICKUP

When all the men were dropped, I returned to pick them up from the water. This was the most difficult part of the operation. I found you had to fly the helicopter at an altitude high enough to clear the water but at a speed slow enough to pick up the men. We tried several methods for pickup. Finally, a rope ladder about 30 feet long proved to be most successful. The hoist was satisfactory if only one man was to be picked up; but if more than one man had to be raised to the cabin, it became more difficult because the helicopter would have to come almost to a hover over the water. Ground cushion was lost while hovering above the water and more power was needed.

We found that pickups could be made at a groundspeed up to 20 knots. It was relatively easy for the men in the water to follow the ladder as it trailed in the water. After we made contact with the man, he was immediately lifted clear of the water. This allowed him to hang almost straight below the cabin of the helicopter as it continued to fly at the same airspeed. After he reached the cabin entrance, we gained additional speed, and at once another approach was made to recover each swimmer still in the water.

OPEN WATER OPERATION

The first of the tests was successful and we were given approval for additional tests. These were made in open water along a stretch of coastline approximately five miles long.

Operating in the ocean presented new problems. First, it was found unsatisfactory to drop men where the ocean swells were too large or heavy breakers covered much of the shore line. Next, it was difficult to determine the depth of the water near the shallow beaches. And third, it was a problem for the pilot to regulate his height above the water when there were large ocean swells. Several times I found my wheels getting wet on a pickup.

About 60 men took part in the ocean operation, and the only casualty in the tests was a man who sprained his back attempting to dive head first. We found that a great amount of cooperation was needed between the pilot and the crew chief, who also acted as jump master. By

use of the intercom the pilot could tell the crew chief the proper time to jump the men, and the crew chief could help guide the pilot so the ladder would be at the right position and altitude for pickup.

PRACTICE MISSIONS

Later, we flew two actual practice missions using the swimmers as a ground reconnaissance party. In one we moved the party from a ship to a designated beach area and in the other from a land area to another beach area.

In both missions the helicopters were given a definite course to follow out to sea which would eventually bring them back to the beach designated as the landing area. As they approached the coastline, they would fly parallel to the beach and discharge their men into water as was practiced on the earlier tests. Gear taken was waterproofed, packaged, and dropped along with the men. The helicopters returned to their original point of takeoff, and the ground reconnaissance party continued on to the beach. At a predetermined time the helicopters returned to the same area to pick up the men.

If the reconnaissance party were successful, it was to display panels on the ground inviting the assault force to land. The party would later establish landing areas for the helicopters and assist in bringing them into those areas. However, if the operation were not successful, panels would not be displayed and the ground reconnaissance party would meet the helicopters at the predetermined time about a half mile off shore.

At the predetermined time we returned with the helicopters to pick up the reconnaissance party and found panels displayed. Our helicopters relayed this condition to the assault commander, and the troop-carrying helicopters were immediately sent out to the beach area. The maneuver was a complete success.

In later maneuvers we proved that a smoke screen could be very beneficial to pathfinder aircraft without hinderance to their operation. The swimmers used were very enthusiastic about the part they played in this operation.

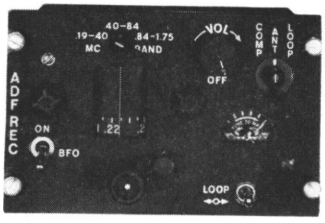
I believe these parties can be trained whenever needed and used under actual wartime conditions.

Conversion to Greenwich Mean Time

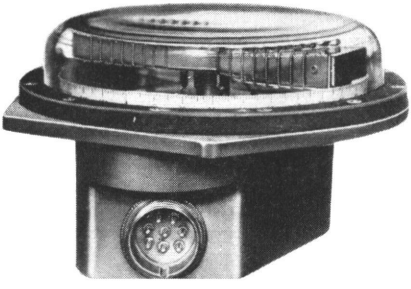
Greenwich Mean Time has been used on all CAA Air Traffic Control facilities since 15 June 1958. To enable aviators to become accustomed to the use of GMT, control personnel will give the GMT first followed by the corresponding local standard time.

Conversion from local time to Greenwich Mean Time is accomplished as follows:

To convert from	to Greenwich Mean Time
Eastern Standard Time	Add 5 hours
Central Standard Time	Add 6 hours
Mountain Standard Time	Add 7 hours
Pacific Standard Time	Add 8 hours



Army Aviation's New ADF



A. W. Parkes, Jr.

RADIO DIRECTION FINDING EQUIPMENT on aircraft dates back to before World War I, and many types have been used in the succeeding 40 years. During the past 20 years, continually improved versions of the automatic direction finder (ADF) have appeared. The AN/ARN-59 has now been officially standardized as Army Aviation's primary navigation aid until such time as self-contained navigation systems are ready for issue.

The AN/ARN-59 ADF operates in the band of 190 to 1750 kilocycles. It can be used to get automatic bearings to any clear-channel radio transmitter, whether it be a 5-watt transportable ground transmitter which can be put on the air in a few moments or a 50,000-watt broadcast station. There are about 25,000 such ground radio transmitters in this frequency band located worldwide. This new ADF can operate with stations located far beyond the horizon. Reception, at altitudes of a few hundred feet above the terrain, from stations considerably beyond the horizon may be very important in sparsely settled areas or in tactical applications.

The AN/ARN-59 replaces a family of heavier and otherwise less suitable ADFs. This replacement was made after determining that the operational requirement existed for a direction finder on aircraft in the 190 to 1750 kc band. Advances in design made it possible to reduce the weight over the heaviest previous standard ADF by a factor of 3 to 1 (from over 60 pounds to under 20 pounds), with an even greater ratio of volume reduction.

Although previous standard

automatic direction finders were adequate, they were much too heavy and large, and otherwise operationally unsuitable for Army aircraft. The AN/ARN-59 is lighter and has less aerodynamic drag than the older models. This has been accomplished with no sacrifice in reliability, by a mechanical and electrical design expected to simplify maintenance in the field. For example, a shielded room is no longer necessary for maintenance tests because of a part of the bench test equipment, a device resembling a dishpan into which the loop fits snugly, electrically simulates a large, shielded room. Additional features which insure reliability include use of a ferrite core loop, ferrite cores in r.f. and i.f. coils, indicators, and high value capacitors, all hermetically sealed.

RELIABILITY

Reliability for operation in all kinds of military aircraft and in all climatic conditions was the primary requirement; an unreliable radio direction finder is expensive at any price. If an ADF cannot be relied upon for continuous operation in the high humidity of the tropics, the extreme cold of the Arctic, the dust and heat of the desert, and under severe shock and vibration, it is definitely not suitable for present day military use. The AN/ARN-59 was adopted as standard after more than a year of engineering and suitability tests by Army laboratories and field agencies.

After an additional year of operational experience, its reliability factor is one of the best in the airborne electronic field.

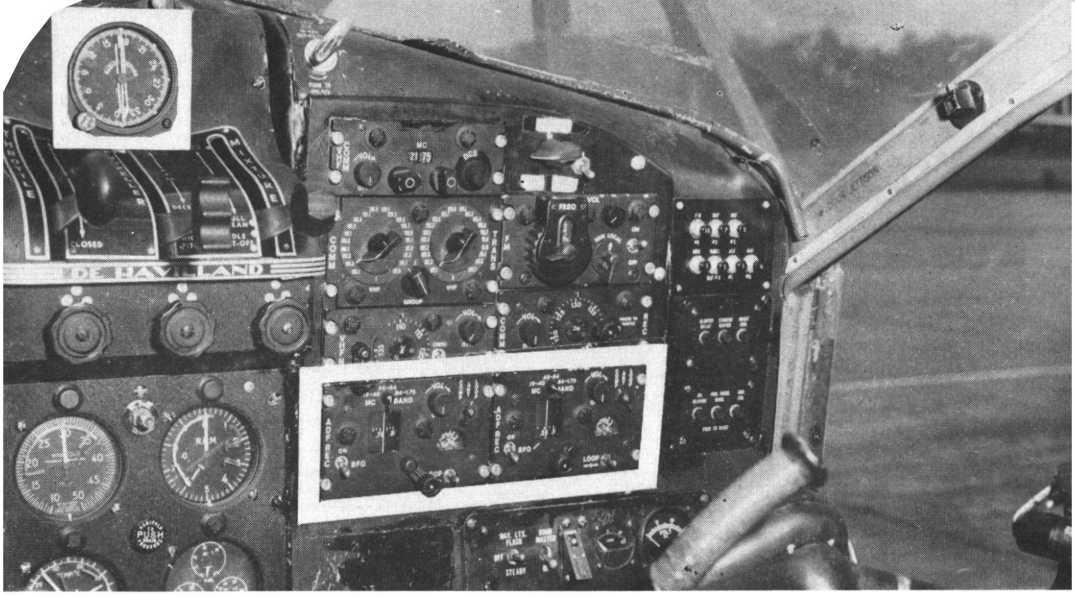
Requiring less space and wiring, this new set can be installed in existing aircraft as part of a retrofit program as well as a single or dual installation in new aircraft.

By operating the subminiature tubes well below their continuous ratings, lower bulb temperatures and considerably longer life are realized. Sudden failure of these tubes plus other components are minimized by an eight-hour bench run-in prior to final inspection.

Design specifications have increased in keeping with the need for more elaborate electronic systems required as additional equipment is installed and operated simultaneously in an aircraft.

Radio frequency radiation caused by poor dynamotor commutation, improper filtering of low voltage ripple, or circuits which allow signals to reach the receiver through the powerlines had to be eliminated. Receivers have been damaged by transmissions from equipment within the same aircraft even with the transmitter operating at a frequency well separated from that of the receiver. Radiation from an r.f. oscillator can also stray through the antenna to another receiver in the aircraft. Recognition of these problems and proper design and testing have eliminated these defects.

Mr. Parkes is vice-president of the Aircraft Radio Corporation, Boonton, N. J., which manufactures the AN/ARN-59. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.—The Editor



Dual installation and dual indicator of new ADF in Beaver

USEFUL ANYWHERE

The AN/ARN-59 is useful anywhere in the world on almost any clear-channel signal within its band. Although the receiver is basically an automatic direction finder (ADF), it is also designed to meet all of the electrical and operational requirements for receiving, on a fixed antenna, the 4-course low-frequency radio ranges still in great use in many parts of the world.

A receiver designed for use as a flight instrument for Army aircraft, particularly at night, must have selectivity which can differentiate between stations only 3 kc. apart. The receiver must be mechanically and electrically stable so that when the station is tuned in and identified, the aviator can assume that it will remain there while he attends to other duties.

A receiver incapable of detecting stations 3 kc. apart or which does not remain tuned to the desired station can get the aviator into a dangerous situation, particularly while flying at night or when adjacent channel-stations hundreds of miles away may easily be heard. Partial remedy on any airborne radio is careful station identification.

This receiver was designed to operate with radio stations throughout the broadcast band, even though they may not be on a clear channel. Obviously, if an airplane is flying in an area where signals from two or more stations on the *same* frequency are heard, the receiver can make no distinction and the indicator cannot select the direction of the desired station. The ability of the AN/ARN-59 on ADF to differentiate between stations that are nearly the same frequency is excellent, depending on the stations' relative powers and distances.

ACCURACY

Accuracy of bearing indication is assured by a simple compensator. The indicator is compensated to read the true bearing of the station to an accuracy of better than two degrees, even though the apparent direction

of the radio wave may be distorted by the position of the aircraft.

The low power input to the AN/ARN-59 of 2.8 amperes at 28 volts DC helps to minimize the drain on the aircraft's generator system. The size of the generator, as well as its weight, goes up fast as the power requirements increase.

TEST EQUIPMENT

Test equipment suitable for use in the field was made available simultaneously with the AN/ARN-59 and installed at several Army agencies and at aircraft manufacturing plants. The test equipment made bench testing very simple prior to installation of the AN/ARN-59. BTK-21/ARN-59 nomenclature has been assigned for the bench test kit required for maintenance. The only additional equipment necessary is a signal generator and a voltohmmeter. Instructional literature on operation and maintenance of the test equipment completes the requirements for doing a good day-to-day maintenance job. Training of personnel for this job is only slightly more extensive than for the MOS of Radio Repairman.

Mechanical remote control of tuning on the AN/ARN-59 is preferred to digital presentation. The mechanical system permits simplicity and reduction in weight and size and requires less time to tune. It is quicker and easier for the aviator to crank to a station than set three separate knobs in a digital-type tuning device.

One AN/ARN-59 may be installed for dual control and dual monitoring for student training purposes. In this arrangement, identical control units and indicators, along with a "push-to-control" and indicator light, are installed in each cockpit. Completely dual ADF installations are being placed where required for either tactical or navigational requirements.

A number of U. S. Army aircraft flew the North Atlantic during 1957 using the AN/ARN-59 as the primary radio navigation aid. Distances between radio checkpoints on such trips were as much as 1,000 miles. Thus reliability, sensitivity, and accuracy became matters of the difference between a very wet and a very dry trip. The trip proved to be dry!

SENSITIVITY

The AN/ARN-59 is so sensitive that even with the aircraft on the ground a standard low-frequency airways radio station of the "RA" class can be heard and tracked as far as 100 miles away, depending on weather and intervening terrain. Normally, one can expect reception ranges, in flight, of 200 miles over land from this class of station. Over water, the distance is often greater.

These flights seemed to show that this ADF is one of the best obtainable. Army Aviation has a useful navigational tool in this new standard ADF. In the coming years, UERs from users (or the lack thereof) should confirm its value and weaknesses.

For safety's sake, heed these answers to that continual question of

WHY TORQUE?

M/Sgt Raymond A. Dix

EVERY MECHANIC WOULD torque his neck to get a look at MARILYN in her famous calendar pose. And chances are, he'd torque it at pay call and mess call, or just standing in front of the drug store. Fortunately, he doesn't have to worry about overtorquing or undertorquing in these cases. Nature gave him some darn good stops and warnings to keep him from twisting his head off. But, put a wrench in his hand, give him a bolt to turn, and it's a different story!

The accident files of the U. S. Army Board for Aviation Accident Research contain many cases that resulted from the improper torquing of some nut or bolt. It doesn't seem to matter whether they were overtorqued or undertorqued. Both have been fatal!

Raise the tail of a Bird Dog and place it firmly on a jack point. Grab the tailwheel yoke with both hands and try moving it in all directions. Chances are, you'll get looseness in all directions. This is an undertorqued condition. Imagine the terrible vibration that must take place in that tail assembly during landing and takeoff. With the vibration and knocking together of those loose metal surfaces, crystalization of the metal is followed by fatigue, cracks, and failure. It's a rare case where damage is limited to the tail assembly. Normally, this is followed by rudder and elevator damage — sometimes even worse! There are many cases on file of so-called accidents due to undertorquing.

SHEAR POINT

Some mechanics make sure they won't have any loose, vibrating metal knocking together. They tighten everything down, then get a pipe or long bar for leverage so they can take one more turn. This doesn't always strip threads. Mostly, it just stretches and strains the bolt almost to the shear point. With the jolt of a landing or the vibration of normal flight, the bolt breaks off and there's another accident. In these cases, overtorquing is the cause.

Even where the proper torque is indicated on a part by the manufacturer, it doesn't guarantee that proper torque will be used. There are cases where this information was totally disregarded.

An accident investigation board has a tough job tracing down the cause of those accidents resulting from improper torquing. But, in most instances, they *will* find it! When the nut or bolt that failed is found, it

will be sent to a laboratory for analysis. The analysis will prove, beyond all doubt, whether or not the failed part was improperly torqued.

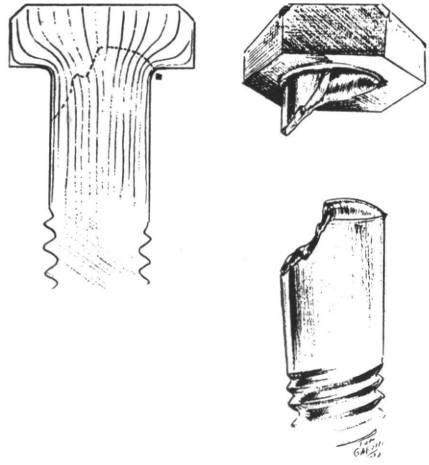
HELPFUL HINTS

If *you,* the mechanic, don't want an accident of this type on your conscience, follow these helpful hints on torquing:

Torque Wrench. Make sure you have a torque wrench available in your aviation unit. Don't just say it's unauthorized by your T/O&E. Order one! And submit a UER on your T/O&E.

Use and Care. Make certain that you, and any other person likely to use the torque wrench, entirely understand its proper use. Give it maintenance care, handle it gently, and store it neatly and carefully. It's a precision instrument; have it calibrated and tested at a reliable depot at the regular intervals recommended by the manufacturer, or more often if you believe it's required.

Dash Two. Refer to the dash two maintenance handbook for the prescribed torque to be applied to the job you're doing. If you have to fall back on the S.A.E. chart, make certain you're not working with a special material. The S.A.E. chart is only valid for standard nuts and bolts. If the dash two handbook gives you two different readings, get the correct one from the manufacturer's technical representative, and submit a UER on the dash two. Never try to remember the torque values throughout your aircraft. There are just too many to remember! If you feel capable of remembering all the torque values of one aircraft, you belong on a quiz show! Maintenance handbooks are always being revised and this includes torque values. Make sure you get the right one.



Results of improper torque

Loosen it First. Never try to check the torque on a nut or bolt just by applying the torque wrench. It won't work! If you want to prove it to yourself, attach a light coil spring to a weight and pull it. You'll see that the spring stretches farther to get the weight moving than it does to pull the weight after it's moving. The reason is static friction, which must be overcome before you can get a true indication of the pull necessary to move the weight. The same is true of the torque necessary to turn a nut or bolt. Get the indication of torque while the nut or bolt is turning. This means that you must first loosen the nut or bolt; then use the torque wrench to set the correct torque **while the nut or bolt is turning.**

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

—The Editor

YOU ARE ON an instrument flight plan flying at 6,000 feet. The minimum en route altitude is 2,000 feet. The procedure turn altitude at your destination is 1,500 feet. After contacting ATCS and making a position report, you receive clearance to continue your flight. ATC clears you to cruise at 6,000 feet to your destination airport.

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

This clearance authorizes you to:

- ☐ **Make an immediate approach upon arrival at your destination.**
- ☐ **Cruise 6,000 feet to your destination.**
- ☐ **Make an immediate descent to any altitude and continue to your destination.**
- ☐ **Make an immediate descent to procedure turn altitude and continue to your destination.**
- ☐ **Make any amount of descent you desire, but do not go below the minimum en route altitude before reaching your destination.**
- ☐ **Maintain any altitude between 6,000 feet and the minimum en route altitude so long as you notify Approach Control when passing through each thousand.**

The recommended solution to the PUZZLER may be found on page 32.

Notes from the Pentagon—

(Continued from page 3)

most challenging part of this proposed program to implement, as it requires an unselfish devotion to duty by the senior aviator. It involves such actions as:

a. Foregoing habitual travel in command aircraft to allow younger aviators an opportunity to obtain experience as service pilots in such aircraft.

b. Conducting twin-engine transition training on the basis of military requirement rather than individual desires.

c. Emphasizing in daily contact with subordinates the importance of command and management experience in the Army as well as development of pilot proficiency.

The foregoing proposals may be distasteful to some aviators who may have lost their gladiator spirit. However, without such firm determination to provide a real service to the Army, we may restrict the proper growth of Army Aviation. Our "crown" may grow additional thorns and become really uncomfortable.

MASTER ARMY AVIATOR

MAJOR WILLIAM G. KILMER, the Master Army Aviator above, is an Industrial Mobilization Trainee at Hiller Helicopters, Palo Alto, Calif. As of 15 September 1958, he will be assigned to the Training and Organization Division, Transportation Section, Hqs, USCONARC.

Holder of a private pilot's license prior to entering the service, Major Kilmer graduated in 1942 from the Liaison Pilots' Course P-9 at the Artillery School, Fort Sill. From 1942 to 1945, he served as a Liaison Pilot with the 90th Infantry Division, took part in the Normandy invasion, and received the Silver Star.

He was the first Army Aviator to be assigned to the Office of the Chief of Information, Department of the Army, serving in that capacity from 1951 to 1952. Other major military assignments include command of the 506th Helicopter Company at Fort Benning in 1953 and command of the 6th Helicopter Company in Japan and Korea from 1954 to 1955. He was assigned to Fort Rucker in 1956 as Transportation Corps Liaison Officer, and became the first officer to hold this position.

He majored in Education at Drake University, Des Moines, Iowa, graduating in 1939. His service schooling includes the Associate Course at Command and General Staff College, Fort Leavenworth (1952), and Helicopter School (1954).

Major Kilmer is the second Army Aviator to receive an Airline Transport Rating, which he was awarded in 1950. Instrument rated and dual qualified, he has logged more than 3,200 hours of first pilot time in Army aircraft.

"I was fifteen feet off the ground. I was in a right turn. Yet I was holding full left rudder and full left aileron. My right propeller was feathered. The stall warning horn was blowing like mad. Straight ahead the top of a palm tree stuck up above the horizon. Beyond it lay the Florida swamps. The roof of my mouth was dry. Beads of sweat became rivulets. I was scared. In fact I had never been so scared in the nineteen years I had been flying.

"Later I realized that I had witnessed a similar harrowing experience nearly ten years before without being aware of it at the time. You see, at that time, as a strictly single-engine pilot, I had never heard of MINIMUM SINGLE-ENGINE CONTROL SPEED! Pardon the capitals. I have since seen this written as V1, Vse, Vmc, etc., but it is my firm conviction that this all-important speed cannot be spelled out too plainly."

The above quotes are from an article entitled "The Big Scare" which appear in the July, 1957, issue of the UNITED STATES ARMY AVIATION DIGEST. This article presented a dramatic and lucid account of the author's introduction to minimum single-engine control speed. One month after it was published, two Army Aviators lost their lives in an attempted single-engine go-around.

The Seminole was making a right hand traffic pattern approach to runway 7, with the left engine shut down and its propeller feathered. This runway was 2,230 feet long with overruns of 500 feet on each end. The weather was VFR. As far as can be ascertained, the aircraft was in good mechanical condition. Occupying the left seat was a Senior Army Aviator (2,666 hours total; 108 hours in the Seminole) who was receiving dual instruction. The instructor pilot in the right seat was also a Senior Army Aviator (3,603 hours total; 625 hours in the Seminole). The flight was properly authorized and cleared for training purposes. The aircraft had made several landings prior to the accident. On the last approach, a touchdown (or near touchdown) was made at

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

Bird Dog Classic—II

AND IT HAPPENED that in ancient days, there chanced to be a young page who was considered the most normal man in the kingdom. All manner of folk gainsayed him thus. And it came to pass that when he had met the test and had risen to knighthood, he was called Sir Normal. For such was the way in that day.

Sir Normal was assigned to the Bird Dog Brigade of His Majesty's Flying Artillery. He applied himself diligently and earnestly strove to become proficient in the ways of his craft. And it came to pass that when he had mastered the maneuvers of the beast and was filled with the confidence of his youth, he descended from the heights, having it in mind to return the Bird Dog to the stables.

The confident knight made a normal approach on a left base leg for alighting to the north. It chanced that the wind was calm on that day and he lowered 45 degrees of flaps, the better to lower the alighting speed of the craft.

The Bird Dog lit in a normal manner, with the knight in complete command. It traveled straight down the alighting path for the distance of a strong arrow shot (400 feet). After traveling three-quarters of this distance, the knight noticed that all was not well with the tail of the craft; it seemed suddenly light. He pulled aft on the controlling stick and the Bird Dog began to turn to the starboard. Sir Normal engaged full left stirrup, but the craft continued to turn and began to skip lightly over the sod. The left wing dipped to the surface and scraped itself thereon, while the right foreleg broke at the hip. The

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approximately the halfway point of the runway.

Simultaneous with touchdown (or near touchdown), full power was applied to the operating (right) engine. The Seminole yawed to the left on a heading approximately 30° from the runway. It passed over a hangar near the runway, clearing it by 5 to 10 feet, and continued across an open area in a left wing-low attitude. The landing gear was down and flaps were fully extended. Beyond the open area stood two smokestacks (125 feet high), at a distance of 1,300 feet from the runway. To the left of the smokestacks was a line of factory buildings (40 feet high). These were the obstacles confronting the pilots as the aircraft passed over the hangar building and open area.

The Seminole continued in a left wing-low yawing attitude. A greater degree of bank caused it to miss the smokestacks and pass over the first factory building. After clearing this building, the aircraft rolled to the left, crashed into the factory courtyard and burst into flames on impact. This accident was nonsurvivable; death for both pilots was instantaneous.

WRECKAGE EXAMINED

Examination of the wreckage

Bird Dog stumbled to a swirling stop.

And the gray beards came in a mournful fashion to examine the broken craft and read the signs on the turf. And when they had finished, they called upon the knight and spake in this manner:

"Whyfore didst thou not have the controlling stick back to prevent the lightness of thy tail from the moment of alighting?"

"What caused thee to fail in the use of the brake?"

"Why didst thou not use the power, for such is the way of torque that it will aid in the stopping of a starboard turn?"

"Why didst thou not use a measure of down aileron on the outside of this turn, for surely drag was sorely needed in that place?"

"All these things have we asked thee, to no avail! The scribe has written for all to read and his scrolls prove that the last portion of the alighting roll is no place to relax thy command of the craft."

"As sure as the horse needeth reins, thy Bird Dog needeth full directional control even until thou art ready to dismount!"

"Let not the *normal* approach nor the *normal* alighting lull thy senses. For it is written: 'Thy flight continues until the engine is silenced'."

"Go and tell thy children, and thy children's children, lest they also stumble on this path."

And the gray beards raised their cups in unison. For they were very wise, and such was the custom in those days.

BIRD DOG RATE SOARS

During the three year period, 1955-1957, the Bird Dog accident rate has grown from 34 per 100,000 flying hours to 58 per 100,000 flying hours. This represents an increase of 70.6%.

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revealed the following:

a. Landing gear down and locked.

b. Flaps fully down.

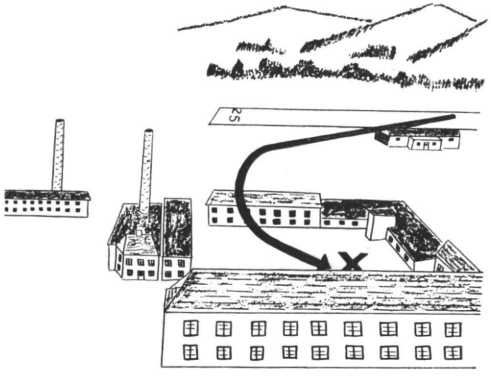
c. Left propeller feathered.

d. Right propeller pitch change transmission cam in full high position.

There was no known materiel failure which may have contributed to this accident. A technical team examined the wreckage and could find no evidence of mechanical failure. Both eyewitness reports and mechanical evidence indicated that the right engine was developing full power and the left engine propeller remained feathered until impact.

The application of full power to attempt a single-engine go-around in landing configuration, *at low altitude and low airspeed,* is every bit as lethal as pulling the pin from a live grenade in a sealed room. The odds are overwhelmingly against you!

Final resting place for Seminole



Flames destroyed most of this Seminole

The Operating Handbook tells the story. TO 1L-23A-1, page 36, contains this note:

"With full flaps and gear down, level flight cannot be maintained on one engine; *unless you have a safe margin of airspeed and altitude, you are committed to the landing. DO NOT ATTEMPT TO GO-AROUND.*"

CAUTION

The single-engine go-around procedures on page 38 of this same publication contain this caution:

"Elevator control forces at the start of a go-around are not excessive; however, *extreme rudder control will be required at low airspeeds* and if insufficient or applied too slow, the airplane can go into an uncontrolled roll."

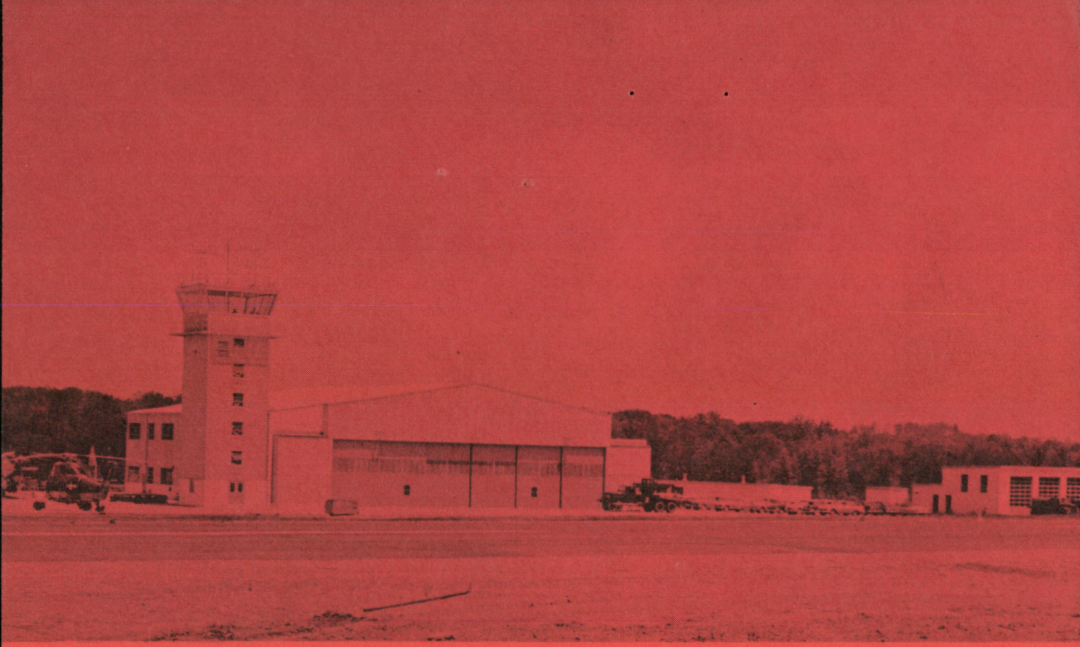
Altitude and particularly *airspeed* are the two margins that must be maintained to safely practice single-engine go-arounds. Although the Operating Handbook says to maintain at least 85 mph at the beginning of a go-around, remember that 85 mph is the bedrock bottom for maintaining control! It is re-emphasized that 100 mph is the minimum *safe* single-engine airspeed in the L-23 type aircraft when practicing single-engine operation in the traffic pattern.

Solution to PUZZLER

On the basis of the factual information contained in the PUZZLER on page 27, the recommended solutions are as follows:

Make an immediate approach upon arrival at your destination.
Cruise 6,000 feet to your destination.
Make any amount of descent you desire, but do not go below the minimum en route altitude before reaching your destination.

NOTE: *You are encouraged to submit comments to the Editor-in-Chief of the U. S. ARMY AVIATION DIGEST on the contents of the problem or on any of the material appearing in the magazine.*



Above is the front view of the new rotary wing hangar of the 3rd Trans Co (Hel) and 153rd Trans Det (CHFM), new tower, and new fire station. Below, the Headquarters building is seen at the left, while the rear of the rotary wing hangar is at the right.

In addition to serving Fort Belvoir and the U.S. Army Engineer School, Davison Army Airfield is the home of a fleet of aircraft used by Department of the Army officials. Army air traffic destined for the Washington, D. C., area also uses this field, and a total of 385 transient flights were recorded in May, 1958.

A single 3,000-foot runway handles the entire traffic load at present. Completion this summer of a new heliport parallel to the main runway will ease some of this traffic congestion.

The recent transatlantic hops of Seminole Deltas to Europe and the Far East owed much of their success to the Davison facilities which provided the final stop for maintenance, checking of equipment, and other necessary essentials preceding these ferry flights.

Davison has standard radio facilities as well as a GCA for training purposes. Growing pains continue and FY 59 construction calls for completion of another hangar and a rotating beacon with new runway lights.