Med Plans + Operations Div

SEPTEMBER 1958

UNITED STATES ARMY AVIATION DIGEST

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FORT RUCKER, ALABAMA

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NG: State AG.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

UNITED STATES
ARMY AVIATION
DIGEST

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COVER

A view familiar to more Army Aviators than any other except Ozark Army Airfield is this one of Post Army Airfield, Fort Sill, Okla. With a medium (Mojave) helicopter company and Otter company based here, it is the home of 30 Mojaves, 35 Bird Dogs, 10 Choctaws, 10 Sioux, 4 Beavers, and 1 Seminole. Its tower handles about 5,300 separate flights each month. The Fourth U. S. Army Instrument Pilot Training School is located here, and the Redleg Flying Club also operates from the field. The front cover view, from southeast to northwest, shows the one hard surface runway 5,000 feet long. The sod surface will accommodate aircraft up to C-130s or equivalent weight.

Notes from the Pentagon

Pros Are Made Not Born

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

COLLEGE AND HIGH SCHOOL stadiums across the country are springing to life. Thousands of eager young athletes are straining to punt farther, tackle harder, and muscle their way into coveted positions on the first team. These young men push themselves beyond the normal limits of human endurance in hopes a watching coach will tag them as future All-American material: These are amateurs.

At the same time, groups of other, slightly older, men are trotting onto the fields of closed stadiums to begin their practice sessions. Every motion of these men is made with deceptive ease, appearing almost casual to the untrained observer. With all their accuracy and precision, they hold something extra in reserve. No motion is wasted, and every movement has a purpose: These are professionals.

The true stamp of a professional is not limited to the fields of sports, medicine, law, and the arts. It can be found on others from all walks of life. Regardless of what any man's vocation may be, from the most humble to the mighty, the real professional exhibits abilities that place him far above the efforts of any amateur.

What makes a professional—training? Unfortunately, the answer is no. Schools can only provide training in the fundamentals of any particular subject. To qualify as a professional, the graduate must continue his study until he has learned everything there is to know about his field. In these days of rapid advances and changing techniques, this usually applies until retirement, and after.

Does knowledge make a professional? Again, the answer must be no. Knowledge without application is like an engine without fuel; it just won't operate! Knowledge and application must be combined to produce the professional. Here is where the amateurs begin to fall, for this is the crucial step that demands hours, hours, and more hours of practice. The true professional who is not completely devoted to his field is rare indeed. There are no short cuts to this result.

At no time in its history has Army Aviation demanded pro-

fessional abilities more. New and more complex equipment, expanded utilization, and all-weather concepts combine responsibilities far above the capabilities of amateurs. Army Aviators are challenged to meet this demand—meet it in a professional manner.

Professional aviators know their equipment. They know the limitations of their aircraft and skill. Neither false pride nor ambition will cause them to exceed these limitations.

Why all this talk about professional qualifications? *During the first 6 months of calendar year 1958, 10 major helicopter accidents and 18 fatalities were caused by Army Aviators flying into weather conditions with which they were unable to cope.*

Amid ever-rising costs for equipment and training, budget restrictions require that noncombat losses be held to a minimum for successful accomplishment of the Army Aviation mission. Accidents of this type are avoidable.

Coaching amateur football teams can be a frustrating occupation. If you doubt this, keep your eyes on the losing coach at the next high school or college game you attend. You'll see him pacing the sidelines, sending in a constantly changing lineup in a desperate effort to find a combination that will stop the opposition. He often cannot predict the manner in which his players will perform, individually or as a team. Successful coaches of professional teams are seldom faced with this dilemma. They know the capabilities of players and teams. Game strategy and substitutions are based on this knowledge. Uncertainty is of minor concern.

Army commanders cannot afford to rely on amateur aviators. They must know the operational capabilities of individual aviators and units. This implies a responsibility on the part of each commander to provide the aviators of his unit(s) with the knowledge and application necessary to insure professional standards. *It further implies a responsibility not to exceed the limitations of equipment or personnel.*

Only in this manner can professional standards necessary to Army Aviation be established and maintained.

Only in this manner will Army Aviation reach maximum operational capability and accomplish its mission without the hindrance and expense of needless noncombat losses.

QUOTABLE QUOTES

"As those of you who have visited our U. S. Army Aviation Center well know, we have not been idle in our efforts to provide ourselves with the eyes and vertical mobility we need to stay alive on the atomic battlefield." — General W. G. Wyman (USA, Ret)

The Soviet Helicopter Program

Theodore A. George

DURING THE PAST few years there has been a noticeable increase in the number of press references to Soviet helicopters. Brief articles have also appeared from time to time on alleged progress in rotary wing aircraft technology which has taken place in the USSR. In view of this apparent activity in helicopter development and the fact that helicopters are currently in use throughout the Soviet military establishment, it is of considerable importance to the U. S. Army to appreciate fully the extent of helicopter progress in the USSR and its effect on Soviet military capabilities. The purpose of this article, therefore, is to summarize the current and probable future state of helicopter development behind the "iron curtain."

HELICOPTER DEVELOPMENT

Although the current emphasis on helicopter development in the USSR is recent, having started sometime during the Korean War, the Russians are by no means newcomers to this field of aeronautics. Research in rotary wing aircraft design can be traced back to the period 1909-12 when B. N. Yurev designed a small helicopter known as the model 1-EA. A prototype of this vehicle was built in the early thirties and actually flight tested around 1932. Several other small helicopters were built during this period. The most notable design was that of the "Omega,"

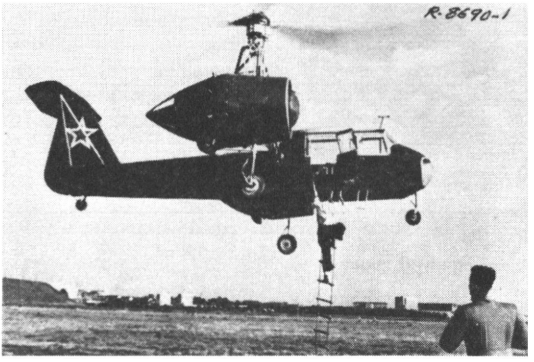
Hound (MI-4) loading 57 mm antitank gun

which was completed in 1939. The project was shelved during World War II. It was revived in 1945, when a prototype of the Omega was built and flight tested. However, like most other countries, the USSR failed to develop an efficient helicopter useful for military transportation until recent years.

AERONAUTICAL RESEARCH

There is good reason to believe that helicopter development in the USSR enjoys a high priority, only slightly below that of combat aircraft. Consequently, it is not surprising that all of the numerous Soviet organizations connected with aeronautical research devote considerable attention to theory and practical aspects of rotary wing aircraft design. The following is a partial list of the more significant organizations concerned with aeronautical research activities:

The Hare lifts more than Chickasaw



The Omega—a prewar design

a. The Academy of Sciences of the USSR exercises a controlling influence over almost all scientific effort through the control of funds. Many of the more prominent aerodynamicists and aircraft designers are also members of the Academy and receive much of their guidance from it.

b. The Central Aerohydrodynamics Institute is the Russian equivalent of our NACA. Much of the basic scientific work and experimentation is conducted by the Central Institute. This organization operates under the over-all policies prescribed by the Ministry of Aviation Industry.

c. The Flight Testing Institute performs most of the experimental flying and testing. In addition to testing complete aircraft, the Institute tests certain new components, such as communication and navigation equipment, before they can be accepted for operational use.

d. The Aero Engines Institute directs the design and testing of new powerplants. A number of

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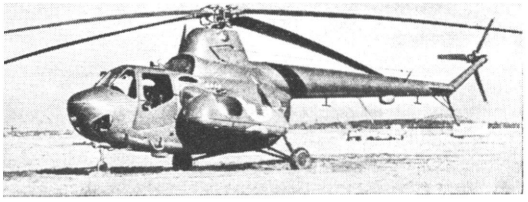
Theodore A. George, a mathematician and aeronautical engineer, is the Aviation Technical Consultant, Office of the Assistant Chief of Staff for Intelligence, Department of the Army. Views expressed in this article are the author's and are not necessarily those of the Department of the Army or of the U. S. Army Aviation School.—The Editor



The Hare in medical evacuation role

small, but self-sufficient, design teams operate under supervision of the Institute.

e. The Aviation Materials Institute is responsible for airborne development and metallurgy applicable to aircraft structures. New alloys and airframe construction techniques are thoroughly tested by this institute before they can be used.

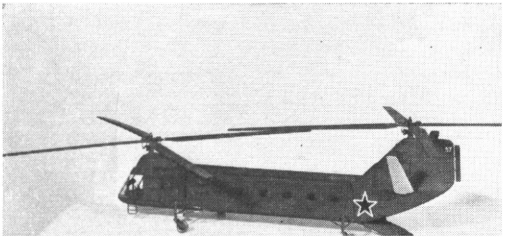
Of particular importance in the Soviet scheme of things is the maximum utilization of foreign scientific research and new ideas developed outside Russia. In order to ensure that foreign sources are used to the utmost, the Soviets have established a so-called Bureau of New Techniques. Among other projects, this organization translates and disseminates all foreign technical articles which may be of interest to Soviet aeronautical engineers. The speed of handling is nothing short of phenomenal. Articles from U. S. and other Western periodicals are distributed in looseleaf format to Russian engineers within a few days of their initial publication. In this manner the Soviets hope to avoid many blind alleys of unproductive research, while at the same time taking full advantage of promising projects initiated outside the Soviet Union.

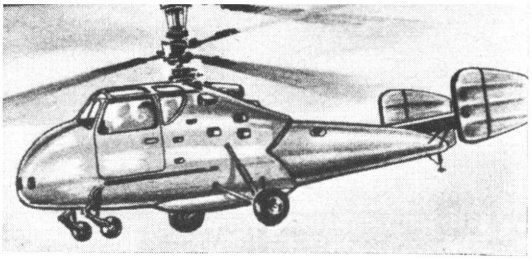
HELICOPTER DESIGN PROCEDURES

Specifications for the design of a new helicopter may be initiated in several places. Requirements for a new model could and frequently do originate in one of the military services. On the other hand, Aeroflot (the Soviet civil air organization) may establish the need for a new helicopter for special cargo or passenger service. After the requirement has been fully coordinated with all interested agencies and received the blessing of the Ministry of Aviation Industry and the Central Aerohydrodynamics Institute, it is assigned as a project to one of the helicopter design teams.

At the present time the Soviets have two full-time helicopter design teams. One is headed by Nikolai Kamov and the other by Mikhail Mil. The Kamov team has concentrated so far on helicopter designs incorporating the twin overhead rotors on coaxial masts (counterrotating for elimination of torque). On the other hand, Mil has been responsible largely for helicopters which, in many respects, resemble the Sikorsky design (single overhead main rotor and tail rotor). In addition to the two full-time helicopter teams, at least one other aircraft design team has been assigned to work on helicopters. It is probable that other teams have also worked on helicopter design when circumstances demanded it. Each of the design teams may call upon one of the Institutes for assistance involving basic aerodynamic research or advice in the selection of suitable component parts.

The Horse—heavy cargo helicopter





The Hen

Close liaison is maintained between the team and the agency which originated the requirement while work on the design is in progress. When the final design is completed several prototypes are built and tested both by the Flight Testing Institute for air worthiness and by the user agency for performance. If accepted by both, it is assigned for production to one of the several factories capable of manufacturing helicopters.

PRESENT HELICOPTER DEVELOPMENT

The Soviets now have in service or in prototype stage a complete line of helicopters, ranging all the way from the ultra-light single seater to a very heavy cargo type.

The smallest helicopter developed in the USSR is known as the HAT (K-10).* It is an open frame helicopter powered by a 50 hp reciprocating engine. This helicopter was developed by Kamov and incorporates the twin overhead rotors typical of his design. The HAT is equipped with floats and can land on ground or water with equal ease. It has only limited speed and endurance with negligible payload capacity. Its primary use is for short-range reconnaissance and courier missions.

One of the more recent helicopters to make its appearance on the Soviet scene is the HEN (K-15). This is also a Kamov design and is intended for reconnaissance and liaison employment. The HEN is powered by a small 260 hp radial reciprocating engine (nine cylinders). It has a range of about 200 nautical miles with a cruising speed of 65 knots. No significant payload is attributed to this aircraft; it can accommodate one passenger or observer in addition to the pilot. It is probable that the HEN is currently in production.

Even more recent than the HEN is another Kamov design known as the HOG (K-18). Essentially the HOG is an enlargement of the HEN. It can accommodate a pilot and three passengers, or 750 pounds payload. The increased gross weight of the HOG, resulting from enlarged fuselage, increased payload, and more fuel required, is probably made possible by improved rotor efficiency.

The HARE (MI-1) is the first helicopter to go into mass-production in the Soviet Union. Photographs of this aircraft were seen for the first time in 1951. It has been in continuous use since that time in both the Soviet military establishment and civilian economy. The HARE can be classed as a utility aircraft having a payload capacity of about 500 pounds, or 3

**The NATO names such as "HAT" are used throughout this article. Soviet nomenclature such as "K-10" is used only occasionally.*

The Hog—utility transport

The Hat—reconnaissance helicopter

passengers. However, the HARE also has been used for reconnaissance, in the absence of a specialized vehicle for this purpose. The HARE is equipped with a rotor blade deicing system and other features considered quite advanced for its period of development (1949-1950). The original HARE design has been modified recently and is called MI-3 by the Russians. The 575 hp engine has been replaced by one of 740 hp. A fourth blade has been added to the main rotor. The new HARE appears to have been designed specially for medical evacuation. A litter pod is suspended from each side of the fuselage.

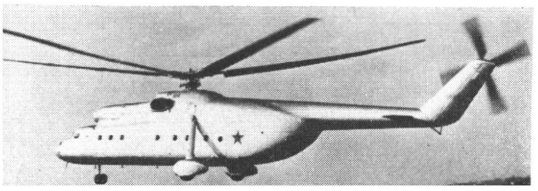
The HOUND (MI-4) has been the workhorse of Soviet Army Aviation. This versatile aircraft resembles our H-19. However, it is considerably larger than the H-19, having a payload of about 2 tons with a range of 200 nautical miles. A particularly significant feature of the HOUND is a set of clamshell doors at the rear of the fuselage. When open, a two-track ramp is lowered for loading vehicles and other heavy equipment. The HOUND has been in service with the Soviet Army since 1953 and is still in large scale production.

The largest helicopter currently in service with the Soviet Army is the HORSE (YAK-24). This large tandem-rotor helicopter was designed by a team headed by General Yakovlev. This is the only time that the Yakovlev design team is known to have been associated with helicopter development. The HORSE has a payload of nearly 5 tons and is equipped with a ramp door under the tail section for loading heavy cargo. The HORSE is equipped with two 2,000 hp reciprocating engines very similar to that of the HOUND. In fact, the entire power train in the HORSE is almost identical to that of the HOUND, with the only major difference being the interconnecting shaft between rotor systems for safety in the event of engine failure. The HORSE also has a range of about 200 nautical miles.

Last year the Soviets unveiled a prototype of a very large cargo helicopter designated HOOK (MI-6). This is the latest of the Mil designs and is believed to be in the testing stage at the present time. The HOOK is probably the largest helicopter in the world at present. Its gross weight is in the order of 70,000 pounds; payload is believed to account for between 20,000 and 25,000 pounds. Power is obtained from two 4,500 ESHP gas turbine engines.

Military employment of the HOOK is not clear. It is unlikely to be used for assault missions as are the HOUND and HORSE. However, there is little doubt

The Hook—heavy cargo helicopter



that such an aircraft could find useful application in logistics and improve the over-all mobility of the Soviet Army.

Today the Soviets can boast a relatively complete range of helicopter types, each designed for specialized usage. Although Soviet interest in this field dates back some 50 years, the bulk of the actual research and development work has been accomplished within the past 8-10 years. In order to accomplish this sizable task, Soviet engineers have been forced to neglect all but proven techniques of helicopter design. Thus, while the Soviets have achieved impressive results, they are still lacking in experience with unconventional designs and refinements of helicopter technology.

In the future it is probable that the Soviets will concentrate on attempts to improve helicopter operating efficiency. High on the list of future developments is the conversion from reciprocating to gas turbine engines. Also, the Soviets are likely to develop all-weather navigational equipment for their helicopters. With gas turbine engines and improved navigational equipment, Soviet helicopters could prove to be a potent tool on the battlefield of the future.

MASTER ARMY AVIATOR

MAJOR NORMAN W. GOODWIN, the Master Army Aviator pictured right, as Chief of the Plans Division, Office of the Director of Instruction, U. S. Army Aviation School, is influential in the development and coordination of instructional plans and supporting projects for the school. Prior to his current assignment at Fort Rucker, Major Goodwin served four years in the European Command. From 1953 to 1955, he was the Operations Officer and Executive Officer of the 328th Helicopter Company, which he joined at Fort Riley and accompanied to Europe. During 1955-57, the Major commanded the USAREUR Aviation Detachment at Heidelberg.

After OCS in 1942, he went to Denton, Texas, for primary flight training and to Fort Sill for tactical flight training, completed in 1943. As Liaison Pilot with the 941st FA Bn, he participated in desert maneuvers during 1943-44, then accompanied the battalion to the European Theater in 1944. In World War II, he earned the Air Medal with four Oak Leaf Clusters and the Croix de Guerre avec Etoile de Bronze. From 1945 to 1949, he served as instructor in the Department of Air Training, The Artillery School. He completed helicopter training in 1946 at Sheppard Field, Texas, to become one of the Army's first helicopter pilots.

In 1949, he headed west for an overseas tour with the 1st Cavalry Division Artillery. During the Korean conflict, his service merited the Distinguished Flying Cross with one Oak Leaf Cluster, five additional Oak Leaf Clusters to his Air Medal, the Bronze Star Medal, and the Presidential Unit Citation (Republic of Korea). Rotation in 1951 resulted in his assignment again as an instructor in the Department of Air Training, TAS, for two years.

As a member of Class No. 12 of the Instrument Flight Course at Fort Sill, he became instrument qualified in 1953 and was awarded a Special Instrument Certificate in 1958. Major Goodwin is both rotary and fixed wing qualified and has logged more than 4,800 hours in Army aircraft.

How's Your Proficiency?

CWO Gordon L. Coles, TC

HOW GOOD A FLIER are you? Are you satisfied with your performance? Is your Aviation Officer happy with your proficiency? Has the unit IP given you the nod on all you're supposed to know? Or was the nod half-hearted and modified by, "Better clean up those steep turns." Even though your check ride brought approbation, it's your duty to keep things that way.

YOUR DUTY

AR 95-32 makes it plain that maintaining your flying proficiency is a military duty. Your commander is charged only with providing the equipment and time. It's your responsibility as an aviator to see that you are trained to cope with any situation.

NO PRO

A reserve officer on two weeks active duty with an infantry division, after taking a check ride in a Bird Dog, decided to go on a local flight. After preflight inspection and runup, the aviator taxied the aircraft to the takeoff position and started the takeoff roll, applying abrupt full throttle. Shortly after the roll started, the aircraft began a turn to the left toward a building and another taxiing aircraft. The aviator applied right brake and rudder; the aircraft straightened momentarily, then started a turn to the right. He applied left brake and rudder, but the aircraft continued turning. It made an abrupt ground loop to the right, skidded backwards approximately 35 feet, and came to rest on the left wing, with the left main gear collapsed.

RUSTY FLIER

Red-faced explanation revealed a state of rustiness. Any reserve officer who flies rarely should have something more than a simple checkout. But what about the officer who takes a turn in the pilot's seat every four weeks? Let's face it—even 80 hours a year isn't going to keep him—or you—in top shape without a systematic plan.

You should face the fact that you're being paid for your ability to cope with any emergency that may arise. To do this, you must make a determined effort to follow a proficiency program tailored to your needs.

Proficiency checks run all the way from the thorough checkout required by Seventh Army to that of the Aviation Officer who gets out of the wrong side

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CWO Gordon L. Coles is an instructor in the Mojave, Department of Rotary Wing Training, U. S. Army Aviation School, Fort Rucker, Ala. A former Marine pilot, he has logged more than 4,000 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

of the sack determined to run his aviators through check rides. Whatever your setup, when the chips are down, it's your responsibility and your advantage to keep proficient and to improve your skill to the highest level possible.

Keeping proficient is safety insurance, too. Analysis of 48 private pilot accidents indicates that 25 percent occurred to pilots who had renewed their CAA physical during the 30-day period prior to the mishap. CAA's verdict: "A state of rustiness." Don't let this happen to you.

KEEP SHARP

It's not a "great big deal" to set up a program that will keep you sharp enough to take care of ordinary emergencies. A professional minded pilot can set up and carry out a program for himself. Any successful program, however, must be well planned. Nothing can be gained until you know exactly what you want to accomplish. Set your objectives when you know your needs.

In filling this first need—an objective analysis of your flying ability—call on the unit IP or check pilot. At the end of a check ride this man can give you a pretty good idea of your weaknesses. The check pilot watches you go through maneuvers and applies standards to what you're doing. If something isn't up to scratch, he'll tell you about it. If necessary, he'll make suggestions for general flying improvement and call attention to unsafe practices. This ride will accentuate the negative—your shortcomings—and you can bet it'll help you do a better job of flying.

Not every pilot needs the same amount of practice to maintain proficiency. That makes this first check ride important. You'll know where to concentrate. Most aviators admit that 80 hours annual flight time is just barely enough to maintain minimum proficiency. It's not enough to keep instrument proficiency unless a good plan of attack is followed. All Army Aviators must be instrument qualified by 1961, so the handwriting on the wall is very plain indeed.

CHART CAN HELP

Charts are boring to most of us, but sometimes they're necessary. A chart is provided for your convenience at the end of this article to help you get the show on the road. It's up to you. Keep your chart handy and check it as you progress.

Aviators flying many long nonstop administrative flights do not ordinarily get much practice on takeoffs, instrument approaches, and landings, so herein such a pilot should watch his proficiency. Your program must include practice on maneuvers which you don't regularly perform in daily or weekly flying.

TAKE IT HARD

You'll get nowhere if you don't take your program seriously. Flying boils down to this: If you can't handle every emergency that *might* pop up on *any* flight, you'd better turn in your wings. If you don't, you might become a statistic! A proficiency program will put you on the road to be-

coming an "old pro," although it isn't a magic formula that works by itself. While it will help organize your effort to the best advantage, *you* still must furnish the effort.

TAILORED TO FIT

Your own private program must have a minimum standard. A regular check ride should be taken at fixed intervals to evaluate your progress. The unit IP or someone designated by the Aviation Officer will be glad to do this. The check ride measures your proficiency; thus, it is very important.

The very heart of the pilot proficiency program is the instrument check. A checkout in a new or later model isn't enough. Neither will the annual written exam keep you up to a satisfactory level. You can't practice emergency procedures once a year and still expect to be sharp 6 months later. So the entire program can be built around maneuvers for an instrument checkout.

THE HOW AND WHY

The program should be set up to practice all maneuvers on the following chart at least once every 60 days—preferably more often. Except for the emergency procedures, most of these can be practiced on administrative flights. Track to a station once in awhile with ADF instead of omni; make your climbs, descents and headings precise. If

INDEX OF MANEUVERS

PILOT PROFICIENCY	1st Qtr.	2d Qtr.	3d Qtr.	4th Qtr.
Takeoffs, normal and crosswind				
* Climbs and climbing turns				
* Maneuvering at low airspeeds				
* Stalls				
Forced landings				
* Simulated additional emergencies				
Gliding spirals				
On-pylon eights				
Lazy eights				
Chandelles				
* Traffic Control procedures				
* Steep and timed turns				
* Recovery from unusual attitudes				
* Radio navigation and orientation				
* Instrument flight procedures				
Aborted landings (Go-Arounds)				
* Rapid descents and climbs				
* Single engine procedures (multi-engine)				
Single engine landings (multi-engine)				
* Operation of aircraft emergency equipment				
Search and rescue procedures				
Power-off spot landings				
CAA regulations and rules				
Short field landings and takeoffs				
Passenger briefings and evacuation				
First aid and survival rules				

* For hooded or instrument flight

instrument rated, file IFR into and out of high density areas. Follow this program faithfully and you'll find your proficiency won't taper off after sweating out the Annual.

The chart will help you locate your area of need. Each time a maneuver is performed well, check it off the list. At the end of two months, you'll know which maneuvers you've missed and must practice.

Every flight can be a training flight. Once each trip, mentally run through all the emergency procedures for the aircraft you're flying. Get these from the Dash-1 Handbook. At least once every 60 days take a proficiency flight and simulate these emergency procedures. On this flight, also go through procedures your personal chart shows you've missed.

This is a program that has many facets. There's self-improvement that is highly satisfying to all of us; your value to the service is enhanced; and lastly, don't forget the check pilot—he'll be pleasantly surprised to find you've really improved your proficiency.

PUZZLER

THE DIVISION G3 has just briefed you on the plan for employment of the ground elements of the division. As the Division Aviation Officer, it is your responsibility to plan the employment of the Division Aviation Company to support these ground units. The G3 plan calls for two batteries of 105 howitzers from Division Artillery to reinforce the 1st Battle Group. The batteries so employed will require as many as three observation airplanes.

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

You recommend that:

- ☐ **The Div Arty S3 direct the Artillery Flight Commander to provide three observation aircraft to support the two 105 howitzer batteries in support of the 1st Battle Group.**
- ☐ **Three observation aircraft be attached for an unlimited period to the Combat Support Flight of the battle group which the howitzer batteries are reinforcing.**
- ☐ **Three observation aircraft from Artillery Flight be attached to the Combat Support Flight for the period the howitzers are reinforcing the battle group, after which the aircraft revert to the control of the Artillery Flight Commander.**
- ☐ **The aircraft remain under the control of the Artillery Flight Commander, and the Commander of the Combat Support Flight of the 1st Battle Group makes a daily request for the number of aircraft needed.**

The recommended solution to the PUZZLER may be found on page 22.

ARMY AIRCRAFT MAINTENANCE IN THE PENTOMIC ARMY

Colonel Frank G. Forrest, *Inf*

ANY PROGRAM AIMED at the full and logical exploitation of aircraft as an Army vehicle must recognize that aviation flies on its maintenance in much the same way as "an army marches on its stomach." In aviation units the state of maintenance is particularly significant because aircraft are exceptionally sensitive to maintenance. In order to be operational, an aircraft must be mechanically sound in every respect. Successful accomplishment of the Army Aviation mission, therefore, is possible only when a system of maintenance is employed which is readily responsive to the needs of the units charged with the execution of the mission.

CATEGORIES

Prior to the advent of the Pentomic era, Army Aviation generally consisted of small flight detachments called aviation sections which were organic to artillery battalions, infantry regiments, signal battalions, engineer groups, etc. These sections were equipped with comparatively simple aircraft. Although the function performed by these planes was important, the over-all capability of aviation in the Army was limited. The general plan for aircraft maintenance followed the same pattern as maintenance for other Army equipment. The five echelons of maintenance were divided into three categories. First and second echelons comprised organizational maintenance; third and fourth comprised field maintenance; and fifth was depot maintenance.

ORGANIZATION

In each of the various aviation sections, mechanics, known as crew chiefs, were assigned to perform organizational maintenance. By virtue of the relative simplicity of the aircraft, an acceptable rate of availability could be maintained in the organization. Backup maintenance for the many different flight elements in the field army area was performed by field maintenance companies. These technical service companies were assigned at one per corps, with a heavy maintenance and supply company in general support at army level. Command of the various field maintenance companies was vested in a maintenance battalion headquarters and headquarters detachment, which was assigned as a field army unit. The command line between the aviation element

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Colonel Frank G. Forrest, Aviation Officer, U. S. Sixth Army, has had three previous articles published in the DIGEST. The most recent was ACCIDENT PREVENTION — A COMMAND RESPONSIBILITY in the Nov 1957 issue. 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

and the field maintenance unit was from battalion or regiment, through division headquarters, corps headquarters, army headquarters, maintenance battalion headquarters, to maintenance company headquarters.

EXCEPTION

With the coming of the helicopter company, the Army made an exception to the plan just described. It was realized that an acceptable rate of availability with the large transport helicopters could not be maintained by the unit within the scope of first and second echelon maintenance. Therefore, a field maintenance detachment capable of performing third echelon maintenance was activated for each helicopter company. Successful use of these detachments has been realized when they have been in support of or attached to the helicopter companies.

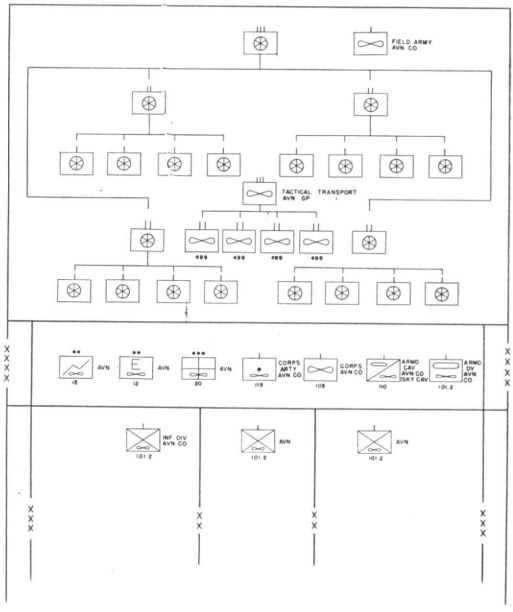
PENTOMIC AGE

The dawn of the Pentomic Age has been accompanied by a change in the general organization and scope of Army Aviation. To meet the requirements for increased mobility and for additional missions under pentomic concepts, the trend is steadily toward the development of company size or larger aviation units. Aviation companies exist or will exist in the division, corps, corps artillery, and field army. Also, there will be units of the type known as Aerial Combat Reconnaissance Companies in the Pentomic Field Army. Other types of aviation units in the field army are helicopter ambulance companies, and tactical transport battalions consisting in the type field army of three light helicopter companies, one medium helicopter company, and one fixed wing company. All these units are equipped with complex aircraft requiring frequent third echelon maintenance functions to keep them operational. If the present aircraft maintenance system continues to be used in the Pentomic Army, it will result in a field maintenance organization of vertical structure of rather large size (see figure 1).

DIFFICULT TASK

The task of coordinating the organization shown in figure 1 with the many separate aviation units in the field army under the complex chain of command previously described appears to be very difficult. Dispersion among units and the tempo of movement on the modern battlefield will create situations which will

Figure 1



require on-the-spot coordination of maintenance and operations effort. The present system does not facilitate this coordination. Therefore, the aircraft maintenance system should be modified to meet the situation presented by the new Army. A new streamlined system, called the Pentomic Aircraft Maintenance System, should be adopted. Elementary features of this system should be:

a. Permits aviation organizations to achieve an acceptable rate of aircraft availability with their own resources.

b. Makes economical use of personnel and equipment.

c. Provides for backup heavy maintenance which is impractical in the forward areas.

SIMPLIFICATION

The Pentomic Maintenance System is simplified as compared to the existing system. Within the five echelons of maintenance, only two categories are established. The category known as field maintenance is eliminated, and the scope of organizational maintenance is increased to include all functions that can be performed by ground or airmobile shop equipment. This probably will include what was formerly considered first, second, and third echelon maintenance. The second category, depot maintenance, includes everything not performed by organizational maintenance, and is accomplished in semimobile or fixed-shop facilities.

AGE OF SPECIALISTS

The aircraft maintenance organization in a type field army in the Pentomic System utilizes three general types of enlisted maintenance personnel: flight engineers, specialist-repairmen, and general mechanics. Flight engineers are assigned to the flight elements of aviation units at a ratio of one per aircraft. They are part of the aircraft crew and are on flight status. General mechanics may also be assigned to flight elements to assist flight engineers or act as crew chiefs. Crew chiefs are designated for those aircraft which do not require or cannot accommodate the individual on board during flights. Flight engineers and crew chiefs assist the pilot in his duties as appropriate, and perform inspections, servicing, and adjusting (first echelon maintenance). Specialist-repairmen and general mechanics are assigned to aircraft maintenance units which perform the higher echelons of maintenance.

PLATOONS AND BATTALIONS

The Pentomic Aircraft Maintenance System provides for only two general types of maintenance units. They are: maintenance platoons which are organic to each aviation company or equivalent, and maintenance battalions which are assigned to depots. The maintenance platoons of the various aviation companies perform second and third echelon maintenance. Fourth and fifth echelon maintenance for all aircraft in the field army is accomplished by the maintenance battalions assigned to depots. The allocation of maintenance units for a type field army under this system is shown in figure 2.

Generally, each maintenance platoon is composed of a command, administrative, and supply element, and an operating element consisting of specialist-repairmen, e.g., rotor and propeller repairmen, airframe repairmen, and general mechanics. The exact size of a maintenance platoon will vary, depending on its workload which is measured by the aircraft equivalents to be supported. In the interest of economic utilization of specialist-repairmen and tools and equipment, maintenance platoons are assigned to aviation units having 50 or more aircraft equivalents.* Fifty aircraft equivalents have been selected as the maintenance load that warrants assignment of the various types of specialist-repairmen and tools. Under this system non-divisional aviation units having less than 50 aircraft equivalents will be supported by the corps aviation company, field army aviation company, or other aviation company for third echelon maintenance as appropriate. As a matter of interest, the present division aviation company has 101.2 aircraft equivalents. Composition and size of depot maintenance battalions will vary, depending on the total number of aircraft in the field army. Depot battalions have maintenance teams capable of moving forward where practical to assist the sundry aviation companies.

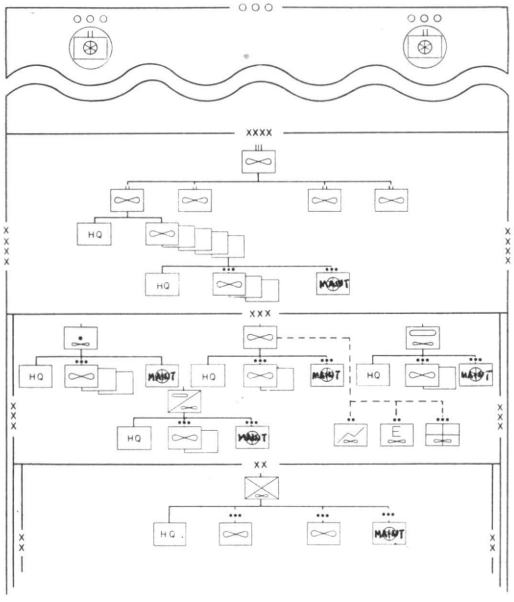


Figure 2

SEVERAL FEATURES

The Pentomic Aircraft Maintenance System should have several features in consonance with certain concepts of the Pentomic Army which warrant mentioning. The new Army organization has seen an integration of personnel of the various branches in one unit. The battle group, for example, is composed of infantry, artillery, engineer, and signal troops. The assignment of aircraft maintenance personnel to aviation units is an extension of this precept.

DISPERSED OPERATIONS

This system facilitates operating from dispersed positions and contributes to depopulation of the immediate combat zone. The number of supervisory personnel is comparatively less, thereby fostering the principle of increasing the over-all firepower-to-manpower ratio.

Adoption of the Pentomic Aircraft Maintenance System could

**An aircraft equivalent is the maintenance equivalent of one observation airplane (L-19). Maintenance equivalents of other Army aircraft are at present: L-20, 1.2; L-23, 2; H-13, 2.5; H-19, 3.5; H-34, 5; etc.*

be accomplished easily. All aviation companies in the new Army organization have assigned maintenance platoons of a limited third echelon capability. If augmented slightly and appropriately equipped, these platoons could perform third echelon maintenance functions for the entire company. The job of maintaining aircraft records and stocks of aircraft parts supply will not change materially, except that the supply inventory will increase.

IN EXISTENCE

Establishment of depot maintenance battalions will be rather simple in that an organization for this type of unit already has been developed. All that is required is the augmentation of these units to accomplish fourth echelon maintenance. In adopting this new system, the principal workload probably lies in the revision of regulations and manuals and convincing interested agencies in its intrinsic worth.

PARTS SUPPLY

Any discussion of aircraft maintenance should involve parts supply. Supply of aircraft parts in the Pentomic Field Army is complicated by the fact that the storage of parts must be accomplished at the depots; yet, those parts required for maintenance in the aviation units must be readily available. To be mobile, aviation units in the forward area must not be burdened with tonnages of aircraft parts. Units should keep on hand only those items that are used daily, and can be transported in the mobile shop. Another factor having a bearing on the problem is the long procurement lead time that exists on many aircraft parts. Therefore, economy in the use of those items is necessary.

AVAILABILITY, CAPABILITY UP

In the Pentomic Aircraft Maintenance System, these problems are solved by the employment of a Transportation Supply Control Office located in each logistic command. This agency acts as a central inventory and supply control point for all aircraft and aircraft parts for the field army or armies supported by a given logistic command. Records of the depot or supply point location and the quantity of all aircraft parts are maintained in this office. All requisitions for parts from any aviation unit are electrically transmitted directly to the designated Transportation Supply Control Office (TSCO) where electronic data processing machinery provides information as to the availability of the part and its location. Using electrical means, TSCO then issues airshipping instructions to the appropriate depot or supply point with information to the aviation unit concerned. Delivery of the part is made via the established theater and field army air transportation systems.

What's the Plan?

IT IS 1730 HOURS on a cold winter evening. You look out the window at the falling snow and slushy ground. The days are getting shorter. You put on your coat, turn out the lights, and reach for the door. It's 15 minutes past quitting time, and you reflect that it's no night to be flying. The loud jangle of the phone snaps you back to reality. You turn back and pick up the receiver.

"Flight operations. This is Captain Rogers."

"Captain, this is Sergeant Smith at the MPs. We just had a call that an Army plane crashed and is burning near the rail crossing on route 76. That's all we got from the fellow who called. What shall I do, Captain?"

What would you do?

Maybe this hasn't happened to you yet. But, if you stay in this business long enough, the chances are good that something like it will happen. What *would* you do?

Hundreds of questions pop into the mind in this situation. How to get there? Who is in the plane? Whom does it belong to? What about the ambulance? How do we get a doctor? What about fire? Who must know? How about MPs? Do they need a chaplain? How can we keep in communication? Could a helicopter land there? Who is supposed to investigate this?

Whoa, boy! Whoa! Hold it just a minute.

Let's get a plan. If your outfit is on the ball, you already have a plan. You call it the PREACCIDENT PLAN. Look in the file under that title, pull out the folder, and watch things fall into place.

Naturally, we all want to prevent accidents. But, no matter how carefully we plan, they will happen occasionally. The next best thing is to be prepared for accidents that do happen. The preaccident plan should contain specific instructions for each person involved. He will then know how and when to get to the accident scene and what to do when he gets there. The aircraft population and facilities available will determine how elaborate the plan should be. Even a two-plane field will use a preaccident plan based on part of the following:

1. Crash rescue plan.
2. An investigation board.
3. Working agreements with engineers, signal officer, PIO, surgeon, chaplain, transportation officer, and provost marshal.
4. Ready investigation kit and transportation to the accident scene for the investigation board.
5. Authority for the investigation board to call in technical assistance as needed.
6. Pilot briefing.

The two most important items are taking care of the injured and getting the investigation board to the accident scene as soon as possible. To accomplish

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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

these, a preaccident plan is just as necessary as a fire extinguisher in a building, a first-aid kit in an aircraft, or an ambulance at the hospital.

Let's take a closer look at the elements basic to a good plan.

CRASH RESCUE PLAN

Crash rescue is the key to your preaccident plan. Army regulations require a crash rescue plan which involves many items. The regulation* is too lengthy to be discussed in detail here. Covered in the crash plan are the preparatory measures, duties, and operating procedures essential to activate all emergency crash fire fighting and rescue services and associated supporting activities in a rapid and orderly manner. An alarm type system is used because preservation of life is the primary consideration. The regulation covers everything from crash crew training to necessary grid maps and authorized equipment. Many new developments have taken place since the writing of this regulation, especially in the role of helicopters as standby crash rescue vehicles. The other services have used helicopters this way for some time. Several Army airfields are now doing the same.

Locating downed or overdue aircraft can be expedited through a communications search. This is generally done by Air Traffic Control or Military Flight Service when an aircraft is reported missing, but may fall on your shoulders under certain circumstances. Many agencies are available to aid in locating or verifying a downed aircraft. Among these are: CAA communications stations, Ground Observer Corps, Civil Air Patrol, state and county police, radio and television stations, newspapers, public utility companies, U. S. and state forestry services, and adjoining military facilities.

SR 95-50-1 Procedure for Aircraft Fire Fighting and Rescue

INVESTIGATION BOARD

Investigating officers should arrive at the accident scene as soon as possible. At a well run airfield, it is not unusual for the aircraft accident investigators to arrive while rescue and fire fighting teams are still at work. This means that the investigators must be alert and ready to go on short notice. Aircraft accident investigation boards should be appointed ahead of time and enough officers should be on the board to assure the availability of the required number. It is desired that a meeting place be prearranged and transportation waiting there to take board members to the accident scene. *Care should be taken to appoint the most capable investigative personnel to the board.*

ASSISTANCE

Working agreements concerning duties and areas of responsibility should be made with the following.

Engineers — For surveying and mapping the debris pattern and preparing sketches.

Signal Office — For photographic and communication assistance. The photographer should arrive at the scene with the investigators. He must be capable of taking all necessary

pictures at the direction of the investigators.

Public Information Officer—For handling press relations. The press has a right to certain information regarding an accident. If proper information is not given, chances of unfavorable comments and undesirable publicity are increased.

Surgeon — Regulations* require an aviation medical officer on the investigation board. Although this officer is trained in the proper medical procedures regarding aircraft accidents, advance coordination must be arranged to assure his getting to the scene with the rest of the board. In the event an aviation medical officer is not readily available, arrangements should be made to secure one from another headquarters. The crash rescue plan covers other medical personnel and the ambulance.

Chaplain—For assistance in notifying the close relatives of personnel involved in accidents and related items.

Transportation Officer—For all transportation incident to accident investigations. This includes assignment of vehicles for board members and others rendering technical assistance. An advance arrangement, covering funding and packing, is desirable to assure prompt shipment of engines or aircraft parts to laboratories for analysis.

Provost Marshal — SOPs should be in effect which will assure that an adequate guard is immediately available at the accident scene. Prompt and efficient guarding of the wreckage will assure preservation of evidence and government property. The SOP will contain all special instructions needed for guards at an accident scene, to include handling of visitors, official and unofficial. In the event military guards are not available, instructions should include the procedure for securing civilian guards.

INVESTIGATION KIT

An investigation kit, containing all items that might be needed by the aircraft accident investigation board, should be ready to go at all times. The kit should be kept at the prearranged meeting place of the board.

SPECIALISTS

Authority for the investigation board to call in specialists (factory technical representatives, aerodynamicist, fuel analyst, USABAAR, etc.) should be clear and understood. The proper procedure for contacting these specialists should be recorded and kept in a convenient place.

PILOT BRIEFING

The rescue of pilot and passengers constitutes the main concern of any preaccident plan. Pilots can do much to save themselves and the passengers. Part of the preaccident plan should involve periodic pilot briefings on techniques to follow in the event of an impending or actual crash. Four basic principles are involved here: *anticipate, communicate, prepare for a wait,* and *cooperate.*

**AR-385-40*

Anticipate — Pilots should know all emergency procedures, be familiar with lost communication, bail-out over water, and survival procedures.

Communicate — Pilots should know all possible means to attract attention from the ground or water. This also applies to rescuers who should know the methods and have the means to communicate with survivors.

Prepare for a Wait—Survivors should know to prepare for a wait at all crash scenes. Even when the position is known, or an aircraft is overhead, it may take hours or days to effect the rescue.

Cooperate—Sounds silly that there's a need for cooperation from a downed pilot. But, it is necessary! The pilot should have a thorough knowledge of rescue procedures. For example: the downed pilot must be aware of certain helicopter rescue techniques in order to aid his own hoist rescue. Or, he may have to prepare a helicopter landing area.

There you have the essentials for a good preaccident plan. Your installation may find it suitable to add or take away from this plan, but the basis is there.

All the plans in the world won't help if filed away and forgotten. Review it for adequacy and bring it up to date at regular intervals. Keep all personnel completely informed of the plan and any subsequent changes. Test all parts of it from time to time. Dry runs will bring out errors or omissions, and may save a life at some later date.

If we cannot prevent an accident, let's at least be prepared for those that do happen. Have a plan — A PREACCIDENT PLAN.

Solution to PUZZLER

On the basis of the factual information contained in the PUZZLER on page 13, the recommended solution is as follows:

Three observation aircraft from Artillery Flight be attached to the Combat Support Flight for the period the howitzers are reinforcing the battle group, after which the aircraft revert to the control of the Artillery Flight Commander.

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 any of the material appearing in the magazine.*

A midair collision can spoil your whole day. Follow the rules; quadrantal separation is better than none. — FSF

Memo from Flight Surgeon

THE ARMY AVIATOR has no safer rule to follow regarding medical treatment than this: Consult a Flight Surgeon and adhere to his recommendations. An aviator may become sick at a place where no Flight Surgeon is available; however, in the interest of preserving health and flying safety he should seek treatment from a competent physician.

Since certain drugs produce reactions not compatible with flying safety, a pilot treated by a civilian physician should report to the Flight Surgeon upon return to his duty station. If possible, the Flight Surgeon should determine the contents of any prescription used in the treatment. This will assist in determining the pilot's physical fitness for flying.

The Army Aviator does not need extensive medical knowledge, but it is imperative that he be oriented in certain basic medical facts having a direct relation to his performance and flying safety. He should know the characteristics of certain drugs, and their potential for producing unfavorable reactions which could lower his level of skill as a pilot.

DRUG OR NARCOTIC?

You are not necessarily being doped when you receive "drugs" in the form of medication. The word *drugs* is a general term covering many medicines, including *narcotics*. In other words, all drugs are not narcotics—but all narcotics are drugs. Aviators should restrict their flying when under treatment with unknown medication or after taking any of the following types of drugs.

ALCOHOL. This drug causes a depression of the higher brain centers, with varying degrees of effect, including impaired coordination, decreased reaction time, also poor planning and judgment, all of which are essential to safe flying. Do not pilot an aircraft within 10 hours after ingestion of any amount of alcoholic beverage. If the amount is equivalent to 2 ounces of alcohol, do not pilot an aircraft for 24 hours following the last drink. Remember, bonded bourbon whisky is 100 proof, or 50 percent alcohol.

ANTIHISTAMINICS. Drugs of this group that are most available to military personnel are benadryl, chloratrimaton, and pryabenzamine. They are useful in shrinking and somewhat drying the mucous membrane lining of the nose and sinuses, which constitutes excellent treatment of sinusitis and certain allergic disorders. The unfavorable reaction of these drugs is sedation, with varying degrees of drowsiness and decreased reaction time, as well as occasional disturbances of equilibrium. Piloting an aircraft within 8 hours of a single dose

of these drugs is inadvisable.

ASPIRIN and APC preparations. These drugs are coal tar derivatives, and in the susceptible individual or in prolonged usage will produce a depressing effect on certain blood forming elements, which leads to abnormal white blood cell activity and a decrease in resistance to infections. You should not take more than two tablets of aspirin or APC per day for more than two successive days unless under treatment by a physician.

ANTIBIOTICS. These preparations such as penicillin, terramycin, etc., offer no determent to flying unless there is an immediate reaction within 15 minutes, or a delayed reaction after many days or weeks. The latter reaction is usually manifested by intense itching of the skin, as well as pain and swelling of joints.

BARBITURATES. This group contains such prominent drugs as phenobarbital, amytal, nembutal and seconal. In the absence of severe pain the principal reactions are relaxation, sedation, and sleep. Furthermore, these drugs are habit forming. The resulting decrease in reaction time and quality of judgment should preclude their use by flying personnel. Do not pilot an aircraft within 12 hours of a single dose of the above drugs.

BENZEDRINE. The inhaler form of this drug has been removed from the open market because of its habit-forming qualities. Benzedrine is a powerful stimulant and, with a reserve power in the body, it will counteract sedation and sleep. In the absence of this body reserve, benzedrine produces a depressing effect similar to the barbiturates. It also produces a shrinking of the mucous membranes in the nose and sinuses, which is the primary desirable effect in aviation medicine. This property has been incorporated in Benzedrex, a preparation which is not habit forming. It is permissible to use a Benzedrex inhaler occasionally during flight.

DIARRHEA MIXTURES. These mixtures usually contain an opium preparation combined with one of the barbiturates. The ill effects of diarrhea plus the decrease in reaction time and judgment preclude flying while under treatment with these drugs. You should not pilot an aircraft within 8 hours of a single dose of a diarrhea mixture.

IMMUNIZATION. Biological immunizing agents produce varying degrees of local tissue reaction and generalized systemic reactions, such as fever, malaise, muscle aches, and headache. Headache definitely reduces reaction time and judgment. The individual should not pilot an aircraft within 24 hours of receiving any single immunization, either the basic series or a booster shot. Smallpox vaccinations should be checked every other day until the individual is released by the physician.

MOTION SICKNESS DRUGS. All such drugs produce some degree of sedation, which is not

compatible with flying. Piloting an aircraft within 8 hours of taking a single dose of any motion sickness drug ("Mother Sills" included) is not recommended.

LOCAL OR BLOCK ANESTHESIA for tooth extraction or minor surgery. When the anesthesia wears off, pain returns or develops which is distracting in varying degrees. As a general rule, do not pilot an aircraft within 12 hours of the above treatment.

SULFONAMIDES. All sulfa drugs produce similar unfavorable reactions to the human body which differ only in degree. The principal reaction is depression of the blood forming elements, resulting in anemia or lowered white blood cell activity. This leads to visual disturbances, vertigo, impaired coordination and reaction time, weakness, and lowered resistances to infection. These manifestations are definitely not compatible with flying. A minimum of 48 hours should elapse after the last dose of any sulfa drug prior to any flying duty. One of the most important steps to be taken during sulfa administration is the consumption of at least three quarts of fluids daily. Absolute abstinence from alcohol must be observed.

TRANQUILIZERS. The use of these drugs by flying personnel is discouraged because of effects upon neuromuscular coordination, reaction time, concentration, and division of attention. Change 4, AR 40-110, dated 13 September 1956, imposes suspension from flying for four weeks after the last dose of any tranquilizer.

SELF MEDICATION

An unfit physical condition of the pilot constitutes a compromise of flying safety and an unnecessary risk to the lives of himself and his passengers. Despite this danger, flights are made daily by pilots who are physically unfit to fly. Subconscious fears may prevent a man from seeing his Flight Surgeon. Also, many pilots fear being grounded with loss of flight pay for any period of time. These fears result in failure to report "minor" ailments such as colds, hearing difficulties, and sore throats. The individual who seeks to cure himself with doses of aspirin, lozenges, and patent cure-alls takes an unnecessary chance. All too often, these attempts at self-medication are harmful. Insure your flight pay and stop avoiding the Flight Surgeon, who is one of your best friends.

PATENT MEDICINES

The "do-it-yourself practitioner" has thousands of proprietary compounds available in stores for his disposal. They are advertised by mass communications media to heal ailments from athlete's foot to baldness. To the uninitiated, the promise to cure liver irregularities as well as "tired blood" is more attractive than the possible consequences of reporting to the Flight Surgeon. Most of these compounds and patent-pills are not harmful by themselves; a few may even be beneficial. Some

ease and relieve (without curing) the symptoms of an illness. They neither heal nor touch upon the causes of sickness. They become dangerous when the user is lulled into a false sense of security as he begins to "feel better."

When used steadily over a long period, some become habit-forming; others which act as cumulative poisons on continuous intake may seriously damage the body.

The use of cathartics and laxatives is as bad a habit as it is common. An occasional catharsis may give relief, but the habitual use of salts, laxative chewing gums and chocolates, milk of magnesia, aperient waters, bromo-quinine, or any other regulator is decidedly harmful.

The pilot who dodges the issue of sickness for economical reasons should realize that the majority of patent medicines are a waste of his money. At best, they relieve painful discomfort and irregularities in body functions for short periods; they do not bring about a final cure. At worst, some drugs may kill you.

The claims of relief and cure made in public media may be impossible to deliver in your case. Advertising can be fraudulent, designed to deceive. A few, well-advertised indigestion cure-alls consist of sodium and calcium carbonates in fairly equal proportions. If you insist on this treatment for gastric disorders, these ingredients (soda and chalk) may be purchased, for a few cents a pound. In pill form, with a trade name, they cost more than 50 cents for 4 ounces.

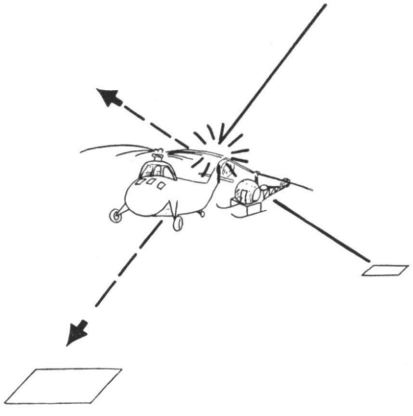
The pilot with a health problem should consult the Flight Surgeon rather than the patent medicine counter. The Flight Surgeon's expert knowledge and friendly advise very often can prevent serious complications, if he is given the chance to treat "minor illnesses" in their early stages. Remember to "check in" with him when you have been treated by a physician who is not normally concerned with aviation medicine. It is better to be grounded for a few days when medically advisable than to risk crashing or being permanently grounded later.

Flying both rotary and fixed wing aircraft and more than 300 missions, aviators of the 502d Aviation Company, 2d Armored Division logged more than 100,000 passenger miles during Exercise Strong Arm without an injury to a passenger or an aircraft accident, according to Capt Richard T. Heard, 502d Commander.

THE VALUE OF A LOOK is variable, depending entirely on the circumstances. One look would have been worth three lives and $224,487 in the following narrative.

A Sioux pilot came in for a landing. His passenger dismounted and the pilot, without properly clearing, proceeded to take off.

At the same time that the Sioux was on the approach, a Choctaw was making a descent to a landing area further upwind. The Choctaw pilot observed the Sioux and made a 360° turn to the right, then continued to descend. He saw the Sioux land and watched the passenger dismount, then centered his attention on the landing and several tall poles that had to be cleared. At this same time, the Sioux pilot began his climb from takeoff.



In a few seconds the two aircraft collided, at an altitude of 50-75 feet. The Sioux pilot may have seen the Choctaw just prior to contact. He was observed attempting to make a left turn. The main rotor blades of the two aircraft came together, causing those of the Sioux to disintegrate. The Sioux began to burn and fell, inverted, to the ground. The Choctaw seemed to hang momentarily in the air; then it dropped to the ground and came to rest on its left side. The Choctaw did not fall as fast as the Sioux, which indicates that it was still getting some lift from the sections of the rotor blades remaining. The pilot tried to control the aircraft, and it apparently responded to some extent.

Parts of the rotor systems

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.

One look might have prevented this accident

were thrown in all directions with tremendous velocity. Sections landed as far as 400 yards away from the impact area. A piece of a rotor blade from the Choctaw struck a soldier standing 509 feet from the collision and completely severed one leg.

This accident is the result of three important facts:

1. The Sioux pilot did not make a clearing turn prior to takeoff and apparently did not see the Choctaw until a moment before collision.

2. The Choctaw pilot continued on a flight path over the Sioux, although he had seen it on the ground with the rotor turning.

3. The location of the two landing areas, the surrounding obstacles and wind direction made the landing and takeoff paths from both landing pads correspond.

Had either of these pilots exercised the very basic fundamentals that are taught and emphasized in training, this accident could not have happened. Had the takeoff and landing paths of the two pads not converged, the accident very probably would not have happened. Certainly, the Sioux pilot should have made a clearing turn before takeoff, and the Choctaw pilot erred in making his approach over another helicopter, especially when he saw its rotor turning. It is clear that all possible safety measures at any landing site cannot fully protect pilots who fail to LOOK.

Though the cost of a look is small, its value cannot be measured. Think of this the next time *you* get in a hurry.

MURPHY'S LAW: "IF AN AIRCRAFT PART CAN BE INSTALLED INCORRECTLY, SOMEONE WILL INSTALL IT THAT WAY."

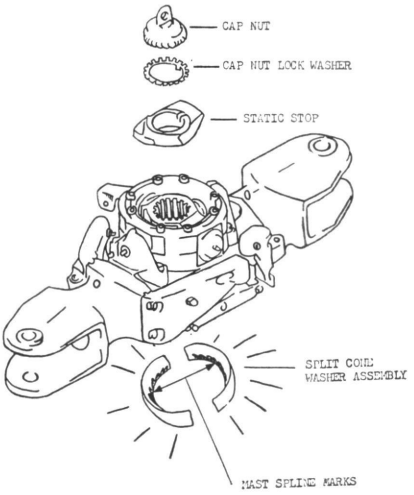
The Sioux required a test flight because of the removal and replacement of the main

rotor assembly and blades. The test pilot performed a thorough preflight inspection, with special attention given to the main rotor assembly. He then started the helicopter, made the normal pre-takeoff checks, and brought the Sioux to a hover. Finding cyclic control vibration present, the pilot elected to have the main rotor blades tracked.

Tracking proved that the main rotor blade track was within limits, and the pilot again raised the aircraft to a hover for a period of 15 to 20 minutes. During this time, the cyclic control vibration ceased. Several hovering autorotations were performed and reaction appeared normal. The pilot next made a takeoff and began a traffic pattern. At an altitude of 500 feet, he decided to perform an autorotation. Slight abnormal vibrations were felt at the beginning of the autorotation, so the pilot immediately aborted and continued in a normal power-on landing.

Following the landing, the pilot reduced power and pitch preparatory to stopping the engine. This was the signal for a practical demonstration of Murphy's Law. Severe vibrations threw the pilot from side-to-side in the cockpit, and his hand was battered by the collective pitch lever. The engine was immediately shut down.

The Sioux presented a sad picture with its main rotor assembly resting on the stabilizer bar assembly. Investigation revealed that the split cone washer assembly had slipped from place during the landing, allowing the main rotor assembly to slide down the mast when the weight of the main rotor blades exceeded lift during the engine shutdown.



SPLIT CONE WASHER ASSEMBLY INSTALLED IN ACCORDANCE WITH MURPHY'S LAW

A series of small marks evident around the top of the split cone washer assembly, made by contact with the mast splines, proved conclusively that the washer assembly was incorrectly installed. To wit: UPSIDE DOWN!!!

A Chickasaw pilot was practicing autorotations from pinnacle takeoffs. Shortly after entering autorotation, a vibration was felt in the cyclic control, and the nose of the aircraft pitched up and to the left. The pilot overrode the servos, reduced airspeed, and added power in an attempt to rejoin the needles and effect a power recovery. The engine rpm went past the rotor rpm and a loud chattering noise was heard. The pilot realized he could neither make a power recovery nor reach the cleared area ahead. He made a moderate flare to

Bird Dog Classic—III

AND THERE CHANCED to be a Knight of the Stirrup, Sir Heffie Foote, assigned to the Bird Dog Brigade of His Majesty's winged forces.

Sir Heffie was a warrior of great stature, known throughout the kingdom for his prowess with all the weapons of the royal arsenal. Alas, he was a terror to the Ladies of the Court. And when the fiddler played, these damsels fled in horror. For they knew full well the pain of trampled toes occasioned by the exuberant but clumsy dancing of the mighty knight.

Sir Heffie soared forth on a windy morning and whirled his Bird Dog through the sky, jousting merrily with a group of puffy cumuli. And when he had tired of the sport, he descended to alight. He dove the Dog beside the green turf and choked its roar, whistling softly to the earth.

The Bird Dog met the turf in good fashion; then it swerved to the right, back to the left, again to the right, and repeated to the left. A scream of pain issued from the Dog. Its forelegs locked into the sod, and the Dog bit its spinning nose into the grass, kicked its heels high into the air, and pivoted over on its back.

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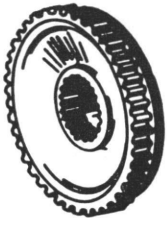
stop all forward motion of the aircraft. The Chickasaw settled into the trees, fell to the ground, rolled down a slope and came to rest on its right side. The aircraft burst into flames as the pilot leaped out.

Detailed investigation revealed that the ring gear (part # S14-35-4371) and sprocket (part # S14-35-4079) had been installed with the wrong tolerance. The lower end of the sprocket splines and the upper end of the ring gear splines were heavily gouged for approximately 180°, showing a slippage of the gear teeth. The lip on the upper end of the ring gear was completely worn away by abrasion from the sprocket teeth.



Inspection of the other Chickasaws at this pilot's unit revealed many improper ring gear and sprocket tolerances. More accidents waiting for a place to happen!!!

No person who comes within walking distance of an aircraft is immune to Murphy's Law. Those pilots muttering in their beards about poor maintenance may now proceed to deflate their egos. "Quoth the Raven —"

The pilot calculated that the weight to be carried in the Raven exceeded 480 pounds and determined that the ballast bar

And those who observed the crash clanged the bell and brought forth the gray beards. These learned scholars examined the scars of the alighting path and regarded the injured Dog, listening the while to the angered roar from Sir Heffie. He swore loudly of locking brakes, until the youngest of the gray beards reached up and set the Dog's wheels spinning with a gentle touch.

The leader of the gray beards affixed his seal to a scroll and turned to the silent knight.

"The ways of thy feet are known, and the scars of the path tell the cause of this injury to thy craft.

"Thou hast trampled thy stirrups without mercy to correct the errors of thy direction. And when thy direction was lost to thee, thou didst stand on thy stirrups and force thy Dog to bite this turf.

"Woe betide him whose heavy feet shall tramp the brakes of his craft in this fashion. It were a far better thing that thou hadst gently pressured thy brakes or used thy spur to soar forth and return again.

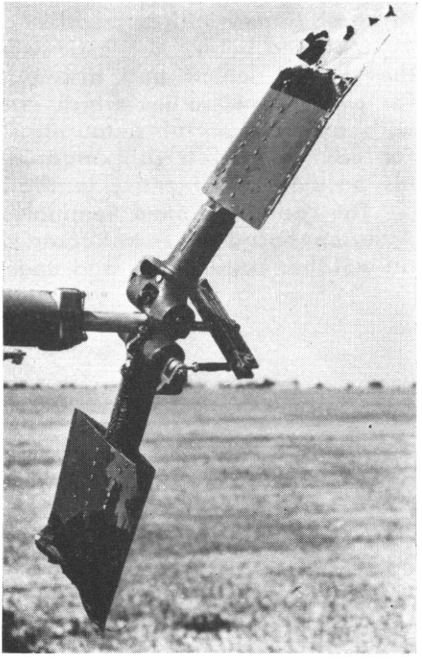
"It shall be recommended that thou dance on a bed of coals to teach thee a gentle touch with brakes and toes."

And the gray beards departed for they had been long away from their cups.

should be installed in the aft position. He instructed the mechanic to install the ballast bar and watched closely as the work was accomplished. The mechanic finished, and the pilot inspected the safety on the two bolts that were used to secure the ballast bar.

Satisfied that all was in order, the pilot took off. He proceeded to a large field and practiced takeoffs, approaches, and hovering maneuvers. Experiencing a sudden vibration during a hover, the pilot landed immediately. Inspection of the aircraft showed that the ballast bar had come loose and swung into the path of the tail rotor. Only 8 inches of each tail rotor blade remained on the aircraft.

If this pilot had been familiar with the Pilot's Handbook, he should have known that the bal-



Lack of two bolts

last bar is designed to be installed with *four* bolts. Those other two holes are not for ventilation!

The cost of these three accidents, $155,476.38, is a good indication of how serious Murphy's Law is to Army Aviation.

Unfortunately, the law was in effect for a good many years before aircraft designers became aware of it. As a result, aircraft that are in current use have many parts subject to improper installation or adjustment. Present-day designers use Murphy's Law as a factor in the design of aircraft parts and components. Replacement parts for current aircraft are constantly being redesigned or modified to reduce and eliminate the chances of improper installation.

Until Murphy's Law is repealed, pilots, mechanics, inspectors, and all others who are subject to the law must THINK, CHECK, RECHECK, AND KNOW before installing or adjusting any aircraft part. The answers are in the Operating Handbooks and Technical Orders. It's up to us to use them!!!

WEATHER RADAR FOR ARMY

A standard model U. S. Army Seminole (L-23D), equipped with a lightweight AVQ-50 airborne radar system, is the first Army aircraft to be equipped with a weather avoidance radar system.

Mounted behind a plastic radome inside the nose of the Seminole, the system detects and displays a picture of turbulent weather as far away as 80 miles which enables the pilot to avoid storm areas with a minimum of detouring. The information may also be used for navigational terrain mapping, further aiding the pilot to check his position and identify landfalls.

The radar-equipped Seminole will be evaluated by the U. S. Army Aviation Board at Fort Rucker, Alabama, to determine its potential all-weather capabilities and operational suitability.

Above is Post U. S. Army Airfield, Fort Sill, Okla., named in honor of world-famous flier Wiley Post. Shown are hangars 1 and 2, separated by Flight Dispatch. The tower is having its electronic equipment modernized and will become an approach control facility very soon, with Ground Control Approach Unit. When officially flight checked, GCA will become available for instrument letdowns. A new hangar (back cover) has been built and with other new construction is expected to reduce wind damage. Fuel is available but hangar space for transient aircraft is not.