JULY 1962

Dir Plans, Supply & Operations

UNITED STATES ARMY AVIATION DIGEST

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UNITED STATES ARMY AVIATION DIGEST

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JULY 1962 VOLUME 8 NUMBER 7

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

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

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

Use of funds for printing of this publication has been approved by Headquarters, Department of the Army, 27 November 1961.

To be distributed in accordance with requirements stated in DA Form 12.

THE OBJECTIVES OF ARMY AVIATION

SURVEILLANCE , OBSERVATION
ARMED COMBAT , COMMUNICATIONS
TARGET ACQUISITION , MAPPING & SURVEY , TACTICAL AIRLIFT
LOGISTICAL AIRLIFT , COMMAND TRANSPORTATION
ELECTRONIC WARFARE , CASUALTY EVACUATION
RADIOLOGICAL MONITORING

Lieutenant Colonel Morris G. Rawlings

THE ARMY AVIATION program, like a helicopter in the hands of a beginning student, has often appeared to be flying off in all directions at once. The built-in frustrations of a complex and complicated system seemed insurmountable to the military mind accustomed to straight-line thinking. Any lack of direction, however, has been far more apparent than real, for Army Aviation has made great strides toward its stated objectives.

More disturbing than the effects are the causes. It is obvious that any program which involves thousands of men and millions of dollars will be subjected to a series of checks and balances. This will cause erratic movement, but not movement lacking in direction. Directionless effort occurs only when

- no objectives are established, or
- established objectives are not known to, or understood by, those who must implement the program.

Unfortunately, the operational objectives of Army Aviation have been hidden in classified documents which precludes general distribution. Individual Army Aviators in the field and the commanders for whom they work cannot be blamed for their lack of familiarity with Chapter 5 of the *Combat Developments Objectives Guide*. Yet, it is in this classified document that the detailed objectives are prescribed and described in an *unclassified* manner.

Their publication here is to serve two purposes. The first is to verify their existence to those who have doubted; the second, to ensure that the articulate advocates of Army Aviation utilize the same text when selling their services.

CHAPTER 5
ARMY AVIATION
OPERATIONS

Section I—General Objectives
510 Operational Objectives
a. General Conditions.

(1) See Section I, Chapter 1, (CDOG)

(2) Techniques of employment of organic aerial vehicles will be influenced by enemy weapons systems and friendly air defense requirements. The

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degree of use will depend upon availability and utility, which are enhanced by simplicity of design, economy of maintenance, and minimum logistic support requirements. Aerial vehicles will augment and, where practicable, replace certain ground vehicles. Weather conditions, except the most extreme, will not limit the operation of aerial vehicles. Light observation types will be equipped with sufficient instrumentation to permit operation at night and during conditions of low visibility in forward areas of the combat zone. They will have a capability of homing on electromagnetic radiators organic to ground elements.

b. Concept of Operations.

(1) Aerial vehicles will be used for observation, surveillance, target acquisition, tactical and logistical airlift of troops and materiel, casualty evacuation, transportation of command and staff, an increased communications capability, mapping and surveying, radiological monitoring, movement of critical supplies and personnel, electronic warfare and armed combat.

(a) Observation missions will include the adjustment of artillery and mortar fire upon preselected targets or targets of opportunity.

(b) Combat surveillance and target acquisition missions will include the collection of military information by visual and mechanical sensor means and will extend to the maximum range of weapons organic to the Army. Where specialized equipment peculiar to a specific mission is required, means must be provided for attaching and detaching such equipment from the aircraft without hindering operational effectiveness of the equipment or aircraft. Such a capability is required to prevent the necessity for equipping all aircraft for the most sophisticated mission it may be required to perform, and at the same time provide a basic operational flexibility.

(c) Airlift of combat and combat support elements in the battle area will routinely receive highest priority for use of available airlift type aircraft.

(d) When tactical requirements are met, airlift type aircraft will be assigned on a routine basis for logistical airlift.

(e) Aeromedical evacuation will be available from forward position areas.

(f) Command posts of combat units will be airmobile or mounted in aerial vehicles and operated in flight as required. Use of aircraft by commanders and staff for liaison and control will be routine.

(g) Communications capabilities will be increased by using aerial vehicles as radio relay stations and as wire laying and courier vehicles.

(h) Armed aircraft will provide both offensive and defensive fires. Offensive fires will be employed where engagement with enemy forces is an integral part of the mission. Defensive fires are those fires delivered for self-protection, protection of other aircraft, or close-in protection of troops. The types of fires required are antipersonnel and antimateriel, against point, area, and air-to-air targets. The number of different types of weapons systems will be kept to the minimum. Any weapons system which replaces an existing weapons system must be a significant improvement from an operational standpoint. It is desirable to incorporate the point fire and area fire capability in one weapons system.

(i) Armed aerial vehicles will be used to augment the firepower of ground combat elements and fire support provided by other services, and to provide armed escort as required.

(j) Army aerial vehicles will be used to deliver priority supplies.

(k) Certain aircraft will be capable of dispensing CW and BW agents.

(l) Sensors mounted in Army aircraft will be used to furnish information for Engineer mapping and survey.

(2) Combat operations will require aerial vehicles which can operate without restrictions which might be imposed by faults of terrain, requirements for prepared bases, or weather conditions other than extreme icing or turbulence.

c. Specific Operational Objectives.

(1) Aerial vehicle operations must be immediately responsive and organic to those units having a continuing requirement for their use. Supply sources of ammunition, fuel and spare parts must be immediately responsive to logistical requirements of aerial vehicles.

(2) The combat surveillance and target acquisition capabilities of manned and unmanned aerial vehicles must be extended to cover the entire area of influence of the field army commander.

(3) Use of aerial vehicles will be coordinated with other airspace users. It is mandatory, however, that aerial vehicles operate with minimum restrictions, particularly in forward areas of the field army where formal flight planning and submission of flight plans is frequently impractical.

(4) Aerial vehicle commu-

nications must be compatible with the communications used by all elements of the military forces.

(5) Aerial vehicles used for medical evacuation must be configured to permit inflight treatment of evacuees by medical personnel when required.

511 Organization Objectives

a. As technological advances permit, aerial vehicles will be assigned in increasing numbers to lower echelons of command. During the interim period, aerial vehicles will be assigned to headquarters one or two echelons above those subordinate units having an intermittent requirement for their use. When a unit has a continuing requirement for aerial vehicles, they will be made an organic part of the unit.

b. Adequate aviation command and control organizations must be available at appropriate echelons to effectively command, control, and coordinate required aviation support.

The users, that is, the arms and services which use Army Aviation, have no real responsibility in the research and development cycle other than to carefully evaluate their requirements. These next several paragraphs, quoted from Chapter 5 of the *Combat Developments Objectives Guide,* are to express those user requirements. Some, in the interest of clarity, are cross-referenced to other paragraphs of the basic document which you should also read, not as an aviator, but as an Army officer.

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512 Qualitative Materiel Development Objectives

a. General. Future design and research objectives should emphasize the following:

(1) Method of attaching and detaching specialized avionics and sensory equipment from aircraft.

(2) Reduction of helicopter and compound aircraft vibration.

(3) Reduction of noise produced by aircraft.

b. Manned Aerial Vehicles. A homogeneous family of aerial vehicles mounting one or more identical power units and using the same fuel. The number of power units will be kept to a minimum and will be determined by the size of the vehicle and the type missions for which it will be required. The vehicles must be capable of operation in all but extreme weather conditions and must not be restricted by terrain. A minimum number of types of vehicles is desired, and operation and maintenance should be so simplified as to permit assignment and use at company/battery/troop level. It is highly desirable that the operation of these vehicles can be simplified to the extent that the operator can be an enlisted man with a minimum amount of specialized training.

c. Unmanned Aerial Vehicles. (See paragraph 1512b.)

d. Airborne Sensors. (See paragraph 1512c.)

e. Collision Warning. Equipment that will provide warning of conflicting air traffic or terrain obstacles. The equipment must provide sufficient warning to allow corrective actions by controllers of aerial vehicles of the period.

f. A Means for Nullifying Enemy Electromagnetic Radiation. (See paragraph 1512c.) A means to nullify radiation from enemy radar and other electromagnetic devices. It must be capable of being carried or operated from aerial vehicles of the period and be effective to the range of "sensed" radiation. It is desirable that the means offer either passive or active defense.

g. A Means to Reduce the Infrared Radiation from Aircraft. A means to reduce the amount of infrared radiated from aircraft power sources or to reduce or negate the capability of enemy weapons to home on such radiation.

h. A Means for Recognizing Friendly Aerial Vehicles. (See paragraph 712g.)

i. Army Air Traffic Regulation and Identification System. (See paragraph 712g.) A system for Army air traffic regulation and identification to move air traffic in the airspace over the field army effectively, rapidly and safely. It must provide for en route air navigation, terminal letdown of air vehicles, air-to-air and air-to-ground communications, coordination of air traffic with air defense, and coordination with missile firing and drone flights. It must be compatible with air traffic control procedures of other services. The system must permit maximum use, with minimum restrictions and coordination with other airspace users, by units in the forward areas of the field army.

j. Aerial Weapon Systems. A system of weaponry capable of being mounted in or on aerial vehicles of the period. The system must provide for antipersonnel and antimateriel fires to include air-to-air fires. It is desirable to incorporate point fire and area fire capabilities in one weapon system. Systems will be of sufficient lethality and flexibility to neutralize targets of a point or area nature at ranges commensurate with the operational environment of Army air vehicles.

k. Communications System.

(See paragraph 812.)

l. Navigation System. (See paragraph 812n.) An effective and reliable navigational system for aerial vehicles which is not restricted by line-of-sight requirements and which can assure common location identification between air and ground. It is desirable that the system be capable of use by both air and ground elements.

m. Source of Energy. (See paragraph 1612f.) A source of energy for the propulsion of aerial vehicles.

n. Propulsion Systems. Propulsion systems are required which use the latest engineering techniques to provide increased endurance or range and to reduce logistical and maintenance requirements. Reduction in specific fuel consumption is a particularly important area to be emphasized in order to provide range extension, increased endurance and decreased fuel requirements. (See paragraph 1612f.)

o. A Means for Adapting Aircraft to Specialized Missions. (See paragraph 1512c.) A system for easily attaching and detaching specialized avionics and sensory equipment from an aircraft without hindering the operational effectiveness of the equipment or aircraft. Basic operational flexibility will require a standard electronic configuration for Army aircraft instrumentation capable of accepting specialized equipment as required. Such specialized equipment must be configured to permit its integration with the airframe by simple connections, physical and electrical, without a requirement for highly skilled technicians to accomplish installation.

p. A Means for Alleviating Aerodynamic Forces Due to Turbulence. A gust alleviation system to reduce the aircraft response and consequently the aerodynamic forces on the aircraft due to atmospheric turbulence. The system must be lightweight and must not require services of highly skilled, specialized maintenance technicians. This system must be capable of being mounted in aerial vehicles intended for sustained low-altitude high-speed operations.

q. A Means for Reducing Helicopter and Compound Aircraft Vibration. A need exists to reduce the vibration experienced by pure helicopters, V/STOL and compound aircraft. Increased emphasis on long range and high forward speeds indicates a need to find solutions for the high vibrations associated with these flight conditions.

r. A Means for Reducing the Noise Produced by Army Aircraft. A need exists to develop means for reducing the high noise levels produced by Army aircraft. The noise signature of these aircraft reduce their effectiveness in operations in the forward areas. A significant reduction in noise levels will enhance aircraft use.

s. Encapsulation of Fuels. A means for encapsulation of fuels in lightweight tanks is desired. The system should reduce tank rupture and attendant fire hazards to aircraft. It should incorporate materials or devices to reduce fire and explosions which might result from enemy fire.

t. Aircraft Fuel Decontamination System. (See paragraph 1612j.)

u. Environmental Instrument Panel. A presentation to the aviator of the environment through which he is passing to include terrain, the horizon and other aerial vehicles in such an integrated display that no additional training is required to fly in nonvisual flight conditions over that necessary for visual flight conditions.

v. Automatic Remote Area Letdown System. A lightweight system to permit aerial vehicles to land at designated areas under nonvisual flight conditions which can be coupled with an autopilot to provide automatic approach and touchdown.

w. Efficient HF Electromagnetic Radiator. (See paragraph 812j.) An antenna or similar device to be unobtrusively mounted to an aerial vehicle, providing no aerodynamic drag, which will radiate the signals produced by the standard HF transmitter (for those aircraft so provisioned) in the frequency range of 2-12 mc with an electrical efficiency of 75 percent.

x. Protective Devices. A system for protection for the vital parts of the aircraft and crew should be developed. This protection should not appreciably increase the weight of the aircraft and should protect against small arms fire and low velocity shell fragments.

y. A Means of Increasing Helicopter Stability. Improvement of helicopter stability through basic design rather than the addition of equipment. Design criteria should provide for significantly improved ease of control, flight reliability, overall simplicity, maintenance economy, and reduced training time to be inherent in the rotary-wing vehicle.

This article contains the operational objectives for Army Aviation. Its publication, we hope, will ensure that all Army Aviators are aware of those objectives, and will assist in their attainment.

One game; one ball park; one set of rules!

After writing in the May 1962 issue of the AVIATION DIGEST (CRASH SENSE) about the survival fiasco that cost three lives, it's a real pleasure to report another case that could be used as a textbook model on the subject. Another thing we like about this one is that it made our job much easier because the pilot kept a

Survival Diary

First Day
1245 Local Time

THIS WILL BE a brief written record of events leading up to and subsequent to the crash of our H-19. My purpose in writing this is to avoid the pitfalls of a bad memory. The four of us (myself, crewchief, and two passengers) left an outpost this a.m. at 0645. We had departed the morning before and worked our way to the outpost doing recon and station recovery for supplementary control operations. We finished up at 1710 and planned to search for the last monument on our way back today.

This morning we had coffee at a local house before leaving, and I drank a can of liquid Metrecal. We flew about ½ mile to the airstrip where our gas had been dumped and refueled the ship, loading an extra drum inside. We had a little over an hour's work to do on the way in and were 2½ hours out from destination. I wanted a little extra reserve fuel to cover any unexpected delays.

Takeoff was normal, helped by a 10-15 knot wind. About 45 minutes later, we started our search for the monument, a 2-inch steel pipe sunk in cement, protruding about 2 feet above

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Prepared by the United States Army Board for Aviation Accident Research.

the ground. We were following faint vehicle tracks in the savannah, made—we supposed—by the original survey party in 1958.

I was flying at about 45-50 kt, 50-75 feet above the ground, heading generally into the wind. I spotted the monument to my right about 200 feet away and started a right turn to keep the monument in sight and check the area for a dry landing site. There was water standing on the ground near the marker, but some higher ground ahead and to the right looked promising.

Just as I completed the turn, and before I could begin to plan my approach to land, the ship settled rapidly toward the ground. I applied full throttle, increased pitch slightly, and dropped the nose to gain airspeed and fly out of the settling condition. This had no effect and we continued to settle.

I flared to touch down on the main gear and pulled pitch to cushion the landing. Touchdown was made on the main gear. Although hard, it would have been safe on a firm surface. As the nose gear settled into the mud, both struts bent rearward and the ship swung to the rear, rolling onto its left side. There was no impact force and deceleration was moderate.

The engine was still running. I pulled the mixture and turned off all switches and we evacuated the ship. No one was injured. I told the crewchief to disconnect the battery. We unloaded the ship and carried our gear to higher (dry) ground about 75 yards away to make camp and wait.

We could not hope for an early pickup. We were not due back until Thursday p.m. and this was Wednesday a.m. I had left word of our route and destination, but there was no one to check on our arrival. We do not have IAGS radio in [deleted] and cannot file flight plans or give position reports by radio. I expect the other pilot to miss us Thursday and start searching early Friday. He will probably check our three previous operating sites and then fly along our proposed work area.

The weather has been clear and should stay that way now that the dry season is starting. He should have no trouble finding us. We have plenty of food and water for a wait of several days. We are 25 miles from the nearest house and it's another 20 miles from the house to the nearest town. Walking over the wet savannah and swamps is a last resort. It would take at least 3-4 days and be exhausting work. We plan to wait. After the gas fumes have cleared from around the ship, I plan to use the HF radio to try and contact someone.

First Day
1600 Local Time

The radios and electrical systems are dead. Must be shorted out by water. All day, we have seen no sign of life but small birds. We are in uninhabited country. Game is scarce in open savannahs and we are over a mile from the nearest tree line in a clearing several miles square. Most of the ground is covered with a few inches to a foot of water, with a few higher dry areas. The grass is from 2-3 feet high.

There is no place nearby for a fixed wing strip. At least we can't find one. It is hot, windy, and dry. My companions have stood up fine so far. The two passengers were pretty shaken up initially but are getting back to normal. The crewchief is doing real well.

I feel pretty miserable at having wrecked the ship. I have preached a lot of safety in my five years of flying and always felt sort of superior to those who had "pilot error" accidents. Now, I'm getting a look at the other side of the card. I'm so thankful that no one was injured. The crewchief and I have a few bruises and I got a few gas burns, but nothing serious at all.

My portable radio was banged around quite a bit, but I finally got it working after a fashion.

We listened to Christmas carols for a while today.

Second Day
1000 Local Time

The inactivity is the worst part of this business—that and the knowledge that as yet no one even knows we are down. It would be pretty bad if one of us was seriously injured. I have tried to keep everyone busy. Time goes a lot faster that way.

We have made a fairly comfortable camp and keep working to improve it. I have had everyone practice with our signal mirrors. The red and white ship and our yellow shelter tarp from the survival kit should make good signals. Also, we plan to use the mirrors and smoke flares when an aircraft comes near.

Our URC-14 radio seems to be okay. We will make the signal fire from oily rags to give black smoke. We made an "LL" panel signal near our camp to signify that we are all well. The two passengers left this morning at 0700 to do some hunting. They are due back at noon.

Second Day
1200 Local Time

The two passengers are back. They saw three deer, but they were too far away to shoot. At least we know now that game is near if we need food. How fortunate it was that we were planning to stay out for three days. With a little rationing, we have food for a week, clean clothes all around, two canvas cots, two hammocks, three blankets, one air mattress, two ponchos, and other equipment as follows: 1 gallon thermos jug with water; 5-gallon water can with 4 gallons of water; URC-14 radio; survival kit, less folding machete, gloves, compass, first aid kit; 16 ga double barrel shotgun with 30 rounds of #6 shot, 20 rounds of #9 shot, 13 rounds of buckshot; .45 pistol with 50 rounds of ball ammunition; .22 pistol with 25 rounds of long rifle ammunition; 100 feet of rope; 150 feet of wire, complete tool box; LP gas lantern; 4 flashlights; machete; portable radio; 7x50 binoculars; mosquito nets; 2 aircraft first aid kits; insect bomb; signal mirror; and personal gear such as pocket knives, shaving kits, compasses, books and magazines, toilet paper, insect repellent, etc.

We made cots from the troop seats and stoves from grease cans, with dirt and gas in the bottom for fuel. We made lamps for light and bug chasing from cans of oil with rag wicks. We put up the shelter tarp with signal poles we were carrying to mark stations. The tarp is old and rotten but, except for some grommets that pulled out, it has stayed together even in the wind that blows here all day long.

When our water is gone, we will have to use surface water and iodine pills. That may help me to lose some weight. I have a flight physical coming up next month and need to lose about 10 pounds.

Second Day
1400 Local Time

Our little bird friends are still with us. They are small red and black critters, quite tame, and

Survival camp

may make us a stew in a few days. I was surprised to find minnows swimming around in the holes gouged in the mud by the main gear of the ship. Several cranes and doves have flown by camp, but we did not see them in time to take a shot.

If necessary, we should be able to find game by walking over along the tree line. The mosquitos were terrible last night at dusk and for an hour or so after. Without bug dope and nets we would have really suffered. During the day, the wind common to the dry season here clears them away. This same wind is what got us in trouble. It has just started. The day before yesterday was the first time I had flown in it in the H-19. Last dry season, all my time was in the L-20. This is not an excuse, but a possible reason why I was not more wind conscious.

We buried our water cans under ground to cool them. I guess the water is about 10° cooler that way and it tastes a lot better.

One of the passengers has decided that someone will get worried and come looking for us today at 1500. I don't expect anyone before noon tomorrow, but it sure would be nice to see that Otter come flying over. Waiting would be a lot easier after we know we have been seen.

A few minutes ago, the crewchief and I both thought we heard a distant gun shot. We searched the area with binoculars but could see nothing.

A thought that occurs to us at frequent intervals is about the natives that live in this neck of the woods. They are reputed to be very antisocial and carry long, sharp, wicked-looking spears and use poisoned arrows and other nasty things. The local police back at the home field have told us all sorts of wild tales about them. It seems they get out of hand once in a while and the police go in to round them up. This usually ends up in a running battle and a few dead natives. The survivors are understandably resentful and start more trouble later. A real vicious circle. I hope we don't run into any.

Second Day
1830 Local Time

The passenger was right! At 1420, we saw the U-1A heading south. He was too far away and heading away from us so he did not see our mirror flashes. He came back at 1510—heading directly toward us at about 1500 feet. Such a flurry of signalling you never saw! The two passengers with mirrors, the crewchief waving the door of the ship, and me with the smoke and URC-14 radio. We learned later that the signals that proved most effective were the mirror flashes. The pilot saw them long before he could see the wrecked ship or our tarp. The smoke was not seen.

As the Otter circled overhead, we made contact by the URC-14 radio. We advised the pilot we were okay and did not have need of food, water, or medical supplies. We told him the area was not safe for landing. He told us an H-19 would pick us up tomorrow afternoon and flew away.

We celebrated by eating the best of our remaining food for supper. We had dove soup, peas, chile con carne, canned peaches, and coffee. Last night I was real chilly, even with a wool blanket, so I made a grass mattress out of my poncho. Should be warmer tonight. We also used grass for cleaning and wiping, and tied the shelter tarp guy ropes to grass clumps.

Third Day
1000 Local Time

We crawled out at 0630 this morning. Another cold night, but the grass mattress helped. We're all packed and waiting for the chopper. We finally ran out of water and are drinking surface water. So far, no ill effects.

Third Day
1130 Local Time

H-19 in sight about five miles north!

PILOT'S COMMENTS AFTER RESCUE

In general everything went extremely well during the period we were waiting to be picked up. This was due to several factors:

1. None of us were injured.
2. We were very well equipped for a stay in the Llanos, due to the fact that we had planned on a two or three day trip and had brought along the required equipment.
3. The four of us had worked together extensively and had confidence in each other.
4. We knew that when the rescue pilot began looking for us he would know right where to go because he was familiar with my work plan.
5. The weather was clear with no rain to cause discomfort.

We did encounter several problem areas. Immediately after the accident we were all more or less in a state of shock. Some took longer to recover from this than others. I found that it was best to keep them busy, to keep them occupied until they had settled down a little. The same held true later on. I kept them busy improving our camp site, making signals, salvaging equipment, hunting, reading, etc., and kept myself busy too. That is a primary reason why I kept a written record of events. We

Concluded on page 43

Cogitate!

PROPER RECOGNITION of those individuals and units whose tireless efforts give that extra emphasis to our expanding program is most important.

As one means of giving proper recognition to them a broad spectrum of awards are given, taking the form of trophies, plaques, medals, and certificates. Among those are the following which are presented annually at the AAAA National Convention:

AA OF YEAR AWARD. Sponsored by the Army Aviation Association and presented to an Army Aviator who has made an outstanding individual achievement in Army Aviation during the previous April 1 - March 31 period.

AA SOLDIER OF THE YEAR AWARD. Sponsored by the Hiller Aircraft Corp. and presented to the enlisted man serving in an Army Aviation assignment who has made an outstanding individual contribution to Army Aviation during the previous April 1 - March 31 period.

OUTSTANDING UNIT AWARD. Sponsored by the Hughes Tool Co., Aircraft Division and presented to the aviation unit that has made an outstanding contribution to or innovation in the employment of Army Aviation in furtherance of the Army mission, over and above the normal mission assigned to the unit.

McCLELLAN AWARD. Sponsored by the many friends of Senator John L. McClellan in memory of his son, James H. McClellan, a former Army Aviator who was killed in a civilian aviation accident in 1958. This is presented to the person who has made an outstanding individual contribution to Army Aviation safety during the previous April 1 - March 31 period.

DR. RASPET AWARD. Sponsored by Mr. William P. Lear, Sr., in memory of Dr. August Raspet, a scientific leader in the field of subsonic aerodynamics, who was killed in an aviation accident in 1960. Presented to the person who has made an outstanding individual achievement in the sciences related to subsonic flight.

Nominations for these awards may be made by either units or individuals (military or civilian) who desire to see a deserving individual or unit recognized.

Documentation to support nominations should present a brief outline of substantiating facts and include:

For Individual Awards: Name, rank, unit and duty assignment, address and photograph.

For Unit Awards: Unit name, present assignment or official address and commanding officer or chief's name.

(Documents should be typed but not tabbed since they will be photocopied.)

The wide variety of outstanding contributions made to our program by many individuals and units throughout the year will undoubtedly make your choice difficult, but *now* is the time to consider their relative merits and start sending in your nominations. Nominations must be in by 1 September.

Remember — no matter how outstanding or deserving the individual or unit, they won't receive an award and recognition without a nomination!

Send nominations to: Army Aviation Association of America, ATTN: Awards Committee, 1 Crestwood Road, Westport, Conn.

Nominate!

The Army Aviation Story

Richard K. Tierney

Part II—Academics and Training

MAJ WILLIAM W. FORD headed a list of light aviation enthusiasts who throughout 1941 had worked diligently to bring about the birth of Army Aviation. In late 1942 he was named by Gen Robert M. Danford, the chief of Field Artillery, to organize and train a group of aviators who would test the concept of making light airplanes organic to the Field Artillery. The tests, discussed in Part I of this story, were successful and on 6 June 1942 the War Department approved organic aviation for the Field Artillery. Lieutenant Colonel Ford was instructed to establish and direct the Department of Air Training at Fort Sill, Okla.

THE FIRST STEPS

Shortly after the birth of Army Aviation Colonel Ford went to Washington to arrange the final details and Major Wolf remained at Fort Sill to handle arrangements and to secure a competent corps of instructors. The first instructors were civilians employed at a salary of $300 per month. Eventually most of these civilian instructors were commissioned and given flight pay. The Department of Air Training was ready for business by the end of July and consisted mostly of the members of the test group.

In July 1942 volunteers with civilian pilot ratings were requested to attend the tactical flight course. The 19 students in Class One reported to Fort Sill on 1 August and after preliminary orientation, tactical flight training commenced on 3 August and lasted until 18 September. The course, which was later lengthened, used the L-4B Piper, the L-2B Taylorcraft, and the L-3C Aeronca. The first class of mechanics had begun on 27 July 1942 and lasted 5 weeks.

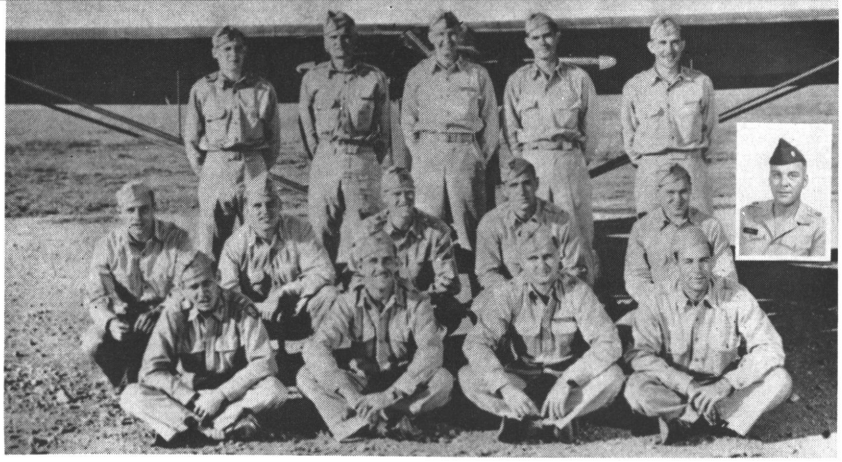
When the Department of Air Training began operations, it had 23 aircraft on hand and on order 100 Piper J-3s (L-4s) and 50 Taylorcraft (L-2s).

Post Field was turned over to the Army Ground Forces by the Air Corps and several small auxiliary fields were built either on the reservation or on nearby leased land. A number of tactical training strips were built on the reservation and on the wildlife refuge.

For the first five classes the Department of Air Training accepted for its liaison pilot classes both officers and enlisted men from the ground forces and services of supply. However, each student was required to have at least 60 hours of flight and to hold (or have recently held) a pilots license. The student's maximum weight limit was 170 pounds and he must have been able to pass the physical examination for Class II pilots of the Air Corps.

During the early years of the war a number of civilians were recruited for the air training department by air shows which were put on at surrounding communities. This aroused a great deal of interest and, along with the recruiting slogan, "that you're better off flying than digging a hole," resulted in a number of applications.

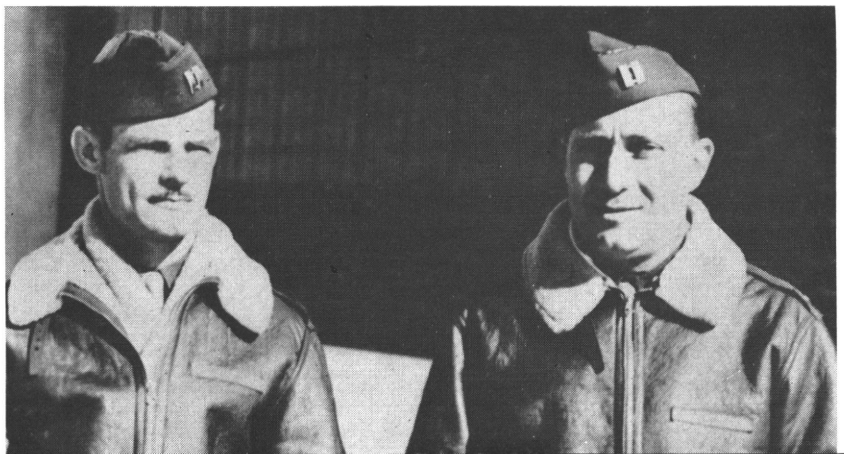
Students received about 15 hours of dual and solo time, mostly air work to refresh their flying technique. Then they were given about 28 hours of flying in and out of small fields, taking off and landing on roads and over obstructions. Toward the end of the course they were given 6 half-days of instruction as observers. Students also received 12 half-days of ground instruction on navigation and meteorology; 27 half-days on maintenance and repair of airplanes and engines; and 3 half-days on tactical employment of organic air observation. All pilots were issued a kit of hand tools and did the maintenance on



The first pilot class. This class was graduated in September 1942. Reading from left to right they are: front row, Lt S. A. Williamson, Capt J. E. Swenson, Lt H. R. Phillips, and Sgt J. S. Rengers; middle row, Sgt R. S. Wilkinson, Sgt W. C. Schoonover, Lt J. W. Byrd, Lt W. D. Stephens, and Sgt C. B. Allen, Jr; top row, Lt B. A. Devol, Jr., Lt G. M. Albert, Lt R. P. Stallings, II, Capt J. M. Watson, Jr., and Lt T. L. Hendrix. Absent when this picture was taken were Capt E. S. Gordon and Lt J. U. Overall (inset).

Col W. W. Ford, first director, and Lt Col G. J. Wolf, first executive, of the Department of Air Training.

Capts T. F. Shirmacher and T. S. Baker, the first squadron commanders of the Department of Air Training.



BIRTH CERTIFICATE
OF ARMY AVIATION

WDGCT 320.2 (2-5-42) June 6, 1942

MEMORANDUM FOR THE COMMANDING GENERAL, ARMY GROUND FORCES:

Subject: Organic Air Observation for Field Artillery.

1. Reference is made to letter War Department, February 25, 1942, AG 320.2 (2-5-42) MT-C, subject: Service Test of Organic Air Observation for Field Artillery, and 1st Indorsement thereto.

2. Your recommendation that organic air observation units be included in Field Artillery organizations is approved.

3. It is desired that you take immediate steps to effect the necessary changes in organization, equipment and training entailed by this action. The following will govern:

a. *Organization*:

(1) Liaison airplanes will be authorized for Field Artillery units at the rate of 2 per light and medium Artillery Battalion, 2 per Division Artillery Headquarters and Headquarters Battery or Field Artillery Brigade Headquarters and Headquarters Battery.

(2) Personnel will be authorized at the rate of 1 pilot and ½ airplane mechanic for each liaison plane authorized.

(3) The required changes in T/Os and T/BAs will be submitted as soon as practicable.

b. *Procurement and Maintenance*:

(1) The Commanding General, Army Air Forces will be responsible for the procurement and issue of airplanes, spare parts, repair materials and the necessary auxiliary flying equipment required by this program. The airplanes will be commercial low performance aircraft of the "Piper Cub" type.

(2) All maintenance other than that requiring the facilities of base shops will be accomplished by the Army Ground Forces.

(3) Maintenance requiring the facilities of base shops (customarily referred to as 3d echelon maintenance in the Army Air Forces) will be a responsibility of the Commanding General, Army Air Forces.

(4) It is desired that you confer with the Commanding General, Army Air Forces regarding the number of aircraft required under the 1942 Troop Basis, the anticipated delivery rate, the estimated requirements of spare parts, repair materials and auxiliary equipment, as well as the procedures and policies regarding their issue and delivery.

c. *Personnel*:

(1) Qualifications:

Recommendations for the detailed qualifications and specifications for both commissioned and enlisted personnel will be submitted for approval. These will fall into two general categories: a pilot capable of piloting the liaison-type airplane as well as assisting in normal maintenance; and a mechanic qualified to service the airplane and perform repairs incident to 1st and 2d echelon maintenance.

(2) Sources of personnel:

(a) Pilots: Volunteers, now under your control, who are qualified to pilot liaison-type airplanes will be utilized to the maximum as pilots. Additional pilots needed to fill requirements of the 1942 Troop Basis will be made available by the Commanding General, Army Air Forces.

(b) Mechanics: Mechanics will be procured from sources under your control.

(3) Extra compensation and ratings:

(a) Pilots will be authorized additional compensation for participation in frequent and regular aerial flights. A rating generally similar to that of a liaison pilot will be established for pilots.

(b) Appropriate ratings for mechanics may be Technician, Grade 3, or lower.

d. *Training*:

(1) The basic flight training of pilots (exclusive of those under your control already qualified) will be a responsibility of the Commanding General, Army Air Forces. This training will be limited to that necessary to enable safe operation of low performance aircraft and qualify a student according to standards established for liaison pilots.

(2) You are authorized to organize at Fort Sill, Oklahoma, or other stations selected by you, a course of instruction for the operational training of pilots, mechanics and observers in the tactical employment of organic air observation in Field Artillery units.

4. Changes in training literature will be prepared at the earliest practicable date.

5. A copy of the directive to the Commanding General, Army Air Forces is attached hereto. The Commanding General, Army Air Forces has been furnished a copy of this letter.

By order of the Secretary of War:

I. H. EDWARDS,
Brigadier General,
Assistant Chief of Staff.

Birth Certificate of Army Aviation

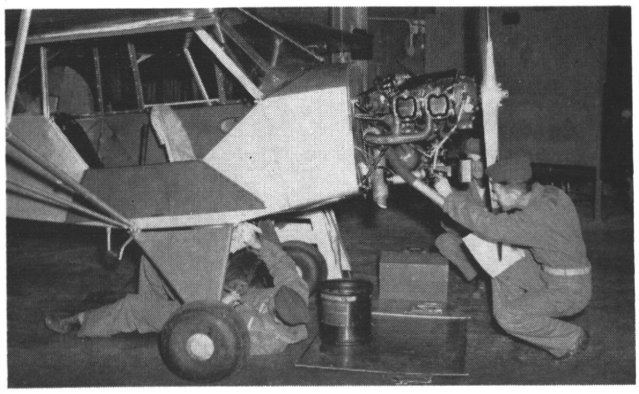
the aircraft they flew.

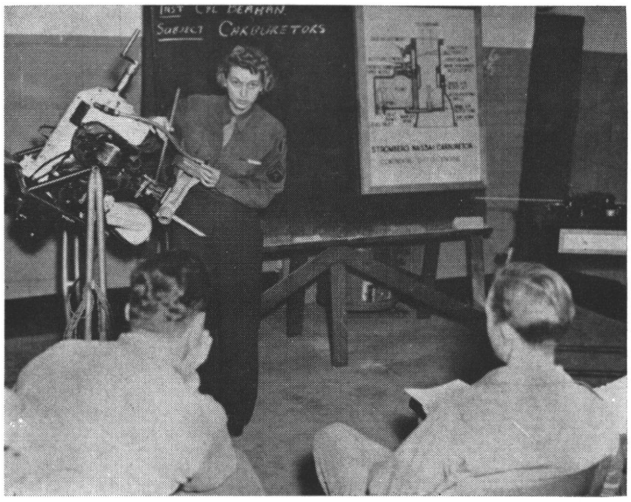
Student mechanics were selected from members of the ground forces who had considerable mechanical experience. They received extensive training in maintenance and repair of aircraft and engines and upon graduation were capable of performing in the field all first and second echelon maintenance. The Army Air Forces was responsible for third and fourth echelon maintenance, but in most cases Army mechanics performed all maintenance short of a complete overhaul.

The air training department had no trouble filling mechanics classes. By 3 August 1942 over 3,000 applications had been received. However, applications from qualified pilots fell below expectations. By 3 August there was only sufficient personnel to provide a class of 20-30 students each two weeks instead of 30 weekly as had been contemplated the previous June.

To remedy the situation the Army Air Forces was directed to supply 100 basically trained pilots a month. The first of these reported to Fort Sill on 19 September 1942, and those who qualified for the tactical course were enrolled in Class No. 6. These men had learned to fly under the civilian pilot training program and then were placed in the Air Corps Reserve. When called to active duty they were rated as Liaison Pilots.

This plan failed to supply the needed pilots. Between 1 Sep-





Upper right, pilots undergoing a course of instruction in mechanics. At lower right Cpl Beahan (first name unknown), the first WAC instructor in the Department of Air Training's maintenance division, explains carburetors to a class of students.

tember and 26 November 1942, the Army Air Forces furnished 338 such pilots, many diverted from the glider program. Of these, 102 did not qualify for the tactical course—most of them being overweight. Of the 236 accepted, 16 percent washed out, and the net yield from the program was only 198.

Since few Army officers with civilian pilot ratings were coming into the Army in 1942, an agreement was made with the Air Corps to establish a source for primary training of pilots.

On 26 November, 25 Field Artillery officers began primary flight instruction at Denton, Texas. The same number of Field Artillery officers were to report to Denton each week thereafter. They received 9 weeks of training as liaison pilots from the Harte Flying Service before reporting to Fort Sill for the advanced course. The course at Sill ran 5 weeks, but often was extended because of delays, caused mostly by bad flying weather.

The first officers sent to Denton were selected from the staff, faculty, school troops and the Field Artillery replacement training center at Fort Sill.

Beginning with the Denton class of 3 December 1942, selected Officer Candidate School graduates and attached, unassigned officers attending courses at the Artillery School were sent for flight training.

While Air Corps reservists were flowing through this system it was necessary to increase the advanced course at Fort Sill from 7 weeks to 10. The reservists were given 5 weeks of basic military training which they had not received previously. By 1 February 1943 reservists ceased to come into the program and it was found feasible to reduce the advanced course to 5 weeks.

The Army Air Forces' primary flying school at Pittsburg, Kan., began accepting Artillery pilots for flight training about 15 February 1943. Starting with

The first training fatality at the Department of Air Training at Fort Sill, Okla., occurred on 8 March 1943. Lt R. P. Stallings, a flight instructor, was killed when he and a student crashed in the L-2 pictured above. The aircraft was on a downwind turn when it stalled out and spun in.

Two unidentified mechanics check an L-4A used in seaplane training at Lake Lawtonka.

the class reporting to Denton on 18 March 1943, the classes alternated between Denton and Pittsburg.

The environments at Denton and Pittsburg were not the best (academically speaking) for turning out aviators. At Pittsburg the students were quartered in a hotel and were on per diem. At Denton they lived in a men's college dorm. At both training sites there were plenty of young ladies to distract the young flight students. In fact, there was a women's college at Denton, and the situation there reached a point where the only flight students that didn't get married were those who were already married.

At any rate, the brand new second lieutenants were given silver wings upon graduation and then reported to Fort Sill overweight, with 50-mission crushed hats, and without any respect whatsoever for Colonel Ford's desire that they keep off the grass. However, after a few of their number experienced the wrath of the veteran artilleryman, the students acquired a little humility—and stayed off the grass.

GROWING PAINS

Original plans called for 80 percent of the Field Artillery pilots to be enlisted men. The 20 percent officer pilots were to provide supervision. The plans didn't work—mainly because the enlisted men who were able to perform an acceptable job as liaison aviators were usually officer candidate school material. Consequently, enlisted pilots generally left troop units for OCS shortly after reporting for duty. The War Department decided it would be better for enlisted personnel to attend OCS before going to flight school, and on 20 April 1943 enlisted men ceased to be eligible for liaison pilot training.

An Army Ground Forces directive dated 15 September 1943 named only Pittsburg to be used for primary training. However, a few students continued to be sent to the Denton school until about 16 November 1943.

In January 1944, Colonel Ford departed for troop duty and Colonel Wolf succeeded him as director of the department until the end of the war.

Seaplane training for pilots and mechanics was begun on 7 April 1944 as part of the tactical course, and facilities were built at Lake Lawtonka. Also, train-

THE FLEET! Lt Col G. J. Wolf (front), Lt M. J. Fortner (right rear) and an unidentified mechanic take a spin in the crash rescue boat during seaplane training at Lake Lawtonka, Fort Sill, in 1944.

ing in the use of the Brodie device was directed by the commanding general, Army Ground Forces, on 31 October 1944. The Brodie device was a cable launching and landing apparatus which enabled aircraft to get in and out of confined or unimproved areas and to operate from Naval landing craft.

In fall 1944, it was decided that an adequate number of pilots had been trained to meet requirements until the first of the year. As a result, Class No. 88, which reported to Pittsburg on 27 July 1944, was the last to be enrolled until January 1945. Meanwhile, the Army Air Forces terminated its contracts with civilian flying schools and Class No. 88, which was at Pittsburg 11 weeks, became the last to be trained there.

Class No. 89 resumed the training program on 13 January 1945 under Army Air Force instructors at Sheppard Field, Texas. After 14 weeks of basic instruction the class received an additional 14 weeks of instruction at Fort Sill's advanced course.

In early 1945 pilot losses in combat necessitated an increased input of from 30 to 40 students every 2 weeks and a reduction in basic training to 11-12 weeks. The tactical instruction was slashed to 5 weeks and liaison pilots were rushed overseas until the situation eased. Beginning with Class No. 94 which reported for basic training on 9 March 1945, the Army was able to resume the full schedule of 14 weeks both at Sheppard Field and Fort Sill. This schedule was continued until the Department of Air Training gave way to the Army Ground Force Air Training School. The only other change under the department was the reduction of student input from 40 to 30 per class beginning with Class No. 101 which was enrolled on 18 June 1945.

AGF AIR TRAINING SCHOOL

The highly successful employment of Army Aviation in combat resulted in numerous requests for light organic aviation from branches other than the Field Artillery. To serve vital needs, most major ground combat units were borrowing the Cubs from the Field Artillery whenever possible. Consequently, the Cubs were effectively employed in such missions as courier and liaison operations, photographic and visual reconnaissance, column control, emergency resupply, and evacuation of wounded. (A more detailed account of Army Aviation in combat is presented in another portion of this story.)

In August 1945, the War Department adopted an agreement which extended organic aviation to five more users: Cavalry, Infantry, Engineers, Armor, and Tank Destroyer. The agreement, which had been reached previously by General Jacob L. Devers, CG, Army Ground Forces, and General Ira C. Eaker, CG, Army Air Forces, also called for additional light aircraft for the AGF.

Instruction at the Department of Air Training had previously been limited to Field Artillery personnel. Now it became necessary to expand the program, and effective 7 December 1945 the Department of Air Training of the Field Artillery School was redesignated the Army Ground Forces Air Training School. This school was established to provide tactical training to include the added ground arms incorporating organic aviation. The school was placed under Maj Gen Louis E. Hibbs, Commandant, Field Artillery School. Brigadier General Ford, back from troop duty, was named Assistant Commandant for Air Training and again directed the tactical air training program. Under the new system, primary flight training was still provided by the Air Corps.

Six Field Artillery pilot classes were in session when the changeover came and another was enrolled before the student of the first Officers' Army Ground Forces Airplane Pilot Course assembled on 28 January 1946 at the school. However, not enough students were on hand to begin instruction and the group had to wait until Class No. 3 reported on 11 March.

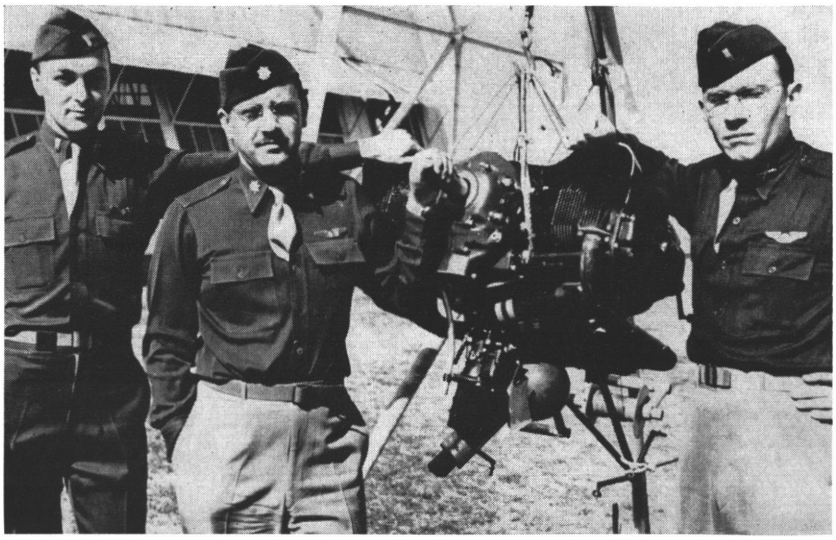
A similar situation existed with the Field Artillery Air Mechanic Course. Three were in session and allowed to finish, but no more were enrolled. The first enlisted Army Ground Forces Air Mechanic Course started on schedule—21 January 1946.

By June 1946 the demobilization of the Armed Forces brought about a severe Army-wide shortage of personnel. As a result the Air Training School had to eliminate seaplane training from the curriculum and sharply reduce the time devoted to the Brodie device.

Although courses of instruction were being tightened, the Air Training School was expanding its facilities at Post Field. In July construction was started on a concrete runway 5,000 feet long, 200 feet wide, and included taxiway and increased apron space.

The sod surface previously satisfactory for training purposes with light airplanes had begun to deteriorate as heavier aircraft used the field in increasing numbers.

During the postwar period the Army began reorganizing its



Maj Robert M. Leich (center) was the first engineering officer of the Department of Air Training. His assistants were 1st Lts L. M. Bornstein (left) and M. J. Fortner.

school systems. In November 1946, the Department of Air Training again was established at Fort Sill and the Army Ground Forces Air Training School was discontinued. The department offered training support for all the ground arms, rather than just Artillery as it had prior to 7 December 1945.

The Korean War brought about an increase in student input at the Department of Air Training. On 28 August 1950 a 4-week National Guard refresher training course in Army Aviation tactics was authorized, and in November 1950 a United States Air Force Pilot Artillery Observation Course was started. It was set up for four classes of 5 days duration and could handle 10 pilots a class between 6 November 1950 and 23 February 1951. Numerous facilities also were added and early in 1951 the Air Training Department was using three new stagefields.

Outside of the helicopter training program (covered elsewhere in this story), the Air Training Department did not incur many more significant changes until it was dissolved and the U.S. Army Aviation School was established.

The successful growth of the Department of Air Training can be traced to the tireless efforts of a great many people. Most notable are General Ford and Colonel Wolf who each served as director of the department. Other key personnel include Capts Robert R. Williams and T. S. Baker, who at various times served as chief of the Flight Division; Captain E. F. Houser, chief of the Tactics Division; and Captain R. M. Leich, and Lts M. J. Fortner and Lloyd M. Bornstein. Lieutenant Fortner, a member of the original test group, was an aeronautical engineer with experience in light aircraft maintenance. He was primarily responsible for developing maintenance courses for both pilots and mechanics.

ARMY AVIATION SCHOOL

The use of aircraft by all arms and services rapidly increased the volume of training and administration at the Air Training Department and led to the establishment of the U. S. Army Aviation School at Fort Sill.

The school was established effective 1 January 1953 as a Class I activity under the commanding general, Fourth Army, by authority of Department of the Army General Orders No. 9, dated 16 January 1953. Actually the school came into existence on 1 July 1953 when the Department of Air Training was deactivated. However, in 1960 the official birthday of the United States Army Aviation School was established as 6 June. Previously, the birthday was recognized as 1 January, but correspondence dated 15 January 1960 from the U. S. Army Aviation Center, Fort Rucker, to the Adjutant General, Department of the Army, requested that "the birthday of the United States Army Aviation School be changed from 1 January to 6 June to coincide with the birthdate of Army Aviation."

Indorsements of the request at Third Army and Continental Army Command recommended approval. Secretary of the Army Wilber M. Brucker approved the request on 23 February 1960 and ordered that the 6 June birthdate be made a matter of record.

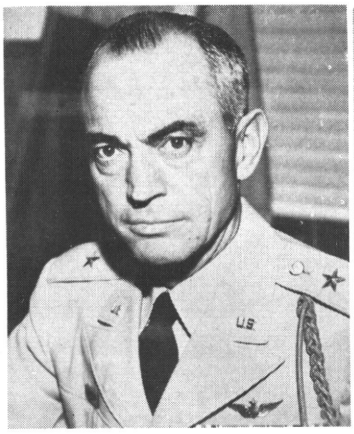
School courses at Sill offered only to officers included: airplane and helicopter tactics courses, instrument and instrument examiners courses, and a twin-engine transition course.

Officer and enlisted personnel were eligible for the Cargo Helicopter Pilot's Course (enlisted graduates were made warrant officers). Repair and maintenance courses for fixed and rotary wing aircraft also were available to enlisted men.

Primary flight training was given by the Army Air Forces

Brig Gen William W. Ford

Col Gordon J. Wolf



Brig Gen Carl I. Hutton

Col E. O. Hopkins

Directors of the Department of Air Training And Commandants of the U.S. Army Aviation School

Col (Brig Gen) Wallace W. Ford was the first director of the Department of Air Training at Fort Sill, Okla., from 6 June 1942—January 1944. After a tour overseas he returned and directed the Army Ground Forces Air Training School at Fort Sill from January 1946—November 1946 when the AGF School was disbanded. The AGF School had been established on 7 December 1945 and placed under the command of the commandant of the Field Artillery School. General Ford filled the position of Assistant Commandant for Air Training, which was responsible for operation of the flying school. General Ford became director of the reestablished Department of Air Training in November 1946 and held the position until July 1947.

Col G. J. Wolf was director of the Department of Air Training from January 1944—7 December 1945. He directed the Army Ground Forces Air Training School from 7 December 1945—31 December 1945.

Col (Brig Gen) Carl I. Hutton was director of the Department of Air Training from August 1947—November 1949. He was commandant of the U. S. Army Aviation School at Fort Sill from July 1954—September 1954 and commandant of the U. S. Army Aviation School at Camp—Fort Rucker from 1 September 1954—7 June 1957.

Col Edward O. Hopkins was director of the Department of Air Training from November 1949—October 1951.

Col I. B. Washburn was director of the Department of Air Trianing from October 1951—16 January 1953 when the U. S. Army Aviation School was established at Fort Sill. A period of transition followed and the Aviation School did not become fully operational until 1 July 1953, when the Department of Air Training was discontinued. Therefore, from 16 January 1953—1 July 1953 Colonel Washburn was in charge of both organizations. From 1 July 1953—June 1954 he wore one hat, that of commandant of the U. S. Army Aviation School at Fort Sill.

Maj Gen Bogardus S. Cairns was commandant of the U. S. Army Aviation School at Fort Rucker from June 1957—December 1958.

Maj Gen Ernest F. Easterbrook was commandant of the U. S. Army Aviation School from February 1959—March 1962.

Brig Gen Robert R. Williams, present commandant of the U. S. Army Aviation School, began this assignment in March 1962.

Col I. B. Washburn

Maj Gen Bogardus S. Cairns

Maj Gen Ernest F. Easterbrook

Brig Gen Robert R. Williams

at Gary Air Force Base, San Marcos, Texas. (In May 1946 Gary had been partially reactivated and primary rotary and fixed wing flight training of Army Ground Force personnel had been moved from Sheppard Air Force Base to Gary. In early 1949 Gary was closed and flight training shifted to Connally Air Force Base, Waco, Texas. Gary was reactivated again in early 1951 as a result of the Korean War and expansion of the U. S. Air Force. Consequently, all rotary and fixed wing primary flight training of Army officers was transferred back to Gary by March 1951. The Army fixed wing mechanic and the Army and Air Force rotary wing mechanic programs, had been at Sheppard, but were moved to Gary early in 1951.)

FIXED WING TRAINING

By 1953 primary fixed wing students were spending 17 weeks at Gary and receiving 418 hours of ground school and 100 hours flying time. Ground school instruction covered aerodynamics, meteorology, aerial navigation, aircraft maintenance, flight regulations, aircraft instruments, and communications. Flight training included the basic maneuvers and an introduction to instrument flying. The L-19 and the L-21 were used in flight training.

The 12-week tactical course at Fort Sill included 120 more hours in the L-19. Training included operations from small strips, dirt and paved roads; landing and taking off over an obstacle about 25 feet high, and on a rocky strip about 250 yards long; low-level flight; advanced flight maneuvers; night and cross-country flying; evasive maneuvers; and other types of missions.

Tactical ground school included an expansion of the topics covered at Gary plus ground force tactics, adjustment of artillery and mortar fire, map reading, aerial photography, reconnaissance, development of Army airfields and related subjects.

Instruction in adjustment of artillery fire started in the classroom with training aids. Students sat in chairs and observed puffs of smoke which appeared on a huge terrain board and represented fire missions which they conducted. Once they learned how to adjust fire on the board, they took to the air and practiced on Fort Sill's artillery ranges. Similar procedures were used to instruct other courses.

During the final phase of the course the class would establish an airfield and operate from it as a division aviation section in a field exercise.

Upon graduation the new Army Aviator could apply for the helicopter course, instrument training, or the twin-engine transition course.

INSTRUMENT TRAINING

Instrument training in Army Aviation originally was only provided by contract schools. However, as the requirement for instrument trained aviators grew, the Army realized the need for establishing its own instrument school to supplement the program. In January 1953 the Instrument Flying Course was organized and placed under the supervision of the Department of Flight, Army Aviation School at Fort Sill.

The LC-126 was used in the 8-week course which included 80 hours of hooded flight, as much actual instrument time as weather permitted, and about 120 hours of ground school.

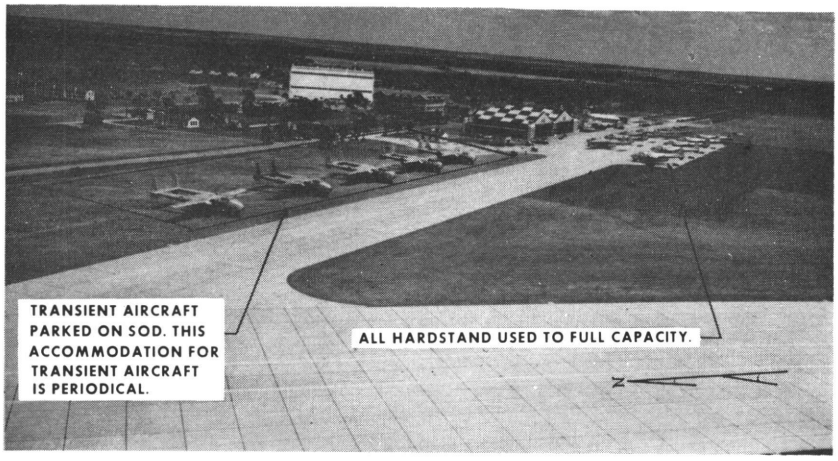
In August 1953 the Instrument Flight Examiner's Course was initiated to teach pilots to conduct and grade the Army's annual instrument flight examinations. The students received about 40 hours of instrument time during the 4-week course.

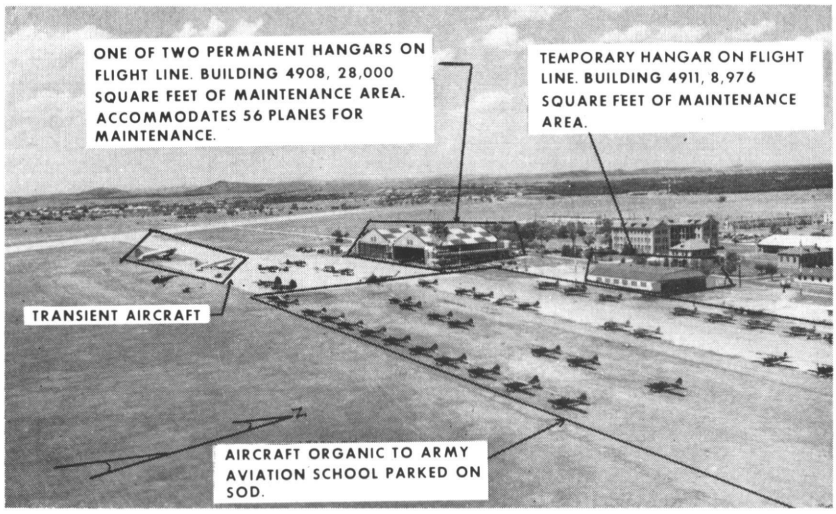
The 2-week twin-engine transition course was set up in January 1953 to train Army Aviators to fly command type aircraft. Students trained in the L-23 and received 36 hours of ground school and 25 hours in actual flight.

RAPID GROWTH

The day the Korean War started, 25 June 1950, the Department of Air Training had about 50 members on the staff and faculty, about 100 students, and about 125 aircraft—L-5s, L-16s, L-17s, and H-13s.

By August 1954, staff and





faculty of the Army Aviation School at Fort Sill had grown to almost 300 members. Also, there were 800 students and about 500 aircraft (8 types). Such rapid growth resulted in numerous problems and crowded conditions which began to hamper the school's ability to perform its mission.

Aviation is a highly specialized activity, and requires the highest standards of instruction. These high standards required adequate and sufficient maintenance space, airspace, classrooms, administrative space, and billets.

Inadequate hangar space, dispersal of activities, and submarginal facilities for aviation at Fort Sill resulted in excessive costs and inefficient operations.

Insufficient aircraft parking hardstands (see photos) meant that about 80 percent of the aircraft had to be parked on the sod, and continuously operated under extremely dusty conditions. The sod had deteriorated and was a sea of mud when it rained and dusty when it was dry. Dust circulating through engine parts resulted in excessive deterioration of aircraft parts and frequent engine replacements. In addition, a lack of hangar space made the aircraft extremely vulnerable to frequent and severe storms.

Periodic storms of great intensity pointed out the lack of adequate hangar space at Post Field. One storm in particular (on 4 August 1946) was accompanied by 3-inch hailstones and severely damaged 231 (48 percent) of the aircraft. Training time lost was 15,975 hours and the estimated total damage cost to aircraft was $575,000. Over an 11-year period, ending in 1953, total storm damage amounted to $2,161,730 and 39,505 training hours lost.

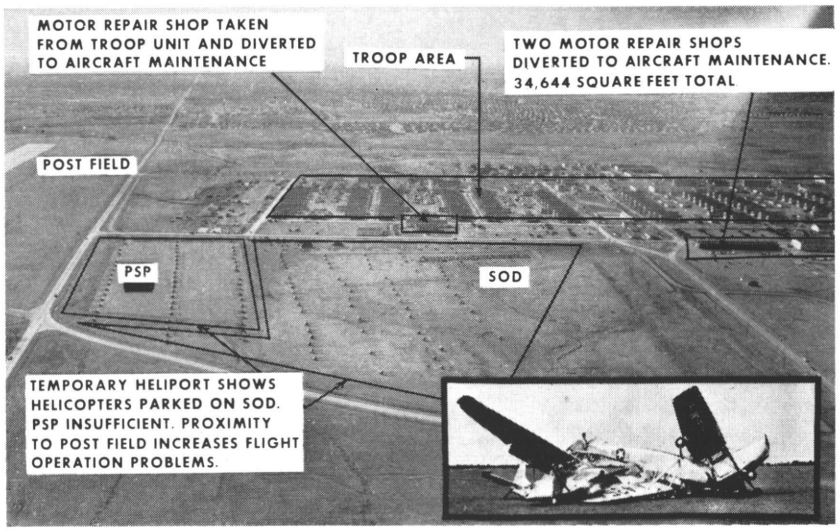
The location of the heliport also posed a problem, due to its encroachment on other training activities at the Artillery School and its proximity to fixed wing traffic at Post Field.

The Army realized that aviation is a highly specialized business and that the facilities at Fort Sill did not meet the needs of Army Aviation. Consequently, plans were under study in 1954 to move the Army Aviation School to a home of its own.

A number of possibilities to relieve the Aviation School's problem were considered. The possibility of expanding activities at Fort Sill and utilizing abandoned Frederick Air Force Base as a subpost was explored. Other facilities considered were at Shawnee and El Reno, Okla.; San Marcos (Gary) Air Force Base, Texas; DeRidder Army Field Forces Base, Camp Polk, La.; Stewart Field at Savannah, Ga.; Camp McCall, N. C.; Fort Riley, Kan.; Camp Rucker, Ala.; and an abandoned Air Force installation at Childress, Texas.

Camp Rucker was chosen over other sites mentioned above primarily because Ozark Army Air Field had three 5,000-foot runways. Buildings had just been renovated at a cost of $8 million. Huge truck stands on the reservation would serve as good heliports. Large buildings used for truck repair would serve as good rotary wing maintenance hangars.

Camp Rucker had its drawbacks, but so did other installations inspected. And none of the other sites had all four advantages mentioned above.



A Department of the Army letter dated 23 July 1954 informed the commandant of the Army Aviation School that "The Secretary of the Army has approved the transfer of the Army Aviation School and the Aviation Test Section of [Army Field Forces] Board No. 1 to Camp Rucker, Alabama, from Fort Sill, Oklahoma."

The letter further directed that the commandant of the Aviation School would work with the commanding generals of Third and Fourth Armies to prepare movement plans which would be submitted to the Department of the Army not later than 1 September 1954 for approval.

Brigadier General Carl I. Hutton, who had been commandant of the Army Aviation School at Fort Sill since July 1954, named Lt Col Carlyle W. Arey as his Chief of Staff. On about 20 August Colonel Arey departed Fort Sill for Camp Rucker with an advance party of 50.

On 28 August 1954 General Hutton left Fort Sill and on 1 September assumed command at Camp Rucker. Colonel Jules E. Gonseth, Jr., assistant commandant of the Aviation School, remained at Fort Sill as acting commandant until early in November when he departed for Rucker. Lt Col Charles Ernest took over for Colonel Gonseth until the rest of the personnel moved and command of the school passed to Rucker.

The move was effected with a minimum cancellation of classes. Some smaller courses, which were scheduled consecutively (twin-engine, instrument, and some mechanic classes) were cancelled. The school was forced to cancel some helicopter courses after problems developed during the move.

The first course of study to get under way at Camp Rucker was a combined Army Aviation Tactics Course. Class AATC-54-K completed primary at Gary Air Force Base on 10 September 1954. These students were either held at Gary or granted leave with orders to report to Camp Rucker on 9 October 1954.

Meanwhile AATC-54-L graduated at Gary on 8 October and reported to Camp Rucker on 12 October 1954. The two classes were combined (AATC-54-K-L) and on 18 October 1954 became the first Aviation School flight class at Camp Rucker. This combined class of 120 officers was graduated on 29 January 1955.

AIRCRAFT MOVEMENT

The responsibility for moving the School's aircraft rested with the Department of Flight and the Maintenance Section.

Since a number of pilot classes were in residence at Sill when the move began, it was necessary to schedule the movement of aircraft from early August 1954 through the following February. As a class would finish training at Sill, the graduates and instructors would fly their aircraft to Rucker in time to be used by a class phasing in there.

The L-19s had the shortest range of the fixed wing aircraft that were moved. The School began moving its L-19s in October 1954 on a 788-mile journey that included two stops. The LC-126 movement began in November 1954 and the L-23 in January 1955. The L-20s were used as control aircraft during some of the flights.

Moving the 250 rotary wing aircraft was more of a problem. They made 12 stops over an 855-mile course. The longest leg was a 97-mile flight from Greenville to Longview, Texas, and the shortest hop was 35 miles,

The following civilian employees of the Army Aviation School were transferred from Fort Sill to Camp Rucker and are still at Fort Rucker. All were flight instructors with the Department of Flight at Fort Sill except Mr. Steltenpohl who was an aircraft maintenance inspector with the Aircraft Maintenance Division.

NAME	*PRESENT ASSIGNMENT*
Milton P. Crenchaw	Dept of Adv F/W
Richard J. Followill	U. S. Army Aviation Board
John Jacob Green	Dept of Adv F/W
Doyle E. Grigsby	Dept of Adv F/W
George H. Howard	Dept of Adv F/W
Jimmie Johnson	Dept of R/W
Don C. Jones	Dept of R/W
John J. Kochis	Dept of Adv F/W
Malcolm F. Landrum	Dept of Adv F/W
Charles E. Maggart	Dept of Adv F/W
Charles L. Martin, Jr.	U. S. Army Aviation Board
Schuyler L. Mathews	Dept of Adv F/W
Virgil M. Mingus	Dept of Adv F/W
James P. Morris	Dept of Adv F/W
James R. Paul	Dept of Adv F/W
Clarence G. Stockwell	Dept of Adv F/W
Gerald T. Thorpe	Dept of Adv F/W
Francis R. Werner	Dept of Adv F/W
Robert L. Chisolm	Dept of Adv F/W
Neil S. Dodson	Office of the DOI
Philip Gennuso	Dept of R/W
Melvin H. May	Dept of R/W
William P. Whitman	Dept of Adv F/W
Wayne G. Steltenpohl	CAM

from Ruston to Monroe, La. Types of helicopters moved included H-13s, 23s, 19s, and 25s.

Each helicopter carried an auxiliary 5-gallon gas can. Also, an L-20 and an H-19 accompanied the flights as control aircraft and each carried extra gas in 5-gallon cans. The first mass movement of helicopters took place in late October 1954.

Establishing a new home at Camp Rucker involved a great deal of extra work and many disappointments for the faculty and staff of the Army Aviation School. Although often discouraged, the situation improved as the aircraft began to arrive.

The fall of 1954 was devoted primarily to the development and renovation of facilities essential to the operation of the School. Rehabilitation was started on the Post Headquarters building and the Department of Tactics was moved into some excellent classroom buildings in the Tank Hill area.

At Ozark AAF, the control tower was relocated in an area from which the ends of all three runways could be observed. Also, work was started on Knox, Ech, Northwest Corner, and Hooper stagefields. A number of strips were constructed for fixed wing operations in the western part of the 60,000 acre reservation and work was begun through the Mobile District Engineers to negotiate leases for areas on which off-post strips, stagefields and airports could be constructed.

December 1954 was a busy month at the Army Aviation School. The Third Army maneuver, FOLLOW ME, centered at Camp Rucker with over a thousand troops from other posts on duty at Rucker for two months. Also in December, the 351st Infantry Regiment returned from Trieste, Italy, and was stationed at Camp Rucker. The 351st, along with the 517th Engineer Company and the 98th Army Band, was designated as a regimental combat team to provide training support troops for the School. Despite the addition of the 338th Field Artillery Battalion, the 351st was not brought up to strength and on 30 September 1956 was reorganized into the 99th Battalion Combat Team. On 24 March 1958, the combat team was redesignated the 2d Battle Group, 31st Infantry Division.

By the end of 1954 the School had seven classes in session. All of the necessary facilities were operating, the hospital was open, and the Army Aviation School had celebrated its first Christmas in its new home.

The two most significant events of 1955 were the establishment of the Army Aviation Center on 1 February 1955, and the redesignation of Camp Rucker as Fort Rucker—a permanent Department of the Army installation—on 13 October 1955. General Hutton became commanding general of the Center as well as commandant of the School.

While many problems were encountered in the early months, sand proved to be one of the most disturbing to the training program. The wild grass on the stagefields at Rucker did not last due to downwash of the helicopter rotor blades.

The sand problem developed into a major, unexpected headache and resulted in loss of time and badly damaged bearing surfaces inside the engines of the aircraft. The problem gradually disappeared with the application of a thin asphalt coating on some of the strips and hovering pads, and the addition of more training areas.

The flight training schedules began falling behind during the early days. The fixed wing schedule was adjusted by the elimination of some portions of the courses. However, rotary wing training continued to slip, despite weekend flying. Additional helicopters and instructors were considered as a solution, but it was reasoned that this would only double the instruction problem since it would take two months, and badly needed instructors, to standardize the newcomers. There was no easy solution—it took hard work and time to solve the many problems facing the School.

F/W CONTRACT TRAINING

Personnel of Class 56-7 were the first Army students to receive primary training in the L-19 from a contractor. Instruction was conducted by the Hawthorne School of Aeronautics at Spence Air Base, Moultrie, Ga., beginning on 3 January 1956.

Air Force personnel were training Army students at Gary Air Force Base, but the Air Force requested that part of the Army's input be diverted to Spence. Classes of 27 Army students were to be phased in at Spence every 13 training days until six classes had entered.

Maj G. W. Jaubert and MSgt Harold Scales formed the Spence Air Base Unit of the Aviation School Regiment to handle administrative matters pertaining to the Army students. Mr. Leslie H. Locke was Hawthorne's supervisor in charge of Army training.

Class 56-7 and the two following classes completed normal training and graduated from primary before word was received that Army training at Spence would terminate on 30 June 1956. The training pace of Class 56-10 (scheduled to graduate on 10 July) was quickened and the

students graduated on 30 June.

Classes 56-11 and 56-12 were transferred to Gary Air Force Base on 1 July and within a few weeks had completed primary training and reported to Fort Rucker. In all, 128 out of 135 students successfully completed training at Spence.

On 19 April 1956 a Department of Defense memorandum directed the Army to assume responsibility for all Army Aviation training. It further directed the Army to assume command of Gary Air Force Base and to let bids for a civilian contractor to conduct primary fixed wing training. The commanding general, Fourth Army, responsible for planning and operations, was authorized to utilize the commandant of the Aviation School as a technical advisor.

In May 1956 Col Jules Gonseth was sent to Gary to administer the contract and Col John D. Edmunds was named to succeed him as assistant commandant at the School. Upon completion of his duties at Spence, Major Jaubert reported to Gary to assist Colonel Gonseth.

The Army officially took over Camp Gary on 14 December 1956. W. J. Graham and Sons, Inc., had been awarded the training contract and on 7 January 1957 began training the first class, 57-9, which was made up of 115 Army students. Mr. William R. Hailey and Mr. Thomas A. Webb, were flight commanders of the group.

The permanent military contingent at Gary was made up of the military commander (Colonel Gonseth), his deputy (Major Jaubert), 22 other officers, and 22 enlisted men. They were responsible for the military operation of the base and checked the contractor's job performance. The rated officers conducted at least half of the student check rides and all of the civilian acceptance flights. They also visited student briefings and academic classes and one rated officer served in a quality control and advisory capacity as aircraft maintenance officer.

Mr. Graham, president of the contracting firm, was in charge of his operation at Gary. Mr. Garnet Howell, on leave of absence from the Aviation School, was Director of Training; Mr. Virgil Mingus, also on leave from the School, was Director of Flying; and Mr. A. L. Taylor was Director of Academic Training.

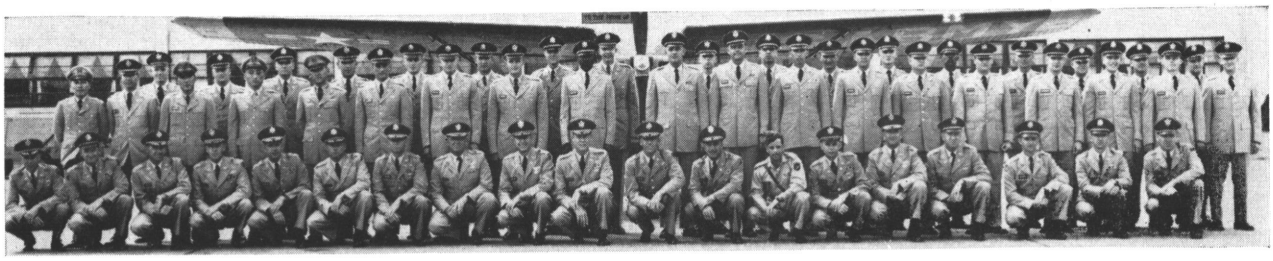
All told, 2,898 students were sent to Gary for training under Graham and 2,151 successfully completed the course.

To further consolidate fixed wing training, the Army moved primary to Fort Rucker on 1 July 1959. Class 59-13, still in residence at Gary at that time, was transferred to Fort Rucker where the advanced course instructors gave the students the remainder of their primary training and then carried them through the advanced phase.

Primary set up temporary headquarters at Lowe Army Air Field. Lieutenant Colonel Jaubert was made first director of

CLASS ROSTER — 57-9

Toler, William K	2/Lt	Holmes, Robert L	2/Lt
VanDervort, Edmund L	2/Lt	Phillips, John H	1/Lt
Antoniou, Michael N	2/Lt	Purcell, Robert W	1/Lt
Askin, Ronald J	2/Lt	Schmidt, Elbert J	1/Lt
Bagnal, Charles W	2/Lt	Seymour, Edward C	1/Lt
Bell, John E	Capt	Spence, Thomas H	1/Lt
Blewster, James C	2/Lt	Anderson, Karl R	2/Lt
Bratt, Clarence M	2/Lt	Anderson, Paul F	1/Lt
Christopher, Harry G	2/Lt	Andree, Robert G	2/Lt
Cobb, John E	Capt	Andrews, Joseph J	2/Lt
Crouter, Edgerton T	2/Lt	Claggett, William	1/Lt
Defrance, Rudolph B	2/Lt	Dale, Teddie A	2/Lt
Dewey, Arthur E	2/Lt	Dalrymple, William C	1/Lt
Doiron, Nicholas H	2/Lt	Frack, Joseph C	2/Lt
Gallagher, James E	1/Lt	Herbert, Bentley J	1/Lt
Isham, Keith L	1/Lt	Hlywa, Nicholas G	2/Lt
Jenkins, Edward H	1/Lt	Hobbs, Harry V	1/Lt
Kallestad, Richard D	1/Lt	Jespersen, Vale D	2/Lt
Massengill, James R	1/Lt	Johnson, David S	2/Lt
Newkirk, Eddie H	1/Lt	Johnston, Lowell E	2/Lt
Rhein, John H	2/Lt	Luckey, James F Jr	1/Lt
Riggins, Gary R	1/Lt	Ortner, Anthony J	2/Lt
Roughen, Albert H	1/Lt	Sanland, Donald T	2/Lt
Schull, Dunell V	2/Lt	Singletary, Charles B	2/Lt
Vann, Peter J	2/Lt	Suttle, Albert B Jr	Capt
Wagenheim, Herbert M	2/Lt	Tucker, Bert E Jr	2/Lt
Wall, John F Jr	2/Lt	Utz, John S	2/Lt
Williford, Henry G	1/Lt	Walker, Wayne	1/Lt
Bailey, Paul O	Capt	Wash, William B	1/Lt
Creson, Robert F	Capt	Weinstein, Leslie H	2/Lt
Draper, Edwin L	2/Lt	Bergstrom, Richard H	Capt
Dunegan, Walter L	2/Lt	Burbank, Robert A	2/Lt
Flinn, Robert F	2/Lt	Carter, Carl V	1/Lt
Frank, Winfield C	2/Lt	Champlin, Donald A	1/Lt
Gafner, Richard L	2/Lt	Gillingham, Richard I	1/Lt
Gentry, Roy C	2/Lt	Harris, James R	1/Lt
Goodman, Robert A	2/Lt	Hover, Charles E	1/Lt
Grivna, Lawrence F	2/Lt	Hulett, Clarence M	1/Lt
Hodges, George A Jr	1/Lt	Killough, Charles K	2/Lt
Kirkpatrick, Andrew C	1/Lt		



OFWAC 60-1
11 September 1959 — 27 January 1960
Hawthorne's First U.S. Army Class
Green I on Left — Green II on Right

1st Row (L to R) Maj R. M. Shoemaker; Capt J. F. VanSant; Maj C. B. Sinclair; Maj R. S. Kellar; Maj K. E. Davidson; Maj R. L. Gabardy; Lt Col W. C. Boehm; Lt Col M. H. Parson; Lt Col G. S. Beatty, Jr; Col A. M. Burdett, Jr; Lt Col J. W. Hemingway; Lt Col G. A. Peyer; Maj M. M. Mahmud; Maj R. J. Dillard; Maj T. A. Crozier; Capt W. E. Crouch, Jr; Capt W. A. Lusk, Jr; Capt J. M. Blair; Capt J. A. Lynch.
2nd Row (L to R) 1st Lt D. J. Kim; 1st Lt A. L. Powell; 1st Lt C. Chin; Capt C. Chang; Capt K. Yoon; 1st Lt P. L. J. Klempnow; 1st Lt J. B. Morgan; 1st Lt D. T. Moentmann; 1st Lt W. D. Gess, Jr; Capt J. H. Mapp; Capt W. T. Fitts, III; Capt J. B. Hatch; 1st Lt H. E. Malone, Jr; 1st L. E. Scoggins; 2nd Lt R. L. Hazlewood; 2nd Lt R. W. Nelson; 2nd Lt K. O. Hulse; 1st Lt C. E. Sauer; 2nd Lt R. L. Chancellor.
3rd Row (L to R) 1st Lt C. G. Robertson; 1st Lt R. L. Filson; 1st Lt J. M. Henderson, Jr; 1st Lt R. D. Millspaugh; 1st Lt Z. K. Rector; 1st Lt F. W. Russell; 1st Lt T. R. Chapman; 1st Lt C. F. Morgan; 2nd Lt R. M. Rusch; 1st Lt J. A. Matos, Jr; 2nd Lt J. L. Christie; 1st Lt F. D. Scott; 2nd Lt D. M. Whitehead; 2nd Lt D. H. Halsey; 2nd Lt G. W. Nelson; 2nd Lt J. P. Vaughn; 2nd Lt C. F. Shearer. Absent—Capt H. L. Wheeler and 1st Lt W. F. Boyle.

Primary Fixed Wing Training at Fort Rucker and Maj Parris Welch the first deputy director.

On 22 June 1959 Hawthorne School of Aeronautics was awarded the primary fixed wing training contract and began training the first primary class enrolled at Fort Rucker, 60-1, on 11 September 1959. The class, composed of 57 officers ranging in rank from second lieutenant to full colonel, was graduated on 27 January 1960 (above). Mr. Robert Snowberger and Mr. Fred Gardner were flight commanders of 60-1.

Hawthorne officials who started at the school with Hawthorne and are still there include Mr. Leo E. Carver, General Manager; Mr. Earl Mengle, Director of Flying Training; and Mr. James Thursby, Director of Academic Training. Mr. Brax Batson, who was Director of Training until February 1961, was succeeded by Mr. Leslie H. Locke, who had supervised Army training at Spence Air Base.

Lowe AAF had been completed in 1957 for use as a base field for the Advance Contact Flight Division, Department of Fixed Wing Training. To accommodate primary, about 62,096 square yards (128 acres) of black-topped surface were added just before the move from Gary. Primary's permanent home, Auxiliary #3, was completed and occupied this summer. The installation includes a 2-story instructor building with a floor area of about 12,000 feet; a 6-story control tower; a 2-story operations building consisting of about 4,000 square feet and a single story fire and rescue building with a floor area of about 2,800 square feet.

In all Auxiliary #3 will occupy about 200 acres and have four 2,000-foot runways, connecting taxiways, and a parking apron 1,456 feet by 380 feet.

ROTARY WING HISTORY

Early in 1945 the Army began investigating the feasibility of adapting rotary wing aircraft to the Army Aviation mission. The first Army helicopter pilots were trained in late 1945 and in 1946 under an informal agreement with the Army Air Corps. They were selected on an individual basis and trained in Sikorsky R-4, R-5, and R-6 helicopters at Scott Field, Ill., Sheppard Field, Texas, and San Marcos, Texas.

In 1945 Capt R. J. Ely completed the course at Scott Field and became the Army's first helicopter pilot. Others who received their training from the Air Corps include Capts Kenworthy Doak, Thomas J. Rankin, and J. Y. Hammack, and Lts Robert R. Yeats, Daniel Wilson, and Norman Goodwin.

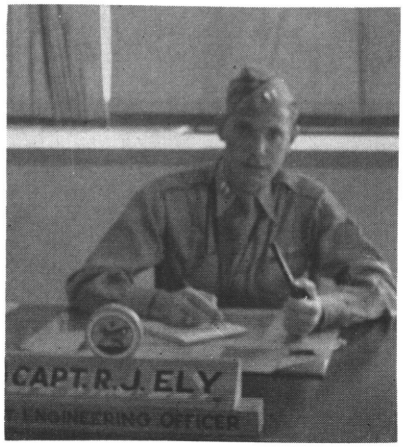
In 1946 the Army obtained its first helicopters, 13 Bell YR-13s. (The Sikorsky H-19 and Hiller H-23 were added after the Korean War started.) These YR-13s began coming off the production line in December 1946.

As interest in rotary wing operations mounted, the Bell Helicopter Company was awarded a contract to train helicopter pilots and mechanics for the Army. In February 1947 Bell began the first formal Army helicopter pilot training course. Attending were Lt Col Jack L. Marinelli (now Col and president of the U.S. Army Aviation Board, Fort Rucker, Ala.); Capt Hubert D. Gaddis (now Lt Col and director Aircraft Division, U. S. Army Aviation Board, Fort Rucker); Maj Jack Blohm (now Lt Col, retired and with HumRRO, Fort Rucker); and Capt Darwin P. Gerard (now Lt Col, retired, and with Grumman Aircraft Engineering Corporation). This

group received its instruction in the successful new YR-13 (H-13) at Buffalo, N.Y.

In 1947, under a formal agreement with the Army, the U.S. Army Air Corps began giving Army students primary rotary wing training at San Marcos AFB. The first class, consisting of four students, began on 1 September 1947 and lasted 6 weeks. Training was in the YR-13. The first students to receive training under this agreement were Maj Harry Bush (now Lt Col); Capt Jack Tinnen (now Lt Col and with the White House presidential flight); Capt Troy B. Hammonds; and Lt L. C. Boyd (now Lt Col and Deputy DOI, Fort Rucker).

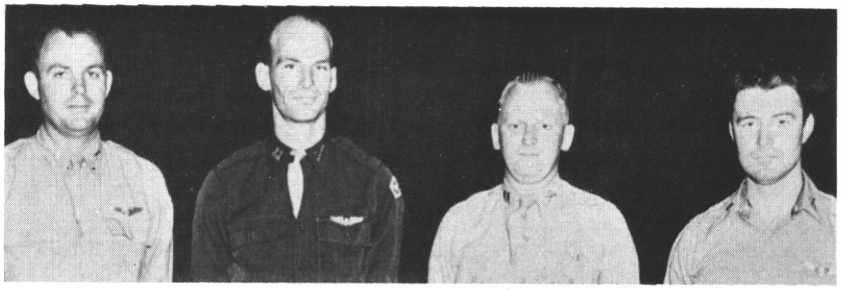
It was hoped that Army students would train with Air Force students, but the Air Force



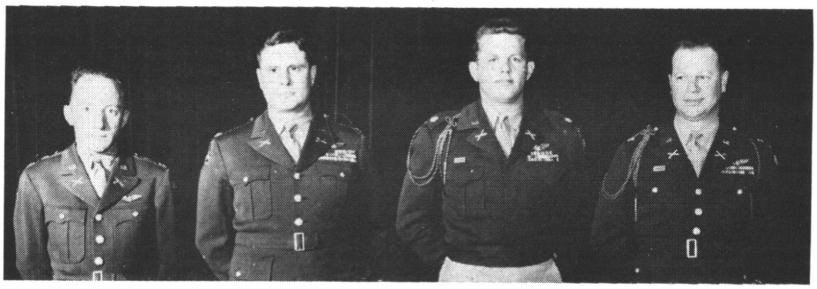
Capt R. J. Ely, first Army R/W pilot.

trained their personnel in R-5s and R-6s, and a separate system of training in YR-13s was set up for the Army students. The Army students were turned out as qualified helicopter pilots after 25 hours of instruction.

The Army felt that 25 hours of instruction was inadequate and that its rotary wing pilots really knew little or nothing about techniques or finer points



Above, the first group of Army officers to receive informal helicopter flight training from Bell. They are (left to right): Lt Robert R. Yeats, Capt Thomas J. Rankin, Capt Kenworthy Doak, and Lt J. Y. Hammack. Below, the group that attended Bell's first formal helicopter flight course. They are (left to right): Capt Hubert D. Gaddis, Lt Col Jack L. Marinelli, Maj Jack Blohm, and Capt Darwin P. Gerard.



of helicopter flying. Consequently, the Army Helicopter Advanced Tactical Training Course was established at Fort Sill on 1 November 1948. Capt Hubert D. Gaddis set up the flight training course and flight standardized the first Army rotary wing instructor pilots. Members of this group, who took their helicopter flight training from either the Air Force or Bell, included three Army officers and two civilians: Lts Rodney J. Collins, Norman Goodwin, and Marcus Sullivan, and civilians James K. Knox (now deceased) and Charles L. Martin (now with the U. S. Army Aviation Board, Fort Rucker). These men instructed the Army's first tactical helicopter training course, which consisted of eight students who were graduated on 3 December 1948.

In July 1949 this course was renamed the Army Field Forces Helicopter Pilot Course, and in August 1951 it was changed to the Army Helicopter Aviation Tactics Course.

In the summer of 1953 the Army established a course which graduated warrant officer cargo helicopter pilots for Transportation Corps helicopter companies. Applications came from enlisted men or warrant officers and the prerequisites did not require prior aviation training.

The Army had negotiated with the Air Force to conduct this course, but the Air Force refused —stating that helicopter flying could not be taught to individuals who were not already pilots and that teaching enlisted men to fly was against policy.

Bell Helicopter Corp. also required prior fixed wing training before it would accept students in its rotary wing course. Nevertheless, the Army took a bold, unprecedented step and established the course.

Candidates in the enlisted men's portion of the course underwent intensive OCS-type training. They were given a sergeant's pay while in the course and wore no insignia. The candidates were subjected

to an intensive hazing program and stood rigid personal inspections. For example, it was not uncommon to see a candidate standing at attention and continuously saluting a telephone pole and addressing it in the proper military manner.

The students were trained in flight fundamentals, advanced flight techniques, theory of flight, navigation, meteorology, maintenance, map and photograph reading, helicopter transport subjects, and transition flight training. The Army's decision paid off. The course proved most successful and still is a part of the program.

In August 1954, when the Army Aviation School was moved to Camp Rucker, the rotary wing course was changed from a section of the flight department to a department of its own. Lt Col James W. Hill was made director of the Department of Rotary Wing Training at Rucker and Maj Hubert D. Gaddis the deputy director.

As a result of the move, Army Cargo Helicopter Pilot Course 55-E was cancelled and ACHPC 55-F ordered to report to Rucker on 18 October 1954. This class, made up of 25 officers and officer candidates, was the first rotary wing class to begin instruction at Rucker and on 30 April 1955 it was the first to be graduated. (See box below for list of students.)

Army Helicopter Aviation Tactics Course 55-H reported to Rucker on 11 January 1955 for advanced training after having been graduated from the basic course at Gary AFB on 7 January 1955. AHATC 55-G was cancelled.

The Department of Defense memorandum of 19 April 1956 directing the Army to assume all aviation training and command of Gary AFB also initiated action to obtain Wolters AFB, Mineral Wells, Texas, for use as the Army primary helicopter school. This presented a problem since the Army did not desire to continue basic rotary wing training at Gary and did not plan to start its training program at Wolters until late in the year. Consequently, plans were made to move the program from Gary to Rucker. Orders for Class 56-17 to report to Gary on 22 June 1956 were cancelled and the class was directed to report to Fort Rucker on 13 July 1956. The class began training on 17 July and was graduated on 21 September.

When it was decided that Wolters AFB would be used, Col John Inskeep was sent from Rucker to Wolters to administer the contract. On 14 May 1956 Major Gaddis left Rucker for Wolters to provide aviation technical data and guidance. He selected sites for location of four stagefields and designed the main base heliport.

Wolters AFB was transferred from the Air Force to the Army on 1 July 1956 and Colonel Inskeep assumed command. Colonel Chester H. Meek was named deputy post commander and Col Wayne E. Downing was assistant commandant. On 13 July 1956 Secretary of the Army Wilber M. Brucker redesignated the post "Camp Wolters" and on 26 September the U. S. Army Primary Helicopter School at Wolters became an official Army school.

Shortly thereafter the Southern Airways Company was awarded a contract to provide all flight training and associated ground school instruction, plus the maintenance of government owned aircraft and equipment at the school. In 1957 Southern signed a new contract which contained a clause allowing the contract, if renewed each year, to run through June 1964.

The first class to be trained at Wolters was 57-6, the Army Aviation Transport Pilot Course (Rotary Wing). It got under way on 26 November and was graduated on 27 April 1957. (See pictures on page 26.) The class was divided into two phases of training:

- a 4-week officer-candidate-school type training for enlisted men who were graduated as warrant officers upon successful completion of the course;
- a 16-week course in primary and basic flight training for Medical Corps service officers below the rank of captain, warrant officers, and the warrant officer candidates who had successfully completed the OCS-type training.

The first students at Wolters were instructed by 27 Southern Airways instructors who had been standardized during Au-

FIRST HELICOPTER CLASS GRADUATES AT RUCKER

W/O Jack M. Hendrickson	Sgt Bobby G. Bruce
1st Lt Donald F. Lusk	M/Sgt Robert W. Beechter
1st Lt Willie M. Dixson	SFC Rex C. Flohr
1st Lt Curtis O. Greer	Pvt Charles R. Hall
CWO William L. Ruf	SFC Donald R. Joyce
Capt Glen W. Jones	M/Sgt M. I. Keys
2d Lt Raymond E. Smith	SFC Raymond T. Kline
1st Lt Jack C. Snipes	Sgt Michael J. Madden
M/Sgt Donald C. Beachnew	SFC Eugene E. Price
M/Sgt Henry R. Beau	SFC Lucis L. Share
M/Sgt John F. Williams	M/Sgt Joseph M. Truitt
Sgt Stanton C. Beedy	SFC Jay L. Dugger

SFC L. T. Brown

gust and September at Fort Rucker. The students flew H-23s which were brought in from Fort Rucker. Upon completion of primary, a portion of the graduates reported to Fort Rucker for transition training in transport helicopters and the remainder were sent to various Army units to fly observation and utility helicopters.

During the first graduation ceremonies at Wolters the facilities constructed by the 931st Engineer Group (under Col William N. Beard) were formally turned over to Camp Wolters.

Wolters and Rucker each handled half of the primary helicopter training input until 1958 when it was turned over in its entirety to Wolters. The last primary class to be trained at Rucker was Army Aviation Helicopter Course 58-10 which was enrolled on 30 June 1958 and finished primary on 6 September 1958.

Permanent Army personnel at Wolters conducted instruction in military subjects and maintained a quality control group which also gave each student two check rides.

By the end of June 1961 the Wolters' curriculum offered three courses: the Warrant Officer Rotary Wing Aviation Course, which consisted of enlisted National Guardsmen and Reservists on active duty for rotary wing training; the Officers Rotary Wing Qualification Course, which consisted of fixed wing aviators qualifying in helicopters; and the Officer Rotary Wing Aviator Course, for nonrated officers.

The primary helicopter school had recorded a total of 365,000 flight hours by 5 July 1961. On that date the helicopter school also recorded its 1,000,000th autorotation which was accomplished by Warrant Officer Candidate Dudley D. Moss in an H-23D. About 900 autorotations are accomplished each training day.

Colonel Inskeep, who had directed the fortunes of the USAPHS since it was established, retired from active duty on 31 July 1961. He was succeeded by Col Jack K. Norris who assumed command on 1 August.

This fall (1962) the Army plans to establish an Observation Helicopter Tactics Course which will be conducted at Camp Wolters and Fort Sill. After completing primary rotary wing training at Wolters, half of the graduating class will be sent to Fort Rucker for transitioning into cargo helicopters and the rest will remain at Wolters for 15 hours transitioning into the H-13, the aircraft

FIRST CLASS TO GRADUATE FROM USAPHS
WARRANT OFFICERS

1. *Clayton L. Anderson*
2. *Alvin D. Arrington*
3. *John A. Banks*
4. *James E. Beeman*
5. *Virl A. Black*
6. *Donald D. Bright*
7. *Basil B. Catalano*
8. *James B. Childers*
9. *Benson M. Collett*
10. *Gerald H. Dirks*
11. *Roger L. Eichelberger*
12. *James A. Godfrey*
13. *Lawrence C. Hammond*
14. *Raymond L. Henry*
15. *Joseph P. Holland*
16. *Charles R. Honeycutt*
17. *Carl H. Hunter*
18. *Martin A. Jetton*
19. *Lloyd K. Kaul*
20. *Anthony G. Kusilka*
21. *Pascual Lentini-Bottey*
22. *Robert W. Meade*
23. *John E. Moodt*
24. *Henry C. Norton*
25. *James M. Parker*
26. *James P. Pickel*
27. *Joseph L. R. Pinard*
28. *Leslie G. Purdom*
29. *Royce D. Raley*
30. *Hu B. Rhodes*
31. *John W. Schwegler*
32. *William T. Slye, Jr.*
33. *Alfred E. Smith*
34. *Dale L. Stockwell*

and

35. *CWO Robert E. Helterbran*

Right, candidates undergo intensive DCS-type training.

to be used in the tactical phase.

The next 10 hours of the new course will cover tactical flight training, followed by a low-level cross-country flight to Fort Sill. The class will spend 4 weeks at the Artillery Center where instruction will include artillery gunnery, adjustment of artillery fire from the H-13, aerial gunnery, and various other phases of tactical training.

R/W AT RUCKER

At Fort Rucker the Department of Rotary Wing Training moved into its new home at Hanchey Army Air Field in October 1959—5 years after the first rotary wing class reported to Rucker. The new Army airfield (referred to as Auxiliary #2 while being constructed) was named in honor of Maj Charles Wesley Hanchey. Major Hanchey, a Senior Army Aviator who served as an artillery observation pilot in World War II, was an outstanding pioneer in the development of the Army's rotary wing program.

The average number of students at Hanchey at a given time has risen from 100 to 145 since Hanchey opened. Courses of instruction are:

- Officers Rotary Wing Aviator Course, phase 2
- Warrant Officers Rotary Wing Aviator Course, phase 2
- HU-1 Instructor Pilot Transition Training Course
- Army Aviation Medical Officers Orientation Course
- Special Cargo Helicopter Transition Courses
- Helicopter Instrument Flying Course
- Helicopter Instrument Flight Examiners Course

The Army's rotary wing instrument program was born out of necessity. By 1954 there was an increasing number of helicopter accidents caused by a loss of visual reference. This clearly indicated a serious lack of information in the field of rotary wing instrument flight. This was also reflected in Army policy which stated that "because of their aerodynamic characteristics and inadequacy of flight instrumentation, Army helicopters will not be flown unless visual reference to the ground can be maintained." Exceptions were to be made only for special tests or training activities.

This policy was in direct contradiction to the growing hope that the helicopter would help balance the mobility-firepower scale disrupted by the development of nuclear power. To be effective it was necessary for the helicopter to operate around the clock and calendar in any part of the world, and at near zero visibility.

A group of the U. S. Army Aviation School felt the helicopter had this potential. A member of this group was Maj Hubert Gaddis, then director of the Department of Rotary Wing Training. In December 1954, he appointed Capt Ellis G. (Sam) Langford and Capt Emil E. Kluever to conduct a test and evaluation program to determine the feasibility of helicopter instrument flight. Captain Langford was from the Department of Rotary Wing and Captain Kluever reported from the Instrument Division, Department of Fixed Wing Training.

The two captains had to start from scratch. Some instrument flying had been conducted on a small scale in Korea with H-19s. Also some preliminary work had been done at the School in December 1954 when Captains Langford and Kluever accomplished the Army's first simulated (hooded) helicopter instrument flights. However, no specific conclusions had been reached.

Major Gaddis, Captain Langford, and Captain Kluever "hit the trail" to collect information on helicopter instrument flight. In February they visited the Navy, Marines, Air Force, and National Advisory Committee for Aeronautics. Liaison also was established with New York Airways, Los Angeles Airways, and the Bell Aircraft Corporation. However, the data acquired lacked the necessary technical information. Despite this, the trio returned to Rucker fully convinced that instrument flight with Army helicopters was both feasible and practical.

In March and April 1955, the H-19 and H-25 were evaluated. Stability characteristics varied between the single rotor H-19 and the tandem rotor H-25. In straight and level flight the H-19 proved to be more stable and had less tendency to pitch, roll, and yaw. Excessive vibrations on the H-25 instrument panel during climbs, descents, autorotations and airspeed transitions caused instrument interpretations to be difficult. As a result the H-19 was determined to be the more suitable instrument trainer and was the only helicopter used in the early months of the program. Plans called for possible use of the H-25 when more instructors became available.

The first helicopter instrument class, consisting of CWO Clifford Turvey and CWO A. R. Tucker, began on 3 May 1955. Captains Langford and Kluever taught this class and several others in order to qualify instructor pilots being assigned to the test and evaluation program. The students were selected at random from the qualified list of H-19 instructor pilots at the School.

CWOs Marvin M. Wingrove and Jack M. Crich completed the

second class and along with CWOs Turvey and Tucker were recommended in September for standard instrument tickets.

Authority for the commandant of the Aviation School to award helicopter instrument tickets was approved on 16 April 1956. The certificates were to be valid in rotary wing aircraft while the holder was participating in the instrument program.

On 1 May 1956, Brig Gen Carl I. Hutton, commandant of the School, presented the first standard helicopter instrument certificates to Capt George A. Dalusky; 1st Lts Garland B. King, William A. Smith, Jr.; CWOs Tucker, Turvey, Wingrove, Crich, Ralph L. Ebert, James B. Regan, Wesley E. Rose; and civilians Don L. A. Whittaker (deceased), Phillip Gennuso, and Charles D. Shuman. (Mr. Whittaker received the first special helicopter instrument card early in August 1958.)

A few months previously in January 1956, the School was authorized to fly helicopters under actual instrument conditions. This led to the first actual instrument flight, which was made by CWO Tucker and Mr. Don G. Clark on 19 January 1956. The flight lasted one hour and was conducted at various altitudes up to 4,000 feet. Each pilot flew the H-19 (No. 55190) for a half hour and experienced no serious problems.

Another part of the test and evaluation program consisted of the Instrument Helicopter Experimental Course which began on 26 March 1956 with 14 students and lasted 4 weeks. (See box.)

The hope of operating helicopters at near zero-zero visibility has been a matter of debate among rotary wing strategists for years. In the summer of 1956, two of these "strategists" talked themselves into a flight in near zero-zero weather conditions.

Maj Oran B. Jolley was the new commander of the Rotary Wing Instrument Flight Division. During his first few weeks at Rotary Wing, he had heard considerable talk among the test group pilots about their ability to fly helicopters when visibility was down to nothing. One morning fog had all operations grounded and the test group was sitting in the PX drinking coffee. Major Jolley couldn't resist the temptation. He began needling the group, and a friend of his, Lieutenant King, in particular, about their boasts. He wanted to know why, if they were so good, they weren't out flying.

Lieutenant King replied that they were unable to obtain an aircraft. Major Jolley laughed that off as a poor excuse and stated, "I can get one anytime." Lieutenant King quickly answered that if Major Jolley would get the aircraft he would be happy to take him up and demonstrate what the helicopter could do in the heavy fog.

Major Jolley, his bluff called, stayed in the game and called Lieutenant King's bluff. They both agreed to go through with it and DOI (much to their disappointment) okayed use of an H-19 to conduct a test flight under the School's evaluation program.

The pair took off in heavy fog at East Port and flew to the Enterprise homer where they were picked up by the Cairns GCA. After "tooling around" in the soup at 8,000 feet for a while they made a perfect GCA approach—breaking out at about 15 feet. Lieutenant King calmly set the H-19 down and asked Major Jolley if he wanted to try an approach.

Major Jolley declined and admitted that he had just had his first helicopter instrument flight. Lieutenant King then admitted that he had just made his first instrument approach below minimums.

The two agreed that they had established, at least in their own minds, that the helicopter can be effectively operated under near zero-zero weather conditions. Both Major Jolley and Lieutenant King were familiar with the saying about discretion and valor—and they left the H-19 at Cairns until the weather lifted.

In 1957 the CAA (now FAA) sent two representatives from its air carrier division to Fort Rucker to attend a special helicopter instrument training course. Mr. Kenneth Cooper and Mr. Wayne Jordan began training on 25 February 1957 and finished the course on 26 March 1957. Since then six more CAA-FAA representatives have completed the course.

Another step in the development of the rotary wing instrument program was the revision of Army Regulations to allow the operation of helicopters under instrument conditions. A set

Personnel who were enrolled in the Instrument Helicopter Experimental Course:

Capt Darrough	CWO Vaught
Lt Getz	Mr Broyles
Lt Jack Burton	Mr Otto Buettner
Lt Miles	Mr Gerry Decker
Lt Trapp	Mr Gordon Hazell
CWO Bouza	Mr R. D. Maier
CWO Moczygemba	Mr John Thompson

of proposed changes was drawn up by Mr. Whittaker and submitted for approval on 19 May 1958. Generally, the proposals requested that the regulations be reworded to include helicopters in a number of existing regulations. Specifically, they requested that rotary wing takeoff minimums be made lower than those applying to fixed wing aircraft and also that helicopters be allowed lower minimums at destination and alternate airports. Most of these changes were approved in late 1958.

The first formal Army Helicopter Instrument Flying Course, 59-1, began on 14 July 1958 and closed on 20 September 1958. These graduates were immediately enrolled in the Army's first Helicopter Instrument Flight Examiners Course which ran from 22 September 1958 to 18 October 1958. The graduates were 1st Lt Kenneth L. Wenn; CWOs Harold E. Marks, Richard L. Piety, Douglas E. Story and Henry Coleman; and U. S. Marine Corps 1st Lts Bruce W. Driscoll and David T. Forbes, Jr.

Aircraft evaluated for use in the early portion of the instrument program were the H-13, H-19, and H-25. The H-19 was finally chosen and used until late 1958 when it began to be phased out in favor of the H-34 and H-21. The latter two aircraft are still used, but are gradually being replaced by the HU-1A which was obtained for instrument training in late 1959.

Another rotary wing first occurred when helicopter GCA equipment was installed at Hanchey AAF in February 1960. Chiefly responsible for the development of rotary wing GCA were Capt Darrell Sandel, Capt A. P. Betti, and MSgt John R. Reynolds. Experiments proved successful and in September 1960 the first rotary wing GCA installation was certified by FAA. During fiscal year 1961, the rotary wing GCA handled 4,138 approaches. Records were not kept previously.

MAINTENANCE

By 1954 mechanics were being trained on three fronts. The Air Force trained the Army's organizational fixed and rotary wing mechanics at Gary AFB while third, fourth and higher echelon mechanics were trained at Fort Eustis, Va. The Air Force did not have aircraft such as the H-23 and L-23 and only taught maintenance courses on the H-13 and L-19. Consequently, it was necessary for the Army to operate organizational mechanics courses which the Air Force did not include. These Army courses were given at Fort Sill by both the air training department and later the School.

The first Air Force program for training Army mechanics was organized at Keesler Air Force Base, Biloxi, Miss., on 17 March 1948. Those responsible for setting up the fixed wing course were Mr. Donald McShee, the senior instructor; Mr. Joseph M. Robinson, now with the Department of Maintenance, USAAVNS; Mr. Robert I. Devereaux; Mr. Charles Putz; and Air Force Staff Sergeant Ralph Peak. The civilians were civil service personnel working for the Department of the Air Force.

The first class began about mid-May and consisted of about 8 students—a mixture of Army National Guard and Army personnel. Classes ran 5 days a week for 13 weeks and averaged 8-13 students. The input was increased during the Korean War.

On 12 March 1949, the mechanics school was discontinued at Keesler and on 16 September 1949 it was resumed at Sheppard AFB. At that time Mr. Devereaux succeeded Mr. McShee as fixed wing senior instructor. The first class at Sheppard was started shortly after 16 September. Thereafter classes began every 5 days and each averaged 15-20 students.

On 2 August 1950, Mr. Devereaux was named senior instructor of the rotary wing course and Mr. Robinson took charge of the fixed wing program. From this point, the history of Air Force training of Army helicopter mechanics closely parallels the fixed wing program.

When Sheppard was deactivated, the mechanics course was transferred to Gary AFB. Mr. Robinson and Mr. Devereaux left Sheppard with an advance party on 26 February 1951 to set up shop at Gary. Training resumed on 2 March 1951 on an accelerated basis which had been started at Sheppard. Due to the Korean War, classes had been increased to 30 students and two classes a day were conducted on a swing shift basis.

When the Army was directed to assume responsibility for all of its aviation training (April 1956) plans were made for the Air Force program to be absorbed by the Army Aviation School. In August 1956, the training program at Gary began closing down. Instructors who moved to Rucker were Mr. Robinson, Mr. P. L. Gary and Mr. W. W. Ford. All are still working in the School's Department of Maintenance.

THE ARMY PROGRAM

When the School moved to Camp Rucker, the Department of Aviation Maintenance was established, which remained in existence until the Department of Academics was organized in September 1955. The new organization was a step in the consoli-

dation of training and included both maintenance and general subjects instructors.

Lt Col C. P. (Ted) Damon directed the Department of Academics until January 1957 when he was succeeded by Lt Col David Cogswell. Mr. John Gable was the civilian education advisor, from September 1956 to March 1957.

In August 1957 further reorganization at the School resulted in the formation of the Department of Maintenance and the discontinuance of the Department of Academics. The general subjects instructors were transferred to the Department of Advanced Fixed Wing.

Colonel Cogswell headed the Department of Maintenance until February 1958 when he was succeeded by Lt Col Harry J. Kern. Colonel Kern has been director ever since except for a period from 9 September 1958—19 December 1958 when Col Robert R. Schulz held the position. Mr. James Burkett Howard has been education advisor since May 1957, two months after Mr. Gable left.

The establishment of the Department of Maintenance resulted in an expansion of all phases of fixed and rotary wing organizational maintenance.

A project to simplify the aviator mechanics MOS system was accomplished in July 1959 by the Department of Maintenance. The original MOS system designated mechanics only as 671.1 (fixed wing) or 672.1, 673.1, and 674.1 (rotary wing). This system did not give commanders any indication of which aircraft a mechanic was qualified to work on. The decimal and "1" simply indicated that the mechanic was only qualified for first echelon (organizational) maintenance.

Plans to develop a new system were started under Colonel Cogswell and continued by Colonel Kern. The new MOS structure, developed by Maj Arvil Quinn and Mr. Howard, retained the decimal, which was followed by various numbers to indicate on which aircraft the mechanic was checked out.

By the spring of 1960 commanders in the field were having great difficulty in releasing organizational maintenance personnel for school attendance. A number of solutions were considered, and one of the most plausable was to send the instructors to the field. Consequently, the Department of Maintenance organized the U.S. Army Aviation School Organizational Aircraft Maintenance Supervisor Mobile Instructional Team.

Three teams traveled to all continental Army areas and presented 40-hour courses of instruction at major posts. The instructors were military personnel assigned to the Department of Maintenance. Current plans call for teams to be sent into the field again this summer.

In July 1961 a new course was organized at the Department of Maintenance to cover automatic stabilization equipment, which is incorporated on the H-34s and H-37s.

Courses on the Chinook are now being planned. Last May a group of civilian and military instructors attended a 5-week Chinook maintenance course at the Vertol plant in Norton, Penn. Another group enrolled in June and will return to the School to help write programs of instruction.

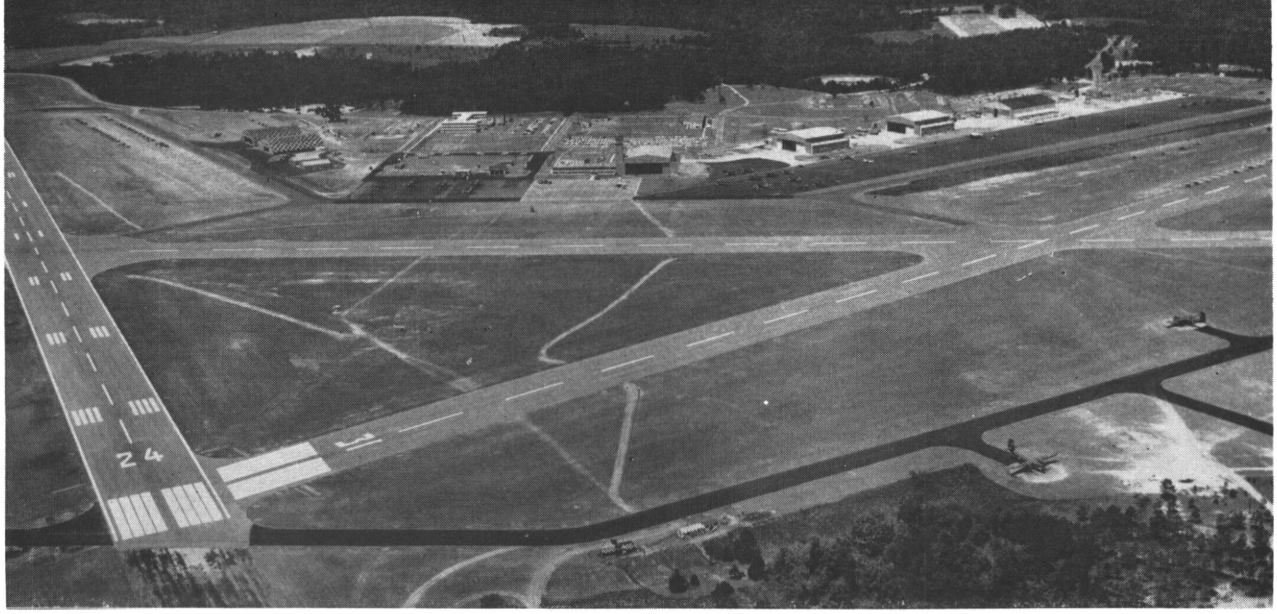
Today basic students report to the Department of Maintenance for a 5-week course which covers fundamentals. Following this course they can return to the field, but normally continue at the School in either advanced, fixed, or rotary wing training.

If the student continues in fixed wing maintenance, he enters a 5-week course in which he receives instruction on the L-19 (Bird Dog) and L-20 (Beaver). He then is generally returned to the field; however, selected graduates from this class are sent to a 3-week course of instruction on the U1-A (Otter). After one year of experience in the field, fixed wing mechanics are eligible for either the 3-week L-23 (Seminole) class, the 4-week AO-1 (Mohawk) class, or the 4-week AC-1 (Caribou) class.

Basic graduates who continue in rotary wing instruction are given 5 weeks of training in the H-13 (Sioux) and H-23 (Raven) course. The majority of these graduates return to the field, but a few are accepted along with mechanics having field experience to enroll in either the 2-week HU-1 (Iroquois) course, the 5-week combined H-19 (Chickasaw) and H-34 (Choctaw) course, or the 4-week H-21 (Shawnee) course. Rotary wing mechanics who have one year's field experience qualify for the 5-week H-37 (Mojave) course or the 2-week Automatic Stabilization Equipment course.

Basic course graduates who are not elected for further aircraft maintenance training, and are slated for overseas tours as mechanics helpers, receive advanced individual training for 3 weeks.

The Aviation Department at Fort Eustis began its first course of instruction on 21 June 1954. The department was organized to offer resident instruction in Army Aviation maintenance and supply, air movements, and all other aviation subjects for which the Transportation School was responsible. The Department



Cairns Army Airfield as it appears today at Fort Rucker, Ala. Originally this installation was named Ozark Army Airfield, but on 10 January 1959 it was renamed in tribute to Maj Gen Bogardus S. Cairns who died in an H-13 crash on 9 December 1958.

also provided assistance and technical know-how for the development of numerous Army-wide aviation training projects.

CONTRACT MAINTENANCE

Contract maintenance within the Aviation School program originated in March 1953 at Fort Sill. The Korean War had spawned a rapid input of personnel and aircraft which in turn resulted in an expanded maintenance load. The school's maintenance schedule, plagued by unstability of tours of duty, fell rapidly behind. It was decided that contract maintenance was the only answer.

In April 1953, Lt Col Austin J. McDermott was made the first Contracting Officer Representative, a position created to represent the contracting officer on aviation matters. Bids were let and the Spartan Aircraft Corporation of Tulsa, Okla., was awarded the first contract.

Spartan made the move to Rucker with over 200 of its employees and remained with the School until the Aeronca Manufacturing Corporation of Middletown, Ohio, was awarded the contract.

Aeronca assumed aircraft maintenance responsibilities at Fort Rucker on 1 July 1955 and was headed by General W. W. Ford, retired, who had been the first director of the Department of Air Training. Aeronca was responsible for the school maintenance until 1 July 1956 when the Hayes Aircraft Corporation (currently called the Hayes International Corporation) of Birmingham, Ala., was awarded the contract. Hayes has handled the contract maintenance at the School ever since.

Mr. Glen O. Peterson was general manager of Hayes operations at Rucker when the contract was first awarded. In February 1959, Mr. Peterson was succeeded by Mr. W. T. Neal who had been the assistant general manager. Previously, Mr. Neal had been employed by Aeronca at Fort Rucker as Director of Maintenance.

The CAM (Chief, Aircraft Maintenance) organization at Fort Rucker evolved from the contracting officer representative position established in 1953. Its functions are to handle the contract, negotiate with the civilian contractor and to act as overseer in a quality control capacity.

Actually, the CAM organization was born on 22 August 1955 when Lt Col David E. Condon's position as contracting representative officer was dissolved and he was made contracting officer for aircraft maintenance. In addition, his position was given staff status as the Deputy Chief of Staff for Aircraft Maintenance.

In 1957 the position of contracting officer for aircraft maintenance was reorganized and transferred from the jurisdiction of the Chief of Staff to G-4. Its director, Lt Col Russell W. Humphreys, was made contracting officer for aviation and Chief, Aircraft Maintenance. On 8 September 1958 Lt Col Donald B. Thomson succeeded Colonel Humphreys and absorbed the added responsibilities of post aircraft field maintenance officer.

L-19 BIRD DOG H-13 SIOUX U-1A OTTER

Tux

THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

Exce

HU-1 IROQUOIS H-34 CHOCTAW H-23 RAVEN

L-19E STRUCK WIRES during night approach to tactical strip. Incident damage to left flap and horizontal stabilizer. No injuries.

H-19C PITCHED UP VERTICALLY during normal cruise flight at 70 knots. Pilot shut off servos and regained control of aircraft. During recovery, main rotor blades flexed into and severed tail boom forward of pylon. Cut portion of boom fell from aircraft. Aircraft was landed without further incident. Major damage to main rotor blades, tail rotor, pylon, drive shaft, and gear box. No injuries. Suspect servo malfunction.

U-1A STALLED DURING ROUNDOUT and landed hard. Landing gear driven through fuselage. Major damage. No injuries.

TL-19D OVERTURNED by propeller blast while taxiing behind C-119. Major damage to left wing, left wheel, and elevator. No injuries.

H-13H ROLLED on right side and burned during attempted test flight hover. Aircraft destroyed. Pilot sustained second degree burns on hands and face. Cause undetermined pending investigation.

L-23D LEFT GEAR COLLAPSED during roll after bounce landing. Major damage to left wing, propeller, landing gear, flaps, elevator, and left engine. No injuries. Suspect materiel failure of left landing gear.

HU-1A LOST OIL PRESSURE during flight. Aircraft completed forced landing with no damage. Caused by ruptured oil line between filter and manifold.

AO-1 STRUCK BARRIER POLE during maximum performance demonstration takeoff. Incident damage to left slat.

H-23D LANDED HARD during practice autorotation. Major damage to tail boom, skid, and basic body. No injuries. Suspect improper pitch application.

L-20A ENGINE LOST POWER IN FLIGHT. Aircraft was landed on highway with no damage. Loss of power resulted from engine backfiring through carburetor. Cause undetermined pending analysis.

H-34A LOST THROTTLE CONTROL during flight. Aircraft landed with no damage. Caused by failure of throttle cable. Inspection of 16 other H-34 aircraft revealed 11 with throttle cables rusted and corroded beyond limits. Area of failure was at pulley end of arm assembly.

AC-1 SUSTAINED DAMAGED left wing, flap, and aileron. Cause of damage unknown. Suspect left main gear struck rut in road during demonstration shortfield landing. Incident damage.

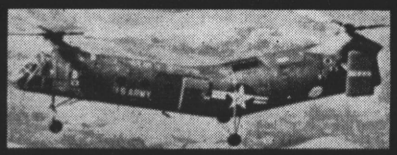
H-21C SETTLED AND ROLLED on left side during attempted takeoff. Major damage to forward and aft rotor blades, hubs, and left main landing gear. Cause undetermined pending investigation. Minor injuries to four passengers.

U-1A ENGINE FAILED during takeoff. Aircraft crashed into marshy terrain and burned. Seven occupants evacuated with first and second degree burns and one fractured shoulder. Cause undetermined pending investigation.

L-19A ENGINE FAILED during takeoff climb. Aircraft struck runway, bounced, and was intentionally ground-looped to avoid running into ocean. Aircraft overturned on beach. Major damage to both wings, vertical stabilizer, rudder, and engine. Cause of engine failure undetermined pending investigation. No injuries.

HU-1A EMITTED SHRILL GRINDING noise in flight. Aircraft landed hard from autorotation, causing major damage to tail rotor, drive shaft, and skids. No injuries. Transmission seized after landing. Suspect lack of lubrication to upper portion of transmission.

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



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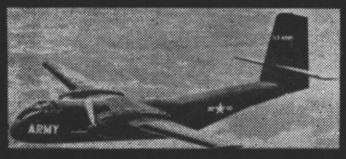

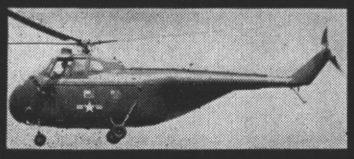

L-23 SEMINOLE H-37 MOJAVE AC-1 CARIBOU H-19 CHICKASAW

H-13G STRUCK POWERLINES, crashed and burned. Aircraft destroyed. Pilot and crewchief sustained fatal injuries.

AO-1 STRUCK TREES during takeoff from confined area. Minor damage to underside of fuselage. No injuries.

H-13H CRASHED AND BURNED during practice slope landing. Aircraft destroyed. Pilot sustained minor burns. Cause undetermined pending investigation.

L-20A LOST POWER during takeoff. Aircraft landed on sod with no damage. Caused by inadequate preflight. Emergency fuel shutoff valve safety wire was broken and valve control had been moved into partially closed position.

H-34C SETTLED through trees after takeoff from tactical site. Caused by application of collective pitch to avoid tree that was not seen at takeoff due to blowing sand. Application of pitch caused loss of rotor rpm. Incident damage to main and tail rotors. No injuries.

H-19D ROTOR TIPS STRUCK rotor tip of parked helicopter while taxiing. Incident damage to rotor tip caps.

L-19 CRASHED INTO TREE during spin recovery at low level. Pilot sustained crushed chest and lacerations.

L-19A ENGINE FAILED after takeoff from tactical strip. Aircraft landed, rolled into heavily wooded area and was destroyed. No injuries. Suspect fuel exhaustion.

H-13E ENGINE FAILED on final approach. Aircraft was autorotated into flooded rice field. Cross tubes bent. Suspect fuel exhaustion.

H-13G LITTER CAME LOOSE in flight and struck main rotor blades. Major damage to main rotor blades and litter. Aircraft landed with no further damage. No injuries. Suspect failure of front litter attaching mounts.

H-13E STRUCK TREES and rolled on left side during attempted takeoff from confined area. Major damage to all components. One occupant sustained minor injuries.

HU-1A LOST OIL PRESSURE during flight. Aircraft completed forced landing with no damage. Piece of metal matching carbon bearing spacer from No. 1 seal found on magnetic sump plug.

HU-1A LOST RPM during power recovery from practice autorotation. Aircraft landed with no damage. Suspect malfunction of fuel control or nozzle assembly igniter.

L-19A STRUCK WIRES during low-level flyby practice for Armed Forces Day demonstration. Minor damage to windshield, right wing, and right flap. No injuries.

H-13H STRUCK POWERLINES while flying in valley to avoid gusty winds. Major damage to bubble canopy, fuel tank, and main rotor. No injuries.

L-23F NOSEWHEEL FAILED to lock in down position. Major damage to propellers and fuselage during landing. No injuries. Caused by materiel failure of nose gear actuator nut assembly.

L-19E BROKE LOOSE from left tie-down rope during severe thunderstorm, pivoted, and struck adjacent civilian aircraft. Incident damage to rudder.

H-13E LANDED TAIL LOW from practice autorotation. Aircraft pitched forward causing incident damage to left skid and bubble. Suspect aircraft was out of weight and balance limitations. Also suspect metal fatigue in left skid.

TL-19D ENGINE FAILED during landing approach. Aircraft landed short of runway and struck railroad tracks, causing major damage to main gear and tailwheel spring. No injuries. Suspect fuel exhaustion.

Icing in JP-4 fuel—

Is This The Solution?

Lieutenant John M. McPhee

ARMY AVIATION has entered the jet age. But in this new age, the Army must look for an answer to an old problem: What to do about the ever present threat of fuel icing in JP-4 fuel.

The Iroquois, Mohawk and Chinook are now powered by jet type engines. Without a doubt others will be produced in the future. With this changeover we can expect the problem of fuel system icing to take on major dimensions as in the case of other military and commercial operations.

Water in jet fuels has been the cause of some major accidents and many lesser incidents. This cause develops when moisture, ever present in jet fuels, reaches a freezing state and arrives at some vital point in the fuel system where it can cause a partial or complete loss of thrust.

Army Aviation has not encountered this problem until recently. The avgas used in piston engine aircraft does not present the problems that are encountered using JP-4 fuel. Several factors have a direct bearing on the icing problem when using jet fuels.

The water saturation value varies extensively with temperature change. Let's say that an Army aircraft is serviced with a water saturated fuel containing 80 parts per million of moisture although, in actuality, this value could be much greater. The fuel is cooled in flight, and supercooled water droplets are produced. Even though the water content is minute, a small amount of glaze ice will form on contact with metallic surfaces. Considering how rapidly jet engines consume fuels, this ice could mount up in a critical location of the fuel system.

Condensation of moisture in the fuel tanks is another source of water. Water droplets form and migrate to the bottom of the tanks. In a cold climate ice would build up in the bottom of the fuel containers. When warm weather prevails the ice would break off and clog restrictions. Or, if the water could not be removed from the tank because of its frozen state, and if it subsequently remelted, this could cause other problems in addition to freezing.

Dissolved water, even suspended water at times, is difficult to remove. Free water will remain suspended much longer in jet fuel than in aviation gas.

Many methods have been studied and used to combat fuel icing in aircraft. Although some do the job relatively well, all have some limitation.

Fuel preheating and predehydration have been tried with little success. The former method is not effective and very impractical. Mechanically predehydrated fuels soon reabsorb water by breathing moist air through the tanks, either on the ground or in the flight. Alcohol "prewashing" is cumbersome, costly, and presents other problems as well.

Design changes in the fuel systems to make them less susceptible to icing conditions sometimes prove to be a partial answer. By making a restriction a little larger, its chances of icing might be lessened. But more often than not other complications would arise due to the design change, and the whole operation proves very costly.

Filters and separators are quite efficient but do not constitute an adequate solution to the problem.

Perhaps the most effective and popular approach is the use of heaters. They are employed on most multi-engined jet aircraft today but on very few single-engine craft. While very effective in localized areas, they do not provide for icing conditions

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which may occur in the tank and valve system upstream of the heaters. Nor do they give any relief whatsoever if the engines are not running. While fuel tanks are provided with "jiffy" drains for the removal of excess water, during cold weather operations this drain would be rendered useless. Heaters are quite expensive and would represent a large capital investment. Also, the price for adding weight would have to be paid through the inability to carry more personnel, supplies, or fuel to the front line.

"Although past experience with additives to prevent fuel system icing has been somewhat limited, results obtained in using this approach have demonstrated its effectiveness. During the winter of 1959 the Air Force tested a particular additive under field conditions at a cold weather base. From this test it was concluded that the use of a chemical additive to combat fuel system icing is feasible. While the particular additive tested was not completely satisfactory, there were no inflight malfunctions during this test which could be attributed to icing of the fuel control or screens in the main fuel feed line. Further, it was possible to drain water from the fuel tank sumps at below freezing temperatures. The additive could not, however, be considered for Air Force use since it was found to cause deterioration of a material used in the tanks of certain aircraft.

"A program to provide for an additive which would be compatible with aircraft system components as well as effective as an anti-icing agent was initiated by Wright Air Development Division immediately after the conclusion of the test at the cold weather base. Tests were developed to evaluate candidate components at WADD and Boeing Laboratory facilities.

"To obtain additive candidates for testing, WADD presented the icing problems and the solution offered by additives to all oil and chemical refiners. A request was made for these organizations to submit samples of materials within their inventory for testing. These were to be "off the shelf materials," nothing to be developed. In the event that no commercially available material could be found, WADD established two research contracts to study the basic chemical structures and properties required for a compound to be an effective and compatible jet fuel additive.

* * *

"Sensing the potential market if a compound within their inventory could qualify, industry responded to this program by submitting over 150 compounds for evaluation. Approximately the same number of different compounds were studied by USAF contractors in an effort to correlate chemical structures with anti-icing and aircraft compatibility characteristics."*

Phillips Petroleum Company, Bartlesville, Okla., had submitted for evaluation a chemical compound designated PFA 55-MB. After extensive laboratory tests, this additive was the only material to qualify for an Air Force service test.

November 15, 1960, Boeing-Wichita began flight tests on PFA 55MB in a B-52G. Extreme icing conditions were simulated by adding 2cc of water to each gallon of fuel. Two engines utilized the water-conditioned fuel with PFA 55MB in concentrations of 0.1 percent (by volume). One engine was used as a control unit and burned the same water-fuel combination without the additive present. All engines were heaterless.

"On five 10-hour missions conducted using this fuel configuration, three flameouts were experienced on the test engine using non-additive fuel. No flameouts or icing malfunctions were experienced on engines using additive fuel. One 24-hour mission was accomplished to provide a longer "cold soak" of the test fuel. Ice free operation was again experienced with the additive present, although a flameout was encountered in its absence.

"In a second phase of the flight test the conditioned fuel was cooled to $-55°$ F before loading it aboard the aircraft. This fuel contained 100 parts of water to one million parts fuel (the 2cc H_2O/gal used in the previous phase represents approximately 800 parts per million). On each of the 3-hour missions accomplished in this phase, a flameout was encountered on the test engine using conditioned fuel without the additive. The additive again eliminated flameouts and icing malfunctions even though water-conditioned fuel was used on four of the remaining engines."*

A third phase of this inspection was initiated to further flight test the additive. This was a service test aimed at the continuous exposure of PFA 55MB to aircraft system components. Over 300 flying hours were accumulated with no adverse effects resulting.

August 5, 1960, a service test was initiated at the 4043d Strategic Wing, Wright-Patterson AFB, Ohio. Fifteen B-52s and ten KC-135s were used. To date this test represents several thousand flight hours and several million gallons of additive treated fuel. Periodic inspection of

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*Reprinted from Aerospace SAFETY magazine, April 1961.

Fuel	Plugging Temperature ° F
JP-4 (100 ppm H_2O) + no additive	+12 to +16
JP-4 (800 ppm H_2O) + no additive	+28 to +30
JP-4 (100 ppm H_2O) + 0.1 vol % PFA 55MB	−76
JP-4 (800 ppm H_2O) + 0.1 vol % PFA 55MB	−76

Figure 1

Anti-icing effectiveness of PFA 55MB as determined by another organization is seen in figure 2.

Fuel Condition	Fuel Temperature	Time for Plugging
(100 ppm H_2O) no additive	−50° F	3 minutes
(2cc excess H_2O) no additive	−50° F	1 minute
(2cc excess H_2O) 0.1% PFA 55MB	−50° F	no plugging

Figure 2

the aircraft disclose no incompatibility effects.

As you might have guessed by now, the results of these tests were quite excellent. PFA 55MB has been tested in every area imaginable.

Typical results published by the manufacturer are seen in figure 1.

In no case was this additive found incompatible. Tests were run on several topcoating layers of fuel tanks, some of the BUNA-N type. It was concluded that any changes resulting from exposure to 0.2 volume percent PFA 55MB in water-saturated JP-4 were equivalent to effects from water-saturated JP-4 alone.

The additive was tested for thermal stability and water solubility. In both cases JP-4 fuel was not adversely affected by PFA 55MB. Many potential additives fell down in the water solubility tests in that they degraded their own anti-icing effectiveness by increasing the water solubility of jet fuels. Others failed for a variety of other reasons.

PFA 55MB was given a 100-hour test stand run using fuel containing twice the recommended concentration of the additive. Engine operation was not affected. Nor were there any tendencies of deposit formation. These observations correlated to a high degree with the results of the test flights.

Tests were conducted to observe what temperatures had to exist before jiffy drain failure occurred. Figure 3 shows these results.

PFA 55MB Concentration In Water	Temperature of Ice Formation	Temperature of Jiffy Drain Failure
0%	+32° F	+28° F
5%	+25° F*	−50° F
10%	+18° F*	−50° F
18%	0° F*	−50° F

(*Very soft slush ice)

Figure 3

The results of those tests (and many more that have not been mentioned here) were very conclusive. On 15 November 1960, the Wright Air Development Division of the United States Air Force gave their approval for the use of PFA 55MB treated fuels on a SAC-wide basis. Beginning in April of this year it is being added to all JP-4 procured by the United States—offshore and domestic.

The arrival of a jet fuel anti-icing compound is a major accomplishment. It could go far in breaching the gap opened by the ice problem that has appeared as Army Aviation enters the jet age. It offers a means to improve the reliability and safety of Army aircraft in any icing conditions throughout the world.

Fuel additive is cheaply priced. The latest unofficial information indicates the cost of PFA 55MB will be in the neighborhood of .2 cents per gallon or less.

The additive can be easily handled. In the tests that have been conducted using the PFA 55MB anti-icing compound, an additive injector unit was employed. In subsequent use, no doubt, the additive will be injected into jet fuel at the refinery. This method would greatly reduce airfield maintenance that might be required to operate an additive injecting unit.

As Major Robert M. Barendse put it so aptly in his article of October 1960 in the DIGEST—

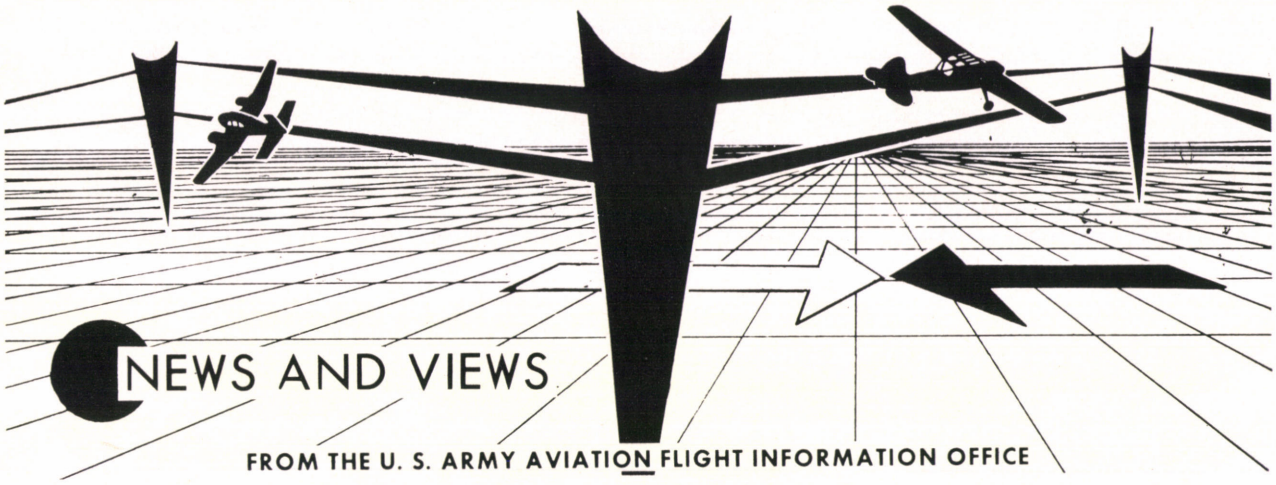
"Army Aviation and the Department of the Army are now entering the ice age.

"Fuel system icing has been both the suspected and proven villain in many aircraft accidents. As Army Aviation develops a more sophisticated fleet of aircraft, the problem increases rather than diminishes. *The ability to use those expensive machines is directly proportional to the amount of clean fuel available.*"

Will a chemical anti-icing compound such as the PFA 55MB do the trick? Both you and I know that only time will tell. But in the meantime, I'm willing to bet on it!

Charts reprinted from a Phillips Petroleum Company pamphlet, "Anti-Icing Additives for Jet Fuel"

The need for a new flight information package tailored to the Army Aviator's specific operational needs was the basis for the test and evaluation of the U.S. Army flight information kit.



Test and Evaluation of the U.S. Army Flight Information Kit

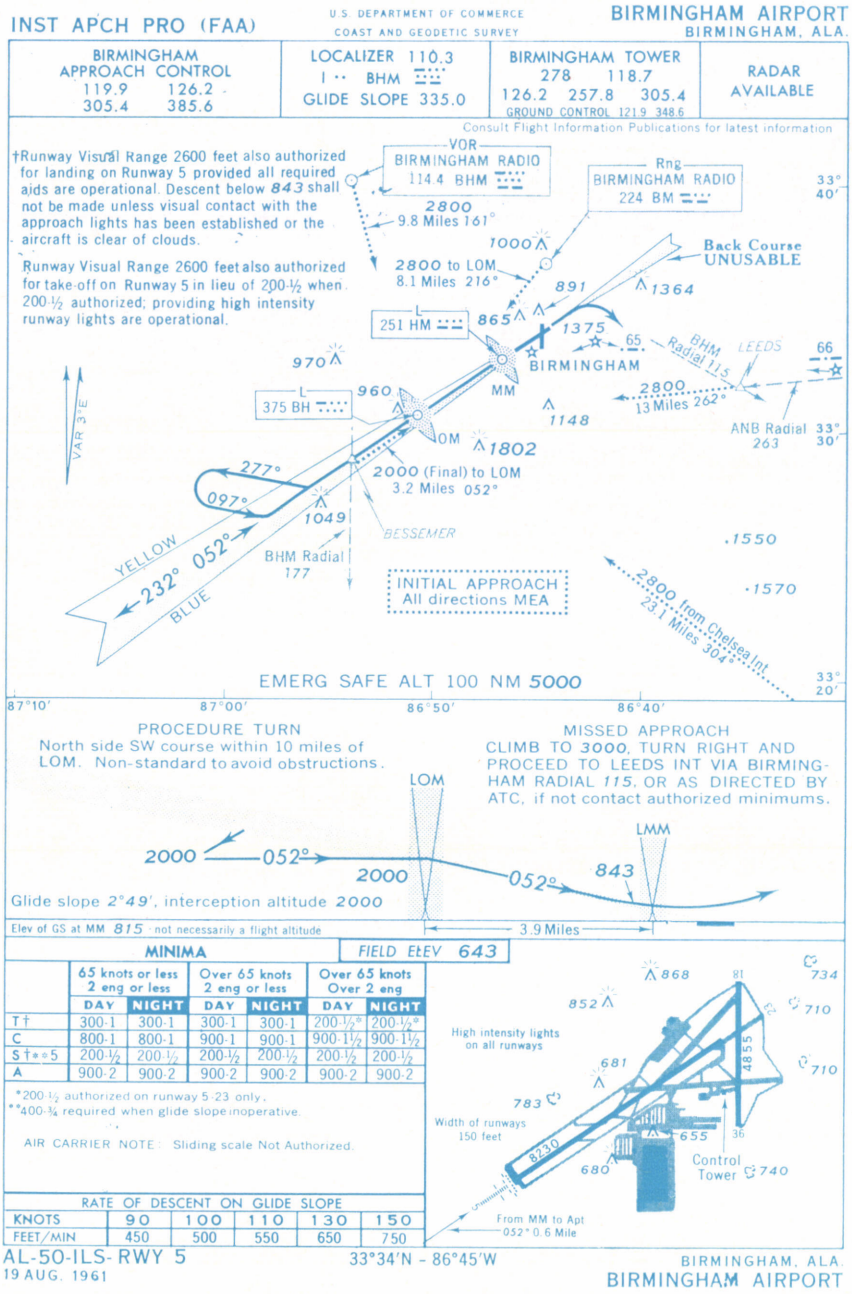
A PREVIOUS article in the DIGEST (April 1962) outlined the basic mission of the United States Army Aviation Flight Information Office (USAAFIO). An important aspect of this mission involves a continuing review of air navigation material, including flight documents and charts, to determine their operational suitability for Army Aviation.

Some months ago USAAFIO, in coordination with CONARC, initiated a test and evaluation project for a flight information kit. The basis for this project stemmed from a staff request to explore other sources of aeronautical publications. It should be noted that the findings of this test will complement other pertinent factors involved in determining an effective Army flight publication. These factors, involving long range planning and special operating requirements, will provide the basis for a decision at staff level on the flight publications programs.

As a result of this test assignment USAAFIO was provided an opportunity to evolve a flight info "package" tailored to the aviator's specific operational needs, both preflight and airborne. Many of the ideas, recommendations, and even complaints received from aviators were used in designing this test kit.

We in USAAFIO *must* rely on these field comments to provide a valid source of data for such projects which contribute to the progress of the overall flight information program. Using this theory the test program was designed to reach the individual user by soliciting the aid of Army Aviators at installation level. The results, therefore, are intended to reflect individual operational opinions, criticisms and recommendations to provide a realistic basis to make a decision involving future procurement of flight information material.

Aviators who have actually participated in the recent test—or just looked over a shoulder—should be acquainted with some of the background involving this

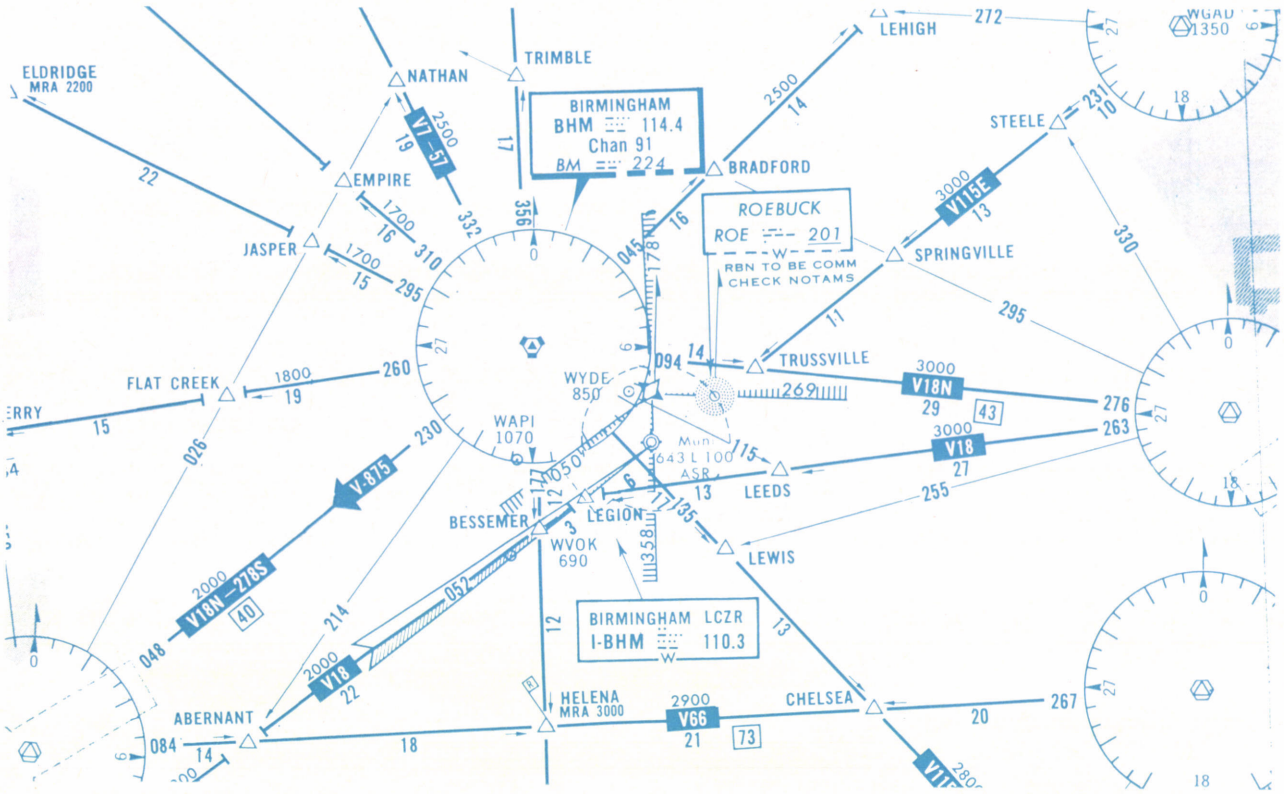


new candidate for membership in your "silent crew." The test manuals, were published by the U. S. Coast and Geodetic Survey (US C&GS). This government agency may sound a bit alien, but in fact, it has been in the flight information publications field for many years. Most of you are familiar with the excellent VFR cross-country sectional charts produced by the US C&GS. You may not be acquainted, however, with their instrument approach procedure and en route charts designed primarily for instrument flight—that is, those of you who did not participate in the referenced test project.

Essentially, the test kit consisted of a preflight planning manual, en route charts, and instrument approach charts. The latter are designed complete on one side, permitting "back to back" printing with obvious savings in bulk; they are published in four manuals, Northeast, Northwest, Southeast, and Southwest. This leads to convenience in our, to use a current phrase, "compact" airborne quarters. In addition were numerous special area departure and arrival charts incorporating much useful operational data. All of these charts were the product of joint civil and military air standards coordination which permits the Army to introduce its specific cartographic requirements and, to the maximum extent possible, reflect your navigational needs.

As the title of this article indicates, this U. S. Army Flight Information Kit was produced to satisfy the specific operational requirements of the *Army Aviator*. USAAFIO and comments, suggestions, and recommendations from you, the field user, provided the basis for designing this tailored package. The content format was based upon the latest cartographic specifications as prescribed and agreed to by a joint military/civil aeronautical standards group (FAA/DOD Cartographic Requirements Group). This latter group comprises technical representation from the three military services. Members include representatives fully oriented to the operational requirements of the Army Aviation mission.

USAAFIO as the monitoring agency for the T&E project has been busy carrying out this function. The receipt of many cards, letters, telecons, and personal visits during the T&E period underscore an extensive interest in this special project.



During the test period (these past 6 months) we were not able to answer all of the field correspondence pertaining to the test and the material involved. This article is intended to brief all interested personnel on the details of this project.

Because we are dealing with many questions, a collective reply based on the Q&A format seems to be the best method of handling this problem. All inquiries have been screened and the most important questions and answers concerning the test follow.

WHY WAS THIS TEST AND EVALUATION CONDUCTED?

This action implemented a Signal Corps responsibility to accomplish a continuing review of all flight publications procured for Army Aviation. In addition, this test satisfied a staff request to explore the best and most economical source for these documents, consistent with the publisher's capability to satisfy Army operational requirements.

WHAT IS THE PURPOSE OF TESTING AN ENTIRELY NEW MANUAL WHEN WE ALREADY HAVE ONE IN USE WHICH APPARENTLY HAS BEEN SATISFYING REQUIREMENTS FOR THE PAST SIX YEARS?

Current Army Aviation operational techniques and changing requirements in the field demanded a closer look at the present product. Problems arising from increased bulk and weight of the present product demanded that we investigate methods of tailoring new contents which would both satisfy the operational needs of *every* aviator and control the bulk which will be effected by an inevitable future increase in instrument procedures.

WHAT IS THE CAPABILITY OF THE US C&GS TO SATISFY ARMY AVIATION FLIGHT INFORMATION REQUIREMENTS?

As indicated previously, this government agency has been producing both VFR and IFR flight documents for many years. They do in fact, supply much of the basic cartographic data to other flight publication agencies engaged in producing IFR flight documents. Their extensive technical resources may permit ready and direct responsiveness to the air operation requirements of the Army mission.

WHY DO THE US C&GS EN ROUTE CHARTS FAIL TO SHOW ALL CIVIL AIRPORTS OF POTENTIAL USE FOR ARMY OPERATIONS?

The purpose of not showing all civil airports was an effort by the civil/military air standards group to reduce the clutter and

increase the readability of en route charts. The Army reserved the right to add civil airports as the requirement for such airports were generated by the users. The results of the test and evaluation has indicated a firm requirement for nearly 1500 airports which lack an associated instrument approach procedure. Action has been initiated to have these airports included on an early revision of the low altitude en route charts.

WHY WEREN'T ALL CARs INCLUDED IN THE PREFLIGHT MANUAL?

In what we think is a worthwhile effort to reduce bulk we have selected those CARs which are applicable only for Army operation. It is considered unnecessary to include regulatory data which apply only to commercial aircraft.

WHY WERE VFR AIRPORT DIAGRAMS AND COMMERCIAL BROADCAST STATIONS EXCLUDED FROM THE PREFLIGHT MANUAL?

In our present TM coverage, not all VFR airfields are diagramed and the remainder (almost an equal amount) are tabulated in a directory. In addition, a survey questioned the absolute necessity of a diagram in locating an airfield. Most of these airfields also are small fields which pose few problems on entry into the traffic pattern. The tabulated airfield directory in the test manual provides all the essential information in planning a flight to a particular VFR field. The commercial broadcast stations were eliminated in an effort to reduce bulk and present information that is absolutely necessary for VFR and IFR flight. Generally, commercial broadcast stations serve as only an aid to VFR cross-country flight. However, selected commercial stations are portrayed on the low altitude en route charts in accordance with established FAA/DOD criteria. Normally this criteria depicts three broadcast stations within a 50-mile radius of FAA LF aids, which is considered more than adequate for their usage.

WOULD THERE BE AN IMPROVEMENT IN THE QUALITY OF THE BINDER AND TABS WHICH DIFFER CONSIDERABLY FROM THE STANDARD TM 11 DOCUMENT?

The binder quality was purposely designed for a relatively short term of endurance to permit expendability at the end of an aviator's average tour (approximately 2 years). The adoption of this expendable binder is the result of a study to reduce costs of the present system involving the return and repair of relatively expensive binders. The binder used in the T&E is not considered the final answer to this expendable concept. Further study will be made of other binders to determine the best available type to meet the cost and endurance criteria desired.

WOULD THERE BE ANY CHANGE IN THE PRESENT SYSTEM OF FLIGHT MANUAL DISTRIBUTION?

As the result of the T&E, consideration is being given to modifying the present distribution system to be more responsive to the specific operational needs of the individual aviator. This modification would also reflect requirements imposed by current and long range planning within the Army Aviation program. Past studies of this problem indicate no all inclusive solution but this T&E has served to initiate new action in this matter.

WHY THE PORTRAYAL OF ALL INSTRUMENT APPROACH DATA ON ONE SIDE OF THE SHEET?

This format was selected after much discussion and consideration of the technical and operational aspects involved. Use of this design permits "back to back" printing as well as providing all pertient data on one side. The obvious advantage is a reduction in number of sheets (again that bulk factor!), as well as providing a complete reference on one side of a sheet to facilitate instrument approaches.

WHY WASN'T A PLOTTER AND FLIGHT CASE ISSUED FOR THE T&E KIT?

With respect to a plotter, the short duration of the test and limited number required did not warrant the cost of developing a special item. A plotter was not considered a part of the T&E, and may be readily designed and adapted to the US C&GS charts should they be selected for official Army use. The T&E manuals were designed to fit the present flight cases.

User comments and suggestions submitted to this office since the beginning of this test have contributed much to the success of this project. The point has been well made—that any navigational product designed to effectively meet the aviator's needs must be based upon clearly stated requirements from the field. We here in USAAFIO possess the technical resources to review flight information recommendations and pass them on to the cartographic agencies for publication in the most suitable format to satisfy Army Aviation requirements. You can be well assured, as a direct result of this project, that you will have an improved flight document kit in the future.

Here's a brief report on the reliability, supportability, and maintainability of Army Aviation's newest aircraft — the Mohawk.

AO-1A Logistical Evaluation

Major James R. Barkley

THE 1,000-hour flight test logistical evaluation of the AO-1 aircraft, conducted by the U. S. Army Transportation Aircraft Test and Support Activity, Fort Rucker, Ala., has been completed.

The method of test consisted primarily of (1) effecting wear and tear on the aircraft through the accomplishment of an accelerated flight program of 1,000 hours on each of two aircraft, and (2) performing the maintenance necessitated as a result of attaining the flight program.

The information gained from performance of the maintenance and the attainment of the flight program provides:

- Data for evaluating and determining the aircraft's logistical supportability.
- The means to end corrective action required for increased time between overhaul (TBOs) of major dynamic components.
- The means for determining design and mechanical deficiencies requiring corrective action or modification.

The AO-1 1,000-hour flight logistical test began on 24 Oct 60 with one aircraft, serial number 59-2617. The second aircraft, serial number 59-2618, began test on 31 Oct 60. Both aircraft were new production models with test hours being the first flight hours attained after release from the production line.

Approximately 80 percent of the test hours were flown in the vicinity of Fort Rucker, Ala., which is located in a temperate climate with an average humidity of 75.2 percent and an average temperature of 67°. The remaining flight hours were flown in areas which provided a wide range of climatic conditions.

TEST APPROACH

Utilization and operation of the aircraft were controlled through the use of predetermined flight profiles. In the development of these profiles, maximum effort was made to ensure compatibility of TATSA's flight program with that under which the aircraft would probably be used in tactical operations.

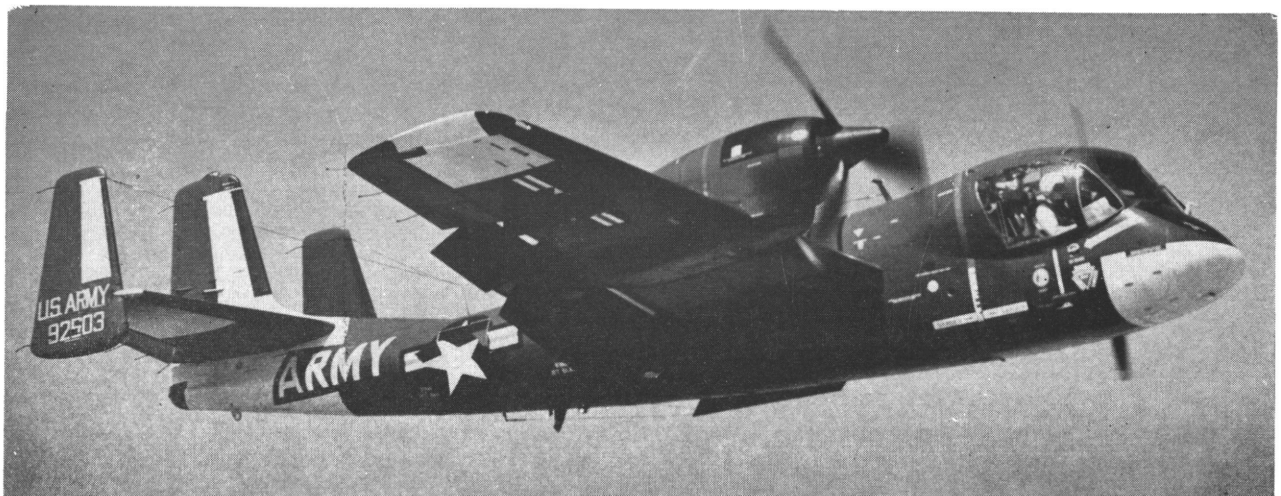
Briefly, the flight test programs were divided into five mission types.

Type I Mission—Simulated short range tactical observation. Hours flown: 575.

Type II Mission—Simulated emergency resupply. Hours flown: 114.

Type III Mission—Simulated

Major Barkley is Deputy Chief, Maintenance Engineering Division, TATSA (U.S. Army Transportation Aircraft Test and Support Activity), Ft Rucker, Ala.



extended range tactical observation and ferry missions. Hours flown: 658.

Type IV Mission—Maximum gross weight missions (14,500 pounds). Hours flown: 233.

Type V Mission—Pilot training. Hours flown: 420.

Maintenance Support

First through fourth echelon maintenance was accomplished through civilian contract, employing personnel with skills equivalent to those of military personnel in field units. Maximum control was maintained to ensure that all maintenance work was performed in a manner compatible to the procedures and methods used by a military unit in the field.

Limited fifth echelon maintenance was performed when dictated by special test requirements. Overhaul of components was accomplished through closed-circuit overhaul contracts with the prime manufacturers.

Supply Support

Parts peculiar to the AO-1 were procured from the prime manufacturer through U. S. Army Transportation Materiel Command. Items of common hardware were drawn through normal supply channels.

TEST OBJECTIVES

The AO-1 test objectives were to determine the aircraft's reliability, supportability and maintainability. These three terms were defined as follows.

- Reliability:
  Component service tour.
  Aircraft availability rate.
  Problem areas.
  Suitability of lubricants.
- Supportability:
  Maintenance manhours.
  Spare parts.
  POL requirements.
- Maintainability:
  Adequacy of maintenance publications—
  maintenance allocation charts,
  inspection guides.
  Adequacy of special tools and equipment.
  Ease of maintenance features.

TIME BETWEEN OVERHAULS (TBO) EXTENDED

With the AO-1, TBO development centered on the engines, props, prop controls and miscellaneous smaller items, such as hydraulic pump, fuel pumps, etc.

TATSA returned four complete propeller assemblies to the propeller manufacturer for analytical overhaul at 150 hours. Four more units were returned which had achieved 300 hours of operation, and at the completion of the test two more assemblies which had attained 600 hours were returned for overhaul. As a result of this testing, the service life of the propellers and controls was doubled from 300 hours to 600 hours.

The 1,000-hour logistical evaluation of the AO-1 commenced with the intention of operating the four installed engines for a minimum of 500 hours between overhaul and possibly more if test experience at that time justified further operation. By making intermediate inspections each 100 hours and replacing internal parts as required, TATSA succeeded in operating two engines 1,000 hours and another 686 hours. This latter engine and another engine suffered power shaft failures which exposed a significant problem that is now being corrected by the engine manufacturer. The intermediate inspections also pinpointed several problem areas within the engine which required engineering action in the form of design changes, material changes, or changes in fabrication techniques.

As a result of the experience gained by TATSA during the test, time-between-overhaul of this engine has been increased from 200 hours with a 100-hour intermediate inspection, to 600 hours with 200-hour intermediate inspections. This increase is applicable to those engines which have incorporated some of the fixes evaluated by TATSA.

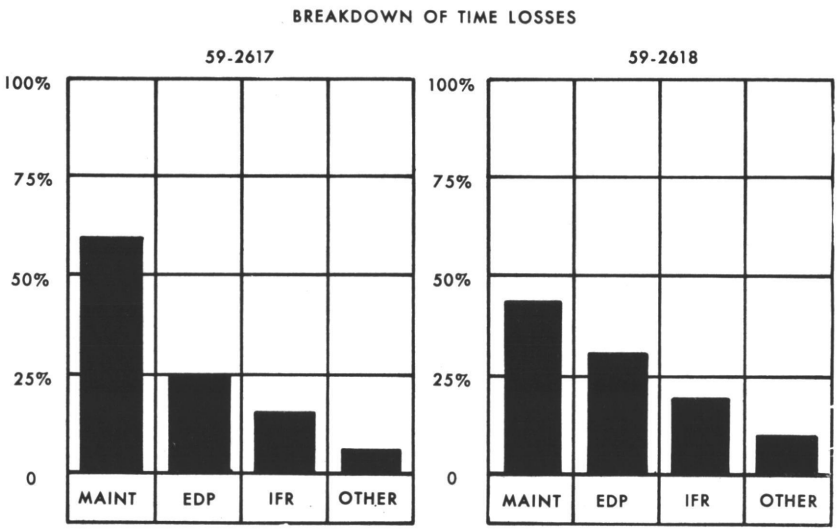
The availability rates attained during the logistical evaluation are not considered to be completely indicative of those which could be expected in the field due to:

- the maintenance and inspection systems utilized during the initial 500 hours of the test program;
- nonavailability of certain parts in the supply system; and
- the unreliability of the avionics navigational equipment which restricted the aircraft to VFR flight operations.

Early in the program, it was determined that the omni portion of the navigational equipment was frequently unreliable. A subsequent investigation revealed that the location and type of omni antenna being used on the test aircraft was the source of the problem. The contractor and the Signal Corps conducted an antenna survey. As a result of this study, the installation of a new type antenna was approved. The "split-loop" antenna, as it is called, was located on the center of the vertical fin. Unfortunately, the TATSA test aircraft were not modified.

Considering all maintenance down time, the flight to maintenance ratios were:

Aircraft 59-2617,
Organizational—1 to 2.4
Field—1 to 2.9
Aircraft 59-2618,
Organizational—1 to 2.4



Field—1 to 3.4

This is an overall ratio of 1 to 2.4 for organizational maintenance and 1 to 3.2 for field maintenance.

An interesting sidelight of the evaluation was the compilation of fuel requirement data. JP-4 jet fuel was the standard fuel used throughout the test. For the 2,000 hours of flying 257,031 gallons of fuel was used, an average of 127.51 gallons per hour. It is believed that the consumption rates experienced during the logistical evaluation are indicative of that required to support the aircraft in the field.

Currently, a 1,000-Hour Product Improvement Flight Program is being conducted on each of the two aircraft.

An interesting side program being conducted is the determination of the effects of alternate fuels (aviation and motor gasoline) on the T-53 engine.

The program is divided into four separate areas:

- Two hundred hours of flight using only 80/87 octane aviation gasoline.
- Two hundred flight hours mixing 80/87 octane and JP-4. This is conducted by alternating JP-4 and 80/87 gasoline on a 2 to 1 ratio. JP-4 is used for 20 hours; then without draining the remaining JP-4 or adjusting the powerplants, 80/87 aviation gasoline is used for 10 hours. The process is repeated for 100 hours.
- Two hundred hours of mixing 115/145 octane aviation gasoline and JP-4. This test will be conducted at the same ratio as the 80/87, JP-4 test.
- Two hundred hours of using military truck gasoline and JP-4. The test will also be conducted at a 2 to 1 ratio.

To date, the first 200 hours using straight 80/87 octane aviation gasoline have been completed. Phase II using the blend of 80/87 and JP-4 is progressing satisfactorily.

Internal engine inspections indicate that 80/87 could be used as an alternate fuel when JP-4 is not available. The frequency of use and concentration of the fuel will be a major determining factor for establishing special engine inspection requirements.

Approved alternate fuels for the T53-L-3 engine and special engine inspection requirements will probably be established by TMC upon completion of the TATSA fuel evaluation.

The AO-1 aircraft is now being issued to operating field units. As a result of the extensive logistical testing, proper analysis of data obtained and aggressive TMC action to have required changes incorporated in early production models, the aircraft will be able to serve as a very effective tactical tool for the combat commander.

Continued from page 8

found that we were much better off while working than while worrying.

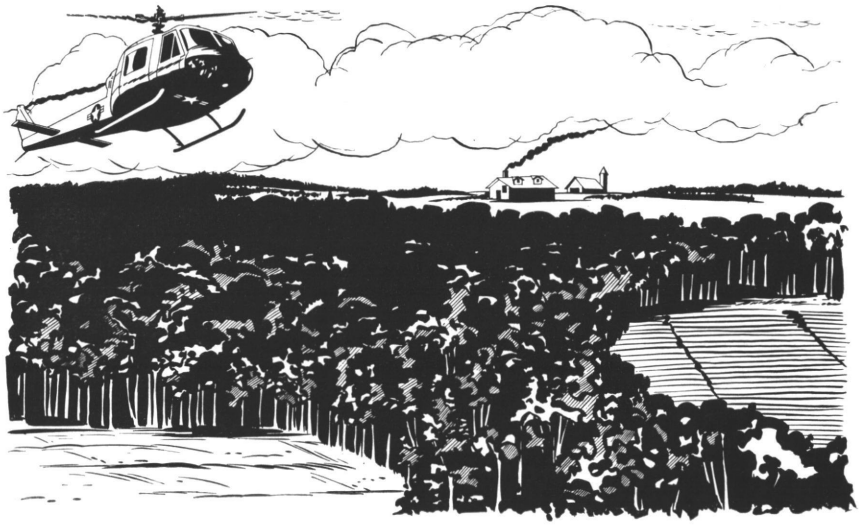
Our survival kit proved very useful but would have been inadequate alone. The insect repellent and head net were valuable. The canned water was slightly tainted but potable. The rations had deterioriated but were usable. The tarp was deteriorated but was usable with repairs. Smoke flares functioned but were not seen. The signal mirror was indispensable. The survival manual gave us many good ideas—the gas stoves from tin cans to mention one. The over and under rifle-shotgun was not needed because we had private weapons available.

Our personal items of equipment that proved most useful were the folding cots, mosquito nets, clean clothing, insect bomb, food and water, rope and wire, tools, shotgun, radio, and reading material.

I received excellent support and cooperation from my companions. There was no bickering, arguing or personality problems. *NOTE: This account has been edited only to the extent that identifying names, dates, and places have been deleted. Punctuation has been altered slightly to provide reading ease.*

CRASH SENSE

Down Collective



"GABBY TOWER, this is Army one-eight-nine-two—emergency! Over."

"Army one - eight - nine - two, this is Gabby tower. Give me your location and state the nature of your emergency. Over."

"Roger, this is eight-nine-two, three miles northeast of Bottom Field. We have engine failure. Over."

"Army one - eight - nine - two, this is Gabby tower. Repeat your message and give your exact location. Over."

"This is eight-nine-two! We're three miles northeast of Bottom Field and we have engine failure! Do you read?"

"Roger, Army one-eight-nine-two. Understand three miles northeast of Bottom Field. Has your engine failed completely? Over."

"Aw-----!"

The remainder of the last transmission is best left with a red faced tower operator. What's important is the distraction that this bit of dialogue, estimated to have lasted 30-40 seconds, caused. It was enough to divert an instructor pilot's attention during the loss of approximately 1,000-1,300 feet while he was performing an autorotation.

Here's what happened: Out for a practice instrument flight, an Iroquois pilot was making climbing and descending turns under the hood while an instructor pilot rode shotgun. At the beginning of a climbing turn to the right, at an altitude of approximately 2,500 feet, the IP heard a loud noise from the engine area and saw the engine rpm drop rapidly to zero.

He took control immediately and established an autorotation, then called the tower to report the emergency. By the time he had finished his conversation with Gabby tower, the aircraft was down to about 1,000 feet and he saw that the field he had selected was crisscrossed by terraces and furrows. He turned right into the wind and toward another open area.

When he reached 500 feet, it became apparent he couldn't make the new field. He waited until they were just above the trees and flared. The Iroquois clipped the tops from several black gum trees, crashed to the ground and came to rest on its left side. Both pilots escaped unhurt through the right door. The aircraft was damaged beyond economical repair.

Why didn't the IP let the pilot handle the radio and concentrate his efforts on the emergency landing? This is the question that pops into most people's minds when they review this accident. Certainly, his first thought should have been to get the aircraft on the ground, and it makes good sense to let someone else make the radio calls. However, when you're over 300-400 foot terrain with an indicated altitude of 2,500 feet, the time it takes you to reach the ground in autorotation is less than 90 seconds. This, coupled with the fact that the pilot was under the hood practicing climbing and descending turns, makes it highly unlikely that he could have removed the hood, oriented himself, and determined the nature of the emergency in time to satisfactorily make the radio transmissions.

The second question asked is why the IP didn't have a forced landing site in mind before the emergency and why he continued downwind over a wooded area when open areas were available on both sides. Unfortunately, there doesn't appear to be a reasonable answer, other than the distraction caused by the Gabby tower operator.

If any one item is stressed to the exclusion of all others during pilot training, that item is forced landings. To fledgling aviators, instructor pilots seem to take a fiendish delight in closing the throttle at the most inopportune times and places. But they soon

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Prepared by the United States Army Board for Aviation Accident Research.

learn their instructors are not merely trying to create customers for the head shrinkers, and find the true purpose is to instill reflex emergency reactions to the point where they become habit-forming. They learn that pilots who constantly plan forced landings, keeping an accurate knowledge of terrain features and wind in the back of their minds, are two steps ahead of the game. Planning for emergencies is not a sign you lack confidence in your aircraft—it's just *plain good flying sense.*

Though the investigation board listed division of attention between performing the autorotation and communicating with the tower as a cause factor of this accident, no transcript of the actual transmissions was included in the accident report, nor was any apparent attempt made to time these transmissions. This, despite the fact that a taped record was available until 30 days after the accident, when it was erased for reuse in accordance with local policy.

THE ENGINE

The initial incident which started the chain of circumstances leading to this accident was engine failure, and this particular T-53-L1A engine had a remarkable history. Though it had only 93 hours and 20 minutes operating time since new at the time of the accident, it had been installed in no less than FIVE aircraft, and had been returned to the factory for repair TWICE during its brief life.

"... and came to rest on its left side."

Here are some excerpts from the engine history:

1. It was removed from the first aircraft because of an excessive oil leak at the N1 tach seal after 10 hours of operation.

2. After 8 hours on the second aircraft, the engine was returned to the factory for correction of another oil leak.

3. It lasted 33 hours and 35 minutes in the third aircraft, then was returned to the factory for investigation of metal chips found in the oil system.

4. After 34 hours and 10 minutes in the fourth aircraft, the engine was removed because of an unusual grinding noise during runup, and excessive vibration and surging in automatic position. The first stage nozzle was found cracked and replaced; the first stage turbine was found damaged and replaced; and the second stage turbine bearings were found worn and replaced.

5. At the time it was installed in the fifth and last aircraft, the engine had a total time of 85 hours and 35 minutes.

After the accident, the engine was sent to a laboratory for analysis. Here is what they found:

"1. Parts of the first stage nozzle curl P/N 1-110-059-01 lodged on the nozzle vanes, melted because of local hot spots, and blocked the nozzle inlet area. The additional loss of combustor cooling air flow due to failure of the nozzle curl aggravated the situation which resulted in burn out of some of the nozzle vanes.

"2. With the abnormal combustor air flow distribution, the flame pattern shifted to the combustor inner wall and outer face of the first stage turbine nozzle inlet. The elevated temperatures resulted in the burning of the first stage turbine blade tips. Molten metal from the first stage nozzle was deposited on the N1 turbine wheel and nozzle cylinder. There was no mention of high EGT at the time of failure.

"3. The N2 turbine wheel was run in an over temperature condition and the molten slag from the N1 turbine and nozzle was deposited in the N2 nozzle vanes and N2 turbine cylinder causing the N2 system to bind up after cooling down. The failed/broken positions of the N2 turbine blades were found in the tail pipe of the engine at the scene of the crash and are considered to be secondary damage.

"Conclusions: In view of the above information and facts, it can be concluded that this in-flight failure may have been prevented if: (1) a vibration check had been made with the proper vibration equipment each time the N1 wheel or power turbine assembly had been removed and/or replaced; (2) the usual engine 'whine' verbally reported by a pilot had been written up in the aircraft/engine records and a hot section inspection completed. This inspection may have revealed that a piece of the N1 nozzle had passed through the engine at this time and revealed the installation deficiencies; (3) furthermore, assuming that the N1 flight idle speed was acceptable on the first flight of the day, a 4% N1 rpm decay noted prior to the second flight was indica-

tive of engine rpm deterioration and should have been investigated further prior to releasing the aircraft for flight.

"It has been determined that the primary cause of failure was the N1 nozzle and that this failure was brought about by a combination of factors, namely: (a) *improper field installation of the combustor assembly* which caused an unbalance of combustor air flow and imposed excessive local temperature and stresses on the nozzle, combustor liner and curl, and (b) unknown engine vibration level contributed to the cracking of the first stage turbine nozzle curl."

And there you have it: engine failure caused by improper installation, an IP caught unprepared, and the distraction caused by a gabby tower operator—all contributing to the loss of a $250,000 aircraft.

RANK PRESSURE

The Accident

An Iroquois departed its home field at 0900 hours for a local flight to a nearby drop zone. Aboard were the pilot, a crewchief, and two passengers. The purpose of the flight was to allow the two passengers, one a full colonel, the other a lieutenant colonel, to observe an airborne drop.

The aircraft flew directly to the drop zone, but the weather, 300-foot overcast and visibility estimated at 1-1½ miles in fog, caused the airborne drop to be cancelled. The helicopter was heard in the vicinity of the drop zone but was not seen.

No further report was heard from the aircraft until approximately 1520 hours when the home field was notified it had crashed, killing all aboard.

The crash site was located around 2300 hours and guards were posted until the accident investigation board could arrive the next morning. The crash site was located in an unpopulated mountain area that required a 2-hour climb to reach.

From evidence obtained at the site, the investigation board determined that the Iroquois crashed in a left climbing turn of 32° into a 35° mountainside at an elevation of 1,150 feet. A watch, thrown clear and stopped by the impact, determined the time of the accident as 0953 hours.

Two witnesses, one located at an elevation below the crash site and one at an elevation above the crash site, stated there was limited or no forward visibility at the time of the accident. Both said the engine sounded normal prior to impact.

Another case of attempted VFR into IFR weather by a pilot who was not rotary wing instrument qualified. But this time, the investigation board was able to pinpoint the motivation and answer the all-elusive question, WHY?

Here is what the flight surgeon had to say:

"Weather reported by the forecaster near the crash scene was foggy with severe restriction of visibility. The forward speed of the helicopter exceeded the visibility of the pilot.

"Evidence indicated that the senior officer aboard was habitually a demanding passenger who was often unaware of safety of flight factors. (On at least one previous occasion, when this pilot refused to fly into excessively high wind conditions, this passenger had expressed strong criticism of his courage and threatened to find a more cooperative pilot.)

"The pilot's operations officer reported that he always seemed self-assured to an excessive degree that could have resulted in the acceptance of risks which should have been refused.

Demanding passenger

"Information available on the [passenger's] personality suggested the pilot was strongly motivated by his passenger to fly the mission as the passenger saw fit."

And here is what an associate stated:

"I, [another pilot], make the following statement in an endeavor to substantiate circumstances and possible cause factors surrounding the fatal accident of HU-1ASN _____.

"I reported to_____ and was assigned to the T/D position of senior Army aviator. My mission, in addition to that of Army aviation advisor, was as pilot of one assigned helicopter and one fixed wing aircraft.

"During the first four months of my assignment I was required on frequent occasions to transport Col _____ in one or the other of the assigned aircraft. On several of these missions, comments were made to me by [the same officer] concerning my 'obvious lack of training,' or my 'inability to see well enough to read a map.' Other comments were: 'If you can't fly this aircraft, I'll get me someone who can,' or 'What the h--- are you trying to do, get us all killed?

"Inasmuch as I consider flying a serious business, at no time did I consider the comments to have been made in jest. They were in my opinion completely unjustified. I have been a rated Army aviator for almost 10 years and have logged over 2300 flying hours, but this was my first encounter with a non-rated commander who was so viciously critical and intolerant.

"The aforementioned comments, and others of a similar nature, were so frequently made and in such a vehement and domineering manner that I soon began to look upon scheduled flights with Col _____ with apprehension. It was impossible to predict when or over what the next outburst would occur.

"On two different occasions, hazardous flight conditions forced me to refuse him the use of the aircraft. However, the duress under which I felt when he was aboard the aircraft could have caused me to possibly accept a borderline risk in an endeavor to satisfy him.

"From conversations I had with the other assigned pilot [the one involved in the fatal accident] prior to his death, I knew he was experiencing the same difficulty and was quite concerned over the situation."

The senior officer's domineering personality was further confirmed by another officer, who said:

"As motor officer, the satisfying of Col _____ 's desires regarding vehicular transportation was of particular interest to me. I found him consistently unreasonable in his demands and expectations, and inconsiderate in his use of the transportation assigned. The drivers were most unhappy when required to drive for him because of the treatment they received."

The investigation board's recommendations to prevent future accidents of this type were:

That all Army Aviators be made aware of the extreme hazards of inadvertent IFR flight in rotary wing aircraft while flying in VFR conditions under reduced visibility.

That all military personnel utilizing Army aircraft be directed to accept the judgment and professional competence of Army Aviation personnel as to their operational limitations.

Fortunately, the area commander recognized the seriousness of this problem and issued the following letter to his command:

"1. In a recent Army aircraft accident which resulted in the loss of four lives and complete loss of the aircraft, there are indications that marginal weather conditions were among other factors contributory causes to this accident.

"2. The pilot or the aviator in command of an aircraft is the final authority on whether a mission will be flown or aborted due to weather or other factors. He is directly responsible for the operation of military aircraft under the general provisions of AR 95-1 and AR 95-2. Officers, particularly those senior to the pilot or aircraft commander, will exercise extreme care not to influence the pilot's professional judgment or decision through an over-eagerness to accomplish a mission. At no time will pressure be brought to bear directly or indirectly on the pilot to attempt the completion of flight missions against his better judgment. The competence and training of our pilots is such that full reliance can be placed upon them."

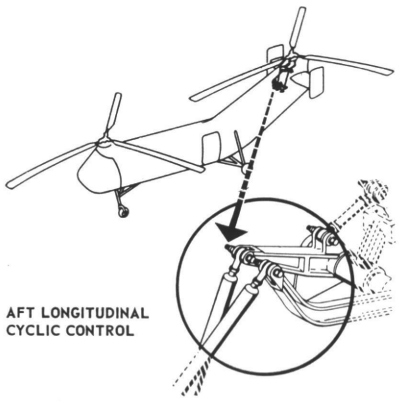
RED DIAGONAL

"Mayday! Mayday! Mayday!" This frantic message jolted the leader of a flight of three Shawnees and one Choctaw. He turned to look back and saw a column of ugly black smoke billowing upward. At its source lay the crumpled remains of an H-21. He saw no evidence of life around the wreckage and knew the pilot, copilot, and crewchief had no chance to escape.

The cause for this one came to light as investigators probing through the wreckage found an open control rod end on the aft longitudinal cyclic control. The bolt and nut that held the control rod end were found and their threads were like new—with no indication of shearing or breaking. This proved the nut had backed off the bolt, allowing the bolt to drop out, and causing complete loss of control.

Further evidence of slipshod maintenance was found as the investigation continued. An unsafetied nut was found on the flight controls under the cockpit and an open end wrench was found jammed through the bulkhead and outer fuselage skin

". . . no chance to escape."



just forward of the flight controls!

How can such careless maintenance get by unnoticed? The records told the story. Investigators checked the 781-2s that were used as work sheets for a PE performed 14 hours before the crash. They found this write-up: "All push-pull rods need purging." In the corrective action column was the word "Purged" beside a sign-off signature. But the symbol in front of the entry was a RED DIAGONAL.

The method used for purging push-pull rods requires that rod ends must be disconnected and reinstalled. Push-pull rods are flight controls. Any time one is removed and replaced, the aircraft status symbol must be a RED CROSS! The purpose should be obvious—to ensure an inspection for proper installation.

TB AVN 5, Paragraph 18d, states:

"It will not be necessary to enter a red cross to indicate an unsafe condition caused by the evident removal of parts or assemblies when the removal is perfectly obvious and the mechanic remains at work on the aircraft. *However, if the removal is such that improper installation would create a hazard to safety, a red cross will be entered on DD Form 781-2 to assure an inspection by the aircraft maintenance supervisor or other qualified supervisory personnel as designated by the aircraft maintenance officer.*"

Three lives and a $250,000 aircraft lost for the lack of a red cross in a maintenance form and a cotter key!

WELL DONE

Those of you who completed primary fixed wing training at Lowe Field, Fort Rucker, in recent years will remember how dark it can get down in the hollow with only a sliver of moon in the sky. Such a night was 10 April 1962.

The "Blue Hats" were getting their night checkouts and the pattern was crowded with L-19s. In the back seat of one aircraft, Instructor Pilot Gerald Crabtrey watched the runway lights flash by as his student rounded out. He heard the screech of tires as they touched down and the tinny rumble of the rollout. But that was all he heard! The engine had stopped, and there was no radio noise in his earphones. The Bird Dog rolled to a stop on the runway. Crabtrey saw the glow from their navigation lights dim away to darkness. He realized the battery must be dead, swung his head around and saw the aircraft behind turn final.

Urgent calls for a go-around were issued from the tower and the mobile control unit at the end of the runway, but they were unable to contact the approaching aircraft.

Crabtrey saw the other L-19 reach short final with no indication of going around. He snatched his safety belt loose, threw off his shoulder harness, jerked the radio cord from its socket, and reached forward to fling the door open. Squeezing past the student in the front seat, he dropped to the ground and grabbed the wing strut, shoving with all his might. With the student steering, he pushed the L-19 off the runway onto the grass seconds before the landing aircraft rolled past the spot where they'd stopped.

Later analysis of the engine proved the cause of failure to be a clogged carburetor strainer screen.

CRASH SENSE would like to join Crabtrey's employers, the Hawthorne School of Aeronautics, in WELL DONE congratulations for his quick thinking and action that kept two aircraft out of the accident columns.

Flight instructor Crabtrey shows how quick thinking and muscle saved L-19s

Annual Writing Awards Contest

MONTHLY WINNERS

500 AND 1	Brig Gen Carl I. Hutton	July 1961
TO GO OR NOT TO GO	CWO John H. Green	August 1961
WHY NOT TIGERS?	Gerald T. Thorpe	September 1961
THE ARMY FLYING HOUR PROGRAM	Victor J. Schulte, Jr.	October 1961
ARADMAC	Brig Gen Melvin D. Losey	November 1961
HOLD IT!	Lt Lloyd H. Morgan	December 1961
KNOWLEDGE IS THE KEY TO SUCCESS	Maj George Rogers	January 1962
PFNS	Maj John A. LaMontia, USAR (Ret)	February 1962
WHAT AM I?	Capt Charles A. Stephenson, III	March 1962
POP UP	Lt James B. Morgan	April 1962
PUTTY IN YOUR HANDS	Lt Forrest H. Williams	May 1962
AERIAL PHOTOGRAPHY	Lt Robert M. Shabram	June 1962

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

ANNUAL WINNERS

1st Prize $125.00	2d Prize $75.00	3d Prize $50.00
Capt Forrest H. Williams	Brig Gen Carl I. Hutton	Lt Col George Rogers

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

The second U. S. ARMY AVIATION DIGEST Annual Writing Awards Contest starts with this issue. Again all authors are encouraged to submit entries.

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

Articles accepted for publication during the first contest period and as yet unpublished are automatically entered in the new contest. If you haven't received a letter of rejection, you're still in the running. For those who have not submitted entries, this is a fine chance to increase your value to the Army and the Army Aviation Program by improving your writing abilities. A professional military man of today must be able to express himself clearly and concisely in writing as well as in speech. By writing an article for the DIGEST you benefit professionally, and possibly financially.

Again this fiscal year, cash wards will be given to the three authors whose articles are judged the best contributions to the magazine. First prize will be $125.00; second prize $75.00; and third prize $50.00.

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

* * *

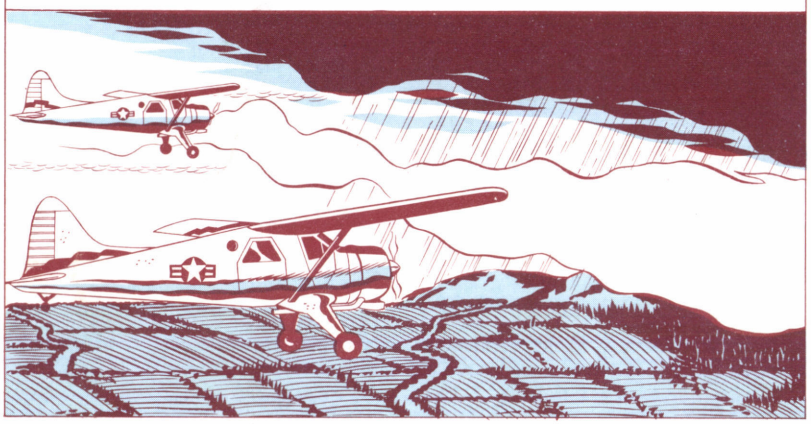
Appropriate pictures, diagrams, charts, etc., necessary to illustrate articles should be backed with protective cardboard for enclosure with the manuscript. Photographs preferably should be 8 x 10 black and white glossy prints. Illustrations will be returned if requested. Articles will not be judged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

MOUNTAIN ROULETTE

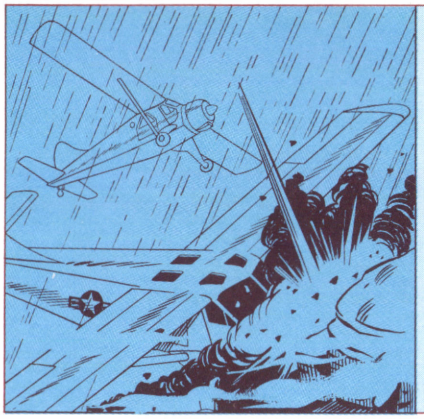
prepared by

THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

DESTINATION WEATHER WAS GIVEN AS 1,500 FEET BROKEN, VISIBILITY FOUR MILES IN RAIN AND HAZE. EN ROUTE CEILINGS WERE FORECAST TO BE 1,000 FEET MINIMUM, WITH VISIBILITY TWO MILES IN RAIN AND HAZE.



FIFTY MILES OUT, THEY SAW TWO LAYERS OF CLOUD AHEAD-ONE ABOVE AND ONE BELOW THEIR ALTITUDE OF 2,500 FEET. THEY FLEW ON, DROPPING TO 1,500 FEET, THEN TO 1,000 FEET, TRYING TO STAY VFR. THE CEILING CONTINUED TO DROP AND THEY PENETRATED THE CLOUDS, DESCENDED TO 900 FEET, BROKE OUT AND JOINED CLOSE FORMATION. A FEW MOMENTS LATER, THEY FLEW BACK INTO THE CLOUDS AND LOST CONTACT WITH EACH OTHER.



THE SECOND PILOT LOOKED DOWN AND SAW TREES ON RISING TERRAIN 200 FEET BELOW. HE MADE A STEEP CLIMBING LEFT TURN AND CALLED THAT HE WAS BREAKING AWAY. THE LEAD PILOT TRIED TO MAKE A LEVEL RIGHT TURN TOWARD RISING TERRAIN AND CRASHED INTO A 40° SLOPE. BOTH PILOT AND CREWCHIEF WERE KILLED AT IMPACT.