UNITED STATES ARMY

AUGUST 1965

AVIATION DIGEST

UNITED STATES ARMY AVIATION DIGEST

AUGUST 1965 VOLUME II NUMBER 8

DIRECTOR OF ARMY AVIATION, ACSFOR
DEPARTMENT OF THE ARMY
Col George P. Seneff, Jr.

COMMANDANT, U. S. ARMY AVIATION SCHOOL
Maj Gen John J. Tolson, III

ASST COMDT, U. S. ARMY AVIATION SCHOOL
Col George W. Putnam, Jr.

EDITORIAL STAFF

Capt Frank A. Mariano
Fred M. Montgomery
Richard K. Tierney
William H. Smith
Diana G. Williams

GRAPHIC ART SUPPORT

H. G. Linn
H. A. Pickel
D. L. Crowley
A. Lofé

USABAAR EDUCATION AND LITERATURE DIV

Pierce L. Wiggin
William E. Carter
Ted Kontos
Charles Mabius

Letters 1
Eagle Flight, Capt John N. Tragesser 2
Case Against Antihistamines 5
Improved Aerial Visual Observation, Capt Henry L. Quisenberry 6
An Effective Air Line of Communications, Capt Richard E. Reader 10
Decision, Capt Darrel Nelsin 13
Into the Trees by the Book, Capt Burton A. Blanton 16
Now It's MUST 17
Angel Named Huey, Lt A. J. Scaran, USMC 21
Army Pilot Rescues LIFE Photographer 26
Simulation, Maj Paul F. Anderson 22
Doubleheader Airmobile Operations in Vietnam, WO Bruce P. Mauldin 27
Countering a Viet Cong Ambush, William H. Smith 30
Searching Made Easy 33
Are You Confused? Maj Howard (Rip) Collins 34
Diet, Ted Kontos 41
Tentage, Richard K. Tierney 44
Crash Sense 46
1st Cavalry Division (Airmobile) Inside Back Cover
Channeled Approach Back Cover

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

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

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

Use of funds for printing this publication has been approved by Headquarters, Department of the Army, 29 December 1964.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1, 20 March 62, and DA Circular 310-57, 14 March 63. Complete DA Form 12-4 and send directly to CO, AG Publications Center, 2800 Eastern Boulevard, Baltimore, Md. 21220. For any change in distribution requirements, merely initiate a revised DA Form 12-4.

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

For those not eligible for official distribution or who desire personal copies of the DIGEST, paid subscriptions, $4.50 domestic and $5.50 overseas, are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402.

LETTERS

Sir:

In the past two months, we at Naval Station, Roosevelt Roads, Puerto Rico, have received a copy of your excellent publication because of the generosity of our Army neighbors at Fort Brook, San Juan, P. R.

The mission of the "rotor-heads" here at Roosevelt Roads is far more like the Army's use of helicopters than that of the Navy, and all of the helicopter pilots here (9) have read your digest with great interest and find the articles informative and helpful.

If possible, we would appreciate inclusion on your distribution list for four copies each month and I can assure you that they will receive the widest local distribution. Thank you again for an extremely interesting, informative, and timely digest.

LCDR C. J. JABURG
U. S. Naval Station
FPO New York 09551

• *Thanks for the kudos. You're on for four until your official distribution begins.*

Sir:

Some of the new UH-1 aircraft received in the 17th Air Cavalry of the 11th Air Assault Division mount the new AN/ARC-51 BX UHF radio. These radios have a 20 preset channel capability. It is possible to switch between the manual and the preset frequency with speed and ease. It seems like an excellent system, and has proved quite useful.

After some research and discussion we came up with several practical frequencies which meet most VFR/IFR requirements. They are listed below in convenient sequence.

These, we have mimeographed on 3 x 5 file cards and mounted in a conspicuous place in each aircraft, where it serves as both a reference to the preset channels, and a reminder for forgetful aviators.

Emergency	243.0	Emergency	243.0
AF Twr	236.6	Civ Twr	257.8
AF Gnd	275.8	Civ Gnd	348.6
AF Metro	344.6	VFR FSS	255.4
Lcl Freq		IFR FSS	272.7
Army Twr	241.0	Lcl Freq	
Army Gnd	229.4	Lcl Freq	
Lcl Freq		Lcl Freq	
Lcl Freq		Navy Twr	340.2
Lcl Freq		Navy Gnd	336.4

CAPT CHARLES W. ABBEY
Trp C (Air), 3d Sqdn, 17th Cav
11th Air Assault Division
Fort Benning, Ga. 31905

Sir:

Ever wondered how far that VHF radio would reach? Well most of us have. Remember the formula $R = 1.4\sqrt{A}$? Now that will give us a pretty good idea. Let's see now, my altitude is 3,000 feet above that VOR station, the square root of 3,000 is something like 54.6 or slightly better. Let's multiply 54.6 by 1.4 and we come up with 76.4. Now wasn't that simple—or was it?

Why confuse yourself with all this when we can get the approximate answer by simply adding 50 to 1 percent of the altitude? Now this isn't by the book but will work pretty well for altitudes between 2,000 and 10,000 feet, the altitude most of us would be using.

Altitude Above Ground Station	1% of Altitude	+ 50	Approximate Reception Distance (Statute Miles)
2,000 ft	20	+ 50	70
3,000 ft	30	+ 50	80
4,000 ft	40	+ 50	90
5,000 ft	50	+ 50	100
10,000 ft	100	+ 50	150

CWO ARCHIE A. HARRELL
D Trp 3d Sqdn 8th Cav
APO New York 09028

EAGLE FLIGHT

Captain John N. Tragesser

THE MONOTONOUS drone of whirling rotor blades is broken by the crackle of the radio, "Eagle 6, this is Dragon 36. Two platoons of enemy infantry at coordinates USC 6246, presently engaging and fixing. Landing azimuth 275°. Over."

"This is Eagle 6. Request approved. Eagle ETA 03 minutes. Out." Within minutes, the Eagle flight will swoop down upon the routed and disorganized enemy, annihilate him, then move on in search of new prey.

What is this *Eagle?* It's an elite, highly mobile combination of infantry troops and fire support,

The author proposes an entirely new concept of mobile air firepower and shock force to be used in conjunction with airmobile operations

capable of finding, fixing, and destroying small pockets of enemy resistance in the vicinity of airmobile objective areas.

Where do we find the Eagle? Under the new airmobile concept, the infantry battalion commander has the resources to organize the Eagle. By so doing, he will add depth to his area of operations —by probing, thrusting, continually keeping the enemy on the defensive. He can thrust and parry without prior warning, preventing a routed and disorganized enemy from successfully withdrawing and regrouping. Let's take a closer look at the method of operation.

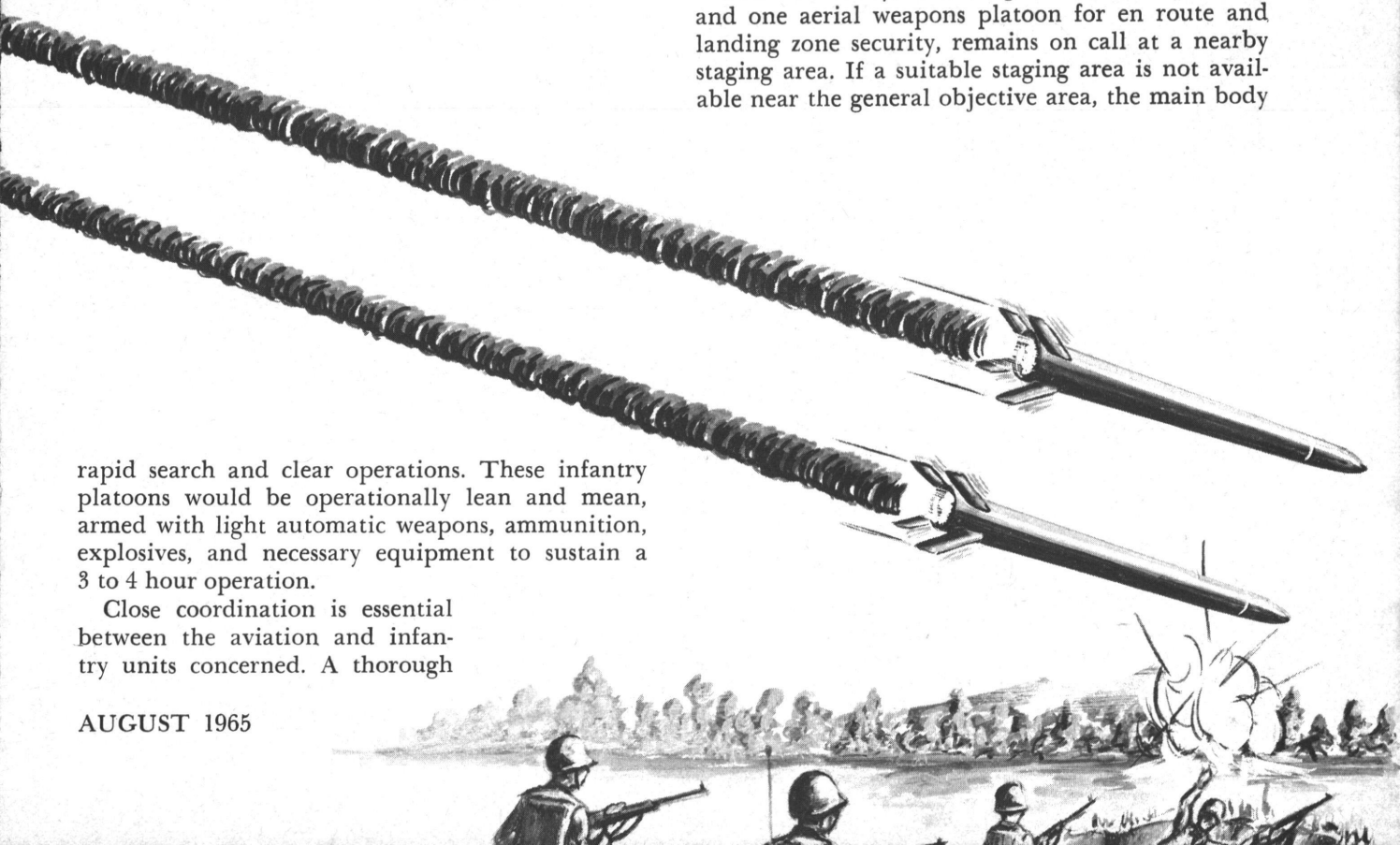
Because of the specialized nature of this mission, it is recommended that specific units, both aviation and infantry, be selected to train for and perform the Eagle operation. Further, specific platoons within the Assault Helicopter Battalions should be married with hand-picked infantry platoons, selected primarily for their aggressiveness and skill in rapid search and clear operations. These infantry platoons would be operationally lean and mean, armed with light automatic weapons, ammunition, explosives, and necessary equipment to sustain a 3 to 4 hour operation.

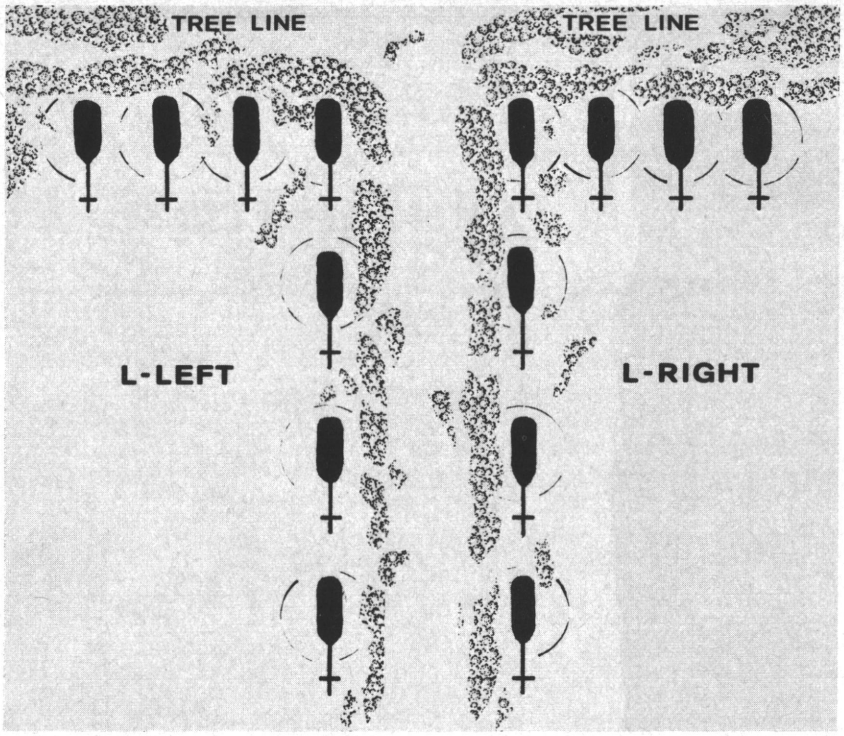
Close coordination is essential between the aviation and infantry units concerned. A thorough detailed briefing should be conducted by the Eagle task force commander (ranking infantry officer) to include the following:

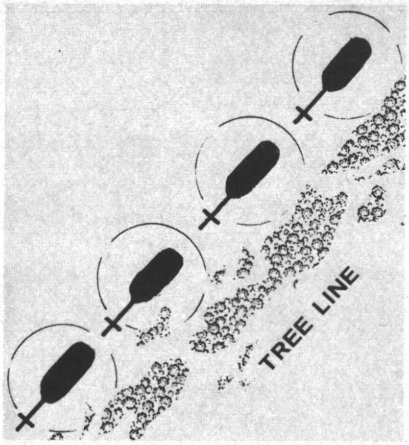
Sequence of events
Possible landing zones
Radio frequencies and calibration of radios
POW collection point
Pyrotechnics
Emergency signals

An Eagle operation has two phases: phase I, the reconnaissance, and phase II, actual commitment of the Eagle ground force. Phase I, the reconnaissance, is conducted by one fire team from the Assault Helicopter Battalion's Aerial Weapons Company (two armed UH-1Bs). The fire team proceeds to a predetermined area and reconnoiters all suspected enemy positions and likely avenues of withdrawal from airmobile objective areas, using every available means to develop targets. Eagle's task force commander, accompanying the fire team leader aboard his helicopter, is responsible for determining which targets are worthy of commitment.

The main body, consisting of two airlift platoons and one aerial weapons platoon for en route and landing zone security, remains on call at a nearby staging area. If a suitable staging area is not available near the general objective area, the main body







Eagle assault formations. Left: Platoon(s) in L formation, left and right (for use against objectives having two or more adjoining sides). Above: Platoon(s) in trail formation. To disseminate attack order to Eagle ground force, each aircraft commander will monitor the attack order as relayed to the aviation airlift commander. Each copilot will have a 12" x 12" acetate-covered board on which he will sketch the assault formation, direction of attack, enemy situation, etc. This is then passed to the cargo compartment to be read by infantry troops.

remains on station over an RP. Once a worthy target is developed, phase II, commitment of the Eagle begins.

The task force commander makes an estimate of the situation, determines the type of assault to be employed by the Eagle assault force, and relays the attack order to the aviation airlift commander (see illustration). An attack order includes the following:

Enemy situation in the landing zone
Instructions for prestrike (when applicable)
Direction of landing and departure
Landing assault formation

If the target is a vastly superior enemy force, the Eagle task force commander calls ready artillery fire support to soften up the target before commitment of his main body. While the main body is en route to the landing zone, the reconnaissance fire team uses machinegun and rocket fires to contain the enemy in its present position. Maximum reaction time for the main body is 5 minutes after the attack order has been relayed. The Eagle ground force should then be assaulting enemy positions.

Once the ground force is deployed, the aerial weapons platoon escorts the airlift platoons to a safe orbit area near the landing zone. At this time, the aerial weapons platoon reverts to direct control by the Eagle ground force commander. Since the aerial weapons platoon is capable of providing accurate, discreet fires, the ground force commander can employ the aerial weapons platoon in the following missions:

To neutralize small enemy strongholds, i.e., dug-in automatic weapons positions, fortifications, etc.

To provide covering fires as the ground forces advance upon their objectives.

To contain the enemy in a specific area.

For screening and reconnaissance.

Generally, the Eagle neutralizes his objective within 30 minutes and calls in airlift platoons for pickup. Also, the reconnaissance fire team develops other targets and no time is lost between pickup and commitment of another Eagle. Endurance of the UH-1 helicopter is approximately 2½ hours on station. As a result, we can conduct 3 or 4 Eagle operations without refueling.

Eagle tactics will enhance any infantry battalion commander's mission. The lightning surprise and shock keep the enemy off balance and develop new and larger targets which require additional action. Although this mission overlaps that of the air cavalry, the cavalry does not possess the resources to fulfill these mission requirements as integral portions of every airmobile assault. By performing this mission with elements within the infantry task force organization, closer coordination and instantaneous reaction will be enhanced on the more fluid battlefronts of the future.

When he wrote this article, Capt Tragesser was an aerial weapons platoon leader, Company D, 229th Assault Helicopter Bn, 11th Air Assault Div, Ft Benning, Ga.

THIS IS THE tale of a test, the story of a study which has interest for people in general and important implications for pilots in particular.

It shows how the test is conducted to rule out chance; that work is constantly being done to protect the pilot; and that command (and the flight surgeon in this case) has good reasons for their advice.

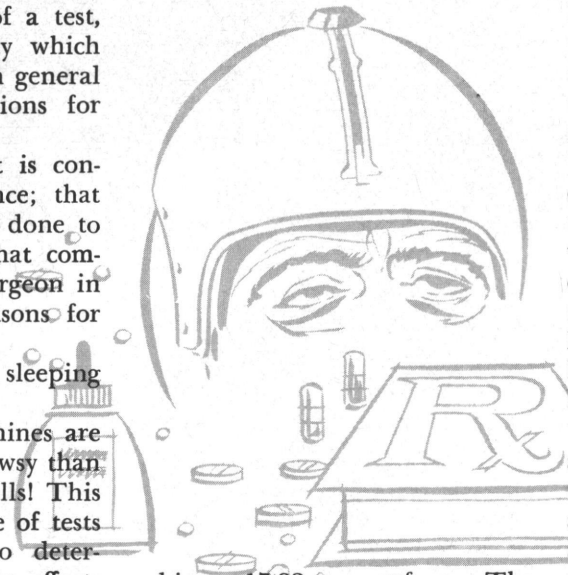
You wouldn't take a sleeping pill before flying?

Most of the antihistamines are better at making you drowsy than several of the sleeping pills! This is the surprising outcome of tests conducted specifically to determine any hazardous side effects which the antihistamines might have upon aviation personnel.

Your flight surgeon has advised you against flying after taking antihistamines. These relatively new drugs have rapidly become almost as commonly accepted as aspirin in the home medicine cabinet. Widely advertised, purchased without prescription, they are mistakenly assumed to be harmless. True, they are not known to lead to physical addiction as many sedatives do, but they are far from harmless for anyone controlling a dangerous piece of machinery—especially a complex, expensive aircraft.

To find out just what side effects might result, the Air University School of Aviation Medicine, USAF, Randolph AFB, Texas, conducted an experiment which was carefully controlled to eliminate inaccuracies from chance differences or variations in individual responses to the drug.

For the test they selected more than 3,000 healthy volunteer male subjects, 17-22 years of age. The sedative effects of the drug were evaluated by making an electroencephalogram, known as an EEG. This is a tracing of the electrical impulses from the brain (as the more familiar electrocardiogram is a tracing of the electrical impulses from the heart). The normal EEG pattern produced by the brain when a person is asleep is different from the pattern of wakefulness.



Such a test as this would not be reliable if one subject had slept around the clock while another was out until the wee small hours; therefore, such differences were eliminated.

All volunteers were basic trainees from the same group, and had undergone identical training schedules. The night before testing the antihistamines they went to bed at 9 p.m. and all were awakened at the same hour and followed the same routine including a morning nap before the test. Meals were controlled, and no stimulants (coffee, tea, carbonated beverages) were allowed. During the test they watched a movie, so they were even thinking about the same things as nearly as possible!

Thirty-three antihistaminic drugs and several sedatives were tested. One of every eight men was given a blank cartridge—a capsule which looked just like the others but contained no drug. However, no one knew whether he was taking a blank, an antihistamine, or a sedative.

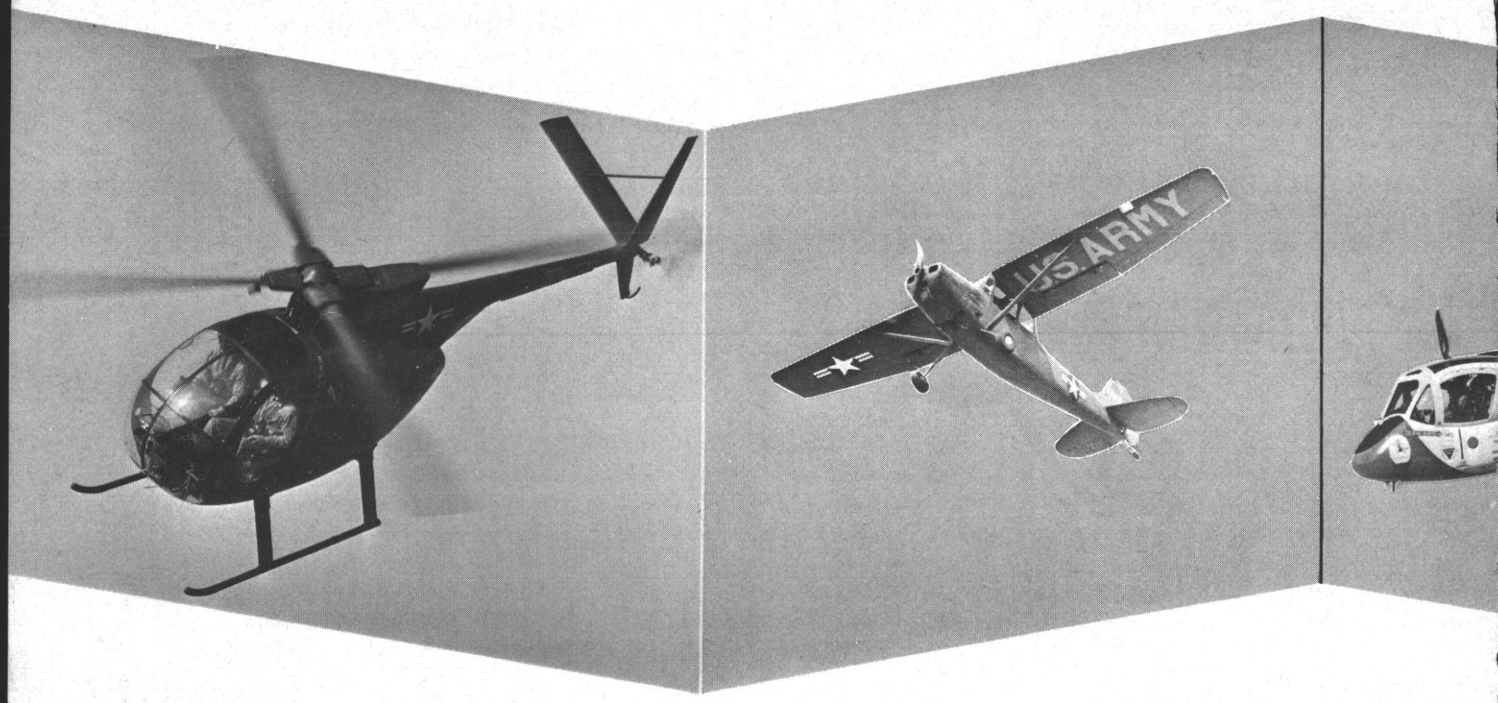
It was found that, "in their ability to produce drowsiness, these antihistaminics are at least as effective, 90 to 130 minutes after medication, as any of the sedatives with which they were compared." Those with the strongest sedative action make you drowsy most quickly. "However, the sleep-inducing capacity of all sedating antihistaminics seems practically the same."

The study proves that many antihistamines induce drowsiness when given in the doses recommended for the relief of allergic conditions. Six of the 33 tested had no discernible sedative effect. However, this doesn't help much, because those which are usually considered the best at allergy relief are also best at causing sleepiness.

They are valuable drugs and have a definite place. But that place is not in a pilot or aircrewman who is going to fly, nor in a maintenance man on duty. The time and place for their use should be determined by the flight surgeon. Many of these drugs have names which do not sound at all like "antihistamine," so the best rule to be guided by is *no self-medication.*

From the Flight Surgeon

Case Against Antihistamines



Improved Aerial Visual Observation

Captain Henry L. Quisenberry

IN ANCIENT times man had to rely on his eyesight or the eyesight of others to gain supremacy over his fellow man. Throughout history, he has used every means available to improve his range of vision. From Biblical times commanders have sought to "take the high ground" to better observe the enemy.

Today, however, this "high ground" observation has become only one of many methods a commander can use. To help him are unmanned drones, radar, aerial photography, and aerial visual observation.

But the scope of a modern battlefield has become so large that the present means of gathering information will need to be improved if the commander is to accomplish his mission.

Because of the great width and depth of a nuclear battlefield, the commander must have a means of going into enemy territory and reporting observations quickly and accurately. Control of the current situation is then assured, and rapidly developing changes can be coordinated between all members of the combat arms. If properly employed, aerial visual observation will furnish this means.

Even in the smaller "brush fire" wars aerial visual observation will again be very valuable. Each new improvement in this technique will increase its value.

Aerial observation can be accomplished from any type of airborne vehicle. To gain maximum

Formerly a Mohawk Flight Commander, Dept of Fixed Wing Tng, USAAVNS, Capt Quisenberry is now serving in Vietnam.

benefit however, two types of aircraft should be used.

The first type would be used for observing the forward edge of the battle area. A light observation helicopter (LOH) is being manufactured by Hughes Tool Company, Aircraft Division. The LOH will be used in all aviation companies supporting infantry, armored, mechanized, and airborne divisions. This vehicle will give the aerial observer much greater visibility, more room for observation equipment, and better communications facilities. Until the LOH is operational, the 0-1 will continue to be the mainstay in aerial reconnaissance missions.

The second type of aircraft needed is a high performance, high speed airplane which could fly deeper into enemy territory. The observer could then locate targets for our long range cannons and missiles.

The Army Aviation School at Fort Rucker, Ala., tested such an aircraft in 1957 and 1958, but found that it could not meet the requirements established by the combat arms. However, the test did point out that a pilot-observer team could locate lucrative targets on the ground at altitudes up to 25,000 feet. The report also recommended that aerial observers trained in higher performance aircraft be included in appropriate TOE.

Tests at Fort Rucker indicated a definite need for a high altitude tactical observation aircraft. In 1960 DA procured from Grum-

*The importance of an aerial observer is pinpointed in this photo. Among the 19 dummy targets hidden in the area are Honest John and Little John rockets with launchers and an M-48 tank.**For all targets see next page.*

man Aircraft Corporation its first high performance aircraft, the OV-1 Mohawk.

But the most important part of our aerial observation system is the pilot-observer team. It is in the training and utilization of this team that the most improvement can be made.

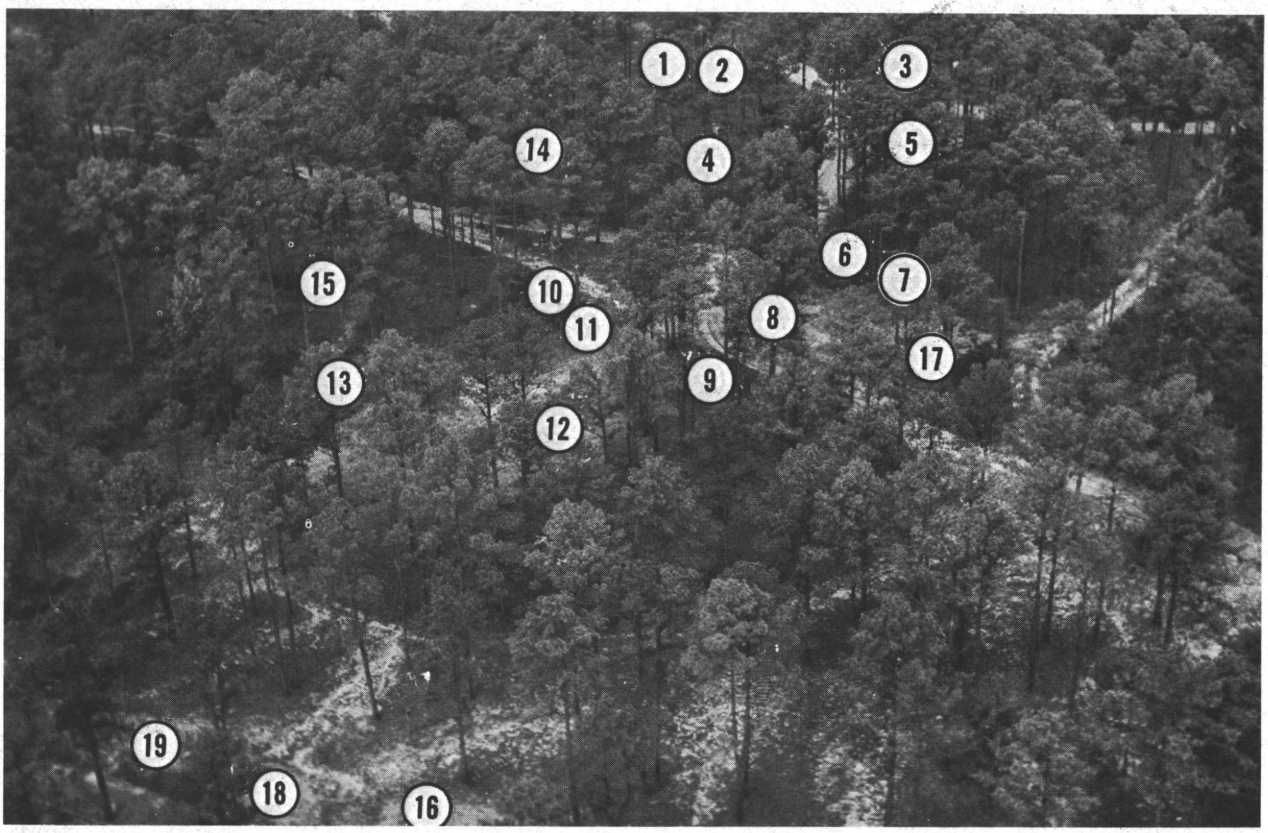
Millions of dollars are spent each year to train pilots and to maintain their proficiency in the aircraft currently in use in Army Aviation. This training qualifies the pilot as an expert in the performance of his flying duties. Techniques in observing, designed to make the aircraft a more efficient tool, would require too great a share of the pilot's attention. He can no longer serve as both pilot and observer, as he once did.

A definite need exists for the establishment of an aerial observation school. It could be incorporated into any of the Army's service schools or established at Army level.

The responsibility of selecting personnel for observer training lies with the commander. He should be better informed of the requirements, both physical and mental, that a candidate for observer training should possess. This responsibility could be brought out in the Command and General Staff College. When commanders are made more aware of the value of aerial observation, they will place more command guidance on the selection of future observers. High standards should be set, as they are for Army Aviators.

After being selected, the trainee should be given observer training as outlined in AR 95-51. Also, he

1. *Jeep*
2. *Jeep with mounted 106 mm recoilless rifle*
3. *105 mm gun*
4. *Truck, 2½-ton*
5. *Tank, M-48*
6. *Buggy top*
7. *Igloo*
8. *Sniper foxhole*
9. *Haystack*
10. *Drape net over ¾-ton truck*
11. *Dummy log over foxhole*
12. *Little John rocket with launcher*
13. *Honest John rocket with launcher*
14. *Sliding flattop over .30 cal mg*
15. *Swinging flattop net over .50 cal mg*
16. *2-man sleeping foxhole*
17. *Haystack*
18. *2-man foxhole*
19. *1-man foxhole*



should be taught to search terrain for the enemy in all types of reconnaissance aircraft, record and transmit visually obtained information, and photograph probable enemy installations. Photo-interpretation should also be one of his skills. He must also be able to adjust artillery fire—and select nuclear targets in the event that such weapons are employed.

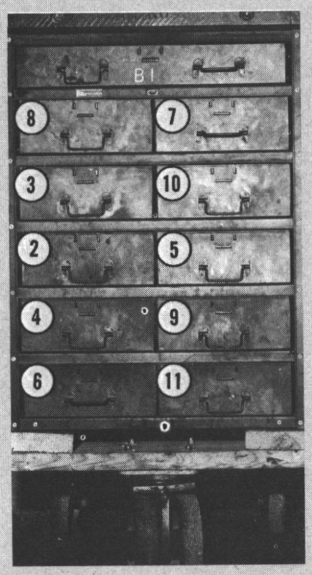
All of these requirements indicate that the role of the aerial observer will be more complex in the future and that he will have to be expertly qualified. The battlefield commander of any future war will have to rely heavily on the services of the pilot-observer team.

Unless a definite training program is established, a sufficient number of observers qualified to direct artillery and missile fire, as well as detect camouflaged missile sites and other enemy defenses, will not be readily available in the event of war. Such was the case in Korea. The quick training and lack of familiarity with objects when viewed from above cost the United Nations Forces time and targets of opportunity.

The effectiveness of aerial visual observation is improved every time a new flying technique is developed, a new piece of detection equipment invented, a better aircraft is operational, and communications channels and equipment are made more reliable. Many improvements in these areas are made by private industry, and much experimentation is being carried on in Army testing centers.

It is our task to improve also on the human components of this system by providing better training for the observer, along with a program of regular monthly practice missions so that he can maintain proficiency. But the most important consideration is to train observers NOW—before a critical need for them arises.

Portable Shadow-Board Toolbox



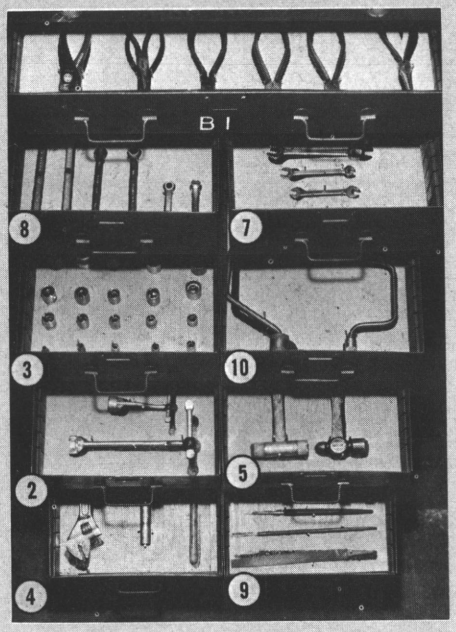
THIS TOOL cabinet has been modified to a shadow-board type tool holder, mounted on wheels, and is used by an entire aircraft maintenance team. The specific content of the box is naturally determined by the type of aircraft being maintained.

Each individual tool has a place marked for it on a shadow board, made up of ½- or ¾-inch plywood cut to fit the floor of each drawer. Nails are driven into the board around the perimeter of the tool to hold it in place (sockets are placed in holes drilled to fit each socket). A silhouette of each tool is painted on the board. This makes tool inventory a matter of opening a drawer to see that a tool is over every shadow. Inventory also shows what tools are out of place. (Notice drawers B-1 & 2.)

The simplicity of inventory makes practical a check at the end of each day or upon completion of a specific job. These frequent inventories reduce the chances of tools being left in an aircraft and possibly causing a serious accident.

The fact that this toolbox is used by a complete team eliminates the need for each mechanic to work out of his own toolbox or the worry of getting tools mixed up. Using this type of toolbox, mechanics have cut the loss of tools in this unit to zero in the past six months.

—65th Transportation Company (Lt Hel)
19th Aviation Battalion
APO Seattle 98731



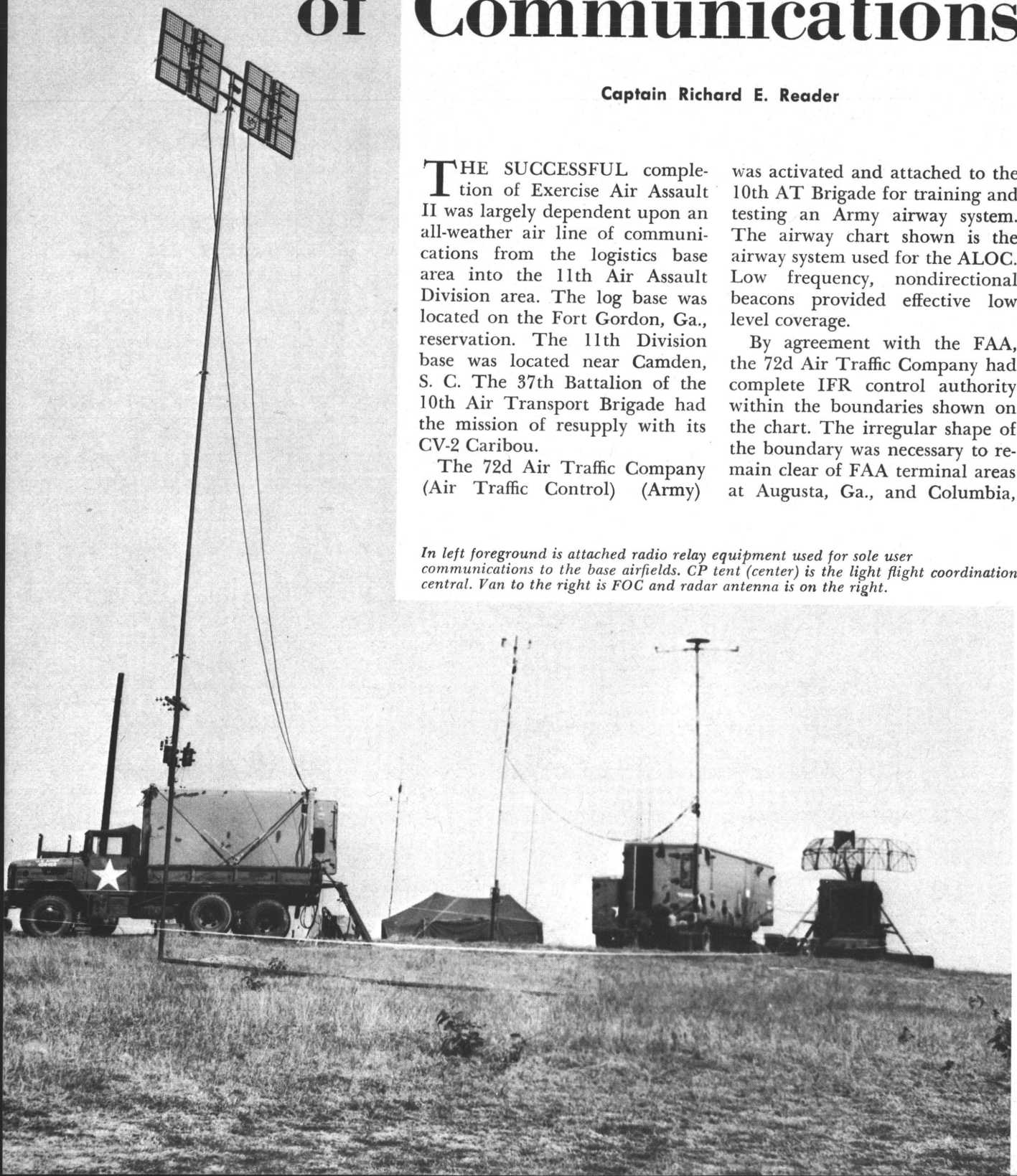
An Effective Air Line of Communications

Captain Richard E. Reader

THE SUCCESSFUL completion of Exercise Air Assault II was largely dependent upon an all-weather air line of communications from the logistics base area into the 11th Air Assault Division area. The log base was located on the Fort Gordon, Ga., reservation. The 11th Division base was located near Camden, S. C. The 37th Battalion of the 10th Air Transport Brigade had the mission of resupply with its CV-2 Caribou.

The 72d Air Traffic Company (Air Traffic Control) (Army) was activated and attached to the 10th AT Brigade for training and testing an Army airway system. The airway chart shown is the airway system used for the ALOC. Low frequency, nondirectional beacons provided effective low level coverage.

By agreement with the FAA, the 72d Air Traffic Company had complete IFR control authority within the boundaries shown on the chart. The irregular shape of the boundary was necessary to remain clear of FAA terminal areas at Augusta, Ga., and Columbia,



In left foreground is attached radio relay equipment used for sole user communications to the base airfields. CP tent (center) is the light flight coordination central. Van to the right is FOC and radar antenna is on the right.

S. C. This authority extended from the surface to 3,000 feet MSL in the southern area and from the surface to 4,000 feet MSL in the north. Except for a published notice of intensive Army traffic in the maneuver area, no VFR restrictions were placed on either military or civilian aircraft.

Airspace control was under the jurisdiction of two flight operation centers at Little Mountain, S. C. The second platoon had control of the northern area and the first platoon controlled the southern area. Flight coordination centers were established at Thomson, Ga., and Ridgeway, S. C., with an additional mobile FCC in the division area for use as required. Beacons were located as shown on the chart. Officers and controllers were trained at the FAA Academy in Oklahoma City, Okla., in special courses developed by the FAA for the 72d Air Traffic Company. The airway was established based on FAA procedures and minima, with provisions for reduced separation if necessary.

This was the composition of the Army airway system, a "first" in all respects for a CONUS exercise.

Radar vectors were used when destination airfield of CV-2 flight was changed while it was en route under actual instruments. All other aircraft operating in the same area were rerouted simultaneously. No problem.

WHY RADAR?

The airway system just described can and did work. Why, then, should radar be added to the system? To do this would mean additional training, maintenance, and communications problems. If it works without radar why not keep it simple?

Location of the airfields, as seen on the chart, placed them close enough together to be considered as one for instrument approaches and departures. Another consideration was that FAA regulations require IFR aircraft to remain 5 miles from airspace boundaries when under manual control. Safety and the use of additional airfields, then, were the justifications for the use of radar. The merits of being able to "see" arriving, departing and en route traffic should go without saying.

For these purposes, the decision was made to provide terminal radar coverage for both north and south areas. The system was to remain under manual control procedures, with radar providing a backup capability.

Why not use one of the GCA units for this purpose? The GCA and airfield operations sections are not under control of the air traffic company. What if the airfield should move? What about the delegation of airspace, clearance authority, communications requirements, coordination, and priority of actions? These questions all point to the fact that if the system is to work, radar must be a part of the air traffic company.

Two months before departing for the maneuver area, 2 officers and 18 enlisted men attended a special radar controllers course at the FAA Academy. At the same time, a request was made for the issue of radar equipment on a 180 day loan.

With training completed and the equipment being issued, AN/TPS-1D radar with IP-406 remote indicators, personnel began preparing two FOCs for radar capabilities. The equipment was issued by component, and installation had to be completed in the field due to lack of available time. The radar sets proved to be superior for the mission but the indicators were inadequate because of their size. An indicator with a larger diameter is required.

Two days after arriving in the field a flight check of the airway system commenced. While this was being done, the flight check aircraft was tracked and plots were made on the radar scopes. The plots included fixes, airspace boundaries, airfields, and obstructions. A short time after the flight check was completed the 37th Battalion's Caribou started using the system.

The SIF (selective identification feature) equipment was issued minus cables essential for its operation. As a result use of the secondary beacon for positive identification was impossible. Numerous targets on a small indicator and lack of interrogation capabilities compounded problems and resulted in controller indecision. This, unfortunately, resulted in something less than complete confidence in the controllers' ability by some aviators flying the system. Individual controllers became more proficient with each aircraft controlled.

FAA advisors, on the other hand, were impressed with the

When he wrote this article, Capt Reader was with the 72d Air Traffic Company (Army), Ft Benning, Ga.

controllers' ability and desire to learn, in spite of the primitive equipment (by FAA standards) and the many additional requirements placed on the individuals, such as vehicle maintenance, guard, KP, etc. This problem can be resolved by establishing an Army airway system in an area where controllers and aviators can get maximum continuous exposure to such a system. The FAA, for example, requires that its controllers be recertified in their areas of responsibility when away for more than 30 days. This is required regardless of past experience.

But back to the question, Why radar? As radar was used for Exercise Air Assault II, its use not only accomplished the two requirements of safety and greater airspace utilization but several other advantages become obvious. Some of the greater advantages were:

Aircraft can be readily accepted into the system without prior flight plan or notice.

Reduced separation standards allow for a higher saturation point.

Aircraft can be vectored to forward airstrips for one-time operations without further navaids.

Hot areas can be visually displayed and cleared with a minimum of confusion to the rest of the system.

All of these advantages were actually put to use during the field exercise.

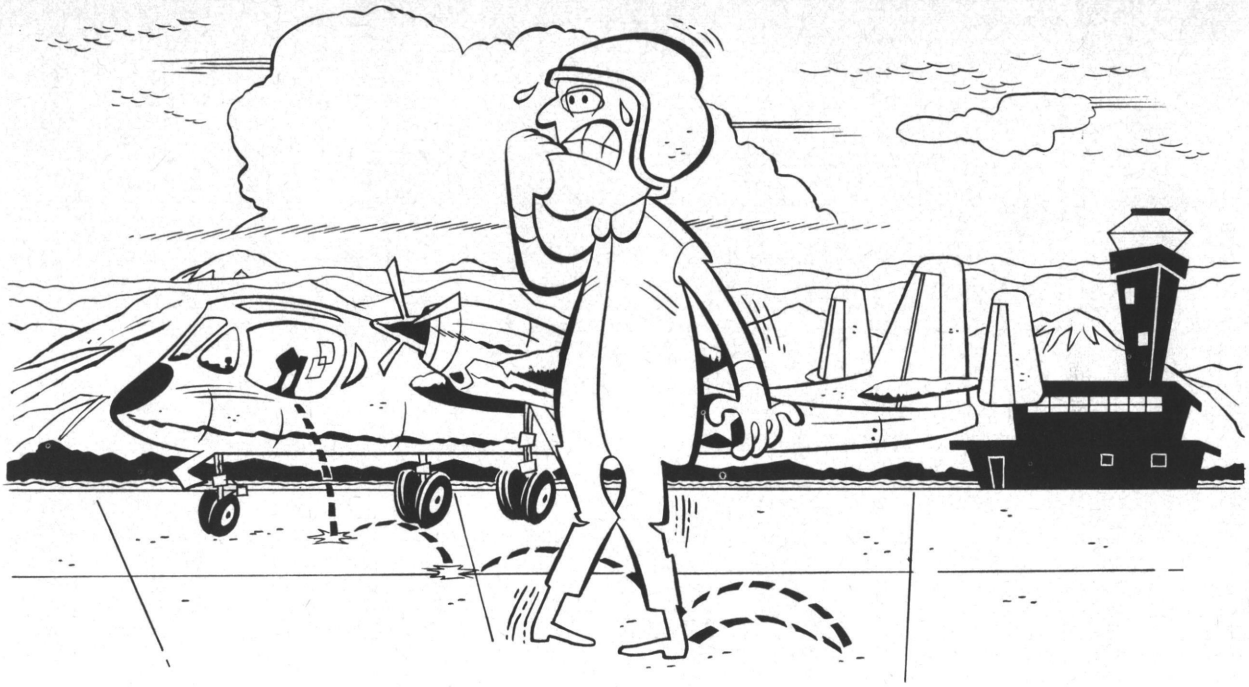
The following is a good example of how radar helped to minimize potential bottlenecks. A mission involving several CV-2s departed the log base area for a forward area airstrip. While en route, and actual IFR, the destination airfield was changed. This required issuance of new clearances to all aircraft en route and rerouting all aircraft operating in the area of the new destination. With radar, no real problem; just vector.

The system developed and used was designed to establish and operate an air line of communications and not to provide VFR flight following. To attempt flight following and operate an IFR airway simultaneously would cause an inefficient system for both missions. Radar with SIF can perform limited flight following for VFR aircraft requesting this service.

In view of all the advantages of radar, I find myself asking, "Why not radar?"

Oh yes! What if the area of operations is not suitable for the use of radar? No problem; go manual.

Sergeant at one of the radar controller positions in the flight operations central van



Decision

Captain Darrel Nelsin

ALL OF US in our profession are faced with decisions daily—some relatively unimportant, others might mean the difference between life and death. To arrive at the moment of decision and to be able to make that decision correctly and at the appropriate time is ultimately what we, as Army Aviators, have been trained for since the first time we threw on the master switch.

The following story of a flight from Hill AFB, Utah, to Lawson AAF, Ga., is but one example of those moments of decision.

Initial weather briefing was received at 2030, 28 January 1965: maximum cloud tops in excess of 16,000 feet MSL, with severe to moderate icing in clouds. A decision was made to delay departure until 0730, 29 January. An additional factor in this decision was the forecast of more favorable winds and a lowering of cloud tops.

A second weather briefing occurred at 0805, 29 January. Forecast received and noted on DD 175 as follows:

Cloud layer beginning at 7,000 feet MSL with layers up to 18,000 feet MSL with a higher broken and a high cirrus overcast at 30,000 feet MSL. Light rime icing to be encountered in clouds. CAVU conditions were reported in vicinity of Myton VOR (about 95 nm SE of Salt Lake City VOR). Two Air Force aircraft had arrived at Hill AFB within the last hour and reported negative ice on their descent from altitude.

Our flight plan was filed for 17,000 feet MSL to Lamar, Colo., then a climb to 19,000 feet continuing east. This first portion of our plan was to climb out to 17,000 feet MSL after crossing the Salt Lake City VOR (SLC) and if no serious ice conditions were encountered by Myton VOR (MTU) to continue as filed to Grand Junction VOR (GJT).

However, under no circumstances were we going to proceed east of Grand Junction under actual IFR conditions. We agreed on this because of MEAs of 14,000 feet and 16,000 feet MSL from Grand Junction to Pueblo, Colo. Basis for this decision was the possibility of ice load conditions coupled with heavy fuel weight and minimum terrain clearance. In essence, we felt it would have been difficult enough maintaining 17,000 feet MSL because of high fuel weight. This left little mar-

When he wrote this article, Capt Nelsin was with Company B, 226th Assault Support and Escort Battalion, 11th Air Assault Div, Ft Benning, Ga.

gin, at this altitude, for the additional weight of any appreciable amount of ice.

Takeoff was made at 0905 local with a right climbout to 240° contacting SLC radar as soon as we were airborne for a radar vector to intercept V-484 airway. Communication was established as instructed. After being positively identified by SLC, a vector was given to correct and intercept the airway. Climbout was stabilized at 1,600 fpm, 140 knots IAS, 78 lbs torque (Tq), 90 percent N_2. Engine, wing and tail deice equipment was left in the off position with pitot heat on. IFR conditions were encountered at approximately 7,000 feet MSL at +2° C. Climb continued normal, and passing through 11,000 feet MSL, light rime ice was observed by the copilot forming on all structural parts of the aircraft.

Interception of V-484 was accomplished SE of the SLC VOR at approximately 12,500 feet MSL. We were then handed off to SLC center from radar. At this time, all deicing equipment was turned to on-heavy as the rime ice continued to form. The wing deicer boots effectively eliminated the ice as it formed, while the engine and oil cooler inlet deicers indicated no significant action. Rate of climb at this time was 600 fpm, 138 knots IAS, 60 lbs Tq, 1678 prop rpm with all systems OK. The autopilot was engaged and the wing and tail deicer was turned off, leaving engine deice on.

At 14,200 feet MSL, another cloud layer was entered. Moments after entering this cloud layer, light clear ice combined with rime ice started forming. Wing and tail deicer was placed in the on-heavy position. Rate of climb dropped to 200 fpm, 130 knots IAS, 60 lbs Tq, 1678 prop rpm. It became obvious that requested altitude of 17,000 feet was not feasible. We requested and received an amended altitude from SLC center to 15,000 feet MSL. Autopilot was disengaged and simultaneously meto power was applied. Rate of climb was now 100 fpm, 125 knots IAS.

After reaching 15,000 feet, we stabilized at 50 lbs Tq, 140 knots IAS. Moments later, heavy clear ice rapidly accumulated. To maintain altitude, attitude was increased with subsequent loss of airspeed to 110 knots. Maximum power was applied but altitude could not be maintained, so a gradual descent of 500 fpm was established, thereby increasing airspeed to 135 knots. Simultaneously, a reversal of course and descent to MEA of 13,000 feet MSL was requested and received from SLC center. A shallow right turn was established because of a 13,600 foot mountain peak which was north of our course. Our new altitude could not be maintained with maximum power and prop rpm. Airspeed was now approximately 120 knots, with controls sluggish.

As airspeed continued to decrease, a minimum rate of descent was established to prevent a stall. About 3½ inches of clear and rime ice had formed on all parts of the aircraft. Deicing equipment was completely ineffective. Our descent continued to 12,500 feet, (500 feet below MEA) where we lost the SLC VOR signal. A decision was made to jettison the

drop tanks. We requested SLC center advise us of our approximate location and if we were in a safe area for jettisoning. Although center had us on radar, and we knew our geographical location, we were advised that "information pertaining to jettisoning of external stores could not be given."

At this point, we were temporarily able to maintain 12,500 feet, so we decided against dropping the tanks. Moments later, airspeed again dropped to 110 knots and another descent was initiated. The drop tanks were immediately jettisoned manually and center was advised of time of release (our estimated position was 32 nm SE of the SLC VOR, 5 nm S of course). After jettisoning, airspeed slowly increased to 135 knots and the descent was stopped at 12,200 feet MSL.

A gradual climb was initiated with maximum power still applied. Altitude gain was extremely slow (about 50 fpm). When altitude of 13,000 feet was finally achieved, power was reduced to 90 percent and approximately 55 lbs Tq. Airspeed was maintained at 135 knots. By continuously changing prop rpm and adding maximum power as needed, an altitude of between 12,800 feet and 13,000 feet was maintained.

As we approached the SLC VOR, clearance was received to 9,000 feet and later to 8,000 feet at which time a GCA was begun to Hill AFB. We became contact at 7,500 feet and made a normal approach and landing.

The incident was reported to base operations and the aircraft position at the time of jettisoning was verified with SLC center by telephone.

A local weather phenomenon was explained to us by the Air Force weather detachment when we talked to them about the light rime ice forecast on our DD 175. Two rates of cooling are encountered by orographic lifting of warm moist air, moving east, over the rugged Wasatch Range, which runs north and south in the vicinity of Hill AFB and Salt Lake City. As the flow of air moves against the mountains, that air which flows onto the gentle slopes of the large canyons is cooled considerably slower than that which flows against the steep slopes of the peaks. This in turn causes cells of different temperatures at specific altitudes which, of course, cause different icing conditions.

This phenomenon is extremely variable and unpredictable as to exact location or duration, hence, difficult to forecast. Thus, the weather detachment tends to rely heavily on pireps.

The moral of this flight becomes apparent with a moment of reflection. This first point, of course, is planning for the unexpected—a plan mutually agreed upon in advance by those involved. The degree of training is also apparent: at no time was there a moment of panic. Each action as it occurred was instantly reacted to with the proper corrective measure.

To sum up this experience, it should be said that to achieve the decision, two important ingredients must be called upon: planning and training.

—SKY SOLDIER
Aviation Safety Bulletin

into the trees by the book

Captain Burton A. Blanton

AT APPROXIMATELY 1630 hours on 26 October 64, ten minutes after takeoff on a tactical screening mission, I had a complete engine failure in an OH-13S model—over trees and no place to go!

I was flying at approximately 250 feet with cruise power and 70 knot airspeed when the engine stopped. I lowered collective pitch somewhat but maintained about 1/4 up travel. This seemed to slow my rate of descent. As high tension powerlines were directly ahead, I chose to turn right, downhill, and take my chances. At this time I made a radio call in the blind but was unable to transmit anything, other than that I was going down in the trees.

I was able to complete a 180° turn and at approximately 50 feet from treetops pulled the aircraft into a steep flare. I had picked a spot in the trees that looked sparser than the surrounding area. As I settled into the treetops, I pulled all remaining pitch. All motion seemed to stop for a split second before we plunged straight down for 50-60 feet. Tail low on initial contact with the trees, the aircraft hit the ground in a level attitude but in a small gully which pushed the left skid into the cabin.

My observer and I climbed out of the ship with slight injuries. We took a pencil flare gun and three smoke grenades from the aircraft and then moved away a short distance. When we heard the first aircraft, an OV-1, we fired two smoke grenades: one red, one green. These were evidently not seen, as the smoke hugged the ground and did not rise above the trees.

Approximately 30 minutes later an OH-13 was heard just north of us. I fired one of the pencil flares, and when he came closer my observer fired the second flare, which the aircraft spotted. I then set off the last smoke grenade (white) to mark the exact point of the crash. In a short time, we were picked up and evacuated to the Army hospital.

—SKY SOLDIER
Aviation Safety Bulletin

When he wrote this article, Capt Blanton was a Scout Section commander, B Troop, 3/17th Cavalry, Ft. Benning, Ga.

Ed Note: The techniques used by Captain Blanton are the published ones appearing in the aircraft -10. They enabled him and his observer to survive this crash with a minimum of personal injury.

Artist drawing of 400-bed U. S. Army Medical Service MUST field hospital

Now It's MUST

AT THE beginning of World War II no hospitals in the U. S. Army were capable of moving with small units fighting in jungles or isolated areas. To provide surgical support to this type unit a small 25-bed hospital was developed.

This hospital was designed so its equipment and supplies could be airlifted or carried in 35- or 40-pound back packs. Reduced size and weight of the equipment and improved packaging made this possible.

These little hospitals represented the ultimate in mobility. Their basic features were used in designing a new transportable field hospital for the Army. Called Medical Unit, Self-contained, Transportable (MUST), the new hospital features airmobility, all-weather reliability, controlled environment for efficiency, and short setup and teardown time needed in fast moving actions.

The new hospital is made up of three basic components—a utility element, a rigid but expandable element, and an inflatable element that looks like a Quonset Hut. Of modular design, the elements may be fitted together into a variety of groupings.

The heart of the MUST unit is the utility package. It produces electricity for lights and power, air for the inflatable element and vacuum to deflate it. It furnishes heated or cold air to maintain temperatures and humidity. It also pumps hot and cold running water and furnishes suction and compressed air for surgery and dental rooms.

Shaft power from a small gas-turbine engine in the utility element drives the electric generator, pumps, and other accessories. Compressed air is bled from the compressor section of the engine for pneumatic uses and for the hot air portion of the airconditioning system.

The element is completely inclosed by a weathertight case which also reduces the noise level to acceptable standards.

The only external requirements are fuel for the engine and fresh water for the hot and cold water systems. Electrical cables, ducts,

and hoses are stowed within the unit.

THE EXPANDABLE ELEMENT

Once the expandable section is placed in position it takes six men only 30 minutes to make it ready for use. It's leveled with built-in jacks and enlarged by extending the sides outward from the center fixed section. The air lock is installed, airconditioning ducts, electrical cables and other utility services connected, and the element is ready.

This shelter makes a room with 206 square feet of floor space and has the same specifications found in hospital operating rooms and clinical laboratories. It can also be used for diet preparation, dental facilities, sterile supply preparation, a pharmacy, and X-ray lab.

When the expandable component is used as an operating room or for other purposes where an electrical failure could be dangerous to the patient, an emergency lighting system is available. The surgery lights automatically turn on 25 milliseconds after an accidental loss of power and will continue to burn for over an hour. Power for the emergency lights is furnished by a nickel-cadmium battery. The battery is automatically recharged when regular power is restored.

THE INFLATABLE ELEMENT

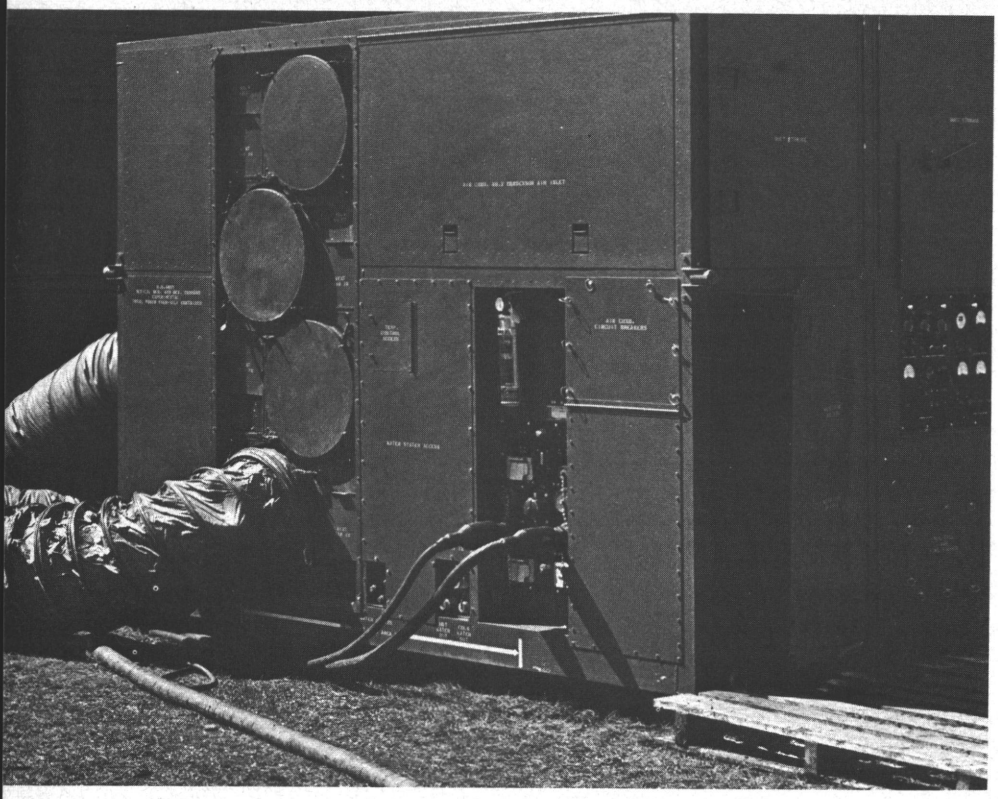
The inflatable unit is probably the hardest to erect. Even so six men can make it ready for use 30 minutes after it is airlanded. It consists of four 13-foot inflatable sections, two end walls, and air lock, and all cots and other equipment needed. All equipment is self-contained.

To erect the element, the wall sections and end panels are spread on the ground. The air hose from the utility element is connected and the sections are inflated. Then sections are joined together by zippers. Utility connections are joined, the air lock installed, and the element is ready for use.

Erected, the element makes a room 20 feet wide and 52 feet long. Any number of these elements can be zippered and buckled together to form larger buildings.

The element can be used as a 20-bed ward, receiving and classification room, shock treatment

Utility element supplies all power and airconditioning requirements for MUST hospital complex



Although the MUST elements were tailored for

Air or ground — a MUST surgery is designed to move easy, set up fast

room, pre- and post-operative area, dispensary, and emergency room.

When the unit is inflated to the normal air pressure of 1.5 pounds per square inch gauge (psig) of air pressure it will support a snow load of 10 pounds per square foot. It can withstand a wind condition of hurricane force. A patching kit is provided for making repairs. Leaks are not serious; a damaged section is supported by adjacent sections until repairs are made.

The air locks for the inflatable and expandable elements are used as doors leading to the outside and to provide controlled atmospheres inside the shelters. They are also used as passageways between elements.

The air locks are 5 feet wide and 11 feet long. Two stretcher bearers and their patient may enter an air lock at one time.

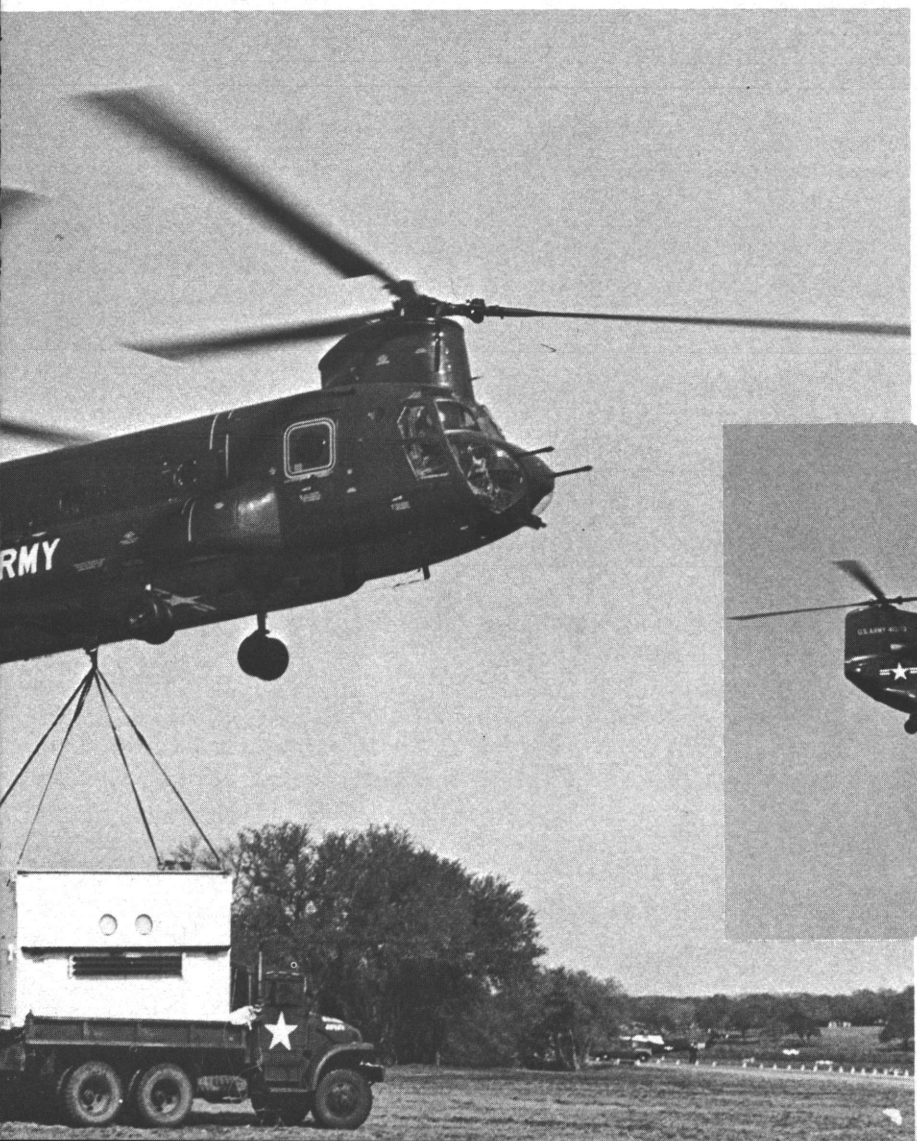
TRANSPORTING THE COMPONENTS

Although the new MUST concept was designed around the M-35 truck, its light weight allows it to be easily airlifted. The utility and inflatable elements are light enough that they can be carried externally by any of the Army cargo helicopters. The expandable unit may require a CH-37B, CH-47A, or CH-54.

The utility element is 6′ wide, 9′ long, and 7′ 2″ high and weighs approximately 3,800 lbs. The inflatable element is 3′ 6″ wide, 12′ long, and 6′ 10″ high and weighs about 4,000 lbs. Largest and heaviest of the three is the expandable element. When folded into its container it is 7′ wide, 12′ long, and 8′ high. Its weight varies from 4,000 lbs. to 6,000 lbs., depending upon the equipment packed with it.

The utility and expandable elements are self-contained and skid mounted with lifting and towing devices. The inflatable element is packaged in a skid mounted container equipped with towing and lifting eyes.

the M-35 truck, their light weight allows them to be air-lifted.



MUST

UTILITY ELEMENT OUTPUTS	
Electrical power	90 kilowatts, 400 cycle 10 kilowatts, 60 cycle
Refrigeration	20 tons
Air heating	526,000 BTU/hr at −65° F
Water heating	60,000 BTU/hr
Water pumping	Cold: 9 gal/min Hot: 6 gal/min
Air pressure for inflatable elements	1.5 psig
Compressed air or suction	Available as required

Note: Exhaust heat energy may also be used for steam generation for sterilization, sanitation, water purification, and for other uses.

The number and kind of elements in a complex depends on specific needs. Elements may be added, removed, or rearranged easily.

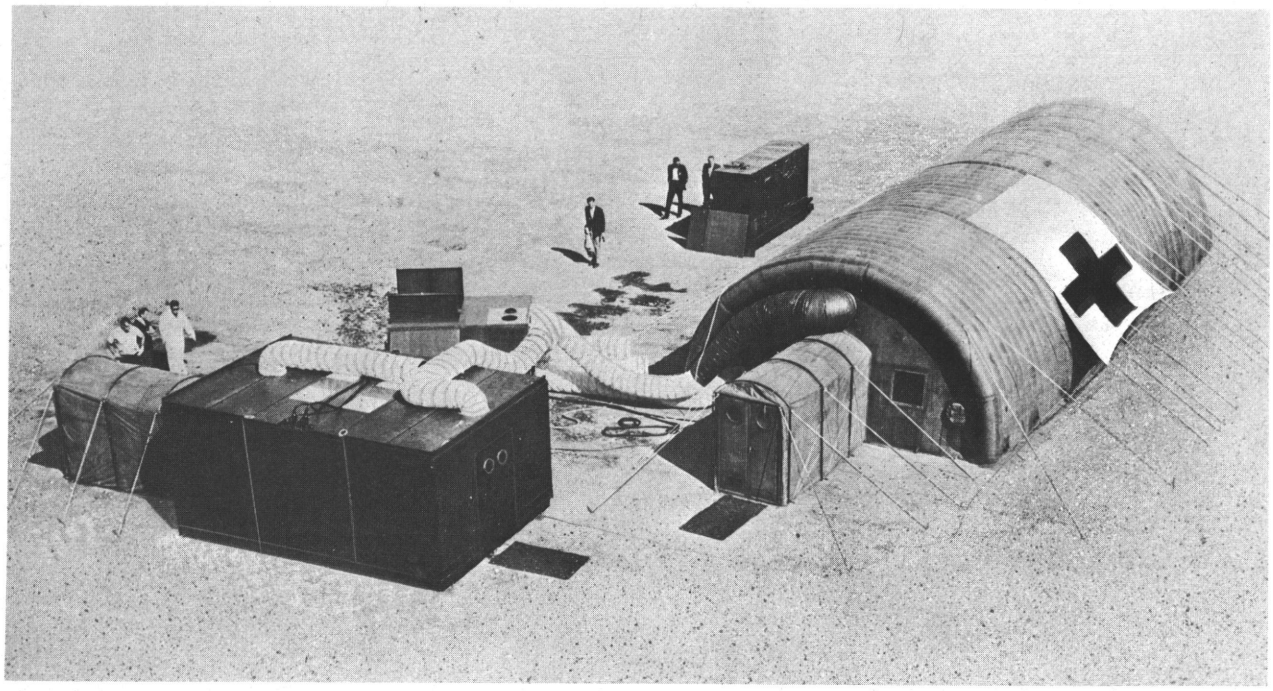
In a field situation sometimes only one part of a hospital may be needed. For instance, a surgery unit may be detached from a hospital during a fast moving operation and flown into the combat area to take care of the casualties. When the element is no longer needed it can be returned to the hospital and be in use at its old location within a few minutes.

Utility elements needed to support a hospital depend upon the makeup of the hospital. One utility element will provide power for four inflatable units or six expandable units, plus one additional expandable unit having heavy power needs (such as X-ray facilities), at the temperature extremes of −65° F or +140° F. In the moderate temperature ranges, up to twice as many of each element may be serviced by one utility element.

OTHER USES

Expandable and inflatable components with supporting utility elements offer a whole new idea in field shelters. The units would be excellent for arctic living quarters. Or they could be used for radar installations and communication shelters. The inflatable elements could offer a cooled or heated, dust free area for the repair of aircraft or delicate components.

The three elements in the MUST concept of a field hospital. Left foreground, an expanded rigid element. To the right, an inflatable ward section. To its immediate left is its shipping box, holding the complete ward, air lock, cots, linen and all supplies for 24 hours. White ducts lead to third MUST (utility) element.



Angel Named Huey

Lieutenant A. J. Scaran, USMC

SOME PEOPLE are lucky! They have live guardian angels flying alongside them all the time. The Marines in the helicopter squadron at Danang are lucky; their guardian angel is called "Huey." But Huey belongs to someone else—he belongs to the United States Army.

Huey is a jet powered, rotor driven, bullet shooting, rocket firing hunk of machinery called—helicopter—UH-1B.

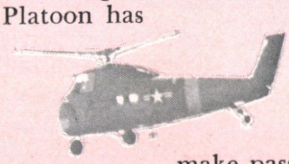
Picture this. Thirty-six Marine Corps UH-34D helicopters airlifting 400 Vietnamese soldiers into a zone to engage the Viet Cong (VC) guerrillas. Upon entering the landing zone, they receive small arms fire from the ground. Since the 34Ds are only armed with two M-60 machineguns, the flight leader transmits over the intercom: "Fangs one-two-three and four, this is Yankee Poppa leader. We are receiving small arms fire from both sides of the landing zone. Request assistance." Now Huey is at his best! He and his mates turn what was a quiet countryside into a raging inferno of bullets, rockets and fire.

The Danang Huey, a member of the 7th Army Airlift Platoon, has a four-man crew and is equipped with four outside mounted machineguns and two rocket pods.

Huey has another nickname at Danang, "Fang." When Huey's armament is considered, the name must have come from the deadly sting of the bird.

The Huey platoon is called upon for a minimum of six missions a day. While on these missions, the pilots can be involved in up to 40 sorties.

In addition to the machinegun laden angel, the 7th Platoon has a special Huey affectionately nicknamed "The Hog." A chief warrant officer said, "When the Hog Assaults a Viet Cong position or target, the firepower of 48 rockets keeps the enemy in their holes and their heads down. The Hog is definitely a weapon to have on your side." Then, the two gun teams swing in with suppressing fire on the flanks of the landing zones, swing around and come in again. The tactics are such that always two of the four Hueys are on target. While two are on, the other two are swinging around, coming back on target.



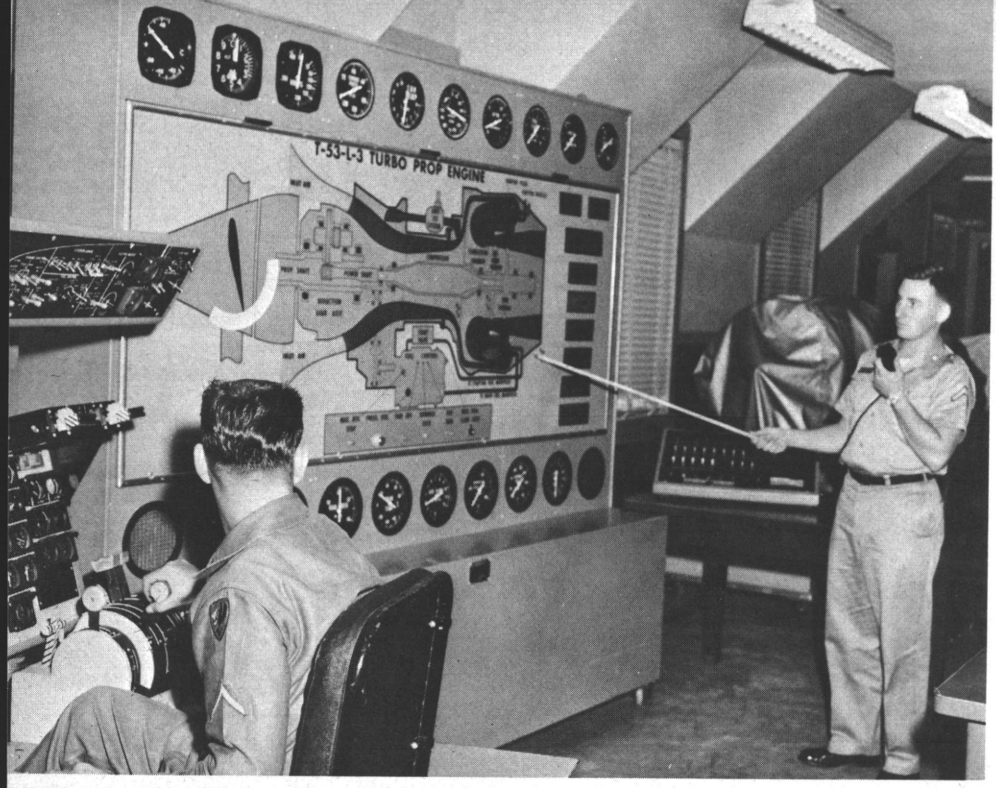
After the troops are on the ground and on the attack, the Hueys escort the 34Ds back to Danang, and one part of the day's work is completed.

All in all, the officers and men of the 7th Army Airlift Platoon are in a class all their own. They risk their lives for others on every mission whether it be strike or resupply. One officer of the Marine Medium Helicopter Squadron said that the lives of many Marines have been saved by the Hueys and their crews. He tells this story: "The UH-34D in which I was riding was hit by Viet Cong fire and made an emergency landing in VC territory. No one was hurt in the landing. The guerrillas were all around and firing at the chopper as well as at us. The 7th Platoon Hueys immediately spotted the trouble and began to make firing runs, keeping the VC pinned down. They continued to make pass after pass for about 10 minutes until the maintenance helicopter rescued us."

As an afterthought, he said that the Marine Medium Helicopter Squadron could never perform their mission without those "great guys" from the 7th.

All heroes are instilled with a unique quality called humility. In explaining his job of aircraft commander/pilot, one warrant officer said, "Anyone who can ride a bike can fly a Huey." The Marines know better. Immediately after takeoff and in flying formation, all eyes look left and right, to make sure that their guardian angels named Huey are still there.

—THE REPORTER,
May 22, 1965



Instructor points to engine condition on T53-L-3 engine simulator during maintenance course at USAAVNS

Engine simulators allow the instructor to duplicate at will conditions needed for training – safely and at less cost

Simulation

Major Paul F. Anderson

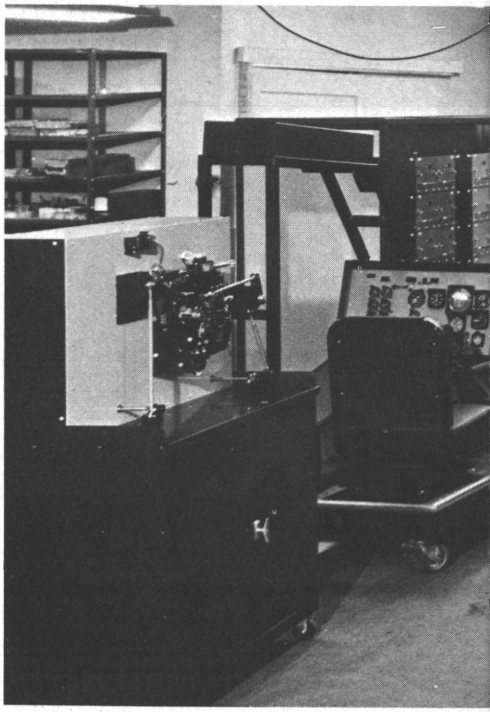
ARMY AVIATION has come a long way since 1942. During most of this period, training and training devices have lagged somewhat behind the requirements. All too often the attitude has been, of necessity, to try and make do with what was available. But more complex equipment calls for more highly qualified technicians in the field. The Army must provide more comprehensive training than ever before. It can no longer afford to "make do" when training aids can be developed to improve the school product. The problems of student safety and useful learning ability during work on a live turbine engine with its high-pitched whine have engendered a need for a new training aid.

Only so much theory and "book teaching" can be accomplished from the platform. Supplementing this with practical exercises on end item or component equipment has proved to be absolutely necessary.

Traditionally, a preferred method of phasing instruction on propulsion systems is to provide:

- Lecture or conference instruction on theory of operation, systems function, disassembly and assembly procedures, inspection requirements, troubleshooting techniques and repair procedures.

When he wrote this article, Maj Anderson was assigned to the U. S. Army Transportation School, Ft Eustis, Va.



• Practical exercises involving supervised disassembly, inspection, parts replacement and preservation techniques and reassembly on training equipment.

• Practical instruction on operation, troubleshooting, adjustment, repair and calibration on live engines in a test-cell environment under close supervision. (Included in this phase is the use of diagnostic equipment.)

In the area of reciprocating engines this system has proved very satisfactory and is currently practiced at the Transportation School. Not so with instruction presented on the turbine engine. Probably the greatest deficiency of turbine instruction has been this inability to allow the practical application of procedures and methods taught.

With this shortcoming in mind, and the knowledge gained from a similar problem experienced by the Aviation School at Fort Rucker, it was hoped that simulation of a live engine would solve this problem.

Realism in training devices can become downright disconcerting. Approximately a year and a half was required for ground laying, specification determination, funding and budgeting, redesigning the previous trainer, and construction of a T53/T55 (UH-1D and CH-47A) Turbine Engine Simulator, since labeled Device 2A27A.

What is this trainer and what can be accomplished by its inclusion in the courses of instruction on turbine engines?

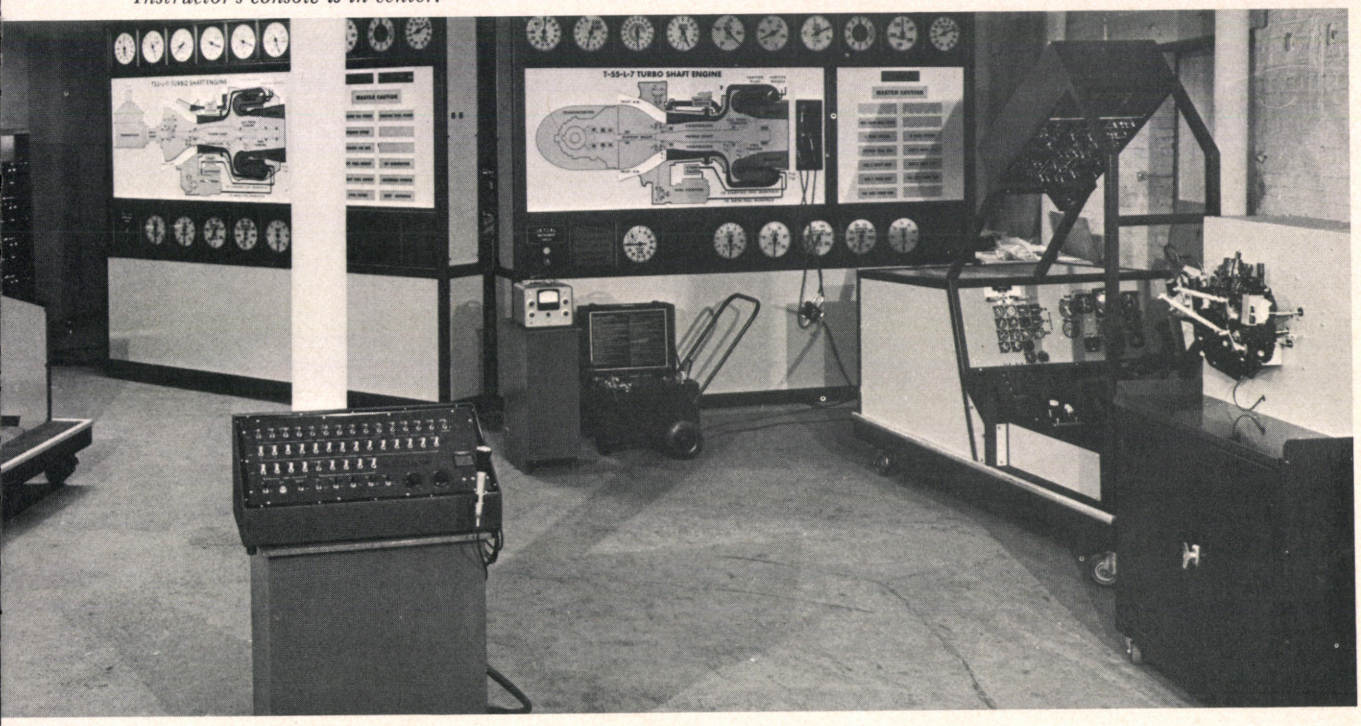
Depending on the MOS to be taught, the cockpit and fuel control units are connected to the appropriate display panel. The cockpits, constructed to allow the operator to be viewed by the class, have all essential engine and systems indication active.

Actual starting procedures are required to activate the trainer, and the primary reason for the cockpit is to create various situations which will allow the interjection of malfunctions by the instructor. By creating the conditions under which various "troubles" occur, a better understanding can be obtained by the student. This will make his job of troubleshooting, inspecting and repairing more meaningful and comprehensive.

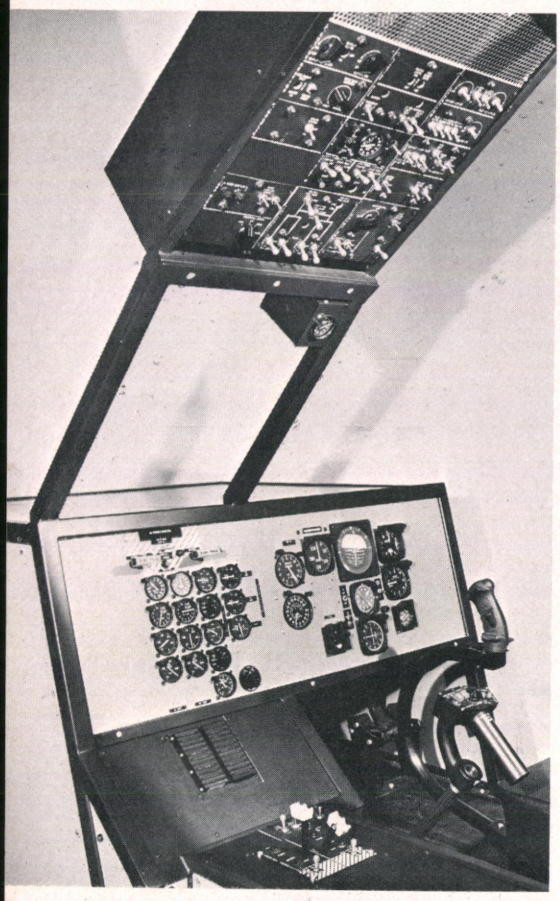
The two display panels, representing the T53-L-11 and T55-L-7 engines as animated cutaways, have sequential lighting to show various systems operation. Shown are air flow, fuel flow, bleed air, combustion and exhaust; large-faced reproductions of critical engine instruments (reflecting identical readings found in the cockpit); additional instrumentation to show the effects of fuel control adjustments by showing fuel flow and compressor discharge pressures. In addition, connecting pads are available for the attachment of actual diagnostic equipment (Jet-Cal Analyzer/Vibration Meter) available to units in the field.

This last innovation should be one of the most beneficial attributes of this trainer. All too fre-

Layout of fuel control units, cockpits, and animated cutaways for UH-1D (T53-L-11, left) and CH-47 (T55-L-7, right). Instructor's console is in center.



Cockpit simulator.



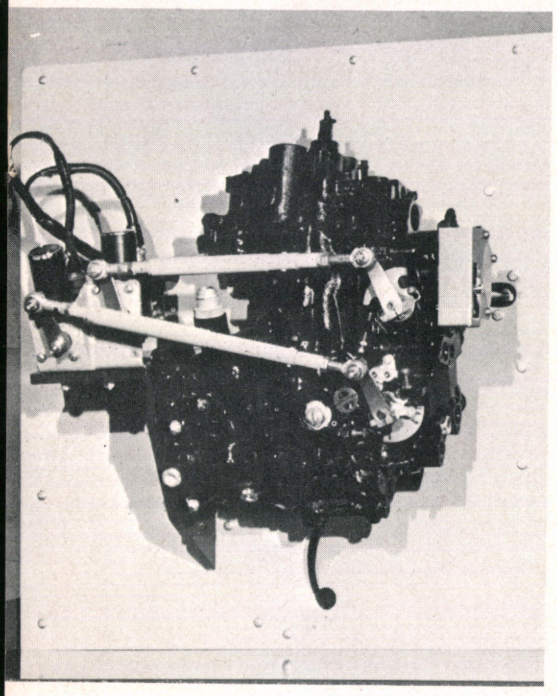
"The equipment does everything but fall apart for the military trainee," a reporter stated after seeing the simulator in action

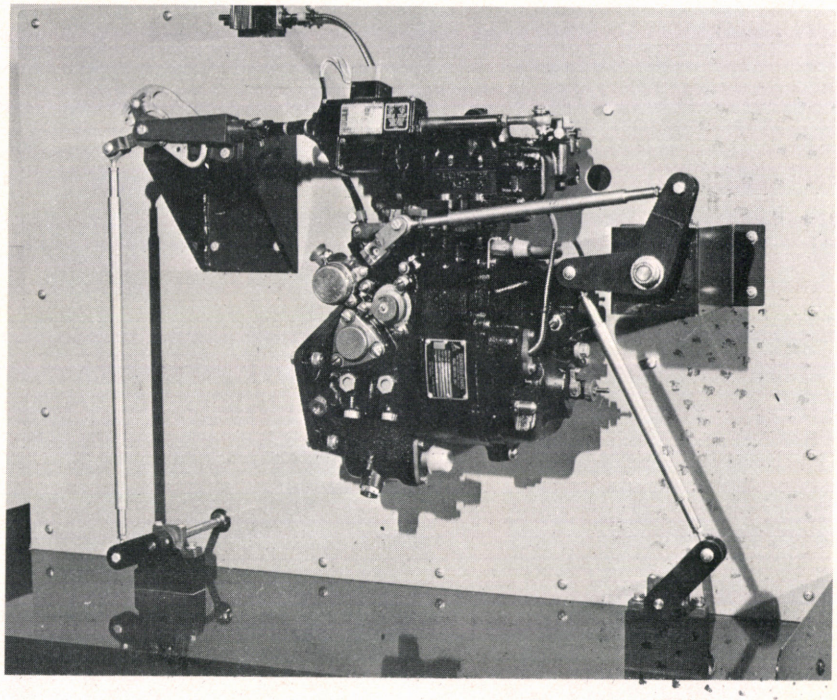
quently, test equipment available for troubleshooting is not understood and, as a result, not properly used. Conditions indicating both normal and abnormal operation of the engine can be simulated, relayed to the actual test equipment and readings taken from them. Practical exercises in this area should erase some of the mystery normally associated with these "black boxes" and allow maintenance personnel to take advantage of their value as troubleshooting tools.

Probably the most salient features of the device are the fuel control units. A greatly misunderstood, highly complex and extremely sensitive piece of equipment, the fuel control can present more maintenance headaches than can be imagined. Adjustments to this component must be properly understood and executed. Neither hours of lecture nor thousands of words in a manual and work on unanimated or schematic-type training aids can give the mechanic needed proficiency and understanding of the adjustments authorized on this unit.

As presented on the 2A27A, the fuel control is a completely animated, actual item, reacting both to adjustments on the fuel control and electromechanical input representing temperature, altitude, and power demands placed on the engine by cockpit controls and/or

Depending on the course, the cockpit (CH-47A, left) and its fuel control unit (below, left) are connected to appropriate display panels. Other fuel control unit is for UH-1D





the instructor's malfunction console.

The instructor's console is instrumented to interject some 41 malfunctions into the engine, engine systems, the fuel control, diagnostic equipment and, in the case of the CH-47A application, the auxiliary powerplant (used for starting). Standard cold- and hot-day conditions may be applied as well as ground or airborne operation.

Included is an instructor's microphone which, when used, cuts out the electronic sound system of the trainer. The sound simulation system not only produces sounds of normal operation (starting, steady state operation, variations of power and shutdown including the sound of rotating blades) but also such abnormal sounds as a surge condition or a bearing seizure. A volume control is available to the instructor to modulate speakers on the display board and to the student for a separate speaker in the cockpits.

Realism, the key to good simulator construction, was achieved by taking engineering data on three actual engines and transposing this data, with a ±1 percent error in the instrumentation and relay, to an analog computer. This computer takes inputs from the cockpit controls and the instructor's console and calculates proper readouts. Then it relays them to the fuel control unit, cockpit instruments and the display panel instruments and lighting system.

As related by a civilian newsman after viewing the device, "The equipment does everything but fall apart for the military trainee." Should the trainee miscue when making adjustments or not correct for injected malfunctions, it is forcefully brought to his attention by a gawd-awful sound and the flashing of an $125,000.00 GOOF light.

Among those to receive training on the simulator will be the following Military Occupational Specialties:

AMOC—Aircraft Maintenance Officers Course

672.4 —Multiengine Fixed Wing Mechanic

675.4 —Single Rotor Helicopter Mechanic

678.1/4—Tandem Rotor Helicopter Mechanic

679.4 —Fixed Wing Technical Inspector

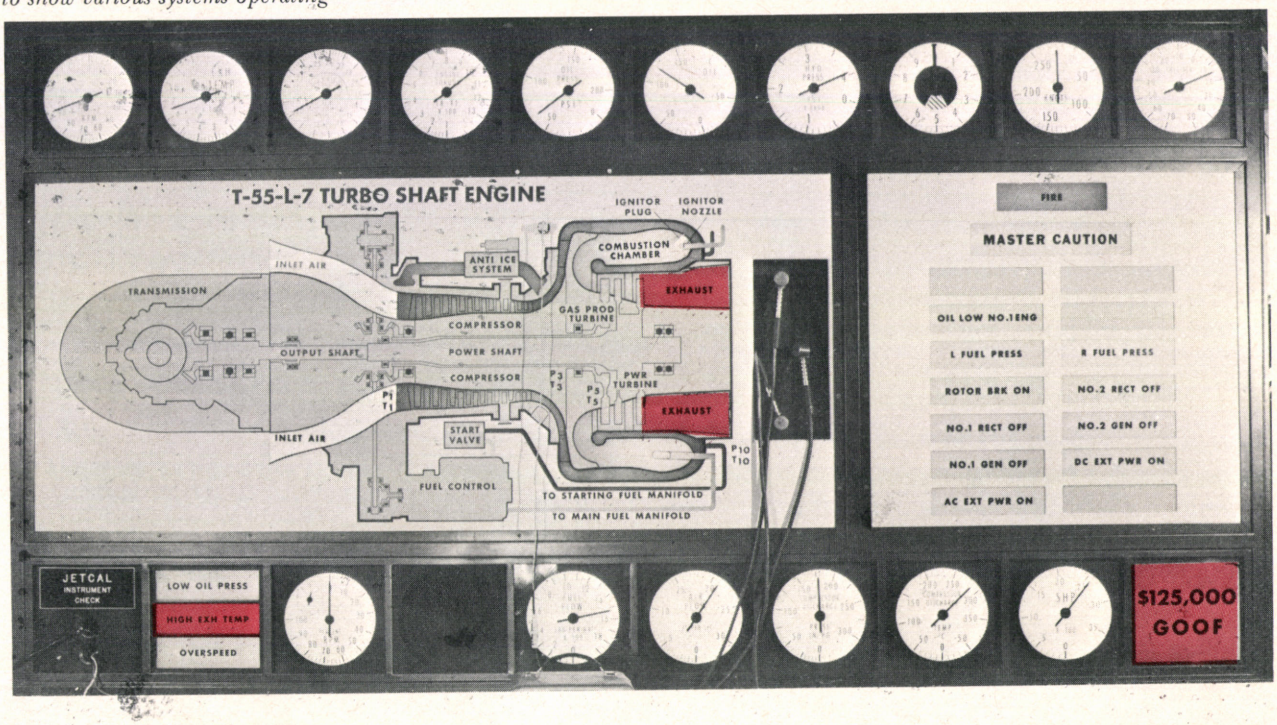
679.5 —Rotary Wing Technical Inspector

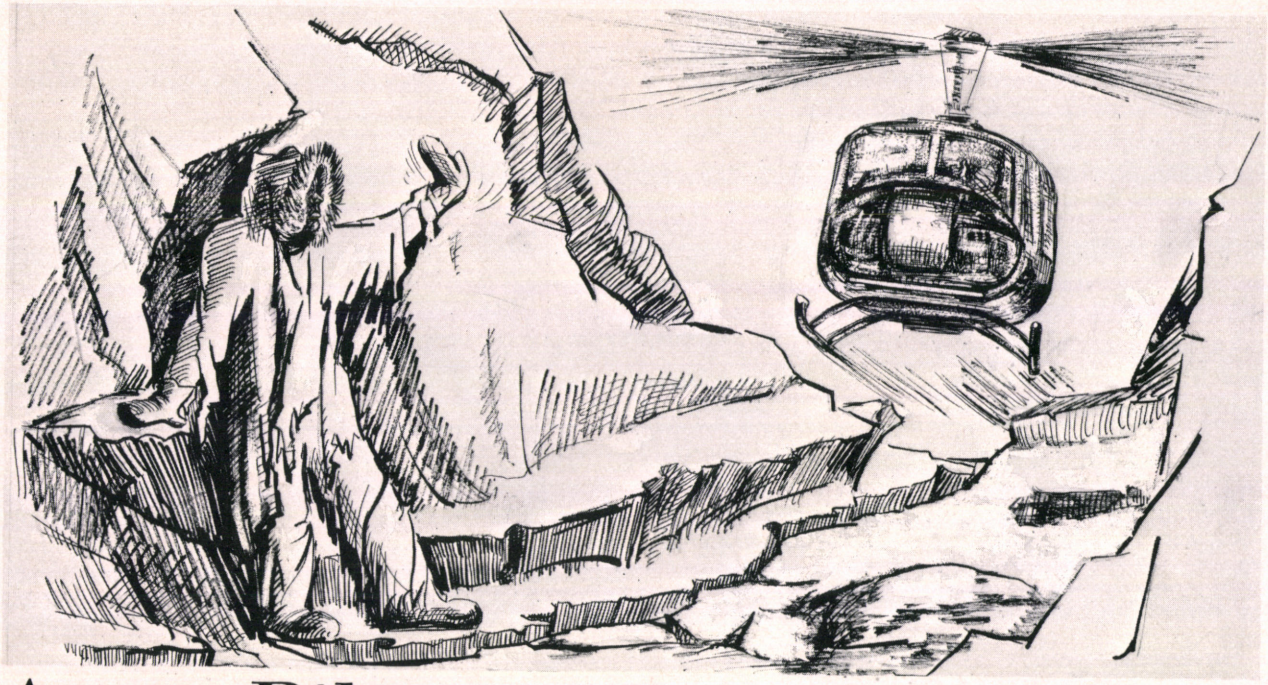
679.6 —Maintenance Supervisor

681.1 —Aircraft Engine Mechanic

Although the device lends itself to teaching basic theory, systems and sections, its primary and most beneficial use will be malfunction identification (both with and without diagnostic equipment) and adjustment procedures on the fuel control. The simulator is expected to provide much needed depth to this phase of training by giving realistic operational simulation in the classroom.

Display panels represent engines as animated cutaways and have sequential lighting to show various systems operating





Army Pilot Rescues LIFE Photographer

MEMBERS OF the U. S. Army Aviation Detachment, Antarctica Support, Fort Eustis, Va., are getting ready for their next trip—this fall—to the bottom of the world.

During their last tour one of the Army pilots, flying a UH-1B, was credited with saving the life of a LIFE Magazine photographer.

The photographer, Mike Rougier, was coming down a rugged mountain near Shackleton glacier when he slid 1,800 feet down an icy slope to the edge of a 400-foot precipice.

Rougier, his heavy gloves and Antarctic gear ripped to shreds, guided himself toward some rocks, thudded onto them, lay still a moment, then staggered to his feet and waved to his party.

Within minutes after word of the accident had reached camp, a UH-1B was on its way to the scene.

"When I saw where they'd have to land I waved them off for it looked absolutely impossible," Rougier recalled. "But Chief Warrant Officer James Lockhart just gave me the 'no sweat' sign (thumbs up) and kept coming."

Lockhart eased the UH-1B within a few feet off the ground and Army medic Clifford Crilly jumped out, bundled Rougier onto a stretcher and both soon were aboard the hovering UH-1B. The UH-1B's whirling blades were within two feet of the overhanging rock. After some touchy moments the UH-1B whirled away to the base camp. Rougier was safe in camp less than an an hour after he slipped.

The 12-man U. S. Army Aviation Detachment, commanded by Major William Hampton, deployed to the bottom of the world last October.

Mission of the unit was to provide aviation support to the U. S. Navy and to the U. S. Antarctic Research Program during Operation Deep Freeze '65.

The unit lived on the trail. Much of its work involved landings at altitudes above 10,000 feet, far above the ceiling of many helicopters. The Army reports the unit's three UH-1B helicopters operated well at the high altitudes and with heavy loads of passengers and survival equipment.

The unit's pilots logged 659 hours in 116 days.

—ROTOR BREEZE, April 65

Double-Header Airmobile Operations In Vietnam

WO Bruce P. Mauldin

ARMY AVIATION in Vietnam has seen many big changes. The 52d Aviation Battalion, supporting the ARVN II Corps in Vietnam's rugged central highlands, has brought into operational use a concept of airmobile operations which promises to be highly effective.

One of the major problems encountered in airmobile operations in the mountains and jungles of II Corps is that, due to excellent cover and concealment afforded by the dense jungle, the Viet Cong can often retreat unseen from a tactical zone while the assault force is just beginning to land. Noting this, as well as the fact that the enemy usually retreated along a known or easily predictable route, the 52d sought a method of turning these retreats into ARVN's advantage.

Mr. Mauldin is now attending the Helicopter Instrument Flight Course, U. S. Army Aviation School, Ft Rucker, Ala.

U. S. Special Forces personnel have trained RVN soldiers to near perfection to execute "doubleheader" type operations

Quick response to air intelligence is vital to success of doubleheader operations

Developed by Col Theo C. Mataxis, Senior American advisor to II Corps, the "Mataxis Doubleheader" concept is based on the fact that Special Forces A Teams have established bases, each consisting of several rugged strike force companies, along a line which runs generally north and south near the western border of Vietnam. Two adjacent camps become involved in a doubleheader operation. Theoretically, bases of operation could be established near each other specifically for conducting such an operation, but the Special Forces camps provide a ready-made pickup point, emergency landing area, and readily available source of reinforcements should they become necessary.

The concept behind this type operation is to "squeeze" the enemy force between two friendly forces. This is not a new concept, except that in past operations of this nature, usually conducted wholly by ground transport, the VC have proved

Special Forces A teams have trained men readily available for action at predesignated points

Let an airlifted ARVN force dri
then later in the day when the e
second force in their escape path

highly adept at escaping out the sides of the "sandwich."

One solution would be to use four separate forces moving toward each other, but this would involve a fantastic number of troops. The basic problem was one of mobility. In other words, the ground units could not get into position to begin the squeeze quickly enough to prevent the enemy from evaluating the situation and escaping.

This was when aviation came into the picture. Why not move a force in by air to a primary landing zone, let the ARVN troops drive the VC in a given direction, then later in the day, when the VC are least expecting it, land a second force in their escape path and trap them? In this case the assault would take on the aspects of an ambush, completely taking the VC off guard, and they would be forced to fight or surrender. Even if the VC did not run from the first force, but chose to fight, reinforcements could be moved in almost immediately. Thus the "Mataxis Doubleheader" was born.

Initial planning involves choosing a primary landing zone in a hostile area. The 52d Battalion prefers LZs at least large enough for three aircraft, but due to terrain limitations and the small number of suitable LZs in any one given area, this is often impossible. The LZ is often a river sandbar.

The second LZ is chosen in an area usually no more than 20 kilometers from the first, preferably closer, and in the direction in which the Viet Cong force is anticipated to move.

A staging area is chosen. It will usually be an improved airfield located as nearly equidistant as possible from the two camps to be used as loading areas.

Early on the morning of the operation, the aircraft in the airmobile force move from their home base to the staging area. Logistics has been taken care of, and command, medical, and mess areas are established. A lone O-1 reconnaissance aircraft takes off into the dawn. The pilot will make a last weather check before the operation begins. His radio call comes, and soon the entire field is enveloped by the high-pitched whine of the UH-1Bs' turbine engines. Radio checks are completed, the aircraft line up on the runway, and the empty copters take off, looking like so many jet-powered tadpoles.

the VC in a given direction, my least expects it, land a nd trap them

Long before dawn, a crew briefing was conducted at home base, so the pilots and crews know exactly what today's operation will entail, yet there is little of the usual chatter over intercoms. This is going to be a long, hard day.

Soon Camp A is in sight, with its tiny dirt airstrip lined with over 200 troops. They probably aren't chattering too much either. These are Montagnard tribesmen trained to near perfection by U. S. Special Forces soldiers. They comprise some of the toughest fighting units in Vietnam.

Now we're airborne with our fighting friends on board.

The LZ is close now. We see the VNAF fighters going in on pass after pass, plastering the LZ with their heavy firepower. Now the armed UH-1Bs start their run. Same treatment, different weapons, a lot slower maybe. Better insurance right now than Lloyd's of London.

Descend, land, unload, move out before your buddy eats up your tail rotor on the way in.

Second lift same routine, then back to the stagefield to feed those hungry choppers some JP-4. This is where the ground crews really shine. They can do everything but change the engine in under 5 minutes, including patching holes.

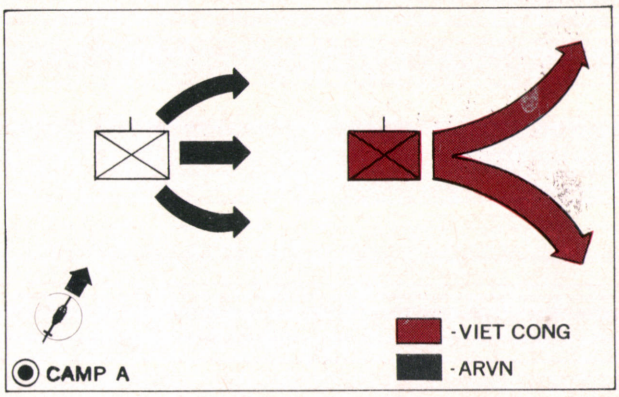
Until now this has been just like any other combat assault. Normally we'd already be on our way home. But now we just sit and wait; 1400 is a long time away.

But it comes, and we move out again. This camp has a nice wide runway, but we're gone again with a load of troops too soon to admire it. Two lifts into the new LZ (300′ x 100′, to 3,000 feet elevation, in 150- to 200-foot trees), and then we head home.

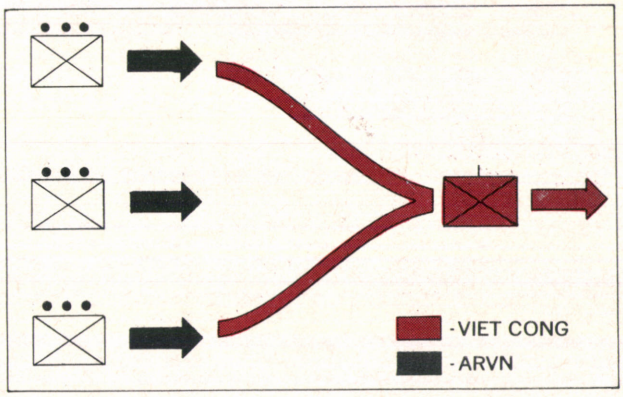
Whether or not the "squeeze" worked we won't know until later, but we do know that we've given it a fighting chance with a bunch of helicopters, untold hours of planning, and a little sweat. What we have done is conduct two airlanded assaults into two separate areas, employing troops from two separate strike force camps. We have done this for the price of one operations order, one stagefield, and one logistical effort.

This is what the textbooks would probably call "maximum use of U. S. Army Aviation in the tactical zone." Or something like that.

Two-pronged envelopment action by airmobile forces

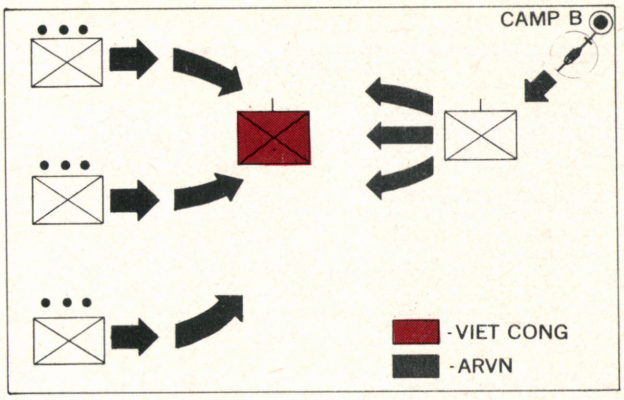


At 0730 an airmobile force is lifted into an area to the west of the VC force, and immediately takes action to force the VC company to the east. The VC, in this case, split their force as a diversion.

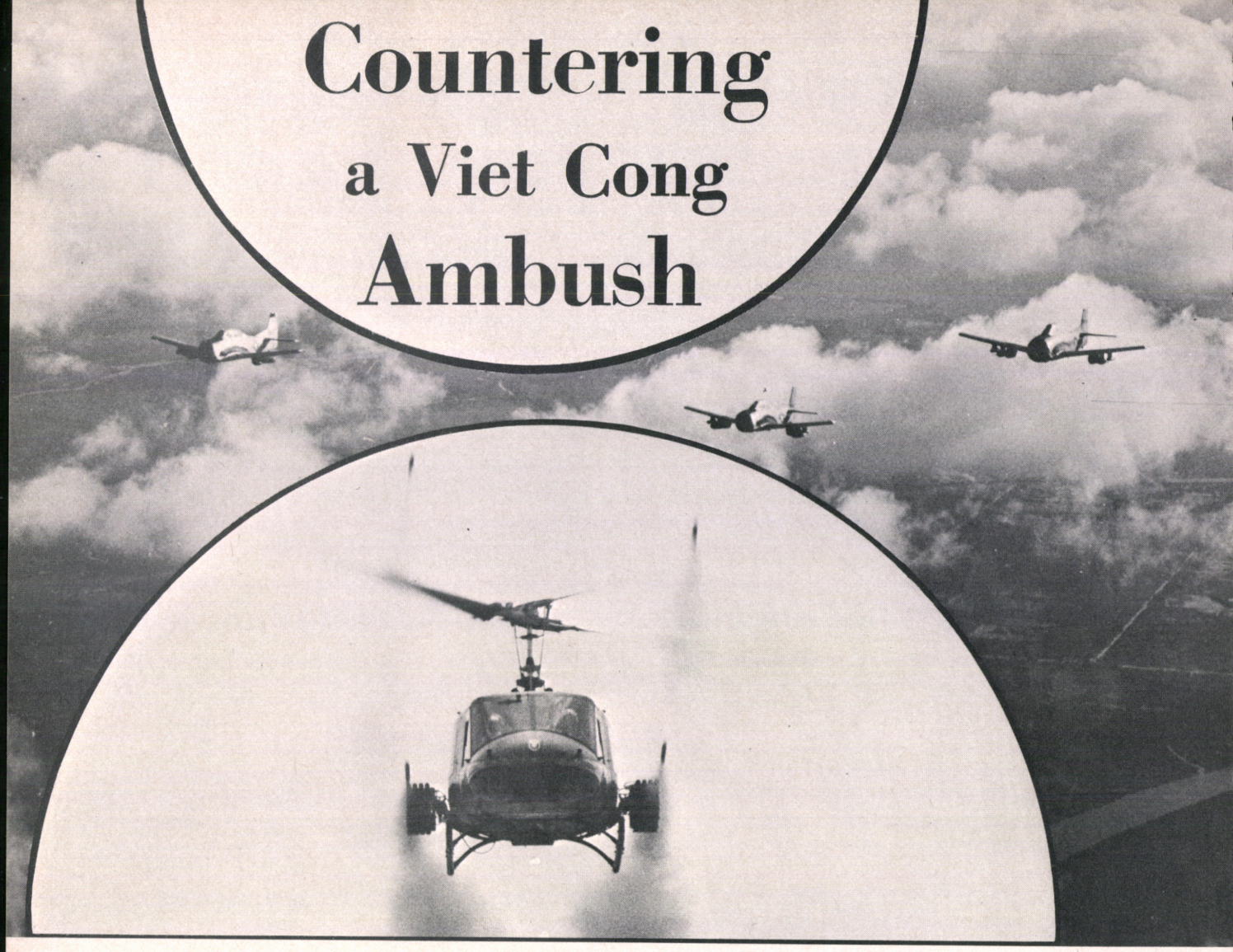


Above: The ARVN force has spread to three platoons on line, and continues a fast eastward march. By noon the VC have generally regrouped, and are moving slowly away from the ARVN force.

Below: At 1400 the second airmobile force is airlifted into the retreat path of the VC, and immediately spreads to flank the VC force. Airmobile force A also begins closing in on the flanks and the VC are trapped.



Countering a Viet Cong Ambush



William H. Smith

WE HAD JUST come in from a flight down south. Maintenance crews were still servicing the aircraft when we received word of the ambush. The report said that an ARVN (Army Republic of Vietnam) platoon, accompanied by an American advisor, had been ambushed by communist VC while on a rescue mission into a mangrove swamp. They quickly retreated to an abandoned outpost and called for help.

The old man immediately alerted both "Viper" and "Ringo" armed platoons. To get one platoon off the ground as soon as possible, he had all personnel concentrate their efforts on servicing Viper's aircraft.

I received permission to ride with Viper control, and we were soon on the way. Forty-five minutes after receiving the report, we were flying over the old outpost. We found the situation critical. The VC were within 200 meters of the RVN troops. They were pushing hard, and it was evident that unless we could drastically change the situation the men were lost.

An Air Force forward controller in a TO-1D arrived about the same time. He said he had come to direct the fire of four VNAF (Air Force, Republic of Vietnam) Skyraiders who were coming.

This was a stroke of good luck. By using the Air Force airplane as a controller, our control ship could act as an additional gun ship to give us more firepower. We immediately got him busy helping us, and we started our pattern of diving and hitting the

The sudden onslaught of lead and high explosives from the Hueys stopped the VC attack dead

VC whenever they dared move or fire a weapon.

The sudden onslaught of lead and high explosives from the skies had its effect on the VC. Their attack first faltered and then stopped dead. For 30 minutes we held them in check and even pushed them back a little.

But like other aircraft, helicopters can carry only a certain weight. This limits the amount of ammunition on board. When fire must be heavy, as it was here, ammunition disappears fast. In 30 minutes our Hueys were empty and we had to go back for more ammunition.

Fortunately we had pushed the VC back far enough that tactical fighter aircraft could operate without endangering friendly troops. We turned over the VC punching game to the four Skyraiders. They waded in and kept pressure applied where it was needed.

Back at the airstrip we hurried through an inspection of the helicopters while they were being rearmed and refueled. Five had received seven hits, but these were small caliber stuff and did not affect flying ability.

Two crew members had received minor shrapnel wounds, one on his chin and the other on his left elbow. We gave them first-aid and tried to get them to go for proper medical treatment. Both refused. They laughed at their minor wounds and said they wanted to finish the mission.

While we had been helping the ARVN rescue platoon, Ringo had gotten airborne. They had headed toward us, intending to relieve us so we could rearm, but on the way they learned the VC had attacked at two other points. When the rescue platoon was ambushed, its home outpost sent out another platoon to try to rescue them. This platoon in turn was ambushed by the communists. The other attack was at the outpost itself. The VC probably reasoned the outpost had depleted its manpower so much that it would be a pushover.

The Ringo commander didn't make the mistake of dividing his strength in three different areas. Instead he made his aircraft available on call to the commanders of the besieged units and attacked specific concentrations as requested. This kept them busy all afternoon. Before the day was over every aircraft in his unit expended itself of ammunition at least four times.

In inspecting Ringo aircraft, it was found that every one of them had received hits. Fortunately none were serious. One American gunner in the Ringo platoon was seriously wounded in the right leg and later had to be evacuated to the United States.

After rearming and refueling we took off again for our besieged troops, but before we got there we learned that the communists had retreated into the jungle. The four Skyraiders had gone to the home outpost to help there. Since our friends in the old outpost were now safe and the Skyraiders were at the home outpost, we decided to help the ambushed convoy.

But a radio call to the old man, who was flying with Ringo, changed our minds. The situation had changed. The main VC thrust was at the home outpost and the Skyraiders had their hands full. He wanted us to help them. He and the Ringo platoon were still busy hitting specific targets, mostly concentrations of VC back in the woods, and "Panther" (.50 caliber) helicopters were helping the convoy.

The CO also gave us an interesting specific assignment. He said that about 5 minutes ago one of the A-1E Skyraiders had been hit and had made a crash landing in an area infested with communists. He wanted the helicopter I was riding in to go pick up the pilot. Only five people were on board our aircraft so we were the

Evacuation of 83 wounded RVN troops accomplished by UH-1Bs, American advisors, RVN med evac personnel

COUNTERING . . . AMBUSH

logical choice. The old man said we could take two other helicopters along to ride shotgun.

We had no trouble finding the downed aircraft. It had landed in an open field of high grass and had not caught fire. But we saw no sign of life and at first we feared the pilot to be dead or captured by the VC.

The two other helicopters started orbiting the wooded areas surrounding the clearing, providing cover and suppressive fire. If any VC were there they would find it unhealthy to fire on us.

We came in alongside the downed aircraft. Its canopy was open and the pilot was missing. There was a movement in the grass and everyone's trigger finger tightened a little. The grass parted and the pilot stood up, a smile on his face extending almost from ear to ear. He was not seriously hurt and had been hiding in fear of the VC. We took him on board.

When we rejoined our platoon we found the other helicopters busy making life miserable for the VC. For the rest of the afternoon we occupied ourselves that way, expending our ammunition and fuel supply four times before the communist had sense enough to retreat.

The Panthers made three passes, raking the VC with .50 caliber bullets. The VC in turn fired a few shots at the Panthers and took to the woods as fast as they could. As they did they received fire from this direction, too. The friendly troops, realizing that they did not have a chance against the attackers, left the trucks and hid in the woods. They were waiting for their chance to get back. The Panthers gave it to them. Many VC got away but enough died to make the ambush a costly venture.

When the action was finally over and the VC had crawled back into the swamps, it was found that 32 ARVN soldiers were killed defending their country. Eighty-three were wounded. We evacuated the more serious. Three American advisors were killed and five were wounded in action.

We lost a lot of equipment, but most of it was actually destroyed and did not fall into the hands of the VC.

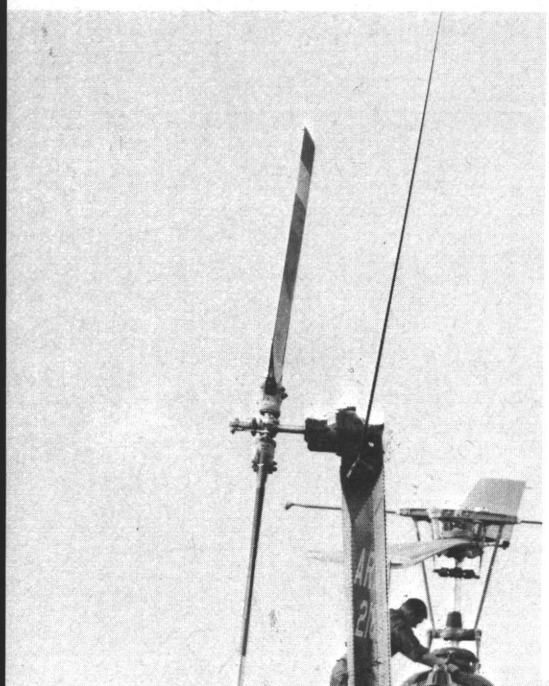
We weren't able to determine exactly how many of the enemy were dead. Many were killed by aircraft back in the woods and swamps, and understandably the ARVN didn't want to go in there just to count dead VC. Then too, the VC followed their usual practice of removing many of their dead before retreating.

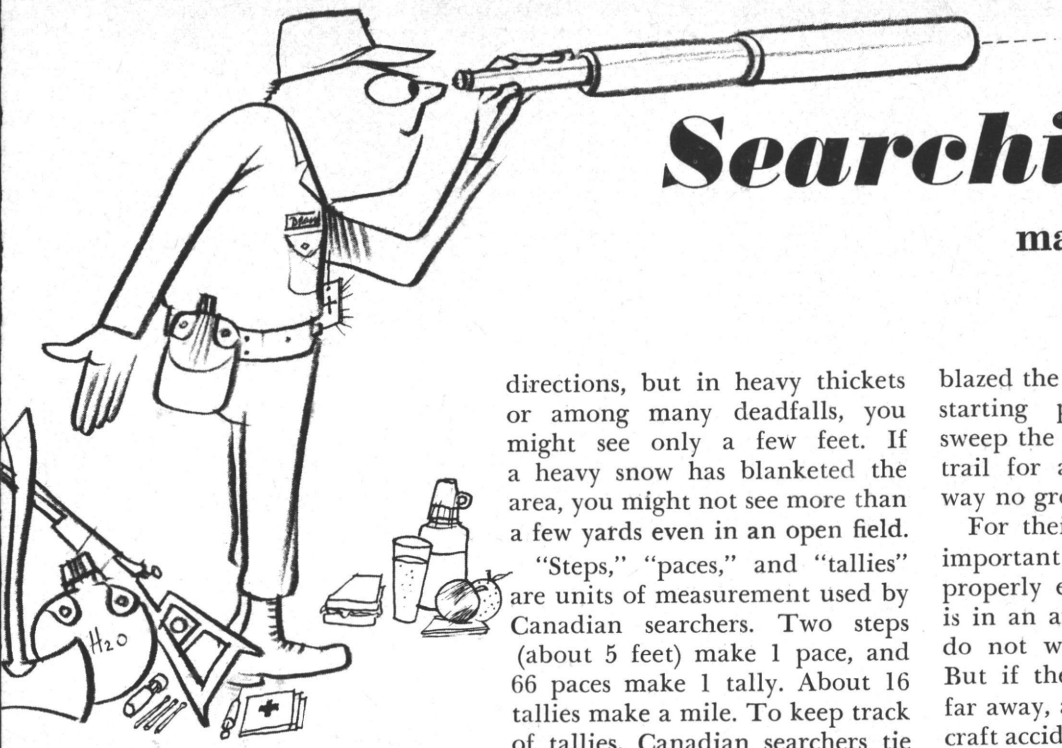
We estimated that 50 had been killed. We counted almost that many pools of blood or trails where the bodies had been dragged before they could be picked up and carried off. We also estimated that 80 were wounded. Among the equipment captured were one machinegun, two BARs, two smg, and four rifles. Also there were a lot of junk weapons made from lengths of pipe and hunks of lead.

As usual the old man held an after-action critique. He said that as the attacking force the VC had the advantage over us. Under normal conditions they could exploit this advantage to a successful conclusion. But the timely intervention of aircraft had changed things. Everytime the VC attacked he revealed his location, enabling us to hit him.

In his official report the old man advised that ARVN units should notify higher headquarters when they have convoy movements. That way we could be on the alert. Also he advised that all convoys be escorted by Bird Dog aircraft and that armed helicopters be stationed within 10 minutes flying time of any convoy, ready to intercept any VC giving trouble.

This narrative is based on an after-action report. The article is not a factual portrayal of events. It is written to inform Army Aviators about the general type of assignments to be expected on a tour in Vietnam.





Searching

made easy

JUST ABOUT every post, camp, or station in the United States has, at one time or the other, been asked to organize a search party. Perhaps it was to find something as small or precious as a lost child, or as large and substantial as a downed aircraft.

For whatever reason, the whole operation can be quicker and easier if search personnel know the fundamentals of search methods.

Our Canadian neighbors have had considerable experience in organizing search parties to locate lost aircraft and personnel in the far north. They have reduced searching to a science. Here is some information on their methods of operation.

Before an attempt is made to search an area, they establish the search visibility. This is the distance a searcher can see in any direction while in a standing position. This search visibility varies according to the type of terrain in which the search is to be made, the visibility condition, and the object looked for.

In open fields you might be able to see 300 or 400 yards in all directions, but in heavy thickets or among many deadfalls, you might see only a few feet. If a heavy snow has blanketed the area, you might not see more than a few yards even in an open field.

"Steps," "paces," and "tallies" are units of measurement used by Canadian searchers. Two steps (about 5 feet) make 1 pace, and 66 paces make 1 tally. About 16 tallies make a mile. To keep track of tallies, Canadian searchers tie a knot in a string or transfer stones from one pocket to another. A searcher concentrates on looking, and all too frequently forgets his tallies if he depends on memory alone.

To make the search, personnel line up in what is known as a sweep line. The distance between each is determined by the search visibility. For example, if the search visibility is 50 feet then each searcher is 100 feet apart, etc. Best control is achieved if the sweep line has no more than 10 searchers.

The end men in each sweep are called flankers, blazers, or pivots. During the first sweep the searchers move on one of these flankers in a line abreast. Besides searching his area, this control flanker keeps record of the tallies made by the sweep line. The other flanker blazes a trail as he goes along. When the sweep line has searched the distance they were supposed to go, they are said to have reached the end of a leg.

When they have reached the end of each leg, the whole line pivots on the flanker who has blazed the trail and returns to the starting position. During this sweep the other flanker blazes the trail for another sweep. In this way no ground is left unsearched.

For their own protection, it is important that the searchers be properly equipped. If the search is in an area close to home, they do not worry about equipment. But if the search is to be made far away, as it will be in most aircraft accidents, the searchers themselves may become casualties if they are not equipped.

In Canada, searchers have a pack which contains such things as a ground sheet, sleeping bag, change of clothing, extra boots, insoles, mitts, socks, axe, compass, knife, matches, whistle, mirror, first-aid kit, signal panel, etc. They believe that it is important for searchers to have what they need to survive in the cold but that they must not be overloaded. Unnecessary items are never carried.

A base camp is usually established, and here are found all the things necessary for an overnight stay. Included are food, tents, extra sleeping bags, cooking equipment, stoves, coleman lanterns, fuel, etc. An important item that should be kept at the base camp is a chain saw. This piece of equipment is very handy and is used mostly to supply wood for the camp.

Canadian searchers are well trained. They know the dangers of the wilderness and prepare themselves to cope with it. Perhaps more American soldiers and aviators should take heed and do likewise.

ARE YOU *Confused?*

Major Howard (Rip) Collins

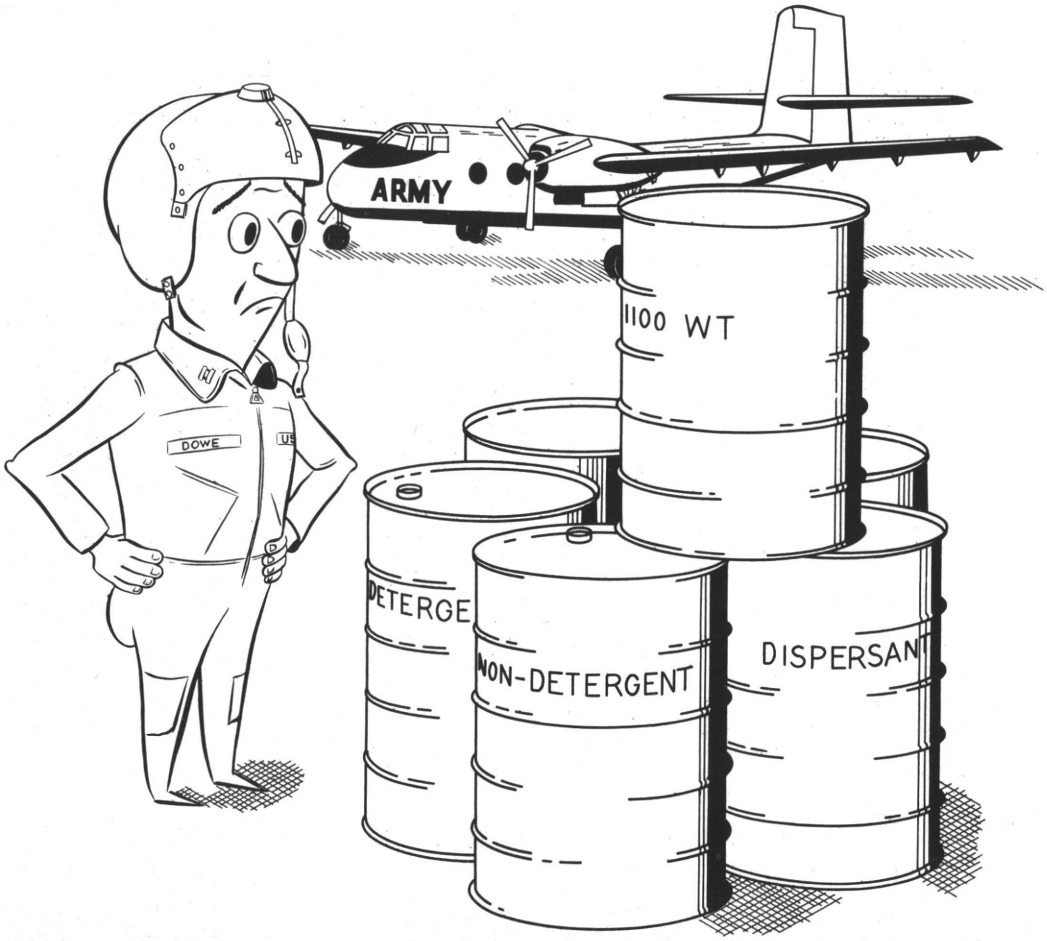
DETERGENT," "nondetergent," "dispersant," "1100 WT"—man we've heard them all! What kind of oil are we supposed to be using in this beast? How often have we participated in a discussion concerning lubricants to be used in present reciprocating aircraft engines?

Just a while back, pilots of a CV-2B, Caribou, upon arrival at a strange field, were confronted with the problem of nonavailability of the type oil they thought was used in the R-2000 engine. Not willing to take a chance on mixing strange lubricants (as they had been taught ever since flight school) they elected to call their home station and request oil to be delivered them at X airfield.

A special aircraft was dispatched with lubricating oil to enable the stranded aircraft to be on its merry way. What type oil did this courier aircraft fly to the lubricant starved bird? You guessed it! The very same oil that was available at the airfield being visited.

So, you say the pilot goofed because he didn't know exactly what oil he had been using! Or the flight engineer certainly should have known! Yes, that's all well and good, but it could also happen to you!

In another classic example of this fouled up



OK, let's take a close look at Lubricating Oil, Aircraft Piston Engine (Ashless Dispersant)

situation, two field grade aviators dropped in for a passenger and refueling stop at X Army Airfield in a U-6A after a tiring 5-hour flight from their home station—one of the most prominent of all Army airfields. The ground crewman meeting the aircraft mentioned that the Beaver needed oil but that he would be unable to service its lub system. All aircraft from the home station of this bird were serviced with "1100" oil, an oil no longer used by the rest of the Army! The aircraft would have to be flown to the municipal airport, some 20 miles and a "hellofalota" inconvenience away to find that oil!

That additional stop en route home didn't really hurt these field grade types too much, but the knowledge they acquired some time later concerning the situation sure did infuriate them! Yep! Right again! These guys flew 20 miles out of their way to put in the wrong oil when the right type was readily available at their passenger dropoff point! Those aircraft from the aviators' home station had been using ashless dispersant oil for over two years, but everybody had still been requesting (but seldom receiving) that oil referred to as "1100."

As a result of the first little tale, I was given the dubious honor of researching this matter concerning reciprocating aircraft engine lubricants to determine exactly what oil could be successfully mixed or used in the Caribou engines. We all knew we should be using type II, ashless dispersant oil, but what do you do upon arrival at an Air Force or civilian installation in need of oil? Or what about that out of the way training site that still has several drums of 1100 weight, MIL-L-6082 oil on hand but no ashless dispersant oil?

Let's now start at the beginning. What is Lubricating Oil, Aircraft Piston Engine (Ashless Dispersant)?

A few years ago the Army decided to purchase an oil which would prevent the sticking of piston rings and clogging of oil passages as well as minimize the formation of varnish deposits within its piston operated engines. Specifications covering this oil required that it should minimize the formation of sludge deposits, thereby acting to some degree as a detergent oil.

Well, MIL-22851A, the military specification under which this oil was qualified, says that this lubricant shall be of three types.

Type I is nothing more than an additive concentrate of various chemicals in a 1100 weight oil base. It is a blend of petroleum lubricating oil and additives to impart oxidation stability and dispersant properties to the aircraft engine oils qualified under specification MIL-L-6082, grade 1065 or 1100, when mixed in the proportions by volume of 1 part concentrate to 9 parts oil. The lubricating oil used in preparation of the concentrate shall be a principal component of either an approved MIL-L-6082 grade 1100 oil or an oil blend which, when tested, will meet the 6082 specifications.

So, what does all that mean? Well basically, it means you take a little 1100 weight 6082 oil, add a few chemicals with cleaning power, anticorrosive properties, and perhaps a "chemical glue" to hold

Cut out for handy billfold reference.

LUBRICANTS FOR ARMY AIRCRAFT PISTON ENGINES

WHEN THE APPROPRIATE -10 INDICATES MIL-L-6082, GRADE 1100, YOU SHOULD NOW USE:

***MIL-L-22851A, TYPE II, LAD OIL**

IF NOT AVAILABLE, YOU MAY USE ANY OF THE FOLLOWING TO TOP OFF YOUR OIL SUPPLY:

MILITARY	COMMERCIAL
MIL-L-6082, GRADE 1100	AERO SHELL W 120 OR W 120 (1) OR W-100
MIL-L-6082, GRADE 1100, WITH 2% CYCLOHEXANONE ADDED (FOUND ONLY AT USAF BASES AND COMMONLY CALLED AIR FORCE HIGH-DETERGENT OIL)	ESSO AVIATION OIL E-120 OR E-100
	ENCO AVIATION OIL E-120 OR E-100
	VALVOLINE SUPER AERO 7000

AS A LAST RESORT, USE ANY SAE 50 OR 60 WEIGHT NON-DETERGENT AVIATION OIL. WHEN THE APPROPRIATE -10 INDICATES MIL-L-6082, GRADE 1065 OIL, YOU SHOULD NOW USE:

***MIL-L-22851A, TYPE III, LAD OIL**

CONTINUED ON BACK

Maj Collins is aviation safety officer, 37th Air Transport Bn, 10th Air Transport Brigade, Ft Benning, Ga.

them all together, then you have type I, ashless dispersant concentrate.

O.K., what the heck do I do with this? Nothing really! This concentrate (type I) added to the old MIL-L-6082 1100 weight oil then produces the mysterious type II, ashless dispersant oil used in all large reciprocating aircraft engines of the modern Army.

Contractors supplying lubricants to the Army will mix their approved type I additive to an approved MIL-L-6082 1100 weight oil at the rate of 1 part concentrate to 9 parts of 1100 weight and give you the type II, ashless dispersant oil you require for your bird's engine.

Now you should see that this mysterious type II oil is really only the old 1100 weight oil, or an acceptable substitute of the same viscosity, with a few chemicals added to reduce sticking of valves, rings, etc., and to minimize the formation of varnish and sludge deposits.

O.K., how about this third type mentioned in MIL-L-22851A specification?

Type III, ashless dispersant lubricating oil blend is nothing more than MIL-L-6082 *1065* weight oil with the same type I additive blended by volume to 1 part additive and 9 parts 1065 oil. What have we here? An ashless dispersant oil lighter in weight (viscosity), comparable to MIL-L-6082, 1065 weight, with the ability to reduce the sticking of moving parts and minimize the formation of varnish and sludge deposits within the engine. Type III ashless dispersant is designed for use in smaller engines. The Army will probably use it only in those engines below 450 horsepower.

IF NOT AVAILABLE, USE ANY OF THE FOLLOWING:

MIL-L-6082, GRADE 1065	AERO SHELL W 80 ESSO AVIATION OIL E-80 ENCO AVIATION OIL E-80

*THE CONTAINER MAY BE LABELED ML-L-22851, MIL-L-22851 (WEP) OR MIL-L-22851A, DEPENDING UPON DATE OF PACKAGING. "LAD" REFERS TO LUBRICANT ASHLESS DISPERSANT.

FUELS FOR ARMY AIRCRAFT PISTON ENGINES

MOST ENGINES USE MIL-L-5572, 100/130 OR LOWER OCTANE AVIATION GASOLINE AS A PRIMARY FUEL. THIS FUEL IS GREEN IN COLOR.

THE ARMY BUYS ONLY MIL-L-5572, GRADE 115/145, A SUITABLE ALTERNATE, FOR USE IN ALL PISTON DRIVEN ENGINES. EXCEPTION: ARMY AVIATION SCHOOL TRAINING FLEET.

GRADE 115/145 GASOLINE IS PURPLE IN COLOR. WHEN SPARK PLUG FOULING IS ENCOUNTERED, ADD TCP (TRICRESYL PHOSPHATE CONCENTRATE) AS PRESCRIBED IN TB AVN 23-2. WHEN UNIT IS USING TCP IN LOCAL FUEL, COMMERCIAL FUEL WITHOUT TCP PURCHASED AWAY FROM HOME STATION IS ACCEPTABLE.

CANADIAN FUEL SPECIFICATION 3-GP-25C OF THE PROPER GRADE MAY BE USED AS AN ALTERNATE FUEL WHEN NECESSARY.

For those of you who are chemists or chemical engineers, the chemical and physical properties of the lubricating oil blends are specified below.

PROPERTIES	TYPE II BLEND	TYPE III BLEND
Ash, max, percent	0.0025	0.0025
Carbon residue, max percent	1.2	0.75
Pour point, max, degree F	0°	-10°
Flash point, min, degree F	470°	420°
Sulfur, max, percent	0.5	0.5
Sediment, max, ML/100 ML oil	0.005	0.005
Neutralization 0 No. max	0.10	0.10
Copper strip corrosion (3 hr at 212° F) max	No. 1	No. 1
Viscosity at 210° F		
Saybolt Universal Viscosity max	125	84
Kinematic viscosity, cs, max	26.1	16.6
Viscosity index, min	95	100

Of course any oil offered under these specifications must meet a series of tests to show proof of quality in accordance with several testing procedures.

Well, I've told you what the stuff is, but where do we go from here? We still do not know what lubricants are compatible and can be mixed without harmful results. So here's the scoop!

Several commercial oils presently on the market are qualified products under MIL-L-22851A and can be used continually without harm or reduction of inspection intervals. Remember, type II is for those engines previously using 1100 weight oil and type III for those using 1065 or special light weight oils. The "type" now serves to designate oil viscosity or weight.

NOMENCLATURE	TYPE II	TYPE III
Aero Shell	W-100 or W-120	W-80
Esso Aviation	E-100 or E-120	E-80
Enco Aviation	E-100 or E-120	E-80
Humble Aviation	E-100 or E-120	E-80
Valvoline Super-Aero	7000	

There should be no shortage of engine lubricants which you can put in your bird, especially when you consider that the old MIL-L-6082 1100 weight oil is the basic compound from which the new type II dispersant oil is blended. Therefore it can be added to your sump whenever necessary without adverse effects.

All right! You now have an old lubricant and new commercial lubs which can be used with type II ashless dispersant oil. How about this crazy stuff called "detergent" used exclusively by the Air Force?

The *Petroleum Products Handbook* (Virgil B. Guthrie, McGraw-Hill, 1960) states: "The term

"The term detergent, though widely used in the lubricating oil field, is actually a misnomer . . ."

detergent, though widely used in the lubricating oil field, is actually a misnomer. A better term for the action of this class of additive is dispersant, since it keeps insoluble combustion and oxidation products dispersed in the oil. The initial use of dispersants was to prevent heavy deposits from forming in the ring belt area at the high temperatures of diesel-engine operation. These deposits would ultimately lead to ring sticking if not checked. The ability to keep carbonaceous and other deposits dispersed also is important in gasoline engines. The general use of hydraulic valve lifters made dispersants mandatory. The modern hydraulic valve lifters can tolerate very little varnish or sludge before they begin to stick, with valve noise resulting. The detergent-dispersant type of additive contributes to engine cleanliness, since the products of oil oxidation and contaminants from combustion are kept in colloidal suspension until drained with the oil. There is also evidence that some new types of detergents actually retard sludge formation, particularly in low-temperature and stop-and-go driving."

The oil which the Air Force has been using in their piston driven engines for the past several years is MIL-L-6082 oil to which 2 percent cyclohexanone is added. *Stewart's Scientific Dictionary,* published by Stewart Research Laboratory of Alexandria, Va., describes cyclohexanone as "The saturated cyclic ketone produced by partial dehydrogenation of cyclohexanol. It distills without decomposition and is miscible with the usual lacquer solvents and diluents, hydrogenated and chlorinated hydrocarbons. The boiling point is 155.6° C. Cyclohexanone is an excellent solvent for cellulose ethers and esters, crude rubber and most of the natural and synthetic resins and gums. It has been found one of the best solvents for vinyl resins. Industrial application of this chemical has been based largely on its powerful solvent action for a wide variety of materials."

To me, all that indicates that cyclohexanone was added to MIL-L-6082 oil as a solvent to throw down accumulated sludge and varnish, and reduce the sticking of moving parts. Thereby it serves the same purpose as those additives in the later produced oil of MIL-L-22851 specification.

The Bureau of Naval Weapons, in their BUWEPS INSTRUCTION 10350.1A, dated 3 April 1963, entitled "Utilization of Aircraft Engine Lubricating Oils," provided instructions for transition to ashless dispersant oil, MIL-L-22851 on all piston driven aircraft engines of the Navy. Paragraph 6 states: "U. S. Air Force facilities will not have MIL-L-22851 (WEP) dispersant oil, but instead will supply a Grade 1100 oil to which 2% cyclohexanone has been added. This oil may be added to aircraft using MIL-L-22851 (WEP) oil for makeup, as required, without any special precautions."

This I do not interpret to mean that they encourage mixing the two lubricants, only that it can be done, when necessary, without adverse effects. Reports from the oil analysis lab of a nearby Naval Air Station obtained from the Bureau of Weapons indicate requirements have necessitated mixing the two lubricants on several occasions in Navy engines. No adverse effects were reported!

Air Force Technical Order 1-1-648, dated 25 August 1964, entitled "Sludge Control in all Reciprocating Aircraft Engines," points out the same information. Paragraph 4d says: "These oils are definitely compatible. The use of Specification MIL-L-6082 as makeup oil for transient aircraft that have been serviced with Specification MIL-L-22851 oil has no significant effect on the engine oil characteristics."

Why does an Air Force TO contain this information? This TO contains the implementing instructions for effecting the transition to MIL-L-22851 oil for all Air Force piston driven engines.

Sure enough! Headquarters, Middleton Air Materiel Area in their letter dated 19 August 1964, subject: Specification MIL-L-22851 Type II Aircraft Reciprocating Engine Oil, directed that the Air Force had begun a program to replace MIL-L-6082, grade 1100 oil, containing 2 percent cyclohexanone, with specification MIL-L-22851 oil. The transitional period was to vary from area to area but the entire program would be completed by 1 July 1966.

The oil to which TO 1-1-648 referred as MIL-L-6082 was this old 1100 weight oil with 2 percent cyclohexanone added. They are now transitioning to MIL-L-22851 and using the old oil for makeup, as necessary.

Stick to the proper grade oil! Mixing different grades does not afford your engine that lubrication the manufacturer desired it to have

If mixing the two lubricants is satisfactory in Navy and Air Force aircraft engines, why can't it also be satisfactory in Army aircraft engines?

That's one question my research has not answered!

Well, why even worry about it since the Air Force is now changing over to type II, ashless dispersant oil? I do have a reasonable answer to that question. Implementing instructions from the Air Force indicate stocks of MIL-L-6082 with 2 per cent cyclohexanone added will be depleted before complete transition is accomplished. This means you're still going to find that "forbidden oil" at some Air Force installations for a long time to come.

What then, do we do about TM 55-405-3, change 3, concerning the use of cyclohexanone in Army aircraft engines? Heck, I don't know how much experience the authors of this TM have had with mixing the two lubricants in question, but I'll bet it's less than that accumulated by the Navy since April of 1963 and the Air Force since August of 1964!

To take you off the hook, let me point out that telecom with AMC confirms the fact that no harmful results will be encountered in using 6082 with 2 percent cyclohexanone as a makeup oil on engines which have been operated for some time on MIL-L-22851 dispersant oils.

So, since you have been operating for two years on type II, ashless dispersant oil (if your engine requires 1100 weight oil according to the –10, that is) you can now add either type oil you encounter at Air Force bases.

Well! Well! This sounds like you can add on most any oil you can get your hands on, doesn't it? This is almost true if you remember a couple of simple rules about lubricants.

First: Stick to the proper grade oil! Mixing different grades (weights or viscosities) does not afford your engine that lubrication the manufacturer desired it to have.

Second: Don't use commercially sold detergent oils which do not indicate conformity with MIL-L-22851A specifications. No telling what the results of such a mixture might bring.

Are you still confused about this business of proper weights, grades or viscosities? "Rightly so," I would say, with all the mystery and fog surrounding the various systems in use. If you were really alert and able to comprehend by rambling remarks in writing this squib, you perhaps noticed that most producers of commercial lubricants have two grades of oil shown as acceptable replacements for type II, ashless dispersant oil.

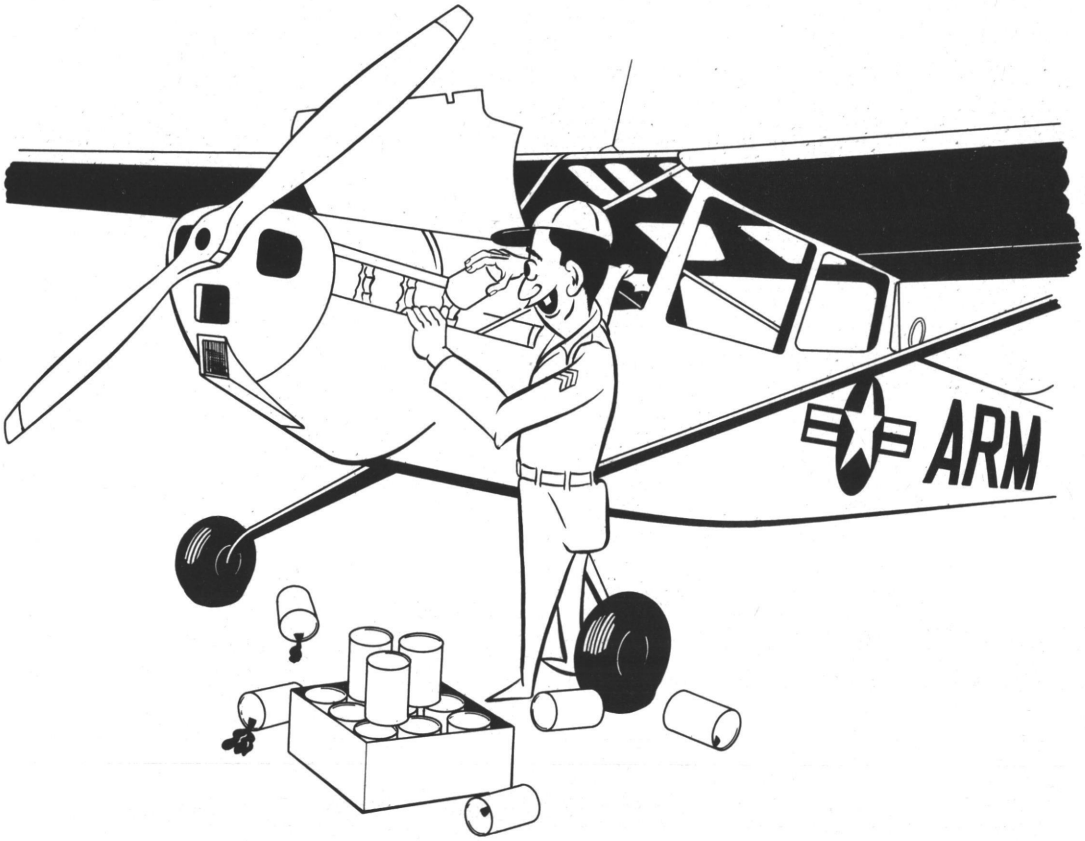
How come, G.I.? I'll tell you what! TM 10-1105 says viscosity is the internal friction or resistance opposing the flow of a liquid. The lower the viscosity, the less the resistance and the greater the fluidity; the higher the viscosity, the greater the resistance and the less the fluidity.

Now, several methods are used in measuring viscosity, which, in itself, accounts for some of the confusion surrounding this problem. We will concern ourselves with only one method: that of measuring kinematic viscosity.

The petroleum industry finds it convenient to measure viscosity indirectly by the kinematic principle. That is, flow is produced solely by the pressure head of a column of oil. The observer notes the time in seconds for a specified sample of oil to flow through a specified capillary tube at a controlled temperature. One of the commonly used instruments is the Saybolt Universal viscosimeter which permits the observer to record the viscosity in efflux time in seconds, usually referred to as Saybolt Universal Seconds.

The Society of Automotive Engineers has established a yardstick from which lubricants are catalogued according to their viscosities. Here is a partial listing for explanation purposes:

SAE Viscosity Number	Viscosity Range, Saybolt Universal Seconds at 210° F	
Oil grades, or weights	Minimum	Maximum
20	45	Less than 58
30	58	Less than 70
40	70	Less than 85
50	85	110
60	105	124
70	125	150



NOTICE first of all that an SAE 60 weight might also be classified as a 50 weight if it had a Saybolt Universal Seconds (SUS) rating of between 105 and 110.

Military lubricants are classified in a little different manner, still using SUS as the unit of measure for their yardstick. First, most oils use a four digit number as an identification, i.e., 1100, 1065, 3050, etc. The first digit identifies the series of oil.

1 is 1000 series—aircraft engine oil
2 is 2000 series—general purpose oil
3 is 3000 series—also general purpose oil
4 is 4000 series—compounded oil

Now, the last three digits usually indicate the approximate Saybolt Universal Seconds at test temperature. Therefore, a military grade 1100 oil would be an aircraft engine oil with a viscosity of approximately 100 SUS at 210° F, which, if you check the conversion table to SAE standard, would be an oil conforming to SAE grade 50.

Well, how about that now? But, wait one moment! The military designation does give the *approximate* SUS viscosity rating, but the military specification under which an oil is qualified permits a greater latitude in its viscosity. As an example, type II, ashless dispersants may have between 93 and 125 SUS at 210° F and still fulfill all requirements for proper viscosity under this Spec. 22851A. Also, type III may range between 62 and 84 SUS and still be OK.

Let's go back and see what problem this will create! If type II can be anywhere between 93 and 125 SUS, and can still compare to grade 1100 since that is the basic oil from which type II was produced, then this lubricant can be either an SAE 50 or SAE 60 weight depending upon its actual viscosity. (See table on SAE conversions.) So—now you see some petroleum producers manufacture both an SAE 50 and 60 weight oils which meet the requirements under specification MIL-L-22851A. My advice is, use either of them and do not worry about it! Since 1065 oil has a tolerance of 62 to 84 SUS, then it may be either an SAE 30 or SAE 40 weight oil.

OK, now in summary: All Army aircraft should now be using ashless dispersant oil, MIL-L-22851A, either type II or type III, depending upon the manufacturers' recommendations in your —10 tech-

nical manuals. Remember, type II for 1100 recommendations; type III for 1065 or lighter grade recommendations in the –10.

So, you haven't seen type III, ashless dispersant? Well, I haven't either but you can requisition it as follows: Lubricating oil, aircraft piston engine, specification MIL-L-22851, type III, corrosion resistant.

5 gal cans FSN 9150-965-2303
55 gal drums (16 gauge) 9150-965-2304
55 gal drums (18 gauge) 9150-965-2305

I can't guarantee you'll get the stuff until all stocks of 1065 MIL-L-6082 are depleted, but it's surely worth a try.

The list of commercially available oils in this article has been validated as those conforming to specification MIL-L-22851A and can be used interchangeably with type II and III dispersants as listed. The old MIL-L-6082 oil is compatible with the new ashless dispersant, when mixed by proper grade as indicated, so it can also be used without adverse effect.

You now have a multitude of lubricants available to you and should see that very little precaution is really required in selecting the proper kind.

In case you wonder just how valid and authoritative all this "hot poop" is, I'd like to recommend that you don't write a 2028 on TM 55-405-3, change 3, based solely on this article. However, you can bet your bottom dollar that is just exactly what I am going to do!

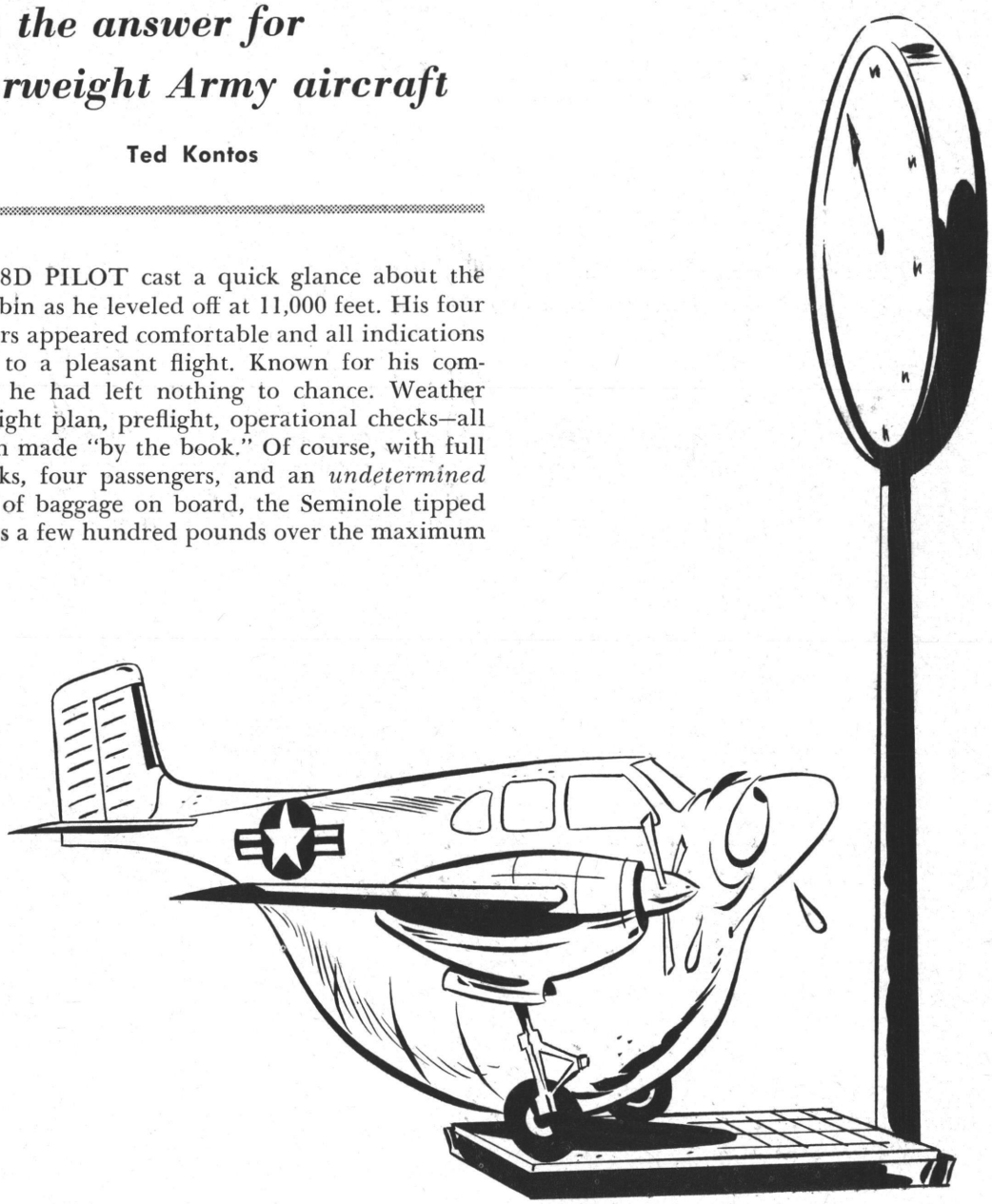
In conclusion, run this through your mind! In this age of nuclear weapons, space craft and electronic marvels beyond our comprehension, it appears to be easier to place a man on the moon than to determine what cotton picking oil you put in an Army aircraft. And until one of these bright young genius-type engineers invents an engine that operates without the use of oil, this condition will probably continue to exist.

DIET

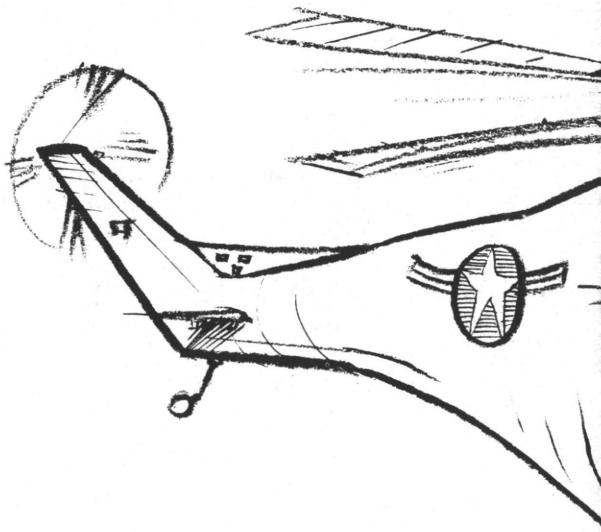
. . . the answer for overweight Army aircraft

Ted Kontos

A U-8D PILOT cast a quick glance about the cabin as he leveled off at 11,000 feet. His four passengers appeared comfortable and all indications pointed to a pleasant flight. Known for his competence, he had left nothing to chance. Weather check, flight plan, preflight, operational checks—all had been made "by the book." Of course, with full fuel tanks, four passengers, and an *undetermined* amount of baggage on board, the Seminole tipped the scales a few hundred pounds over the maximum



the maximum permissible gross weight of virtually every Army aircraft can easily be exceeded



gross weight permissible for takeoff; but this was SOP in his unit and had been ever since he could remember. It didn't present any problem — the runway used was a long one with no obstructions, and by the time they reached their destination enough fuel would have been burned to correct this condition.

A few minutes later, ice forming on the wings caught his attention. Other aircraft in the area also reported ice. Still, there was no cause for concern . . . until the left engine suddenly failed. Even with the propeller feathered, the airplane would not maintain level flight.

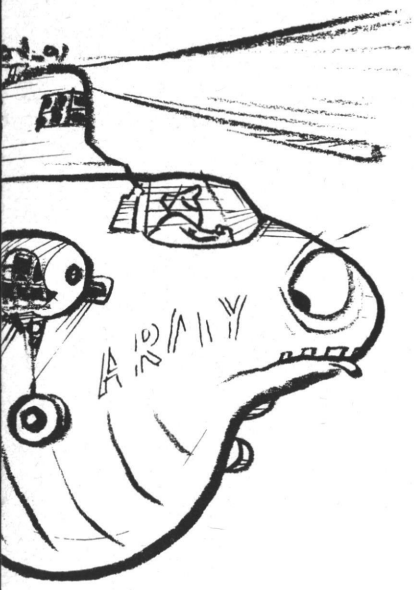
The terrain, approximately 5,000 feet above sea level, loomed closer. At 7,000 feet it became obvious that the U-8 could not make it back to the airfield. Spotting an open field, the pilot banked and began his approach. The left wing crumpled as the tip smashed into a stone mound. The nose yawed to the left and the right wing struck a small hill. The wrecked plane caught fire and burned. There were no survivors.

Although the accident investigation board uncovered numerous accident cause factors, it was generally agreed that the combination of high field elevation, wing ice, and *excessive gross weight of the aircraft* at the time of engine failure had posed a triple threat the pilot could not overcome.

Because class I aircraft such as the U-8 cannot readily be improperly loaded, there is a tendency to overlook the importance of weight and balance as it applies to these aircraft. Weight and balance have two distinct identities: Weight implies the gross weight of the aircraft from takeoff to landing, while balance refers to the location of the center of gravity. *The maximum permissible gross weight of virtually every Army aircraft can easily be exceeded.* Since completion of a weight and balance DD Form 365F is not normally required for class I aircraft, the pilot frequently may not even be aware that an overweight condition exists.

Class II aircraft pose additional problems. Although completion of a DD Form 365F is required for these aircraft prior to flight, the form is often incomplete or is filled out improperly. A check of forms accompanying accident reports shows a variety of discrepancies. In one instance, the pilot's computations showed the aircraft to be 97 pounds *below* maximum gross weight for takeoff. However, two passengers were not included on the form.

In addition to the requirement to complete a weight and balance form, class II aircraft require attention which is sometimes overlooked and which can create dangerous situations. These aircraft must be *individually* weighed annually in accordance with AR 95-16. Evidence from the field strongly suggests that this is not always done. Since the basic weight of the aircraft, as well as the empty center of gravity, may vary over a period of time, due to installation or removal of equipment, this procedure is necessary. Failure to comply with this requirement causes the affected aircraft to be placed in a RED (nonoperational) category. A check of the current DD Form 365B for each class II aircraft will



show if there are any candidates for the RED category in your unit.

Regardless of aircraft type, the effects of improper loading are numerous and varied. Improper loading can result in overgross weight, an out-of-balance condition, or a combination of these. This can cause:

Increased drag
Longer ground roll
Decreased rate of climb
Decreased airspeed
Increased stall speed
Abnormal control stick forces
Increased fuel consumption
Decreased range

Possibility of structural damage or failure due to flight through turbulent air, or from hard landings.

Another point to bear in mind concerning twin-engine aircraft is that improper loading, particularly overgross loads, may cause loss of safe single-engine operation should one engine fail.

Weight and balance problems posed by class II aircraft are easily understood, but those presented by class I aircraft frequently are not. Although installed equipment may vary from one aircraft to another of the same model, a typical U-8D has a basic weight of approximately 5,200 pounds. If the fuel tanks are fully serviced and a copilot is used (required by AR 95-2 for IFR flights), one passenger and approximately 60 pounds of baggage may be carried without exceeding the maximum permissible takeoff gross weight.

Loading of the U-8F is more critical. If it is equipped with distance measuring equipment and with radar, only the pilot, copilot, and one passenger may be carried if the fuel tanks are filled. Other aircraft are similarly affected: An O-1A or E model taking off with two occupants and a full load of fuel does so in an overweight condition. So does a UH-1 loaded with armament.

To assist U-8 pilots, one airfield operations office displays posters showing the U-8 loaded in various configurations. This doesn't solve the problem, but it does let the pilot know *if* and *how* much his aircraft is overweight.

The practice of assigning a passenger as a copilot if he is a rated aviator is another means of creating a spot for an additional passenger. However, if an IFR flight is to be made in a high density traffic area, AR 95-2 requires the copilot to also be instrument qualified. This often complicates matters.

Even though an aircraft may not be overloaded according to weight and balance charts, another factor — density altitude — seriously affects performance and must be considered.

A CH-37 pilot with 22 passengers aboard attempted to fly out of a confined area on a hot, humid morning. Other 37s with similar loads had made it out *earlier*. After lumbering into the air to approximately 50 feet, rotor rpm dropped. In spite of reducing pitch and applying full throttle, the helicopter sank into trees. Ten minutes later after transferring the 22 passengers to another CH-37 and *adding one additional passenger,* the second CH-37 attempted to take off from the same spot. What happened was an exact repeat of the first accident. Fortunately no one was hurt, but it cost $500,000 to repair the two helicopters.

Since all seats of most Army aircraft can't be filled and baggage carried, along with a full load of fuel, without exceeding permissible maximum gross weights, a compromise must be made. *Either range must be sacrificed for greater payload, or payload must be sacrificed for greater range.* A third election is to operate the aircraft overgross and hope for the best. Which is the proper choice? Where can we look for a final solution?

Perhaps the best answer to this problem has already been found. From the files of one unit we read:

. . . We all knew we were operating at a gross weight which would place us below the height of the terrain on single engine. The fact was, it had gone on so long that *no one* could achieve a change in command SOP. . .

This unit's SOP *was* changed — *after the fatal U-8 accident.*

Increasing demands for more mobility have given a high priority to the developing of lightweight, low-cost shelters for Army Aviation

TENTAGE

Richard K. Tierney

NEW TACTICAL and logistical concepts are evolving with the development of Army Aviation. U. S. Army Natick Laboratories face the challenging job of developing and designing equipment and supplies compatible with these concepts. One of the most important areas of work at NLABS is with aircraft maintenance tents.

A tent for use with the UH-1D recently was researched and evaluated by NLABs and the 11th Air Assault Division (see DIGEST, Feb 1964).

Another aviation maintenance tent is an air-supported, double-wall sectional type tent made of 13-15 oz. neoprene-hypalon coated nylon cloth. The tent can be fitted with single-wall end closures made of the same fabric. It is supported by a continuous flow of low pressure, high volume air supplied by an electric motor-driven blower.

Each tent (or section) can be used independently, or can be joined to others with appropriate end closures. With various combinations of end closures, the tent will provide maintenance space for any aircraft in the Army inventory except the CH-47 and CV-2.

NLABS search for shelters extends into research on rigid foam plastics. The high strength-to-weight ratio, good insulation properties, and the ability of some of these materials to be produced under field conditions makes them valuable for the production of shelters.

A number of shelters have been constructed by spraying polyurethane foams over air-supported bags, which were subsequently removed for reuse. The largest shelter produced was 60′ x 20′ x 10′ in the shape of a hemicylinder with quarter-sphere ends. The shelter had 3-inch thick walls made of a 3 pound per cubic foot density rigid foam. Without question, larger shelters could be made but just how far size may be increased requires further investigation. The weight of the foam in the shelter was approximately 1,500 pounds and the shelter had a clear floor area of about 1,100 square feet. Present material cost for foam of this type is about $0.50 per pound.

One shelter of this type successfully withstood the snow load of a New England winter and the wind pressures of a fall hurricane; another supported a bulldozer. With no added cooling or heating, temperature inside the shelter stayed at 74° F during the summer and did not go below 34° F during the winter (the bare ground under the shelter did not freeze). At Natick the ground normally freezes to a depth of 3 feet and the winter air temperature occasionally drops to 0° F and below.

Present techniques for shelter production involve either spraying the foam over some type of support such as a tent or air-supported shelter or using molds

Air-supported, double-wall neoprene-hypalon coa

to produce modular units which would then be fastened together to form the shelter. Each method has certain advantages and drawbacks. Both methods require considerable special equipment, electric power, and trained personnel. The spray technique, at present, can be used only over a rather limited temperature range and under good weather conditions. The modular method is not so limited by temperature and weather since it would require a heated shelter in which to produce the units.

To overcome these shortcomings and eliminate special requirements, NLABS is developing a self-foaming flexible sheet. Sheets of this material would be prefabricated into the desired shape, packaged, transported, stored, and erected in the field when desired. After erection, the foaming reaction would be initiated by the heat from a match at one spot. The foaming reaction would then propagate by itself to produce the final foamed shelter.

R&D work on this concept is being financed by the Canadian Government under the United States-Canadian Development Sharing Program with NLABS supplying technical guidance. Work has already resulted in development of a flexible sheet system with most of the desired characteristics. Application of a single lighted match to the material will cause the entire sheet to foam, even at ambient temperatures as low as −40° F. Present effort is being devoted to producing this material on a semi-pilot plant scale so the sheets can be produced in large enough quantities to construct prototype shelters.

In addition to shelters, plastic foam holds out hopes for the development of systems for field construction of instant runways and helipads. One such helipad is being considered for construction at Natick Laboratories.

Also, NLABS envisions the use of foamed plastics as crash resistant materials in aircraft and for armor protection.

Currently, firm requirements have not been generated within the Army for the uses of the foamed plastics. It is believed that this material has great potential uses for the military services.

on cloth maintenance tent

Polyurethane foam shelter supports bulldozer, withstands hurricanes

The following letter was written by a commander to the aviators in his command. It presents a completely honest appraisal of problem areas and a positive approach to aviation safety.

crash sense

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

HONESTY -- A POSITIVE APPROACH

DURING THE PAST few weeks individual air crews have experienced considerable difficulty in getting off the ground with the UH-1B, both armed and slick. The matter was climaxed yesterday when I personally totaled my command ship off the end of the runway. I am most embarrassed over the accident but extremely thankful that everyone walked away from the wreckage. I have directed the accident board to make a thorough investigation of this accident and call a "spade a spade" concerning my judgment, pilot technique, procedures, etc.

The basic problem centers around gross weight and density altitude. Here, the density altitude exceeds 5,000 feet daily. All over the area, most of our Hueys are operating at maximum gross weight most of the time, especially the armed ships.

During our routine safety meetings and briefings we have stressed density altitude and gross weight and the importance of aviator judgment, pilot technique and good common flying sense in coping with these problems. To date this approach has failed, and immediate action must be taken to cope with the problem.

During our discussion this morning, there appeared to be several approaches to the problem:

Reduce fuel load.
Reduce ammo load.
Remove excess equipment from the aircraft.
Aviator training to improve knowledge and technique.
"User" education.
Don't get in a hurry.
Know your ship.
Use a standardization pilot.

In amplification of the policy I announced this morning, the following will govern:

1. Auxiliary fuel tanks will be removed from the aircraft as soon as possible. Pending removal, auxiliary tanks will not, *repeat not,* be filled.

2. All armed ships will be limited to 4,000 rounds total of 7.62 ammo, plus 250 rounds each for the crewchief and gunner. At the discretion of unit commanders, the 4,000 round restriction may be further reduced to provide additional ammo for the door gunner. Total ammo for the armed ships will not exceed 4,500 rounds.

3. Slick ships will be limited to 400 rounds each for the door gunner and the crewchief. A lesser amount should be used when acceptable.

4. Spare M-60 machineguns will not be carried.

5. Personal weapons will be limited in every case to the following:

a. One pistol per crew member if desired.
b. Two M-14 rifles with 60 rounds per weapon.
c. Two M-16 rifles with 120 rounds per weapon.
d. The M-79 with 20 rounds of ammo may be substituted for one M-14 or one M-16 weapon.

6. Slick ships will be limited to four passengers, and C ships with a console mounted will be limited to three passengers.

7. On assault operations, the baggage compartments will be free of all equipment and supplies. C-rations, necessary tools and other mission essential items will be carried to the stagefield by slicks, medical evacuation, or maintenance ships.

8. On single-ship missions, the crew may carry one case of rations, survival kit, a small tool roll or kit, and one can of hydraulic fluid.

9. Extreme care and planning will be exercised concerning fuel management.

10. One thermos jug may be carried per ship.

11. Aircraft commanders will exercise sound professional judgment on all aviation matters. If necessary to change intended points of landing, planned cargo, or passenger loads, inform the user and do not exceed the capabilities of either the aircraft or the crew.

12. Aircraft commanders may reduce the load restrictions stated above at any time in order to accomplish the mission safely.

13. Unit commanders will review aircraft commanders' orders and will not designate an individual based upon rank or position unless the individual is qualified. A battalion directive will soon be published on this matter.

In connection with the policy announced above, each aviator must continue to improve his professional ability and attend to minute detail in all aspects of flying. Such things as downwind takeoffs, procedure shortcuts, failure to know emergency procedures, lack of weather knowledge, hurried actions, etc., will always result in loss of life and destruction of valuable property and equipment.

In summary, I enjoin each and every aviator to get with the program, and, despite the setbacks of the past few days, prove to the command that the _____ Aviation Battalion is still the best.

UH-1 QUICK-DISCONNECT FUEL COUPLING

UH-1 QUICK-DISCONNECT FUEL COUPLING

The Problem:

Score from failure to properly seat and lock coupling:

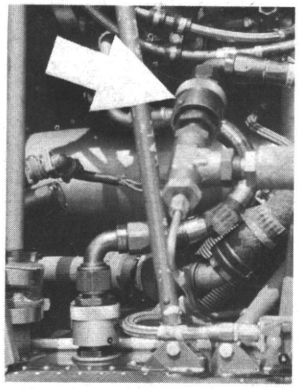
Major Accidents:	2 (1 aircraft destroyed)
Injuries:	6 (fatal) 3 (serious)
Incident:	1
Forced Landings:	7

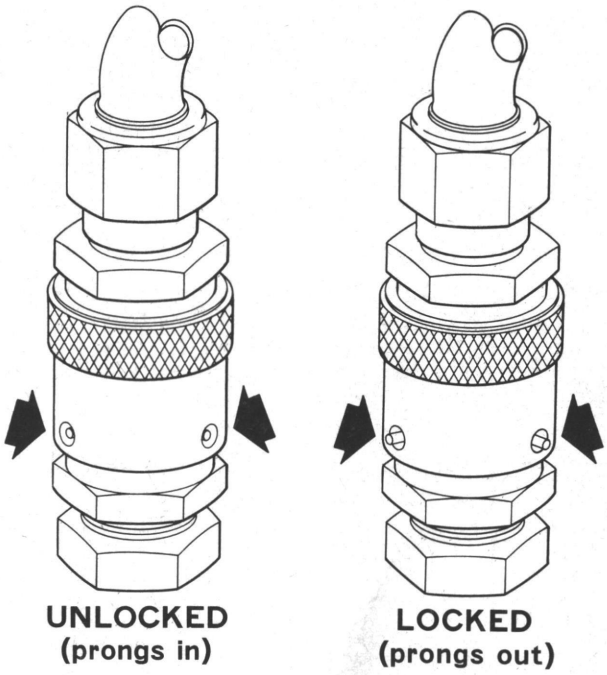
Most mishaps from this source come from failure of maintenance personnel to properly secure quick-disconnect couplings after removing and replacing fuel filters or "O" ring seals.

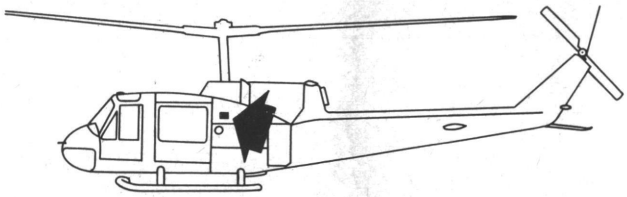
The Cure:

Mechanics: Check that couplings are seated with prongs extended and coupling cannot be moved by hand.

Pilots: Check for extended prongs and security of coupling during every preflight.





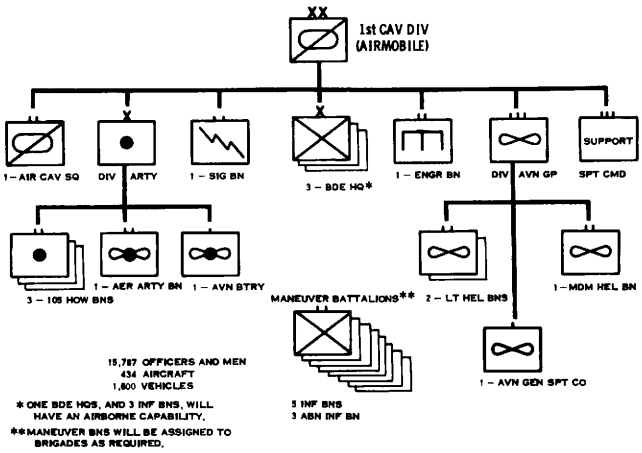


WARNING

An Army pilot's small daughter died recently after swallowing some pills from a survival kit issued to her father in 1963. The pills, chloroquine (trade name: Aralen) were in a container with no warning label. *One* pill is usually fatal, *two* nearly always fatal, for small children. The kit the pills came from was identified as Survival Kit, Personal, PSK-2, FSN 6545-611-0978. Most personal survival kits contain drugs dangerous to children. Keep them away from small hands!

1st Cav Div

(Airmobile)



EARLY IN World War II, Army divisions on the move frequently forgot their fledgling Army Aviation sections and left them behind. But as of 1 July the Army has a division that couldn't possibly move without the support of its Army Aviation components.

The 1st Cavalry Division (Airmobile)—capable of moving one-third of its combat elements simultaneously in its own aircraft—has been authorized as one of the Army's 16 divisions. It will supplement—not replace—the heavier infantry, armored, and mechanized divisions.

Plans for the new division call for 15,787 men, 434 aircraft (including 6 fixed wing) and 1,600 ground vehicles. It is being organized at Fort Benning, Ga., primarily from elements of the 2d Infantry and 11th Air Assault Divisions, but to reach full strength it is expected that other Army units will have to be tapped.

Name and colors of the 1st Cavalry Division, on duty in Korea since 1950, were exchanged with those of the 2d Infantry Division at Fort Benning. The experimental 11th Air Assault Division, which proved the feasibility of tactical mobility concepts unique to the new division, has been dissolved. 1st Cavalry Division (Airmobile) was given 8 weeks to become combat ready. Intensive training is underway to refine new tactical mobility concepts so they may be effectively employed in combat if necessary.

The airmobile 1st Cav was pared back from the 16,000 men and 459 aircraft originally proposed for the Air Assault Division, which never reached personnel strength but did have 455 aircraft. The total of 1,600 ground vehicles includes about 550 more than originally recommended. In comparison, a ROAD infantry division has 15,900 personnel, 101 aircraft and 3,200 ground vehicles.

Problem areas include a shortage of Army Aviators and maintenance personnel. The 1st Cav will have between 950-995 aviators. About 30 percent of these must come from sources other than the 2d Infantry and 11th Air Assault Divisions.

Forty percent of the new division's personnel shortages are in the aviation maintenance field. About 389 maintenance people (20 percent of the total maintenance requirement) are needed in critical maintenance skills.

A number of changes have been made in the 1st Cavalry structure as compared to the 11th. The Divarty's Little John Battalion (see July 1965 DIGEST) has been dropped. Division officers pointed out that the 1st Cav could not operate without Air Force (TAC) air cover and that these aircraft along with firepower organic to the division could supply the same support offered by the Little John Battalion.

Another change occurred in the division aviation group where the Mohawk battalion was eliminated. Six OV-1 Mohawks were retained in the group to accomplish reconnaissance and surveillance missions.

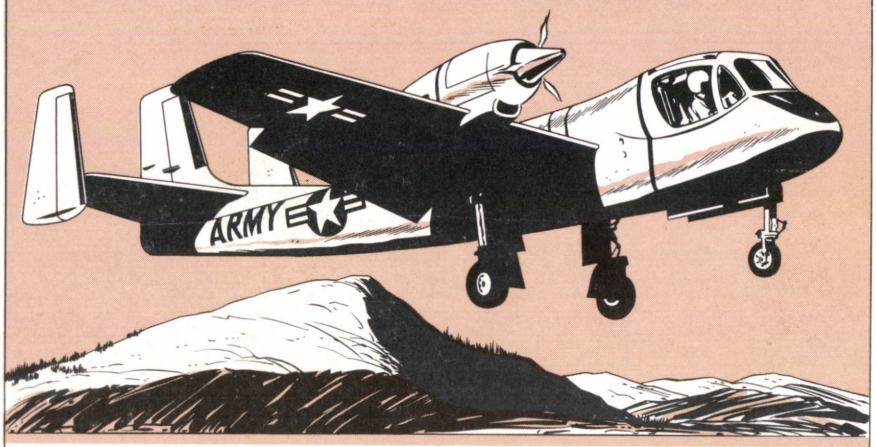
A third change was the incorporation of a full brigade capable of parachute operations. Since the 11th had only a battalion so qualified, two more are being trained.

The last major change involved the attached 10th Air Transport Brigade. An aviation group was substituted to enable greater flexibility. A group, probably to be located at Army level, has the advantage of being able to be tailored quickly for various combat missions and/or to support other units.

With its 1st Cavalry Division (Airmobile) the United States Army is vigorously engaged in making yesterday's combat mobility dreams come true.

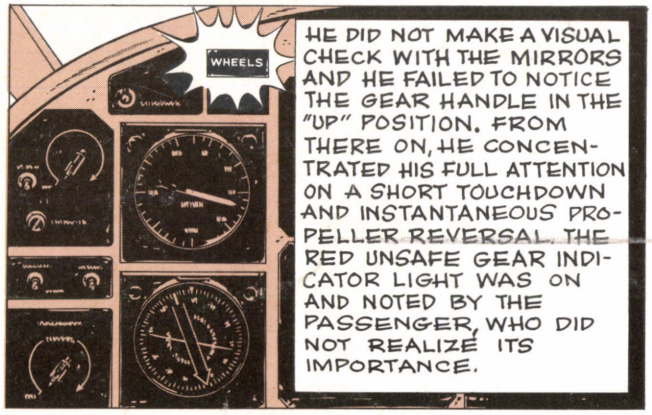
CHANNELED APPROACH

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



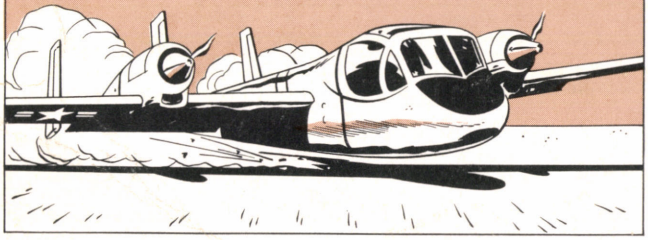
A SENIOR ARMY AVIATOR WITH MORE THAN 3,000 ACCIDENT-FREE FLYING HOURS COMPLETED AN IFR FLIGHT CLEARANCE AND LANDED. HE WANTED TO SHOW HIS FLIGHT SURGEON PASSENGER HOW SHORT THE MOHAWK WOULD TAKE OFF AND LAND, SO HE ASKED FOR AND RECIEVED A LOCAL VFR CLEARANCE.

HE MADE THE TAKEOFF AND WHEN HE TURNED CROSSWIND, HE TOLD HIS PASSENGER HE WOULD LEAVE THE GEAR DOWN. EVIDENTLY THINKING THE GEAR WAS STILL DOWN, HE TURNED DOWNWIND AND STARTED THE PRELANDING CHECK. WHEN HE CAME TO THE WORD "*WHEELS*," HE JUST THOUGHT WHEELS AND WENT ON TO COMPLETE THE CHECK.



HE DID NOT MAKE A VISUAL CHECK WITH THE MIRRORS AND HE FAILED TO NOTICE THE GEAR HANDLE IN THE "UP" POSITION. FROM THERE ON, HE CONCENTRATED HIS FULL ATTENTION ON A SHORT TOUCHDOWN AND INSTANTANEOUS PROPELLER REVERSAL. THE RED UNSAFE GEAR INDICATOR LIGHT WAS ON AND NOTED BY THE PASSENGER, WHO DID NOT REALIZE ITS IMPORTANCE.

AS HE ROUNDED OUT AND THE AIRCRAFT DIDN'T TOUCH DOWN WHEN HE FELT IT SHOULD, HE KNEW SOMETHING WAS WRONG AND SUDDENLY REMEMBERED SEEING THE RED WARNING LIGHT ON THE INSTRUMENT PANEL. HE APPLIED POWER, BUT THE AIRCRAFT CONTINUED TO DESCEND, STRIKING THE RUNWAY IN A SLIGHT RIGHT WING LOW ATTITUDE. THE POWER TOOK EFFECT AND THE OV-1 BECAME AIRBORNE AGAIN. HE LOWERED THE GEAR, CHECKED THE CONTROL RESPONSES, MADE SEVERAL LOW PASSES FOR VISUAL GEAR CHECKS, THEN LANDED.



THE INVESTIGATION BOARD DETERMINED GROUND SPEED AT IMPACT WAS 100 KNOTS AND FOUND THAT THE AIRCRAFT WAS IN CONTACT WITH THE RUNWAY FOR LESS THAN ONE SECOND. IT WAS ENOUGH TO CAUSE A MAJOR ACCIDENT AND $22,500 IN DAMAGES. THIS AVIATOR FELL VICTIM TO A HIGHLY CONTAGIOUS AND OFTEN FATAL FLYING MALADY... *CHANNELED ATTENTION!* IN HIS EAGERNESS TO SHOW OFF THE SHORT FIELD ABILITY OF THE OV-1, HE BECAME SO ENGROSSED THAT HE CONCENTRATED HIS FULL ATTENTION ON THE LANDING AND GAVE ONLY LIP SERVICE TO THE PRELANDING CHECKLIST. THE CHECKLIST IS DESIGNED TO PREVENT THIS TYPE OF ACCIDENT... *AND WILL IF GIVEN ITS FAIR SHARE OF CONSCIOUS ATTENTION BEFORE EVERY LANDING!*