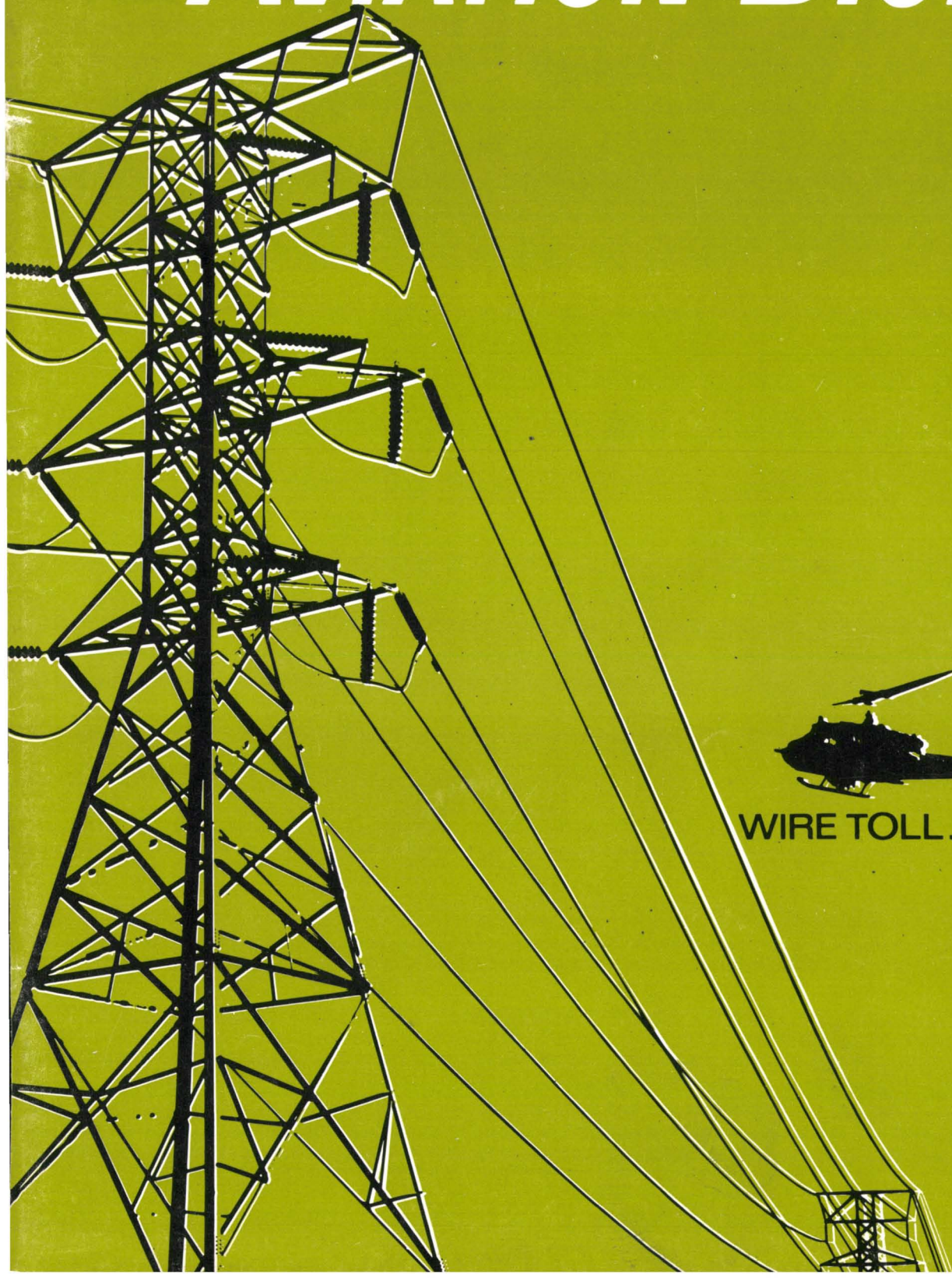
UNITED STATES ARMY

NOVEMBER 1970

AVIATION DIGEST



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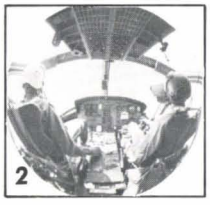

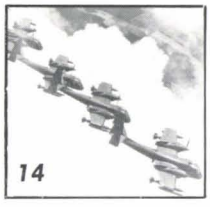

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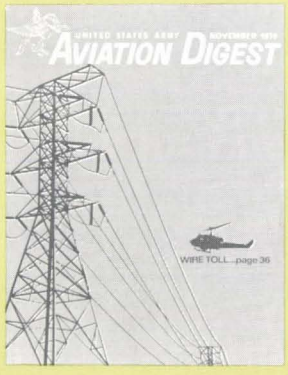

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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TACTICS

(The Opinion Of The Senior Officer)

Major Jim H. Clary

WHAT ACTION should an armed helicopter pilot take when confronted with enemy .50 caliber antiaircraft fire? Most pilots would probably call for air strikes and/or artillery and then depart the area. Ninety-five percent of the time this answer would be correct, but what about the other 5 percent? When artillery and air strikes are not available, how can an aviator handle this problem and accomplish his mission? At this point an old adage, "Tactics is the opinion of the senior officer present," becomes relevant.

It would be useless to attempt to define specific actions a pilot should take when confronted with heavy antiaircraft fire. However, it may be valid to become familiar with how several Army aviators successfully developed and employed a scheme of fire and maneuver against .50 caliber antiaircraft fire.

In 1968 in the IV Corps Tactical Zone (CTZ) of the Republic of Vietnam the Viet Cong (VC) launched a multibattalion assault against a lightly defended Vietnamese district headquarters. The assault began at 2200 hours and was supported by mortar and recoilless rifle fire. The VC commander had emplaced several .50 caliber, antiaircraft-mounted machine guns in strategic positions to counter allied air support. At this time artillery support was very limited in IV Corps and immediate response to air strike requests was not always possible. Thus, the Vietnamese commanders relied heavily upon U. S. Army helicopter gunships to provide aerial fire support and the success or failure of the communist ground assault could, to a great degree, depend on their effectiveness.

Terrain in the IV CTZ affords assaulting ground troops only limited cover and concealment during attacks. Therefore, antiaircraft weapons were used to keep the gunships at a range that would render their fire support relatively ineffective.

The light fire team dispatched to the embattled district was comprised of two AH-1G HueyCobra helicopters which had only recently been introduced into Vietnam. The fire team quickly engaged the flashing mortars and recoilless rifles while the VC responded with intense antiaircraft fire. The fire team leader requested artillery fire and a tactical air strike, but, artillery was out of range and Tac air was not readily available. Meanwhile, the U. S. advisor at district headquarters radioed that the VC ground attack had breached his defenses.

The fire team leader ordered the team to turn off all exterior lights and instructed the team wingman to decoy ground fire. When the antiaircraft gunners fired at the decoy who maintained sufficient altitude (3,000 feet) and distance to take evasive action, the fire team leader made a low-level firing pass at the assaulting enemy troops. To retain the advantage of surprise, the VC were not attacked or decoyed consecutively from the same direction. The attack angles were varied by at least 90 degrees on each firing pass.

Shortly after the initial engagement, a third AH-1G joined the light fire team and made a rotating rearming and refueling schedule possible. This enabled two of the three gunships to provide constant overhead cover to the district headquarters.

The tactics outlined were employed throughout the night. At approximately 0500 the unsuccessful VC withdrew. Succeeding investigations proved the grazing fires of the attacking gunships were very effective. They also revealed that the VC had dug large pits in which to emplace their antiaircraft weapons. The walls of the pits had been excavated to provide the gunners with overhead cover. This construction technique probably accounted for the failure of the gunships to completely neutralize the antiaircraft fires. However, it is interesting to note that had proximity fused or flechette rockets been available, these positions might have been neutralized early in the battle.

The employment of the fire team in this situation is not meant to be "the school solution." The tactics used that night were only "the opinion of the senior officer present."

Photos on these two pages by CW4 Bill C. Walton

Third Man In The Cockpit

Robert Kurtz
Air Traffic Control Specialist
U.S. Army Aeronautical Service Office

STATISTICS CAN always be found to support nearly any viewpoint, but to bring your attention to some of the current problems in the U. S. Army air traffic control (ATC) system here are a couple of eye openers:

• The Army operates more airfields worldwide than the U. S. Air Force and three times the number of airfields/heliports in the Republic of Vietnam than do all the other services, civil agencies and free world forces combined.

• The Army controllers in Vietnam control more traffic than that controlled by all the control towers in the entire Federal Aviation Administration (FAA) Southern Region (a seven-state area) and three times the total CONUS military traffic handled by the FAA.

The point is the entire concept of aircraft employment, military or civilian, revolves around an efficient means of control. However, without some rapid improvements in equipment, personnel and concepts in the field of air traffic con-

This article does not necessarily reflect the view of the Department of the Army

trol this job will become progressively more difficult. Immediate action on some of today's pressing problems in this area could forestall, if not eliminate, future complications which are bound to come. Here are some of the things with which you as Army aviation personnel should be concerned. Whether you are a mechanic in the States or an aviation commander in Vietnam, you are affected by air traffic control in some way.

The Army Controller

The majority of the Army air traffic controllers have undergone schooling conducted by the Air Force, are subject to Army and FAA rules and regulations, and usually find themselves working in a foreign country under International Civil Aviation Organization (ICAO) rules which are supplemented by local allied agreements and tactical conditions. With the exception of the Air Force training, this statement could fit the Army aviator. Incidentally, that one exception was eliminated last October when the air traffic controller's school at Ft. Rucker, Ala., was activated with a unique curriculum designed for the control tower, ground control and approach controller. Academic training alone does not produce an air traffic controller who is qualified to control traffic. An additional period of 2 to 6 months on-the-job training is required in order to yield a productive individual.

ATC Procedures

One of the restrictions which the ATC system has to face is the existing concept of air traffic operation contained in the U. S. Army Air Traffic Operation Manual FM 1-60. This concept is not entirely aligned with the standards and procedures used by the FAA, USAF or host countries. The fact that practically all nations have subscribed to the ICAO air traffic rules and procedures must be considered for they will influence to a degree the ATC system used in all wars.

Since the Air Force provides air transport support, the standards used by the Army must be acceptable to Air Force commanders or be outlined in a Joint Tactical Air Traffic Control Manual (JTATCM). The JTATCM exists as only a figment of the author's imagination.

Third Man In The Cockpit

The only standards for ATC operations are contained in FAA Terminal Air Traffic Control Manual 7110.8 (TM 11-2557-29) and ICAO Annexes. Army Air Traffic Operations (FM 1-60) contains the following statement: "Army aircraft operations below the coordination altitude will be controlled in accordance with ATC procedures established by the Army component commander, without necessity for coordination with the ATC facilities of other services."

You might ask, "Well, what is wrong with that?" First, there is no air traffic control system which is an entity. The standards and procedures must interlace with adjacent areas and certain terminology must be used in order that maximum understanding is achieved. The use of the phrase "coordination altitude" has no meaning in the air traffic field outside the Army. Let us join the rest of the world and use "delegated airspace" which includes both vertical and lateral limits.

Delegated airspace is not necessarily controlled airspace. The responsible agency may designate, after coordination, certain segments as control airspace where agreed-upon separation will be provided. The remaining airspace would be treated as "elsewhere area."

If we want acceptance by other agencies, standard procedures must be applied between Army aircraft and other aircraft within controlled airspace. Reduction of standards may be realized if they are coordinated with and approved by the agency operating these other aircraft. Primarily this approval must be obtained from the Air Force, Navy and allied countries which, in a tactical environment, is time consuming and extremely difficult to accomplish. The proposed JTATCM would outline certain approved reductions of standards based on the tactical situation.

Next, the tactical theater is not the place to write, coordinate and publish ATC procedures. That's really getting behind the power curve since the Air Force might have already established an ATC system before the Army aviation requirements are even defined, i.e., Korea, Vietnam, Thailand. Where will the Army find the expertise to write these procedures? To my knowledge there is not one qualified air traffic controller in the entire officer ranks and no way to identify those officers who have ATC experience at the command and staff level.

Education

Officers at the decision-making level must be knowledgeable in the ATC field. This can be accomplished by establishing a course of instruction which will produce an ATC qualified officer with an identifying military occupational specialty (MOS). Some thought and recognition has been given this problem by HQ CONARC and an officer ATC school at Ft. Rucker, Ala. has just graduated their third class of Army-trained ATC aviators; however, no system to maintain identity of these individuals has been programed.

The U. S. Army Aviation School at Ft. Rucker pointed out this requirement early in 1967. The Army also requires a warrant officer career progression program which would be available to qualified controllers who have worked behind the mike. Additionally, all officer branch and career courses must contain course material pertaining to their branch as it relates to supporting the air traffic requirements.

That is, Signal Branch should be instructed on communication requirements; Engineer Branch should understand control tower and NAVAIDs siteing and construction criteria; and all officers should understand the vital role that ATC plays in providing air logistic support. Wouldn't it be wonderful if we had one career course specifically designed for the Army aviator!

These officers should know that there are regulations and manuals pertaining to the Army ATC system written specifically for their guidance, e.g., AR 95-37, AR 95-9, TM 11-2557-25, TM 11-2557-26, TM 11-2557-28, TM 11-2557-29, TM 95-200, TB 95-1, Army Subject Schedule 1-4.

What is our problem? The Army lacks ATC officers knowledgeable at the grass-roots level and jointly approved doctrine is left to field commanders to hassle over on an individual basis.

Lessons Learned

The "real world" Army ATC system equipment with some minor modifications is based on the results of Air Assault II conducted in 1964. This so-called real world is in reality a "paper world" which closes its eyes to existing requirements and proven procedures used in Vietnam. From the highest levels the word is regroup under real world planning. The end result at the pencil-shoving level is that Vietnam proves nothing.

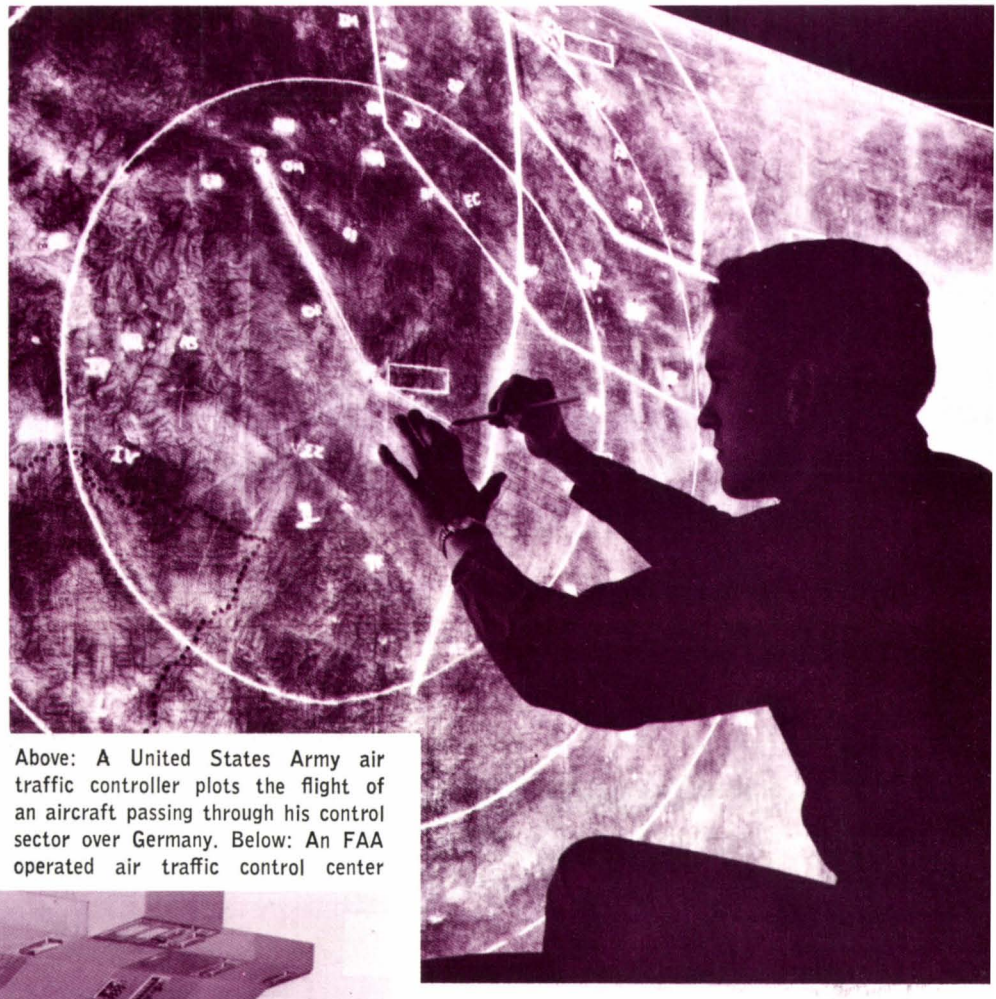
Leave Vietnam out of it is repeatedly enjoined at conferences concerned with ATC matters. Hell, even war protesters admit we have a tactical situation in Vietnam. Are not the lessons learned there worth consideration in defining the modern day Army worldwide ATC responsibilities? If aircraft are to be retained organically by the Army, the Army must provide ATC services as it has provided maintenance support. What should be said is, "How was it done in Vietnam and what changes are required in order to adapt these les-

sons learned to various combat environments?"

It probably cannot be said that *all* officers directly involved in ATC support in RVN would back this statement, but it probably has the wholehearted approval of the majority. In fact, a few of these combat-proven veterans even become a bit emotional over the subject.

Management

The air traffic control tower equipment for one semifixed installation in a combat area costs in excess of $200,000 and approximately $250,000 for a CONUS installation. These figures do not include airfield lighting, nondirectional radio beacons, radar or VHF omnidirectional ranges. Now

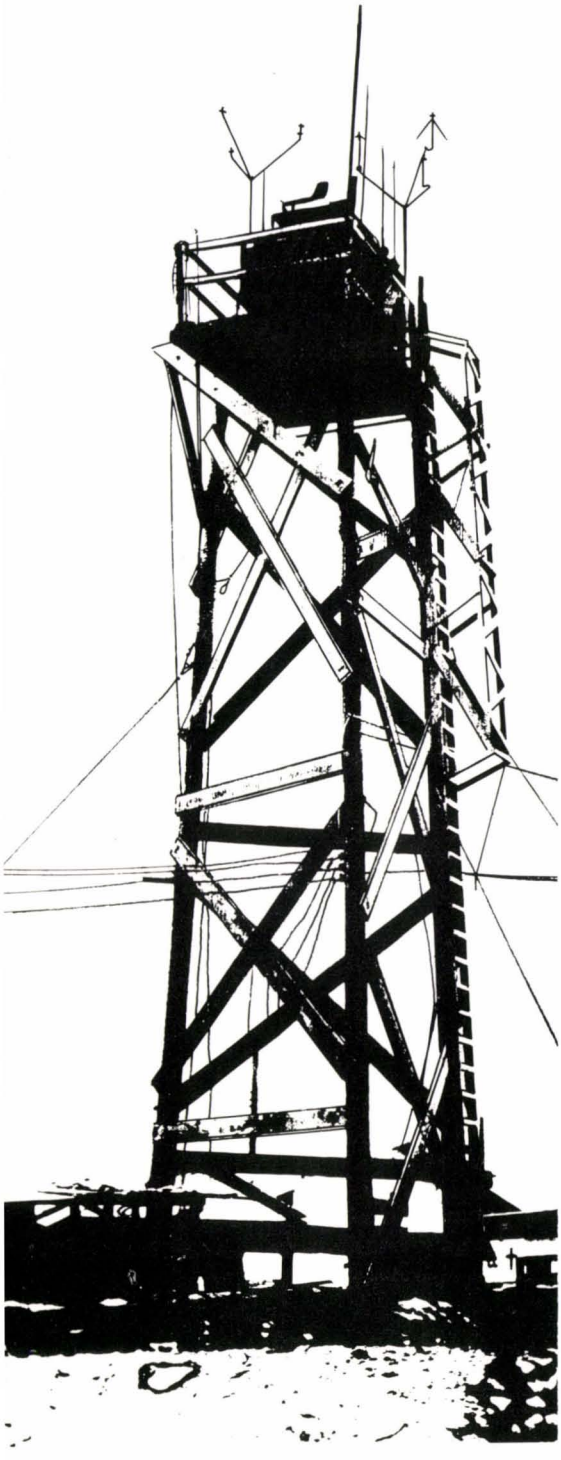


Above: A United States Army air traffic controller plots the flight of an aircraft passing through his control sector over Germany. Below: An FAA operated air traffic control center

with this amount of money involved for equipment, which is more or less a permanent inventory item, the Army has, of course, looked ahead and supplied qualified maintenance and support personnel, right?

Wrong. The MOS' of personnel assigned to maintain the ground ATC equipment are those which were developed to support aircraft electronics. An ATC equipment repairman MOS course should be implemented which would include such items as intercom system, barometer calibrations, wiring configurations, internal and external wire plant installation, NAVAID monitor and alarm systems, switch panels, facility lighting, environmental controls, etc.

Third Man In The Cockpit



This mobile control tower at Camp Evans, RVN, provided air traffic service for over 25,000 aircraft during 1 month's operation

As long as we are talking about equipment the air-ground radios used in our tactical mobile facilities should be addressed. These radios were designed for use aboard aircraft and do not have an acceptable level of reliability when used under the continuous duty cycle of an ATC facility. This and all other equipment shortcomings mentioned in this article were pointed out in a Tactical Air Traffic Control Equipment Study (TATCES) completed by the U.S. Army Aeronautical Service Office in October 1968 which, by the way, created no whitecap waves of reaction.

Although the Army has willingly accepted the responsibility of controlling airspace over land combat forces, the planners are still trapped by outdated thinking and uncoordinated planning on what equipment, personnel and organization will accomplish the task.

The system envisioned for the aviation company (ATC) and FM 1-60 has a saturation point far below that of a radar environment. Radar isn't the final answer, but what is? Radar is here and presumably will continue to be the primary ATC tool for many, many years to come. Are we on board?

No! Outside of a couple of CONUS installations there is no surveillance radar in the Army ATC system. Don't look down on some of the small so-called underdeveloped nations; they are more advanced in manual control procedures and not far behind the Army on terminal radar control (TRACON) facilities. Both Vietnam and Thailand will own and operate approach control surveillance radars in 1970. The Army has no program to obtain this type radar for tactical use, irrespective of stated field requirements.

The AN/TPS-54 is a lightweight radar which, with modification, would appear to satisfy the approach control requirement initially identified by Vietnam in 1966. A GCA type radar (AN/TPN-18) is used to provide service at the terminal radar control facilities operated by the Army in RVN. Although the TPN-18 is usable, it has several inherent disadvantages when used in a surveillance mode for a TRACON. These are:

- The high frequency of an X-band radar displays practically all precipitation areas which, in turn, block out aircraft targets which would normally appear on the scope.
- Range is limited to a maximum of 40 nautical miles.
- A system to display fixes, runway centerlines and other data is not incorporated.
- A dome to cover the antenna transmitter is required in order to perform maintenance during certain weather conditions. Working with extremely high voltages during periods of precipitation is not conducive to career progression for the radar technician. A dome will also provide environmental control which will increase reliability of the equipment.
- Backup transmitter and receiver are not installed.
- Consoles are large and heavy for today's mobility requirements.
- Ground return is not eliminated since moving target indicator (MTI) circuits are not used.

After the fact procurement is the standard for ATC equipment and then only in a piecemeal fashion. Since Army airfield operations vary from LZ to high density instrumented airfields, several types of control tower equipment must be available. A man-portable, one position tower is required at LZs and low density tactical airfields.

The use of a two-position tower is required where an instrument capability exists or when traffic density dictates.

A three position, four-man control tower should be available at instrumented high density airfields. Not one of the above requirements has an Army Type A classification. Figure 1 depicts a remoted one-man control tower which will provide two operating positions. Figure 2 shows the use of a one-man tower at a location requiring three positions of operation (other equipment has recently been installed).

The requirements were outlined over 1 year ago. How long will this situation be prolonged before understanding is created in the aviation ranks.

I am reasonably sure a picture is beginning to emerge. Besides the control tower, TRACON and GCA units, other equipment must be obtained—power units, NDBs, TACANs, VORs, remote area landing systems (RALS) and many more. These units form a family of equipment which may be used separately or in combination, depending on the operational requirement.

In order to eliminate excessive TOE authorizations; establish priorities within available assets; manage expensive and difficult to procure items; monitor overall equipment and personnel performances; establish new requirements based on field experience; and develop a functional ATC communications system, a single manager is required within each field Army. This manager would attach individual ATC facilities to combat elements, as required. As his most important tool the manager would have a service evaluation section whose duties would encompass evaluating controller techniques, procedures, phraseology, compliance with regulations, technical evaluation of equipment and flight inspection of instrument approaches.

The service evaluation teams would recommend the award or withdrawal of controller facility ratings and detect flaws or deficiencies in the air traffic control system. It is the only method by which the ATC system can be properly evaluated. Regardless of the type war involved, this concept is the proven and most reliable method to employ. It has worked in Vietnam; it would have done the job in Korea or World War II while, in retrospect, TOE 207E(G) hasn't satisfied a single tactical operation.

Some of you combat veterans might feel the Army flight following system in Vietnam had a combat support mission. The 165th Aviation Group researched their records and could find no example during a period of 1 year where the VFR flight following system was instrumental in saving a downed aviator. No control authority rests with, nor can control instructions be issued by, the flight following facilities. But because of concept they have been maintained at some considerable expense in resources. Approximately 90 air traffic controllers are used in the Army flight following network in RVN.

Past, Present and Future

We in the Army can take solace in the fact that we are not alone with our ATC problems. The Air Force has problems obtaining center trained controllers for their air traffic regulatory centers in Vietnam and Thailand. They are also hard pressed to maintain their pipeline of qualified controllers for their radar approach control centers (RAPCONs). In some cases their equipment does not fill the bill but they do have an energetic program under way to overcome this shortcoming.

The AN/TPN-19 is an Air Force sponsored terminal radar facility-surveillance and GCA which should show up in the field around December 1972. A new mobile control tower (TSW-7) which may be used at high density airfields is undergoing testing at Eglin AFB, Fla. What is the Army planning in these two areas?

In 1964 a small development requirement was revised which included two types of control towers and a GCA radar facility. Another revision was approved during May 1969. This piece of paper has been floating like a log on a becalmed sea and has not produced a single piece of hardware for use in the field.

If the Army is to continue building airfields some investment and reorganization is imperative in the ATC area. A centralized management of equipment and personnel assets must be implemented. A qualitative materiel requirement for a *family* of Army air traffic control equipment, as recommended by the TATCES, should be developed.

FM 1-60 and TOEs should be revised to conform to modern day techniques and state-of-the-art equipment with procedures agreed upon between the services and contained in a JTATCM.

CONUS ATC facilities must be operated by Army personnel to provide a training base in time of war and a nucleus of qualified personnel in times of peace. It takes 1 to 2 years to train a qualified controller from the time he enters the service and our reenlistment rate is less than 15 percent. This won't hack the program. The Army ATC organization, personnel and equipment is in a dire state of affairs and without some assistance from you Joe's in the field we will continue to run into that old adage from my great grandfather who said, "He who fails to look ahead must be riding backwards on a jackass." Gentlemen, can't we find a home for a bantling?

DANGEROUS

Aeromedic

Sharp metal insignia can cause injuries in a crash

To the aircrewmen: The protective clothing and equipment worn by air crewmen is usually highly regarded by even the most daredevil and carefree among us. However, we frequently take for granted the safety of some minor adornments of our uniform. Recently, a Department of the Army message regarding subdued insignia provided for wear of a variety of metal pin-on insignia for officer and enlisted personnel. The intent of this directive was most certainly to enable frequent changes of insignia while reducing the expense usually associated with tailoring. However, in the aviation environment such insignia could inadvertently act as discomforting or even injury contributing or producing instruments.

These sharp and irregularly shaped metallic insignia could potentially interfere with comfortable flight or contribute to injury in the following ways:

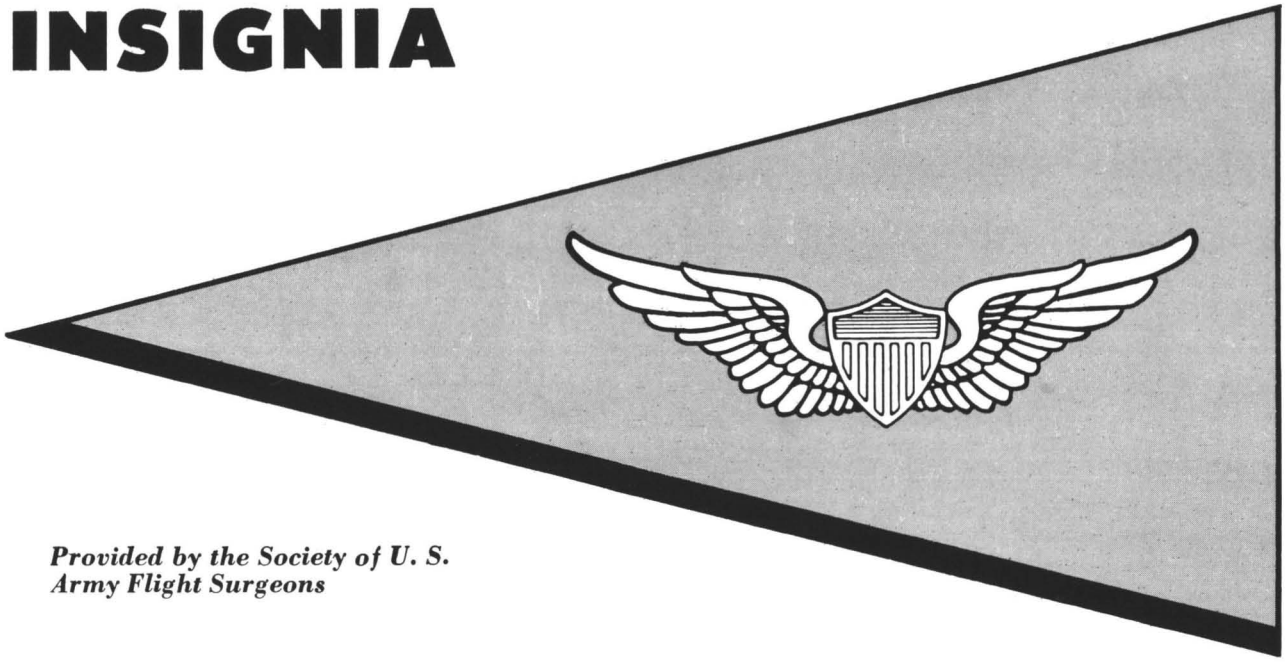
• **Complicate or contribute to injury sustained as a result of crash forces.** For instance, the head and neck could flex forward and to the side, causing the lower face to catch and scrape along the insignia. In another instance, a blunt part of the aircraft could strike an individual in the area of the insignia, causing the sharp insignia to inflict a wound more serious than was possible by the blunt object alone. Such a wound in a vital area, such as the front of the neck above the collar, could prove to be fatal rather than simply minor.

• **Result in injury during hasty egress from an aircraft.** This type of injury could occur under two conditions. First, during ejection or bail out from a disabled aircraft. Due to the effects of wind velocity (windblast), such insignia could be driven against the flesh with increased force resulting in minor injuries. However, during deployment and inflation of a parachute canopy, the risers could catch the insignia and inflict even more serious injury. The second manner of interfering with safe egress might be as a result of catching on other equipment within or a part of the aircraft. This could inflict injury primarily or could delay egress under less than desirable conditions.

• **Produce unnecessary discomfort and nuisance under other equipment.** A number of examples could be cited here . . . the pressure of overriding shoulder harnesses, flak and protective vests, survival vests, etc. Certainly a minor condition, but in already uncomfortable and cramped cockpits every little bit counts.

• **Act as a heat sink.** This last condition is less likely to be a problem but is, nevertheless, possible. During a flash fire such an item would conduct heat readily and might produce mild injury, either directly or indirectly. If nothing else it will heat up under the rays

INSIGNIA



Provided by the Society of U. S. Army Flight Surgeons

of the sun; but alas, what is one more calorie of heat in the Huey-Cobra?

The U. S. Army Board for Aviation Accident Research has accumulated over the years a few cases in which metal insignia have complicated or contributed to minor injuries of the neck and face. Thus, this discussion is more than academic. However, prior to July 1970 there was no mandatory requirement for the use of metal subdued insignia on fatigue (and we assume flight) clothing. This increases the number of persons at risk for such injury or complication. Since there are no fatal cases on record, it is difficult to criticize or indict the wear of metal insignia. *However, for safety's sake it might be prudent to limit the use of metal insigina by air crew members. Perhaps the optional use of cloth insignia by enlisted, as well as officer, flying personnel would satisfy all requirements.*

Nevertheless, any account of injury or difficulty arising from the use of metal insignia needs to be documented. If you know of cases in which metal insignia contributed to injury during air crew duties, particularly if the injuries were serious or fatal, report these to the Editor, U. S. ARMY AVIATION DIGEST, Ft. Rucker, Ala. 36360.

To the flight surgeon: Most certainly the determination of injury causation should be at the forefront of every flight surgeon's analysis of an aircraft accident. Sometimes injury can be inflicted in subtle and unusual ways. The preceding discussion is a fitting example. Often other items of equipment are at fault. A poorly designed or constructed kneeboard during crash force deceleration becomes a flurry of relatively high velocity missiles, inflcting untold injury. Improperly stored or unnecessarily carried equipment becomes a cascading avalanche, resulting in battered flesh.

Thus, the flight surgeon's role in identifying these hazards is vital. Certainly the investigation of an aircraft accident lends itself to more than just an unpleasant, tiresome journey into the wilds or an unforeseen TDY. But you need not await that fateful day. Join the safety officer in his endeavors. When you note potential safety hazards on the flight line or in flight, have them corrected immediately. Don't wait for the weight of statistical evidence. Some things can be taken on faith alone (or at least on educated guesses). Nevertheless, our future decisions must be based on data eventually, so join your fellow air crewmen and submit any accounts to the editor.

Because of your diligence in reporting or preventing such minor infractions of safety, you may be unknowlingly, even unwittingly, saving hundreds of tiny episodes of suffering . . . even lives.

FORT EUSTIS

Clementine R. Bowman

"MAYDAY! MAYDAY! This is Red Dog Four-Six, losing transmission oil pressure, three-zero west of Qui Nhon."

This message was picked up by a company operations officer and relayed to the maintenance officer supporting a combat assault helicopter company in the Republic of Vietnam. It was a situation in which the maintenance officer could use the training he received at the U. S. Army Transportation School, Ft. Eustis, Va., when he attended the Aircraft Maintenance Officer Course.

The 13-week Aircraft Maintenance Officer Course is taught at the Aviation Maintenance Training Department under the direction of Colonel Garrison J. Boyle III. Ft. Eustis is the only Army post training aviation maintenance officers.

The course which began in June 1954 teaches the maintenance officer to be a manager. The student learns the management tools used to plan, organize, direct and control aviation maintenance activities.

Students are taught in a model shop laboratory which is set up similar to a maintenance shop in the field. They learn to set up a shop which will meet the needs of a particular unit. Stations are set up for engine repair, power train system repair and for other basic component repairs needed in a particular unit.

Awareness of resources is emphasized during the course. One of the most important resources is personnel. Each station the student sets up for specific repairs will have a trained noncommissioned officer in charge with the required enlisted men who have been trained in the same military occupational specialty (MOS).

Students are taught inspection techniques and the repair and servicing requirements of both fixed and rotary wing aircraft. They learn to evaluate damage, diagnose malfunctions of the aircraft systems and their components, and prescribe the necessary repair procedures. Also, they are trained in aircraft recovery and evacuation. Thus, the maintenance officer is taught to be responsible for all types of maintenance on all types of aircraft under his control or in his shop.

The first phase of the course ends with a 3-day period of actual maintenance test flights. Specific malfunctions are fed into the aircraft and the student must fly in these aircraft to detect the trouble. These test flights give him the experience he will need in the field and the ability to predict the actions he must take to correct the malfunction.

In this manner he gains a broad and diversified knowledge in all phases of aviation maintenance. The Aircraft Maintenance Officer Course is open to commissioned and warrant officers of the Army. Officers from the Navy, Marine Corps, Air Force and allied nations also are eligible to attend.

After the first 13 weeks of training in the Aircraft Maintenance Officer Course (Phase I) there are four additional phases open to the students in the form of maintenance test pilot courses.

Beginning in mid-1966 the maintenance test pilot courses were planned to give a common sense approach to the problems of maintenance officers in the field. They were designed to improve aircraft reliability, increase safety and availability, and cut maintenance costs by early detection and repairs. Each of the four phases teaches the same techniques on different aircraft.

The courses make qualified maintenance officers experts on a particular aircraft. Phase II teaches the UH-1 Huey and the AH-1G HueyCobra; Phase III, the CH-47 Chinook; and Phase IV, the OV-1 Mohawk.

Every aspect of troubleshooting is stressed in the courses. Malfunctions are fed into the aircraft. For example, the brakes which control the rear wheels on the Chinook can be disconnected. During the first check on the ground this trouble would not show up, but at a later check in the test flight the student pilot has to lift the front wheels off the ground and then he would notice his rear brakes were

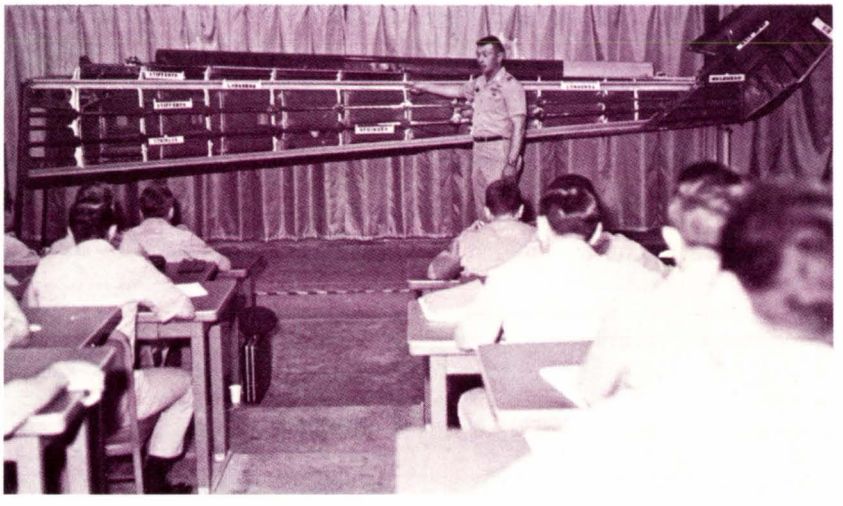
This is the last in a series of three articles on aviation maintenance training at Ft. Eustis, Va. The first appeared in the September issue of the AVIATION DIGEST and the second in the October issue. This article outlines the scope of instruction as given in the Aircraft Maintenance Officer Course, U. S. Army Transportation School, Ft. Eustis, Va.

not working and would have to determine the reason why. Also, certain gauges which measure temperature and pressure can be interchanged within a system to give misleading or unreliable readings or a bad gauge could be installed. There are 10 or more malfunctions which may be fed into the smaller aircraft and at least 30 into the Chinook.

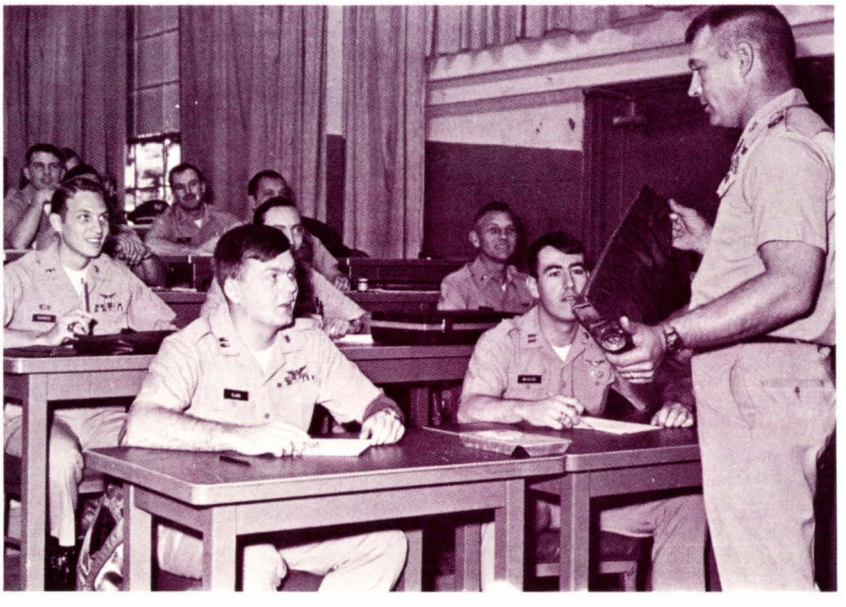
The students are graded on how well they find the discrepancies, recognize the problems and prescribe the maintenance to correct them. Classes are small, ranging from four-to-six students. During the morning students discuss a particular type of problem; in the afternoon they are in flight to diagnose the problem.

At the end of the course the students are given a practical graded flight which combines 10 or 12 different types of problems. There are more than 100 problems which may be fed into these aircraft, but the course provides a procedure for conducting test flights which enables the pilot to diagnose problems and prescribe the appropriate corrective action from the cockpit, thereby saving many hours of maintenance downtime.

Emergency maintenance situations can occur in any area of the world where aviation units are operating. But, thanks to the training received at Ft. Eustis, an Aircraft Maintenance Officer Course graduate can handle the problems.



Above, instruction is being given officer students in airframe repair. Below, officer students attending the Aircraft Maintenance Officer Course receive instruction



Distraught?
Then

READ . . .

POTPOURRI

✦ Captain Lee W. Jurney (left) of the Airspace Division of the Directorate of Plans, Training, Security at Ft. Rucker, Ala., and Eldon H. Olson, vice president and general manager of Honeywell Aerospace Division, Minneapolis, Minn., inspect the first collision avoidance system being used by the military. It is being installed on 222 helicopters at the U. S. Army Aviation School under a contract to Honeywell's Aerospace Division. The device gives a pilot warning of possible collision situations with a pulsed tone in his headset and a flashing light on the instrument panel.

A new dimension was added to the testing of Army aircraft recently when Brigadier General John P. Traylor, deputy commander of the U. S. Army Aviation Systems Command (AVSCOM), St. Louis, Mo., snipped a wide white ribbon dedicating an advanced computer system at the U. S. Army Aviation Systems Test Activity (USAASTA) at Edwards Air Force Base, Calif.

The ribbon-cutting ceremonies officially inaugurated an Advanced Instrumentation and Data Analysis System (AIDAS). The new computer complex is to be used by the USAASTA in conducting engineering flight tests of Army aircraft.

The new system should make it possible to drastically reduce the amount of time required in the final preparation of the test report and to improve the accuracy of the data obtained in flight tests.

The AIDAS is manufactured by the Electro-Mechanical Research Corporation (EMR) of Sarasota, Fla., and was designed to supplant a smaller IBM system and uses a third generation computer for data reduction.

A Naval Presidential Unit Citation streamer was presented to the 18th Aviation Company, 223d Battalion of the 17th Aviation Group recently at Qui Nhon in the Republic of Vietnam.

The award was made for the company's support of the First Marine Division in that unit's successful Chu Lai campaign from March 1966 to September 1967.

The coveted blue, gold and red ribbon with a "Chu Lai" inscription was tied on the company guidon by Colonel William R. McDowell, 17th Aviation Group commander, while the citation was read. The ceremony was held at the company hangar.

Symbolically, the award covers all aspects of military operations. It is a Naval citation awarded to an Army unit specializing in aviation for its support of a Marine amphibious force.

In his congratulatory speech COL McDowell remarked that because of its involvement in I Corps, as well as II Corps, the company had a larger area of operations than 17th Group, its higher command. He called the 18th "an outstanding unit."

The 18th Aviation Company flies the U-1A Otter, a small, one-engine cargo and passenger plane designed to take off and land in short airfields and in rough terrain.

It has been brought to the flight surgeon's attention that the before-takeoff and before-landing checklist for the UH-1B, D and H models include a visual check of

the bleed air switch. For the pilot of the aircraft, this involves a movement of the head from one plane to another in space. As a pilot, he must be aware that if this is done during acceleration or deceleration such as just prior to landing or in preparation for landing or during descending turns, a Coriolis illusion could be induced producing extreme pilot vertigo.

The Coriolis illusion is a violent disorienting sensation of whirling experienced by a pilot when his inner ear gyros (vestibular organs) are stimulated in two planes of space simultaneously. This further produces stimulation of a turning sensation in a third plane of space. Together, the conflicting information produces a state of confusion in the vestibular organs of balance.

At night without an adequate visual reference, a similar illusion may be felt even when the pilot is hovering prior to takeoff.

This condition and the possible illusion could be eliminated by requiring the copilot to perform this check, freeing the pilot for VFR or IFR duties. An alternative would be the performance of the check prior to hovering and prior to any accelerating or decelerating maneuvers. Extreme caution should, therefore, be utilized.

★ If the U. S. Army ever hands out a medal to a machine for duty, performance and dependability, the U. S. Army Primary Helicopter School, Ft. Wolters, Tex., has a hot candidate.

A Hiller OH-23D helicopter, number 57-3007, began its tour of duty at Ft. Wolters in 1958 and since has flown more than 10,000 hours, all on training school assignments.

During a 148-month period the aircraft has not been involved in a major accident and has had only one minor incident with dollar damage of only $232.

Although the number of student pilots who have handled the aircraft is impossible to determine, the fact that the ship was on the active line long before the buildup in the Republic of Vietnam would suggest that one man for each hour might be a realistic guess.

The ship was manufactured by Hiller Aircraft Corporation and was accepted by the Army on 11 July 1958. Southern Airways of Texas Incorporated flight commander Lloyd Wilson completed the ferry flight from Palo Alto, Calif., to Ft. Wolters 4 days later and the aircraft went to work.

In logging an average of 3:35 hours of daily flying, number 3007 has used 150 thousand gallons of fuel and has had 10 new engines and 12 transmissions. From a maintenance standpoint, the aircraft has had all modifications and updating work performed at Ft. Wolters.

The OH-23D is called "Raven" and with apologies to the author the familiar quote is changed to "the Raven forevermore."

INSTRUMENT CORNER

Q. Is a new AR 95-2 under study in DA at this time and, if so, when will it be out?

A. There is a revised edition of AR 95-2, dated 8 May 1970, and it is available now. This revision supersedes AR 95-2, dated 12 February 1968, Change 1. Some changes: (1) fixed wing copilot requirement, (2) RVR, (3) marker beacon and approach light outage.

Q. When on an instrument approach, will radar service automatically be terminated without the pilot knowing it?

A. Yes, radar service is terminated automatically when the landing is completed or the tower controller has the aircraft in sight, whichever occurs first (AIM, part I, page 1-59).

Q. What's the word on precision approach minimums with marker beacon and/or approach night outage? Do I raise the decision height (DH) or not?

A. No, DH is based on glide slope information. The marker beacon tells you position only. AR 95-2 says an increase in published visibility or minimum descent altitude need not be applied under the conditions of runway approach lighting or marker beacon outage. (Reference AR 95-2, paragraph 3-10d).

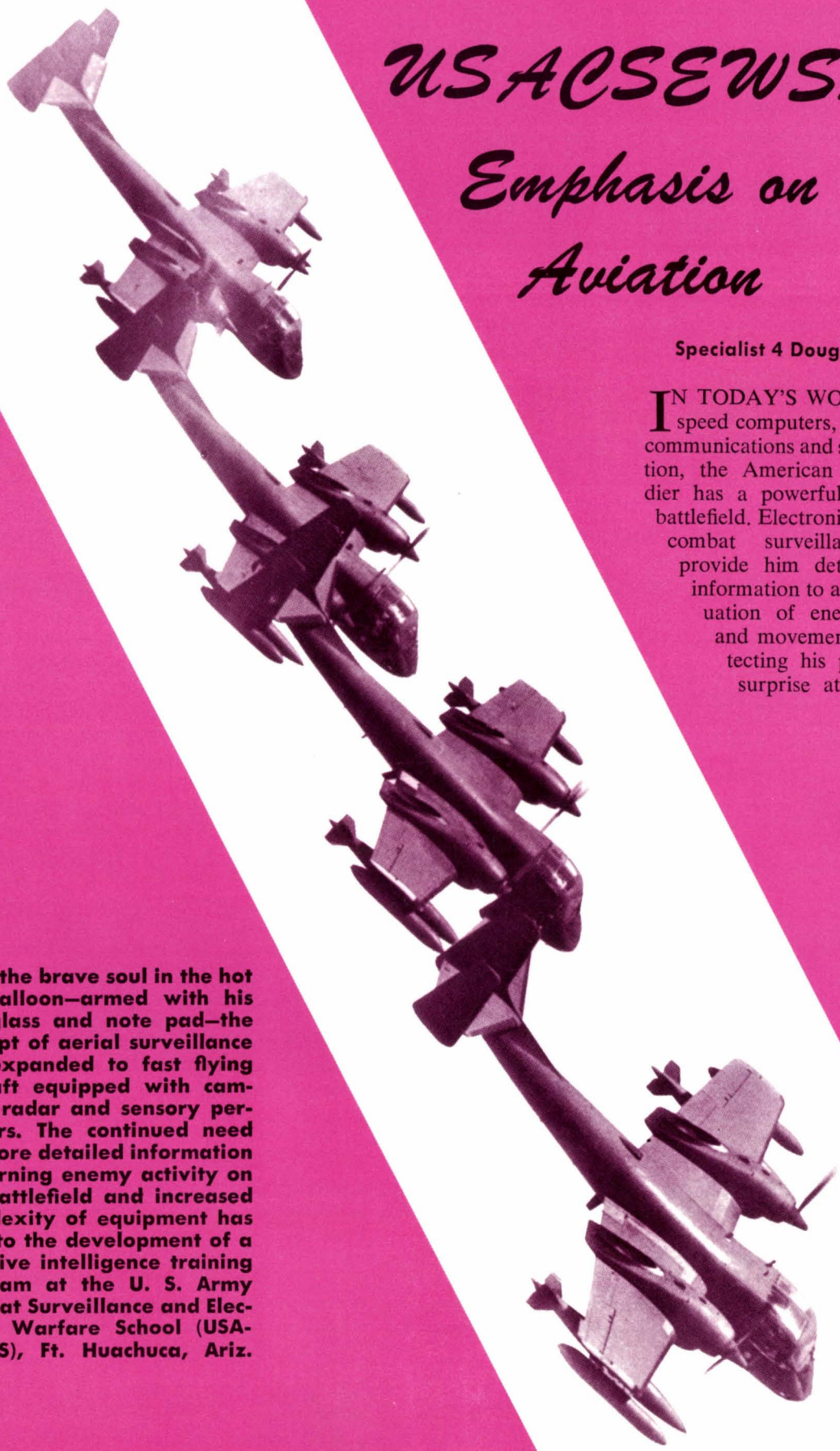
Q. When executing an approach out of a holding pattern, am I permitted to extend the holding pattern while descending to the approach fix altitude?

A. Not unless you are authorized to do so either in the approach procedures or by the controller. All holding patterns below 14,000 feet are 1 minute patterns unless otherwise indicated. When executing an approach out of a holding pattern, you must remain in the holding pattern while descending unless the procedures indicate otherwise. Examples of such authorization would be the notation on the approach chart of a procedure turn barb which guarantees maneuver air space or the notation to descend within 10 nautical miles which again guarantees maneuver space.

USACSEWS: Emphasis on Aviation

Specialist 4 Douglas Kreutz

IN TODAY'S WORLD of high speed computers, instantaneous communications and space exploration, the American infantry soldier has a powerful ally on the battlefield. Electronic warfare and combat surveillance devices provide him detailed tactical information to aid in the evaluation of enemy strengths and movements while protecting his position from surprise attack.



From the brave soul in the hot air balloon—armed with his spy glass and note pad—the concept of aerial surveillance has expanded to fast flying aircraft equipped with cameras, radar and sensory perceptors. The continued need for more detailed information concerning enemy activity on the battlefield and increased complexity of equipment has lead to the development of a selective intelligence training program at the U. S. Army Combat Surveillance and Electronic Warfare School (USACSEWS), Ft. Huachuca, Ariz.

The U. S. Army Combat Surveillance and Electronic Warfare School (USACSEWS) at Ft. Huachuca, Ariz., trains selected individuals in the use, operation and maintenance of ground and airborne combat surveillance equipment and in electronic warfare. It is the only Army unit in the U. S. that offers specialized training in aerial surveillance and electronic warfare.

Special emphasis is placed upon instruction in the operation of airborne photographic equipment and radar devices at the school. Inflight training of prospective airborne sensor specialists covers the camera, side looking airborne radar (SLAR) and infrared. The systems are deployed from the OV-1 Mohawk surveillance aircraft, manned by a pilot and technical observer.

In addition to piloting the aircraft, Mohawk aviators are trained to operate reconnaissance equipment. The technical observer, expert in the operation of all the photographic and radar equipment on board the OV-1, need not be a qualified pilot but does receive ejection seat training to ensure escape in the event of an emergency while in flight. Frequently, the technical observer aids the pilot in navigation during the course of a mission.

Instruction in the Camera Branch courses is focused primarily on two belly-mounted camera systems and a single nose-mounted camera. The KA-30 and KA-76 belly-mounted models are capable of producing detailed aerial photographs at altitudes from 100 to 50,000 feet and provide exposures at angles of 15 and 30 degrees to the right or left of the flight path in addition to vertical shots. Exposing 600 frames on 250 feet of film, the KA-76 system incorporates an image motion compensator to eliminate blurred prints caused by the speed of the aircraft.

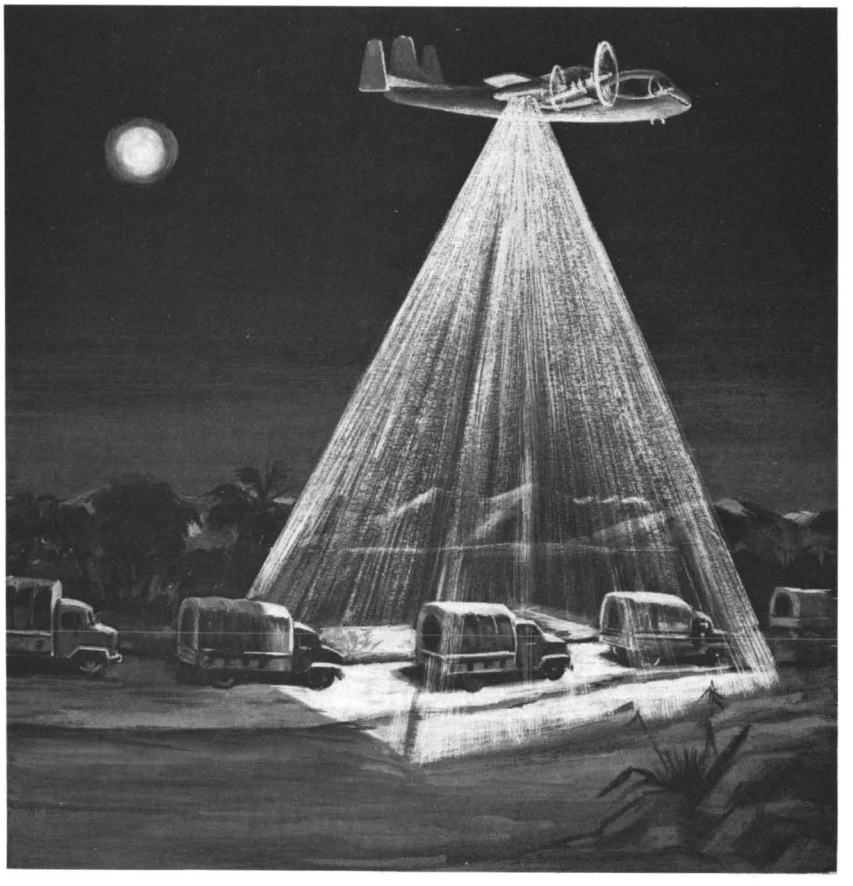
Both belly-mounted cameras can be used at night in conjunction with lighting systems to produce adequate surveillance photographs. Until recently, students at Ft. Huachuca were trained to operate the KA-30 photo-flash cartridge, an extremely powerful explosive type flare used to illuminate ground areas. Although quite effective below 2,000 feet, only 104 flares could be carried on a single mission and flash often temporarily blinded the aviator and silhouetted the aircraft.

To eliminate most of these problems, researchers developed the LS-59 electronic photo-flasher system for use with the KA-76 belly camera. It is now being tested by students and instructors at USACSEWS. Similar to a giant flash bulb the LS-59 illuminates a rectangular ground area with a 375,000-watt intensity for about 1 second with each flash. Because the system is electronic, there is no maximum number of available flashes per mission and the blinding effects produced by flares have been virtually eliminated.

The KA-60 nose-mounted camera shoots a 180-degree panoramic picture of the horizon, providing extensive and detailed coverage on a single exposure of film. Because of its low altitude deployment and wide-angle capacity, the KA-60 has proven invaluable in the detection of troops and landing zones in the Republic of Vietnam.

Cameras are only the beginning of the surveillance story at Ft. Huachuca, however. All airborne

This LS-59 photo flash unit is entirely self-contained. A propeller mounted on the nose of the unit provides sufficient power to generate the necessary electricity



The KA-30 belly camera is exceptionally versatile. Detailed aerial photographs can be obtained at altitudes from 100 to 50,000 feet

sensor students receive instruction in the OV-1C infrared detection system, which locates enemy targets by determining temperature differentials between objects and their backgrounds. The infrared system is deployed from Mohawk surveillance aircraft and is beneficial in coordinating ground/air attacks by detecting patterns of enemy troop and equipment movement and providing information for the revision of map supplements. Infrared surveillance is especially advantageous because it is a passive system. That is, enemy targets can be discovered without the enemy having knowledge that detection has taken place.

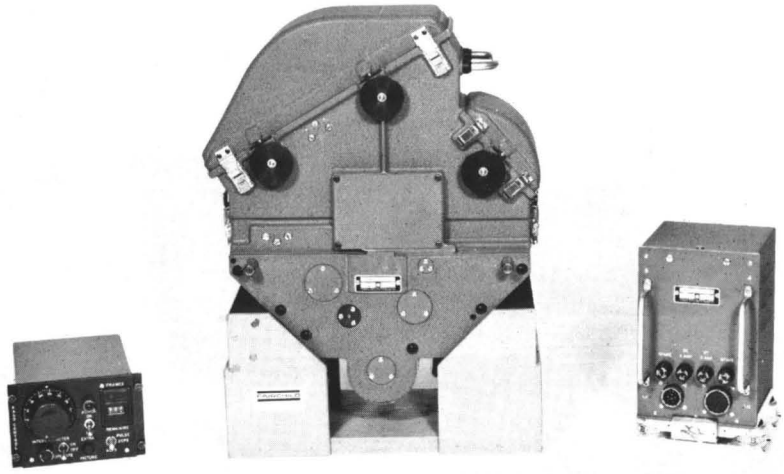
Side looking airborne radar, operated from an OV-1D Mohawk aircraft, provides reconnaissance personnel with information concerning metal objects or targets on the ground located in a perimeter around and below the aircraft. As with the camera and infrared systems, both pilot and technical observer are trained in the operation and maintenance of SLAR. A primary advantage of the system is that the crew is protected from ground fire because it is not necessary to operate directly over the target area. In fact, SLAR can cover an area 100 kilometers to either side of the aircraft, facilitating a maximum coverage of 200 kilometers, although most readings are taken at ranges of 25 and 50 kilometers.

Because of the very nature of the instruction at Ft. Huachuca, the USACSEWS is destined for steady growth in the future. Aviators and infantrymen alike attest to the necessity of immediate and detailed knowledge concerning every aspect of enemy operations. Especially in inaccessible areas protected by rough terrain and camouflage, aerial surveillance is the only means of gaining advanced tactical information. The Mohawk surveillance aircraft, equipped with camera, infrared and radar systems and manned by well-trained pilots and technical observers, is the perfect package of men and machine to do the job.

Students at Ft. Huachuca also enjoy an almost perfect environment for flying and testing of the equipment on which they are trained.

The USACSEWS was recently reorganized to include a school battalion containing a faculty company, a headquarters and headquarters company and a student company. An additional change saw the Electronic Warfare School become a department of the combined Combat Surveillance and Electronic Warfare School. Current growth trends indicate the probability of a second student company being added in the future.

The KA-60 is a nose mounted camera capable of shooting a 180-degree panoramic picture of the horizon. It can be employed at very low altitudes



The Army aviation warrant officer is here to stay, but since his beginning in 1941 his branch has been characterized by conflicting regulations, ill-defined concepts and fluctuating management procedures. However, the Department of the Army is making studies on every area vital to an Army aviation warrant officer—pay, rank, MOS structure and civilian and military schooling

Major George Coutoumanos

THE ROAD AHEAD FOR THE ARMY AVIATION WARRANT OFFICER

THE U. S. ARMY aviation warrant officer has a promising future. But before the following discussion of his future can be beneficial, it is necessary to understand what constitutes a warrant officer. Consequently, I sought this information from three sources: his wife, his commander and his branch.

His wife described him as a hanger for a flight suit that serves as a repository for the paraphernalia of a pilot and amateur handy man; his pockets contain something like two packs of cigarettes, one lighter, a claw hammer, a boy scout knife, an enamel faucet handle and an assortment of screws, snaps, hinges and ball bearings—all of which tend to make him chink as he moves about. In his helmet bag he carries a survival water bag, a laxative, aspirin, a comb, cough drops and, last but not least, Army issue dental floss.

His commanding officer described him as *tactless* . . . to which I said, "Tactless, never! Outspoken, yes. High-spirited, yes. Mettlesome, sanguine, perhaps to a fault. But never tactless."

His branch described him as an

The Road Ahead For The Aviation Warrant Officer

officer appointed by warrant by the Secretary of the Army. By public law he has rank and precedence that are below those of a second lieutenant but above those of a cadet or NCO. (Do not get carried away by that statement you young lieutenants and captains. The W-4 you chew out may be the father of your commanding officer.)

The warrant's branch said he is a highly skilled technician, provided to fill those positions above the enlisted level which are too specialized in scope to permit the effective utilization of a broadly trained, branch qualified commissioned officer.

The term "technician," as applied to the warrant officer, indicates the possession and exercise of skills which are primarily technical as opposed to tactical.

For the purpose of this discussion, the term "aviation warrant officer" encompasses those warrant officers who are pilots—both rotary and fixed wing—commonly referred to as a SLAR (side looking airborne rogue), not to be confused with the side looking airborne grunt of commissioned fame. The term also includes those warrant officers who are aircraft repair technicians, both rated and nonrated.

With the definition of the Army aviation warrant officer firmly established, the next step is to trace his history. The first reference to the warrant can be found in the Code of Hammurabi, published by the greatest king of the first dynasty of Babylon in 1955 B.C. The code stated, "If any mortals doth fail to pay their due debts, a warrant gonna come and police up on their pig and goat." It staggers the imagination to think that over 4,000 years later the warrant, though not confiscating pigs and goats thanks to technology, is transporting them—at least in the Republic of Vietnam.

More recently, in 1918 A.D., or almost 52 years ago, the rank and grade of warrant officer was established. For you young W-1 swingers that's a span of years connecting the turkey trot to the boogaloo.

The flight officer, today's counterpart of the aviation warrant officer, was established by the Act of 1941. Described as the most significant legislation since that which originally authorized the rank of warrant officer, it established two grades: chief warrant officer and warrant officer junior grade. Here flight pay was first authorized for those involved in aerial flight.

Subsequent to World War II, the warrant officer structure was a mixture of conflicting regulations, ill-defined concepts and fluctuating management procedures. In addition, expedient utilization practices, emergency executive orders and expansive wartime legislation tended to blur the distinction between warrant officers and other categories of personnel.

Following World War II, an incentive concept was adopted which was based on the idea of capping each enlisted career field with warrant positions. This practice resulted in a significant increase in numerical requirements. It also aggravated the already inconsistent utilization practices carried over from World War II.

The current overall warrant officer program was undertaken as a last alternative to eliminating the corps. It was, and still is, based on the belief that the Army has a requirement for a separate category of personnel and that the warrant

Army aviation warrant officer strength has jumped 500 percent during the past 4 years

FLIGHT PAY DIFFERENCES

WO	OFF	DIFF.
W1 - $130	01 - $170	$40
W2 - $135	02 - $185	$50
W3 - $140	03 - $205	$65
W4 - $165	04 - $240	$75

2LT draws $5 more than W4

officer corps would be used to fill that requirement.

This requirement was finally stated in 1957 by Army Chief of Staff General Maxwell Taylor, wherein he approved and announced the present warrant officer concept stating that:

• The warrant officer continues to have a definite place in the Armys' personnel structure.

• The increasing requirement to operate and maintain equipment of a technical nature provides that personnel possessing a high degree of technical skill fill these positions, and that this high degree of technical skill be *acquired through extensive training and continuity of assignment.*

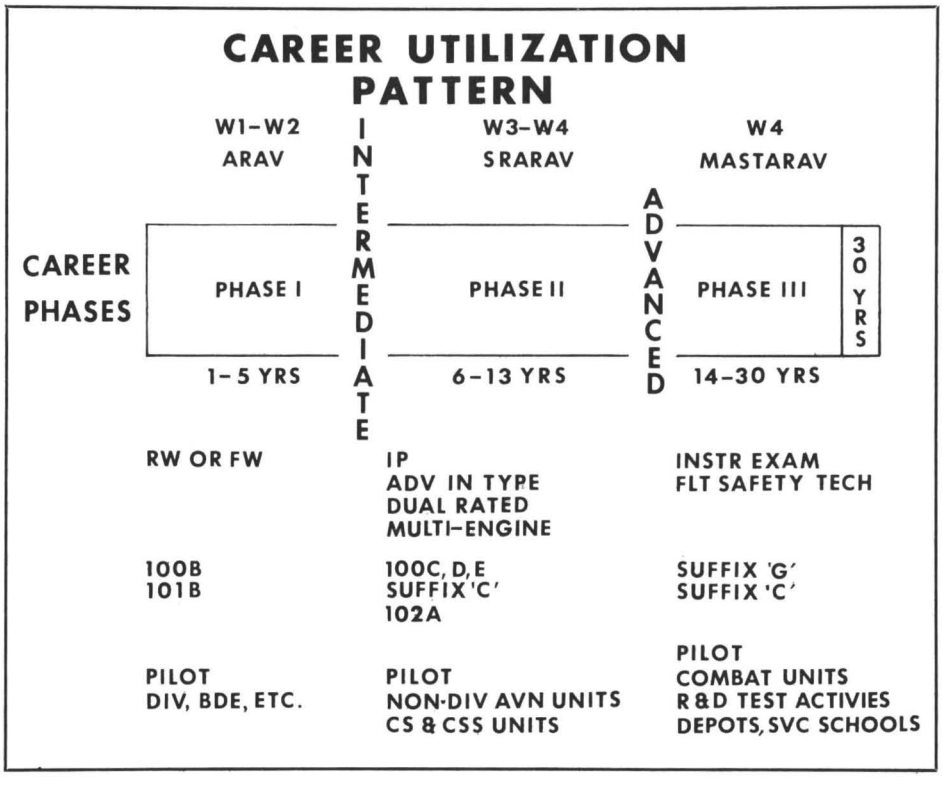
• Warrant officers will fill those positions above the enlisted level which are too specialized in scope to permit use of the broadly trained commissioned officer and be utilized *only* to fill bonafide organizational requirements and *not* as a reward or incentive for either enlisted personnel or former commissioned officers.

This concept was off to a slow start and subject to a lot of criticism. But the utilization of the warrant officer, as we know it today, finally got off the ground (a little play on words there) under the firm and relentless leadership of several leaders of the day including the first Director of Army Aviation, then Major General Hamilton H. Howze.

The aviation warrant officer is here today; the aviation warrant officer is here to stay. This can be dramatically illustrated by pointing out that between July 1966 and July 1970 the Army's aviation warrant officer strength jumped from 2,960 to more than 12,000.

This then is the Army aviation warrant officer. But what of the road ahead? Possibly the greatest bone of contention (next to repeated tours in Vietnam) existing in the aviation warrant officer ranks is that of equitable flight pay. Action for the equalization of flight pay is being taken and may soon be forthcoming.

It is strongly believed that an equitable flight pay program will result in a marked improvement in the attractiveness of Army aviation as a career for our warrant officer pilots. The annual cost of introducing flight pay equity is estimated to be less than $5 million, based on current pay scales and aviation warrant officer strength. But, if instituted, a minimum increase in retention rates is expected to exceed 9 percent. Thus, from a strict-



ly monetary standpoint, for an annual investment of $5 million for flight pay equity the Army will receive a minimum annual return of over $8 million in direct training savings. But more important it will be adding to a career pool of professionals in whom the Army has invested as much as $59 million per year. However, flight pay equity for fiscal year 1971 would represent an unprogramed fiscal item. Therefore, a method or source of funds from within the approved Army budget will need to be identified. Still the case for equitable flight pay is strong and significantly it is in keeping with, and essential to, the all-volunteer Army concept.

Advanced schooling, both civil and military, is becoming more and more important in all spectrums of the Army—most especially in the aviation warrant officer corps. While the initial aviation and maintenance training received by the aviation warrant officer contains sufficient instruction to permit performance of pilot and/or maintenance duties (under most conditions), it does little to further his understanding of tactical unit operations. The tactical environment in which the aviation warrant officer exercises his skills dictates that he possesses this tactical knowledge.

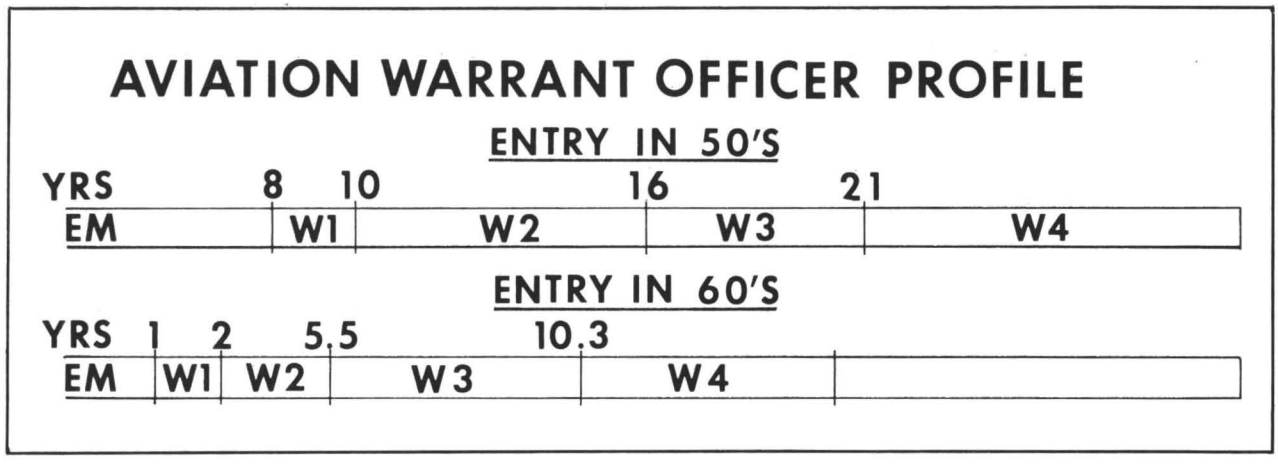
As a result of the requirement of the aviation warrant officer to obtain additional qualification, refresh and update existing knowledge and provide training in newly developed techniques or equipment, a progressive educational career pattern has been developed: the intermediate and advanced warrant officer career development courses.

The purpose of these courses is to provide a career development program to *selected* aviation warrant officers in order that the Army can maintain a base of highly skilled, professional aviator and maintenance technicians who are capable of assuming *aviation related positions of greater responsibility*.

As the primary components of the Army aviation warrant officer career development program, the intermediate and advanced courses have the specific objectives of providing an incentive for excellence through established standards of formal schooling. The goal is to further develop the aviation warrant officer's knowledge of military and military/aviation functions and to expand his pilot skill capabilities in phase with his career development program.

The civil schooling goal for aviation warrant officer is at least a 2-year college equivalency. Currently, the aviation warrant officer corps has approximately 80 percent of its personnel seeking degrees full- or part-time in colleges. Looking forward, efforts are underway to establish an aeronautical engineering college in the Ft. Rucker, Ala., area. Queries are being made to Georgia Tech and the University of Alabama to mention a couple while Embry-Riddle is establishing a facility. The ultimate objective is to offer an associate degree in basic aeronautical engineering. It is envisioned as a 2-year degree program open to aviation warrant officers desiring a 2-year degree under bootstrap.

The road ahead for the aviation warrant officer also holds great promise for additional grades of rank and pay. The adequacy of the present promotion system is good only as far as it goes. Currently, warrant officers are promoted from WO1 to CW2 in 1 year, CW2 to CW3 in 4 years and CW3 to CW4 in 4 years. It is conceivable then to have a basic entry warrant officer candidate, 18 years old and having less than 1 year active federal service, make CW4 in less than 10 years and having only 10 years to go at age 28. This is, and will continue to be, more the rule than the exception. What does this young man, this highly trained technician, have to look forward



PRESENT AVN MOS STRUCTURE

CODE	TITLE
100B	RW Pilot-Obsv & Util
100C	RW Pilot-Med Trans
100D	RW Pilot-Hvy Trans
100E	RW Pilot-Attack
101B	FW Pilot-Single Engine
101C	FW Pilot-Multi-Engine
101D	FW Pilot-Surveillance A/C
102A	FW & RW Pilot
671B	A/C Repair Tech (Nonrated)
671C	A/C Repair Tech, RW Rated
671D	A/C Repair Tech, FW Rated
671E	A/C Repair Tech, RW/FW Rated

SUFFIX CHARACTERS

SUFFIX	QUALIFICATION
6	Instrument Examiner
B	Flt Safety Specialist
C	Instructor Pilot
D	Aeromed Evac Pilot
T	A/C Armament Maint (Transitory)

to then? Nothing but longevity pay raises. To make a long story short, the best of all possible alternatives is the *addition of grades CW5 and CW6*. Such a proposal has passed the talking stage and is now under consideration at the Department of the Army.

To this point, use of the aviation warrant officer can be likened more to nonutilization than to utilization. That is, the surface has hardly been scratched when it comes to using the Army aviation warrant officer to his fullest potential. However, care must be taken, and is being taken, not to eliminate the distinctions that identify the warrant officers as a *separate category of personnel*.

In line with this, positions in all aviation fields are being reviewed for conversion, either way, commissioned to warrant or vice versa. Unless the position clearly calls for a technician rather than a "multifunctional manager" or commissioned officer, that position will not be converted. Those positions that are finally settled on then should be established on the basis of military occupational specialty (MOS) and *repetitive* assignments within that MOS should be made to sustain and increase technical expertise in a chosen field.

It also is recognized that additional primary and duty MOS' are needed. The expanding role of Army aviation and the aviation warrant officer's vertical trend in specialization call for, and are indicative of, new warrant officer military occupational specialties.

Commanders cannot accurately requisition personnel with additional skills over and above the basic MOS qualifications without including extensive comments on the requisitions.

Additionally, many aviation warrant officers who are permanently grounded and who cannot as a result function in their primary MOS are often retrained for nonaviation related MOS' and forever lost to Army aviation.

Therefore, two new MOS' are being proposed: the aviation staff technician—rated (MOS 103) and the aviation staff technician—nonrated (MOS 104).

The rated aviation staff technician MOS is intended to be a duty MOS. That is to better identify specific individual qualifications to meet the increase in specialization areas. The nonrated aviation staff technician MOS is intended to do the same thing but be a primary MOS. Aside from giving additional career growth opportunities to those aviation warrant officers who are not rated, it will enable Army aviation to retain those who were previously rated and have been permanently grounded.

A few of the areas that may well be contained in the 103 and 104 MOS structures include:

- Airfield operations.
- Air traffic control.
- Aviation test and engineering.
- Aviation combat development.
- Aviation armament and fire control.

The road ahead for the Army aviation warrant officer has within it:

- Equitable flight pay.
- Advanced military and civil schooling.
- Additional rank and pay grades (under study).
- Promotion and utilization in chosen specialty areas.
- New areas of specialization with increased responsibility.

In the words of Major General Delk M. Oden, former commandant of the U. S. Army Aviation School: "The fields in which experienced warrant officers can be employed are limited only by the imagination of the person concerned." Indeed, those concerned are both commissioned officers and warrant officers. They are you and me, and history has shown our imagination to be boundless.

PROPOSED MOS STRUCTURE

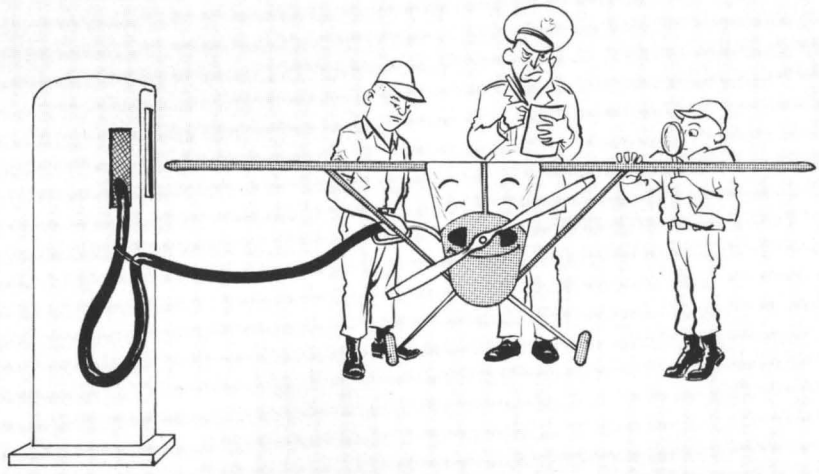
CODE	TITLE
103 -	Aviation Staff Technician (Rated)
A	Avn Personnel Mgmt
B	Avn Safety
C	Flt Tng/Standardization
D	Avn Operations
E	Air Traffic Control
F	Avn Test & Engineering (R&D)
G	Orgn/Equip, Combat Devel
H	Avn Maintenance Mgmt
I	Avn Supply Mgmt
J	A/C Armament & Fire Control
K	Avionics
L	Aide-de-Camp
104 -	Aviation Staff Technician (Nonrated)
A/L	Same as for 103

SUFFIX CHARACTERS

SUFFIX	SKILL LEVEL
1	Basic Technician (W1-W2)
2	Senior Technician (W3-W4)
3	Master Technician (W5-W6)

Maintenance

...so we take better care of your aircraft



Check Your Struts: During your U-8 preflight ensure that there is a minimum of 3 inches extension on the main struts. Any amount less than this could result in *bottoming out* and structural damage on landing. Also, the nose gear should have at least a 5-inch extension of the strut for the same reason. The weight of the aircraft must be considered when checking strut extension; therefore, to obtain an accurate measurement, there should be a full load of fuel on board. If the aircraft struts meet minimum requirements without fuel, addition of fuel (1,380 pounds capacity) could cause an unsafe strut position. Takeoff weight or landing weight should be considered when servicing the shock struts.

☆ ☆ ☆

Cleaning Tips: Use cleaning solvents only in well ventilated areas and preferably outside. Never use solvents near electrical equipment or an open flame.

☆ ☆ ☆

Maintenance Tips: Know the tools in your toolbox and conduct an informal inventory of them after completing each job. It is a good habit to develop and will do wonders toward eliminating engine FOD.

Learn to police the engine inlet area of your bird as the last step prior to securing the cowling and fairings.

Check your torque wrench calibration inspection tag. An inaccurate torque wrench may result in an *incomplete mission* for your bird.

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Installation Of Tail Rotor Drive Shaft Cover Hinge Rod UH-1A, B, D, H: Installing the tail rotor drive shaft cover hinge rod on the UH-1 aircraft is quite a task under ideal conditions, even back in field maintenance areas. In forward base camp areas this job was expedited by using drill, pneumatic (air gun), ¼-inch straight drive, reversible type, by attaching the air gun to one end of a rod with one man guiding it to the hinge eyes and another man at the center of the rod to hold it level. Running the wire through small tubing or pipe will make it much easier (and safer) to hold the rod level. A safe operation can be had by using an air pressure regulator to control air pressure and by using a maximum of half drill speed. This will aid in putting the rod through hinge eyes.

Matters...

A light coat of GOB grease or equivalent type grease may be put on the rod to ease sliding it through the hinge eyes. Also, file the leading end to a smooth round dome-shape. This helps prevent the cutting of the hinge eye surfaces. Any scratch hinders smooth and easy slide through. This same procedure applies to the ventral fin drive shaft cover rod as well with the exception that only two men are needed, the lead man and the air gun operator.

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Grease It Right: When lubricating the counterweights on the U-6 propeller, use only the specified grease (MIL-G-7711, general purpose type). Many people not familiar with the U-6 have thought it best to use high temperature grease. However, experience has proven that high temperature grease causes sluggish prop operation when used in the counterweights.

☆ ☆ ☆

Beware Mr. Clean: If aircraft has to be washed during periods where temperatures are freezing and below, water should not be used; it will seep between aircraft skin, freeze and cause rivet heads to pop off. Other damage can also occur by water getting into components which cannot drain properly. We must remember when water freezes it expands, leading to structural damage to the aircraft. To wash aircraft, use a shop rag dampened in proper cleaning solvent and use another rag to wipe and dry up solvent.

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Get The Right Temperature: It is very important to use correct temperature when heat treating is done with an electric oven or furnace. You can find the temperature charts in TM 55-408. Material that is not properly treated can crack, burn, buckle or just not reach the desired hardness. Cooling is also very important in the process. Cooling too fast or too slowly will have the same effect on the material as incorrect heating.

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OV-1 Engine Oil Servicing: Overfilling the OV-1 engine oil tank can be prevented if the oil level is checked immediately after shutdown. Overfilled engine oil tanks will vent onto the horizontal and vertical stabilizers causing de-icer boot and paint deterioration.

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Aluminum Storage: Do you know that sheets of aluminum should be stored upright on ends, separated with sheets of paper or some other material to prevent scratches in handling the metal. Where aluminum sheets have been stacked flat, handling by sliding or pulling out a sheet will cause scratches and rub off the coating that prevents corrosion. The resulting corrosion causes many expensive aluminum sheets to be condemned.

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New Tiedowns: New tiedowns for the main rotor blades, UH-1B, D and H model aircraft are now available. They should be ordered to prevent damage to the tail boom.

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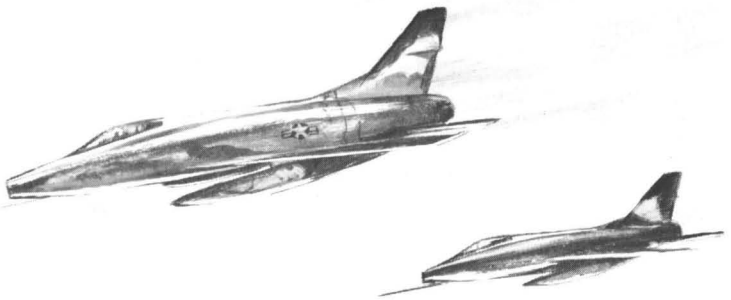
Use Of Aviation Fuels: Aviation maintenance personnel are reminded that aviation fuels are to be used for their designed purpose only. Fuels are not to be used as a cleaning agent for any reason. Maintenance supervisors at all levels should remind all personnel that disregard for the proper use of fuel can cause serious injury or death and loss of property.

☆ ☆ ☆

For Safety: On all UH-1 series helicopters ensure the handle assembly, ejection on pilot's and copilot's doors is saftied with, and only with, *copper* safety wire. In the event of an emergency it's tough pulling for the pilot when it's been secured with steel wire.

The LOH-FAC Tactical Fighter Team

Captain Richard T. Cross



THE COORDINATION between U. S. Air Force tactical air support and our U. S. Army unit, B Troop, 7/17 Air Cavalry, in 1968 and 1969 in the Republic of Vietnam was outstanding. We felt this was due in part to a close personal and professional relationship with the Air Force forward air controller (FAC). This is not always possible to establish, but due to the proximity of our contingent at Phan Thiet to all the people we worked for and with, we developed unique and highly effective procedures which hinged on good rapport and teamwork.

The Air Force FAC was a fighter pilot who was also qualified in the O-1 Bird Dog. He coordinated jet fighter strikes on enemy targets. The F-100 was normally the type fighter used in our area for tactical air support. After many of the missions our OH-6A (LOH) pilots and some of the AH-1G HueyCobra pilots would go over to the FAC quarters and, relaxing over a cold beer, discuss the mission, the results obtained and possible ways to improve operations. The opportunity to sit down with support units has obvious benefits and is one of the reasons we were able to develop a method of pinpoint target marking in an effort to increase the percent of damage done to the enemy.

Before I continue with an example of a typical operation, it is necessary to briefly review how the Air Force FAC normally runs an airstrike. Here are a few of the basics.

The FAC, after locating a target, fires a white phosphorous (WP) rocket into the general area of the target, then directs the fighters on the target. After the airstrike is over the FAC conducts a battle damage assessment from his O-1. Obviously the accuracy of this method depends upon getting the marking rocket on target the first time. Generally, the percent of damage done was good but through our discussions we devised a way to increase the percentage.

The method of operation we agreed upon with the sector FAC was that upon receiving a request for an airstrike from us he would immediately initiate a request for a flight of F-100s, and then fly to our area. After the FAC arrived in the target area we would give him all the information we had, which he would pass on to the jets he was vectoring to the area. Once the jets were on station, briefed and set up on their attack pattern, a team of LOHs would mark the center of the target and move out of the area so the FAC could put the jets in.

By having the jets drop only one bomb apiece, then move back into their holding pattern, we could send the LOH team back into the area, do a quick damage assessment and remark the target. By repeating this process until the fighters had expended their ordnance stores, we found the percentage of damage was substantially increased. Now let's look at a typical mission. Using two LOHs and two AH-1G HueyCobras, we will conduct a high speed area sweep of the gently rolling, scrub tree covered area to our south, known to us as Southern Free Strike Zone.

Takeoff is at 0730 and since we have to travel only a short distance, we arrive in the mission area in about 5 minutes. I drop down on the treetops, followed by my wingman, and we begin high speed, east-west sweeps moving north. For a while the scenery flashes under my LOH in endless monotony. The trails which criss-cross the entire area show recent use so we call everything of importance to the attention of the ever circling Cobras, whose crewmen relay all reports to base operations.

As I pass over a sparse area in the woods a quick movement catches my eye. Turning slowly I come back over the area and find two Viet Cong (VC) hiding under camouflage covers, similar to Army issue poncho liners.

I call my wingman and tell him to move out of the area so the Cobra pilots can concentrate on my area. We have found through experience and practice that this tactic, when we are not receiving fire, eliminates confusion and reduces the time necessary to locate which LOH has the target.

Lead Cobra calls to say he has me in sight. I have my observer select white phosphorous instead of smoke to mark the target. Then I call lead and ask him to tell me when he starts his run so I can mark the target. This is another trick we've found useful. The LOH can mark the target, move out of the area and eliminate the normal time lag created by the Cobras having to wait for the mark to come up before they start their firing passes. The LOH is gone, the mark comes up and the inbound Cobras can punch off their rockets, increasing the chance of catching any VC trying to get away from the smoke mark.

As soon as I mark the area I come "hot" with the minigun, then wheel the LOH out of the area and over to my wingman. The Cobras fire pair after pair of rockets into the area, throwing tree limbs, rocks and a cloud of brown dirt high in the air. After two passes each the AH-1Gs hold off and we go in again in the LOH. Once back in the area we start locating single and multiple entrance bunkers, each well camouflaged and obviously still in use.

Lead Cobra meanwhile has called back to base and has the Air Force FAC request a pair of fighters before he takes off to join us. The FAC arrives in the area in about 15 minutes and assures us that the fighters are being sent from Phan Rang and will be in the area in 25 minutes.

My wingman and I continue to search the area, reporting everything new that we see. When the jets arrive on station the FAC gives us their UHF "push" (radio frequency) then briefs the jets on the target, direction of attack and all other data necessary for their mission sheets. He then requests a target mark from us. I go into the center of the target area and drop a white phosphorous grenade for a mark. I can hear him talking to the jets as my wingman and I wheel out to the north to a safe holding distance.

The first jet (Chalk One) screams in dropping one 750-pound delay bomb and is followed by the wingman who also drops only one 750-pound bomb. As my wingman and I start back into the area the FAC calls the jets and has them hold high and dry. Thick brown smoke obscures most of the area.

The first bomb had missed the target area by 50 to 75 meters or more and the second bomb had missed by over 100 meters. I call the FAC and give him the information. Chalk One requests us to give him a colored smoke and says he will blow the smoke away.

I go back to center of target and my observer drops two red smokes followed by a white phosphorous grenade. By marking the area this way the jet pilots see the initial mark—the white phosphorous grenade—right away and then the colored smoke which comes up more slowly, giving a more lasting mark.

We call clear and the jets start back in. Chalk One drops one 750-pound bomb which from where I am appears to be dead center. Chalk Two follows him with a repeat performance. The jets once again hold high and dry as we return to get a bomb damage estimate. True to his word Chalk One had blown away the smoke in addition to destroying two bunkers. We remark the area and move off while the jets drop their remaining loads, and then strafe the area with 20 mm Vulcan cannons. When the jets finish their firing runs they depart station and my wingman and I go back again to get a final bomb damage assessment.

The jets had done a good job in the overall destruction of the bunker complex. Of the 12 bunkers in the area, three large ones had completely disappeared, five others were partially or completely destroyed, two were damaged and the other two were undamaged. The FAC relays this information to the departing jets so they can have all the data they need to fill out their mission reports.

The troop commander, flying in the command and control helicopter, calls us to say that he is going to bring out our organic infantry platoon and insert them to sweep the area in an effort to gather intelligence data. After the sweep is completed and the infantry extracted, we head back to the base camp.

This description of this mission is greatly simplified. But it reflects the rapport and effective teamwork our unit had established with an Air Force tactical air unit in achieving our common goal of destroying Charlie's war effort.

Chafing Of Aircraft Hoses

"Ah, there's the rub!"

Loss of hydraulic pressure is not conducive to your good health. Inspect the hydraulic hoses often and know all of your preventive maintenance procedures

Major Vincent G. Ripoll and Donald R. Artis Jr.

THE MONTHLY Maintenance Summary published by the U. S. Army Board for Aviation Accident Research (USABAAR) regularly contains numerous references to aircraft accidents and precautionary landings caused by hydraulic system discrepancies. The summaries indicate that in fiscal year 1969 approximately 37 percent of all reported accidents and precautionary landings with confirmed or suspected maintenance causes were attributed to hydraulic system failures. A significant portion of these hydraulic system failures are ascribed to chafed hydraulic flexible hoses.

There are many reasons why hydraulic hoses chafe: improper design, improper maintenance procedures established by the manufacturer, improper or incomplete technical manual (TM) instructions, or poor maintenance practice. These deficiencies usually result in chafing of flexible hoses either by hose-to-hose contact or by contact of the hose with a structural element.

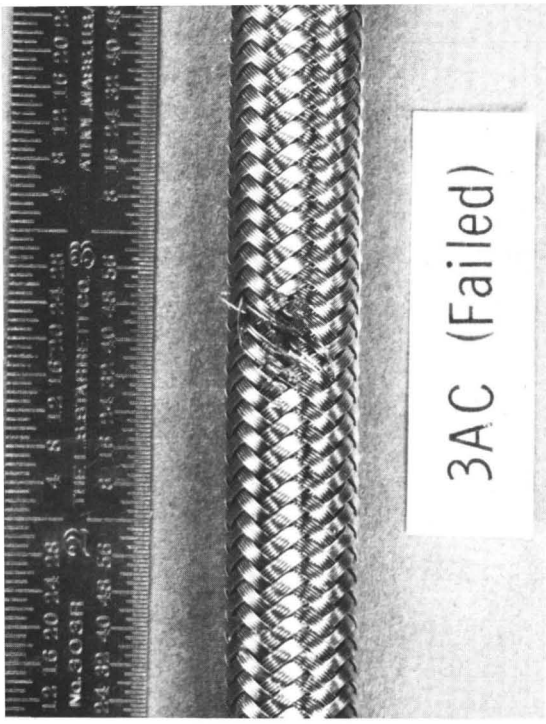
Hydraulic system plumbing installations found in Army helicopters undergo a fairly rigorous development cycle. The designer, using the practices and procedures developed over the years, designs the installation and takes into consideration such factors as line flexure under static pressure, dynamic flow conditions and vibration, temperature, etc. A plumbing mock-up is then built to check and refine the design and to assure that the proper support is provided at the proper location to preclude possible chafing conditions. During initial ground and flight testing of a new aircraft, the plumbing installations are inspected frequently to detect any chafing or other problems. Changes are made to the test aircraft as necessary and testing continues. All changes resulting from this development process are reflected in the design drawings and maintenance manuals.

The production aircraft are all manufactured supposedly in the same manner, and if the manufacturer's quality control procedures are adequate, hydraulic hose chafing should not occur. But, we know in fact that it does occur. Why?

During an investigation of this very serious problem, the U. S. Army Aviation Materiel Laboratories (AVLABS), Ft. Eustis, Va., inspected several AH-1G and UH-1C helicopters at random and found that three out of four had chafed hydraulic hoses. An investigation of the cause of the chafing and why it was previously undetected revealed that instructions in the TM regarding positioning of support clamps and brackets were inadequate.

Various publications have contained recommendations for more adequate supervision to ensure that correct procedures are followed and to push, preach and practice *by-the-book* maintenance, inspections and administrative functions. However, are the TMs telling our mechanics in the field the proper way to perform each maintenance action? A review of TMs 55-1520-221-20, -35, -20P and -35P has revealed several specific deficiencies. To simplify the explanation of these deficiencies, reference will be made in this article to the TM 55-1520-221-XX (AH-1G) series; however, the findings and recommendations apply to most TMs in the 55-1520 series.

During a review of the TM it was found that -20 does not indicate the use or position of clamps to restrain hoses. Many paragraphs are dedicated to the removal and reinstallation of hydraulic system components. Statements regarding the hose assemblies read: "Discon-



A United States Aviation Laboratories' sample of an aircraft hose that has failed due to chafing

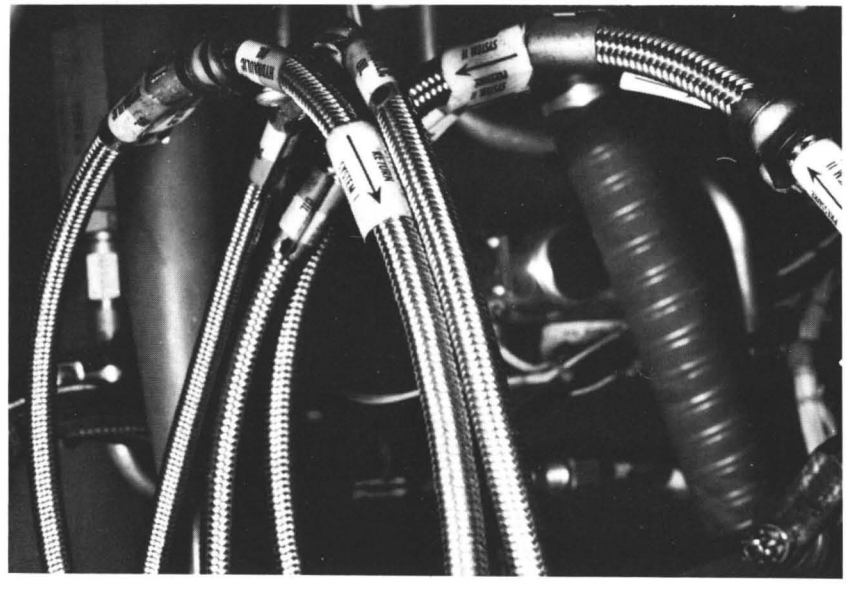
nect hydraulic hoses from. . ." or "Connect hydraulic hoses to fittings. . . ." But an explanation could not be found describing the methods for disconnecting hoses or telling how many clamps to use to prevent or correct chafing conditions. Further, -20P and -35P show the installation of *one* set of clamps on hoses that are 20 and 24 inches long. Chapter 18, section VIII of Technical Bulletin (TB) 750-125 explains the use of clamps, but mainly for use in supporting hoses. Very little is said about the separation of hoses to prevent chafing. TM 55-405-7 gives the shop practices and replacement criteria for Teflon hoses, but again does not elaborate on preventive measures for chafing. Even the "right" and "wrong" figures in both manuals, although very explicit, deal very little with the chafing problem.

Investigations conducted by AVLABS also have revealed that chafing situations can be encountered because of the method used to cut, fabricate and replace a hose assembly. Usually the old hose is used as a pattern for the new one; or, if the old hose is not available, the new one is patterned against a similar hose from another aircraft. Is there anything wrong with this practice? Nothing whatsoever *if* the hose used as a pattern was made by-the-book. But, if that pattern was manufactured from a previous pattern, it can easily be seen that any error in the fabrication will be repeated each time a new hose assembly is made.

Since crew chiefs and mechanics in the field operate through TMs -20, -35, -20P and -35P, it can be assumed that only one clamp will be installed if only one clamp is shown and the field fabrication of a hose assembly will only be as good as the process that is explained in the manuals. This is a discrepancy that the crew chief in the field can do little to rectify directly. However, he is responsible for assuring that his aircraft is available and safe to fly. So what should he do to minimize the possibility of hydraulic system failure due to flexible hose chafing? AVLABS recommends the following:

Perform more frequent checks of hydraulic hose installations and more thorough daily inspections. This will allow detection of chafing problems before failures occur.

Consult the TM to assure that the flexible hoses are supported in accordance with the design requirements. Where hoses are not supported against the structure of the aircraft, use separation clamps as necessary to prevent chafing between hoses as long as the clamps used will not restrict hose travel or cause the hoses to be distorted during the flexing cycles. Once a clamp has been added to avoid chafing, perform a systematic inspection of the hose assembly to detect any further possible failures of the new installation. In using a separation clamp, be sure that the clamp size is appropriate to the hose size by referring to TB 750-125, table 5, page 11. If TB 750-125 is not readily available, use the



AH-1G hydraulic hoses are in contact due to a twisted hose even though the required clamps are correctly in place

HOSE SIZE (TEFLON MIL-H-27267)	-3	-4	-5	-6	-8	-10	-12	-16Z	-20Z	-24Z
CLAMP SIZE (MS 21919)	5	6	7	8	10	11	13	18	22	27

values that appear in the table above.

When replacing a hose assembly ask your direct support (DS) unit to paint a thin stripe of zinc chromate the length of your hose assembly. This will help you to avoid or detect twisting during installation.

If chafing problems are being encountered and the plumbing installation is in accordance with the TM, then point this out to the maintenance officer because it could be a serious problem affecting not only that particular aircraft but also the rest of the fleet. The maintenance officer should in turn seek to have the TM clarified and take action to develop, or have developed, a field fix.

Report problems of this nature under the equipment improvement recommendation program so that AVLABS will be able to use the data effectively.

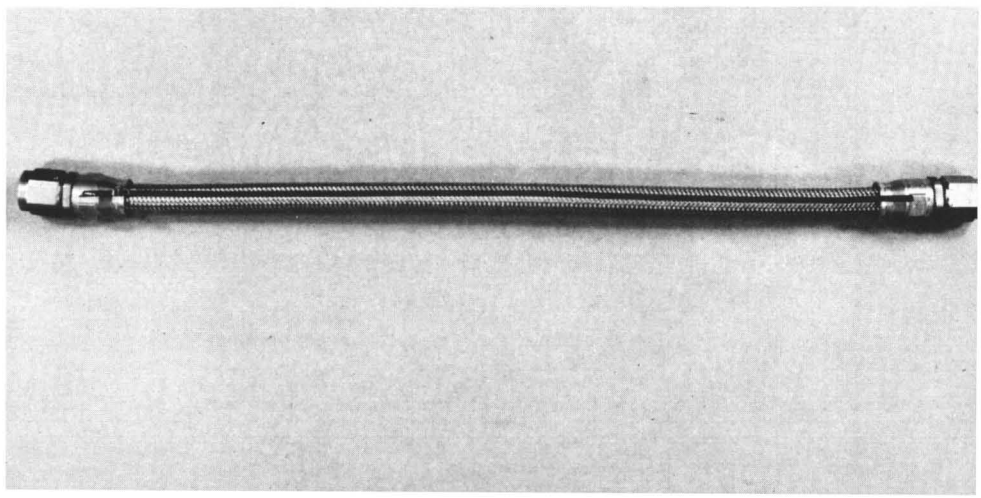
At present, AVLABS is investigating hydraulic hose chafing problems and potential solutions. One method of preventing chafing is to cover the lines themselves with a substance that makes it immaterial whether they contact or not. Testing was begun in November 1969 at AVLABS on steel-braided Teflon hoses to determine their chafing characteristics and to find a solution to preclude their chafing. Various materials are being examined to determine whether they will increase the mean time between failure (MTBF) of the hoses under test conditions. Nylon coil, Teflon coil and polyvinylchloride overwraps have been examined with very encouraging results for the nylon coil.

Testing to date indicates that nylon overwrap represents an improvement of at least 16 times the MTBF of unprotected steelbraided hoses. Therefore, if aircraft hoses will last on the order of 20 hours under flight conditions when rubbing against each other, then the nylon coil overwrap could conceivably extend the time to failure to at least 320 hours. Time constraints to date have not allowed any single test sample in these tests to run longer than 27 hours, so a specimen that lasted at least that long was removed from the test fixture. Therefore, the nylon which lasted 27 hours with only a small amount of wear could conceivably have lasted much longer than indicated by these tests. The life characteristics of hoses rubbing against aircraft structure will be investigated, and the fixes that performed well during the hose-against-hose test will be examined to determine their qualities under these additional test conditions. Teflon tape will also be examined to determine its characteristics and to evaluate its worth.

To solve the problem of hydraulic hose chafing in future Army aircraft, AVLABS will make recommendations to the appropriate agencies to—

- modify TM 55-1520-XXX-20, chapter 6, to include specific instructions on the installation of hose assemblies and clamps to help preclude chafing,
- perform a study to devise methods of determining the exact number of clamps to be used and where to install them to eliminate the guesswork, and
- establish design practices for installation of flexible fluid lines, the routing of those lines in Army aircraft and the locating of the required connections in order to prevent chafing.

Improper design, incomplete technical instructions or improper maintenance practices, regardless of the reason, hydraulic failures still account for over a third of all reported accidents, incidents, forced landings and precautionary landings. Safety and reliability are everybody's business. Check and recheck those hose assemblies—they are the veins and arteries of your bird and, therefore, vital to its life. Leaking, oozing or seeping hydraulic fluid might be the result of a chafing condition. Don't ignore it by just wiping it off. Leave the hoses free to chafe and they will, but protect them from chafing and you will be rewarded with many safe flying hours.



A thin line of zinc chromate painted on an aircraft hose with slippage marks on the fitting permits easy, immediate detection of any twisting

A LICENSE TO THINK GRADUATION

Major Howard J. Stiles

Having received his long awaited wings, the young aviator is not excepted from the safety procedures he has followed previously. Graduation isn't the end—it's the beginning

UPON GRADUATION from flight school you should truly be proud of yourself. With wings on your chest, you have captured a dream that has enticed man since the earliest days of recorded history. To soar with the birds, to transcend the dull throbbing roar of bumper to bumper turnpikes, to view the vista that unfolds as you wing above terra firma, all adds up to make the months of study, sweat and sacrifice more than worth it. You are now an Army aviator. You have joined the ranks of the professionals.

Stand tall. Army aviation has matured from a tiny band of dedicated individuals in World War II to a dynamic vibrant force which today is being baptized in the bloody battles in the Republic of Vietnam. To belong to this elite group, to be privileged to fly "Above The Best" demands a price. That price—clear thinking. Yes, you belong. The challenge is to contribute to the professional growth of Army aviation. Do not let your thinking wander off a dedicated track.

This new found pride is not without pitfalls. Pride can lead to vanity. This vanity can take you down a path to destruction. If you go off the brink, there is no return. What might some of these pitfalls be? The first and probably the most dangerous is the attitude that because you are a recent graduate from the hallowed halls of the U. S. Army Aviation School, you have the knowledge of an airline captain and are invincible. Since you have recently sprouted wings you have got to take your family, wife, girlfriend or buddies flying. So, out you go to the local airport. Now, admittedly, the majority of these little jaunts work out fine. However, the trips that *don't* are the ones we want to stop.

The civilian and military aviation accident reports are full of tragedies of low-time aviators. One can read about such people inadvertently caught in IFR weather or getting trapped by fuel exhaustion. There is always the show-off syndrome. One can read about the inevitable crash from low-level hedgehopping or the clown who tries to fly under a high power line or bridge. The tragedy involving the demise of the aviator is bad enough, but the compound tragedy involving what we might term innocent victims really hurts.

Graduation is not a license to be carefree. Graduation is a license to think, to mature and to grow professionally. To show off, to take chances, to overextend yourself not only revokes the license but also the trust people have in you.

A graduate soon builds up the hours and approaches the 500-hour mark. The statistic keepers would say "heaven forbid" because the young graduate is highly vulnerable. He is prone to step into his Sopwith Camel and forget the fuel. Having conquered the horrors of the first 500 hours, he tends to forget the basics. At this stage Mr. Aviator must exert his manhood. Unfortunately, too many of us equate manhood with disregard for safety. This is causing bent aircraft and bodies. The challenge to each of us as we approach the 500-hour mark is to look at those wings again. One must strive extra hard to think safety and professionalism.

Consider this tragic tale involving a well-qualified instructor pilot. After visiting friends he was taken to the local airport. With meticulous care he demonstrated a thorough preflight. Once airbone, his thinking wandered off the dedicated track. He was seized by the show-off syndrome. He demonstrated several unauthorized aerobatic maneuvers which resulted in a fatal crash. Where was his license to think?

Mr. Senior Aviator also needs to look at his license. His thinking process is a bit slowed. His attitude as the "Old Pro" can place him in the cockpit of a bird he hasn't flown in ages. Get current—ride with someone? Heck no, all he needs is the checklist. Blast off! Unfortunately, the accident reports list this individual all too frequently. In most cases Mr. Senior Aviator is plagued with a host of human factors and psychological problems. Due to his high number of flying hours, his being qualified in a multitude of fixed and rotary wing aricraft, his attitude that it couldn't happen to him and the fact that he is now desk bound and flies infrequently all add up to *error*. The following examples are typical:

- Substitution errors—confusing one control with another or failing to identify a control when it is needed.
- Adjustment errors—operating a control too slowly or too rapidly, moving a switch to the wrong position or following the wrong sequence in operating several controls.
- Forgetting errors—failing to check, unlock or use a control at the proper time.
- Reversal errors—moving a control in a direction opposite to that necessary to produce the desired results.

These classical examples were catalogued right after World War II, yet today we're still plagued with these problems. It behooves us to be aware of our human weaknesses. One must think clearly and continue to think throughout his days as an Army aviator.

Graduation, a license to think. One must think safety. One must think professionalism. One must *think* throughout his career as an Army aviator. Besides the monetary cost of equipment and training, lives are irreplaceable. Each of us must be his own safety officer. We must conserve manpower and materiel. Be a professional Army aviator — think!

Charlie and Da

Dear Danny: I've heard that the O-1 Bird Dog can now be flown at 2,800 pounds gross. Is this information correct?

CPT V. R. C.

Danny's answer: What you've heard is partly correct. The normal gross weight of O-1 aircraft is as follows: O-1A and TO-1A, 2,100 pounds; O-1E, TO-1E and O-1G, 2,165 pounds; O-1D and O-1F, 2,400 pounds; O-1G modified (per drawing 0600520), 2,400 pounds; O-1G modified (per drawing 0600523), 2,800 pounds. To determine which bird you have, check the information listed on the data plate installed near the front door post.

Dear Danny: I cannot find any information in the O-1 operator's manual (Dec 68) concerning the electric primer and the emergency fuel switch installed in some of our O-1s. Can you enlighten me on this?

CW2 B. B. L.

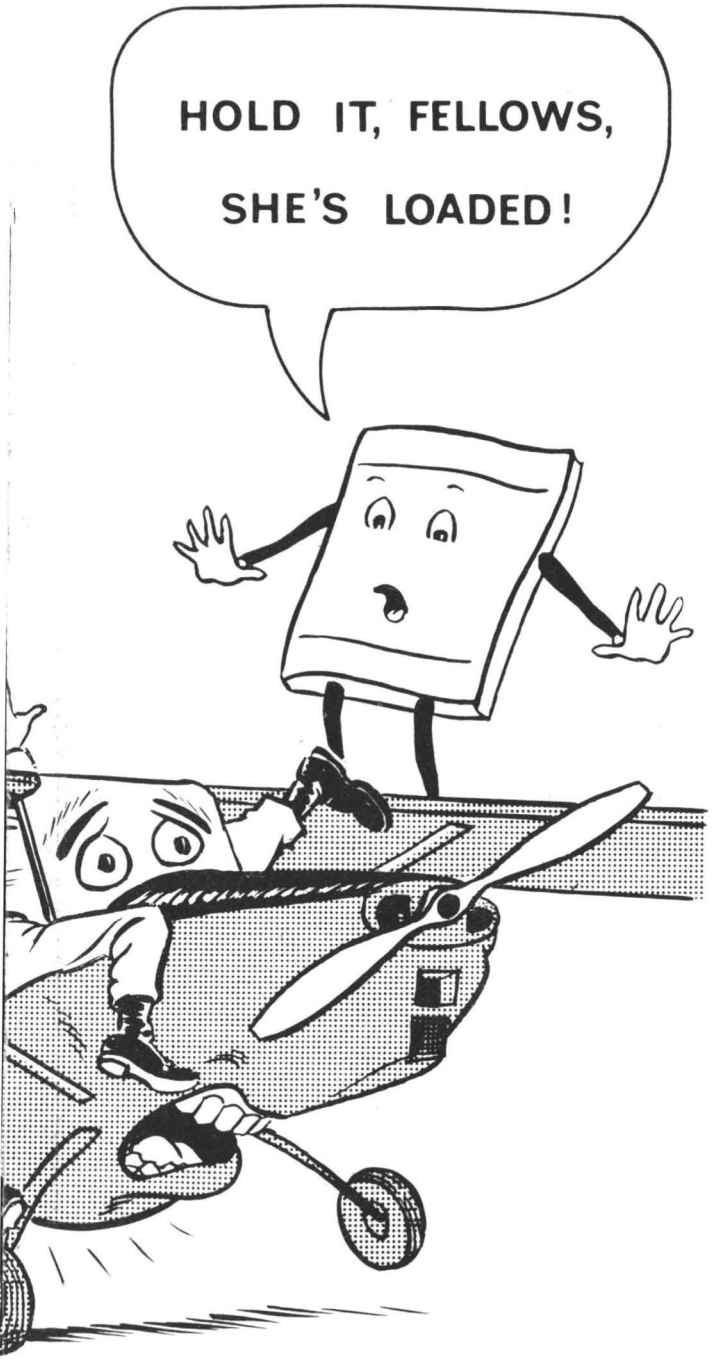
Danny's answer: Some O-1 aircraft have been modified to include an electrically operated engine primer system. This system consists of a solenoid operated fuel valve assembly and a push-button type primer switch. Fuel for primer system operation is supplied by the auxiliary fuel pump. Pressing the push-button primer switch energizes the solenoid valve assembly allowing raw fuel, under pressure, to enter the six engine cylinders. The fuel is injected into the intake port just forward of the intake valve. When the primer switch is not energized, the solenoid valve is in the closed position, providing a positive shutoff to prevent fuel passage into the priming system. An emergency switch is provided adjacent to the engine primer switch. This switch energizes the fuel priming solenoid valve assembly which provides fuel to sustain flight (approximately 2000 rpm) in the event of carburetor malfunction. Fuel is supplied, under pressure, by the auxiliary fuel pump. The procedure to follow in the event of carburetor malfunction is as follows:

1. **Throttle 2000 rpm position - SET.**
2. **Auxiliary fuel pump - ON.**
3. **Mixture lever - IDLE CUTOFF.**
4. **Emergency fuel system switch - ON.**
5. **Emergency fuel system switch (landing assured) -OFF.**

This information will be included in change 2 to TM 55-1510-202-10.

Dear Danny: In the OH-13S model aircraft they say stay out of the 200 to 230 rotor rpm range because

nny's Write-In



of stabilizer bar resonance. What will happen if I allow the aircraft rpm to remain in this range during runup?

2LT E. O. B.

Danny's answer: The purpose in avoiding this area of rpm is to preclude damage being done to the rotor system and other components of the aircraft. The area of 200 to 230 rotor rpm develops undesirable oscillations in the systems which have either a harmonic or sympathetic beat. Most of the time this can be eliminated by engineering and design, but if there is a *possibility* of a harmonic beat your tachometer will always be marked so this resonance range can be avoided.

Dear Danny: I've heard so much about the UH-1D/H 6700 rpm ±50 as being an overspeed on the rotor system that now I'm confused. Just what is the straight information?

WO1 G. A. P.

Danny's answer: Let's see if we can unravel your area of confusion. Under certain circumstances 6700 rpm ±50 *can* be an overspeed, but the statement in itself is erroneous. This figure by itself is taken out of its true context, since people at times fail to read their dash 10s and dash 20s to determine the criteria for an overspeed. TM 55-1520-218-10, paragraph 3-7, Caution, page 209, makes reference to the droop compensator in the governor system and states that 300 to 400 rpm at FLAT PITCH is permissible due to the design of the system. TM 55-1520-218-20, page 3-14, Note, says at N1 speeds of 85 percent or less an output shaft speed of 6900 rpm is permissible. This is 400 rotor rpm, but again is at FLAT PITCH. TM 55-1520-218-CL, N-8, Engine Runup, line 20, is a function performed by the aviator at FLAT PITCH setting and N1 speed of less than 85 percent to determine if the Inc-Dec switch operates through its full range. The 6700 rpm does no damage to the rotor system during this specific check. About the only way you can exceed any of the authorized rpm's is to have the governor switch in manual. Most people who took exception to the 6700 rpm failed to realize the check was performed at FLAT PITCH and less than 85 percent of N1 speed; each presumed this was performed with power applied. We hope this clears the area of confusion for you.

Thanks for your fine letter. Anytime we can clarify any area of confusion, be it large or small, please write.

Captain Kennard D. Frazier

HOW PROFESSIONAL are you in your position as an Army aviator? Does your knowledge and proficiency hinder or aid you in your flying? The answers to these questions and others may not be readily available, but after reading this article it is hoped you will be more capable of evaluating yourself.

Very often an aviator can learn quite a bit from the experience of others. But, to see many individuals learning from the same type of experience is needless, especially if this information has already been passed on to them by other means. I will discuss the advantages of proper preflight and postflight inspections—using true examples, giving the situation, and possible causes and results.

Your standing of professionalism places you in one of two categories:

• An individual who can fly an aircraft but possesses very little knowledge of its mechanical engineering or condition.

• An individual who stays

ahead of the aircraft at all times and maintains a continuous working knowledge of the aircraft that he is flying by performing preflight and postflight inspections.

How important is a preflight? Just ask yourself another question: How important is my life?

One situation I remember well occurred while I was in AH-1G HueyCobra transition. A preflight inspection had been performed in about 20 minutes by a student and instructor pilot. Upon cranking, a lot of smoke was observed coming from the area of the exhaust and oil was leaking down the sides of the aircraft from under the engine cowling doors. When the pilot shut down, he found the oil line to the number 3 and 4 bearing package disconnected. This line supplies oil to the most important bearings in the engine.

A more thorough preflight inspection would have revealed the problem and prevented the danger of a fire with 1,600 pounds of fuel on board. Results could have ranged from engine failure due to a frozen bearing to inflight fire and possible explosion.

The importance of preflight is doubled in the Republic of Vietnam because of the combat situation and your reliance upon your weapons systems.

My unit experienced various instances where guns failed to fire while on a mission. Such faults as power cables disconnected, ammunition improperly loaded and minigun barrel clamps shattering have caused these failures. Quite often rearming is accomplished at night and, because of limited light conditions and flashlight maintenance, some items are easily forgotten or overlooked. Regardless of the high quality of enlisted personnel you have in your unit, they are only human and that's where you and your preflight enter the picture.

Double check when someone else has aided you in preparing your aircraft for flight. Having the crew chief close all access covers and cowlings is fine, but you should double check to ensure that they are secured properly. The following examples clearly express my point as to the securing of cowlings and access covers.

An instructor pilot and student in transition training were departing on a night training flight when the left-hand engine cowling door came open. The door was ripped off by the wind, flew back into the tail rotor and finally struck the main rotor. The aircraft was at about 400 feet. The instructor pilot attempted an autorotation, but the aircraft crashed and burned—killing both occupants.

Being a maintenance officer and test pilot in Vietnam and responsible for ensuring safe aircraft availability, this next example really made an impact on me. I was test flying a HueyCobra when the nose compartment door came open, flew off and struck both main rotor blades. What was to have been a mission-ready aircraft following the test flight resulted instead in a red X condition for 3½ weeks awaiting two rotor blades and a nose door. If I had not become complacent in my preflight and had double checked before starting the test flight, I feel this would never have happened.

There also are repeated instances of the 42- and 90-degree gearbox covers coming off in flight. Each time this happens you invariably experience a tail rotor problem. The screws or Dzus fasteners that secure the covers are very important and *all* are needed to properly secure the covers.

Thus far I have talked only about preflight, but what about postflight? A postflight is a twofold inspection: It is performed to ensure the continued airworthiness of the aircraft and also serves as a short type preflight for the next flight you intend to make. It is a must to record all deficiencies and shortcomings. This is necessary to ensure that maintenance personnel know what to correct. If the deficiency can't be corrected, then it will be in the logbook so the next pilot will be aware of its existence.

Many times a deficiency missed on a postflight will cause an aircraft to be down the next day. Lack of a replacement aircraft will mean *failure to accomplish the mission.*

Remember that a deficiency doesn't mean any less just because it is found on a postflight. One instance that proves the point: A helicopter in our division was on its second flight of the day when the pilot lost control of the N2. After a landing with partial power maintenance discovered a missing bolt from the linear actuator lying on the engine deck. A postflight would have revealed the loose bolt and prevented this situation.

If you are the type individual who skimps or cheats on preflight and postflight, you might ask yourself some of the following questions the next time you're roaring in on a rocket run:

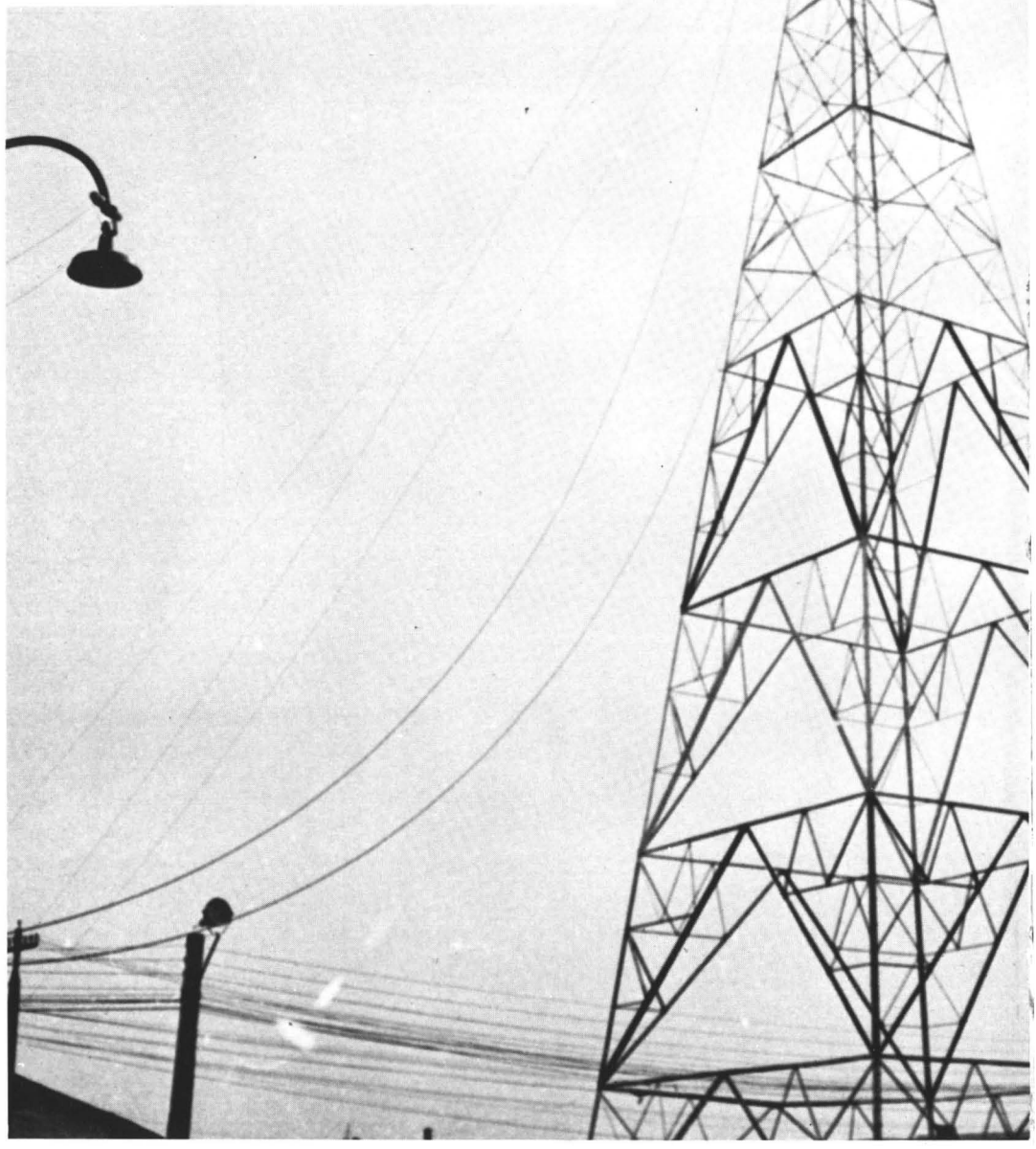
- Was my preflight thorough?
- Will I have any problem with the rotor when I break?
- Were those servos really loose?
- Did I latch the engine door?
- Did I follow the checklist?

The way your heart beats as you answer these and many other questions will tell you what type inspection you've made. If it makes you weak and your heart is thumping loudly, then you had better reevaluate your proficiency because your body is trying to tell you something.

Many things contribute to your evaluation of yourself as a pilot. A professional continues to learn daily, knowing that acquisition of knowledge is a never ending process.

Now, *are you a professional?*

This UH-1B with a crew of four and three passengers aboard was on an early morning administrative flight when it struck the wires in the background at an altitude of 100 feet, crashed and burned. All aboard were killed and the helicopter was a total loss. Visibility was 5 miles in smoke and haze and the aircraft commander was contour flying into the sun



While on a night administrative mission, a UH-1D with a crew of four aboard struck two of these high tension powerlines at an altitude of 200 feet and crashed in water. The helicopter sank and was not recovered. The weather was clear

WIRE TOLL

CW3 Leroy B. Spivey

CW2 Morris L. Marty

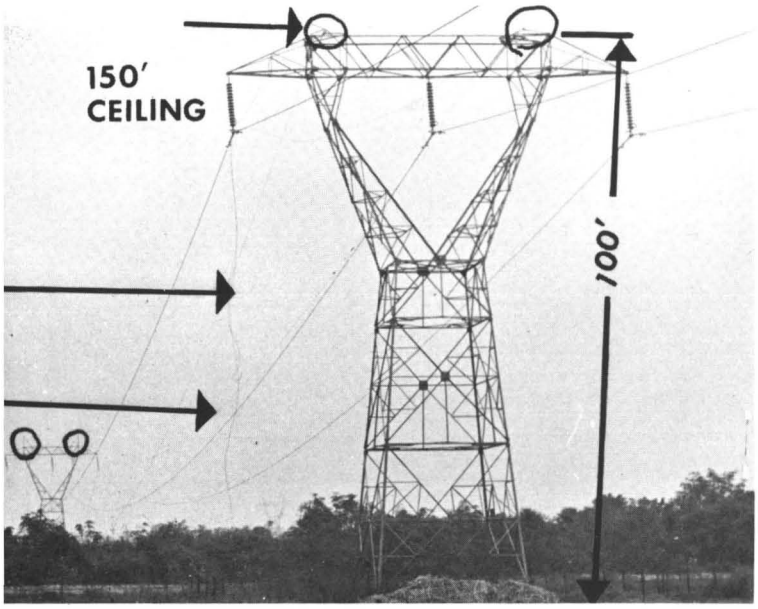
Aircraft Accident Review & Analysis Department
USABAAR

DURING A 5-year period, 23 wire strike accidents in one Army area of operations accounted for 55 fatalities, 15 serious injuries and a hardware dollar loss of $4.4 million. Thirteen of these accidents occurred when helicopters were flown into the same high tension powerlines. Six of these occurred within a 2½-mile span of the powerlines and three occurred at the same location.

Altitude restrictions required seven of the helicopters involved in these accidents to remain below 500 feet because of high performance aircraft in controlled airspaces.

The aircraft accident investigation boards determined that nine of the 13 aircraft commanders in-

This UH-1D with a crew of four and six passengers aboard took off for a dusk support flight and remained low level to avoid air traffic. The aircraft commander cautioned the pilot about the wires shown and the pilot acknowledged and started a climb. The helicopter struck the top strand at the point shown by the arrow, crashed inverted and burned. The aircraft commander and crew chief escaped with minor injuries and helped two passengers from the burning helicopter. The six remaining occupants were trapped in the wreckage and killed



WIRE TOLL

volved in striking the same powerlines knew about the wire hazard in the area of operations. Six of the reports stated that the aviators involved were made aware of this hazard during orientation flights.

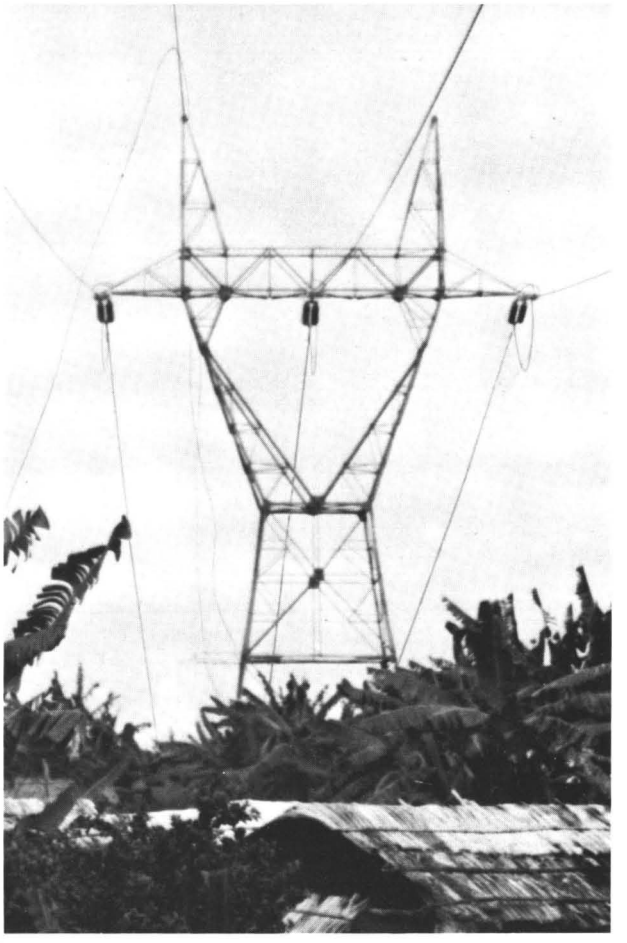
Flight experience was not considered a factor. Twelve of the pilots in command had logged in excess of 600 flight hours. Seven of these 12 had flown more than 1,000 hours.

Restrictions to visibility were present in 7 of the 13 accidents involving the same powerlines. Three occurred at night, two happened at dawn during inclement weather and the remaining two occurred while smoke and haze were in the area. Additionally, both of the latter two helicopters were flying into the sun.

The accompanying photographs and captions depict some of these accidents and the factors involved.

This UH-1H with a crew of four aboard was on a dawn resupply mission and was flying No. 1 in a formation of two. IFR conditions were encountered and the crew of the No. 2 helicopter lost sight of No. 1 and began a descent. They saw the other helicopter intermittently as they descended through broken to overcast clouds, finding it necessary to descend to approximately 100 feet to retain visual contact with the ground. They saw the No. 1 helicopter strike these powerlines approximately 80 feet above the ground and crash and burn. The crew of four was killed. The ceiling at the crash site was between 100 feet and 150 feet, with one-half to one mile visibility. Prior to their departure for this mission, neither crew checked with any facility for en route weather or weather in their operational area

It is apparent from analysis of these accidents that wire strikes can be prevented through strong command attention to wire hazards in operational areas. If wire hazards cannot be eliminated, a vigorous and continuing educational program must be adopted to ensure full awareness of wire hazards by all air crews. Additionally, the feasibility of routing air traffic away from hazardous areas must be considered.



A UH-1D with a crew of four aboard was on a search mission at dawn when it struck a support cable for these powerlines at a height of 100 feet, crashed and burned. The four crew members were killed. The pilot was flying over unfamiliar terrain in marginal weather (fog) when the accident occurred. Part of the support cable is shown entangled in the wreckage

The pilot of this OH-6A was preoccupied by the visual low level recon he was making and failed to see wires stretched between two spans of a river bridge.
A wire caught the left skid, ripping it off and sending the helicopter into a left nose low attitude.
It hit the water at approximately 80 knots and sank. The crew of three escaped with only one minor injury

CW3 Kenneth W. Hill
Aircraft Accident Review and Analysis Department
USABAAR

Aviation Safety Officer Indicator?

WHEN REPORTING to a new unit, any officer may find the CO has just handed him an additional duty as aviation safety officer (ASO). This duty is in many ways the same as other additional duties. The officer's OER will consist mostly of how he accomplishes his duty. The other officers will appraise him by the way he performs and his performance will be inspected periodically by various elements of command.

This article has been prepared to provoke your thoughts in the area I feel is most important to worldwide aviation accident prevention. I'm referring to the *performance measurement* of the ASO and his accident prevention program. The accident rate which we normally use to measure performance is only a measurement of the *results* achieved by ASOs and their programs. By no means does it give an indication where ASOs or their programs may be weak. It tells us what *has* happened, not what *is* happening. Periodic inspections by command elements don't really tell us how ASOs are doing. These inspections only tell us whether they have been proficient in complying with various safety and administrative regulations.

If an ASO fails to perform in certain areas of his duties, his fellow officers may not realize this failure can result or has resulted in accidents or other mishaps, even though some may be grounded by injuries and lose flight pay. Unit commanders need performance indicators to measure how their ASOs *are doing,* not how they *have been doing.*

The program I'll describe is not the ultimate answer. I hope it's a way of provoking thought so others will express their ideas on the subject. This program does have flexibility and it applies to all aviation units, including combat units.

This program calls for commanders to direct their staffs to develop an ASO indicator containing actions directed by regulations and actions demanded by local conditions, as deemed necessary by the commanders. The word *actions* in this context is defined as those acts requiring conscious thought, such as once-a-day coordination with the maintenance officer, once-a-week ramp checks for FOD and unsafe conditions, etc. This indicator then becomes a mandatory cross-check of those functions required by regulations and individual commanders.

The next problem is to make this indicator capable of measuring performance. This can be done by assigning each action of the indicator two possible ratings, satisfactory or unsatisfactory. At some time during the month, or at any time the commander wants to appraise his ASO program, he or his designated representative can use the indicator to determine an informal rating, much in the manner of the Guide to Aviation Resources Management for Aircraft Mishap Prevention. An average rating should then be computed. Anything under 95% would be considered unsatisfactory performance. Actions contained in the indicator (see example) are required at timed intervals set forth by regulations or ordered by the commander.

One probable reaction from this type program is that many S-3s and operations officers will need

AVIATION SAFETY OFFICER INDICATOR
196th Avn Co (ASH)
An Son RVN

FREQUENCY	ACTIONS REQUIRED	RATING	
		Sat	Unsat
DAILY	Coordinate information/action with Flight Operations. Coordinate information/action with Maintenance Office. (OTHERS MAY BE ADDED AS DEEMED NECESSARY.)		
WEEKLY	Inspect physical condition of ramp and maintenance areas for hazards and unsafe practices. Report results to CO with recommendations and a follow-up check in 2 days. AR 95-5, CHAP. 4, PAR. 4-3		
	Inspect/review the preaccident equipment plan (including the kit and where support not in the kit will come from). Posted with the preaccident plan. AR 95-5, CHAP. 9, PAR. 9-3		
	Prepare and maintain a record of preaccident plan tests. AR 95-5, APP. I, PAR. 3-(3)		
	Coordinate information/action with other tenant ASOs.		
	Coordinate information/action with lane tower chief and controllers.		
	Observe preparation and mission launch activity.		
	Observe aviator/operations preparation for mission.		
	Report (written) to CO on all areas encountered weekly along with recommendations and recognition of personnel and areas that are outstanding.		
	Prepare, submit and maintain a record of mandatory reports as required. (OTHERS MAY BE ADDED AS DEEMED NECESSARY.)		
MONTHLY	Assist the CO in conducting the aviation safety council meeting. AR 95-1, CHAP. 3, PAR. 3-3		
	Conduct the aviation safety review. AR 95-1, CHAP. 3, PAR. 3-4		
	Establish, maintain and rehearse the preaccident plan. AR 95-5, CHAP. 4, PAR. 4-3		
	Administer the accident prevention survey with report and recommendations to CO. (Follow up action in 4 days). AR 95-5, CHAP. 5, PAR. 5-3		
	Assist the CO in conducting the aviation safety meeting. AR 95-5, CHAP. 5, PAR. 5-5(h)		
	Establish, maintain and revise 2 Safety Information Boards (one in flight operations and one in aircraft maintenance area). AR 95-5, APP. VI, PAR. 6		
	Monitor the standardization meeting. AR 95-5, APP. VI, PAR. 10		
	Monitor (assist only) the enlisted safety council meeting. AR 95-5, APP. VI, PAR. 13		
	Coordinate on problems in obtaining flight equipment with report (written) to CO. (OTHERS MAY BE ADDED AS DEEMED NECESSARY.)		
WHEN REQUIRED	Submit crash facts message; review aircraft accident reports; prepare and maintain accident folders, etc.		

Aviation Safety Officer Indicator?

crying towels because the requirements of the indicator will leave ASOs with little time to be odd-jobs officers, as so often happens. A major problem is that this type of program will not tend in any way to upgrade performance of units commanded by COs with a mission-in-spite-of-safety attitude. Effective safety does enhance mission performance and, with this type program, commanders and regulations unite to produce an accurate indicator of performance. Anything short of a mission-incorporating-safety attitude on the part of commanders will result in an indicator measuring regulations only.

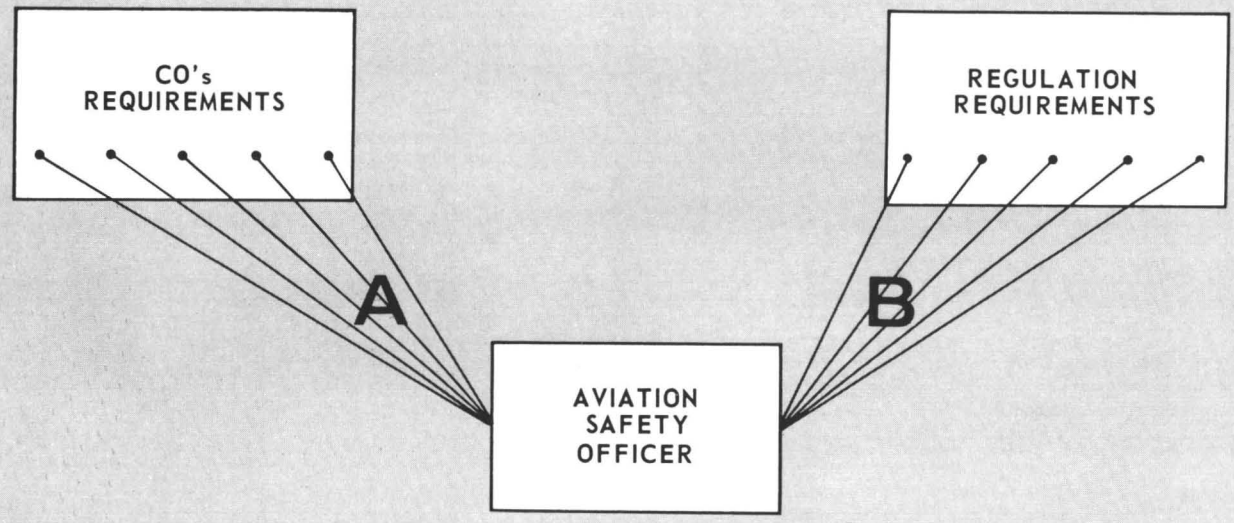
This program offers the following advantages:

1. An *anytime* rating of how ASO duties are being performed.
2. It will indicate potential weak spots in the performance of ASOs, in such areas as administration, standardization, inspections, etc.
3. It will indicate whether ASOs are obtaining cooperation in their work or are not obtaining it and saying nothing about it.
4. It will also have a built-in guarantee that ASOs will not sit at their desks or stay in cockpits to the detriment of their ASO duties. By regulating actions contained in their indicators, commanders may obtain an optional ratio of desk, flying and ASO performance.

These are only some of the results available through this program. There are others, depending on local situations. Since indicators will be formulated by regulations and commanders, they have the potential and flexibility to fit all command levels. This can encompass divisions and various flight detachments at levels where most ASOs are not school trained.

At first glance, this program may look like nothing more than a checklist of things to do. However, results depend on correct use. Most company level ASOs are not school trained. But even if they see this as only a checklist of things to do, it will still help them. Most commanders do not know what an ASO is supposed to do to satisfy the regulations and most spend very little time in directing their ASOs, except to issue special projects. When combined with the fact that most nontrained ASOs are also unaware of regulation requirements and not familiar with items to be accomplished which are not in regulations, this brings about a situation which

How the indicator becomes a simplifying link in the communication process:



Lines marked "A" generally require two-way communication.

Lines marked "B" generally are one-way communication channels, but require cross-checking with the CO or lines "A."

The above process generally occurs during each and every action required under present practices.

results in constant notification by higher headquarters that this and that isn't being done, or isn't being done on time, etc.

At the very least, this program will cause commanders and ASOs to look at the regulations and special local situation requirements. Hopefully, it will cause them to come to a mutual understanding of what commanders want and what should be accomplished. It should be understood that ASOs are their commanders' advisors *only*. Even the best ASO will perform better if he understands exactly what his commander wants. Less experienced ASOs, given this specific information, will give better performance because they understand what their commanders need and want accomplished through clear and concise statements, rather than 14 regulations, 3 SOPs and 9 word-of-mouth directives.

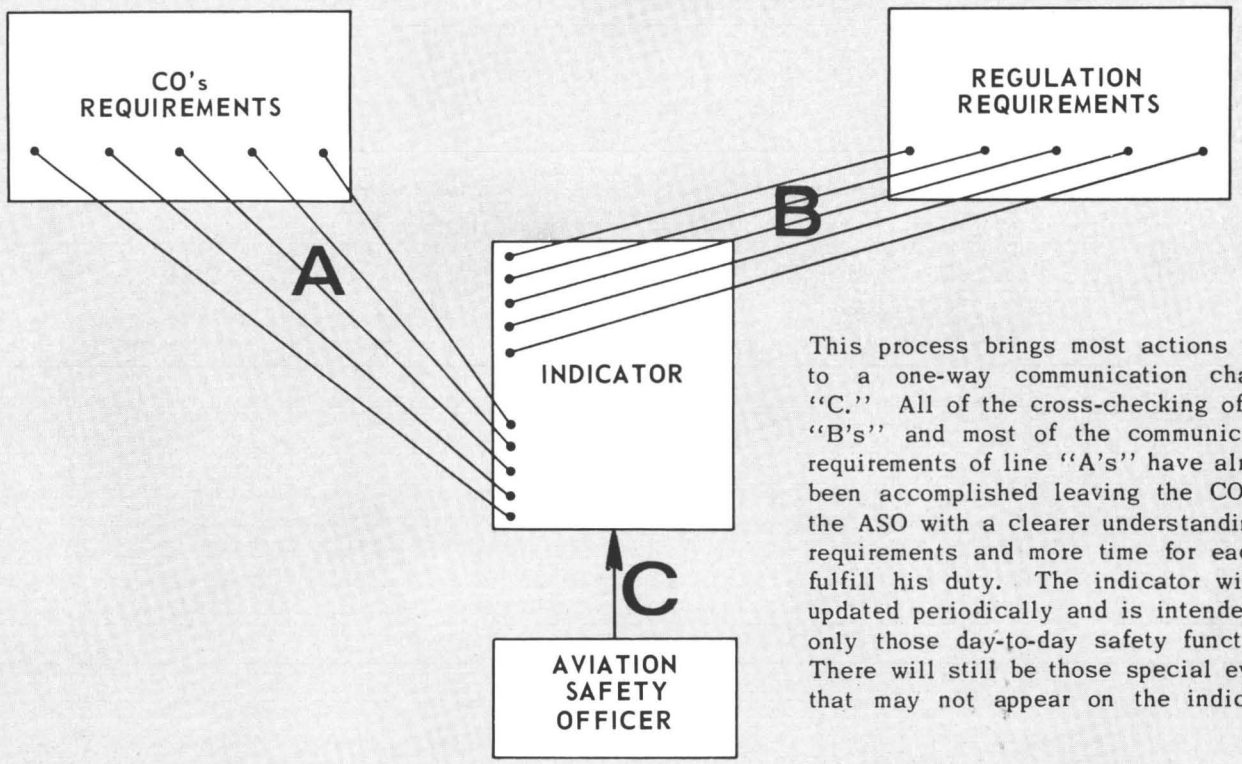
The performance indicator is not meant to take the place of regulations or SOPs. It is intended to augment them. A final requirement should be for commanders or their representatives and ASOs to review their indicators at set intervals to add or delete items as their situations change.

Will this type of program require more time on the part of commanders? Yes. More of their time is needed than is currently spent in most cases. I would point out that aviation accident prevention, by regulation, is a commander's responsibility. Nothing short of teamwork and exerted effort by the unit staff and all personnel of the unit will result in the elimination of aircraft accidents.

If we in Army aviation can develop a method of measuring the effectiveness of our ASOs and safety programs *now,* instead of last year, we can provide our commanders a method of detecting and dismissing ASOs who are not contributing to the accident prevention effort. More important, we can identify and reward ASOs who aggressively pursue the safety goal.

The only way to lower the accident rate is to increase the effectiveness of ASOs and the aviation accident prevention program. To increase this effectiveness, we first need a way to measure what we have in aviation safety today, not what we had last fiscal year.

The sample indicator was written for the unit I am most familiar with. Bear in mind that a team consisting of the commander and his staff may well come up with a better and more practical indicator for your unit.



This process brings most actions down to a one-way communication channel "C." All of the cross-checking of line "B's" and most of the communication requirements of line "A's" have already been accomplished leaving the CO and the ASO with a clearer understanding of requirements and more time for each to fulfill his duty. The indicator will be updated periodically and is intended for only those day-to-day safety functions. There will still be those special events that may not appear on the indicator.

SFC Charles P. Jordan
Education and Prevention Department
USABAAR

An NCOIC talks about . . .

Quality and Safety in the Maintenance Area

I've found that enough personnel have been provided for the maintenance units I've been in, but as maintenance supervisor, you must place these personnel where they can best be used to perform your mission

I REPORTED TO A unit I had left a year before, as NCOIC of a detached platoon supporting fixed wing aircraft. Because of my prior service with the unit, I felt it would be a snap getting back into a smoothly operating groove. As things turned out, it was anything but! When I went into the production control office, I saw a man behind the counter whom I took to be the production control clerk. He was reading a paper with his feet on the desk and didn't bother to look up. I asked him if the maintenance officer was in and he replied, "Uh, uh." I asked him if I could find the maintenance officer in the area and he answered, "I don't know." Then I asked, "Do you know him when you see him?" Still reading his paper, he answered, "Uh, uh." I knew then that I had problems.

I took a walk around the operation to see how much it had changed and the first thing I saw was a large open can of fuel right in front of the hangar. I covered the can with a box, made a note of it and went on with my inspection. At the rear of the hangar, I did a double take. I couldn't believe what I saw. There before me was a pile of used parts that should have been returned to the supply system. In CONEXs scattered around the area, I found broken equipment and even some helicopter parts, both used and serviceable. These helicopter parts had no possible use for fixed wing aircraft, but no attempt had been made to turn them in.

The next thing I looked over was the ground handling equipment. I found very little that was operational. The hydraulic maintenance stands were leaking so badly that the safety locks were the only things that would keep them extended. The safety rails had been removed and lost. The portable two-wheel air compressor had no guard over its belts and pulleys, making it unsafe for use.

I went over the wheeled vehicles and found the door to the storage compartment of a 5-ton stake and platform trailer had been left open. It was

obvious the door had been dragged because it was bent, cracked, caked with mud and sand and almost ripped off.

My next stop was the hangar. I found no grounding cables and no chock blocks. The fire extinguishers had no inspection tags and some were empty. The smoking area appeared to be wherever a man decided to smoke. I checked the bulletin board to find out who the safety NCO and fire marshal were, but there were no orders posted for either. I also failed to find any ground runup orders posted.

While walking around the maintenance area, I saw both military and civilian mechanics performing maintenance without using TMs. I made it clear to the military mechanics that they *would* use TMs, but the civilian mechanics were another problem. I approached the civilian leadman about this and was told that he and his mechanics did not work for the Army and did not have to follow Army regulations. The military personnel couldn't understand why they were required to observe safety and maintenance regulations while the civilians ignored them. After a call to the civilian supervisor for the area, the leadman was replaced by another who did follow regulations and my problem in this area was solved. We have some outstanding civilian mechanics assigned to our maintenance units, but, like military personnel, it's necessary to have close supervision of their work and someone to coordinate the work flow between the civilian and military mechanics. The new leadman solved this problem.

The next thing was to clean up the area and identify, tag and return all parts, both serviceable and unserviceable, to the supply system. This is an area that requires constant supervision to keep it from becoming a serious problem. Parts have to be returned for repair before they can be put back into the supply system as serviceable. Before you complain about the supply system because you haven't received a part you requisitioned, take a look around your maintenance area for unserviceable parts that haven't been returned for repair. This could well be the reason you haven't received your part.

The next step was to assign each maintenance crew an area of responsibility. Crew chiefs were instructed in ground runup procedures for the aircraft we supported and orders were cut and posted, assigning a safety NCO and fire marshal.

For the next couple of months a lot of hours were put in by the entire platoon to bring it up to the desired standards for an aircraft maintenance unit. We made a complete inventory of every piece of equipment assigned to the platoon and checked the condition of each piece. Shortages were reported to unit supply for requisitioning replacements. We repaired all the equipment we could and turned the rest in as unserviceable.

At first, there were a lot of complaints from troops in the platoon. But when things began to shape up, their pride in the platoon began to grow. The condition of our hangar and equipment was soon well above average and production, as well as quality, increased beyond any previous records. We had a satisfied CO and a good working relationship with our customers due to the increased availability of safe flyable aircraft.

After 3 months, we had a large turnover of personnel. By luck, two highly qualified fixed wing technical inspectors were assigned to us. These TIs were as interested in improving working conditions and the quality of our maintenance as I was. There was no such thing as *memory* maintenance in our area.

Lady luck smiled on us again when two factory technical representatives, one from Pratt and Whitney and one from Beechcraft, were assigned. I explained my interest in improving the efficiency of our mechanics and the quality of our maintenance to these tech reps and they were delighted to set up classes on the PT-6 engine and U-21. All personnel of our platoon attended these classes every night. This was the start of cross training for our mechanics.

I've found that enough personnel have been provided for the maintenance units I've been in, but as a maintenance supervisor, you must place these personnel where they can best be used to perform your mission. This can be accomplished by rotating mechanics to different positions, such as production control, shop supply, OJT in technical inspections and as maintenance crew chiefs. By observing their performance in these positions, you can place each man where he will be at his best and prove the most useful to you. It also gives the mechanics a better understanding of the operation they are a part of and the necessity for the correct use of parts, production control, quality control and shop safety.

A near accident might make a good conclusion for this. However, thanks to the quality of maintenance from both our civilian and military personnel, especially those in quality control, we did not have an accident or near accident occur. When you leave your unit for a new assignment, I hope you leave with as much satisfaction as I had from my tour with this platoon.

CAPTAIN ARNOLD H. SAMPSON, son of Mrs. Ruth B. Sampson, Baltimore, Md., won his Broken Wing Award for saving his helicopter and crew after an enemy round entered his collective servo and jammed the collective. On a medical evacuation mission with the 68th Medical Detachment (Hel Amb), CPT Sampson was flying at minimum altitude due to a low ceiling and heavy rain when his helicopter was struck by hostile fire. During evasive maneuvers, he found the collective control immovable. The cyclic was sluggish, but manageable. The collective was set at 40 pounds of torque and could not be moved.

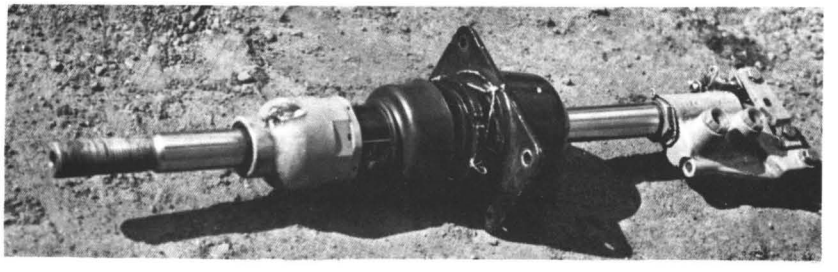
With the helicopter climbing into the overcast at 120 knots, CPT Sampson reduced throttle, experienced a retreating blade stall and the UH-1H went into a left nose high attitude, then into a spinning dive. He closed the throttle as the air speed reached 140 knots and stabilized the helicopter after a 400-foot descent. During this time, he was able to lower the collective to 25 pounds of torque. CPT Sampson then made a running landing at an airfield covered by ground fog.

In addition to the Broken Wing Award, CPT Sampson was awarded the Distinguished Flying Cross, three Air Medals with V device, two Purple Hearts and the Vietnamese Cross of Gallantry for his combat service. He is a graduate of Morgan State College, Baltimore.

BROKEN WING AWARD

LTC Egbert V. Bunger, CO, 8th Evacuation Hospital, Fort Ord, California, presented Broken Wing Award pin and certificate to Captain Arnold H. Sampson for displaying extraordinary skill, judgment and technique after his helicopter was struck by enemy fire

This is a photo of the collective servo from Captain Sampson's UH-1H, showing where bullet entered and jammed collective



EJECT! EJECT!

Lieutenant Colonel Richard F. Taylor
Aircraft Accident Review and Analysis Department
USABAAR

LET'S GET OUT OF HERE!

Facts in this article are correct. Names, times and places have been changed

THESE WORDS, or others too descriptive to print, are spoken by few, but dreaded by all who fly the seat. Many hours are devoted to the *whys* of uttering them at the USAAVNS. The U.S. Air Force and U.S. Navy, by virtue of their larger fleets of ejection seat-equipped aircraft, have devoted more emphasis on when aviators *will* make this decision. Little has been published by the Army. Not enough recognition has been given this problem. Granted, aviators assigned to Hawk units hangar-fly the procedure and each develops his own parameters for deciding when he will go. Hopefully, these parameters are within ejection seat limitations. Why, then, does something like the following happen?

The flight: An OV-1 was on a VFR night mission to train enlisted technical observers in the use of electronic surveillance equipment. The syllabus of instruction defined a specific flight pattern to be flown at 2,000 feet AGL during a 1-hour period. After flying 50 minutes, the pilot called the tower and reported inbound over a predetermined checkpoint in the mission profile and requested landing instructions. Instructions were given and the pilot acknowledged. Fifty seconds later, he called "MAYDAY! MAYDAY!" and reported losing fuel pressure and power. He followed this by reporting all power lost. The tower operator then asked, "What is your position? Can you make my location?"

The pilot replied, "Negative, cannot make your location. My position is 5 miles south of point X-ray."

The tower operator came back, "Not familiar with point X-ray. What is your position in relation to my location?"

The pilot stated, "We are 15 miles south of Gibson." Seconds later, he transmitted, "This is it! Get out! Bail out!" No further transmissions were heard. Search and rescue procedures were immediately initiated by tower personnel, but the airplane was not located until the following morning. It had crashed approximately 15 miles north of the field. The two crew members were killed.

The investigation: Investigation at the scene revealed the airplane impacted in a nose low, wing level attitude at an approximate 70-degree angle. Impact forces were severe. The observer ejected milliseconds before impact. Due to the attitude of the airplane and lack of altitude he was ejected parallel to the ground at about 5 feet. His ejection equipment functioned normally and he struck the ground 120 yards ahead of and in line with the flight path, just as seat separation occurred. The pilot had not activated his ejection seat.

Close examination of the wreckage revealed that neither engine was delivering power at impact. Both propellers were bent backward and marked by im-

pact, indicating they were windmilling when the airplane hit the ground.

There was no evidence of fuel spillage from the main fuel cell area. Both tip tanks ruptured and evidence of spillage in the sand indicated a good amount of fuel was in the tanks at impact. The fuel selector switch was found in the "transfer" position. However, it was assumed that the selector switch was placed in this position after the emergency was declared. This assumption was based on the large fuel spillage patterns found in the areas of the ruptured tip tanks.

From the time the emergency was declared, it was estimated, by use of the tower tape, that the pilot had approximately 50 seconds to eject. Most of this time was consumed by the tower operator transmitting unnecessary communications. This does not infer the pilot had to reply to the tower communications, but he did. This distraction made successful ejection impossible. After analyzing the tower tape, investigators concluded that the decision to eject and the command to eject by the pilot appeared as afterthoughts. The pilot was found in his seat just forward of the wreckage. From examination of the pilot by a flight surgeon, it appeared the pilot was attempting to activate his ejection system with his left hand when the airplane struck the ground. Massive impact forces caused death to both crew members.

Tentative findings: Findings of the investigation of this accident are tentative. They are:

1. The cause of the accident was dual engine failure due to fuel starvation.

2. The pilot placed more emphasis on radio transmissions than he did on escape procedures during the emergency.

3. The pilot did not properly manage the fuel available aboard the airplane.

4. Using another OV-1 and the tower tape, it was determined that approximately 47 seconds elapsed from the declaration of the emergency until impact. The rate of descent was 2,200 feet a minute at an air speed of between 145 and 150 knots. The test flight included a mission profile altitude of 2,000 feet AGL, and was started 5 miles south of where the pilot had declared the emergency.

It is readily apparent this pilot mismanaged the fuel aboard his airplane. When the engines started to lose power, he immediately knew he had committed an error. His natural instinct was to try to correct his error as soon as possible and get on with the mission. He made every attempt to do just that and may have been partially successful, but his prime error was yet to come. The decision to eject was delayed until it was too late.

USABAAR records indicate that the OV-1 ejection seat has a remarkably reliable record of functioning properly. There are no known instances on record where the seat failed to fire after the sequence was initiated. There are many recorded instances of unsuccessful ejections, such as the observer's in this accident.

It is a remarkable phenomenon that everyone ejects in ample time when the need to eject is obviously the result of an *outside* influence, such as combat action. But, all too often, as in the case described, ejections are delayed while pilots attempt to correct *self-imposed* emergencies. By then, it's too late!

One other facet of this accident deserves attention —the redundant questions and time-consuming transmissions by the tower operator. In addition to their other duties, tower personnel are there to aid pilots in coping with emergencies. Generally, they do a grand job. In this instance, the pilot may have been distracted by all the questions concerning the position of his airplane. What about the tower operator's supervisor? Shouldn't he have made sure that all tower personnel knew the code names for specific points and their locations in relation to the field? If he had, when the pilot reported point X-ray, the tower operator would have had no need for further identification.

Many errors or omissions are recorded when an accident such as this happens. The honest commander will always evaluate his actions from this point of view: "What if . . .?" This accident is no exception.

In this case, the fatalities need not have happened if the pilot had elected to eject when he should have. There is no time for waiting!

I recall reading a letter from an Air Force general written after his unit had experienced several fatalities due to late ejections. This officer admonished his men this way (paraphrased because I've lost my copy of the letter): "The decision to eject will be made whenever you think you can handle the emergency." The key word is THINK. If you don't KNOW you can, then is the time to put your faith in Martin and Baker. They're reliable!

The following stories were written by members of a recent Communications Skills class of COL Daniel M. Lewis (USAF, Ret) of the Institute of Aerospace Safety and Management at the University of Southern California

SILENCE

THE SILENCE was eerie. The only sound I could hear was an occasional call of a bird. There was no wind, no rustling of leaves in the jungle that surrounded me. There was only the deep silence.

The contrast of this silence to the sounds I had recently heard was overwhelming—the sounds of men and machines engaged in combat; the sounds of heavy quick breathing by men facing death; the sounds during the ejection from my disabled airplane; the sounds I made crashing into a dead tree while suspended in my parachute; and the sounds of many men pursuing me all seemed a million miles away though just minutes before, they had been very real sounds.

As I sat huddled beneath a bush, not knowing

Silence means many different things to many people. It has a new meaning for me

what was to happen, many thoughts raced through my mind. I thought about my pregnant wife and my daughter. I thought about my copilot's wife and two small boys. I wondered about my copilot himself. Was he alive or captured? Would either of us ever see our families again?

I wondered even more about the men who had been chasing me up the mountainside. It puzzled me that these men, who only minutes before had fired several rifle shots, would suddenly be so quiet. When I took refuge in the bush, they were so close I could hear their footsteps. I had almost stopped breathing for fear they would hear it and find me. Now, the birds made the only sounds.

After about 30 minutes of silence, I heard the most welcome sound I had ever heard, the muffled sound of an airplane engine. With that sound, my spirit soared. From a state of mind that held no hope, I suddenly realized I might be rescued.

With a new feeling of hope, I called the rescue aircraft on my survival radio. I was very careful to keep the radio from revealing my position to the men who had chased me. The rescue aircraft homed in on my radio and flew directly over me. The pilot could not see me through the heavy tree canopy, but he knew approximately where I was. He told me a rescue helicopter was close behind and said to sit tight. He then flew back and forth repeatedly over me to see if there was any hostile ground fire that might endanger the helicopter. After several passes, the pilot was satisfied it would be safe to begin the pickups.

My copilot was the first to be hauled up. I wondered about his condition and imagined the worst. I felt responsible for his safety, though we were separated by nearly a mile of jungle. A short while later, the helicopter came for me. I was told to be prepared to ignite a signal flare. This flare would help the chopper crew determine my exact position.

Suddenly, there was bright red-orange smoke near me. I had not set off a flare or any other signal device. Only the men who had searched for me earlier could have released the smoke. The rescue immediately became less routine. If these men had flares, they could have been setting an ambush for the helicopter. The decision was made to continue the rescue attempt, but there was to be no time wasted. I was directed to ignite a flare and, in a matter of seconds, the helicopter was directly overhead. The tremendous downwash from the rotor blew the foliage back so the helicopter was in full view. The sight was marvelous. It was the most beautiful thing I had ever seen.

The pickup was to be made while the helicopter hovered. I could see a cable extending downward with a jungle penetrator attached. The penetrator was a harnessed seat for me. It touched the ground about 15 feet from me and that was the longest 15 feet I ever tried to span. It seemed that I was in the middle of a hurricane with dirt, leaves and all sorts of debris hitting me in the face. I could not see the ground because of the rapid movement of the tall grass. This caused me to fall twice in my effort to reach the penetrator.

After what seemed an eternity, I had the device, my first tangible contact with safety, in my hands. I quickly unzipped the canvas cover, attached the safety belt and opened the seat. From my training, I knew not to look up until I was ready to be hauled away. After what seemed a second eternity I was ready to go, holding on for dear life with my left hand and signaling the helicopter with my right. I looked up and what I saw gave me the surprise of my life. Less than 10 feet away stood a dark-skinned man. A wave of fear engulfed me again. "Please don't shoot," I prayed. Then I realized he was not trying to harm me, but was smiling and waving goodbye.

The reason for the long silence became apparent. In the midst of this hostile environment was a group of friendly natives. These people had searched for and found me in short order. Since they meant me no harm, they had surrounded me, offering what protection they could. The rifle shots must have been some sort of signal to the group searching for my copilot.

It was only a minute or two until I was aboard the helicopter. There, waiting for me with broad smiles, were the crew and my copilot.

Silence means many different things to many people. It has a new meaning for me.

LOOKING DOWN from 1,500 feet, I had no idea my chase pilot could have survived the crash of his OH-13S. It was scattered over 50 meters of rice paddy, burning, and the cockpit was upside down in a foot or more of water. Small explosions were going off every few seconds. I called operations to report the crash and requested any UH-1 in the area to join me, in hopes that the pilot had been thrown free and was still alive.

I saw movement in tall grass about 100 meters from the crash, armed my skid gun and dropped down on the deck to have a look. I fully expected to see NVA uniforms and brown faces. Instead, the pilot of my chase ship limped from the grass, waving his arms. By this time a command and control ship from my platoon was on hand and I dropped smoke near the pilot to direct the UH-1D to his location. Five minutes later he was on board and on his way to a medical facility.

We'd been flying scout missions together for 3 months and had grown confident of our ability to work as a team. On the morning of the crash, we had flown a first light recon with Joe, as we'll call him, flying high to cover me. We searched for 2 hours with no results. After landing, we were told by operations to carry two passengers to a nearby fire base. To save time, we only removed our observers' machineguns and ammunition, leaving the ships armed with skid-mounted M-60s and grenades. We considered ourselves scout pilots and resented having to fly a boring ash and trash mission, but there was no choice, so we flew our passengers to their destination and dropped them off.

I asked Joe if he wanted to fly back low level and see if we could spot anything to make up for the zero score that morning. He agreed and we left the fire base, going upriver right down on the deck. I was in the lead and Joe was behind and to my right. Because we had flown with each other so much, I seldom called my turns or breaks. It almost seemed that each of us knew what the other was thinking.

Just around a bend was the intersection of the river I intended to search on the way back. I broke right and reduced my air speed to about 40 knots. Joe continued to fly the course of the river low level. I gained about 25 feet, to clear some trees, then descended and picked up a course parallel to the streambed. It was at this point that our flight paths intersected and Joe had to make a hard right turn and descend to avoid running into my tail rotor. It happened so fast he never had a chance to call. I continued up the stream for several minutes, unaware that anything was wrong until I called him and he didn't answer. I climbed to altitude and spotted the wreckage.

It turned out that Joe was not hurt. He had managed to crawl free before his helicopter caught fire. But the result was one OH-13 destroyed in an accident that did not have to take place. We should have never been flying low level without our observers to help clear us in turns. We also learned an expensive lesson—that two ships flying low level must remain in radio contact and the lead pilot *must* report all turns in time for the second ship to avoid a midair. The chase ship, whenever possible, should remain at altitude. Last and most important is the fact that flying ability is completely useless without the use of mature judgment.

EXPEN$IVE LE$$ON

OUR UNIT was a CH-47 assault support helicopter company. On a typical morning we had breakfast at 0430, an operations and weather briefing at 0530 and were scheduled for takeoff at 0615. The operations briefing consisted of the usual reading of the enemy situation, drawing our mission sheets and the assignment of crews to aircraft. The mission sheets, made up by the operations personnel, consisted of a time on station; the supported unit's location, call sign and radio frequencies; the number of sorties requested; and the type of material to be transported. These were assigned to the unit aircraft, according to the estimated time it would take to complete each mission. Our sheet figured to be a normal eight flight hours, providing resupply for artillery fire support bases.

We took off on time and proceeded to our first destination 15 miles away. The weather was not as good as predicted, with clouds less than 1,500 feet above the ground and visibility less than 5 miles. We decided we would go low level since it was only a short distance and the area was relatively secure.

Our first mission was to resupply a small fire support base which had not had an aerial resupply in 2 days and was in desperate need of water and ammunition. Our first sling load was a 500-gallon water trailer, with a sling of C rations tied below it.

We decided Walt, the pilot, would fly the first mission. I was sitting in the left seat, acting as aircraft commander. The way our unit operated, one pilot would make a round trip and the other pilot would fly the next. We had both been into the same area several times in the past few weeks so we didn't use the map, relying strictly on our FM homing device for navigation. We called the unit approximately 5 minutes south of where we thought they were located. The ground radio operator said he heard us, but could not see us due to low hanging

We had no instruments, no lubrication for our forward transmission and only one engine

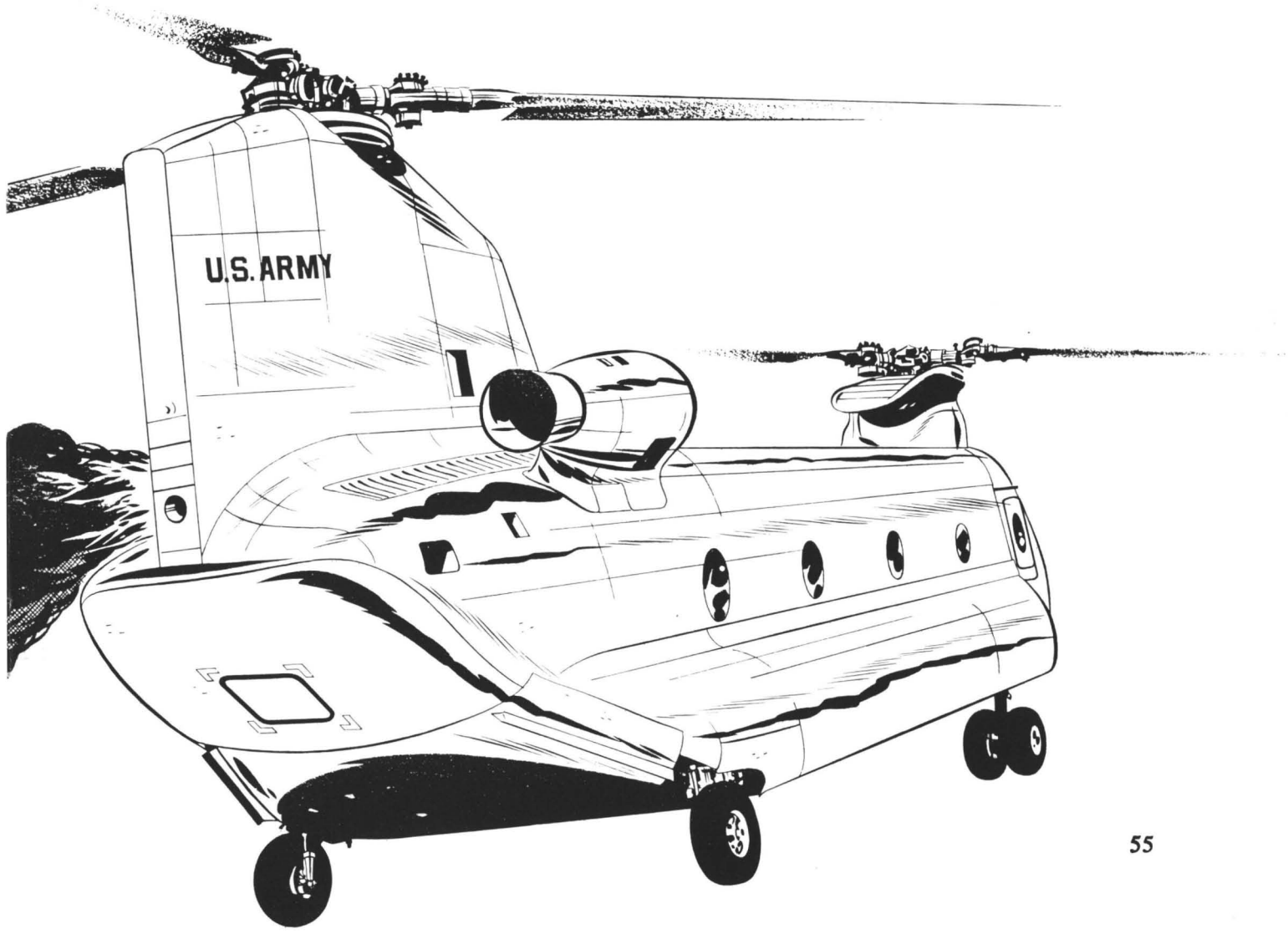
clouds in his immediate area. He directed us to continue on our present course and said he would call as soon as he had visual contact.

In about 2 minutes he called and said he had us in sight, but we were too far to the east. He said we should make a left turn because they had reports of enemy activity in the area toward which we were headed. Walt made a left turn toward the west and, as we rolled out level, I spotted their position. It was a fairly large open field surrounded by high trees on the east and lower ones on the west. The clouds were lower at this point and we were down to an indicated altitude of 500 feet, about 300 feet above the ground.

As we came abeam, south of the area, Walt called and asked for smoke to mark the spot where we were to drop our load. He started a right turn onto a base leg and began our prelanding check. As I reached up to arm our cargo hook, it became dark in the cockpit. I looked outside and saw that Walt had flown us up into the clouds. I glanced at the instruments and saw we were in a climb, with climb power applied. I still had sight of the ground and reduced thrust to get back out of the cloud.

We emerged from the cloud and were on our final approach leg, starting to slow down. We had just crossed the trees and were entering the clearing when we saw ground troops running in all directions, jumping into their foxholes and bunkers. We were already committed to the approach, so we continued toward the smoke and dropped our load. At the moment of releasing the water trailer, we saw tracers whizzing by us. As soon as we heard the crew chief clear us from the load, we made a hasty withdrawal and headed back.

After landing, we shut down and inspected our helicopter for hits. We were lucky. There wasn't even a scratch! For the life of me, I don't see how



we managed to come out in such good shape. After refueling we continued down our mission sheet, completing each mission as it came up with no further excitement. At about 1700, we had radioed our operations, telling them that we had completed our assigned sorties and were headed back. One of the other two-ship missions was getting behind schedule and was just going to call and ask for help when they heard us call in our completion. They requested assistance in moving a small fire support base from one place to another. Knowing operations would divert us anyway, we turned and went to their aid.

We radioed the ground operator and he directed us to our load, an empty water trailer and what we called "ash and trash," made up of empty sand bags, barbed wire, metal posts and housekeeping equipment, weighing about 8,000 pounds. While Walt was at the controls making the first pickup, I was getting directions to the new location. The crew chief was directing Walt over the load and told him we were hooked up.

Walt started adding power for the takeoff as I copied all the information about the new area. I looked outside and cleared us to the left, along with the left window gunner in the rear. We were in an area that was clear to the north and south, but bounded by rubber plantations to the east and west.

We passed an open area during our climbout and I saw one lone individual pop up from the bushes just beyond the rubber trees. I yelled for our left gunner to open fire. Either he did not hear me or did not see his target. We started taking a lot of hits.

As soon as I yelled, Walt applied all available power and started a *left* turn! I grabbed the controls and turned back toward the south. Automatically, my eyes scanned the instruments and the first thing I saw was the big red lighted T handle, indicating our No. 1 engine was on fire. I shouted for Walt to pull the handle. At the same time, I was checking the other instruments and saw we had, in fact, lost No. 1 engine and all of our flight instruments. Also, there was no pressure in the forward transmission.

I saw Walt reaching for the wrong T handle, switched hands on the controls, slapped his hand away and activated the T handle for the left engine. While all of this was going on, the crew of the aircraft behind us was telling us we were on fire and should land. Not knowing the enemy situation below, I decided against landing and asked for a DF steer toward a fire support base I knew was only a short distance away.

We had no instruments, no lubrication for our forward transmission and only one engine. At this point, the crew chief asked if he should release the load. I'd completely forgotten it was under us and was wondering why we kept losing altitude. Of course, it was difficult to stay in the air with that load hanging below us! As soon as it dropped we were able to reduce power from our good engine and continue.

I don't know who switched the radio to emergency or when it was done, but all my talking was going out to everyone listening on the emergency frequency. There must have been at least six aircraft crews answering me, but the only one I heard was a forward controller who happened to be just above me. He knew where the fire support base I wanted was and told me to turn to a heading. Since I had no heading indicator, I couldn't oblige.

The forward controller passed on our right side and told us to follow him. He had come from his position above and behind us. As he passed over the area, he pulled up and told us we were home free if we could make it that far. I climbed a little so I could get a better view and, sure enough, there it was right in front of us and not 100 meters away. I told the forward controller he had a free drink coming any time he visited our unit.

When we landed, out came the supply officer for the unit which owned that piece of real estate. He wanted to know what the devil we were doing here and said we should, "Get the hell outa here!"

We apologized for inconveniencing him and told him we would be unable to fly any more that day. When he realized our predicament, he offered full assistance. I asked for and was given the nerve settler I needed. The crew was treated to fried steak and potatoes, with all the trimmings.

The maintenance crew flew in with the guards that were to remain with our downed helicopter, then flew us home.

When we got to the bar that night after debriefing and closing out our day with operations, the pilot of the other helicopter which had been behind us came in and told us how badly our ship was burning. I was grateful I hadn't seen that much. I'd seen all I could handle right there in the cockpit!

YOU MAY WELL wonder how a set of dog tags could almost kill a man. I'm going to tell you how after I tell you about two other incidents involving jewelry around aircraft.

Incident number one took place while I was assigned to an assault helicopter company as a maintenance technician. I was in the maintenance office discussing the day's work load with the shop NCOIC when operations called and said one of our helicopters was returning to the flight with an electrical problem. I told the NCOIC and he went to get the electrician. I went out to meet the ship and was talking with the pilot when the electrician came out. The pilot kept the aircraft running, told us what was wrong and the electrician began troubleshooting the main generator system. I was going toward the back of the helicopter to find out if he had located the problem when I heard him scream and saw him jump back with a probe from his multimeter sticking in his cheek. Blood was running down his face. By the time I got to his side, he had pulled the probe from his cheek and appeared dazed.

While we were on the way to the hospital, I asked him to tell me what happened. He said that while he was trying to locate the problem with his multimeter, he was busy looking at the meter face instead of watching where he put his hand. He was wearing a watch with a metal band. Somehow, he laid the watch band across two hot contacts. In addition to the hole in his cheek, he had a burn all the way around his left wrist. When he jerked his hand away, he forgot to drop the probe he was holding and stuck it in his cheek. This man was very lucky. He could just as easily have jabbed himself in the eye.

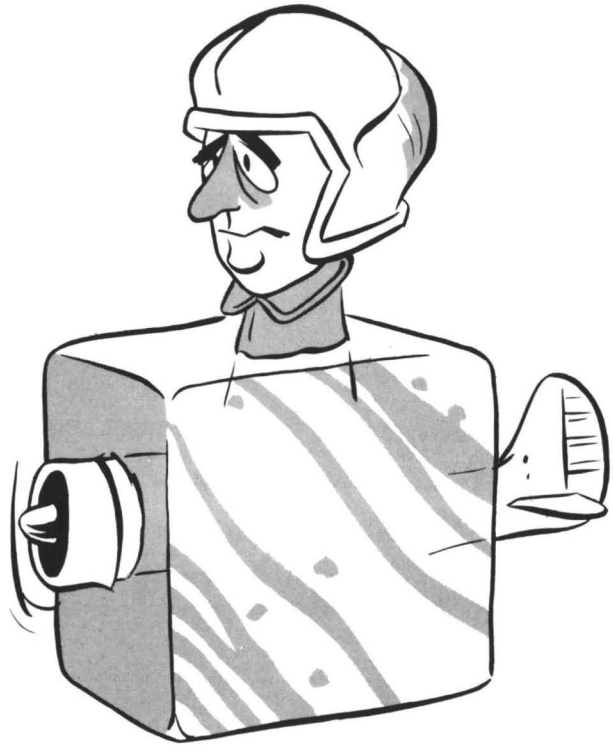
Incident number two took place a little over a month later. Ten of our helicopters returned from a mission and went into the refueling area. A friend of mine was flying one and his engine was on fire. When he told the other pilots, they quickly pulled pitch and got out of the area. My friend was sitting in the left seat of his UH-1, with the door open and the door window down. As he was getting out, he put his right hand on top of the door window and stepped out. A ring on his right hand caught on the door. With the helicopter on fire, he didn't stop to unhook it. He jerked his hand away and the ring took the skin and flesh from his finger almost down to the bone.

You'd think I'd have learned a lesson from seeing these two incidents. If I had, it didn't take. A short time later, one of our helicopters came back with an oil leak and I met it on the flight line with two mechanics. We found the oil leak some place around the input quill on the transmission. We cleaned up the excess oil and I asked the pilot to run it up. As the helicopter was running up, I got on the engine deck and was looking around the input quill area for the leak.

It happened so fast I couldn't tell what had caused it, but I was suddenly picking myself up from the ground with blood all over my face and a hole in my head.

While I was at the hospital getting my head sewn up, the line NCO told me what had happened. While I was bending over, looking for the leak, my dog tags came out of my shirt. As I moved around, they were caught somehow in the rotating controls and my head was pulled into the controls.

From these incidents, I'm convinced that jewelry, including metal bands, rings and metal insignia doesn't belong on the flight line. I hope you'll agree and save yourself a painful experience.



"I'VE GOT AN EMERGENCY HERE"

MY INTRODUCTION to ice came during an instrument flight in a U-6A from Germany to Spain. The flight was planned days in advance and clearances were obtained for our flight across France, Portugal and Spain. Our crew and passengers were eager to go. The weather at takeoff time was better along a flight route which entered Spain from the east than a west coast approach, but we needed flight time and we could log more hours for our annual minimums by crossing France. The weather over western Germany and eastern France was the usual 500 feet overcast, with tops above the operating level of our Beaver and moderate rime ice at 7,000 feet en route. The highest minimum en route altitude to our first refueling stop was 4,000 feet between Luxemburg and Chattilon, France. We requested 6,000 feet and entered "no de-icing equipment aboard" in the remarks column of the flight plan. Approach control cleared us for 6,000 feet and the flight which was to make older and wiser men of two aviators began.

The flight out of the Frankfurt Control Zone, usually a traumatic experience in itself, was uneventful. We reached our assigned altitude and settled down for the first leg of the trip. Shortly after passing Luxemburg, one of the passengers tapped the copilot on the shoulder and pointed to the frost beginning to form on the strut. From our vantage point in the cockpit, the leading edges of the wings could be seen and they were also getting a white coat over the olive drab paint. This was no big thing. We had both flown in Germany for 2 years and a good coating of frost was no stranger. Veterans of two European winters, we also knew we should request an altitude change *now,* as ice seems to attract more ice. We called Paris control and requested a lower altitude. There were no altitudes vacant below and we were told to maintain altitude and stand by. Meanwhile, the entire leading edges of both wings had become solid white. The struts were white over half their surface and the disc area of the propeller was getting easier to see.

We called Paris control again and reported we were building up ice on the wings and propeller and there was no de-icing equipment aboard. Paris again informed us no lower altitude was available and said to maintain our assigned altitude. We asked when we could expect a lower altitude and were again told to stand by. Only 5 minutes had passed since our first radio transmission, but the ice was building fast and there was now a 1-inch thickness on the wings. This accumulation exceeded the ice experience of either of us and we began to look at the wings more frequently. Each time we looked, it seemed another quarter inch had formed.

Three more minutes passed and Paris control had not replied to our change of altitude request. The propeller had become a solid white disc and the air speed had fallen to 90. We advanced the throttle to climb power and put the propeller in low pitch, after exercising it to rid it of ice and warm the oil. Huge chunks of ice hit the windshield, sounding like a machinegun and scaring everyone. We moved toward the fronts of our seats. Paris control finally called and said it would be 10 minutes before a lower altitude would be open. I told the controller we were at full power and losing air speed. His reply was for us to maintain altitude because of traffic below.

By this time the ice had started forming an inverted wedge and we began to lose altitude. We pumped down climb flaps and maintained altitude for a few minutes, but could not regain the 200 feet we had lost. We told the Paris controller we were unable to maintain altitude and he replied that we *must* maintain altitude. We asked about the possibility of landing at an airfield in the immediate area, but there was nothing open between us and Paris. We had to continue.

When we were 500 feet below our assigned altitude, we called the Paris controller. He said we must maintain our assigned altitude or clear the airways. The inverted wedges of ice on the leading edges had grown to 2 inches. The throttle and propeller levers were full forward and the mixture lever was constantly adjusted for best power. Our air speed had dropped to less than 60 and we were 750 feet below our assigned altitude, still going down. We told the Paris controller about our altitude and he immediately replied with words we could not believe: "Turn left to a heading of one eight zero degrees, clear the airway and maintain own navigation."

After clearing the airway, we paralleled it and continued to descend. Paris control would not answer our call for information about the freeze level. Another aircraft requested the same information and relayed the reply to us. We were in trouble. Even the commercial aircraft which had monitored our progress offered assistance, but there was no way they could help. Every suggestion we could comply with had already been done. We gave our passengers the choice of jumping or riding it out. They chose to ride it out.

After descending to 1,000 feet above the terrain, still in the clouds, we found we could maintain altitude and continued toward Evereux, France, about 30 minutes away. We were not losing any ice but we could maintain flight. Evereux GCA gave us vectors and recommended minimum altitudes until we broke out of the clouds on final approach over the end of the runway. Never has a runway looked so good!

We flew the plane all the way to the ground and stalled as we started to round out about 1 foot above the runway. The 1-foot fall caused ice to fall from the wings, but it was so thick it didn't shatter. The airplane was placed in a heated hangar and there was still ice on the floor 18 hours later.

For years, I thought I had done everything possible on that flight. But, recently, an aviator asked me why I didn't declare an emergency. Because the engine was still turning and both wings were still on, I did not consider it an emergency. I didn't know the controller could have determined the proper action I should have taken and that I was making his job more difficult. This flight would have been little more than routine if, at the beginning, I had said, "I've got an emergency here."

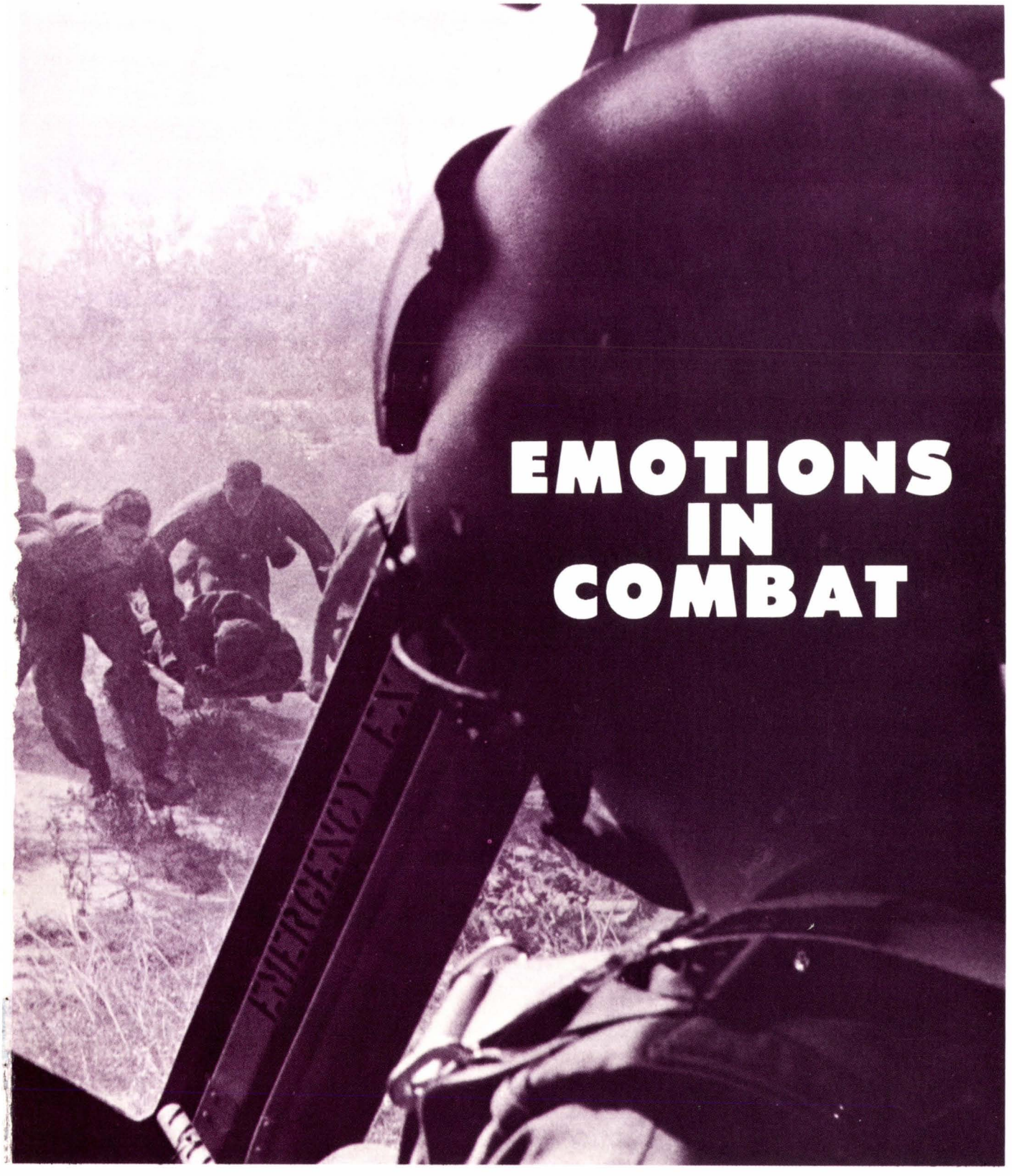
. . . war had become a very personal thing. It had become real people, with real blood running on the floor of his helicopter

A HUEY approached cautiously down the road toward a small defense perimeter. The area was dimly lit by parachute flares and the chutes from burned out flares were scattered across the tops of rubber trees like huge white flowers. A few parachutes still descended, with only glowing sparks to warn the pilot about their hazard. A thick haze of smoke hung over the area and the pungent odor of burning wood and explosives filled the air.

As the helicopter crossed over a knocked out tank at the edge of the area, dust clouds began to rise in great swirls. Captain John Doe, the aircraft commander, picked his touchdown point on the road, knowing the dust would block out all visibility during the last few feet of his approach. Suddenly, one of the infantrymen at the side of the road threw a magnesium flare to mark the landing spot and a blinding light obscured everything. With a curse, Doe pulled pitch, trying to keep the cyclic control centered as the chopper began a steep climb.

In a few moments that seemed a lifetime, Doe's night vision started to return, and he leveled the helicopter, starting a slow left turn for another approach. The copilot called the ground commander on the radio to stop the flares and the second approach was uneventful. The infantrymen huddled with their backs to the helicopter, trying to protect themselves from the stinging choking dust as the copter slid to a stop on the road.

As the dust settled, soldiers approached, struggling under the weight of litters made of ponchos and poncho liners. Doe turned on the cabin light as the crew chief jumped out to help get the wounded aboard. A young soldier, no more than 19 or 20, was lowered gently to the cabin floor, with only a folded poncho to cushion his head. His jungle fatigues were dirty and blood-soaked, but he was still conscious and holding the bandage against his throat to slow the bleeding. His face, pale under its mask of blood, sweat and dust, showed the shock of injury but no sign of fear. The second soldier carried to the helicopter was also young and covered with the grime of combat. His head wound was covered by two large compresses and his face was mostly hidden by the



EMOTIONS IN COMBAT

bandages. He made no movement when he was placed on the floor of the helicopter. There was space for one more young soldier who lay with his eyes closed, enduring the additional pain of vibrations and the unyielding floor of the helicopter.

As Doe watched the wounded soldiers being loaded, he felt a deep compassion for the young men who had given so much for their country. He was frustrated at his inability to help them and he felt a deep anger at the unseen enemy, retreating somewhere through the rubber plantations.

Doe's attention was directed back to the job at hand as the crew chief closed the cargo doors. With a quick check of the gauges, he wound on rpm and started an instrument takeoff, with the copilot monitoring rpm. As soon as they were clear of the dust cloud, Doe nosed over for maximum speed, trying to save precious seconds getting the men to the field hospital.

In less than 5 minutes, the red lights of the hospital pad were in sight. Cleared for a straight-in approach, Doe waited until the last minute to start his deceleration and bring in power. As he touched down, Doe saw medics rushing out to the pad, expertly unfolding litters as they ran. The injured were gently, but quickly, removed and Doe heard the next helicopter calling for landing at the hospital as he took off and headed back to the area. He made two more trips, bringing out wounded. With two other helicopters helping, all injured soldiers were evacuated in a short time. The ground commander decided to wait until daylight to evacuate the dead and Doe was released from the mission after he made his last stop at the hospital.

As his helicopter was being refueled, Doe had a few moments to reflect on the events of that long night. He had only been in RVN for 3 weeks. Because of his past experience, he had been made an aircraft commander much sooner than normal. Tonight had been his first mission as aircraft commander. The mission required him to get into the air as soon as possible in the event of a mortar attack, attempt to spot flashes from enemy weapons and call in artillery on the positions.

The scramble had come about 0100, with instructions to proceed to the unit under attack and give all possible assistance. When Doe arrived in the area, the battle was well developed. The enemy had attacked an infantry company with a battalion sized unit. The American troops, lightly dug in, were hard pressed to hold their position. All available artillery, airstrikes and helicopter gunships were used to repulse the attack. Puff, the Magic Dragon, provided light with its seemingly endless supply of parachute flares. Puff also provided an impressive area coverage support with rapid fire miniguns.

Doe called the command and control helicopter and told the commander he was available for artillery support. The controller had no immediate instructions, so Doe flew figure eight patterns across a river about a mile away. This allowed him to see the action, but stay out of the way of the other aircraft. The situation on the ground was desperate until the arrival of the helicopter gunships. Following instructions from the ground unit commander, the gunships' rocket and machinegun attack so decimated the enemy, the attack was broken off within a short time. The remainder of the battle was an attempt to kill as many of the enemy as possible before they could get out of the area. The artillery observer in Doe's aircraft was effective in bringing artillery fire on the enemy mortar positions supporting the attack. An armored column arrived from the base camp to reinforce the company and the ground commander reported the enemy breaking contact. After mopping up, a medevac ship was called in to start evacuating wounded. Because of the number of wounded, more were needed. Doe volunteered.

The enemy paid heavily for the attack. The next day 114 enemy bodies were collected and buried. To Doe, war had become a very personal thing. Instead of an abstract thing, it had become real people, with real blood running on the floor of his helicopter. The enemy was very real. The bullets that sounded like popcorn popping when they missed and like the thump of a hammer when they hit the helicopter were real. The desire for revenge and hate for the enemy had a long-lasting effect on Doe. He would never refuse a mission, no matter what the risk. He took chances that were out of proportion to gains. He became an accident waiting for a place to happen. Fortunately, he did not find the place. After several months and several close calls he began to regard the war in a more reasonable manner. His attitude gradually changed to that of a level-headed pilot, one who evaluates risks on the basis of fact, rather than by emotion.

Doe is a real person. There are many like him in combat. They break helicopters every day. Some come home in boxes. The lucky ones learn fast. To stop this waste of men and machines we must identify Doe and give him early guidance. We must teach him to control his emotions.

THERE'S THE

ONE OF THE favorite missions in our aviation unit in RVN was a logistics run for food. My turn for a log run came when we heard through the grapevine that steaks were available at a large base about 100 miles south of our base camp.

One of the passengers wanted us to make a stop to pick up electronic parts at a Navy warehouse about half way to our destination. We were assured there was a good heliport between two warehouses. We took off, approached the warehouse area in about 30 minutes and circled it, looking for the heliport. We were soon convinced there was no heliport. The passenger borrowed a helmet from the crew chief and directed us to an area between two warehouses that he assured us was designated as the heliport. We circled slowly, looking the area over very carefully and decided this was some kind of a joke. The area was very small and had high wires on one end, trees on the other and a warehouse on each side. We had just about decided to give up and go to our next stop when the passenger said, "Well, sir, the Navy pilots go in and out of there all the time." It was as if he were saying, "What's wrong with you guys? Everyone knows that Army helicopter pilots can do anything any other helicopter pilots can do." We were hooked! At that point, there was no way to stop us from trying to land in that little *heliport*.

We were relatively light so we reasoned that if the approach looked bad, or if the area was worse than we thought, we'd just abort the approach and go around. We started our approach with more than a little consternation, but we were sure we could recover if anything went wrong. My fellow pilot was at the controls and was doing a fine job as we passed over the wires and started to settle between the two warehouses. Everything was going great. Suddenly, as we came into ground effect we went completely IFR in dust. I couldn't see anything at all out the left side. Before I could say or do anything, we touched down, slightly harder than usual. Dust had been blown into all the nearby warehouses and many very angry people were starting to make their appearance. We told the passenger to get out and made arrangements to pick him up at another heliport later in the day. In the meantime, we were very anxious to get out before we got into more trouble.

I wasn't sure it was safe to try to take off, but we didn't see any graceful alternative. The pilot said that he hadn't gone completely IFR on landing and he was sure he could take off without any trouble. At that point, he pulled pitch, went to a hover, then kept pulling pitch. I was completely IFR again in dust and scared speechless. The first thing I saw was the overhang of a roof of one of the warehouses coming much too close. I pushed the cyclic to the right and we continued straight up to a very high hover, pushed the cyclic forward and started to fly. We were both speechless for several minutes as we realized just how stupid we had been and how close we had been to crashing.

The pilot had also gone IFR, but felt he could not abort the takeoff. He concentrated on watching the artificial horizon and keeping the helicopter as level as possible. I was convinced at that point that, friend or not, we were not going to fly together again. We had been extremely lucky, and I wasn't pleased with his abrupt decision to take off before we had worked out pilot and copilot duties.

Later, when we picked up the passenger at the alternate location, we found that no one had ever landed at the warehouse location before and he apologized for his mistake. He also stated that all of the observers were so preoccupied trying to keep dust out of the warehouses that no one thought to take our tail number and the base commander was furious because he couldn't find out who we were.

A week later we flew by the area again and discovered that "NO HELOS" had been painted on the roof of every warehouse in the area in large yellow letters. Obviously, they wanted no more airborne visitors.

This is the first time I've told this story since the incident occurred. One reason I'm telling it now is because it takes on an additional meaning to me every time I read of a fatality that occurred because someone went IFR in dust and lost control. If you're wise, you'll learn from our stupidity.

HELIPORT, SIR!

USAASO Sez

The U. S. Army Aeronautical Service Office discusses

Two recent "save" accomplishments

Emergency sick calls after duty hours

Aircraft "Save" Accomplishments: In the March issue of the AVIATION DIGEST, we asked for "save" accomplishments from the field. The first we received were from the 359th Aviation Detachment in the Republic of Vietnam and commanded by Lieutenant Colonel John S. Kennedy, Signal Corps.

On 11 March 1970 Dustoff 708 departed Quang Tri at 0400 and immediately went IFR due to unforecast fog. Wisely climbing above the 1,000-foot thick fog bank, the pilot called for assistance. Specialist 5 Hoffman, 359th GCA controller, established radar contact and gave GCA approach to a safe landing. The estimated ceiling at the time was less than 100 feet.

On 11 April 1970 "Catkiller 46" O-1 declared "Mayday" at 2030 hours. The engine had quit and he was going down. Specialist 5 Brown, 359th senior tower controller, quickly alerted the 158th Aviation Battalion which scrambled five ships. The 359th then vectored rescue aircraft to the scene. Within one hour of the distress call the uninjured, jubilant pilot was plucked from "Charlie Country" and was on his way home. WELL DONE, 359th Aviation Detachment (DIV).

These accomplishments represent preservation of precious lives and thousands of tax dollars. Continue sending "saves" to USAASO.

Note: All of you 26D GCA radar repairmen please take note of the importance of keeping systems peaked and operational.

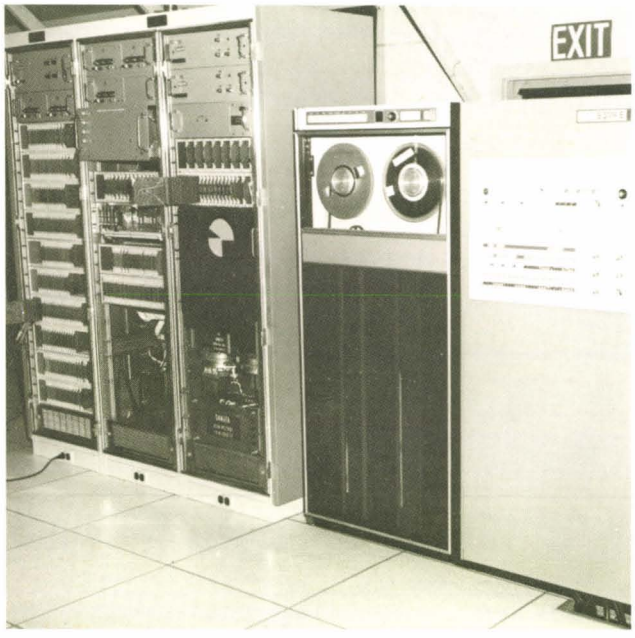
Controllers, Drugs And Medical Officers: During evening hours and weekends the flight surgeon is off duty and a controller going on emergency sick call normally will see a medical officer who is unfamiliar with the special problems of aviation personnel. The following three paragraphs are an extract from the U. S. Naval Safety Center Bulletin at NAS, Albany, Ga.:

"An exceptionally proficient second class air controller was bringing an RA-5C in on a GCA. As the senior controller glanced over his shoulder, it was readily apparent that his man was hopelessly behind the aircraft. He was relieved by the senior controller who later asked what was wrong. His answer: 'I don't know. Since about one-half hour after I took my medicine, I've been feeling real funny.'

"The controller had been seen the previous night by the medical officer of the day. He had an upper respiratory infection and was treated with an antihistamine and an analgesic. Either drug taken individually could slow mental function but taken together they impaired this controller's judgment and coordination enough to make him unfit for the type of work he had to do. The result could have been disastrous.

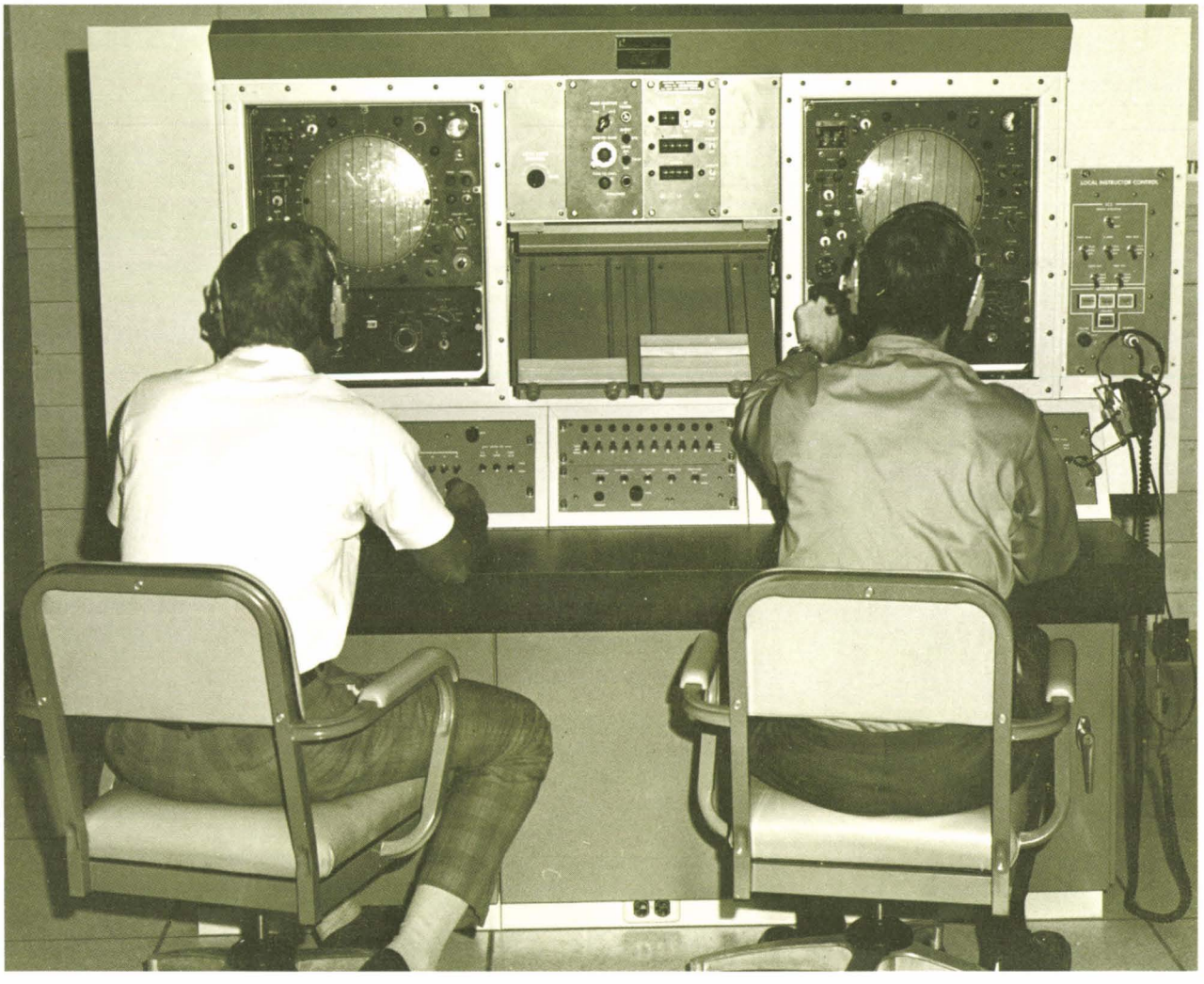
"The blame for this incident lies both with the doctor and the patient. The doctor did tell the patient, 'These medicines might make you drowsy, so be careful driving and so forth.' But he failed to inquire into the nature of the man's work and make his warning a prohibition from controlling aircraft. In like manner the patient *heard* the warning but he failed to apply it to his particular situation."

If you have to go on emergency sick call after duty hours, make sure that you ask the medical officer who treats you, "Will this medicine impair my judgment and coordination enough to preclude the controlling of air traffic?"



New ATC Simulator

The U. S. Army Aviation School, Ft. Rucker, Ala., is installing 10 new air traffic control simulator minilabs in the Department of Special Aviation Training. Each minilab consists of a radar ground controlled approach unit (shown being tested below) and a target control console, capable of projecting four individual targets. At left, the brains behind the new system is the new Sigma 5 computer. The new minilabs are the most advanced training aids in air traffic control instruction



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