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AVIATION DIGEST

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UNITED STATES ARMY AVIATION DIGEST

AUGUST 1977 VOLUME 23 NUMBER

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ABOUT THE COVER

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

The *DIGEST* is an official Department of the Army periodical published monthly under the supervision of the Commanding General, U.S. Army Aviation Center. Views expressed herein are not necessarily those of the Department of the Army nor the U.S. Army Aviation Center. Photos are U.S. Army unless otherwise specified. Material may be reprinted provided credit is given to the *DIGEST* and to the author, unless otherwise indicated.

Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, *U.S. ARMY AVIATION DIGEST*, Fort Rucker, AL 36362.

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VIEWS FROM READERS

Sir:

The 478th Aviation Company (HH), Ft. Benning, GA, the oldest Skycrane Company in the Army, is attempting to establish a Skycrane Registry. It is planned to make a register in numerical sequence by date qualified of all Army aviators, active, retired, National Guard and Reserve who are rated in the CH-54. If sufficient interest is shown it might be possible to get an association started.

The CH-54 Skycrane helicopter has been with the U. S. Army since the first aircraft were brought to Ft. Benning, GA, and tested by the 478th Aviation Company (HH) in 1963. By the end of 1971 the Army had procured 88 CH-54s and the present inventory is about 75 percent of that figure. As there were so few of these aircraft produced, the number of people qualified in the CH-54 is relatively small compared to the total Army aviator population.

Any qualified persons interested in having their names placed on the registry are requested to send the following information: name, month and year rated in CH-54 and current address (if desired) to Skycrane Registry, P. O. Box 1448, Ft. Benning, GA 31905. Names which fall within the same month will be listed in alphabetical numerical sequence. Personnel desiring a copy of the initial registry (planned publication date 10 Oct 77) should enclose a stamped self-addressed envelope in their information letter.

CW4 Bill C. Walton
PAO, 34th Medical Bn
Ft. Benning, GA

Sir:

Continuing review of our medevac utilization has gone on since submission of my article, "Medevac On The European Battlefield" (see page 4), and I would like to add one paragraph to the article, reflecting our latest information and advice....The paragraph is as follows:

Following submission of my article for publication, continuing critique by a number of commanders and staff members of the 1st Armored Division provided input into our medevac consideration. Based on this input, it is suggested that the brigade trains area with the medical clearing company be used as the forward limit of air helicopter employment. However, the brigade commander, using his brigade surgeon or most senior medical officer present as advisor, could authorize air evacuation of ill or injured from an area forward of the medical clearing company, bearing in mind all pertinent factors related to enemy and friendly tactical situation, weather, other battlefield considerations, and the illness or injury itself. It is thought that this arrangement would provide sufficient flexibility and still provide an adequate guideline for medevac employment on the mid-to high intensity European battlefield.

...will supplement the material presented in the body of the article.

Major William C. Wood M.D.
First Armored Division
APO New York 09326

Sir:

On Sunday afternoon, 1 May 1977, a small helicopter crashed at Blatter Field, Orrville, Ohio, before a large audience. The aircraft was privately owned, but as helicopters are still a rarity in the civilian aircraft sphere, the incident is of particular interest to the military aviator, especially National Guard and Reserves who use civilian facilities frequently.

The Federal Aviation Administration (FAA) investigation of the crash probably is not complete, and no doubt will be published and disseminated to all interested agencies. The reasons for the crash were, however, apparent to even the most casual observer. The helicopter approached the airfield at right angles to the runway, flying over the trees to a point near the hangars. After clearing the trees, the aircraft descended to fly between the hangars (and over parked aircraft) with intentions of landing at the fuel pumps. The pilot failed to notice the power lines strung on poles between the hangars, struck them with the main rotor, and crashed. On impact the aircraft fell on its side. The rotor broke off and flew into a hangar where it narrowly missed a number of people and aircraft. The pilot survived.

Blatter Field has a published airport diagram. However, the wires that the helicopter struck do not show because they are not in the standard landing pattern. The attempt of the helicopter to short-cut the old "down wind, base, final" approach, at an uncontrolled field, caused the loss of the aircraft and the hospitilization of the pilot. The maneuverability of the helicopter should not be used to violate established procedures.

CPT Charles F. Santose
Ohio Army National Guard
Stow, OH 44224

Sir:

I want to respond to a letter I was surprised to see in the Views From Readers Column in the May *DIGEST*.

I certainly hope the editorial staff does not knuckle-under to that kind of sexist tripe. I thought the *DIGEST* was for Army aviation, not for disgruntled amazon types.

Most of us want to see more of Pearl and other beautiful females – not less – especially when their photos help advertise or illustrate important points.

Thomas M. Valentine
Ft. Bragg, NC 28307

Major General James C. Smith, commander of the U.S. Army Aviation Center received his Liaison Pilot's wings from the Artillery School in November 1946 — not 1947 as appeared on the outside back cover of the July 1977 issue.

USAAAVS
EIRs
ASO
OHRs
ACCIDENT
PREVENTION
TECHNICIAN

"Aircraft don't crash in the safety office. You have to get out and get with the people."

an ASO speaks out

IT IS ALWAYS a pleasure to meet a professional ASO filled with enthusiasm and initiative. We had that pleasure when CW2 Harold D. Hintze visited USAAAVS to be a guest speaker at a recent ASO course.

CW2 Hintze received the meritorious service medal for outstanding achievement while serving as the aviation safety officer, 3d Armored Cavalry Regiment, Fort Bliss, Texas. His outstanding accident prevention program prompted the invitation to USAAAVS. Here are some of the things he told the class.

"One of the first changes I made when I went to the 3d Cav was to relocate my office. The aviation safety office was next to a lieutenant colonel who was the aviation staff officer. I moved downstairs so the enlisted people didn't have to walk upstairs where the rank is. They don't want the exposure. Move your office wherever the flow of traffic is and you will see the people start coming in and asking you questions. They will sit there and tell you when something is wrong. You need to be where you can learn what is going on.

"After the first month or two in the job, you will want to make changes. People will usually resist change until they see you are really interested in their welfare. When you first start out, you should get to work before they do and stay later than they do for about the first two months. After they see that you're really interested in what they're doing and are trying to save their lives, they respond almost immediately.

"I don't think we should be called safety officers anymore. I think that's a poor term. I would rather be called an accident prevention specialist or technician. Prevent the accident first. That's our job. Then we can burn all the 2397 reporting forms. You should demonstrate an accident prevention awareness in everything you do. That's where the safety officer sets an example.

"I am a firm believer in complete, accurate, and up-to-date records. I keep a lot of charts on the walls so the information will be available at a glance to all those who need it. I have one I call an accident exposure chart. It's a great help to me and the commander. Set up by month, unit, and type aircraft, it is color coded and shows hours flown, landings, and autorotations. The chart shows totals for the month, fiscal year, calendar year, and cumulative for each type aircraft. When the commander calls me and wants to know how many hours we have flown in the last 6 months, last year or 2 years, how many landings and how many autorotations, I can give it to him in a matter of minutes.

"When maintenance needs some backing because they are wearing out skid shoes on autorotations, you have the information they need. You can tell them, 'We have an IP course going on here. Last month they did 60 autorotations and they'll do 400 this month.' That way the ASO is backing the whole unit. He is doing what he is supposed to do.

"We also keep clipboards hanging on the wall. One clipboard is an aircraft status report. Everybody gets this report so maintenance and operations will know which aircraft are down and for what reason. There is a clipboard for FLIGHTFAX. Keep publications such as FLIGHTFAX, PREVENTER, and the AVIATION DIGEST on file and readily available to unit personnel for reference.

"We have three clipboards for EIRs in Huey, Cobra, and OH-58 categories. The safety officer must get a copy of all EIRs. One thing to remember is that the answer to the EIR is sent to the unit which initiated it. Make sure they loan you a copy so you can reproduce it. If the safety officer does not know how the EIR program is going and is not keeping track, he is not doing his job.

"We have another chart on the wall that's a real helper to maintenance. It's a record of compressor stalls with T53 engines. This chart tells you everything, the aircraft tail number, total hours, total time since overhaul, number of overhauls, who overhauled it, how many compressor stalls, the last TEAC, and the baseline TEAC. You can update this with a Form 1352 every month. That way it's all on the wall.

"There's a secret to the chart being on the wall. Number one, it's in your office all the time, so you see it several times a day. Number two, the people who come into your office and see it know you are interested. That also works with the commander. He

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Medevac On The European Battlefield

Major William C. Wood

First Armored Division
Ansbach, Germany

HELICOPTER EVACUATION of casualties during American involvement in the Republic of Korea in the early 1950s and then in the Republic of Vietnam in the 1960s saved countless lives. It also decreased suffering and pain in thousands of cases. This contribution to lowering mortality rates for combat casualties cannot be overestimated.

In U. S. Army, Europe (USAREUR), helicopter evacuation is available from forward tactical areas to medical facilities equipped to handle the most severely injured Soliders.

The capabilities and liabilities of helicopter evacuation must be considered when selecting evacuation techniques for wounded and injured. Warsaw Pact antiaircraft capabilities are formidable and dictate that USAREUR assault and attack helicopter pilots adopt nap-of-the-earth (NOE) flight techniques to survive.

Intrinsic to NOE flight techniques are the slower speeds obtainable; more circuitous routes necessary to reach objectives; longer flying time to a given pickup point; and difficulties in locating checkpoints and specific units due to reduced visibility at lower altitudes. Medican evacuation (medevac) helicopter pilots face the same problems. They may well be slower reaching casualties and may experience more difficulty navigating to a specific point where wounded are located.

Medevac helicopter pilots flying low level terrain contour flight paths can orient themselves better, find the landing zones easier and reduce flying time. However, this type terrain flying increases aircraft vulnerability when compared with NOE techniques in forward battle areas.

Medevac flying is extremely demanding and its pilots *must* be knowledgeable in instruments, NOE and terrain flying techniques to safely accomplish their missions.

There is immediate need in Army aviation to reassess the use of air evacuation in the forward areas, where the antiaircraft threat is the greatest. Western Europe as a combat zone would differ greatly from the Vietnam conflict. American aircraft would be engaged in gaining and keeping air superiority. During this period medevac helicopters would be the busiest. Antiaircraft fire would be intense and sophisticated.

Many NOE flying hazards would be present, as all who recently have flown in Europe realize. These problems all must be considered when anticipating use of medevac on a European battlefield. Ground evacuation of the less seriously ill and injured must be "rediscovered" – while medevac assets must be skillfully employed for lifesaving missions.

There has been some tendency in field maneuvers to use medevac for many injuries not of a life or

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Oh Say Can You See?

CW2 William R. Steele
Department of Graduate Flight Training
Fort Rucker, AL

HAVE YOU EVER given the anatomy and physiology of the eye any serious thought? Probably back in about the third grade someone once said, "The eye may be likened to a camera." It sounds pretty simple, right? Well, in simple terms, let's explore this a little further.

The eye consists of two main parts: the cornea, lens and iris combination which gathers and controls the amount of light; and the retina, a photographic film-like light sensitive layer upon which the light is projected to form an image to be transmitted to the brain.

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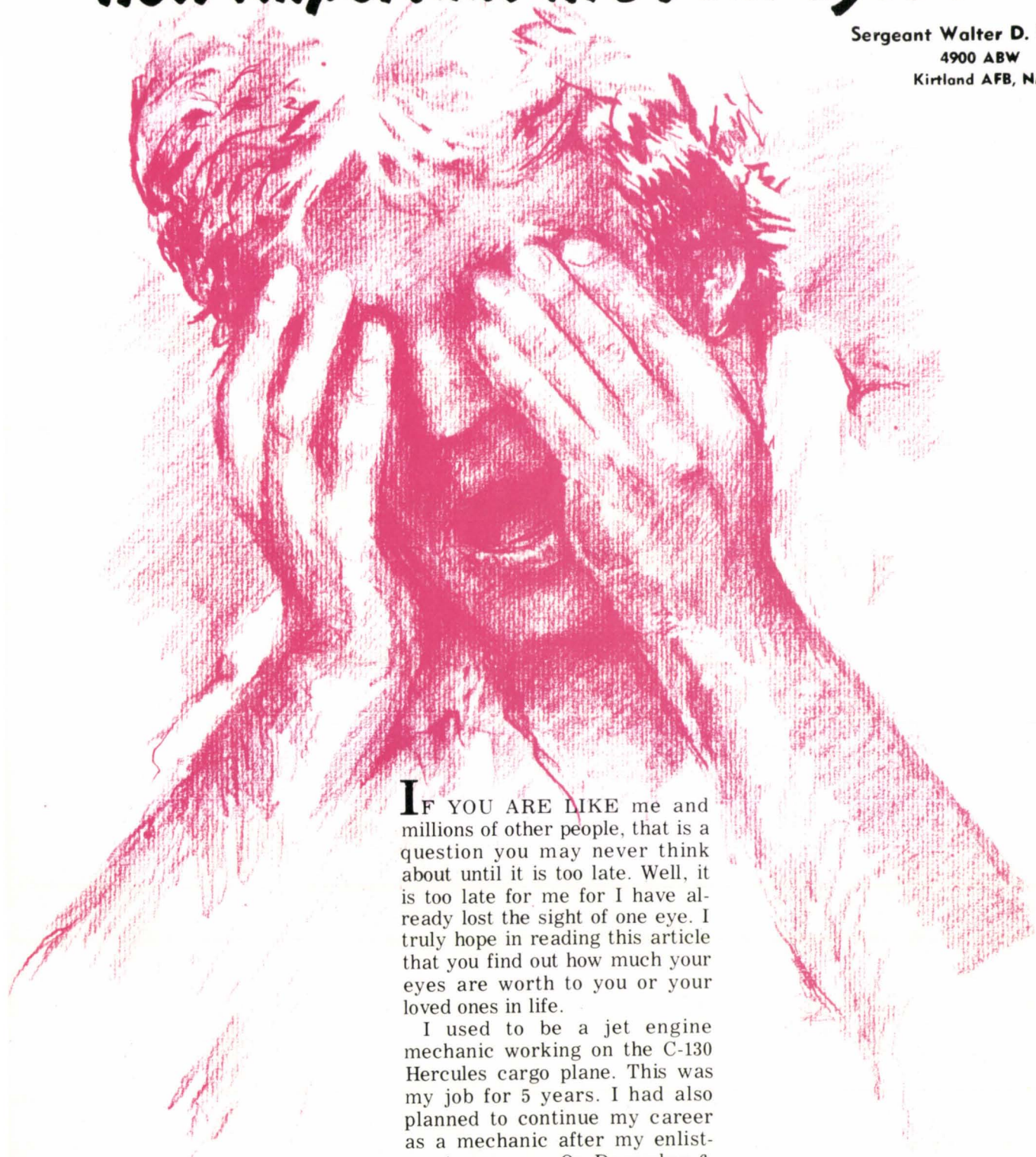
How Important Are Your Eyes?

Sergeant Walter D. Brown
4900 ABW
Kirtland AFB, NM



IF YOU ARE LIKE me and millions of other people, that is a question you may never think about until it is too late. Well, it is too late for me for I have already lost the sight of one eye. I truly hope in reading this article that you find out how much your eyes are worth to you or your loved ones in life.

I used to be a jet engine mechanic working on the C-130 Hercules cargo plane. This was my job for 5 years. I had also planned to continue my career as a mechanic after my enlistment was over. On December 6, 1974, my career ended and a

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AVIATION TRAINING — TOUGHENING UP THE SOFTEST SPOT

LTC Matthew R. Kambrod
Commander, 7th Aviation Battalion
Fort Ord, CA

ONE OF THE MOST significant actions pertaining to Army aviation which recently has taken place on the Army Staff deals directly with training Army aviators. It has not received much publicity among aviators primarily because it has been overshadowed by its more dollar sensitive component, the Army's FHP.

Essentially, effective 1 October 1977, the Army will implement a new training concept for maintaining combat readiness among aviators. The program is based on a pilot's accomplishment of specific tasks and events as outlined in test editions of ATMs now being finalized. The manuals will define what each aviator must accomplish in the aircraft systems which that individual operates as a primary duty.

Before going further we need to be aware of some background information leading to this change to understand fully the Army's move in this new direction. First, recognition that aviation training in the Army sorely needed overhauling is not new. General Bernard Rogers, Army Chief of Staff, while still FORSCOM commander in 1975, stated at a FORSCOM Aviation Resources Management Conference "...the biggest weakness in Army aviation is effective training management, the softest spot in the system."

Barely 9 months had passed when the full impact of General Rogers' comment dealt a sobering blow to aviation in the form of a dramatic increase in aviation accidents, particularly in associated fatalities. The first quarter of FY 76 brought into clear focus that aviation training, due in large measure to budgetary constraints, had been reduced to that point wherein it degraded combat power and readiness. Brigadier General Charles E. Canedy, Deputy Director of Requirements and Army Aviation Officer, ODCSOPS, HQDA, especially noted this fact. This was manifested by the end of FY 76 in totally unacceptable personnel losses and $16 million worth of destroyed aircraft inventory due to aviation accidents.

Also in mid-FY 76, GAO published a report to the Congress assessing the development of each of the services' FHPs. The Army was criticized severely for its FHP management procedures, particularly in the sense that aviator training criteria were not sufficiently definitive to assure combat readiness. The GAO recommended, in effect, that the Army restructure its FHP developmental procedure. The intent was to reflect actual requirements based on legitimate performance-oriented criteria ensuring readiness, rather than on historical precedence which in the past had been the basic tool for formulating FHP funding requests by the MACOM. Translated into real world terms, this meant that where in the past the annual 20-hour CRF instrument requirement meant only that 20 hours of actual instruments or hooded flight would be flown. Now, for example, a breakdown would be required of what was specifically done in those 20 hours flown and payed for by the taxpayer. (Our inability to do just this resulted in our failing to reclama successfully FY 76 and FY 77 Congressional reductions in requested appropriations to fund the Army's FHP.)

The convergence of recognized reductions in Armywide aviation training, increasing accident rates from lack of proper training, criticism from the Congressional watchdog, and primarily our losses in overall combat effectiveness, resulted in General Canedy's convening in April 1976 a DA Special Flying Hour Program Task Force to resolve what had become a problem of significant magnitude. The Task Force, comprised of representatives of DA, FORSCOM, TRADOC, DARCOM, USAAVNC, USAAAVS and Army Research Institute, and under the leadership of Brigadier General Joseph H. Kastner, now Deputy Commandant, Army War College,

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ultimately recommended the following:

• On the premise that training requirements are very different for pilots flying the AH-1 HueyCobra from those operating the C-12 Huron, the 80-hour annual CRF requirement was no longer valid. It should be revised to reflect unique training requirements "by type" aircraft.

• Aircrew Training Manuals should be developed to define specific tasks and events to be accomplished by the aviator (individual aviator training) to ensure retention of flying skills necessary for maintenance of combat readiness.

• The Army FHP be developed at MACOM level on the basis of the summation of the individual aviator training hours cited above, unit training hours required to assure an avition unit's conformance to ARTEP standards, and mission support hours required to service the ground units commensurate with mission.

• That a methodology be developed to track the utilization of funds allocated for aviation training to ensure their being used for that purpose alone.

The Tast Force not only developed the recommendations, but also prepared the initial editions of the draft Aircrew Training Manuals for each of our different aircraft. It was from these ATMs that preliminary individual aviator training hours were extracted and employed for the first time in zero-base budget development of the FY 78 Army FHP.

Where, then, does this background information bring us, and what are the short and long term effects of the program on us as aviators? First, the draft Aircrew Training Manuals are now in the hands of TRADOC being prepared in final format as test editions to be implemented active Armywide effective FY 78 and tested for validity for about 2 years. (Applicability to Reserve components must yet be addressed.) The test editions will fill a gap in aviation unit ARTEPs in that they will provide specific individual aviation training activities to be accomplished by each aviator. This will ensure maintenance of an individual aviator proficiency level essential to the unit's accomplishing its tactical mission as well as meeting unit training standards established through ARTEPs.

One point related to flying hours needs to be made at this time. The draft ATMs originally prepared by the Task Force do have accompanying flying hours necessary to complete the individual aviator training. The final test editions do not have hours requirements specified in the manuals themselves. Only the tasks/events to be accomplished and the time recommended to be spent on the tasks are identified. Evaluation of the TRADOC test editions will provide a basis for adjusting the hours originally tied to the training by the Task Force.

Associated hours for individual aviator training per type aircraft should be the commander's tool to develop the initial portion of his FHP. (Individual training hours, different for each of our systems, have been specified in HQDA (DAMO-RQD) message to all MACOMs, DTG 042125Z Jan 77, subject: Development of Army's FY 78 and FY 79 Flying Hour Program (FHP).) The hours referred to in the ATMs are not stated requirements but are recommended average times required by the "average" aviator to maintain proficiency. The concept under which we must train needs to specify what we must accomplish, not the specific number of hours we must fly. Our 35 years of Army aviation history are replete, unfortunately, with hours flown for no definitive purpose other than meeting mandated annual CRF requirements. We can and must do better as professionals.

The new approach permits flying to a criterion as opposed to a set number of hours; i.e., an aviator will

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OPMS CORNER

Officer Personnel Management System

Flight Pay Entitlements and Flight Status Eligibility

LTC B. H. Freeman
Chief, Aviation Management Division
U. S. Army Military Personnel Center

THE BASIC requirements of qualifying for flight pay under the provisions of the Aviation Career Incentive Act (ACIA) of 1974 were presented in the January 1977 OPMS Corner. The ACIA contains a 3-year transition/saved pay provision that precluded total loss of flight pay for aviators who were otherwise qualified to receive flight pay on 31 May 1974.

During the 36-month transition/saved pay period after 1 June 1974, flying pay for aviators was not terminated as a result of not qualifying for the 12th or 18th year aviation service screening gates or attaining 25 years total federal officer service (TFOS) for commissioned officers. These provisions of the saved pay clause terminated 31 May 1977.

Those commissioned aviators with a primary or alternate specialty designation of 15 or 71, who are not entitled to continuous aviation career incentive pay (ACIP) for failure to meet the "gate" requirements, should remain qualified for aviation service as outlined in AR 95-1, AR 95-63 and AR 600-106 (i.e., Class II flight physical and annual aviation written examination). By so doing, they will receive monthly incentive pay when actually assigned to operational flying duty. Appropriate orders requiring the performance of such duties will be issued by the installation commander as prescribed by AR 37-104-3.

If upon completion of 12 years aviation service a specialty 15 or 71 aviator's entitlement of continuous incentive pay ceases, that entitlement may again commence upon completion of 18 years aviation service if fulfillment of the prescribed operational flying duty requirements for that "gate" are met.

Commissioned aviators with more than 25 years TFOS may fly, *without pay*, as long as they are assigned to an operational flying position and continue to meet the flight status requirements established in AR 95-1, AR 95-63 and AR 600-106. Flying status orders for these officers with more than 25 years TFOS will remain in effect, even though pay entitlements terminate, as long as the aviator is medically qualified for flying status as prescribed by AR 40-501. However, flying status may be terminated in accordance with AR600-107 upon personal request by an Army aviator.

Aviation officers will not be notified individually whether they qualified for the "gates." However, the Department of Army circular of ACIA flying data is published annually for this purpose. DA Circular 600-11 which announces the fiscal year 1976 update information and certification of the key elements of data required by the ACIA was distributed during May to all finance and accounting offices, military personnel offices, and aviation units and should be made available to all Army aviators.

Additionally, 2 months prior to the month of the 12/18-year of aviation service (computed from aviation service entry date), the following remark will appear on the individual's leave and earnings statement: "ACIA 12/18 YR Gate MMMYY" (month/year). The ACIA status for aviators who reach the 12- or 18-year gates will be evaluated by Military Personnel Center and flight pay for aviators entitled to continuous ACIP after 31 May 1977 will be authorized by direct input to the JUMPS-Army pay system (Joint Uniform Military Pay System). No action is required by field activities or installations.

Army Aviators Complete Training At Naval Test Pilot School

Major Thomas M. Walker
U. S. Army Military Personnel Center

THREE ARMY AVIATORS, Major Frederick S. Doten, Major George M. Mullen and Captain Thomas E. Burch recently were awarded the engineering test pilot designation following completion of 11 months of rigorous flight and academic training at the Naval Test Pilot School (NTPS), Patuxent River, MD. They received their training under the Army's aviation engineering and flight testing program and now join an elite group of 55 Army aviators designated as engineering test pilots.

The utilization assignment for these officers will be at the U. S. Army Aviation Engineering Flight Activity (USAAEFA), Edwards Air Force Base, CA. Being NTPS test pilot graduates, they are qualified to fill a wide range of both aviation and research and development requirements as either engineering test pilots or in staff positions involving decisions affecting the type, design and configuration of Army aircraft. Their experience and skills represent a high dollar cost investment and will require a closely monitored program of utilization and professional development.

Army aviators in the grade of major and below, including warrant officers, may apply for the program providing they meet the following prerequisites:

- Rated Army aviator on active duty and on flight status.
- Fixed and rotary wing rated with a minimum of 1,500 hours military flying time, of which 500 hours must be in each category (fixed wing time waiverable down to 130 hours).
- Have a current or previously held an instrument qualification.
- Be a confident swimmer.
- Completed college algebra, physics and calculus with above-average grades.

Latest additions to the Army's engineering test pilot program are, from left, MAJ George M. Mullen, MAJ Frederick S. Doten and CPT Thomas E. Burch

Completion of differential equations, although not mandatory, is desirable. A college degree in engineering is desirable but not required.

Selection and Training: Selection of Army aviators for participation in the program is made by an Officer Personnel Management Directorate (OPMD) board. Representatives of the Aviation Management Branch (OPMD), OPMD grade divisions, NTPS, as well as the Army Engineering Flight Activity are included as board members. Only those applications of officers who are recommended by their respective grade division are considered. Once selected and prior to attending NTPS, officers are sent TDY to the Army Test Pilot Orientation Course at USAAEFA. The orientation course is about 60 days long and is designed to provide academic and flight refresher training. Academic subjects include college math through calculus, physics, aerodynamics, engineering slide rule and technical report writing. Flight orientation includes high altitude environmental training, flight test techniques and familarization in a number of aircraft used at NTPS.

NTPS classes are held twice a year beginning in January and July. The Army's training quota for NTPS is eight per year (4 in January and 4 in July); however, the number of officers trained is a function of requirements. Upon successful completion of the NTPS course, graduates are assigned to USAAEFA or the Aircraft Development Test Activity, Ft. Rucker, AL, for utilization as engineering test pilots.

DA Circular 351-71, dated 13 December 1976, provides specific guidance for submitting an application. Interested Army aviators should contact their respective OPMD grade division regarding application details. Additional information concerning the Aviation Engineering and Flight Testing Program can be obtained through contacting the Aviation Management Branch, OPMD, AUTOVON 221-0727/0794; commercial (202) 325-0727/0794.

The Height of Decision!

SFC William L. Loudermilk and William C. Carn Jr.
Department of Academic Training
Fort Rucker, AL

SINCE THE conversion to TM 95-226, "U.S. Standard for Terminal Instrument Procedures (TERPS)," the term decision height (DH) has replaced the old term minimum altitude. One could well ask: "What's the difference and why the change?" Let's examine the intent of the change.

Despite erroneous definitions and interpretations which are prevalent, the definitions of DH and minimum descent altitude (MDA) are *NOT* the same. DH is the lowest altitude mean sea level at which a missed approach procedure must be executed when visual reference with the runway environment has not been established. An MDA is the lowest altitude permitted until the pilot has established visual reference to the runway environment. DH applies to precision (instrument landing system and precision approach radar) approaches *only* and takes into account the difference between the published field elevation and the runway touchdown zone elevation; it may be lower than the reportable weather ceiling required for the approach. A published DH is intended as a reference point on a glide slope from which the pilot may land visually. If the weather observation were correct and had been carefully considered before starting the approach, chances of a missed approach are reduced considerably.

Is is acceptable for an aircraft to penetrate the DH while the pilot is transitioning to a missed approach climb configuration? Obviously, if the pilot initiates his missed approach at DH, the aircraft most assuredly will pass thru the DH altitude as the pilot transitions to his climb. This is to be expected and was considered when the DH concept was established. Remember, the DH is not an altitude to be "bounced off," but is an altitude selected, after consideration of navigational equipment and pilot capabilities, to provide a safe decision point either to land visually or execute a go-around.

Logically, the next question is: How far below DH may an aircraft be allowed to descend during a missed approach maneuver? An exact answer for all aircraft and pilots is impossible because of response rate and pilot technique. Most Army aircraft will transition into a climb with a very minimum of further height loss. However, you should consider the following data as a helpful guide.

All DHs are already above the missed approach obstacle clearance surface (a 40 to 1 slope for fixed wing and a 20 to 1 slope for rotary wing). See figure 1.

A pilot executing a missed approach is protected by required obstacle clearance (ROC) provided at the DH point on the

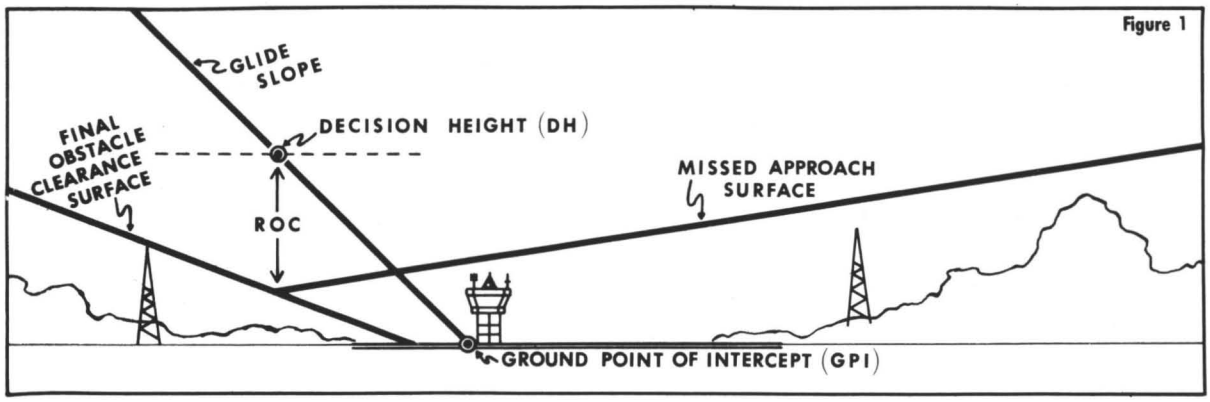

Figure 1

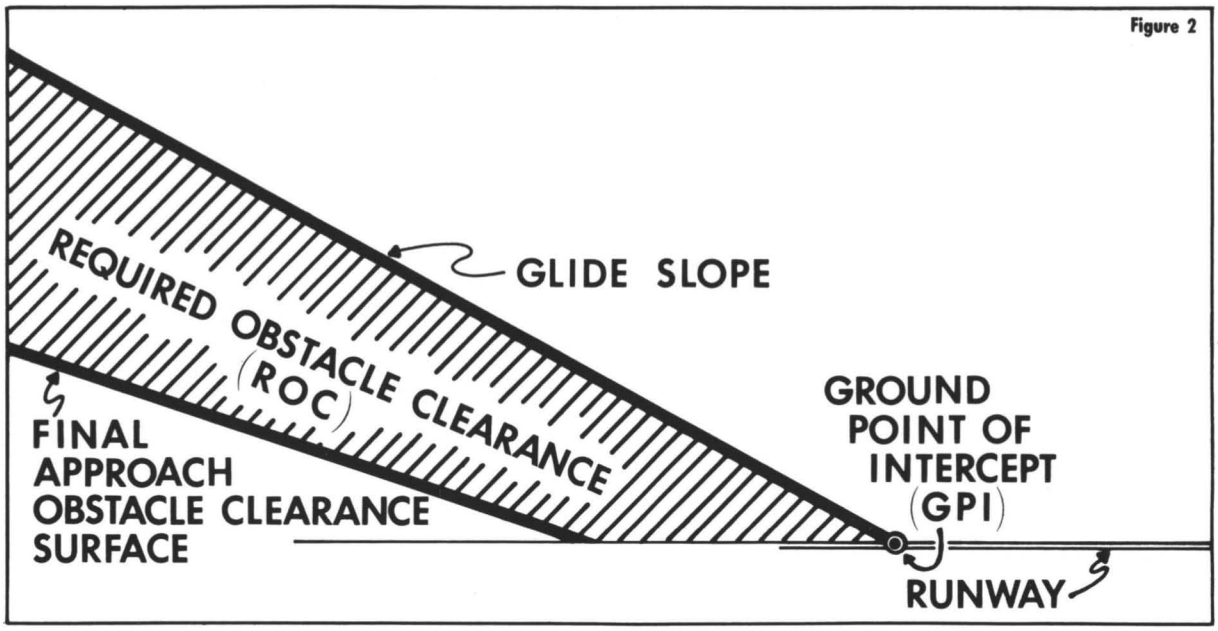

Figure 2

glidepath. This ROC is the difference in altitude between the selected glide slope angle flown by the pilot and the final approach obstacle clearance surface, an imaginary surface beginning 975 feet outward from the ground point of intercept with a slope gradient in relation to the selected glide slope angle. No obstacle may penetrate this final approach obstacle clearance surface. This ROC will vary depending on the DH and glide slope angle (see figures 2 and 3).

Thus you can see, if pilots fail to properly transition to a climb configuration with the ROC provided, they will violate the missed approach obstacle clearance surface – this must be avoided at all times. Now, if your particular aircraft cannot transition into a normal instrument climb within the appropriate ROC, you will have to select a higher DH. A published DH is the *lowest* DH authorized within the equipment and obstruction constraints. Higher DHs can be used, and some major commands do require higher DHs. Remember though, if you use a higher than published DH, you will also need higher weather minimums. The ceiling and visibility must be greater. A little more than one-fourth of a mile visibility is needed for each 100 feet of height for a 3-degree slope. Lots of valuable fuel can be waster starting an approach to a 100-foot ceiling if a pilot is aircraft-restricted to a 200-foot DH.

Treat the DH concept as it is intended and you will reap the benefits of the precision approach. Know your aircraft and fly a precision approach to arrive at your DH on course and on glide slope with the correct airspeed and rate of descent.

(ROC) REQUIRED OBTRUCTRUCTION CLEARANCE AT DECISION HEIGHT

Figure 3

DECISION HEIGHT	2.0 GS	2.5 GS	3.0 GS
100 FEET	88 FEET	74 FEET	65 FEET
200 FEET	156 FEET	128 FEET	110 FEET
300 FEET	223 FEET	183 FEET	155 FEET

EPMS CORNER

Enlisted Personnel Management System

Personnel Utilization

SFC W.E. Trotman
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"IT DOESN'T MATTER what job I'm doing as long as I keep getting paid." Does it matter? Who cares? If there is a job to be done what difference does it make who does it? The answers to all these questions are very important, more important than we might realize.

Let's answer the questions in the order they were posed. First of all it does matter. The Army has a certain number of positions (jobs) with a grade designation and skill for each position. If everything is working as it should, every Soldier should be in a position requiring his or her grade and military occupational specialty (MOS). If you're not working in a position equal to your grade and MOS, chances are someone else is misslotted also. As an example we could have a UH-1 Helicopter Repairer, MOS 67N, grade E5, working in a slot for an Aircraft Powertrain Repairer, MOS 68D, grade E4. This in turn means the 68D, E4, probably is working in someone else's position. Overdone, this type of action can lead to worldwide imbalances and creation of overages and shortages that need not exist. So the answer is obvious. Yes, the position you fill matters – a lot.

Who cares? Unfortunately, not everyone does. The proper and effective utilization of Soldiers is a responsibility of *every* commander, supervisor and unit personnel officer. AR 600-200, "Enlisted Personnel Management System," has an entire chapter dedicated to personnel utilization. Little is left to the imagination. Even the individual Soldier's utilization responsibility is explained: to maintain proficiency in all aspects of his or her PMOS and qualifications in other awarded MOS.

For the last part of this three-part question, let's look at a couple of examples and see if it makes a difference who does what job. First let's look at a staff sergeant who gets selected for the post marksmanship team. That's fine. A Soldier has to be a pretty good shot to qualify. And a year, for instance, away from the Soldier's primary MOS may not be too bad.

A Soldier away from his or her PMOS for a short period of time probably would be able to pick up on any changes that have occurred. But if the detail to the team lasts for a longer period of time a Soldier has to have quite a bit of motivation and initiative to be able to perform in one job while keeping proficient in another as well. What usually happens is this: the Soldier's enlisted evaluation reports are right up there with all contemporaries, by grade and MOS (the duty MOS reflected is usually the same as the PMOS although the Soldier should be evaluated in the actual duty MOS). But what about the MOS evaluation – either under the previous MOS test system or the upcoming skill qualification tests (SQTs). (The last test under the old system for aviation-field Soldiers was in November 1976; all MOS testing ended 1 January 1977. Aviation SQTs are projected to start January 1979.) Chances are MOS evaluation scores were or will be lower.

Now our dead-eye staff sergeant, let's call him Bill, is in the primary zone of consideration for selection to grade E7. Since the board must select the best qualified to perform in the next higher grade and MOS, evaluation scores play an important role in determining best qualified. SSG Bill probably will not be selected because he has not maintained proficiency in his PMOS and is not even up to par with his contemporaries. He should have requested to be returned to work in his PMOS when his skills and knowledge started failing. In addition, he could have taken correspondence courses to help maintain proficiency. So, in part, based on lower MOS proficiency Bill is not selected for promotion, advanced NCOES, or among other things, special assignments. A similar situation exists when a Soldier is working in a secondary or additional MOS.

Let's take another look at the E5, we'll call him Tom, 67N working as a 68D and we'll say the 68D is a secondary MOS. There is nothing wrong with that. A Soldier is considered properly when work-

ing in a SMOS. (Until January 1977 everyone was evaluated annually in their PMOS and every other year in their SMOS.)

What usually happens when a Soldier is working in an SMOS is that PMOS proficiency steadily decreases while the SMOS proficiency increases. Since SGT Tom was doing such an outstanding job, his supervisor put in a recommendation for promotion to grade E6. Our man started studying the code of conduct, first aid, drill and ceremony, etc. When he got the call to report to the Orderly Room, he could hardly contain his excitement. He was sure the first sergeant wanted to tell him about the promotion board.

When he got to the orderly room the clerk was in a solemn mood and would tell him nothing. When the first sergeant called SGT Tom into the office, he sensed something was wrong, and he was correct. The first sergeant explained that his recommendation had been returned by the Military Personnel Office and that SGT Tom was not eligible to appear before the board.

This came as a complete surprise to SGT Tom because he was doing so well as a 68D. The problem is that a Soldier may only compete for promotion in his PMOS or in an MOS which is the normal career progression for the Soldier's PMOS as outlined in AR 611-201. Furthermore, MOS 67N and 68D are in different progression positions. Since SGT Tom had such a low evaluation score in his primary MOS, his recommendation was returned.

Will this happen to you, or have you planned your career? Does it make a difference who does what job? You bet it does!

While the commander must use his personnel assets to accomplish the mission of the unit, extended use of a Soldier outside his or her PMOS may result in a disservice to the unit and the individual Soldier. Remember, you can influence the decision on how best to utilize your skills while developing your career.

FORSCOM Aviation Safety And Standardization Conference

U.S. ARMY Forces Command (FORSCOM) Aviation Safety and Standardization Conference is tentatively scheduled 7 to 8 September 1977 at Ramada Inn (central), Atlanta, GA.

Conference objectives are:

- To provide a forum for interchange of command position/viewpoints on proposed or established aviation policy matters.
- To discuss matters of mutual interest in the areas of aviation standardization, operations and aircraft accident prevention.

Formal presentations at a general session will begin 0800 hours, 7 September 1977. Problem solving workshops are tentatively scheduled following the general session. Work groups will be formed as follows:

- Group I – FORSCOM Flight Standardization Board (Annual meeting)
- Group II – aircraft accident prevention
- Group III – plans and operations

Group leaders will present group findings at the concluding general assembly tentatively scheduled from 0930 to 1200 hours, 8 September 1977.

In accordance with AR 95-63, FORSCOM Aviation Standardization Board will meet in formal session as Work Group I during the FORSCOM Aviation and Standardization Conference. This meeting will be issue oriented. Each issue must have an installation/command position and be listed by priority. The intent is that each issue will be tabled by the FORSCOM standardization officer. Opposing views will be presented and a FORSCOM position established. Issues that can be resolved at FORSCOM level will be assigned for action within the FORSCOM staff. Issues that cannot be resolved at FORSCOM will be forwarded to Headquarters, Department of the Army (DA) along with a position and rationale to support that position and will be resolved at the DA Standardization Board Conference scheduled 27 to 28 September 1977.

Your LZ/PZ Can Be...

CW3 Charles D. Schenck
HQ, 9th Aviation Battalion
9th Infantry Division
Fort Lewis, WA

...A Mountainside....

HIGH IN THE rugged Cascades of northeastern Washington a UH-1 Huey approached the steep, brushy face of a mountain – and was landed.

Elsewhere an OH-58 Kiowa approached between the trees crowding a swift, broad stream – and was landed comfortably in midstream.

At still another location a UH-1 pilot lowered the collective to flat pitch – after a secure landing to a tree-and-scrub covered lake bank.

These and other unlikely landings recently were made by the 9th Aviation Battalion, Ft. Lewis, WA, during the course of testing and evaluating a portable heliport.

One of the most desirable characteristics of helicopters is their ability to operate in and out of unprepared landing areas. These areas, however, have had to be selected based on the limitations of the helicopter; consideration must be given to obstacle clearance, degree of slope and landing surface.

A combat situation entails further problems in selecting a landing area – enemy fire, prevention from detection and others. These combine to effectively limit the choices available to the commander and the pilot. Errors in judgment can result in an aircraft accident, as U.S. Army Agency for Aviation Safety accident case files adequately can testify.

Can the number of landing areas available to a commander be increased with increased safety to the aircraft and crew? The answer is a definite, yes.

At the request of the U. S. Army Transportation School, Ft. Eustis, VA, the 9th Aviation Battalion at Ft. Lewis, WA, conducted a test and evaluation of a portable heliport. Manufactured by Soloy Conversions, Ltd., of Chehalis, WA, the heliport is constructed of lightweight, high strength aluminum and is modular in design. Combinations of its center and wing modules allow for increasing or decreasing the size of the landing surface to meet operational requirements. A center section with two wing units provides a 12- by 18-foot landing platform for a UH-1 (with a safety factor of 3 to 1 for a 12,000-pound load). This latter configuration can be sling loaded by a CH-47 Chinook or even a UH-1 because it weighs only 1,798 pounds.

The center section (625 pounds) will provide a 12- by 6-foot landing platform for lightweight helicopters such as the OH-58 or OH-6 Cayuse. Each leg of the heliport can be adjusted to conform to uneven terrain including slopes of up to 20.7 degrees. Large footpads on the bottom of the legs allow the load to be distributed over a large flat surface, preventing slippage on slopes and sinking in soft surfaces.

The testing of the heliport revealed it to be a highly versatile tool. Its modular design and air transportability allows it to be moved from point to point in minimum time and emplaced within 5 minutes of arrival.

In field tests the heliport was placed on mountain slopes, in swamps, rivers and lakes. In every test sequence the heliport remained firm and steady.

Its adaptability to a variety of terrains permit the establishment of landing areas in places otherwise unusable for tactical or peacetime uses.

Tactical:

• *Observation posts* can be established at virtually any point in the area of operations using the heliport for logistical support of the observation post; launching of aerial reconnaissance aircraft; a platform for ground tactical radar and electronic surveillance and countermeasure equipment.

• *Resupply points* can be established in any type of terrain at most locations. Supplies can be palletized on the heliport and delivered to the desired location by a CH-47, simultaneously establishing a resupply point and a landing area.

• *Remote refueling sites* and landing sites can also be established simultaneously by inserting a heliport loaded with forward area refueling equipment. Remotely activated nondirectional beacons placed at these sites will assist the aircrews in locating them.

• *Boating/landing platforms* can be established in minutes for river crossing operations in large water-covered areas such as swamps and rice paddies.

• *Urban operations* can be enhanced by use of the heliport positioned on city streets, in parks and in some cases on rooftops. Helicopter access to any point in an area will be assured with maximum safety to urban dwellers and ground personnel.

• *Airmobile insertions and extractions* on a small scale can be accomplished using the heliport. One example of the benefit to be derived here is the tremendous increase of landing areas in a mountainous area where only 10 percent of the area is currently suitable for use as a landing zone. This same increase can undoubtedly be experienced in other marginal (numbers of landing zones) operational areas.

Peacetime:

• *Natural disasters*, floods, hurricanes, earthquakes and blizzards occur with unfortunate frequency in the U.S. The heliport will provide maximum safety to ground personnel and the helicopter during the press of massive relief/rescue operations in virtually any type of terrain.

• *Search and rescue* efforts

...A River....

...Or A Swamp

can be improved in cases of aircraft accidents in rugged terrain because the heliport can be inserted immediately at a crash site to expedite evacuation of survivors. At present survivors are often transported for hours over long distances on the ground to suitable landing areas causing great hardship to the survivors and the rescue personnel.

• *National geodetic survey* teams often work in very remote and hostile terrain. The heliport could be used for many purposes by these teams.

Above are listed only a few of the possible heliport applications. The total utility of the heliport is limited only by imagination. Thus it can be said that the versatility of the helicopter coupled with that of the heliport greatly increases the options available to the commander and pilot in selecting landing areas for various tactical and peacetime purposes. With respect to safety, the heliport provides a firm level platform, free of obstacles, on which to land. Main rotor and tail rotor clearance from surrounding objects and ground personnel is greatly increased. Foreign object damage generated by rotor downwash is reduced as the heliport places the helicopter far enough above the ground that the quantity and size of debris is substantially decreased.

The heliport's known size provides a reference point for improved depth perception when landing on snow fields, deserts, rivers, etc.

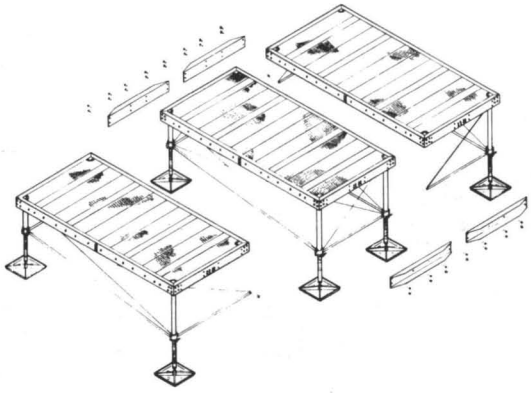
When operating in areas of heavy dust, sand and loose snow, a pilot can lose visual contact with the ground due to the surface material being blown up by the rotor wash. Again the heliport keeps the helicopter high enough above the surface to reduce this effect.

Again, the answer is, yes. The heliport does increase the number of landing areas available with increased safety to the aircraft and crew. It provides the commander and pilot almost unlimited options in the selection of landing areas, thus adding much greater and safer flexibility in the use of aviation assets toward the attainment of mission objectives.

The 9th Aviation Battalion using a heliport on a steep mountainside during UH-1 training exercises

Total Weight	1,798 pounds*
Weight of Heaviest Section	625 Pounds*
Overall Surface Dimension	12′ x 18′
Surface Dimension With One Wing Removed	12′ x 12′
Surface Dimensions With Both Wings Removed	12′ x 6′
Minimum Height Above Ground	5′4″
Maximum Height Above Ground (Downhill side on 20.7° slope)	8′5″

*Weights will vary slightly due to material variation



Exploded View, Heliport. The Portable Heliport currently is manufactured in two basic modules: center and wing sections. They can be used in combinations to create the size landing surface required

Medevac

Continued from page 5

limb threatening nature. In some instances there has been a lack of seriously injured casualties. Then the transportation of the less seriously injured to medical treatment facilities constitutes a valid and much needed function. It both helps the injured individual and provides all important training in the tactical environment to medevac flight crews. Such air evacuation is acceptable but it is not acceptable to equate with what would be required in combat in Europe.

In many ways use of air evacuation during current field maneuvers is in reality conducted in an "artificial" environment. Current doctrine for field units does not adequately define how medevac is to be used on the mid-to high intensity European battlefield. During this type of conflict medevac assets will be limited. They must be protected from loss to hostile ground fire as much as possible and yet provide their lifesaving evacuation capabilities as far forward as is feasible.

Current doctrine provides for employment of medevac aircraft as far forward as the tactical situation will permit. It is unclear how close to the forward edge of the battle area (FEBA) medevac – or any other Army aircraft – can be employed without sustaining unacceptable losses. Also unclear is who should make the decision to request medevac. Command policies need to be established providing guidance on these points.

Unlike Vietnam the Eurpoean battle area is expected to have a more definite FEBA, although numerous possibilities exist for enemy small unit actions in Allied rear areas. Field units urgently need to "rethink" their medevac plans. Ground commanders should begin to exercise the mental decisionmaking process of deciding how medical evacuation would be employed under actual combat conditions as opposed to training exercises.

In training we all wish the most rapid transportation of an injured Soldier. This is obvious, yet commanders should ask themselves, *in the actual situation how would our evacuation plan for this individual differ? Are we ready to adapt to changed conditions of actual combat?*

In each field manuever by units, a group constituting representatives from the division surgeon; operations section (G-3, S-3); air evacuation unit; the command staff; and the unit flight surgeon should assess the use of air evacuation during the manuever. A constructive critique of cases evacuated should follow. Suggestions for improved use of air evacuation resources should constitute an ongoing, constantly improving unit-level program to instruct all consumers in the better use of air evacuation assets. Doctrine could thus be refined.

In many areas medevac doctrine remains to be developed. A pressing need exists for an Army-wide reassessment of air evacuation employment on the European battlefield. Terrain, threat and weather conditions in Europe differ from those found in tropical countries. All of these factors (and more) bear directly on effective use of air evacuation.

Medevac helicopters are appropriately used to evacuate individuals with injuries or illnesses affecting life, limb or sight. Delay in treatment of these types of problems can lead to loss of life, permanent disability or complications of an injury. Minor problems such as "colds," "sprained" ankles, or other less severe problems are better evacuated by the ground route.

Air evacuation carries an expected risk of helicopter travel and poses a mission requirement on aircrews to often fly in poor weather into hazardous areas to accomplish a rescue. To weigh the risks we must be aware of all the factors which affect injured individuals and of those factors affecting mission completion of the flight itself. One key to this problem is to employ available medical personnel, including unit medics, physicians' assistants at battalion level, and physicians to aid in selecting casualties who should be air evacuated.

The availability of medevac helicopters *must not* result in reduction of the ground evacuation assets of Army units. These tables of organization and equipment (TOEs) should not be reduced. Ground ambulances and armored vehicles for medical evacuation use have never been more necessary. Unit allocation of these resources should be increased. Aircraft losses often are unpredictable. And, medevac units must contend both with the antiaircraft threat and with the possibilities of accidents of flight.

Emergency medical technician training programs now being used for education of many unit medical personnel would do well to include instruction in patient selection for air evacuation. Prepara-

tion of the patient for flight and inflight treatment of medical problems also should be covered.

Medical personnel, from unit medic to medical officer, should be taught to deal with medevac decisions which will have to be made on the modern battlefield under hurried conditions. Textbooks and Army manuals do not adequately instruct in these decisionmaking problems. New manuals, new training films and command emphasis on preparing before the actual situation are urgently needed for medical personnel.

Medevac units must maintain accurate and constantly updated knowledge of medical facility locations and their medical capabilities. Unstable patients must receive medical attention at the earliest opportunity. Hopefully this type of care can be effected prior to air evacuation arrival. If not, it should be accomplished aboard the medevac helicopter. Aeromedical evacuation pilots are trained to, and should act as, airborne medical regulators. Decisions on patient destination frequently must be made by the aviator.

A crucial point here is that the air evacuation helicopter must avoid overflying a medical treatment facility which could have provided stabilizing medical treatment and made the remainder of the flight safer for the patient. For instance, a person with a leg or arm injury would be appropriately air evacuated if a threat to the blood supply of the leg or arm existed. This injury could in some cases be due to a fracture which when set could restore the blood supply. In this case the air evacuation to the medical clearing company could find staff who would "set" the fracture, splint appropriately, start intravenous fluids and prepare the patient for further air evacuation.

A second example would be the chest or abdominal gunshot wound. If bleeding is massive, the patient may require immediate medical intervention, with intravenous fluids, which hopefully could be started at the battalion aid station. This patient might require unexpected emergency surgery at the medical clearing company to prevent death. The

45-minute, or 30-minute, or even a shorter flight to the combat support hospital might be too long for the patient to survive. In some cases the shorter distance to the medical clearing company might ensure more rapid care which could save the patient's life. Again, the air evacuation unit must be absolutely sure of all medical facility locations and their capabilities to effectively make these decisions.

An "unstable" patient must receive urgent transportation to the nearest medical facility where medical personnel can bring about a stabilized condition for further evacuation.

Airway establishment, control of external bleeding and splinting of fractures should be done by the unit medic. This prepares the patient for medical evacuation. If the unit medic does not carry out these tasks, they must be done either by the medevac medical team or by the nearest medical personnel.

In the European battlefield environment it may not be safe to use medical evacuation helicopters forward of the battalion aid station. Ground evacuation of casualties to the battalion aid station for examination by the unit physician's assistant, with stabilization of the individual, is the advisable route to follow. Of course, if the tactical environment is safe enough forward of this location – and the severity of the injury is such that air evacuation is advisable – then that option should be considered. But, all factors must be considered.

There is a continuing need to train units in the proper and most effective chain of medical evacuation. A brief summary of this scheme of evacuation follows.

Each battalion in combat should establish a battalion aid station, staffed with medics and a physician's assistant. This facility would send forward for wounded using an evacuation section. This team should be able to splint fractures, begin intravenous fluids and ensure that there is no blockage of the patient's breathing.

The brigade areas (and in the division trains area) should have the medical clearing companies – one per brigade, and one at the division support command area. The medical clearing company should have three to five physicians, a dentist, X-ray and minor surgical facilities, and an observation ward.

The medical clearing company sends forward, using its ambulance section, for wounded from the various battalions and units which it supports. The combat support hospitals should be in areas farther to the rear. They should be capable of more extensive specialty and surgical care capability, X-ray and laboratory assets, and a medical evacuation ambulance section to retrieve casualties from the division medical clearing companies.

Air ambulance companies should be located at the corps level and support the division. Continued review and reemphasis of what each of these facilities can offer will do much to improve use of these assets.

The capabilities of each level of medical care should receive more emphasis than in the past. Evacuation assets must be carefully and prudently used to transport the individuals to the nearest facility for stabilization.

Each ground unit should have individuals who can properly select and mark landing areas for medevac helicopters. These areas must be free of hazards to the helicopter, both during takeoff and landing.

Medical personnel at all levels should learn the advantages and disadvantages of using the helicopter. For example, there are difficulties with inflight patient communication and lighting. Intravenous fluid lines and airway stabilization must be secured prior to flight, due to difficulties in performing these procedures while in flight.

Unit commanders must be aware of the potential hazards of medical evacuation by air and must be prepared to employ ground transportation to the nearest supporting medical facility if air evacuation is not indicated, is delayed or is unavailable.

Flight surgeons should be available as consultants for aeromedical evacuation and *should be used for this purpose.*

When physicians or physicians' assistants are not available, the unit medic and the commander must act on available information and make the best decision possible under the circumstances.

Good unit communication facilities to medical facilities are essential and aid in selecting casualties for air evacuation. Before deciding to evacuate by air or to use the ground route, the individual's medical condition, the tactical situation, road conditions, weather and terrain hazards all must be known and considered.

Just as with employment of all Army assets, helicopter evacuation must be properly applied to the tactical environment. Its use must be constantly reappraised in light of changing conditions on the battlefield. Its limitations and its advantages must be recognized.

To the three combat requirements of the U. S. Army – shoot, move and communicate – we should add a fourth: *evacuate.*

Historically speaking, armies which have been most successful in maintaining individual and unit cohesiveness have been those that evacuated and treated their wounded as early and as well as possible under the circumstances. Western Europe is not Southeast Asia. We must adapt air evacuation doctrine to the European battlefield of the 1970s and 1980s. We have not a month to lose!

Oh Say Can You See? *Continued from page 6*

The center of the retina is called the *fovea centralis*. It contains only cones. The fovea centralis is about 2 degrees wide and is responsible for the night blind spot. The cones are responsible for color and daylight vision. Each cone is connected to the brain by its own connector or nerve. This enables us to have detailed information about an object we see.

The remainder of the retina contains rods and cones with the rods becoming exclusive toward the periphery. These rods are responsible for our night vision. Many rods are connected by a single nerve to the brain. This summation allows less light energy to send an impulse to the brain. This area is 1,000 times more sensitive than the area of cones. This portion of the retina contains an area called the optic disc (point where optic nerve and blood vessels enter and leave). This area (optic disc) is responsible for the day blind spot.

The cones contain a light and color sensitive pigment called *iodopsin*. Iodopsin is insensitive to light below full moonlight. On the other hand, the rods contain a light sensitive pigment called rhodopsin or visual purple. Its sensitivity increases in darkness, but is readily bleached upon exposure to light.

We need to have a basic understanding of the types of vision. The first type is what we call *photopic*. This vision allows us to see in the daylight, to see color and to see sharp images. It is also referred to as cone vision or central vision. The next type of vision is what we call *mesopic*. This vision allows us to see during dawn and dusk. During a moonlighted night, it is our mesopic vision that detects various images. Mesopic vision is a combined use of rods and cones and is characterized by changes in colors and a decline of sharpness.

The third type of vision, and most important to us during night flight, is what we call *scotopic* vision, or night vision. This type of vision allows us to see during conditions of partial moonlight or starlight. With scotopic vision we find ourselves totally colorblind. Under these conditions, we find there is a central blind spot which requires us to use perpheral vision (looking away from what we actually want to see). During night vision our visual acuity is decreased from 20/20 to 20/400 and the only impulse being sent to the brain is from the rods.

Now that we have completed a review of basic visual physiology, let's examine the effect all of this has on you and me in regards to Army aviation after dark. First, there are several night vision limitations. The night blind spot projects directly into the center of our field of vision. It prevents us from seeing certain objects in the darkness, especially when we stare. As mentioned, we must see in darkness with the peripheral retina. The eye must continuously scan. You should remember that even when looking with the peripheral retina, any small amount of light will "bleach" or neutralize rhodopsin (visual purple) and, of course, destroy to some degree our night vision.

A recommended night vision (scotopic) technique is to use a scanning, systematic pattern from left to right, top to bottom, of the area of interest. Use a 10-degree overall lapping pattern, spending no more than a few seconds at each point. Remember to move the head and eyes together. When a target appears, maintain visual track by looking 10 degrees above, below, or to the sides of it to avoid bleaching the retina. Do not stare at a target with central vision as it will seem to disappear.

How many times have you heard someone say, "Make sure you dark adapt prior to flying tonight," and you hurriedly went off looking for a fresh set of flashlight batteries? Dark adaptation may mean the difference between seeing a hazard and not seeing it. Dark adaptation is defined as the process of increasing rod sensitivity to light (building visual purple). This process takes 30 to 45 minutes in darkness. The loss of dark adaptation or the ability to dark adapt can be caused by exposure to bright lights, or prolonged daylight exposure to the sun, sand or snow.

There are a number of steps we can take to protect this dark adaptation. Because the rods are relatively insensitive to ruby-red light, use red illumination in alert areas, hangars, etc. Wear red goggles if they are available, and use red cockpit lighting. Close one eye upon exposure, or anticipated exposure, to any bright light. Use sunglasses during daylight and watch your eating habits (good nutrition).

Avoid self-imposed stresses such as cigarette smoking. Cigarette smoking can saturate the blood with up to 8 to 10 percent carbon monoxide. This causes the body to function as if it were hypoxic before leaving the ground. (Hypoxia affects night vision as we increase altitude.) Smoking causes your physiologic (body functioning) altitude to exceed our actual or true altitude (7,000 feet mean sea level (MSL) true equals 13,000 feet MSL for the smoker). Along with smoking goes alchol and fatigue which further reduce night vision.

To help ensure that you will not become a part of the statistical analysis of night mishaps, here are 10 commandments for night visual acuity:

1. Dark adapt before attempting night flying duties (minimum of 30 minutes).

2. Avoid bright lights after dark adapting (preflight in the daylight whenever possible).

3. Do not stare at any light.

4. Practice blindfold cockpit drill.

5. Keep your windscreen clean, unscarred and unscratched.

6. Learn to look out of the corners, tops and bottoms of your eyes.

7. Do not stare, but scan constantly.

8. Use oxygen at night from the ground up if it is available.

9. Identify objects by total form.

10. Keep physically fit and mentally alert at all times.

How Important Are Your Eyes? *Continued from page 7*

nightmare began.

While working on a C-130 engine change during a TDY in Colorado, I had the misfortune of being too close to the safety wire. While safety wiring a cannon plug, the safety wire pliers bucked on me, causing the wire to penetrate through the middle of my right eye. I saw the wire coming, but there was no time to move. Even if I could have blinked, at the force and speed the wire was coming it would have pierced my eyelid too.

For the next 2 years I went through hell. Words have not been written to describe the pain and heartaches I have experienced. The vision in my right eye was listed as 20/200, which is blindness. I had developed a cataract, which is a clouding of the lens of the eye, obstructing the passage of light. My first operation brought back my vision with the help of a contact lens. I thought my problems were over, but they had just begun. I developed Glaucoma, which causes double vision. While driving or reading, my good eye would see straight ahead while the other eye was seeing two of everything; and, the road was always heading toward the sky. As time went on, my depth perception worsened. I walked into things in broad daylight. The pain from my eye was constant. The pain would race all over my face causing my good eye to weaken and also go blind. It was like 20 Vikings jamming an oak tree through the king's castle doors. I was helpless.

For 2 years I worked approximately 3 months. My time was spent in hospitals and convalescent leave. I was drinking close to 40 dollars a week in liquor. It didn't relieve the pain, but I was so fired up it didn't matter. I was scared of becoming an alcoholic, so the hospital started giving me pain pills. I started with mild pain pills, then went on to stronger pills that could knock out a fighting bull. Still, no pain relief. My doctors were becoming worried that I might get addicted to these pills. I was popping close to 70 a week. The condition in my eye was worsening.

I started traveling to surrounding hospitals for help. In a 2-year period, I visited hospitals for 30 days or more in the following order: The Air Force Academy, Hill AFB Medical Center, David Grant Medical Center at Travis AFB, Kirtland AFB Medical Center, Sheppard Regional Hospital, Brooks Medical Center, Albuquerque VA Hospital, and Wilford Hall Medical Center three times. This does not count the private physicians downtown. The mental strain and personal problems are something I never want to go through again, or see anyone else go through. As a result of these visits, I received only temporary relief for my eye. On December 7, 1976, 2 years and one day later – my eye came out.

Continuous tests showed that my eye was dead and would soon start causing trouble to my good eye. My medical bill, if I were a civilian, would take two lifetimes to pay, not counting my false eye, which cost $800. My VA benefits are only 40 percent with $52 extra a month for loss of eye, leg or arm. This doesn't come close to $300 a month for an E4. I don't know about you, but to me an eye is worth much more than that. I could go on and on talking about all the new adjustments I have had to make with only one eye. Some things I'll never get used to, like popping out my eye to clean it. And looking at a hole in my face for the rest of my life.

I am not bitter nor have I any down feelings. I am grateful for the moral support I received from friends and people in my squadron. I'm also grateful to the many physicians involved to rid me of my pain and saving my remaining eye.

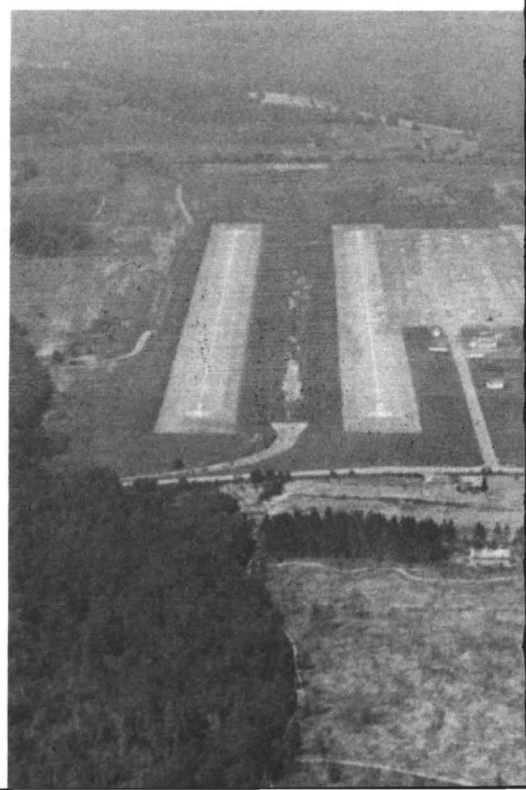
I work in Special Services now, in the base gym. I hope to start a new and safe career. I am only 24 years old.

I hope in reading my story you will have a new outlook on the value of your eyes. If, by chance, you don't, all I can say is that you are FOOLISH. Take it from one who knows. I've been there; they're priceless. So, wherever you are, at work or play, *wear your safety glasses*. It only takes a second to put them on, to save a lifetime of light.

Editor's Note: This article was reprinted from the USAF Safety Officers' Study Kit. It remains in the author's words and has not been edited. SGT Brown wrote the article on his own initiative, his sole purpose being to save someone else the agony he has gone through

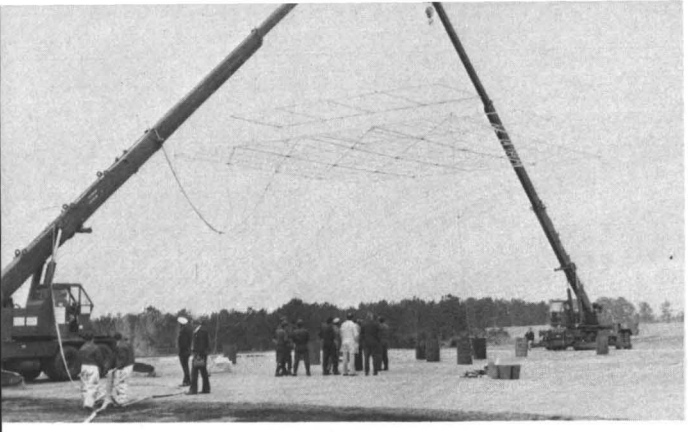
Army Aviation Center

Highbluff Stagefield (1) is used for training graduate students attending qualification and instructor courses. During the evening hours the stagefield is used for Nighthawk/Night Vision Goggles Method of Instruction. Hooper Stagefield (2) is used by graduate students attending qualification and instructor courses. Hunt Stagefield (3) is home for the TH-55 Osage helicopters used in basic airmanship. Students spend their first 50 hours here. Knox Stagefield (4) supports the 282nd Assault Helicopter

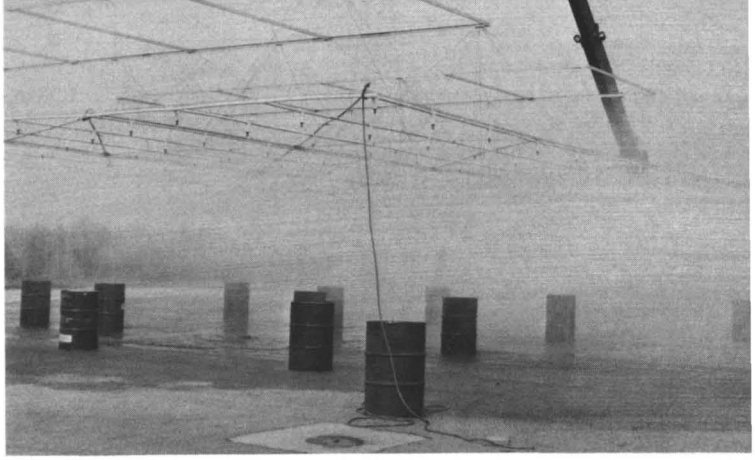


Company. The reserve unit performs operational support requirements and training flights from this facility. (Right) CH-47 Chinook medium lift helicopter based out of Hanchey Heliport. Training here includes initial aviator qualification and instructor pilot qualification. (Left) OH-58 Kiowa observation helicopter operating out of Hooper Stagefield. Training here consists of aeroscout and instructor pilot qualification. The facility also is used in the aeroscout phase of initial entry qualification.

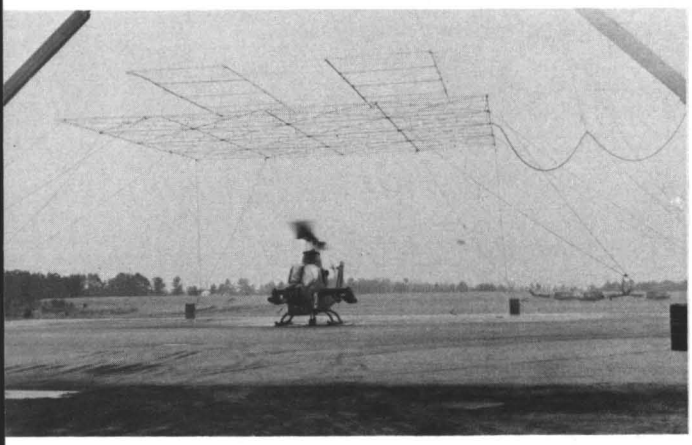
At A Glance, III



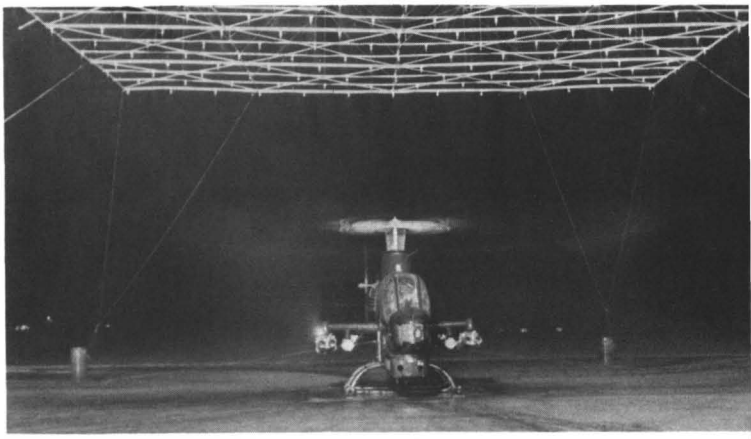
How do you test raindrop impact effect on helicopter rotor blades when there's no rain? First, you take some tubing, nozzles, hoses – put them together and lift with two cranes ...



then pump water through to test the assembly ...



next put a helicopter under the "rainmaker," with the helicopter tied down to the ground to prevent flying at advanced power settings, then run the helicopter both day ...



and night to accelerate accumulation of data. (Rotor wash from the helicopter prevents the "rain" from showing in the last two photos.)

Rain-Testing The AH-1

The Army has solved the problem of how to rain-test an aircraft when there is no rain – the Army creates its own.

Recently, while testing a new main rotor blade for the AH-1 Cobra helicopter, the U.S. Army Aircraft Development Test Activity, Ft. Rucker, AL, a subordinate of the U.S. Army Test and Evaluation Command, needed to operate the blades in rain for a certain number of hours.

When the weather at Ft. Rucker proved uncooperatively bright and sunny, a "rainmaker" was designed, constructed and tested within 3 weeks.

The "rainmaker" can regulate raindrop size and flow rate to meet test specifications, while saving the cost of either waiting for rain or sending the testers in search of it.

This new method of producing a rain effect will be available for similar testing in the future.

Practice — Don't Study SQT

SOLDIERS DON'T have to wade through a mountain of references to study for the new Skill Qualification Test (SQT). In fact, Soldiers don't have to "study" for the SQT – they have to "practice."

That's a fact, according to the U.S. Army Training and Doctrine Command at Ft. Monroe, VA. Soldiers have to practice for the SQT because SQT is a practical demonstration of job skills. Soldiers who practice their skills and can perform them well enough to do the job should have no difficulty passing the SQT.

In fact, if Soldiers want to know the questions and look at the answers on the SQT, it's simple. First, get your copy of the Soldier's Manual and test yourself.

If you're in one of the following MOSs, and you don't have your Soldier's Manual, tell your immediate supervisor: MOS 11B, 11C, 11D, 11E, 16B, 16C, 16D, 16H, 16J, 16P, 16R, 95B, 95C, 95D, 76J, 34E, 34F, 34G, 41C, 44E, 45B, 45K, 45L, 63C, 63G, 63H, 63J, 71P. If you aren't in one of these MOSs, yours is being developed and will be distributed when completed.

The Soldiers' manuals list all the "critical tasks" required to perform their jobs. Remember, if it isn't in there, it won't be on the SQT.

Here it is, step by step: Take your Soldier's Manual, open it to page whatever, pick the critical skill, and do a quick read of the standards and sequence of events. Simple, right? Okay, now do it. If you did it correctly, you're ready for that question on the SQT.

Many Soldiers still believe the SQT has a few "trick" questions. *That is simply untrue!* Each question has a direct practical application to the job. If you need certain tools on the job to perform the task, you'll have them (or simulation devices) during SQT.

The three components of SQT (hands-on, written and performance certification) may be included in the SQT. That is, certain SQTs may have one, two, or all three components, depending on the job.

U. S. Army Training Support Center developers and managers of the SQT report that Soldiers who practiced the job skills outlined in Soldiers' manuals performed well on the SQT during the shakedown phase.

First U. S. Army News Release

Army Reserve Command (ARCOM) flight facilities in Maryland and Massachusetts have received the First U. S. Army Commander's Aviation Accident Prevention Trophy for fiscal year 1976.

The 79th ARCOM flight facility at Hagerstown, MD, received the Category A award while the 94th ARCOM flight facility at Ft. Devens, MA, received Category B honors. The Category A award is given to a unit with 10 or less aircraft, while Category B units have more than 10 aircraft in operation.

Both units were honored for having shown a high degree of professional skill in maintaining a zero accident rate and an operational readiness rate above established Department of the Army requirements. At the same time they met the required Flying Hour Program. Individual and unit training objectives were also exceeded.

AVIATION TRAINING

TOUGHENING UP THE SOFTEST SPOT

Continued from page 9

be able to fly as many or as few hours as are required to maintain competence in the execution of particular tasks and events. Preliminary hours established by the Task Force representatives define what in their best judgment are the mean hours which will be required to accomplish annually the composite individual aviator training tasks by type aircraft. Any return to a direct association of pilots to annual "hard" hourly flying requirements as opposed to tasks and events, will eventually relegate the FHP and aviation training to the depths from which we are now attempting to elevate it.

Recognizing that the transition from AR 95-1's CRF requirements to the ATMs will require a major administrative effort, FORSCOM at the request of DA, has already implemented the draft ATM applicable to Air Cavalry for a 6-month period using elements of the 6th ACCB, Ft. Hood, TX, as the training vehicle. The effort at Ft. Hood is not a test or evaluation of the concept, but an attempt to assess the mechanical problems associated with shifting a major unit into the new training methodology. This procedure is essential before moving the Army across the ATM line in FY 78. The program at Ft. Hood also is being closely monitored by TRADOC, USAAVNC, USAAAVS and the Directorate of Evaluation/Standardization, HQDA's proponent for standardization which is located at Ft. Rucker, AL.

What about short and long term gains? Let's cover the short first. One of the major problems confronting commanders and staffs in general is the development and justification of a viable FHP at their respective levels. The zero-based concept is a simple mathematical linear progression. It consists, for example, of the number of pilots in a command flying UH-1 Hueys, multiplied by the 60 hours of UH-1 individual aviator training time ("P" time) required. This figure is added to those hours required for unit training as determined by the commander.

The individual aviator training hours and unit training hours are then added to mission support hours, or those hours needed to support ground units for the year (to include all their programed tactical exercises such as Reforger). The compilation of flying hours in this manner provides the capability to submit a completely valid/justifiable FHP request for funds in the MACOM annual Command Budget Estimate. This, until now, has been an extremely difficult task.

Next, the concept identifies in detail what tasks the Army expects the aviator to be capable of performing to meet combat readiness requirements and mandates that those things be done. It thus assures the Army through task/event completion that the aviator has, in fact, accomplished the training required to maintain that readiness, and performed mission support duties as a "safe and competent pilot." Further, it makes explicit the fact that funds allocated to purchase fuel and spare parts in support of the three components of the total FHP will be used for those purposes. Reports of flying hours flown by type aircraft submitted to HQDA also will assure this is accomplished.

Also in the short term, we have developed proof positive that we have come of age in aviation training. We now recognize that the training requirements for an AH-1 Cobra pilot are not the same training requirements necessary to maintain proficiency in an OV-1 Mohawk. This was long overdue.

Finally, in the short term, our efforts do show good faith to the GAO and to Congress that we have made significant strides in correcting the FHP management deficiencies which were recognized both by those organizations and ourselves. It is hoped that, while budgetary constraints are a fact of life in these times, Congressional reductions, should they occur in FY 78, 79 or the "out years," would not be applied to the Army's FHP due to a lack of justification on the Army's part.

I should point out, also, that for the first time using the system described we are able to put a price tag on battalion level individual aviator training. The

significance of this is that we are now able to define a loss in combat effectiveness, combat power or combat readiness in terms of ineffective aviation battalions or separate companies. This results from Congressional cuts of, for example, $12 million in the FHP, and the impact of those cuts on individual aviator training, our known constant at this time.

What about long term gains? These are primarily internal to the Army. Using the zero-base system in FHP development, using the ATMs to implement individual aviator training and using the ARTEP as a management tool to assess the training status of our units at any point in time, we have put together a completed package to assure Army aviation's ability to meet its mission requirements in support of ground forces.

Further, the system is a complex administrative problem if consolidated at levels higher than company or troop. The administrative handling of the program can be accomplished best at platoon level, where platoon leaders and section leaders track and ensure the accomplishment of aviator training. Why is this a long term gain? Because it puts leadership and management back into aviation units at the levels where it belongs. It ensures that the responsibility for command is learned by direct involvement with training, readiness and safety – down in the section and platoon where it belongs, where historically it has proven successful in Infantry, Artillery and Armor. The development of young leadership internally in aviation has taken on an important role with the advent of OPMS and Specialty 15.

Finally, we have developed for the out years a "total program" concept in aviation training. This will make each of us far more confident of our individual capabilities and responsiblities. It will make us keenly aware, as Mr. Joseph Cribbins, Special Assistant to the DCSLOG HQDA, stated, "We are not here to keep us occupied in peacetime!" As General Rogers commented at the 1975 FORSCOM Aviation Resources Management Conference:

> *One of the Army's greatest challenges today is getting our aviation capability trained to the point that it can fight on the modern battlefield — not survive, but make a contribution to living.*

I am convinced with what has recently been done in aviation training, with where we are, with where we're going, and with the leadership we now have in and supporting our aviation program, that we are meeting "One of the Army's greatest challenges...," and that we are, finally, toughening up "...the softest spot in the system!"

GLOSSARY

ACCB	Air Cavalry Combat Brigade
ARTEP	Army Training and Evaluation Program
ATM	Aircrew Training Manual
CRF	combat readiness flying
DA	Department of the Army
DARCOM	U.S. Army Materiel Development and Readiness Command
DCSLOG	Deputy Chief of Staff for Logistics
FHP	Flying Hour Program
FORSCOM	U.S. Army Forces Command
FY	fiscal year
GAO	General Accounting Office
GCA	ground controlled approach
HQDA	Headquarters, Department of the Army
MACOM	major commands
ODCSOPS	Office, Deputy Chief of Staff for Operations and Plans
OPMS	Officer Personnel Management System
TRADOC	U.S. Army Training and Doctrine Command
USAAAVS	U.S. Army Agency for Aviation Safety
USAAVNC	U.S. Army Aviation Center

Continued from page 3

AN ASO SPEAKS OUT

sees that you are keeping up with what's going on. He knows that everything is straight and that you are doing all you can.

"Your crew chiefs will see that you have their tail numbers and that gets their interest. If something is done to their aircraft, they will call you and tell you.

"The whole secret is to become totally involved with the unit. Don't be the safety officer who sits in his office and drinks coffee. Aircraft don't crash in the safety office. You have to get out and get with the people.

"We once had an officer who smoked in the hangar. I talked to him about it and he said he would stop it. It happened again and an enlisted man sent an Operational Hazard Report (OHR) to me and I took it to the commander. The commander had a talk with the officer and he doesn't smoke in the hangar anymore. But the OHR is on the OHR board. One Spec 4 brought another Spec 4 into my office and showed him the OHR. He pointed out that I talked to the commander about all problem OHRs. When your people see you take action, it helps your safety program.

"We received an OHR from a subordinate unit maintenance TI who said a guy was pushing a hangar door open with a tug. He told me he did not think he would get any corrective action and asked if I would take care of it. I retyped it and put my name on it. That way I helped the TI and he will keep backing me.

"The safety officer is supposed to be perfect. Everything he does has to be down the straight and narrow. You cannot make mistakes, because the minute you do, you hear about it. I flew an aircraft .1 hour past an intermediate and I got several phone calls and Xeroxed copies of the dash 13. Everybody is watching you. If you have good credibility, they'll

overlook your first goof. But if it keeps happening you lose your credibility and then your safety program is like paddling upstream in a rowboat. If you stand still you end up going backward.

"Inspect your survival gear, especially the first aid kits. Many of the items have an expiration date. If they are outdated they can be harmful if used. I ordered three cases of water purification tablets in 1976. They are good for 3 years from date of manufacture. I received three brand new cases made in 1966. They are still in the supply system and you may still get them when you order. Every time you get something like this, be sure you submit an EIR so we can get outdated items out of the supply system. All the bandaids, tape, and other adhesive in the first aid kit are good for only 3 years.

"EIR your survival equipment. During inspection of one of our survival kits, we discovered that the matches had ignited during handling. Since there are flares in there you can imagine what could happen in the back of a Huey with survival kits going off. We took all the matches that were in match boxes and put them in protective containers.

"You can work up a good EIR program if you get in with your maintenance officers. Take pictures of each item that has been EIR'd and get a copy of the EIR and a copy of the answer to the EIR. Find out how many hours the item has on it and when it was installed. Then when your commander says we are wearing out item X too fast, you can hand him four or five EIRs that document it. That's where credibility comes in with your commander. You are not a safety officer any more; you are an accident prevention specialist. And you are working for the organization – not for the safety office, not for the aviator, but for the whole organization.

"Operations closely monitors the FORSCOM training program. All the classes that have to be given – quarterly, semiannually, and annually – are listed on a board and one slash beside the class title means that it must be conducted in that time frame. When a class is completed, I make the other slash, forming an X. It is not in somebody's desk, hidden. It is right there where it can be seen. All you need then is the backup paperwork. People who give the classes can walk in there and see when the hot refueling class is due again, or the maintenance officer's class, or any other class. It is a big help in seeing that the training is conducted on time.

"I don't think we should be called safety officers anymore . . . I would rather be called an accident prevention specialist or technician. Prevent the accident first — that's our job."

"We use photos a lot in our accident prevention program. I know they are expensive, but so is an aircraft. Oil was spilled and left on the ground outside one of our hangars. We took a picture of it and sent one to the fire department and one to the unit. In about 6 hours it was cleaned up. We had a similar problem with a forward area refueling point and paint lockers. I handled it the same way with the same results. And I use these same photos later at safety meetings. If the photo lab people know you are really interested in your safety program and realize the importance of what you are doing, they will support you all the way.

"When you see someone doing something right and going by the book, it's always a good idea to let them know you appreciate it. A little pat on the back goes a long way in encouraging people to continue to do things right.

"I have touched on just a few of the hundreds of things that can be done to improve your safety program. With a little imagination and a lot of initiative, you can be a true accident prevention specialist."

When my door came off, the force of the wind entering the cockpit was so great it turned me sidewards in the seat and pulled my left arm backwards

Expect the unexpected

CW2 Dean M. Resch

OUR MISSION was twofold – to support an ongoing test and to accumulate test time on the JCH-47C aircraft we were flying. The flight plan route originated at Fort Drum, New York, where a cold weather test was underway for another test aircraft. Enroute to Fort Rucker, AL, which is our home station, we were to stop at Patuxent River NAS and pick up an item of equipment. The flight route was over mountainous, heavily forested terrain with rivers, creeks, and cultivated land in the valleys.

The flight plan was filed with Fort Drum, but due to the 20-minute delay for weather information from Griffis AFB, I contacted Flight Service at Watertown, New York, and received my weather briefing. Forecast conditions were 1,400-foot ceilings with a small amount of cloud cover and scattered afternoon thunderstorms for the immediate Fort Drum area.

We departed Fort Drum at 1020 hours with approximately 1,000 pounds of equipment and 7,000 pounds of lead weights used as ballast on the cold weather test aircraft. I was flying in the left seat as IP with a transitioning pilot in the right seat. Also, as in all our cross-country flights, we had two crew chiefs on board.

The winds were variable at 10 knots as we departed Fort Drum. We had flown an hour southbound at 2,500 feet msl at 125 knots, skirting the only thunderstorm we actually came near to during the flight. It was at this time that we received a report of measured 40-knot surface winds from a local approach control. It seemed to be associated with the thunderstorm we had circumnavigated.

Top left: Left forward fuselage with copilot emergency exit door missing and phenolic blocks in place.

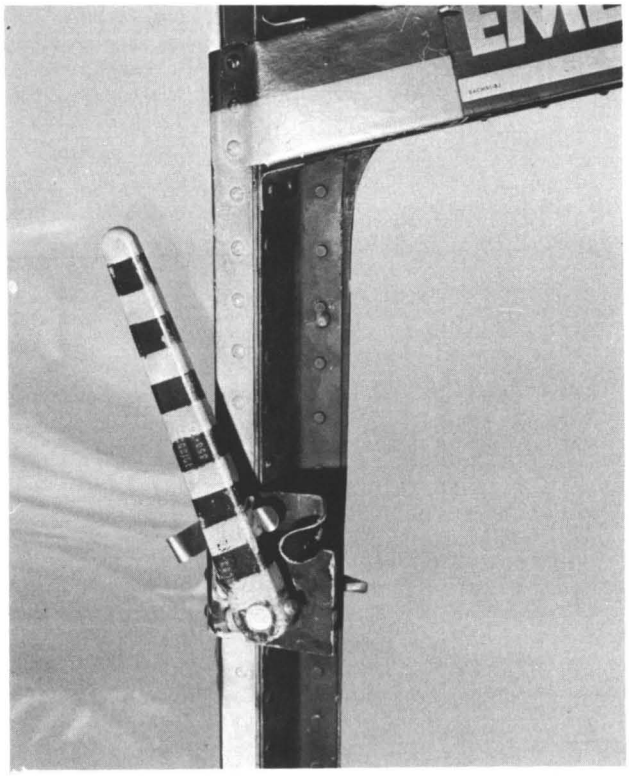
Continuing southbound, while flying perpendicular to the ridgelines, we began to encounter light turbulence and occasionally hit some moderate turbulence. Forty-five minutes later, as we crossed a ridgeline, the aircraft penetrated an area of moderate to severe turbulence. Immediately, the left escape door jettisoned from the aircraft, followed by a loud explosive-type noise. When the door came off, the force of the wind entering the cockpit was so great that it turned me sidewards in the seat and pulled my left arm backwards. Everything I had placed by the center console and my seat vanished, to include all our maps and IFR charts and FLIPS.

The aircraft started to yaw 15-20 degrees left and right. I regained my original seat position with difficulty and immediately checked the instrument and caution panels, expecting to find a SAS problem due to the aircraft yawing left and right. But there were no lights on the caution panel. Within a very short time the aircraft began to vibrate severely in the yaw axis. It was at this point that I began to suspect that the door had entered the rotor system. All this had occurred in two or three seconds.

The pilot immediately initiated a descent and made a 240-degree turn to reach an open field to our right rear. Attempting to regain control of the aircraft, I managed to get on the pedals and cyclic, but I had some difficulty with the thrust in that I could not tighten my finger around the thrust brake trigger. It was as if my fingers had gone to sleep. However, I was able to forcibly override the release by pulling upward on the thrust lever, effectively decreasing the rate of descent. I do not know if my arm hit the aft edge of the door frame or the circuit breaker panel when I was turned in the seat, but I could not manipulate my fingers.

It was at this time that I realized that the pilot was talking to me, but I could not hear him and I could see that he could not hear me. The wind force in the cockpit had unplugged my helmet and the cord was trailing out the door. Seeing that we attained 150 knots of airspeed during the turn, I motioned to the pilot to assist me in slowing the aircraft back for approach. He later said that he thought that I had the landing area in sight. Through a joint effort, we managed to slow the aircraft down.

The closer we got to the ground and the slower our airspeed became, the greater the aircraft yawed. In fact, the aircraft was now yawing 40-50 degrees left and right. I decided on a power-on approach, planning to land with minimum ground roll. Prior to touchdown, the vibration was so severe that the instruments were impossible to read; one of the crew chiefs was thrown against



Upper copilot emergency exit door release still in position after incident

the side of the aircraft, damaging his helmet; and the cargo had shifted despite the cargo tie-down restraints. On touchdown, the aircraft jumped laterally across the ground. I immediately initiated an emergency shutdown and we all exited the aircraft.

Our inspection revealed the following: the forward yellow blade had lost a complete pocket and five feet of trailing edge, leaving the trim tab bent downward 80-85 degrees. The spar had sustained severe damage with a quarter-to half-inch notch on the trailing spar edge. The No. 1 engine cowling was damaged, as was the combustor section. Finally, the red forward blade had been scraped on the bottom side. The emergency door was never found.

It was not necessary to use our survival radio due to the close proximity of a local farmhouse. From there I telephoned flight operations and they notified flight service. Military aid was at the scene within two hours.

I certainly never thought I'd fly the CH-47 with the front door open, but this experience emphasized two important things for me. First, always be prepared for the unexpected. The difficulties I had in communication and in the use of my left hand did not help an already tense situation. A clear understanding and delineation of crew duties did. Secondly, carefully consider where you place charts, publications, and other equipment. I no longer place my gear between the seat and door.

* * *

Following are comments by the investigation board and the flight surgeon concerning this mishap.

Investigation board: The latching device failed to retain the door. The turbulence encountered was a suspected cause. The phenolic block fix recommended by the U.S. Army Aviation Systems Command (USAAVSCOM) had been applied to this particular helicopter, and inspection of the phenolic blocks before and after the incident indicated that the blocks were fitted and installed correctly. It was recommended that the latching device for both the pilot's and copilot's jettisonable doors be redesigned to provide a secure, positive latch to prevent the doors from coming off unless manually jettisoned. (Since this accident, TB 55-1500-210-20-34 (Urgent), dated 8 June 1977, requires that all CH-47 aircraft be inspected to insure that blocks have been installed under the doors to prevent them from shifting downward. It also requires that airframe and door fittings be inspected to ensure adequate forward and aft restraint. In addition, USAAVSCOM has initiated preliminary design effort aimed at preparing an Engineering Change Proposal to provide increased latch engagement and to modify the external release door handle assembly to provide positive locking of the door latch linkage. TMs 55-1520-209-20-1 and 55-1520-227-20-1 are being changed to include information on the blocks and fitting engagement criteria.)

Flight surgeon: The IP was examined and there were no bruises or external evidence of trauma to the shoulder or upper arm. However, intermittent numbness persisted in the left arm and hand for several days. It was suspected that the IP's left shoulder was forcefully hyperextended by wind blast, resulting in temporary injury to the nerves in the shoulder.

CW2 Dean M. Resch is assigned to the Flight Operations Branch, U. S. Army Aircraft Development Test Activity, Fort Rucker, AL. He has a total of 5,000 hours' flight experience, of which 2,750 hours are in the CH-47 with about 1,400 hours IP time. He is also qualified in the UH-1, OH-58A and C, and Bell 214A. He has about 1,000 hours IP time in the UH-1, is a rotary wing instrument examiner, and is qualified as an SIP in 214A. Mr. Resch received the Broken Wing Award for the way he handled the mishap described in this article.

stories with morals

Lieutenant Colonel Harold Anderson
HQ TAC Physiological Training Coordinator

IN ANY DISCUSSION of physiological incidents, we tend to consider only the more spectacular cases, i.e., those involving hypoxia or decompression sickness. While these cases may be more intriguing, the potential for mishaps from such mundane disease as sinus pain, ear pain or abdominal gas pains should not be ignored.

Here's an example of one aircrew who was "laid low," literally and figuratively, by a common sinus block. A routine descent from FL 280 to 16,000 feet (cabin altitude decreasing from 6,000 to 5,000 feet) generated right ear and facial pain. Nasal spray with Afrin, followed by several vigorous Valsalva maneuvers, failed to relieve the problems. When cabin altitude reached 5,000 feet, the crewman lost consciousness, which was regained when the cabin altitude was increased to 6,000 feet. He subsequently lost consciousness on two other attempts to decrease cabin altitude (increase pressure) to 5,000 feet. His fellow crewmembers, fearing for his life, administered mouth-to-mouth resuscitation and external cardiac massage. On orders of a ground-based flight surgeon, the aircraft was landed while he was unconscious. Subsequent examination by an ear, nose and throat (ENT) doctor provided a diagnosis of "maxillary barosinusitis." The hapless crewmember admitted to having a "cold" for the previous week, but since he had never had either an air block or sinus problem in the past, felt he would have no problem flying with it.

Compounding the problem, caused by his poor judgment, was the unfortunate coincidence that he was a member of that small (but not rare) population group which exhibits a fainting reaction to severe pain. (NOTE: The application of mouth-to-mouth resuscitation and external cardiac massage should be initiated only when indicated by absence of respiration and pulse.)

In another case a sinus block occurred during a landing approach. The IP was hit by severe pain and turned over the control of the approach to his student. He landed short of the runway, striking some powerlines. Result: two fatalities and one aircraft destroyed. Neither the IP nor the student ever dreamed that a sinus block would be their final undoing.

Moral of these stories: Don't fly with a cold! (Where have you heard that before?)

Less common, but still a potential hazard, are physiological incidents which involve abdominal gas expansion. The pain generated by the expansion of gas housed in the large intestine can cause severe pain which, even if the victim does not faint, can cause complete incapacitation.

Under normal conditions, there is gas in the large intestine. Some of it is formed by the fermentation of food residues by bacteria dwelling in that area. Some gas (air) has been swallowed. Regardless of its origins, that gas will expand enormously when the external pressure on the body is reduced. Loss of cabin pressurization which may increase cabin altitude (reduced cabin pressure) from 8,000 feet to FL 300 or FL 400, can result in expansion ratios of 3 to 5.5. If the gas cannot be passed as flatus, pain will be continuous and severe.

Flying with a gastro-intestinal condition which has diarrhea as one of its symptoms can compound the problem. The presence of diarrhea inhibits the normal passage of flatus. The crewmember, trying to avoid an embarrassing "accident," will be apt to retain the gas. When the "relief valve" is closed off, there are no alternative escape routes ... all the gas is retained. If, under these conditions, the crewmember should become unconscious, voluntary control over the sphincter muscles would be lost and nature would take its course.

Moral of this story: Don't fly when you have a G.I. malfunction.

Knowledge vs Desire

Men will risk losses out of all proportion to possible gains if they feel that through their skill and luck they can probably avoid the loss

ONE OF THE most difficult aspects of flight safety education is the conversion of skeptics into believers. Aircraft accidents will generally accomplish this, but only if the person being converted is involved in the accident himself or has a close friend involved in one. Needless to say, this is the undesirable way.

A pilot must know *where* and *how* he is liable to be involved in an accident. Not just in relation to emergencies and other obvious pitfalls, but in rela-

tion to the situations and environmental atmospheres that precipitate emergencies and potential accidents. These are the subtle and subconscious causes of accidents, and they are the most heinous of all the causes in that they are so obvious and plain, but yet so nebulous.

We are all human, and because of this, we share common failings. There are three main peculiarities of the species *Pilotorum humanis* that account for the majority of aircraft accidents. Do not deny these manifestations of human nature, because you have them like the rest of our breed. If you have not noticed them by now, you will eventually.

The *first* of these peculiarities is the fact that men tend to be prouder of their willingness to take a chance than of their caution, conservation and carefulness. No doubt many of us can recall flying in marginal weather to make that date or stretching our fuel supply to avoid a refueling delay, or even attempting hazardous flights in aircraft we are not fully qualified to be flying. Sure, we all made it. From the stories we hear, we would think the odds are predominantly in our favor, but are they? Unfortunately, testimony to the contrary reposes quietly in flight safety files under the heading of "Pilot Factor."

While remembering these talks of daring episodes, how many can remember the times you have heard of canceled flights because of weather or of diverting before reaching the destination because of low fuel? Not many, I'll wager. Why? Because it is human nature to romanticize, to startle, to glamorize. Flying is a romantic business. It is so because it is hazardous.

Any profession that involves hazards over and above those encountered in the more common occupations is romantic. Who does not admire the bullfighter, the mountain climber, the auto race driver? There is an undeniable human tendency to romanticize the risk-taker more than the man who figures a way to avoid the risk.

To what does this all add up? Simply this: Conservatism and caution must compete with a subconscious tendency to regard these qualities as a form of timidity unworthy of a pilot.

The *second* undesirable peculiarity of human nature is the fact that men tend to use their powers of logic and reasoning to find justification for the things they want to do rather than to determine what is best to do. In other words, we tend to compromise our better judgment in favor of our desires by rationalizing.

Basically man is a creature of emotions, feelings, impulses and unrecognized urges, all kept under precarious control by a flimsy bridle of intelligence, rationality and logic, and the painful whip of authority and social pressure. Most of us, when confronted with a problem involving a conflict between what we know we should do and what we would like to do, tend to seek a way to satisfy our desires while convincing ourselves that it is the proper thing to do.

"I'd sure like to get back to play in that golf tournament this weekend, but the weather looks pretty mean," we say. "What the heck, I need some weather time anyway, and if I stay low I probably won't get any icing." This is rationalization. "I'd like to get home. I know the weather is bad and I shouldn't go. Anyway, I need some weather time. How convenient. Warm up the golf sticks, I'm on my way!"

When man's basic nature, his fundamental urges and strong desires pull him toward one decision, and his education inclines him toward another, all too frequently he will go with his feelings.

Now the *third* undesirable characteristic of man is this: Men will risk losses out of all proportion to possible gains if they feel that through their skill and luck they can probably avoid the loss. Why do people in automobiles attempt to pass on hills or blind curves? Why do pilots flying a poor landing approach go on and attempt to land when they know they should go around? They know better. Why do they do it?

Why? Simply because it is one of those undesirable human quirks. What is to be gained and what is to be lost? A few minutes' time in the case of the former, a life in the case of the latter. What gambler would play odds like that? Still, if someone asked if you were a gambler, how would you answer?

If you were to sit with a man in his living room and give him these situations, he would tell you he would do the safe thing. But put him in one of the above situations and see what he does. More than you would expect will gamble. It is human nature, and it comes back to the old conflict of knowledge versus desire.

Being a pilot is a hazardous profession, but it is only as hazardous as you want to make it. Control your desires, and be aware of the traps human nature has laid for you. In years to come, remembering what you have read here may save your life.

WHO'S IN COMMAND?

YOU ARE DESIGNATED commander of a UH-1 scheduled for a cross-country flight. Your copilot is a general officer who has little flying experience. During flight planning, you are advised of deteriorating weather. You have a choice of either of two routes. One will take you over mountains; the other, along the seacoast. Because of the poor weather forecasted, you decide to follow the coastline. However, the general insists on flying over the mountains. He wants to save time as well as to familiarize himself with the terrain. Although you make several attempts to point out the hazards involved, the general remains firm. What do you do? Who's in command?

If you conformed to the general's wishes, consider yourself dead. While the example stated is hypothetical, it is based on an actual occurrence. The aircraft involved in that flight crashed.

The question remains: On any given flight, who has the authority to make all pertinent decisions relevant to that flight? In addition, what if a passenger, perhaps a rated aviator, should feel that the pilot is operating the aircraft in a manner detrimental to safety in violation of flight regulations? Has he any authority to intervene? If a standardization instructor pilot (SIP) is giving an instructor pilot (IP) and his student a check ride, who is in command? The IP at the controls or the SIP who is not? Also, what is meant by "senior qualified aviator" as stated in AR 95-1? Does this refer to rank, general flight experience, experience in type aircraft...? Finally, if the pilot in command does have full author-

ity to plan and conduct all phases of the flight, how does he handle a delicate situation such as that involving the general officer?

Before the 30 Nov 1976 revision of AR 95-1, these and similar questions were the rule rather than the exception. However, the revised version provides explicit information that should dispel any doubts as to its meaning. Nevertheless, some questions continue to arise, and another look at paragraph 1-18 appears to be in order. In part, it reads as follows:

"The commanding officer, or his representative, will designate the pilot in command of each aircraft under his control prior to each flight or series of flights. The pilot in command will normally be the senior qualified aviator at the controls. Pilot in command designation will be reflected in the flight plan, when used, and in the unit operations log. The commander places full responsibility on the designated pilot in command who is final authority for all aspects of the operation, servicing, security and hangaring or parking of the aircraft...When two or more aircraft are operating in a flight or as a unit, the senior qualified aviator will be in command of all aircraft, except when the unit commander specifically designates otherwise...."

In addition, we note that the pilot in command will be the IP, SIP, or the instrument flight examiner (IFE) if aboard and performing instruction or evaluation duties. Further, the pilot in command is responsible for the adherence of passengers and crewmembers to regulations governing conduct in and around the aircraft. In these matters, passengers and crewmembers, regardless of grade, seniority, or service, are subject to the orders of the pilot in command.

Consequently, when the commander or his representative designates a pilot in command of an aircraft under his control, he gives that pilot full authority to plan and conduct all phases of flight as necessary to accomplish the assigned mission, and places upon him full responsibility to do so in accordance with existing applicable ARs and SOPs. His decisions are not subject to approval or disapproval of any passengers, regardless of their rank.

While paragraph 1-18 of AR 95-1 saddles the pilot in command with full responsibility for the safe conduct of a flight, it does not relieve the commander, or his designated representative, from his responsibility for making certain the aviator he assigns is fully qualified, current, responsible and capable of performing all the tasks required of him. Failure of commanders to ensure these qualities in a pilot when making assignments, and failure to be explicit in designating the pilot who is to be in command have resulted in accidents, some of them serious.

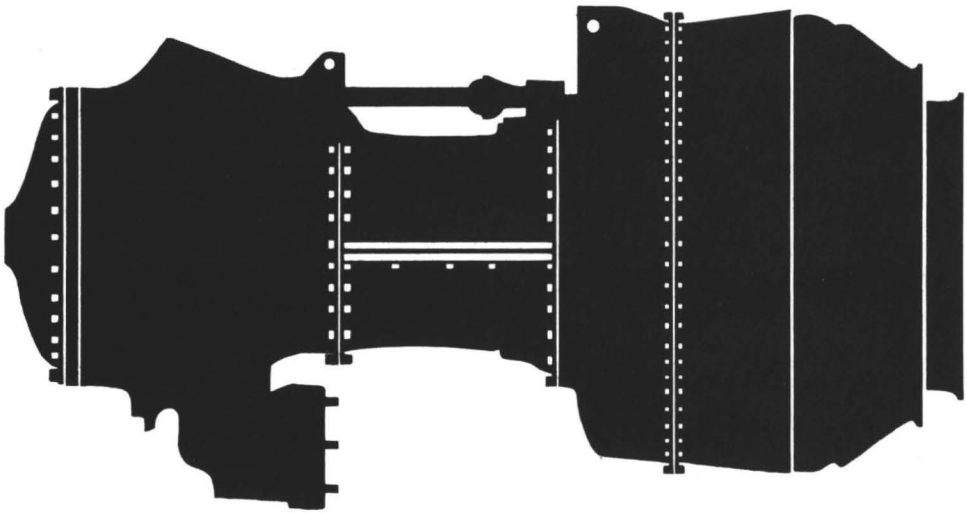
In one instance, the newest and least experienced pilot in the unit was assigned to test fly an OV-1 in marginal weather. When mechanical problems developed, the pilot, hampered by poor outside visibility, could not cope with the situation and a fatal crash resulted.

In another instance the operations officer was not specific in designating the pilot in command when he assigned a CW4 and a CW2 on an IFR flight in a U-21. The CW2 thought the CW4 was in command and the CW4, in turn, assumed the duties of command pilot. When they reached their destination, they made an instrument approach and broke out of the clouds above minimum altitude. Visibility was at approach minimums with darkness, snow and low-level runway light intensity affecting environment perception. On short final at approximately 50 to 100 feet, the aircraft entered a higher than normal rate of descent. Power was added, but the aircraft continued to descend rapidly until it struck the runway with the right main gear, and bounced into the air. The pilot then kept the aircraft airborne and continued to another airfield where he landed safely. Inspection revealed major damage to the center section, right wing, nacelle, landing gear, flap and fuselage. The CW4 was not current in the aircraft and overdue a standardization checkride. The operations officer was aware of these facts when he assigned the crew.

Obviously, pilots should not only be carefully selected for a particular mission, but also their duties should be clearly stipulated. Similarly, when two or more aircraft are to participate in a flight, the unit commander should make certain the individual he wants to be in charge of the mission is specifically designated if it is to be someone other than the senior qualified aviator who would automatically have this responsibility. And senior qualified aviator means senior in rank, regardless of total flight experience, so long as he is qualified and current in the mission, type, design and series aircraft flown. Also bear in mind that when an SIP is rating an IP from the jump seat position, he is limited by AR 95-63 as to the maneuvers he may require the IP to perform – even though he is in command of the aircraft. And, of course, an IFE *cannot* give an exam from the jump seat position.

Finally, in matters affecting flight safety, how does one go about telling a general officer or other superior that he cannot honor some request relevant to a particular flight – a difficult thing to do. But maybe it isn't so difficult after all. Why not follow LTC (Retired) William A. Howell's lead, who as the first commander of the Executive Flight Detachment and first Presidential helicopter pilot often told President Eisenhower politely but emphatically:

"No, sir, Mr. President."



USAAAVS

Turbine engine facts

TO BEGIN WITH, a commendation is in order. Because of the outstanding professional attitude displayed by Army maintenance personnel, a serious engine problem has been eliminated. Before August 1975, an average of one first-stage compressor blade failure occurred every 60 days on Army turbine engines. The 30 July 1975 issue of FLIGHTFAX addressed this problem in an article titled "Care and Cleaning of Lycoming T53 Series Engines." The crux of the article was that we should never spray *anything* into an operating engine. Since publication of this article (approximately 21 months), Army units have not reported a single gas turbine engine first-stage compressor blade failure. The point is clear: While we can point out problem areas and recommend cures, only YOU can get the results. A big well done to all of you! Following are other important facts concerning gas turbine engines:

Failure to follow proper procedures when using engine gas path cleaning compound, NSN 6850-00-181-7594 (better known by part number BB3100), continues to cause bleed band actuators and fuel control air bleed valves to malfunction.

The *preferred* method for cleaning an engine is to use a metered air source, not to exceed 60 psi, to close the bleed band. This procedure permits cleaning of the "hot" section as well as the "cold" section. If the alternative method of protecting the bleed band actuator with a waterproof covering is used, the bleed band will remain open, allowing most of the cleaning fluid to drain out the bleed ports.

With the hot summer months upon us, proper and precise cleaning procedures must be used. In addition, the time is ripe to analyze the HIT data and spot those weak engines that won't be able to hack it as temperatures soar. Further, USAAAVS and the manufacturer recommend that all gas turbine engines operated in a salty or highly corrosive environment be sprayed internally with some type of anti-corrosion compound, such as WD-40 or RUST-LICK, after each day's operation and any time they are to remain idle for an extended period.

TM 55-2840-229-24, par. 5-149, page 5-81, calls out the bleed band closure check for the T53-L-11, T53-L-13, and T53-L-703 engines. The note on page 5-81, paragraph 5-149(3)e, states that figures 5-60 and 5-61 are valid regardless of airframe inlet configuration (i.e., sand and dust separator and/or foreign object

damage screen). Adjustments are to be made in one percent increments. Since the range differs between fuel regulators, as shown in figure 5-61, be sure to use the correct portion of the graph when making these adjustments. The bleed band closing speed for fuel regulators (P/N 8400A4/A5/A6/A7) may be reduced to the lower limit of fuel regulators (84200A1/A2/A3 and 100770-A2) only if it is necessary to relieve bleed band cycling problems.

The note, as stated, is correct for new or new-condition engines. Moving the bleed band closing point to the lower limit of the range will provide quicker engine acceleration but it will also reduce the surge margin. This reduced surge margin will make the engine more susceptible to compressor stall. Therefore, moving the bleed band opening point to the lower limit on an engine that has considerable compressor erosion could induce compressor stall during rapid power changes. If the bleed band is adjusted to the high end of the permissible operating range, the engine will accelerate slower and may lag during abrupt pitch-pulls, but it will be much less susceptible to stall. Consequently, if the engine is set up for maximum acceleration, a sticking or dragging bleed band actuator is sure to cause a stall during rapid power changes.

If the bleed band does not perform as required, proceed with paragraph f. This paragraph calls out the correct procedures for adjusting the point at which the bleed band will close.

If proper operation cannot be obtained, proceed with the interstage airbleed troubleshooting checks listed under paragraph g. Paragraph h lists the procedures for correcting the defects listed in paragraph g, to include cleaning of the "Fuel Control Airbleed Valve" depicted with the cover removed in figure 5-63. Information received from the field indicates that the fuel control airbleed valve has not previously been considered as a cause for bleed band malfunction. In several cases, it appears that mechanics replaced the fuel control unit instead of cleaning the airbleed valve which would have corrected the problem. Improper operation of this valve will cause erratic operation of the bleed band and can induce bleed band cycling.

Turbine Engine Inspection and Overhaul Schedules for T53 Series Engines

The current -20 for the UH-1H, UH-1M, and AH-1G helicopters stipulates a 900-hour hot end inspection for the T53-L-13B and also refers to TM 55-2840-229-24. The correct inspection schedule is listed on the right side of the table of contents as "Chapter 13, Overhaul Interval and Inspection Interval." This chapter was added by change 12, dated 26 June 1976, and deletes scheduled hot end inspections for all T53 series engines except the T53-L-13B's equipped with a P/N 1-110-520-21 first-stage gas producer nozzle. These engines can be identified by "NOZ-21" stamped on the engine data plate. Engines fitted with the P/N 1-110-520-21 first-stage gas producer nozzle still require the 600-hour hot end inspection. Engines fitted with the P/N 1-110-520-19 first-stage gas producer nozzle no longer require a scheduled hot end inspection.

T1 Bellows Problems

The USAAAVS data bank indicates that since CY 1971, eight T1 bellows failures have occurred. Officially designated as the main bellows assembly (NSN 2915-00-992-1138, P/N 74865) this item is listed in TM 55-2840-229-23P, dated 30 September 1976, page 203, figure 73, item 3.

The T1 bellows is located in the computer section of the fuel control, and its function is to adjust fuel flow to compensate for temperature changes. This entire assembly (temperature sensing element and capillary tube) is matched to the fuel control on the test stand and must remain with the same control unit. (See TM 55-2840-229-24, page 5-30, par. 5-70c.)

A number of fuel controls have been shipped for overhaul with the main bellows spring holder (NSN 2915-00-842-055, P/N 80153, reference TM 55-2840-229-23P, page 195, item 71-26) installed in the inverted position. While the holder should not be removed from the control for *any* reason, the correct position is with the flange down. If it is not installed in this position, pressure will not be applied to the spring and incorrect temperature sensing will result. This condition is very likely to cause a severe engine overtemp when the engine is started.

Professionalism and performance always go together. Keep up the good work!

For more information on turbine engine care and procedures, contact Clarence J. Carter, Environmental Factors Branch, Directorate for Aircraft Accident Analysis and Investigation, USAAAVS, AUTOVON 558-3913/3901, commercial 205-255-3913/3901.

Birds

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HUNDREDS OF millions of birds fly over North America. On radar plan-position-indicator (PPI) scopes, flights of birds may appear as bright blips. Large flocks of birds can produce so much signal clutter on the radar scope that images of aircraft are obscured.

Birds that collide with aircraft in flight can smash windshields and cause jet engines to fail. Detection and tracking of flights of birds by radar can prevent such tragedies. This use of radar also may provide ornithologists and conservation officials with a tool to study bird migrations and make bird population counts.

Studies conducted at the U.S. Department of Commerce's National Oceanic and Atmospheric Administration Aeronomy Laboratory and the University of Colorado enabled scientists to experiment with a variety of radars where flights of birds could be studied at close range. Pulse and continuous-wave (CW) radars, and Doppler radars, both coherent and noncoherent, were used to make records of bird wingbeat amplitudes and frequencies and to detect altitudes and directions of flight. The researchers were able to identify some echoes as characteristic of certain bird species.

The first known radar echo from a bird was observed from a ship in 1939. Numerous such sightings were made during World War II, but it was not until 1957 that radar was used significantly to trace bird movements and resolve questions about radar angles (echoes from a "clear" sky), including echoes from birds and insects.

The "ground clutter" produced on radar scopes by nearby surface objects is well known, but even some radar operators are unaware that birds can produce a distinctive radar return. Most bird echoes originate from low altitudes within a range of 50 miles. Some radars are designed to block out ground clutter with a special sensitivity-time circuit (STC), which also eliminates most bird and insect echoes and those of some light aircraft. However, the return signal from a large flock of cranes or geese can produce an echo of as great intensity and greater area than from the largest aircraft.

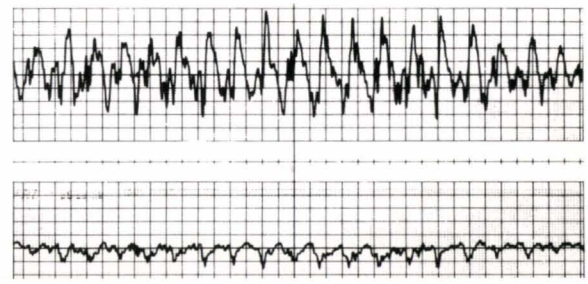
One way of separating bird echoes from ground clutter is that they move across the scope. Insects also move, but mainly as they are blown by the known local wind, distinguishing them from birds.

Probably the most important application of viewing birds on radar is to prevent aircraft accidents that could be caused by collisions with birds. The worst such accident to date killed 62 people when a commercial airliner collided with a flock of starlings at Boston airport in 1960. Damages to military aircraft by birds amount to an estimated $14 million a year.

Radar can be useful in two ways: to provide information on bird movements that must be taken into account in planning air traffic patterns and scheduling flights; and, to provide real-time warning of bird hazards at the time of takeoff. Radars to be used for monitoring bird movements around airports should have short

Radar shows a springtime eastward migration (left to right) of birds over Oliktok, AK (near Prudhoe Bay). Range markers are spaced at 5-nautical mile intervals on the 5.6-minute time exposure, 2005 ADT, 28 May 1972

Some radars are used to record the amplitude and frequency of wingbeat of birds in flight. The illustration shows the signature (recorded signal) of a great blue heron near Boulder, CO. (The fundamental wingbeat frequency is 2.7 Hz (hertz or cycles per second); vertical lines are spaced at 5-second intervals; lower trace is unfiltered signature; upper trace is signature after filtering by a 2- to 200-Hz band filter.)



Birds and aircraft use the same airspace and pose a hazard to each other, especially around busy airports. Use of radar to detect altitudes and directions of birds in flight, and to record wingbeat amplitudes and frequencies, is making it possible to track movements of birds over large areas, to identify birds in flight by size and type, and to warn aircraft of possible hazards

pulse length, narrow beam width, 360-degree coverage, capability for viewing at close range, and a range-height-indicator (RHI). Most Federal Aviation Administration surveillance radars can be used to detect flocks of birds at great distances but are unsuitable for local monitoring.

Radar surveillance is the only satisfactory method of monitoring bird migration, particularly at night and during adverse weather and poor visibility. These features make radar a valuable tool for ornithologists and conservation officials.

Birds can be distinguished from other radar targets by their radar "signatures." There are two types of radar signatures, amplitude and Doppler. Amplitude signatures are caused by variation in radar reflection from birds as they beat their wings. Use of Doppler radar to detect birds is being studied at the National Oceanic and Atmospheric Administration's Environmental Research Labratories in Boulder, CO. Doppler signatures of birds can be used to indicate the speed of a bird's flight relative to the radar and to provide a spectra of velocities that relate the movement of the bird's wings to that of its body mass. Wingbeat and other characteristics of movement can be used to identify particular birds.

Futhermore, the Doppler frequencies produced by bird in flight are well within the audibile range of the human ear and produce sounds distinct from those of other radar echoes. If amplified and fed into a loudspeaker in the traffic control center at an airport, the distinct sounds could warn of birds hazards in the vicinity of the airport. The use of radar, however, can conflict with the normal surveillance of the area around the airport, which requires continuous rotation of the antenna rather than its being fixed on the target. Two radars might be used, each possessing the necessary capability, but coordinated in action.

Radar can be used to locate and identify birds in flight, to follow movements of birds or flocks of birds over large areas, and to prevent collisions between birds and aircraft. However, these uses of radar can hinder its use for other purposes. The applications require further development and greater interest on the part of those responsible for providing safeguards to aircraft in flight, including radar engineers who are interested in various types of radar imagery, target identification and interpretation of radar clutter.

For further information the following list of references on radar studies of birds is suggested to *AVIATION DIGEST* readers:

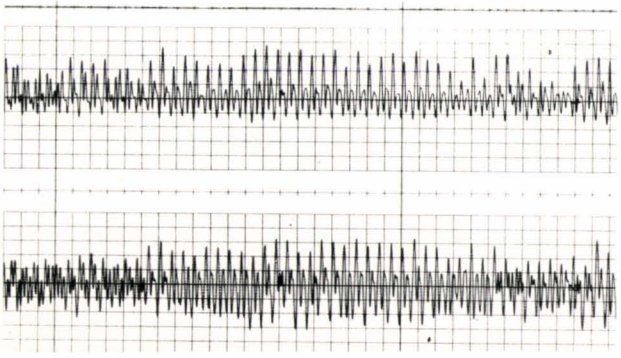
Flock, W.L., "Monitoring Bird Movements by Radar," *IEEE Spectrum*, Vol. 5, June 1968, pp. 62-66.

Green, J.L., "The Application of Doppler Radar to the Study of Flying Birds," MS thesis, University of Colorado, Boulder, CO, 1973, p. 66.

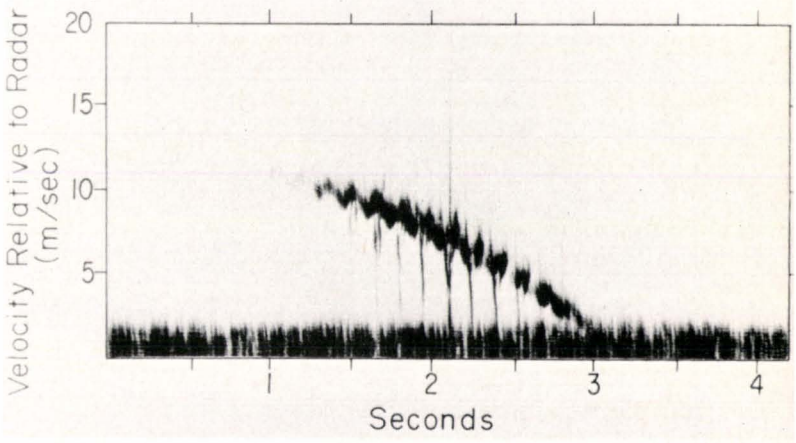
Hardy, K. R., Atlas, D., and Glover, K.M., "Multiwavelength Backscatter From the Clear Atmosphere," *Journal of Geophysical Research*, Vol. 71, March 15, 1966, pp. 1537-1552.

Myers, M.T., "The Detection of Birds and Insects and the Study of Bird Movements with Radar," *Proceedings of the World Conference on Bird Hazards to Aircraft*, September 2-5, 1969, Associate Committee on Bird Hazards to Aircraft, National Research Council of Canada, 1970, pp. 501-519.

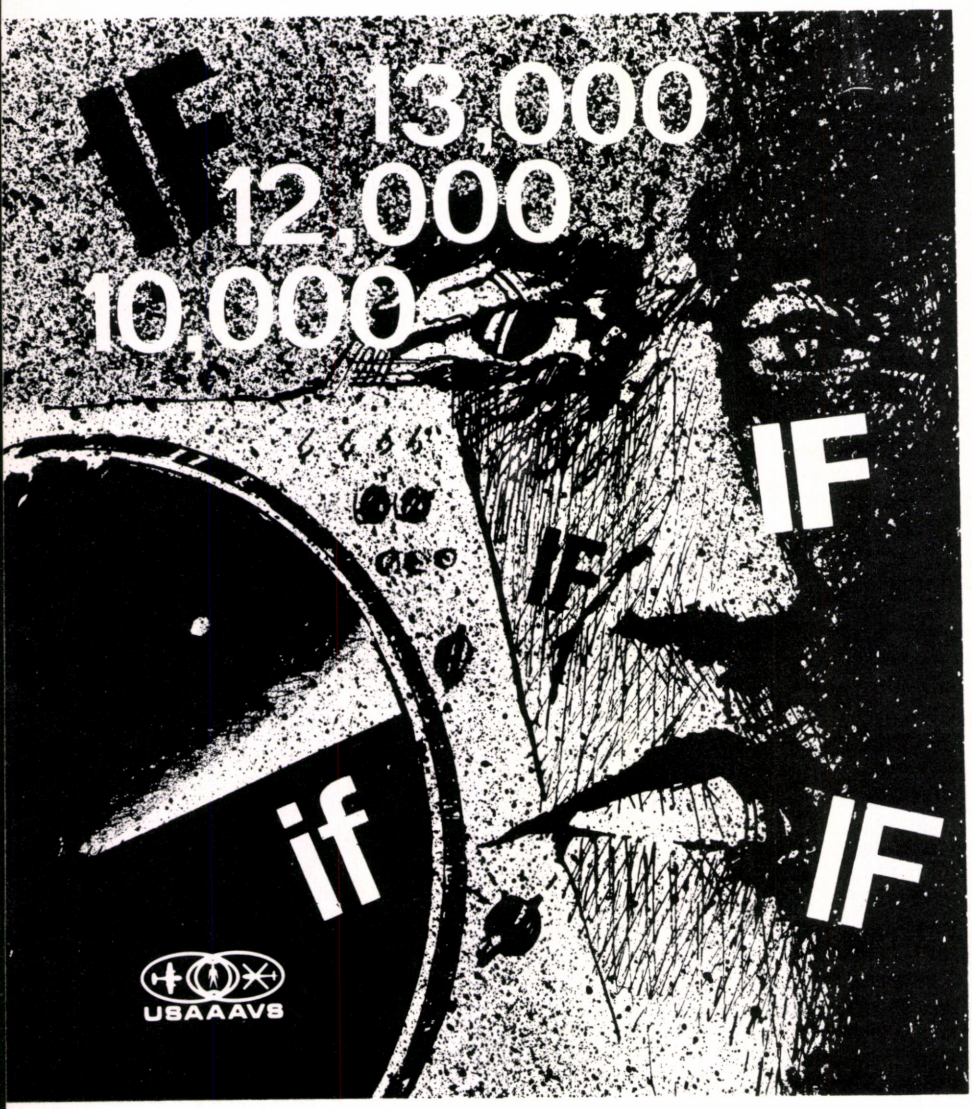
This illustration shows the record obtained from a broad-tailed hummingbird at Nederland, CO, on 15 Sep 1973. A continuous-wave Doppler radar was used. (Vertical lines are spaced at one-fifth-second intervals; lower trace is unfiltered; and upper trace is signature after filtering with a diode rectifier and resistor-capacitor (RC) filter.)



Doppler radar record of a shoveler duck in flight. The horizontal scale is real-time in seconds; the vertical scale is the velocity in meters per second. The dark undulating streak in the center of the record is signature from the bird's body. The vertical streaks or spikes are caused by the different velocities along the beating wings. "Grass" on the baseline is ground clutter, in this case like waves



IF...



THE PILOT LEVELED the aircraft at 10,000 feet. At this altitude, the passengers could ride in comfort in the unpressurized cabin without any need to don the available oxygen masks. All aspects of flight planning had been properly performed, and the mission was progressing smoothly as the aircraft winged its way through the veil of clouds and haze. By all rights, this should have been another relatively short, pleasant and uneventful flight. It was short. Approximately 43 minutes after takeoff, the aircraft plowed into the side of a mountain.

Despite the exceptional qualifications of the crew, the stage for this accident had been inadvertently set during the planning phase when the crew elected to follow a less frequently used route over a mountain instead of the more common one around it – a decision made because the TACAN feature of a NAVAID was out of service. The route selected required a minimum en route altitude of 13,000 feet for the second leg of the flight, after crossing the first intersection at a minimum crossing altitude of 12,000 feet.

Following takeoff, radar contact was established with departure control, and after a series of vectors, the pilot was cleared on course and instructed to maintain 10,000 feet as he had requested. Approximately 25 minutes later, the pilot was contacted by the

center and told that radar service was terminated. He was then instructed to contact the center on another frequency. This was a transfer of control from the center radar sector to the center nonradar sector. The pilot acknowledged the instructions to change radio frequency, but when he was unable to make contact, he requested an alternate frequency. Another was issued him, but again he could not make contact; so he reestablished communications with the center on the original frequency. The center responded twice, but received no further transmission from the aircraft.

Although numerous contributing factors were present, the basic cause of this accident stemmed from the combination of two human errors: failure of the aircrew to request clearance to 12,000 feet before reaching the first intersection; and failure of air traffic control personnel to clear the aircraft to the minimum en route altitude in sufficient time for the aircraft to cross the first intersection at or above the minimum crossing altitude specified. Both of these errors were committed in violation of regulations, and resulted in the aircraft's crossing the first intersection at an altitude that was insufficient for it to clear the mountain that lay ahead.

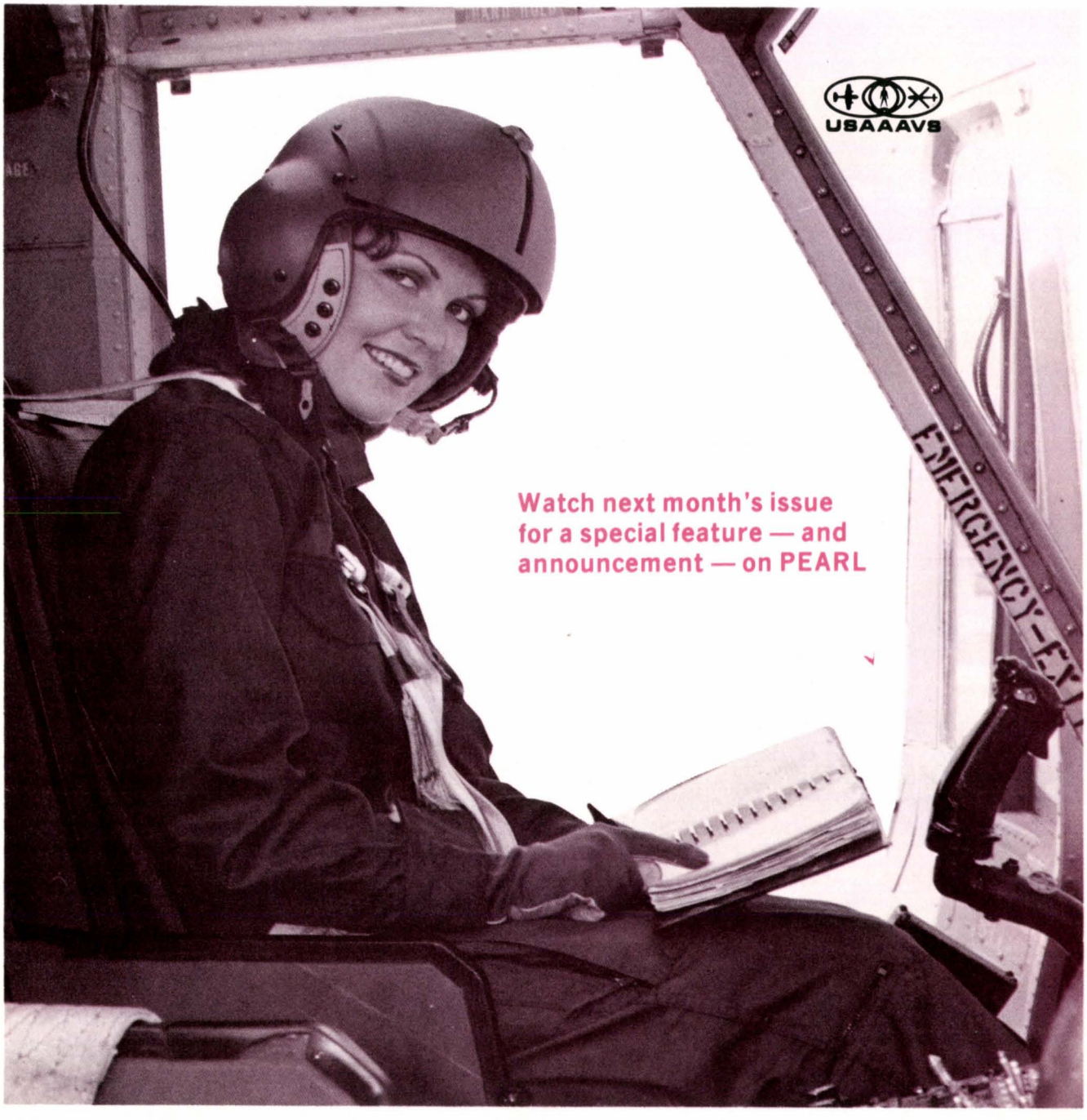
Two possibilities have been advanced as to why this highly experienced aircrew continued flight below the minimum crossing altitude and MEA at the first intersection. One, the pilots may have failed to realize a minimum crossing altitude existed, and thinking they could climb after crossing the first intersection, waited to establish contact with the nonradar sector controller for climb clearance. (The low altitude en route chart contains considerable clutter in the portion that depicts the first intersection. Relatively insignificant data is displayed in much larger type and is more readily visible than the minimum crossing altitude marker, altitude and crossing direction – a case of poor priorities in depicting important information.)

Two, the pilots may not have been aware of their position and may have failed to identify the first intersection. Because of a natural tendency to relax and feel secure in a radar environment, where no requirement for position reports exists, the crew may have neglected to keep an accurate fix on their position along the airway, relying instead on ATC to provide terrain clearance.

When the controller failed to indicate that a higher altitude was necessary, the aircraft continued en route below the minimum crossing altitude for the first intersection. This failure by the controller was aggravated by a shift change at which time the new controller was told the aircraft needed radar service terminated. The relieving controller terminated radar service and issued a frequency change to a nonradar sector frequency without noticing the discrepancy in altitude.

In retrospect, we can muse over what might have been. If the TACAN feature of the NAVAID had been functioning properly...If the pilots had been cleared to the minimum altitude before crossing the first intersection...If this minimum crossing altitude had been more prominently displayed on the low altitude en route chart...If the pilots had been aware of their position...If, after crossing the first intersection, the crew had not been reluctant to climb above their cleared altitude of 10,000 feet without waiting for clearance from ATC (as authorized by par. 1-7, AR 95-1, November 1976, and par. 91.3, FAR part 91)...If the controller had not failed to indicate a higher altitude for the aircraft was necessary...If he had noticed the aircraft was cleared below the minimum crossing altitude for the first intersection...If a shift change of controller personnel had not been made...

Many "ifs" exist, but the sad fact remains: The accident happened. The least we can do is learn from it and ensure that other accidents from similar causes do not occur – ever.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EMERGENCY-EX

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Personal Equipment & Rescue/Survival Lowdown

Care of Nomex

My commander insists we iron our Nomex flight uniform. I have been told this destroys the fire protection of the Nomex. Is this true?

Ironing does not destroy the thermal protective qualities of Nomex. However, repeated ironing will decrease the life span of the uniform with a resulting increase in cost to the local command. Particularly noticeable is damage to zippers and buttons when commercial laundries wash and press the Nomex flight uniform. Tests show that in some instances commercial laundry techniques result in a buildup of residual soap on the material. Soap residuals contain fatty substances that can reduce the fire retardant qualities of Nomex. For the same reason, DO NOT STARCH OR USE ANY TYPE OF FABRIC SPRAYS ON NOMEX. If uniform is inadvertently starched, wash with soap and water and rinse thoroughly.

ALSE Bulletin

A general information bulletin (newsletter) has been published by the Aviation Life Support Systems Management office. The information contained in this bulletin is of special interest to all Army aircrewmen.

You can receive copies by writing to DARCOM, ATTN: DRCPO-ALSE/PEARL, P. O. Box 209, St. Louis, MO 63166, or by calling AUTOVON 698-3241/3291.

Survival Kit Firestarter

Request your assistance in determining the stock number for the survival kit firestarter refilling adapter and refueling cannister. The firestarter, NSN 9920-00-999-6753, which costs $4.15 each, is rather expensive to be considered disposable. The refilling adapter and refueling cannister would save money expended on replacement units and also would allow recharging of those units which currently leak after a period of storage in the survival vest.

Also, the firestarter is not reliable since the swivel gate does not seal adequately on all items to ensure long-term operation. Quarterly inspection of the firestarter units within this organization revealed that many of the firestarters are inoperable because of fuel leaks. Additionally, after a recent receipt of 36 firestarters, 11 would not light. Units were manufactured by Lifesaver Products, Inc., in 1977. Recommend you query other field units to determine if there is a worldwide problem.

The butane lighter firestarter was procured as a nonrefillable "throwaway" item when emptied. Refilling adapters and refueling cannisters are not available through Army supply channels. However, the firestarter can be refilled with Lifesaver A-31 ISO butane fuel. The 10.2-fluid-ounce can comes with an adapter and complete instructions for refilling the lighter. These may be purchased for $2.00 each from Lifesaver Products, Inc., 6210 Wilshire Blvd., Los Angeles, CA 90048. Lifesaver Products recommends one can of butane fuel for every two lighters that receive heavy use.

Several Equipment Improvement Recommendations (EIRs) have been submitted on the firestarter regarding the problems of leakage and being unfilled when received. Standard Form 368, Report of Item Discrepancy (ROID), should be submitted on the unfilled firestarters and an EIR should be submitted on those with discrepancies. Action is rarely taken on just one EIR. Receipt of several EIRs determines that a problem is not an isolated one and that corrective action is necessary.

ATC action line

UNITED STATES ARMY AIR TRAFFIC CONTROL ACTIVITY

WHAT'S UP IN the way of aid when you are down? Inadvertently that is!

The Department of Transportation is coming up with the answer. Their Federal Aviation Administration (FAA) organization has effectively synthesized computer techniques, radar display facilities, and, of course, personnel skills to exploit these technical resources to improve air safety and rescue operations.

The Department of Transportation is using a spinoff from its computerized air traffic control radar system to help locate downed aircraft in remote areas and speed the rescue of survivors.

Developed by FAA, the new technique uses recorded radar data to reconstruct the flight path and pinpoint where the missing aircraft disappeared from the radar scope.

Since the technique was introduced in 1975, the number of aircraft located through its use has increased steadily from 2 that year to 14 in 1976 and to 15 through the first 4 months of 1977.

To date the technique is credited with saving one life. That involved the 17-year-old pilot of a light plane that crashed in a remote mountainpass near Lake Tahoe, CA, in March. FAA data enabled them to zero in on the location and get the surviving pilot out before a heavy snowstorm moved into the area. The technique uses a computer program that originally was developed to detect possible malfunctions during testing of the new computerized air traffic control system. This system provides FAA controllers with direct radar readout of such vital flight information as aircraft identity and altitude. Two years ago, controllers and technicians at FAA's Denver Air Route Traffic Control Center theorized that it also could be used to aid in locating downed aircraft and worked out the procedures with the cooperation of the Air Force Rescue Coordination Center at Scott AFB, IL.

The radar data on aircraft targets is recorded on tape and retrieved for analysis in the form of a computer printout. The printout provides position data on all aircraft that appeared on the radar screen at any given period.

However, using the printout to trace the flight path of a missing aircraft to the point where it disappeared from the radar screen requires skill and specialized knowledge. Only a few controllers in each center presently have the necessary training. Also, because of equipment differences, the technique can only be used at 15 of the 20 Air Route Traffic Control Centers in the country.

So FAA is developing a new computer program that will simplify the task and make it possible for just about anyone in the center to reconstruct a flight path. This involves design and production of special software to enhance the capability of the FAA computer resources to better support the search and rescue mission. All 20 centers are expected to have this capability within the next 2 to 3 years.

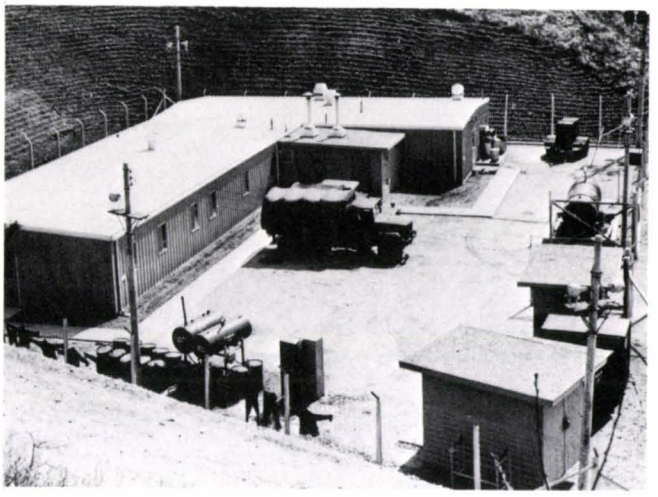
Things are looking up in the fine art of looking for you when the need arises.

Readers are encouraged to send questions to:

Director
USAATCA Aeronautical Services Office
Cameron Station
Alexandria, VA 22314

Coming Up In The September Issue
TOW Training And The School Solution

ATC Selects Its Best



Warrior Control, the Army's only FCC, was named ATC Facility of the Year. Warrior is located near the DMZ in Korea

AN ENLISTED MAN credited with averting a possible international incident has been selected U. S. Army Air Traffic Controller of the Year for 1977, and the U. S. Army's only radar Flight Coordination Center (FCC) has been named this year's outstanding Air Traffic Control (ATC) facility.

The announcements were made by Major General Gerd S. Grombacher, Commander, U.S. Army Communications Command (ACC), Fort Huachuca, AZ.

Specialist Five Clarence W. Murphy, 30, senior controller and shift supervisor of the Kitzingen Tower/Approach Facility in Germany, was chosen from among 1,700 Army air traffic controllers worldwide. He is a member of the 14th Aviation Unit, an element of the 5th Signal Command, headquartered at Worms, Germany.

Specialist Five Clarence W. Murphy, ATC's Controller of the Year

Specialist Murphy is credited with "saving" a small aircraft which became lost near the East German border with its fuel almost exhausted. Immediately realizing that only ground control approach radar could aid the distressed aircraft, Specialist Murphy declared an emergency. Working frantically, he located the aircraft within a short distance of the border and directed it to a safe landing in Kitzinger. Specialist Murphy was credited with preventing a possible international incident for his role in the emergency.

The nomination citation also noted that Specialist Murphy has "greatly assisted the upgrade of the training program for new controllers" at Kitzinger and has developed visual flight rule approach techniques to help trainees better understand the complex air traffic control procedures.

The FCC "Warrior Control," an isolated air traffic control facility located on top of Papyongsan Mountain within the highly sensitive Korean Buffer Zone, was selected from among air traffic control facilities worldwide. FCC Warrior is an element of the U. S. Army Air Traffic Control Battalion – Korea, First Signal Brigade, and is located only 9 kilometers from the Demilitarized Zone (DMZ).

A self-contained, self-sufficient facility, Warrior Control is operated 24 hours a day by two dozen U.S. and Republic of Korea controllers. Its mission is to aid all U.S. Army and Republic of Korea (ROK) Army and Air Force aircraft operating in the buffer zone to prevent inadvertent flights over the DMZ. Warrior also supplements the ROK Air Force early warning air defense systems.

According to the citation nominating Warrior Control as facility of the year, there were no stray flights into the DMZ in 1976. This attests to the skill of the Warrior controllers who process an average of 175 aircraft daily. Approximately half of these involve flights within the sensitive buffer zone itself.

Specialist Murphy and the commander of Warrior Control will accept their respective awards at Fort Huachuca in October.

West Point Cadets At Ft. Rucker

West Point cadet Gregory J. Bozek at the controls of a TH-55 Osage prior to a solo flight from Hatch Stagefield. Cadet Bozek, of Wyckoff, NH, was the first of 46 cadets to solo during summer aviation training at Fort Rucker (see "There Is An Army 'AVCAD' Program," page 2, January 1977 *DIGEST*)

FORTY-SIX CADETS from the U.S. Military Academy, West Point, NY, arrived at Ft. Rucker, AL, 11 July for four weeks of aviation training at the U.S. Army Aviation Center.

Nine other cadets also trained at Ft. Rucker in nonaviation assignments. They received Engineer, Infantry and Field Artillery instruction, all under the 1st Aviation Brigade.

The cadets are between their second and third years at the U.S. Military Academy and the instruction received at Ft. Rucker is part of their annual summer training program.