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NOVEMBER 1988

AVIATION DIGEST

FLIGHT SIMULATORS

Professional Bulletin 1-88-11

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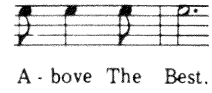

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Major General Ellis D. Parker
Chief, Army Aviation Branch

The Warrant Officer Training System In Transition

ON 7 JUNE 1988, I was pleased to see the first master warrant officer (MWO) selection list announced by Headquarters, Department of the Army (HQDA). That action implemented the final phase of the new Warrant Officer Training System (WOTS). I want to share with you some insight into WOTS because I believe it is the key to our technical future for both Army Aviation and the Total Army. The WOTS has three distinct levels of training for all warrant officers. They are as follows:

• Entry and technical or tactical certification training is required before appointment as a warrant officer. This training is taught in two phases. Phase I, the entry course, is 6 weeks of training conducted in a high-stress environment. Previously, that training has been conducted at Ft. Rucker, AL; Aberdeen Proving Ground, MD; and Ft. Sill, OK. Effective August 1988, all entry course training was consolidated at Ft. Rucker. Once consolidated, the title of the course was changed to Warrant Officer Candidate School (WOCS). Upon completion of the entry course or WOCS, the aviation candidate remains at Ft. Rucker while all others go to their respective military occupational specialty (MOS) branch proponent for Phase II, the follow-on technical and tactical certification training. That is followed by an appointment to warrant officer by the respective branch proponent school. This training and appointment certify the individual to serve at the warrant officer (WO) W1 and W2 level in those positions coded "WO" on the authorization documents.

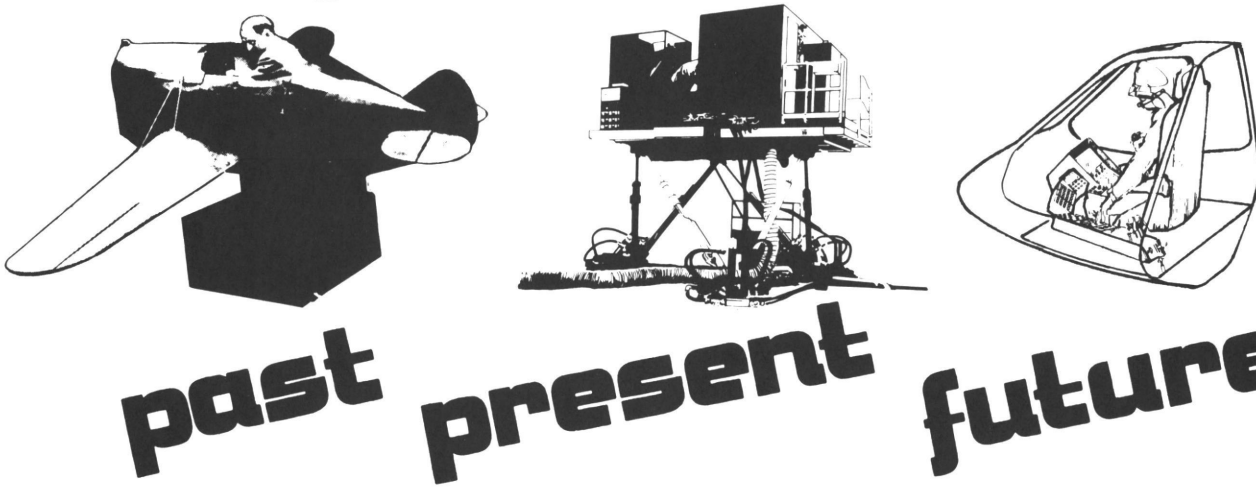
• The Warrant Officer Advanced Course (WOAC) has now transitioned into the Senior Warrant Officer Training Course (SWOTC). That transition was completed during fiscal year 1988. Initially, there may be little difference between the old WOAC and the new SWOTC. Either is required to qualify a warrant officer to serve at the W3 and W4 level in those positions coded "SW" on authorization documents.

• The Master Warrant Officer Training Course is being implemented by phases. Phase I is a lead-in correspondence course that refreshes and updates the student on common core skills and knowledges. Phase I was implemented in June 1988, after release of the first MWO selection list. Phase II is a resident, MOS-nonspecific course. The first class was enrolled at Ft. Rucker in September 1988. Graduation and appointment of the first MWOs will occur on 9 December 1988. Phase III, when developed, will be MOS-specific training that the MOS proponent requires to prepare the MWO to perform at the highest levels of his or her MOS. Selection for MWO will be made only by an HQDA board. Once selected and trained, the newly appointed MWO will be assigned to positions coded "MW" on authorization documents. Until W5 is authorized by a change of public law, MW4s will be designated and assigned to master warrant positions.

These are exciting times for the Army warrant officer, with long-needed changes being made almost daily. The Army's leadership was recently briefed on the Total Warrant Officer System. That briefing included the legislative package currently being staffed through Department of Defense to place into law such features as W5 that cannot be implemented by policy.

We at Ft. Rucker are proud to be on the leading edge of this dynamic period. Ft. Rucker is rapidly becoming the home of the Army warrant officer, as well as the long-recognized home of the aviation warrant officer.

Flight Simulators



"Even the most apt pupil is certain to find himself in difficulties at some time or another during his probation, and owing to lack of skill the machine is necessarily sacrificed to save his life, or at least to prevent a serious accident. The invention, therefore, of a device which will enable the novice to obtain a clear conception of the workings of the control of an aeroplane, and of the conditions existent in the air, without any risk personally or otherwise, is to be welcomed without a doubt...."

Flight International
December 10, 1910

Ms. Wille E. Garrett
Staff Writer

The opinions expressed in this article are those of the author and do not necessarily reflect the views of any Department of Defense Agency.

FROM THE DAYS of the Sanders' Teacher, the Eardly-Billing Oscillator and the first blue canoe, to the AH-64 Apache combat mission simulator (CMS) and the new flight simulators (FSs) for future Light Helicopter Experimental aircraft, FS technology has excelled in its quest to replicate "the real thing."

First, what is an FS? An FS is a ground-based training device that looks and acts like an actual aircraft as far as cockpit layout, visual scenery, motion cueing, control input, response and flight physiological sensation. FSs are used in the classroom to fulfill training requirements in procedures and flight instruments for use in actual flight. FSs are designed to teach students how to execute approaches and landings, hoverings, autorotations, radio communications, takeoffs, emergency procedures, navigation and flight maneuvers. FSs are equipped with an array of highly technical systems to include computer, laser,

visual, digital, radar warning device and weapons systems.

FSs are descendants of trainers. Trainers fall into two categories: procedural trainers and rotary wing or fixed wing synthetic flight trainers.

Instructors use procedural trainers, the first category, to train the student in cockpit procedures (not flight procedures) and to portray *limited* flight characteristics while remaining stationary. These trainers teach students those procedures unique to a specific aircraft and how to prestart, start, runup, engage the rotor, shutdown the engine and perform different emergency procedures.

The second category of trainers, the synthetic instrument flight trainer (rotary wing), pitches, rolls and yaws in response to the controls. These trainers simulate climb, descent and bank, and teach the student to follow imaginary airways on the gauges. Flight instruments respond to cyclic, antitorque and power, and portray the attitude of the helicopter. Presently, the Army has 49 rotary wing and no fixed wing synthetic instrument flight trainers.

A study of the history of flight simulation reveals that the idea of flight simulation dates as far back as 1910 with the invention of the Sanders' Teacher and the Eardly-Billing Oscillator, two of the first flight trainers.

Nineteen years later, in 1929, stimulated by the desire to save money, Edwin Albert Link invented the first successful flight trainer, "the pilot-maker." However, because funds were not available, the U.S. Army Air Corps did not receive its first version of this flight trainer, the Link Model "A," until 1934.

Driven by the same desire to save costs that persuaded Ed Link to develop the pilot-maker, Army Aviation recognized the critical need to employ FSs as a cost-effective means to train aviators and, most important, to save lives. Thus, Army Aviation and flight simulation are by no means "strange bedfellows." Their relationship began in 1956 when the U.S. Army Aviation School, Ft. Rucker, AL, received its first 1CA1 Link trainer. Sometimes dubbed the blue canoe, the "blue box" and less favorably the "idiot box," the 1CA1 paved the way for the generation of more sophisticated helicopter simulators used at the school today.

In the mid-1960s, the school initiated a qualitative materiel requirement to develop a synthetic flight training system (SFTS). The SFTS represents a family of FSs. The approval of this requirement led to the purchase and later delivery of the first UH-1 Huey synthetic flight instrument trainer to the school in 1969. The SFTS group of FSs continues to advance in simulator technology. The

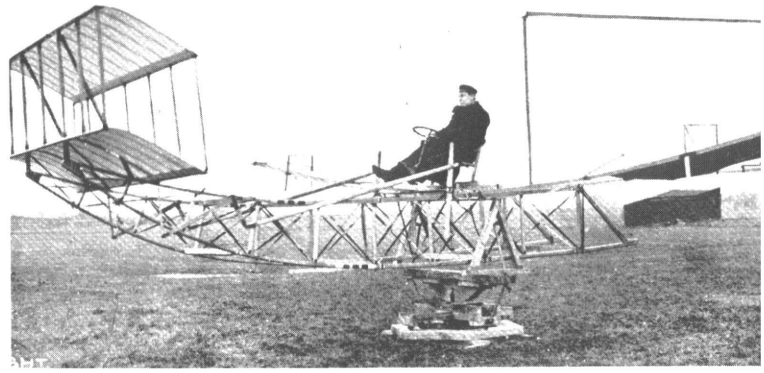


photo courtesy of Link

The Sanders' Teacher was one of two earlier attempts to simulate flight.

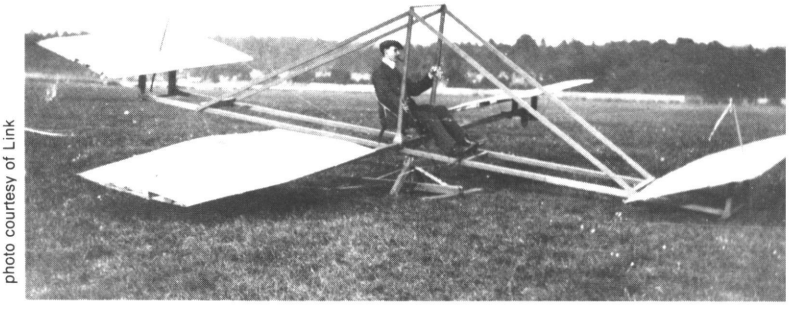


photo courtesy of Link

The other attempt to simulate flight came with the invention of the Eardly–Billing Oscillator.

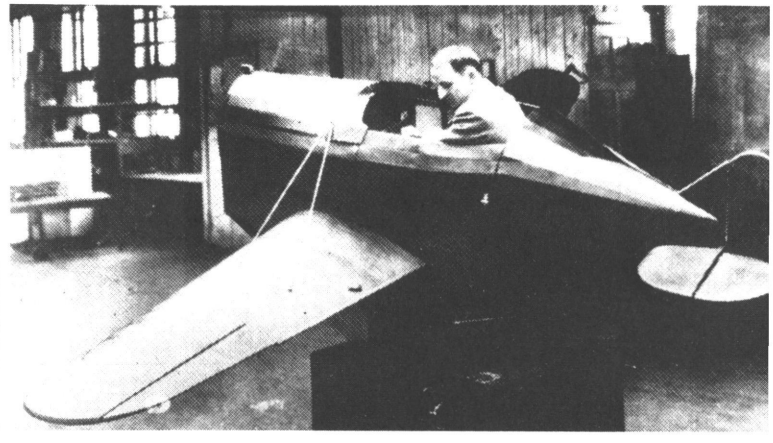


photo courtesy of Link

Mr. Edwin Albert Link demonstrates the first successful Link trainer that he invented in 1929.

The 1CA1, blue canoe, was the first trainer received at the U.S. Army Aviation Center in 1956.

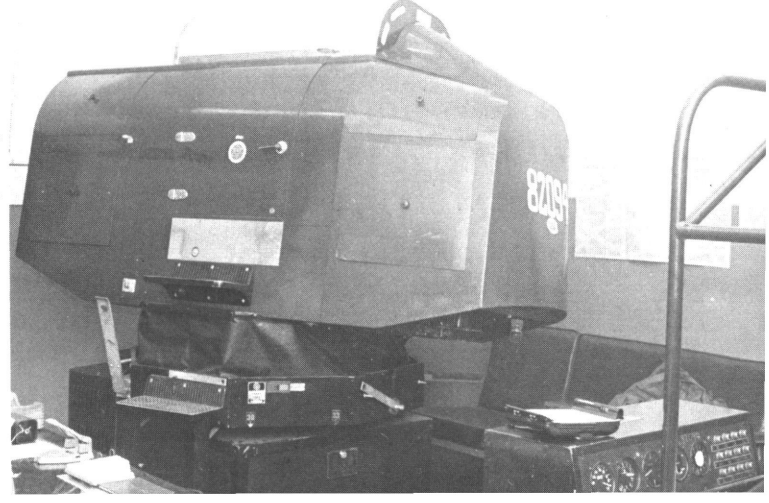


photo by SP4 Abramson

SFTS fielding sites.

UH-1 Flight Simulators
Total: 22 Systems

LOCATIONS	FIELDING DATES
Ft. Rucker, AL (8 Systems)	Dec 69-Apr 83
Ft. Lewis, WA	14 Jun 76
Ft. Ord, CA	24 Mar 78
Ft. Riley, KS	14 Jul 77
Ft. Hood, TX	7 Mar 77
Ft. Knox, KY	12 Nov 77
Ft. Campbell, KY	15 Mar 75
Ft. Stewart, GA	15 Oct 76
Ft. Bragg, NC	10 Dec 76
Ft. Belvoir, VA	27 Sep 78
Ft. Sill, OK	26 Jul 78
Ft. Indiantown Gap, PA (USAR)	15 Sep 77
Hanau, Germany	18 Jul 75
Seoul, Korea	20 May 88
Ft. Shafter, HI	13 Aug 76

UH-60 FS
Total: 18 Systems

LOCATIONS	FIELDING DATES
Ft. Rucker, AL	9 Jul 87
	18 Dec 87
Ft. Bragg, NC	Oct 88
Ft. Carson, CO	Jun 90
Ft. Campbell, KY	28 Mar 88
	26 May 88
Ft. Hood, TX	Feb 89
Ft. Lewis, WA	Aug 88
Ft. Ord, CA	Aug 89
Ft. Riley, KS	Apr 90
Ft. Stewart, GA	Dec 89
USAARL, Ft. Rucker, AL	Dec 88
Ft. Richardson, AK	Oct 89
Hanau, Germany	25 Sep 87
Illesheim, Germany	10 Feb 88
Seoul, Korea	Mar 89
	Feb 90
Ft. Shafter, HI	Jun 89

CH-47D Flight Simulators
Total: 6 Systems

LOCATIONS	FIELDING DATES
Ft. Rucker, AL	23 Oct 77
Ft. Campbell, KY	23 Nov 87
Ft. Lewis, WA	8 May 87
Ft. Hood, TX	24 Jun 88
Camp Humphreys, Korea	Nov 88
Mannheim, Germany	27 May 88

AH-1 FWS
Total: 9 Systems

LOCATIONS	FIELDING DATES
Ft. Rucker, AL	23 Nov 84
	20 May 88
Ft. Campbell, KY	21 Dec 84
Ft. Hood, TX	15 May 84
Ft. Lewis, WA	17 Sep 85
Marana, AZ (ARNG)	28 Apr 88
Ft. Indiantown Gap, PA (ARNG)	16 Jun 88
Illesheim, Germany	15 Apr 85
Hanau, Germany	15 Aug 84

AH-64 CMS
Total: 7 Systems

LOCATIONS	FIELDING DATES
Ft. Rucker, AL	15 Sep 86
Ft. Hood, TX	10 Oct 86
Ft. Bragg, NC	21 Apr 88
Ft. Campbell, KY	4 Mar 88
Hanau, Germany	Jan 90
Illesheim, Germany	8 Jan 88
Weisbaden, Germany	Sep 91

achievements of FSs include the first high-resolution, full-color television visual system; the first advanced weapons delivery simulator; the only laser image generator; multiple cockpit simulation networking; and the first computer-generated visual system that provides nap-of-the-earth capability.

At present, the five advanced technology simulator systems in the SFTS family are the UH-1H FS, the CH-47D Chinook FS, the AH-1S Cobra flight and weapons simulator (FWS), the UH-60A Black Hawk FS and the AH-64A CMS. The AH-64A CMS was the first CMS. Besides being the first CMS, the AH-64A CMS has the distinction of being the first training device ever to receive the Order of Daedalians Award as "Weapons System of the Year—1985."

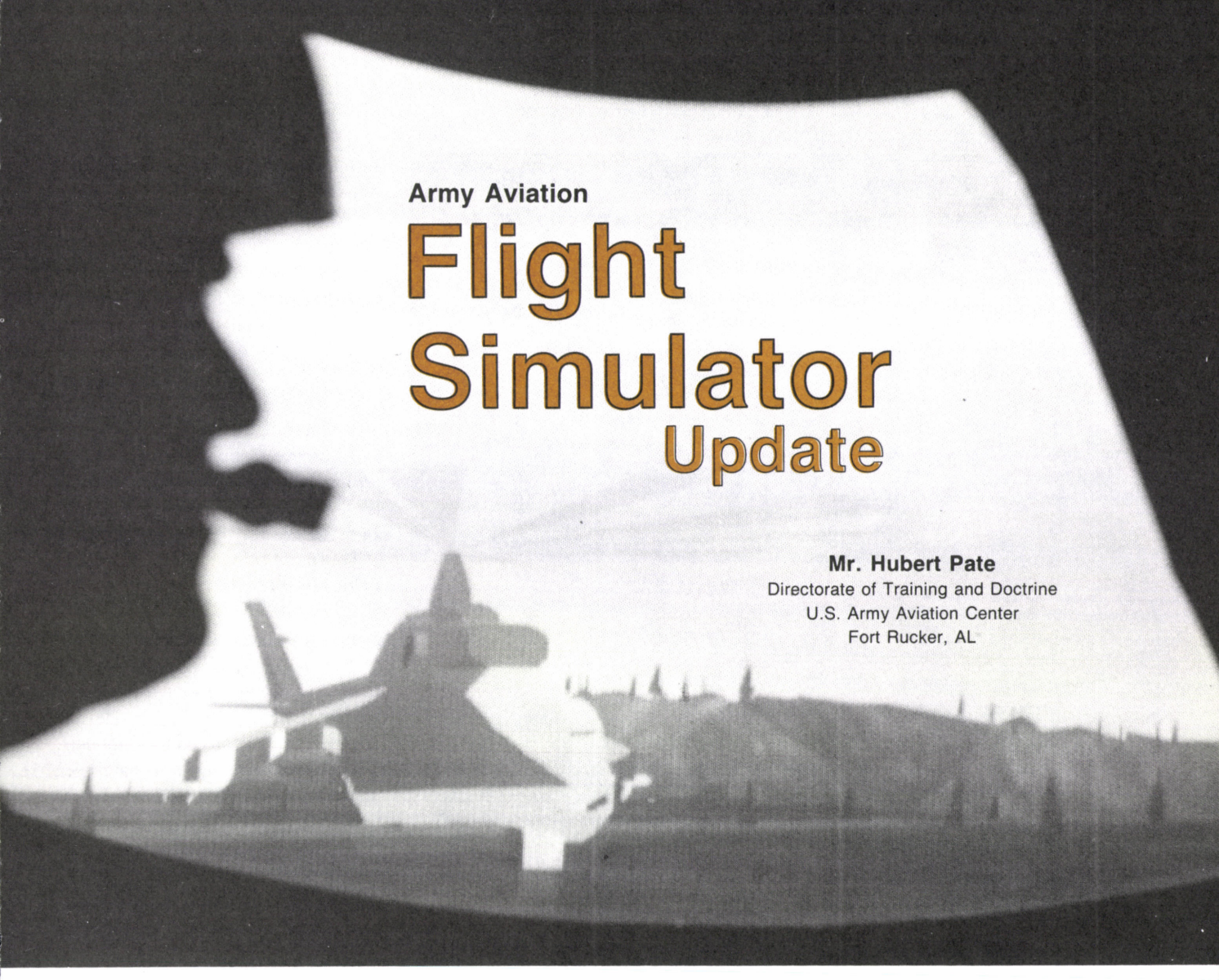
The future MH-47E Chinook and MH-60K Black Hawk CMSs will simulate their designated helicopters. These two simulators are derivatives of the CH-47D and UH-60A FSs. They will be the first ones that the Army procures for the Special Operations Forces, and are expected to be fielded at the U.S. Army Aviation Center in 1991.

This issue of the *Aviation Digest* includes an account of these highly sophisticated, state-of-the-art FSs that make up the current fleet of Army Aviation FS systems. See "Army Aviation Flight Simulator Update," beginning on page 5. In this article, the author briefly traces the evolution of FSs; looks at future FS systems; and discusses aviation training course integration, cost avoidance and Armywide fielding (figure at left) of these training devices.

To present both pros and cons of flight simulation, "Simulator Sickness or I'm OK, You're OK, It's the Simulator That's Different" appears on page 9. Occasional simulator sickness is a small price to pay for the chance to train safely for flight in the actual aircraft.

In "MULTISIM," beginning on page 12, the author discusses a new concept on flight simulators. In July 1988, Link Flight Simulation Corporation, Binghamton, NY, networked an AH-64A CMS, two UH-60 FSs and an AH-1S FWS to demonstrate the MULTISIM concept at Ft. Rucker. The author's research shows that by integrating existing and near-future devices, many training objectives for procedural and synthetic flight trainers that could enhance safety in the air can be achieved in a cost-effective manner.

A list of the SFTS articles previously published in the *Aviation Digest* (see page 11) completes this overview of past, present and future flight simulator systems.



Army Aviation

Flight Simulator Update

Mr. Hubert Pate
Directorate of Training and Doctrine
U.S. Army Aviation Center
Fort Rucker, AL

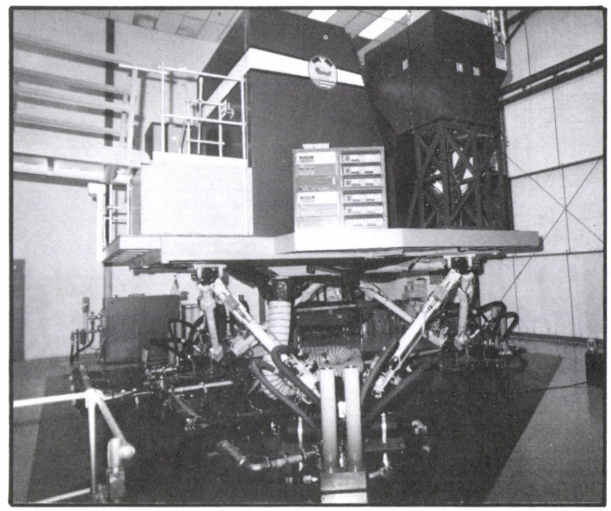
PRACTICE IS preparation for performance. The old cliche "practice makes perfect" is not true. The truth is that practice makes permanent. We perform as we practice. The quality of performance depends on the practice that resulted in this performance.

For U.S. Army Aviation to accomplish its mission, training programs must be developed and conducted. The training programs must provide realistic training situations that require aircrews to train and practice tasks needed for mission performance. Aircrew training in the aircraft is very expensive. Many tasks cannot be trained in the aircraft because of safety considerations, ammunition costs, lack of adequate firing ranges and the lack of eye-safe lasers. State-of-the-art technology is now being used to provide a solution to the problem of producing required training. Army Aviation is now using a suite of flight simulators that replicate the aircraft in design and performance characteristics in every respect. These simulators not only provide effective training, but train at about one-third of the aircraft training costs.

The present fleet of U.S. Army flight simulators consists of the UH-1 synthetic flight training system (SFTS), CH-47D flight simulator (FS), AH-1 flight and weapons simulator (FWS), UH-60 FS and the AH-64 combat mission simulator (CMS). Simulators for scout aircraft and team training are programed for the future.

The pioneer and workhorse of the flight simulator fleet is the UH-1 SFTS. This system was first fielded at the U.S. Army Aviation Center, Ft. Rucker, AL, in fiscal year (FY) 1971. There are 22 systems now strategically located throughout the U.S. Army. Each system consists of four cockpits operated through a central instructor

CH-47 FS



console, enabling four crews to train simultaneously on a single device.

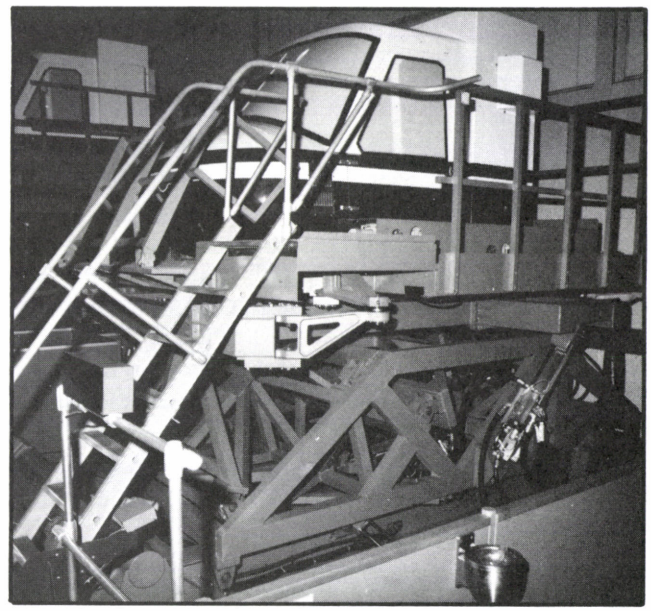
Developed and used as an instrument procedures trainer, the SFTS has been the basic foundation of the Army Aviation instrument program. Aviators now receive initial and continuation instrument training in the device. Twenty-eight of the 41 critical tasks can be trained effectively in the device. At the Aviation Center, it is used in three training courses: the Initial Entry Rotary Wing Aviator Course, the Rotary Wing Aviator Refresher Training Course and the Rotary Wing Instrument Flight Examiner Course. In addition, aviators assigned to the Aviation Center fly the SFTS for sustainment training. Compared to aircraft operation cost, use of the SFTS at the Aviation Center results in a training cost avoidance in excess of $50 million annually.

In the field, UH-1 aviators and other aviators with primary aircraft for which there is no flight simulator available receive continuation and instrument training in the SFTS. Based on aviator density and aircrew training manual requirements, this results in a training cost avoidance in excess of $41 million annually. As the UH-1 is phased out by force modernization attack aircraft in the field, and transferred to U.S. Army Reserve Components, SFTS training requirements will shift accordingly.

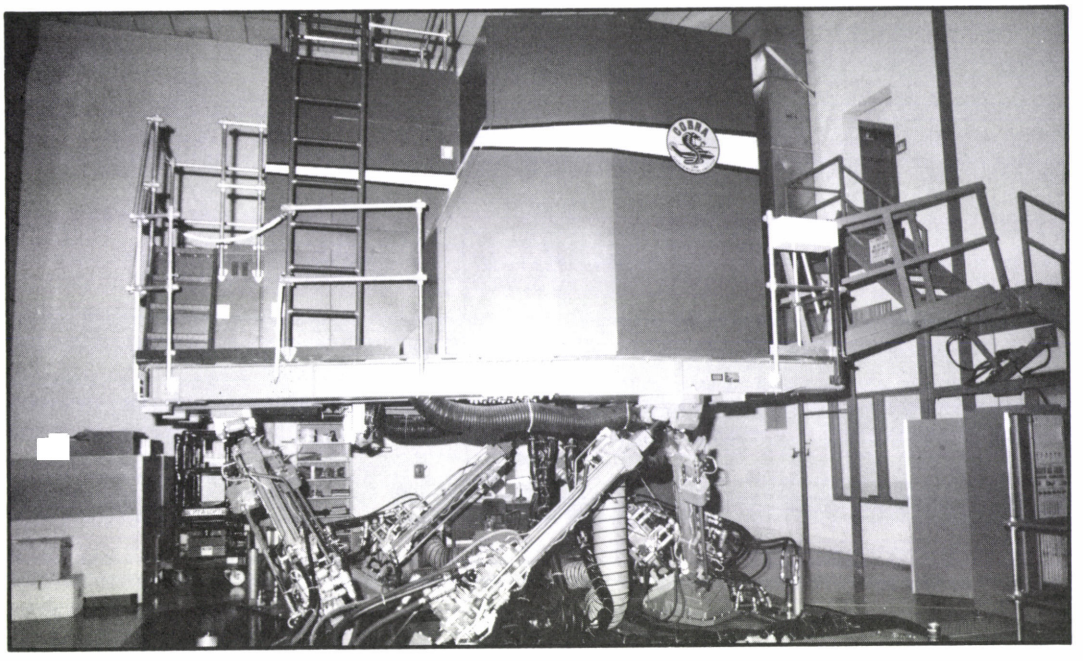
A feasibility project is presently underway to address the possibility of replacing the SFTS computers and splitting the four cockpit configurations into two cockpit configurations. A UH-1 FS requirement study is underway to determine a redistribution plan to better meet Active Army and Reserve Component needs. This project is scheduled for completion in FY 1990 and could result in a face lift and new life for these aging devices.

The number two flight simulator fielded by the Army was the CH-47C. This simulator was also the first equipped with a visual system. Originally four C model simulators were fielded, followed by two D model simulators. Now that the C model aircraft are being replaced by D models, the four C model simulators have been upgraded to the D model configuration.

The first device was fielded at the Aviation Center in FY 1977. The



UH-1 SFTS



AH-1 FWS

fielding was completed with the fielding of number six in Korea in the first quarter of FY 1989. The device replicates the CH-47D aircraft and is used as a flight and mission trainer. It is capable of providing effective training for 93 of the 106 critical flight tasks for the CH-47D.

At the Aviation Center, the CH-47D FS is used in the aircraft qualification course for 18 hours of training. This results in a training cost avoidance in excess of $3 million annually. In the field, the device is used for continuation and sustainment training in locations where the device is available. Based on aviator density and FS requirements, this results in a training cost avoidance in excess of $24 million annually.

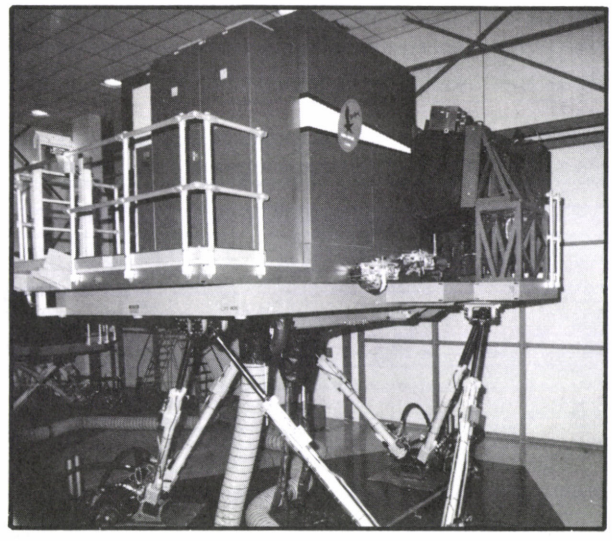
The number three simulator fielded was the AH-1 FWS. This was the first Army FS capable of providing gunnery training. The device consists of two components, a pilot's station and a gunner's station. These two components may be operated independently for individual training or linked for crew training. The FWS is used at the Aviation Center and in the field for flight and weapons systems training. It provides training for 61 of the 73 AH-1 critical flight and weapons tasks.

A total of nine FWS have been fielded. The first was fielded at the Aviation Center in FY 1979. Fielding was completed with the fielding at Marana, AZ, in FY 1988. There are three generations of this device. The first generation produced visuals based on a camera model board of the terrain. The second generation incorporated a laser image generator for visuals. The third and latest generation consists of visuals produced by digital imagery generation. At the Aviation Center, the FWS is used in the aircraft qualification course for flight and weapons system training, and results in a training cost avoidance in excess of $10 million annually. In the field, the device is used for individual and crew sustainment training, and results in a training cost avoidance in excess of $215 million annually.

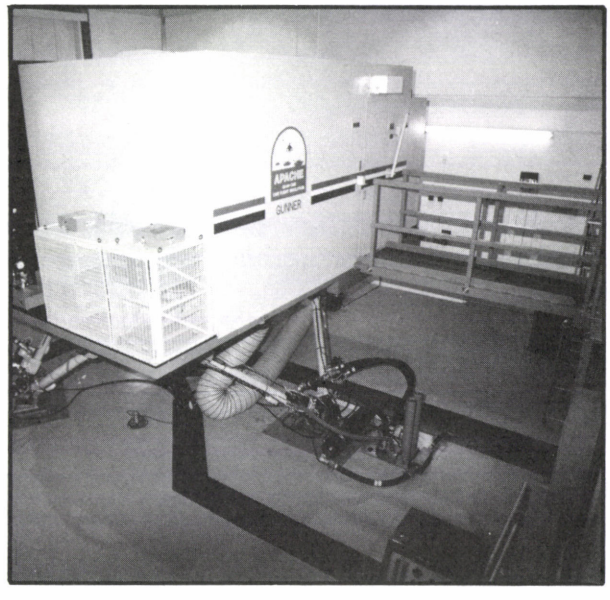
The fourth FS developed and fielded was the UH-60. The first UH-60 production model FS was fielded at the Aviation Center in FY 1987. Eight additional devices have been fielded to date. Nine additional UH-60 FSs are in the present fielding plan and under contract. Requirements for additional devices to support the Army Aviation Modernization Plan are being developed.

This device has been commonly misunderstood because of the fact that the Utility Tactical Transport Aircraft System prototype FS, which was fielded at the Aviation Center in 1982, was not a UH-60 production model simulator and did not exactly replicate

UH-60 FS



AH-64 CMS



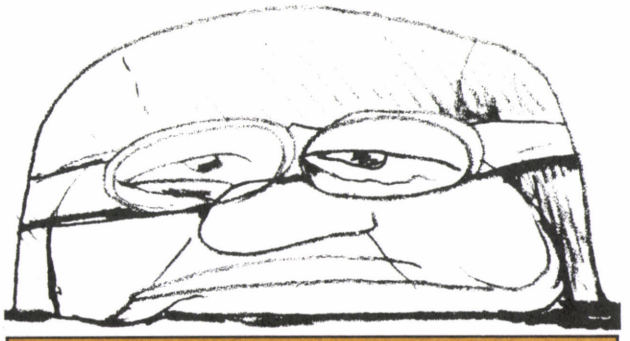
the aircraft. The production models now being fielded replicate the aircraft in every respect. The UH-60 FS is used for qualification training at the Aviation Center and continuation and sustainment training in the field. It is capable of training 76 of the 76 UH-60 critical flight tasks. The annual Aviation Center training cost avoidance exceeds $10 million annually. When fielding is complete, the field training cost avoidance will exceed $121 million annually.

The latest and most advanced Army Aviation FS is the AH-64 CMS. This device consists of two elements, a pilot's station and a gunner's station, allowing each to provide individual training or linkup and crew training. Through computer generation interactive threat, the CMS provides training under realistic simulated combat conditions.

Seven CMSs were originally programed. Five have been fielded to date. Requirements for additional devices are being developed to support the increase in AH-64 aircraft for the 1988 Army Aviation Modernization Plan. All AH-64 combat skills training is conducted in the CMS. At the Aviation Center, the device is used for aircraft qualification training, which results in a training cost avoidance in excess of $13 million. In the field, the device is used for continuation and sustainment training, which results in an annual training cost avoidance in excess of $117 million annually. If ammunition cost were included, these cost avoidance figures would be much higher.

The flight simulators now in the field and scheduled for fielding will undergo updates to keep them current with the aircraft they support. State-of-the-art simulator technology will be used to provide the most effective training at the lowest possible cost in all cases. In addition, flight simulators will be fielded concurrent with new aircraft systems added to the inventory. Devices to support the Light Helicopter Experimental are now in the planning stage. Plans for networking simulators for training as a member of the combined arms team are also in the advanced developmental stage. This approach is a revolutionary innovation and will provide training that has not been possible to date.

As stated, training is the key to successful performance. The technology of today and tomorrow must be used to provide Army aviators the knowledge and skills necessary to fight and win on the next battlefield.



Simulator Sickness

I'm OK, You're OK, It's the Simulator That's Different

Major John S. Crowley, MD
Major (P) Daniel W. Gower Jr.

THINK BACK TO your first experience in a modern flight simulator with a visual display—did you have any symptoms of motion sickness? Be honest now. Have you ever had "flashbacks" or sensations of being in the simulator hours after the period is over? Tell the truth. If you have experienced similar problems in flight simulators, you're not alone. What you are experiencing is called "simulator sickness" or "sim sickness" for short. It has been a topic of research for almost three decades. The syndrome is of concern to simulator designers and users, including simulator developers, flight instructors, flight surgeons, physiologists, commanders, safety personnel and of course, you—the pilot.

So, what is sim sickness? The symptoms of sim sickness are very similar to motion sickness. More than simple motion sickness, sim sickness refers to all the adverse symptoms that have been reported by flight crews during, or more important, after sessions in flight simulators. Commonly reported sensations include general discomfort, nausea, headache, dizziness and eye strain. On a relatively few occasions, vomiting has been reported. Pilots have reported aftereffects of the simulator, usually sensations of illusory movement, several hours after the simulator period. Such flashbacks have been reported while flying actual aircraft.

Most of the reports of sim sickness have been confined to military technical reports, and have not enjoyed much public circulation. In 1983 a tri-Service symposium on simulator sickness was convened at The Naval Postgraduate School in Monterey, CA, to review the syndrome and its potential implications for flight training and safety. In 1957 Havron and Butler published the first report of sim sickness. The report was based on their experience in the U.S. Navy's 2-FH-2 Hovering and Autorotation Trainer. They found that 77 percent of the pilots using the simulator had some adverse symptoms. Over the ensuing years, reports of sim sickness have come from the U.S. Army, Air Force, Navy and Marine Corps, as well as allied air forces. Both fixed and rotary wing simulators have been implicated, and incidences of between 10 percent and 88 percent have been reported. In 1985 in the AH-1 flight weapons simulator at Hanau Army Airfield, West Germany, Major Crowley found that 40 percent of pilots experienced sim sickness. In a more recent (1987) study, in the AH-64 combat mission simulator (CMS), Major Gower documented a 44-percent incidence rate of sim sickness symptoms.

Why is sim sickness important? Three primary concerns with sim sickness go beyond the nausea and discomfort associated with it. Each of these concerns impact the purpose of the use of simulators in the military aviation training program. The first concern is that of safety and health. Primarily, the aftereffects of sim sickness have been found to appear or reappear for up to 10 hours after exiting the simulator. These effects range from dizziness, to nausea, ataxia and blurred vision. All of these pose the potential for on-the-ground and in-flight mishaps. Second, a potential for reduced simulator usage and effectiveness exists because of the discomfort experienced during simulator sessions. Pilots who become dizzy, nauseated and generally uncomfortable in the simulator are felt to avoid using the system to its fullest.

The symptoms also may interfere with learning and create negative transfer of learning between the simulator and the aircraft. Should pilots have to alter their mode of operation in the aircraft to operate the simulation, i.e., reducing head movement, they then develop habits that reduce their effectiveness in actual flight. This reduces the simulator's maximum benefit as a training device and thwarts the benefit gained from simulation.

Finally, as a result of previous research, recommendations have been made to restrict aviators' participation in

Simulator Sickness

actual flight for up to 6 hours following simulator flights. This restriction, while prudent based on current knowledge, still imposes a readiness issue for the operational units that train in simulators. Of particular concern are those aviators who must travel, normally by aircraft that they are piloting, to a facility distant from their home station or home of residence, participate in the simulator training, and then return home by the same mode of transportation. For those units that choose to abide by a 6-hour rule and for those units that have aviators who exhibit symptoms of sim sickness, the time off-station or, for the Reserve Components, the added time "on active duty for training" poses added readiness issues.

Why do pilots get motion sickness in a box that doesn't really move much at all? Why are symptoms often worse when the motion systems are turned off? The most accepted theory is "sensory mismatch," also known as the perceptual conflict theory. Basically, this theory states that sickness occurs when the senses, namely our vestibular, visual and proprioceptive senses, receive information that is in conflict with what our mind expects, based on past experience in the actual aircraft. This would explain why more experienced pilots seem more likely to develop symptoms than low-time aviators. Veteran pilots seem to have a more deeply ingrained "memory bank" of helicopter behavior. Even small deviations are noticed subconsciously by the brain. When the conflict is too great for the pilot to resolve, the result is sim sickness.

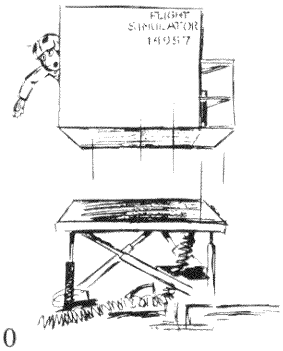
If you have suffered from sim sickness, you may have noticed that the problem seemed to go away as you accumulated more exposure to the simulator. This phenomenon is called "adaptation," which is the demonstrated ability of humans and other species to adapt biologically to obstacles placed in their path. Adaptation is essential to survival. Simulator sickness adaptation is a less permanent adjustment that capitalizes on the plasticity of the human central nervous system. Thus, flight crews learn to cope with sim sickness by developing habits to reduce the symptoms. Pilots have reported they avoid getting sick by not looking outside the cockpit during rapid turns, by closing their eyes, or by not using the visual displays on the sides of the cockpit. Clearly, these practices are not appropriate in actual flight. The pilot who "gets used to" the simulator may actually have developed a few bad habits in the process. Adaptation to the altered environment of the simulator carries with it the potential for aviators to experience problems when they encounter similar but different situations in the real environment. The symptoms experienced by aviators after the simulator flight are thought to be the result of the body "readapting" to the real world.

The extent to which these learned behaviors account for adaptation is uncertain as is the extent to which they produce negative habits, which are then transferred to the aircraft. There is also another and simpler kind of adaptation. The aviators' sensory expectations change with experience in the simulator. The aviators then distinguish between the sensory experiences they expect to have in the simulator and those expected from actual flight. This reduces the sensory mismatch, which in turn reduces the simulator sickness.

So we've seen that sim sickness is a problem in aviation. What can we do about it? We offer the following suggestions for units whose aviators fly in visually coupled simulators and have problems with sim sickness. (NOTE: Some of these will work and others will not for any particular aviator.)

- If a pilot begins experiencing problems, the visual system should be turned off. The pilot should fly instruments for a while, reintroducing the visual system as symptoms permit.
- It is known that tolerance to motion sickness is reduced during periods of illness. Therefore, assignment to simulator training during periods of medical grounding for flu, ear block, etc., may result in increased sim sickness and a reduced training benefit.
- The visuals should be turned off upon termination of each period, before exiting the simulator. Preferably, they should be turned off after a return to a straight-and-level attitude.
- Unnecessary use of situational freeze should be eliminated. This is especially true when the pilot has flown into an unusual attitude or off-horizon position.
- Indiscriminate use of the reset function should be avoided. Pilots should be alerted to look away when it is used. The replay of 15 minutes of flight in a few seconds can be very disorienting and can cause eyestrain.
- Pilots should be careful to keep their head within the design-eye-point of the simulator. This imaginary box in space is within which the human eye will see the screens of the simulator and focus on them as though they were at optical infinity. The pilot may get too close or too far away. If so, the visual scene will seem to be out of focus.
- Prolonged and/or intense exposure to the simulator

should not be scheduled. The worst cases of sim sickness have been reported after prolonged exposures over several days. A study conducted at the U.S. Army Aviation Center, Ft. Rucker, AL, in the Apache CMS, indicated that pilots adapted to the simulator over the period of 10 days. However, they showed a marked decrease in their postural equilibrium as the training progressed. Two periods back-to-back is about all any aviator should plan on flying in 1 day. Even then a break of at least 15 to 30 minutes should be planned.



• Time lags in simulators should be as finely tuned as possible. A lag of a few hundred milliseconds between input and simulator/visual movement is easily noticed by the brain. If you notice a change in the simulator's response to your inputs, bring it to the attention of the maintenance personnel at the simulator site.

If pilots feel sick after simulator periods, the U.S. Navy has recommended that they not fly for 12 hours. After the study at Hanau Army Airfield revealed a significant problem, a mandatory grounding policy, which automatically restricted simulator users from flying actual aircraft until the beginning of the next duty day, was instituted. This policy was well accepted, as evidenced by a survey in which 65-percent of local AH-1 pilots supported the mandatory grounding policy after flying this particular simulator. As a result of the U.S. Army Aeromedical Research Laboratory CMS study, the Aeromedical Center at Ft. Rucker recommended a 6-hour waiting period between simulator and actual flight to allow for the delayed onset of symptoms. It was also recommended, for those aviators who experience sickness or disequilibrium, that they remain in the simulator building until their symptoms subside and they are more stable on their feet and that their flying duties be restricted for the rest of the day.

Flight simulators are justifiably well entrenched in modern aviation; their cost-effectiveness has been established. Attention to problems such as sim sickness should direct efforts toward improving simulator design, not decreasing simulator usage. Finally, those persons who are prone to sim sickness are not necessarily prone to motion sickness in the actual aircraft. The problem of sim sickness originates in the machine, not the aviator. So, if you occasionally experience sim sickness, relax—you're OK. In fact, you are perfectly normal.

Previous SFTS Articles

The following articles are available upon request by writing to the Editor, *U.S. Army Aviation Digest*, P.O. Box 699, Ft. Rucker, AL 36362-5042:

- "The Missing Link," January 1961.
- "Synthetic Flight Training," July 1967.
- "It'll Never Get Off the Ground," May 1970.
- "Synthetic Flight Training System," September 1972.
- "View From the Training Base," November 1974.
- "The Wonderful World of Simulation," February 1975.
- "Flight Simulator Specialist Course," March 1975.
- "A New Approach to Flight Simulator Acceptance," April 1976.
- "SFTS: The Shape of Things to Come," April 1976.
- "Tactical Training in the SFTS," April 1976.
- "The Professional and the Simulator," October 1976.
- "Training Developments at Fort Rucker," March 1978.
- "Flight Simulator Reflections," August 1979.
- "Hi, I'm a Distraught Flight Simulator," October 1979.
- "The Real Thing," October 1980.
- "AH-1FS: One Step Closer to Reality," October 1980.
- "Synthetic Flight Training System Program," November 1981.
- "You Can't Hardly Tell It From the Real Thing," September 1983.
- "Flight Simulation—The Alternative," October 1983.
- "Flight Simulation," March 1985.
- "Flight Simulator Sickness," April 1986.

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MONTHLY WRITING AWARD

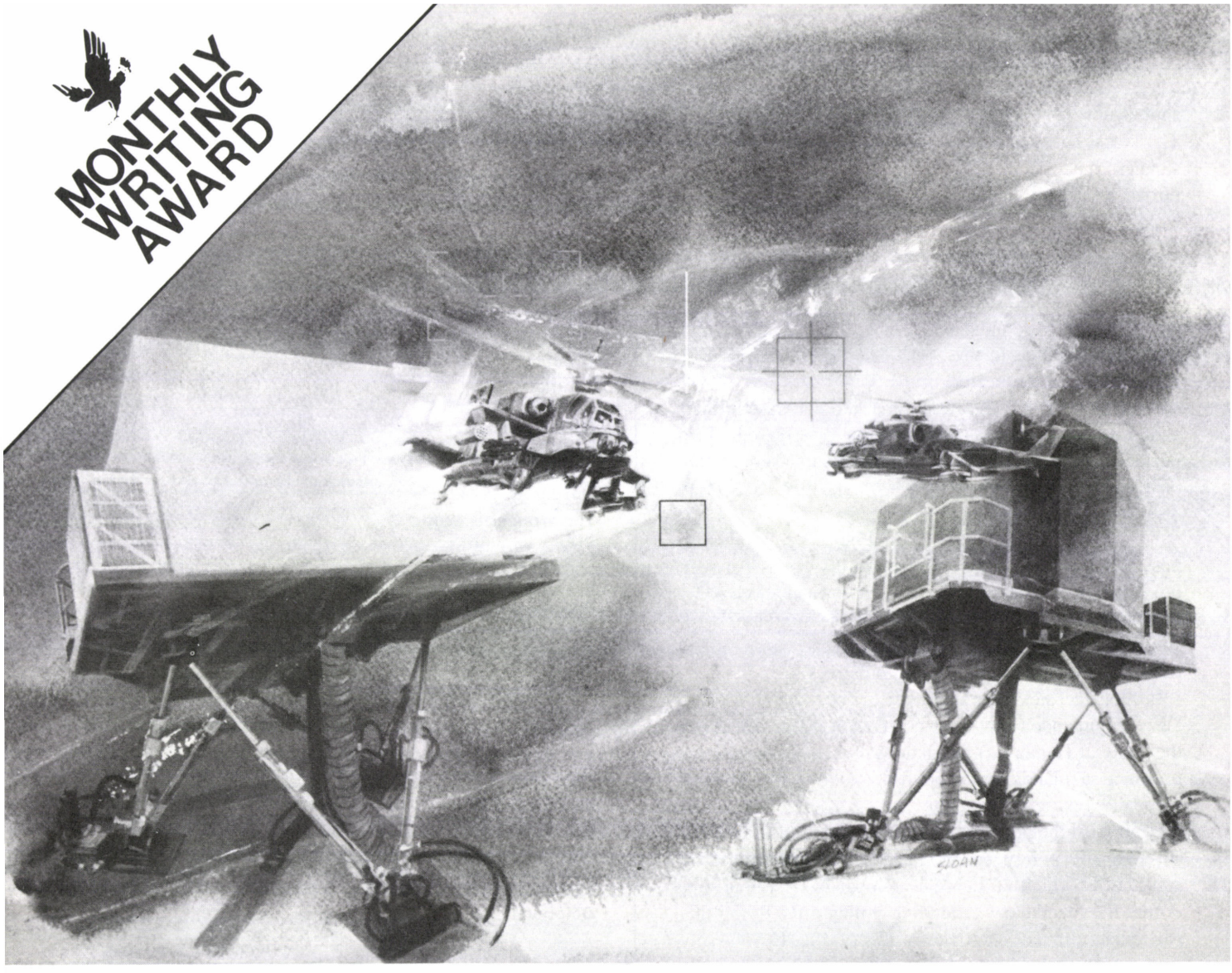

illustration by Robert C. Sloan

courtesy of Link Flight Simulation

MULTISIM

How to fly a realistic, combined team, combat mission with today's devices.

CW4 Bob Monette
D Company, 1/14th Aviation Regiment
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The MULTISIM concept was demonstrated at Fort Rucker in July 1988 by networking the AH-64 combat mission simulator, two UH-60 flight simulators and the AH-1 flight and weapons simulator. The author explores the possibilities and offers future innovative applications of this concept for training Army aviators to fight, survive and fight again.

AT THE U.S. ARMY Aviation Center, Ft. Rucker, AL, an operations order is briefed. The crews hurriedly plan their mission from a common map. As the crews depart the briefing room, you can sense their excited but apprehensive attitudes toward the combat mission. You understand their concern. It is the UH-60 Black Hawk crews' first mission being escorted by an AH-64 Apache. They are afraid they will be unable to maintain acceptable speeds using the aviator night vision imaging system -6 goggles. The reason is the fact that the awesome AH-64 uses both the pilot night vision system and target acquisition designation system (TADS) for terrain avoidance and navigation. The Apache pilots are not actually at ease either. They must act as a backup scout for the first part of the combat mission and assist in hazard avoidance for the combined team mission.

As H-hour for liftoff approaches, the AH-64 pilots make their final system checks, Doppler inputs and fire control computer (FCC) updates. The scout (battle station instructor) departed the forward arming and refueling point (FARP) 15 minutes earlier and is clearing the air corridor north while escorting the two UH-60s to their pickup zone (PZ).

Upon liftoff and departure of the FARP, the light attack team contacts the scout for a situation update. The first indication is that another reconnaissance platoon may have spotted an air defense artillery (ADA) site north of their first objective, the drop zone (DZ). The Apache team lead rogers and will continue inbound with the escort mission. The Apache lead then calls the lift elements and informs them they are inbound and will call 1 kilometer (km) out for pick up and requests their status. The Black Hawk lead replies that the forward reconnaissance platoons are finished loading; they will start a power check when they receive the next call.

As the attack team approaches 1 km from the PZ, they call the lift elements. They receive a reply that the Black Hawks will depart in 15 seconds. As the Apaches round some high ground, the departing UH-60s are acquired in TADS forward looking infrared (FLIR). The flight is announced off. Now, with the combined use of exacting Doppler navigation, map orientation and keen ears and eyes to their APR-39s, the team moves north to the DZ.

Soon the scout is called for updated information. The scout informs the inbound flight of the increased possibility of the ADA site north of their DZ. The Apache team lead announces they will slow their inbound track until the scout comes up with more detailed information. As the Black Hawk acknowledges, the scout makes a hasty call.

"Apache 20, scout 11, remote mission over."

"Scout 11, Apache 20, accept."

"Roger, sighted ZSU in the open VK8550 6920 alt 400."

"One missile my code call ready and shot."

As the team slows their inbound track, the Apaches hurriedly, but with exacting accuracy, enter the grid and altitude of the reported ZSU-23-4 into their FCC for target positioning of the TADS. As the TADS is slaved to the target area, the crew immediately receives information for the remote missile engagement, azimuth, range and launch constraints. They quickly check their map for the position of the scout and angular constraints are met.

"Scout 11, Apache 20, ready shot over."

"Roger 20, shot, laser on."

"Apache 20, splash with kill; no further radar activity in the surrounding area. Suggest you prep south edge of DZ while inbound."

The Apache lead rogers and starts pounding the south side of the DZ while continuing the escort of the Black Hawks. Two km out the Apaches start to slow and the UH-60s continue inbound for their troop drop-off. The DZ appears cold as the AH-64s scan the area with TADS and weapons ready. With no additional activity, the lift elements make their insertion. Upon liftoff they make a sharp right turn and disappear from view.

As the attack team circumnavigates the DZ, the sun crests the eastern high ground. This is a pleasant relief because it marks the end of a very tasking combined team night mission. The Apache team lead calls scout 11 informing him of the completion of the escort mission. The scout had continued his maneuvering north to a visual vantage point of the northern, forward line of opposing troops.

The Apaches are cleared north to a selected battle position 4 km short of the scout's overwatch position. Upon arrival the scout makes a hurried call.

"Apache 20, sighted five T-80s with supporting ADA 1 km north on engagement area three. I'm moving to a better position. I'll call in position."

Apache 20 rogers as the gunner slaves the TADS to the preprogramed engagement area. The pilot immediately starts positioning the aircraft for alignment to support a possible rapid shot. The gunner starts scanning and lasing the area to ensure proper distance. As he scans north, he spots the advancing threat.

"Apache 22—20 spotted armor, area three, laser out."

"Roger 20, spot tracker on your code. (Wing ship selected his laser spot tracker to Apache 20's primary laser code. The TADS will scan the area and lock on when properly coded laser energy is intercepted.)

"20—22 have targets."

"Roger 22, I'll start right to left, you left to right. No ADA at this time."

As the attack team starts their rapid engagements, the scout calls that he is in position and ready to provide laser for remote HELLFIRE missile engagements. The Apaches have the armor column under a hail of laser guided missiles and declines the scout's offer.

"Scout 11, stand fast—overwatch to the north and advise."

"Scout 11, roger."

Just as the time-of-flight message scrolls to "O," the last HELLFIRE explodes in an awesome ball of fire, destroying the last of the armor ele-

ment. The attack crews start scanning past the burning hulks of metal, looking for the expected and reported trailing ADA, but to no avail. Just then—

"Apache 20—bandit south bound, engagement area 3, 4 km from my location, my laser's on lead."

"Scout 11, roger, laser spot tracker looking."

"Scout 11, lock on, Tally 2 Hinds ready for. Remote your code."

"20—negative breaking lock."

"Roger 11, engaging autonomously lead Hind with HELLFIRE."

"Roger 20, 11 standing fast."

As the copilot/gunner (CPG) of the lead Apache lases the lead Mi-24 Hind, the pilot positions the aircraft into exact prelaunch constraints. The first HELLFIRE blasts from the rail a split-second later as the pilot maintains a perfectly stable platform. The wing ship instinctively starts his prelaunch maneuvering, but the second Hind is dropping in and out of view because of terrain. As the lead continues to track smoothly, the HELLFIRE slams into the Hind. Emerging from the ball of fire, a twisted aircraft falls toward the ground. Just then, in a different tone of voice—

"Apache 20, scout 11, trail Hind has broken off and is heading my way—I think I've been spotted."

"Roger 11, we're en route—hang in there."

"22—20 in outbound."

"Roger 22, right wing."

As the Apaches pull maximum power, they are mentally calculating the possible position of the Hind in the rolling terrain. They know the scout is 4 km north, and is now in a dangerous position. The high ground to the right will be used as concealment, and Doppler will measure the proper distance. As the team scans outside the cockpit, they select 30 millimeter cannons and rockets for a close encounter. As the CPGs advise of distance and terrain avoidance, their calculated turn point arrives. As the attack team turns right, they receive a distressed call.

"Scout 11—taking fire from advancing Hind, am evading south."

"Roger 11, have Hind in sight, am engaging."

"Roger 11, still engaging. 11, Hind is breaking engagement—move to overwatch—I'm pursuing Hind."
is breaking engagement—move to overwatch—I'm pursuing Hind."

As the Hind breaks his engagement on the scout, he makes a hard left turn and disappears below rolling terrain. The attack team continues their high-speed, contour chase with weapons ready. As they crest some high ground, they acquire the Hind in another left-hand bank. The terrain will not allow them to attempt an intercept or engagement, so they continue their pursuit.

Freeze.

Question: What should the attack team do now?

- Continue their northbound pursuit and be lead into a possible ADA ambush?
- Will the Hind take advantage of the rolling terrain and turn for a head-on engagement?

These questions and more can safely and tactically be answered.

This multisimulator (MULTISIM) concept was demonstrated at Ft. Rucker between 7 and 22 July 1988, using the AH-64 combat mission simulator (CMS), two UH-60 flight simulators and the AH-1S Cobra flight and weapons simulator as illustrated in figure 1. (AH-1S was referred to as an AH-64 throughout the mission because of its visual representation of an Apache. All flight and weapons characteristics were that of the AH-1S.) These devices were networked using adaptations of commercially available hardware and specially designed interface and management software. The simulators were operated in a common tactical environment including common database, targets, weapons effects, communications, etc.

In networked operation, each of the participant simulators may be visually represented to the other simulator as a friendly or threat aircraft. The MULTISIM instructor operating from the Apache CMS instructor station makes this selection. The instructor may only change the visual and add fixed machinegun effects to the Black Hawk. Other characteristics of the individual simulators such as aerodynamics and flight sensors cannot be changed currently, although such changes could be readily incorporated in the future.

Example: During the mission, the Apache 22 was an AH-1 flight weapons simulator. It was visually presented as an AH-64, but all aerodynamics and weapons capabilities were that of the Cobra. Also the Black Hawks used for the troop insertion later were represented visually as the Hinds, with fixed machinegun capabilities. See figure 2.

The MULTISIM instructor controls hostile activity of the inserted automated targets. These targets respond appropriately depending on whether the participant simulator is friend or foe. The AH-64 CMS threat algorithm reacts to each participant simulator (and combination of simulators) and causes targets (both friendly and threat) to engage the nearest foe. The algorithm also provides for coordinated operation of the APR-39 radar warning receivers on the individual simulators.

The AH-64 threat algorithm provides realistic interactive threats for

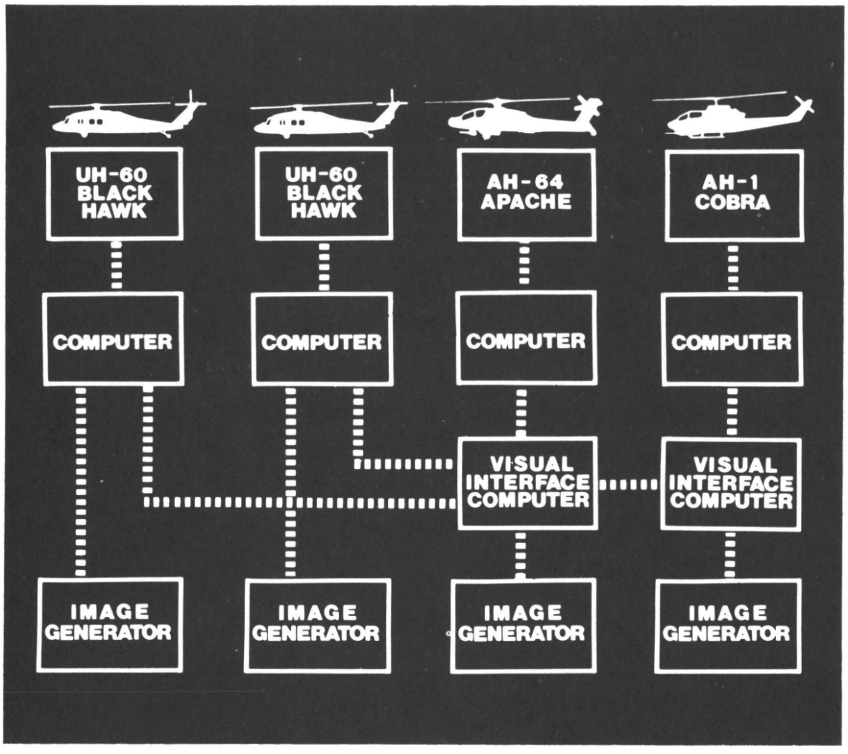

FIGURE 1: Initial Networking Proof-of-Concept Approach

developing tactical decisionmaking skills. This feature, coupled with the high-fidelity CMS systems simulations, is the heart of the combat mission simulator. Adaptations of the AH-64 threat algorithm to respond to all MULTISIM participants are an example of how networking can enhance the capability of lower fidelity simulators.

The prototype MULTISIM network requires separate operators for each of the participant simulators to provide basic control functions, such as initial conditions, freeze, edit, etc. Further research into battle control station could consider single point control as well as scoring displays and record playback for proper debrief and mission review. The networked participants have a direct intercommunication system (ICS), allowing all participants and instructors to communicate. The ICS tie can be physically removed to isolate friendly and enemy participants. The Apache

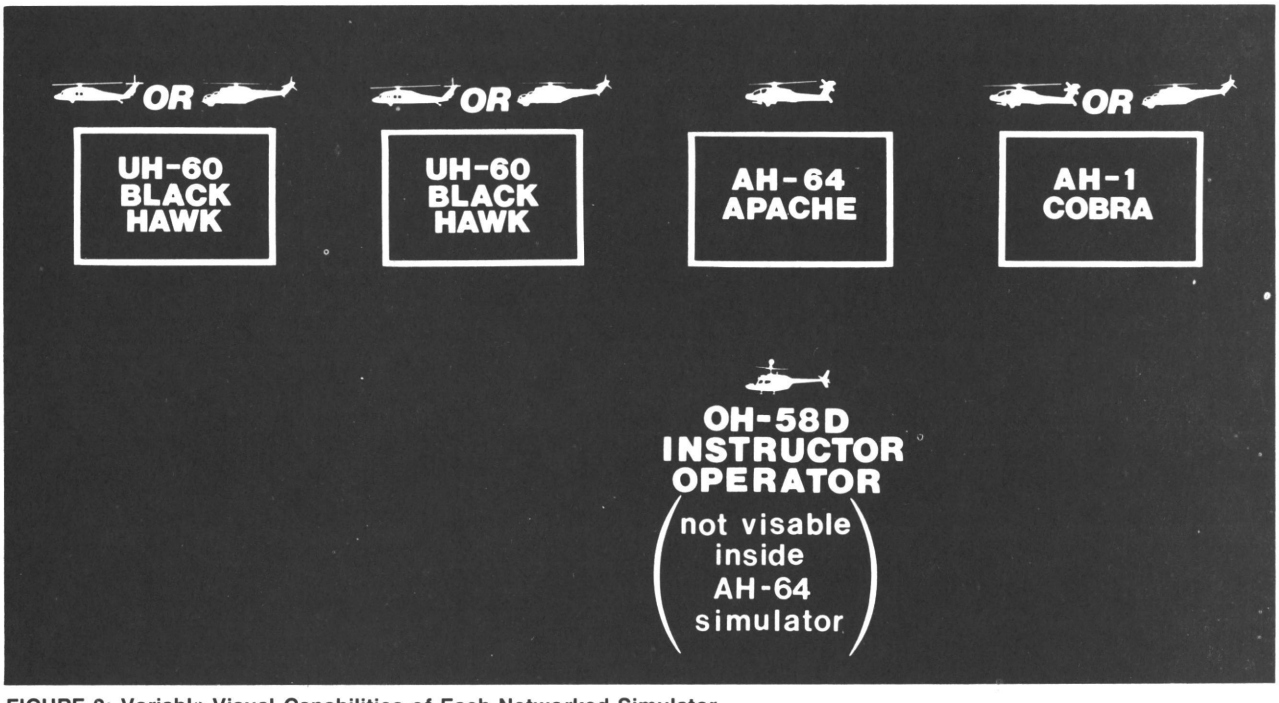

FIGURE 2: Variable-Visual Capabilities of Each Networked Simulator.

maintenance communication system was extended and is used to allow private conversations between instructors.

Visual repeater monitors would provide for on-the-floor or remote observation of networking operation. Three out-the-window monitors (one repeating the front window of each participant) and two sensor monitors (Apache TADS and Cobra telescopic sight unit) are provided. The networked system operates on a common 32- by 40-km visual database, which is identical to the current Apache CMS visual database.

The Need for Full Fidelity.

Simulators and training devices at varied levels of sophistication could be networked to support some degree of team and interactive training. Generally, the level of device and network complexity determines the number and complexity of the training objectives that can be supported.

Today's state-of-the-art helicopters have widely varying flight characteristics and highly individualized operational complexities. To survive in a hostile threat environment, aviation crews must fully exploit the specific aerodynamic and tactical capabilities of their aircraft, avionics, weapon and appropriate subsystems, whether the crews are operating autonomously or as a member of an attack team. Accordingly, high-level aviation team and counterair training requires the use of full-fidelity devices such as the AH-64 CMS to impose a realistic combat workload on the crews. By networking full-fidelity simulators, a new level could be added to the training hierarchy as illustrated in figure 3.

FIGURE 3: Training Device Hierarchy.

Possible requirements to network full-fidelity simulators for advanced aviator training do not preclude, but in fact assume, the use of lower fidelity devices to support and enhance the training environment created by such networking. Recent networking approaches have used selective-fidelity simulations successfully to provide team training for armor crews. The designs were developed based on:

- The low transition rates and limited maneuverability inherent to armored vehicles.
- The specific training objectives associated with the crew tasks involved.
- A system environment significantly less complex than that of today's attack helicopter.

In the future, interactive training systems could ensure different networking technologies supplementing each other. For example, aviator crews could train in full-scale devices in conjunction with armor crews training in selective-fidelity devices. Additional selective-fidelity devices also could be networked to represent air defense units. Each device could be designed to support the needs of the respective crews.

Impact of MULTISIM Training and Research.

The application of MULTISIM could add significantly to the value of simulators used to train Army aviators. The MULTISIM concept allows for important individual training but offers the opportunity for expansion to the entire combined arms area. As the aircraft employed for modern warfighting become more complex, missions also become more complex, which in turn requires more complex and detailed training. These missions will require untold teamwork with scouts, lift, ground elements, the U.S. Air Force and more. This development of team combat skills could be accomplished with MULTISIM in a cost-effective way using existing and near-future devices. This is particularly important with training dollars becoming tighter and the machinery of warfighting costing more to operate.

This does not mean that all tactical training needs to be accomplished in simulator networks. Many important training objectives, however, can be achieved in such a network. In addition, networks of full-fidelity simulators represent a unique and valuable resource for supporting research in team training.

Networking allows for team combined skills training. The section leaders, platoon leaders, company commanders and battalion commanders are directly involved in training. It expands the overall combat decisionmaking skills of an effective fighting team. It can provide training in collective gunnery and many support/mixed team missions. It can allow such training to be conducted in simulated night and adverse conditions using a combination of advanced sensors and night vision goggles (NVG) in a safe, effective manner. Conducting this training in high-fidelity simulators against a realistic lethal simulated threat results in training that only could be obtained otherwise in actual wartime conditions.

MULTISIM—using existing AH-64, UH-60 and AH-1S simulators—could provide cost-effective team mission training and research today. Training could be provided in some difficult

and mission critical tasks. These tasks include the following:

Escort mission/formation flying.

Depending on the unit and mission, the UH-60 may be escorted by the attack helicopter. The safety of the simulators allows these missions to be conducted at dangerous nap-of-the-earth altitude with adverse weather conditions, NVG and/or night sensors and hostile threat activity.

Target handoff.

The AH-64 with its FLIR system provides an excellent means of quickly acquiring and identifying threats. Handoff of these close targets to the Cobra is possible, while the AH-64 concentrates on targets outside the range of the Cobra's weapon and acquisition systems.

Counterair.

The new requirement for helicopter counterair training is an excellent potential use for MULTISIM. Although basic maneuvers may be taught in single-crew simulators, advanced instruction requires combat with skilled opponents rather than against computer modeled threats. In addition, Army doctrine dictates mutual support teams for counterair activities. Thus, training is required for 2-on-1, which MULTISIM has today, and 2-on-2 encounters that could have been demonstrated at Ft. Rucker, but were not because of time constraints. Counterair training in actual aircraft is limited severely by safety considerations. These conditions are in such areas as allowed aircraft maneuver envelopes, aircraft-to-aircraft separation, aircraft altitude, weapons employment and incorporation of ground threats. All of these limitations can be overcome with the use of networked simulators.

Research.

Recently at Link Corporation in Binghamton, NY, an air-to-air missile research evaluation was conducted using the UH-60 in the network as a missile target. Those findings have not yet been released.

During the demonstration period at Ft. Rucker, a 3-day exploratory air-to-air study was conducted. A multitude of information regarding acquisition, evasive and employment maneuvering and engagement techniques was gathered for future evaluation and study. This effort demonstrated the capabilities and potential for future training and tactical studies.

Future enhancements of the existing simulators and further additions to the network could provide additional training and research opportunities. Included are—

- *Scout training.* Addition of a scout aircraft such as the OH-58D Kiowa to the network would allow for laser handoff, remote missile missions, NVG/FLIR sensor operations and much more. Furthermore, the UH-60 is expected to have HELLFIRE missiles in the near future. The OH-58D and the AH-64 will be their lasing platforms. Training and research in scout attack and lift divisions interactions are virtually unlimited with networking.
- *Automatic target handover system (ATHS).* ATHS is a complex system linking many team members. The MULTISIM network is an ideal setting for training in this system. High update rates of large amounts of data between simulators require high-speed systems normally available only with full-fidelity simulators.
- *Mission rehearsal.* A current Army requirement is for a safe, realistic and secure mission rehearsal capability—especially in relationship to special operations activities. An attractive solution is the employment of networked simulators. These simulators could operate on a database generated from Defense Mapping Agency data and intelligence photographs, programed with threats identified by cognizant sources. Such a system would allow detailed rehearsal of a planned mission including the evaluation of various options and the effects of system failures or unexpected threat encounters. Security would be greatly enhanced over live infield operation since the system would be housed in a secure building with minimum personnel access.
- *System evaluation.* A network of high-fidelity simulators could help the Army to evaluate present and new systems and tactics. Operational employment of new weapons such as air-to-air Stinger or modified systems such as an air-to-air gun solution for the AH-64 FCC may be evaluated in a high-fidelity simulator such as the AH-64 CMS. The advantage over field evaluations is the ability to analyze the system relative to the crew total combat workload imposed by systems operation and the interaction of programed hostile threats. Networking further increases the workload realism in these cases since the threat target can be flown by pilots trained in offensive and defensive maneuvers.
- *Tactics.* Networked systems could also be employed to evaluate existing and potential aviation tactics, such as those recently created for counterair missions. Furthermore, by modeling one of the networked simulators with threat aerodynamics and flight dynamics, counterair performance can be precisely evaluated for different aircraft. This would include the capability to easily collect data on line printers and strip chart recorders, which are presently part of the simulator complex.

Conclusion.

The networking of existing full-fidelity simulators could be a cost-effective method of significantly expanding training capabilities to provide Army aviators the training they need to fight, survive and fight again. Each time I was involved with a networking evaluation, the crews and Link engineers discovered new and exciting uses for the combined team concept. Further expansion can provide research and training opportunities to levels that would have been unthinkable a few years ago.

REFERENCE

George, G.R., Knight, S.N., Monette, R.J., *Multiple Simulator (MULTISIM) - The Way to Provide Effective Combat Training Today.* Accepted and to be published proceedings of Interservice/Industry Training System Conference, Orlando, FL, December 1988.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Suggestions for Setting Up an Aviation Life Support System (ALSS) Program

INSPECTION

- Establish an ALSS library.
- Prepare ALSS standing operating procedure.
- Establish an inspection record (visible index file).
- Mark each Aviation life support equipment (ALSE) item.
- Get support from nearest medical facility.
- Make incoming, outgoing message file.
- Secure manuals and use to fullest extent.
- Make full use of the quality deficiency report, equipment improvement recommendation and DA Forms 2028.
- Set up file of ALSS/PEARL'S articles. Copies can be made available if needed.
- Provide ready access and security for ALSE.

TRAINING

- Hold classes on use of ALSE.
- Get aircrew personnel involved.
- Emphasize overnight survival training.
- Provide ALSE training for units that the facility supports.
- Have supervisor give refresher/short ALSE orientation/briefing.

PROCUREMENT

- Initiate ALSE DA Form 2765; use proper advice codes.
- Get to know your U.S. Property and Fiscal Office (National Guard only).
- Learn how to use Army Master Data File; learn proper codes and use them.
- Request funds in advance and use wisely.
- Help write state's regulation for AR 710-2 on ALSE and central issue facility.
- Secure floor space and lockers for ALSE repair parts stock.
- Record demand file actions.
- Keep record of local purchases and self-service supply store buys.

Personnel and Training Requirements

Army Regulation 350-30, "Code of Conduct/Survival, Evasion, Resistance and Escape (SERE) Training," covers special training programs and stipulates that each member of the U.S. Army undergo SERE training. The regulation also requires integration of SERE training into related subjects and into maneuvers and field exercises. In consideration of today's modern battlefield tactics with requirements for exceptionally close aviation support, it becomes absolutely imperative to conduct SERE training at every opportunity. Each unit shall integrate special survival techniques and training. Special training may involve boarding a liferaft while wearing an inflated life-preserver. This type of training would apply to a unit involved in flights over water. Special training for a unit operating in extremely cold climates might consist of building snow shelters or ice fishing. Each unit commander, along with the Aviation life support officer, should evaluate the type of terrain and environment where the unit predominantly operates and then initiate an appropriate ALSE training program.

Thermoelectric Air Conditioner

A solid-state device, designed to provide a source of air-conditioned air, has been selected as one of the most significant new technical products of the year in the *Research and Development* magazine. The program was funded by the Program Manager ALSE, St. Louis, MO. Besides providing a breakthrough in energy efficiency and offering a solution to the ozone-destruction problem, the system offers several inherent advantages specific to microclimate conditioning applications such as:

- Compact and lightweight design.
- High reliability.
- Ease of maintenance.
- Simple operation.
- Adaptability to heating mode.
- Adaptability to cooling or heating industrial gases other than air.

If you have a question about personal equipment or rescue/survival gear, write PEARL'S, AMC Product Management Office, ATTN: AMCPM-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-3573 or Commercial 314-263-3573.

"Above the Best"

John W. Kitchens, Ph.D.
Branch Historian
U.S. Army Aviation Center
Fort Rucker, AL

ON 4 JULY 1987, a momentous event occurred on the post parade field at the U.S. Army Aviation Center, Ft. Rucker, AL. That day "Above the Best," the new song of the Army Aviation Branch, was first played in public.

This song was not the first to be written about and for Army Aviation, nor was it the first song to be entitled "Above the Best." During the very early years of organic Army Aviation, as early as 1943, the "Grasshopper Hymn" was written about the L-4, the Army's observation aircraft, known as the Grasshopper. However, the Army never adopted the song. The first composition entitled "Above the Best," written by Mrs. Jeanne F. Matheny and Mrs. Jane G. Gonseth, was also never adopted. This "Above the Best" song was sung at several graduation ceremonies at Ft. Rucker. In 1960 the composers granted a royalty-free release to the U.S. Army Aviation Center. Included was the right to make needed changes in the lyrics. Generally acceptable modifications apparently never were made, however, and this composition became dated and ceased to be used.

In 1963, the Army Aviation Association of America (AAAA) sponsored the writing of "The Army Aviation Song" by Sammy Cahn and James Van Heusen. It was first sung at a concert at the Hollywood Bowl on 29 September 1963. The Honorable Stephen Ailes, undersecretary of the Army, acknowledged the Army's official acceptance of "The Army Aviation Song" at the concert, but it never was widely used and, therefore, did not become well known.

With the formation of the Aviation Branch on 12 April 1983, the need for an official branch song became evident. The search for an appropriate and widely acceptable aviation song began in earnest. Colonel Andrew J. Miller Jr., deputy assistant commandant and later chief of staff at Ft. Rucker, chaired a committee that conducted a contest for the writing of an Aviation Branch song. In August 1984, the committee met to listen to the 98th Army Band play the songs submitted for consideration. The committee decided that none of the songs captured the history, tradition and spirit of Army Aviation and the new branch; therefore, they discontinued the contest.

Several people at Ft. Rucker continued the search, however. These included Colonel Miller; the Aviation Branch chief and commander, Major General Ellis D. Parker; and General Parker's wife, Mrs. Judy Parker. They considered very seriously one composition, "Aviation and the Army Green," submitted by Captain Donald C. Denmark. The song was presented to the Branch at the annual Aviation branch ball in April 1987. It was sung by a group of instructor pilots, but was never accepted as the Aviation Branch song.

The final phase of the search for an official song began at a social function in Ozark, AL, on 17 April 1987. That evening Mrs. Parker told Mrs. Florence Matthews, a resident of Ozark, how she and many others desired to have an official song written for the Aviation Branch. General and Mrs. Parker then described to Mrs. Matthews the kind of song they were looking for. Mrs. Matthews replied that she had a close friend who was a composer and offered to contact her to see if she would be interested in writing a possible branch song. That evening they agreed that Mrs. Matthews' friend, Mrs. Jo Johnston of Dothan, AL, would be asked to give it a try.

Mrs. Johnston, who was notified the next day, was interested immediately. She talked at length with Mr. Lee Earnest, a retired Army friend in Dothan. He told her a great deal about Army Aviation and called General Parker to arrange an introduction. General Parker was away from the post, so an appointment was made for Mrs. Johnston to meet with the chief of staff, Colonel Miller. In the meantime, Mrs. Johnston wrote the march melody. At her first appointment with Colonel Miller on 6 May, she played a tape of the march. Mrs. Johnston made several other trips to Ft. Rucker to talk with people about the history and traditions of Army Aviation.

It was almost a foregone conclusion that "Above the Best," the motto of the Army Aviation Center at Ft. Rucker, would be the title of the Aviation Branch song. According to Mrs. Johnston, deciding on a title was a necessary prerequisite to developing the lyrics. Other necessary steps included researching the history and traditions, and capturing the spirit of the people about whom and for whom she was writing.

During the months of May and June, Mrs. Johnston worked closely with Colonel Miller, who played a major role in helping her develop the lyrics. He also headed an informally organized group dedicated to bringing the song to actuality. This group consisted of Mrs. Parker, the public affairs officer, the historian and several others. As the branch chief, General Parker suggested what the branch song should accomplish. He believed it should serve to instill pride, dedication, loyalty and a sense of history in those affiliated with Army Aviation, including their families.

Taking her cue from General Parker's suggestions, Mrs. Johnston interviewed numerous soldiers at Ft. Rucker to determine how they felt about the Aviation Branch and their role in it. She found a camaraderie among the soldiers; the men and women of Ft. Rucker were extremely dedicated to their branch, the Army, and above all, the Nation. She was especially impressed by the pride these men and women took in the newly formed Aviation Branch. Mrs. Johnston was able to combine the history, tradition and spirit of the branch into lyrics and music, which captured the essence of Army Aviation. She later wrote, in a letter to General Parker, "I tried to capture the spirit of Army Aviation, but instead, it captured me."

This sense of kinship with the Aviation Branch inspired Mrs. Johnston to write the lyrics. Later she acknowledged her gratitude to Colonel Miller and the many other people at Ft. Rucker who had helped to guide her research and promote her inspiration.

The 98th Army Band at Ft. Rucker played the song, whereupon the bandmaster and some members of the band suggested a few changes. After making some minor changes, Mrs. Johnston had her arranger, Buddy Skipper, arrange the music for the band. She then had 27 studio musicians in Nashville record the composition and presented the tape to General Parker on 22 June. General Parker and Colonel Miller immediately approved the song. They assembled special staff members who heard the tape played on 25 June. In the words of a local newspaper, Army Aviation had moved cautiously toward accepting an official song; however, once Jo Johnston's "Above the Best" was heard, it was accepted "almost by acclamation."

"Above the Best" was dedicated to General Parker and formally presented to the Army Aviation Branch on 1 July 1987. It was then played publicly on the 4th of July as part of Ft. Rucker's Independence Day celebration. The response to the song was overwhelming. The reaction of those assembled indicated that this song was the one for which the branch had been waiting. Only a minor change was made to recognize the role of women. During the month of July, attorneys of the two parties worked out the details of the copyright and the permanent license-to-use granted by Mrs. Johnston to the Army. In the meantime a copy of the song had been sent to the chief of Army bands, who formally recognized "Above the Best" as the official song of U.S. Army Aviation in a memorandum dated 29 July 1987.

During the month of August, the Army distributed "Above the Best" to Army Aviation brigades worldwide. By the end of the summer, it had become an integral part of the Aviation Branch milieu.

This song has become a stirring tribute to Army aviators, to those who maintain and support Army Aviation and to the memories of those who have served Army Aviation and their country so well. The lyrics were written, not only with inspiration, but also with skill so that they will stand the test of time without becoming dated.

During the following months, Mrs. Johnston was recognized as the composer of the widely acclaimed Army Aviation song. Upon General Parker's recommendation General Arthur E. Brown Jr, vice chief of staff, U.S. Army, in a ceremony at Ft. Rucker on 19 January 1988, presented her the Outstanding Civilian Service Award. Three months later, Mrs. Johnston was an honored guest at the annual banquet of the AAAA in St. Louis, MO, where the song was presented. Another tribute to the composer was the thundering response of the audience to the singing of the song by the newly formed Aviation Center Choir during the 1988 Independence Day celebration. This response was also a demonstration of the continuing acceptance and increasing popularity of "Above the Best."

The author wishes to thank the many people at and around Ft. Rucker who assisted and cooperated with him in researching this article. While it is impossible to list everyone, he would especially like to mention the composer, Mrs. Jo Johnston, and the former public affairs officer, LTC Steven Rausch. The author also wishes to acknowledge his considerable reliance on an earlier, shorter account of the history of the aviation song, written by his predecessor, Dr. Herbert LePore.

ABOVE THE BEST

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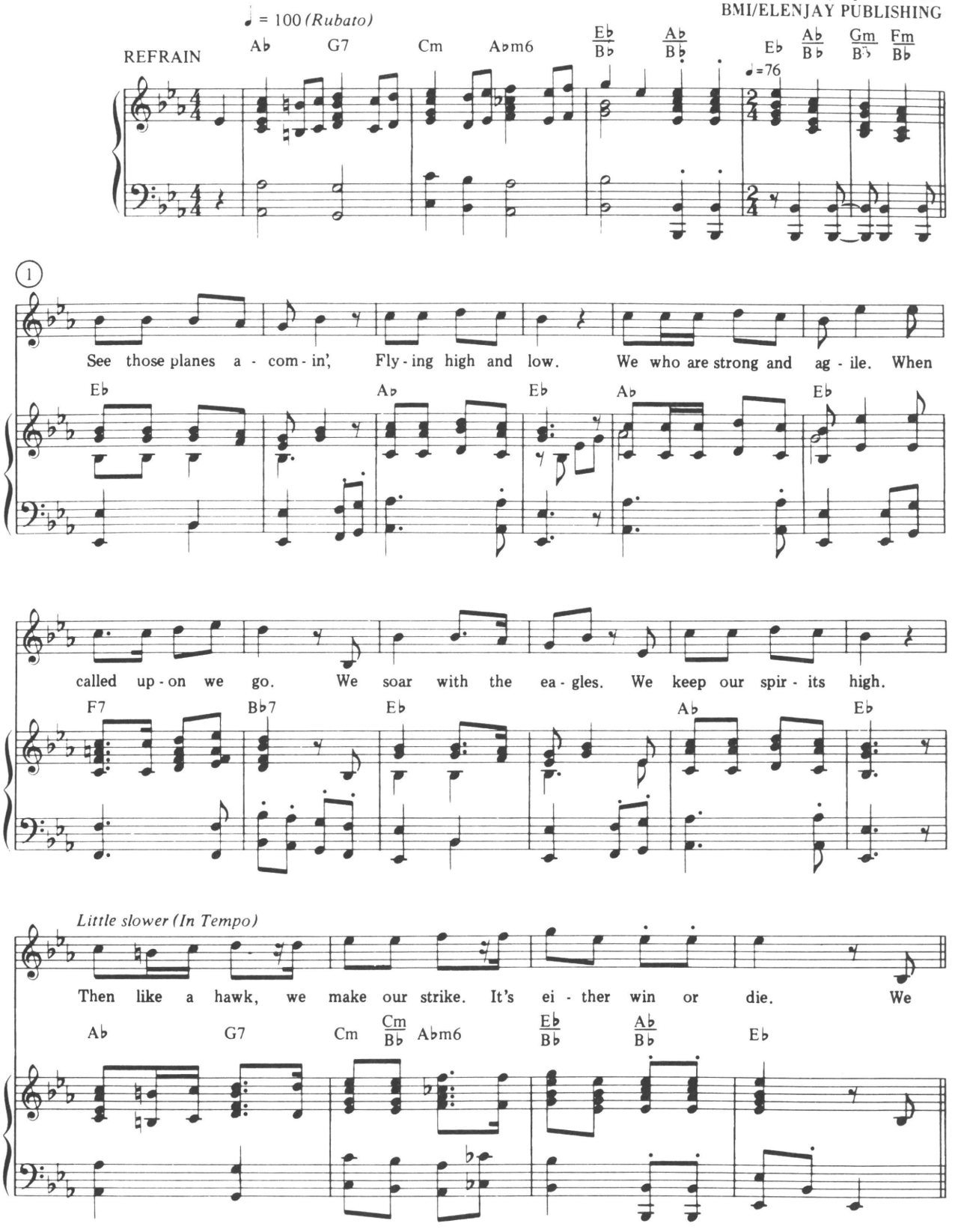
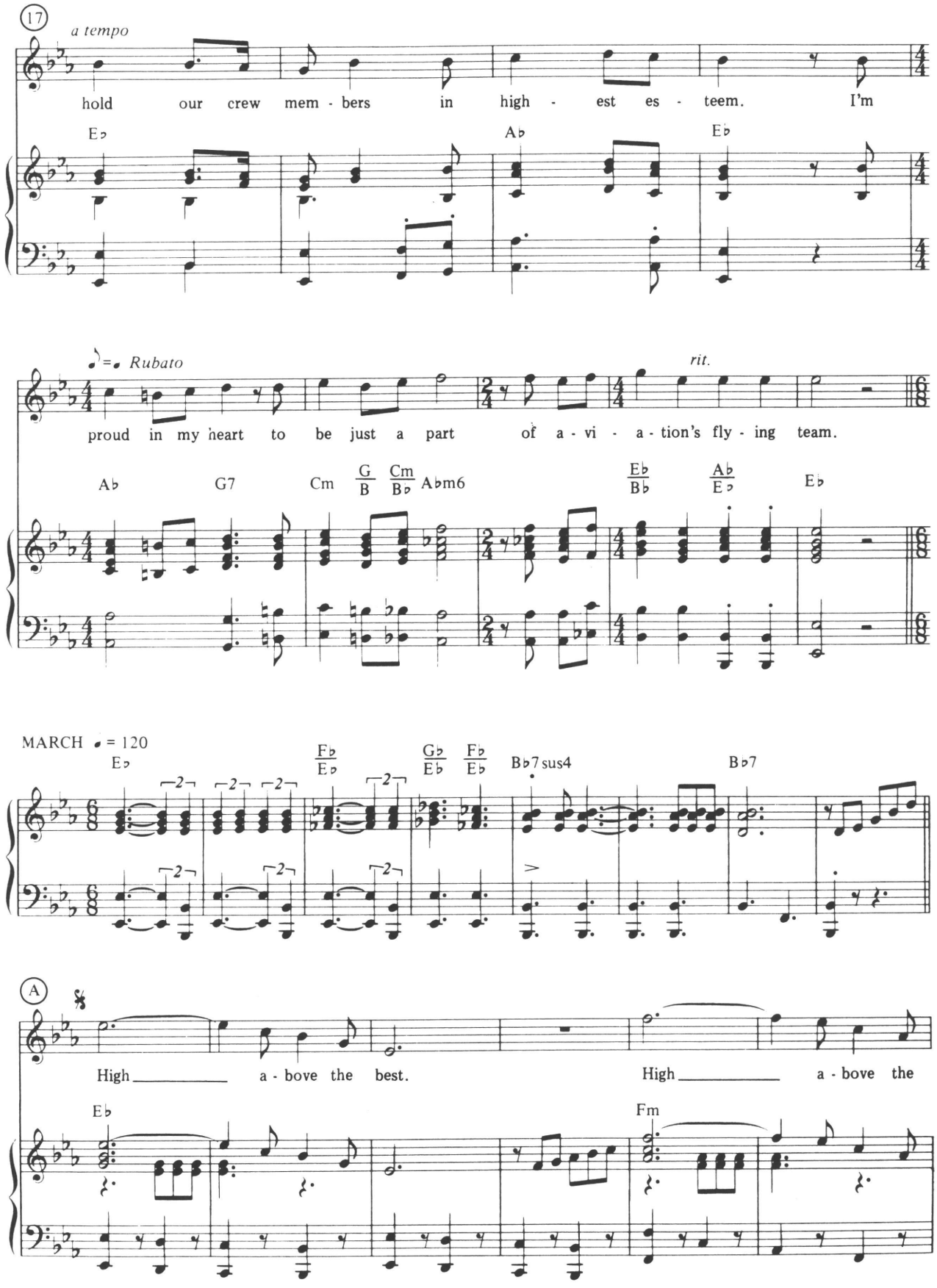
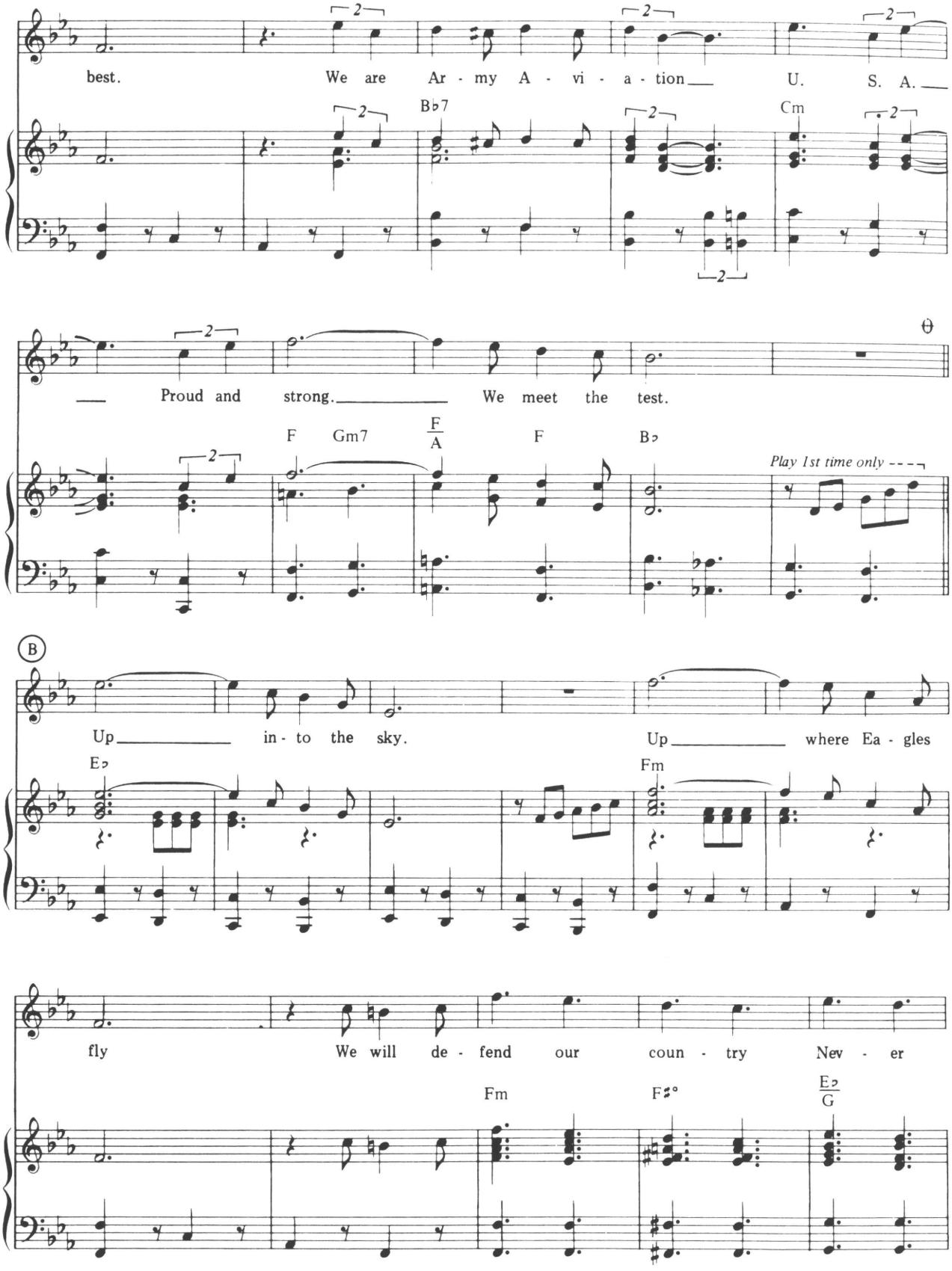
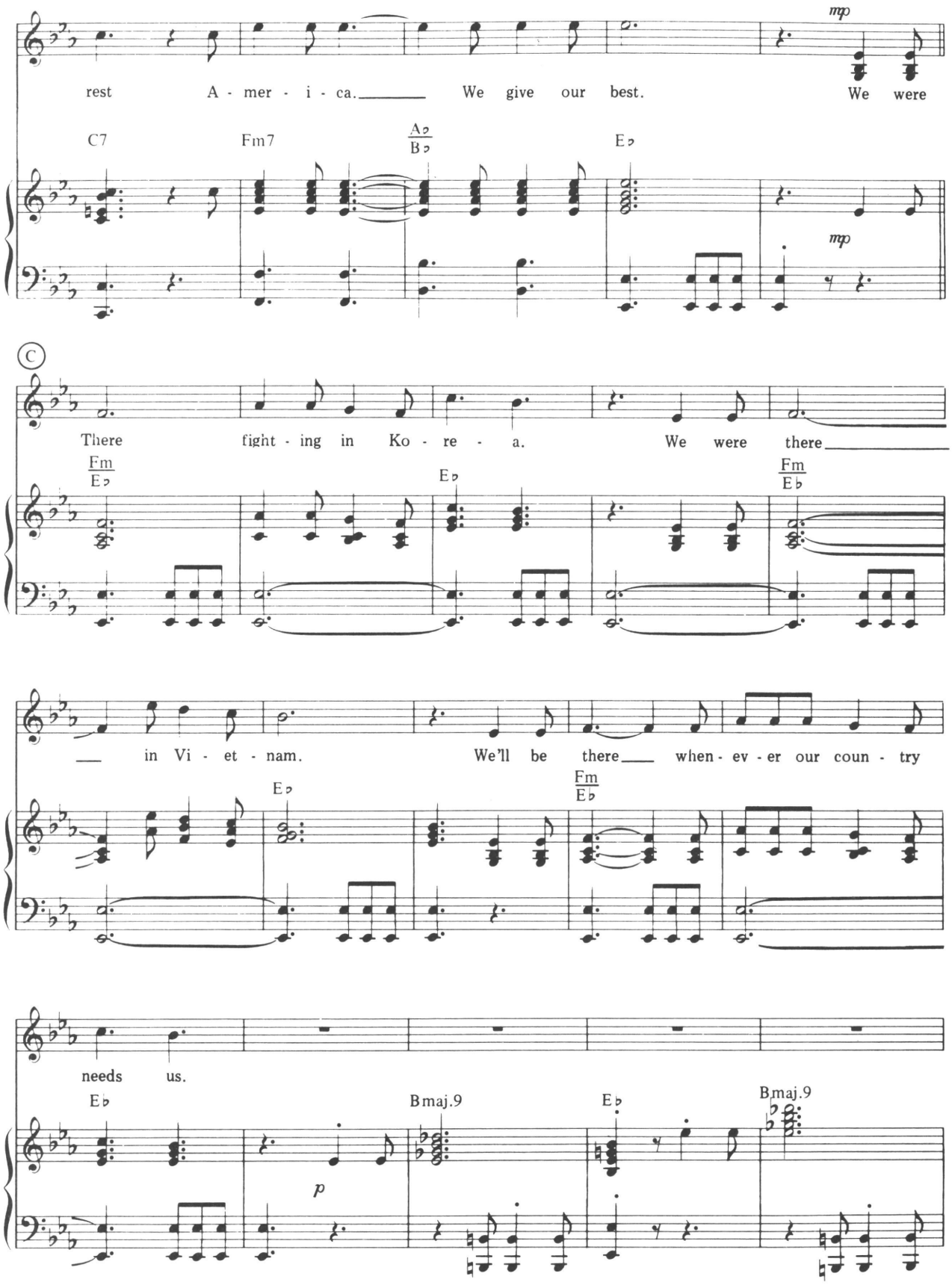
Words and Music by
JO JOHNSTON
BMI/ELENJAY PUBLISHING




17
a tempo
hold our crew mem - bers in high - est es - teem. I'm
E♭ A♭ E♭
♪=♩ Rubato
rit.
proud in my heart to be just a part of a - vi - a - tion's fly - ing team.
A♭ G7 Cm G/B Cm/B♭ A♭m6 E♭/B♭ A♭/E♭ E♭
MARCH ♩ = 120
E♭ F♭/E♭ G♭/E♭ F♭/E♭ B♭7sus4 B♭7
A
High a - bove the best. High a - bove the
E♭ Fm


best. We are Ar - my A - vi - a - tion U. S. A.
B♭7
Cm
Proud and strong. We meet the test.
F
Gm7
F/A
F
B♭
Play 1st time only
B
Up in - to the sky. Up where Ea - gles
E♭
Fm
fly We will de - fend our coun - try Nev - er
Fm
F♯°
E♭/G


mp
rest A - mer - i - ca. We give our best. We were
C7
Fm7
A♭/B♭
E♭
mp
C
There fight - ing in Ko - re - a. We were there
Fm/E♭
E♭
Fm/E♭
in Vi - et - nam. We'll be there when - ev - er our coun - try
E♭
Fm/E♭
needs us.
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E♭
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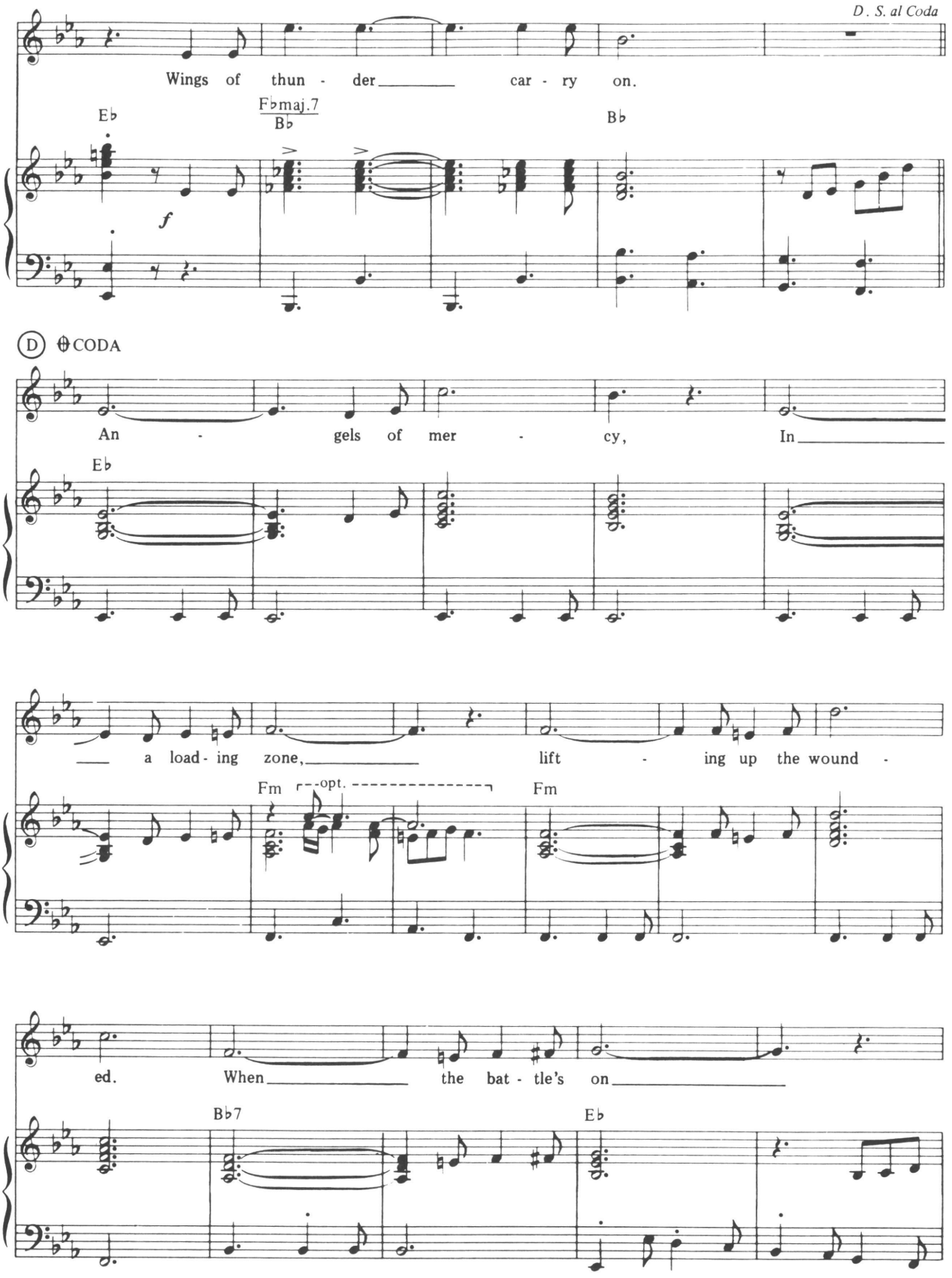
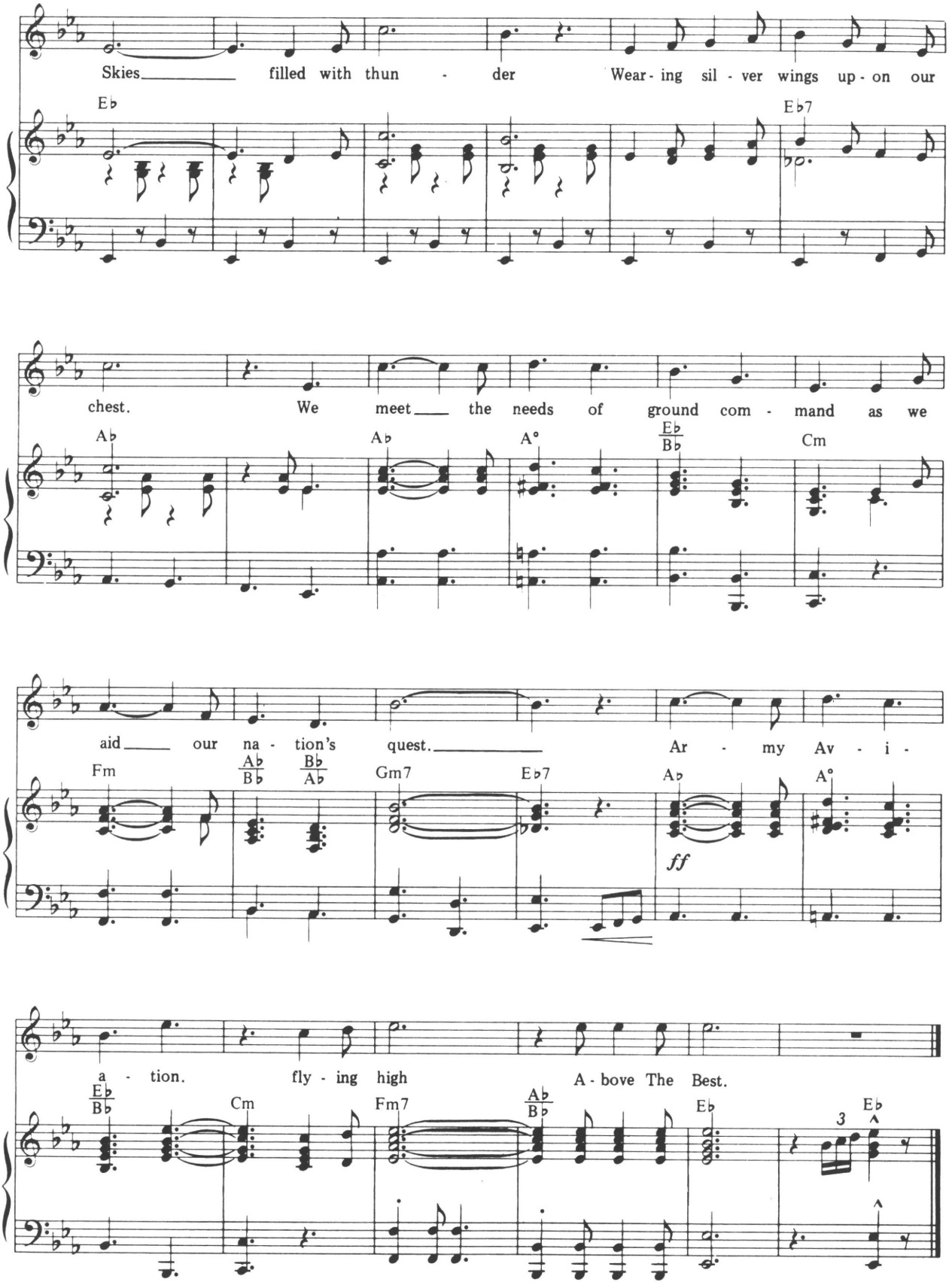
p


D. S. al Coda
Wings of thun - der car - ry on.
E♭
F♭maj.7
B♭
B♭
f
D CODA
An - gels of mer - cy, In
E♭
a load - ing zone, lift - ing up the wound -
Fm
opt.
Fm
ed. When the bat - tle's on
B♭7
E♭


Skies filled with thun - der Wear - ing sil - ver wings up - on our
E♭
E♭7
chest. We meet the needs of ground com - mand as we
A♭
A♭
A°
E♭/B♭
Cm
aid our na - tion's quest. Ar - my Av - i -
Fm
A♭/B♭
B♭/A♭
Gm7
E♭7
A♭
A°
ff
a - tion. fly - ing high A - bove The Best.
E♭/B♭
Cm
Fm7
A♭/B♭
E♭
3
E♭

AVIATION MEDICINE REPORT
Office of the Aviation Medicine Consultant

The Flight Surgeon...Then and Now

Captain (P) Stephen C. Craig
160th Special Operations Aviation Group
Fort Campbell, KY

LAST YEAR marked the 70th birthday of Army Aviation medicine. In September 1917 Lieutenant Colonel Theodore J. Lyster was appointed the first chief surgeon, Aviation Section, Signal Corps, U.S. Army. In those 70 years Army Aviation medicine grew and developed. It became almost extinct in 1949 when the Air Force created its own medical department. Then it had its renaissance with the development of Army rotary wing aircraft.

The original duty of the flight surgeon was to examine candidates for initial flight training and aviators at periodic intervals. Much of what is taught in the Flight Surgeon Primary Course is directed toward these examinations and the attendant administrative details. Although the flight physicals and sick call are priority items, other duties include—

- Flying as a crewmember.
- Inspecting the flight line.
- Advising the unit commander.
- Maintaining the skills of the medical section.
- Coordinating medical aspects of field training exercises, dependent care, family support group and social functions.

The military Medical Manual, 5th edition, 1942, pp 593-594, gives the following qualifications: "The flight surgeon must be equipped with an extensive professional knowledge of psychology, psychiatry, ophthalmology, otology, cardiology, traumatic orthopedics, altitude physiology and the special problems of aviation medicine. He must be thoroughly informed about the work of the airplane pilot.

Certain personal qualifications are necessary. His character and professional attainments must be of such high standards as to inspire the confidence and respect of the flying personnel. The fliers will then realize that he can smooth out their various problems and difficulties; that because of his interest, manifested by fact, sympathy, tolerance and sincerity, they feel his aim is to keep them in such condition that they will be fit to fly. The flight surgeon must have initiative, be emotionally well-balanced, a good mixer, and of unquestionable character and good habits. He must be willing to fly with pilots whom he finds physically qualified for flying. His knowledge of flying, of airplanes, and of Air Corps tactics must be such as to enable him to understand the problems, difficulties and dangers of the pilot and to discuss them intelligently."

These qualifications are just as pertinent today as they were in 1942.

- Extensive medical knowledge. The medical profession is conscientious of continuing medical education for certification and specialty board qualification. Also, Army physicians must maintain a state license to practice.
- Informed about the work of an airplane pilot. There are no requirements for such training either in aircraft or simulators; therefore, the doctor is often a passenger rather than a participant.
- Character and professional attainments must be of such standards as to inspire confidence and respect...that because of his interest...they feel his aim is to keep them in condition...fit to fly.
- He must be willing to fly with pilots whom he finds...qualified. The flight surgeon must remember he is a crewmember receiving crewmember's pay. If he does not share the same risks and dangers as the rest of the crew, he is not doing his job.
- His knowledge of flying, of airplanes, and of Air Corps tactics must be such as to enable him to understand the problems, difficulties and dangers of the pilot and discuss them intelligently. The flight surgeon must be a soldier and an aviator. He must realize that CME also stands for continuing military education. The Army Medical Department Officers Advanced Course, Combined Arms and Services Staff School, and Command and General Staff College are part of this education, as is participation in unit planning for field training exercises.

The Aviation Medicine Report is a monthly report from the Aviation Medicine Consultant of TSG. Please forward subject matter of current aeromedical importance for editorial consideration to U.S. Army Aeromedical Center, ATTN: HSXY-ADJ, Ft. Rucker, AL 36362-5333.

U.S. Army National Guard/Reserve Air Traffic Control Units

Master Sergeant Phillip R. Brown
1st U.S. Army Centralized Aviation
Readiness Training Team
Fort Devens, MA

DO WE REALLY know what it is like to be in a Reserve Component (RC) air traffic control (ATC) unit? What do you really know about them? If it is a challenge working with a National Guard (NG) unit conducting a peacetime mission, well how about a wartime mission? A large portion of the Army's ATC assets are in the RC. The NG units include a group headquarters (HQ), 2 battalions, 2 companies, 17 platoons and 7 U.S. Army Reserve (USAR) ATC sections.

Let's take a look at an ATC platoon in the NG. The ATC platoon has the same personnel and equipment under modified table of organization and equipment 01227JNG02 as does the active duty ATC platoon. One big difference between the NG ATC platoon and the active duty ATC platoon is the training time available throughout the year. The NG platoon has 39 days a year to train with their equipment and personnel.

The NG ATC platoon is made up of volunteers who want to be in the NG. Most of them have good jobs besides being in the NG and are in it for more than just the money. The personnel take 1 weekend a month and 2 weeks a year for annual training. This time does not include night-time work required to accomplish the many administrative details. Leaders volunteer their time (unpaid) to ensure that meaningful training is planned for the personnel to conduct the platoon administrative duties throughout the month. Full-time personnel may have two or three different jobs to perform. The controllers in the platoon and a few key ATC equipment repair personnel can be authorized additional drill periods under the Additional Flight Training Period Program. This program is for controller and ATC equipment repair personnel training using their ATC tactical equipment or a fixed-base facility.

Each NG platoon is presently being supplied with ATC equipment as it becomes available in the NG supply system. These systems include ATC facility AN/TSQ-97, flight coordination central AN/TSC-61B, ATC central AN/TSQ-70A, landing control central AN/TSQ-71 and beacon sets AN/TRN-30(V). Some units are issued ATC central AN/TSW-7A.

Tobyhanna Army Depot, PA, is reworking the platoon's ground controlled approach (GCA) radar. This will give the units a GCA in a shelter with the receiver transmitter group trailer mounted. The rework of this piece of equipment was needed very much. The program is well under way, but it will take time to finish fielding the AN/TSQ-71B(V) to all the NG units. It will give each platoon a more reliable piece of equipment to be used in their training program.

For the RC units to keep abreast of their active duty counterpart activities, the commander, 29th

Group, and a representative from the National Guard Bureau are voting members of the ATC Master Plan Advisory Group. The ATC master plan lists all new ATC equipment/facility installation programs projected in 10-year increments and is prepared and updated by the U.S. Army Air Traffic Control Activity (USAATCA). In support of the total Army concept, USAATCA also provides RC units regulatory guidance, advisors to support training exercises and assistance in ATC matters on an "as needed" basis.

Weekend drills consist of about 16 to 20 hours' training time for the ATC platoon. The platoon performs training goals that are documented on the training schedule for the weekend drill. The training goals performed are from the yearly training program, military occupational specialty (MOS) qualification program, the common task skills and the leadership training program. The training program is supported by a 1-year program, a 3-year training calendar and a mission-essential task list supported by U.S. Army Forces Command (FORSCOM) Regulation 350-2, "Reserve Component (U.S. Army) Training." All training tasks are determined by review of the pertinent Army Training and Evaluation Program mission.

The RC ATC units also have many of the same training distractors as do the *active component* units. The platoon has all the inspections as their active duty counterparts have, plus a few more. The inspections and tasks are spread throughout the year. The NG ATC platoon has all the same requirements as an active duty platoon with much less time to accomplish them.

The active duty ATC units have an easily defined chain of command, such as, platoon to company, battalion to corps and so on. Within the NG system, 15 of 17 RC platoons do not have ATC companies in their chain of command. The platoon may have an aviation battalion or a brigade as their next higher HQ in the chain-of-command while other platoons may have the state troop command as its higher HQ. NG units ultimately work for their state HQ and receive some of their guidance and missions from the state.

The NG ATC platoon training program receives assistance under the affiliation program. The affiliation program is designed to improve operational readiness of high-priority Army National Guard (ARNG) and USAR units categorized as either deploying or essential nondeploying. These units are nominated by FORSCOM and approved by HQ, Department of the Army. Improved readiness is achieved through peacetime association of ARNG units with the proper type and size of active component units. The active component provides training assistance, instruction and equipment support for peacetime training to the affiliated NG unit. The ARNG ATC units are affiliated with either the 1/58th ATC Battalion, Ft. Bragg, NC, or the 2/58th ATC Battalion, Ft. Hood, TX.

The affiliation program is not the only way the ATC units may train. The units can use the Key Personnel Upgrade Program, continental United States and outside continental United States opportunities to train key personnel with their active duty counterparts during different exercises. Units may have their own equipment set up at an NG training site for unit personnel training. As of 25 February 1988, there is a new training opportunity available for use by RC ATC units. This training program is titled Memorandum of Instruction (MOI) for U.S. Army National Guard Air Traffic Control Annual Training at Ft. Rucker, AL.

The training program exists for NG/USAR ATC platoons to train in a hands-on live traffic arena. About 60-percent of the deployable wartime ATC strength is assigned to the NG/USAR. The U.S. Army Aviation Center maintains the world's largest ATC complex and is the logical site to provide the hands-on training. The MOI provides an excellent training opportunity for an ATC platoon, during their 2 weeks' annual training, to conduct decentralized, hands-on, individual MOS training at the Aviation Center.

Readers are encouraged to address matters concerning air traffic control to: Commander, USAAVNC, ATTN: ATZQ-ATC-MO, Fort Rucker, AL 36362-5265

Enlisted Aerial Observer and Field Artillery Aerial Observer Training

CW4 Howard Anderson
Directorate of Evaluation and Standardization
U.S. Army Aviation Center
Fort Rucker, AL

THE ADVENT OF the Army of Excellence tables of organization and equipment (TOE) structure and the fielding of the OH-58D Kiowa model aircraft have precipitated many changes throughout the aviation community. One result is an increase in authorized crew positions and a need for more aircrewmembers to fill them. Enlisted aerial observer (EAO) and Field Artillery aerial observer (FAAO) training programs initiated at Ft. Rucker, AL, during October 1986 meet a portion of that need. These EAOs and FAAOs (known collectively as aerial observers (AOs)) provide units with crewmembers qualified in day, night and night vision goggles (NVG) operations.

Recently, there have been many questions concerning the initial training and integration of the EAO and FAAO into the aircrew training program (ATP). Each AO student receives flight training in the OH-58A/C model aircraft followed by advanced training in the OH-58D model for FAAO students. The flight hours are distributed as follows:

FAAOs receive an additional 16 hours of advanced training at the Field Artillery School, Ft. Sill, OK. FAAOs receive fewer tactics hours because aeroscout

Aerial Observer Flight Hours

	TOTAL	TACTICS AND NAVIGATION	NIGHT VISION GOGGLES	HANDS-ON
EAO	67	39	19	9
FAAO (OH-58A and C)	42	24	18	9*
FAAO (OH-58D)	19	11.9	4.5	2.6

*Maximum allowed time based on tactics proficiency.

security mission tasks are not taught.

The training AOs receive is designed to make them a valuable asset to an aviation unit; however, their effectiveness is based largely on how units train and use them on a daily basis. Training programs should be designed to train pilots and AOs together as a complete aircrew. To accomplish this, units must integrate an AO into the ATP as soon as possible and in accordance with the guidance in Training Circular (TC) 1-210, "Aircrew Training Program Commander's Guide," and Field Circular 1-215-1, "Aircrew Training Manual Supplement for Aeroscout Observer," or TC 1-209, "Aircrew Training Manual for OH-58D Helicopters."

The procedures listed below are a step-by-step process for integrating any aircrewmember into your ATP.

- AO must turn in flight and training records and be integrated into the ATP within 14 days.
- Commander's evaluation is conducted to determine duty position, flight activity category (FAC) status, readiness level (RL) status, NVG designation and requirement for flight evaluation.
- Establish an individual aircrew training folder (IATF).
- Conduct flight evaluation to determine proficiency level and make recommendation for RL status.
  - ☐ RL 3—Qualification/refresher training.
  - ☐ RL 2—Mission training. Unit must establish a program to train aircrewmember to aircrew training manual standards.
  - ☐ RL 1—Continuation training. Unit must establish a program to maintain AO proficiency in all base and selected mission tasks.
- Document all training and evaluations and post gradeslips to the IATF.
- Establish a commander's task list and annotate all ATP requirements to include the following:
  - ☐ FAC level.
  - ☐ Nuclear, biological and chemical requirements.
  - ☐ Annual Proficiency and Readiness Test requirements.
  - ☐ TOE or tables of distribution and allowances position.
  - ☐ Unaided and aided night requirements.
  - ☐ All base tasks and iteration requirements.
  - ☐ Flying hour and simulator device requirements.
  - ☐ Primary and alternate aircraft requirements.
  - ☐ Selected mission tasks for evaluation.
- Task lists and documentation of requirements may be listed in any order and format as long as the crewmember knows the requirements.

Additional questions have been raised concerning how to train and use OH-58D FAAOs when they arrive in units before the fielding of the aircraft. The answer is in the previous paragraphs because they are also OH-58A and C qualified. First, and most important, is to get the aircrewmember integrated into the ATP. Now train in the aircraft on hand. There are no restrictions on training FAAOs in the OH-58A and C models since this is the aircraft used for initial qualification training. The goal is to get the FAAO into an aircraft, performing as many tasks as possible to maintain his proficiency. When the OH-58D is received in the unit, each FAAO must be administered another commander's evaluation to determine a proficiency level in the aircraft. The commander, based on the results of the evaluation, may redesignate the FAAO's RL. The unit must now establish training programs to progress the FAAO to RL 1 status following the same procedure used to progress any new aircrewmember. When the AOs are properly trained and used in the OH-58A and C, subsequent refresher training in the OH-58D will be greatly simplified.

The EAO and FAAO are important members of the aviation community. When properly and quickly integrated into the ATP, they become a valuable asset capable of performing the unit's mission under a variety of conditions. The key factor is that AOs must be used to maintain the skills they worked hard to learn. They need to train as an integrated aircrew in order to develop experience, confidence and teamwork.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362-5208; or call us at AUTOVON 558-3504 or Commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or Commercial 205-255-6487 and leave a message.

AVIATION PERSONNEL NOTES

Army Astronaut Candidate Program

The Army Astronaut Candidate Selection Program is now accepting applications for potential astronauts. Astronauts serve as either pilots or mission specialists in support of the Space Transportation System (the space shuttle). Military astronauts normally spend 1 year of training as an astronaut candidate and 5 years as a certified shuttle crewmember with the National Aeronautics and Space Administration (NASA). Upon completion of their NASA tour, astronauts will serve an additional 4-year Army tour.

All soldiers who are U.S. citizens, regardless of age, sex, rank or component, are eligible if they meet the following prerequisites. Applicants for pilot positions must—

- Have 1,000 hours of pilot in command time in high-performance jet aircraft.
- Have bachelor's or advanced degree in an engineering, biological or physical science or mathematics discipline.
- Pass a NASA space flight physical (Class I for pilots, Class II for mission specialists). Sight, hearing and blood pressure standards are nonwaiverable.
- Be between 64 and 76 inches in height; mission specialists must be between 60 and 78 inches tall.
- Have sufficient retainability to complete a 6-year NASA tour and 4-year follow-on Army tour.

Applications must be received by 31 December 1988 for the March 1989 Army Selection Board. A list of Army nominees selected by the March board will be sent to the Department of Defense in June 1989 and forwarded for a NASA review in July.

Application information for the Army Astronaut Candidate Selection Program can be obtained from the functional area branch of the United States Total Army Personnel Agency (USTAPA) by calling AUTOVON 221-3125 or Commercial 202-325-3125. Written requests for information should be mailed to: Commander, USTAPA, ATTN: DAPC-OPE-A, 200 Stovall Street, Alexandria, VA 22332-0400.

Army Reserve applications should be submitted through command channels to the Army Reserve Personnel Center (ARPERCEN), ATTN: DARP-OPM-P, 9700 Page Boulevard, St. Louis, MO 63192. ARPERCEN will forward Reserve applications for Army selection board consideration.

Eligibility for British Staff College

Army Aviation commissioned officers are now eligible for attendance at the British Staff College. On 2 August 1988, the Deputy Chief of Staff for Operations and Plans, Headquarters, Department of the Army, approved an increase in the number of branches from which the Military Education Level 4 (MEL-4) Board could select officers to attend this foreign military staff college. (Credit will be granted for MEL-4 equivalency.) Aviation, Special Forces and Combat Engineer officers are now eligible along with those previously named; i.e., Infantry, Armor, Field Artillery and Air Defense Artillery.

Those desiring consideration should have a thorough knowledge of tactical operations as shown by a demonstrated background in operations. Company command and experience as a principal staff officer at battalion or brigade level are expected.

The application process begins by officers discussing their desires for attendance with their branch career manager and verifying through him or her that they qualify for MEL-4 schooling. Once eligibility is established, officers should convey their desires by letter to: President, 1989 Command and Staff College Selection Board, ATTN: DAPC-MSB, 200 Stovall Street, Alexandria, VA 22332-0441.

Letters must arrive before 1 August 1989 to be considered; official announcements in winter and spring 1989 may modify the not-later-than date for letters. Further questions should be addressed to branch career managers.

Aviation Field Grade Officer Refresher Course Update

Army Aviation officers interested in enrolling in the Aviation Field Grade Officer Refresher Course (see August 1988 *Aviation Digest*, Personnel Notes) can do so by writing to the Army Institute for Professional Development, U.S. Army Training Support Center, Newport News, VA 23628-0001. Enrollment procedures are outlined in Department of the Army Pamphlet 351-20, "Army Correspondence Course Program Catalog." Field grade Aviation Branch officers and promotable captains being reassigned from a nonaviation assignment to an aviation assignment meet eligibility requirements. The course objective is to provide refresher training for field grade aviation branch officers on aviation doctrine, tactics, techniques and procedures that may have changed while the officer was serving in a nonaviation assignment. Presently, the course consists of 10 correspondence course subcourses.

Details about course content should be addressed to: Commander, U.S. Army Aviation Center, ATTN: ATZQ-CAT, Ft. Rucker, AL 36362-5260.

Active Duty Service Obligations (ADSO) of Officers

The fiscal year 1988 officer voluntary early release retirement program that relaxed many of the ADSO retirements ended in September 1988; however, officers can still request waivers for early release where warranted.

Commanders will be recommending approval of such waivers only in the most exceptional cases, when mitigating circumstances exist. Likewise, the U.S. Army Aviation Center, Ft. Rucker, AL, will only support approval for the most exceptional cases.

Final determination will be made by Officer Personnel Management Division Special Review Boards.

The reason for stringent review of individual requests is twofold. First, budget cutbacks have reduced flight training seats and thus our ability to train to requirements. Second, training invested in junior aviation officers is in the high-cost bracket, and such important investments are only returned adequately through completion of ADSO.

The bottom line is the needs of the Army have changed and have significantly altered approval of requests for release from ADSO.

Aviators Recognized as Associate Members of the Military Intelligence Corps

The Chief, Military Intelligence Corps is authorized to approve aviators' requests who possess Branch Code 35 (Military Intelligence) as a functional area, to become associate members of the corps. Membership certificates have been produced and are being sent to special electronic mission aircraft aviators (15C) to recognize their vital role in Military Intelligence.

Additional information may be obtained by contacting Captain Kitson, Office of the Chief of Military Intelligence, AUTOVON 821-1182/1183.

Delaware Aviators Support West Point Cadet Basic Training Program

Captain Milton H. Norris
Delaware National Guard
Wilmington, DE

THE DELAWARE Army National Guard (ARNG) provided 60 aviators and 15 UH-1 Huey helicopters from Company E, 150th Aviation, to support a "New Cadet Helicopter Orientation" exercise at the United States Military Academy (USMA), West Point, NY, on 9 July 1988.

The program offers the new cadets, called plebes, the firsthand experience and feeling of boarding, taking off, gaining altitude and landing in an Army helicopter. Lieutenant Colonel Edward Schwabe, deputy training officer for the Academy stated that, "It serves two purposes for us. Number one, it gives the new cadets the concept of the Total Army right up front, early in their training. Many of them are surprised to learn that the folks that flew them around were National Guard and Reservists. The other purpose is that, at this particular juncture of their training, the cadets have been training for 2 weeks. Basically, they have been running, polishing their shoes, shining their belt buckles and placed under a lot of pressure. Then all of a sudden they are doing something that is really related to the Army."

Major Robert H. Smiley, coordinator for Reserve Component support at the Academy, requested assistance from the Delaware Guard at a train-

CW4 John Gale, air mission commander, gives final instructions before lift-off.

CW4 Kenneth Draper, a pilot with Company E, 150th Aviation, giving safety orientation briefing to a group of West Point plebes.

West Point plebes double-time to a marshalling area.

photos by Frank Bryson

ing meeting in March 1988. He also obtained additional assistance from Company G, 104th Aviation, Pennsylvania ARNG, PA; Company A, 4th Battalion, 158th Regiment, 97th Army Reserve Command, Aviation Support Facility 28, Willow Grove, PA; and the 2d Aviation Detachment, U.S. Army, at Stewart AFB, NY.

Captain Henry McCann, commander of Company E, 150th, stated, "We provided support for the cadet program, but this mission also served as a training exercise for our aviators. We had to cope with several adverse factors, including very low visibility at the start of the exercise, combined with light rain and maximum weight loads onboard each helicopter. Safety for our aviators and the cadets is also an overriding concern." Smoke from a nearby brush fire that had been burning for more than a week further complicated matters by adding a haze in the air.

The exercise took place at Target Hill Field on the banks of the scenic Hudson River. The field is more than 350 feet long and 150 feet wide. Eighteen helicopters (12 from Delaware and 6 from Company A, Willow Grove) flew continuously from 1330 to 1800 hours during the hot, humid day.

Overall, 1,600 plebes and support cadre, in groups of 7 per helicopter, enjoyed flights of 10 to 12 minutes duration. Each sortie went down the banks of the Hudson River and around the perimeter of the West Point military site.

The plebes who participated in the exercise represented every state in the United States and its possessions. Most had never flown in a helicopter and some had never flown at all. The average age for the plebes ranged from 17 to 19. Many were recent high school graduates. All had been at West Point for a mere 12 days and had little or no military background.

"What this orientation does for the West Point program can't be measured in monetary costs," said Major Guy Minton, training officer for Cadet Basic Training, USMA. "You just have to look at the faces of the plebes before and after each flight to measure the positive impact this program has."

The sorties were flown at 1,500 feet and at 100 miles per hour with "doors open and seat belts tight" to maximize the "feel of the helicopter" and to provide a panoramic view of the countryside.

Chief Warrant Officer, CW4, Kenneth Draper, a pilot with Company E, gave each cadet battalion a preflight briefing. "First I explained how to safely enter and exit the helicopter," said CW4 Draper. "Then I went over all emergency procedures."

After CW4 Draper's safety briefing the plebes practiced load and off-load procedures on two Hueys set up for just that purpose. Next was the march in formation to Target Hill Field for "the real thing."

LTC Schwabe summed up the effect of the mission by stating that, "The action that takes place at this point in time will change a lot of opinions. They (the cadets) now get a good taste of what the Army is all about. And some of them will decide to stay based on what happened in this training."

Joint U.S. and Royal Thai Armed Forces Conducted in Thailand

Specialist Todd Perkins
Public Affairs Office
25th Infantry Division (Light)
Schofield Barracks, HI

THE TASK FORCE Lancer has recently returned to Hawaii after successfully completing Cobra Gold 1988 in Thailand.

Soldiers had to contend with the heat and humidity during the annual joint-combined exercise involving Armed Forces from Thailand and the United States, conducted 4 July through 3 August in and around Nakhon, Korat and Rayong Province.

The exercise was designed to strengthen the ability of the Royal Thai Army in defending Thailand, and to enhance the capabilities of both Thai and U.S. Armed Forces in rapid deployment technique.

"As participants in Cobra Gold 1988, we had a superb opportunity to hone our individual, collective and combined arms warfighting skills with other U.S. forces and the Royal Thai Army," said Colonel Robert Wood, 1st Brigade commander. "We also had the opportunity to train in areas characteristic of those that we may be called upon to fight in someday. An added benefit is that we trained with a scenario that emphasized the rigors of mid-intensity combat."

About 7,500 U.S. military members participated in the exercise that included 1,000 Army, 400 Air Force, 3,210 Navy and 2,390 Marine Corps personnel. Nearly 7,000 members of the Royal Thai Armed Forces also participated.

Some unit training included an amphibious landing by the "Sappers" of the 65th Engineer Battalion. The battalion also conducted small unit training with the Thai Army.

An air assault, conducted by the C Company, 3d Battalion, 21st Infantry "Gimlets," impressed the Thai soldiers. A majority of the Thai soldiers

had never flown in a helicopter before.

A live-fire exercise was held at a Thai gunnery range by A Company, 25th Aviation Battalion (Attack) and the "Red Dragons" from B Battery, 7th Battalion, 8th Field Artillery. AH-1 Cobra attack helicopters fired at pop-up targets while in the hovering and running positions. The ammunition used was 2.75-inch rockets, 7.62 millimeter (mm) machineguns and 40 mm grenades.

Passage of lines, movement to contact, hasty attacks, defense and air assaults were tactics used by the soldiers of the 3d Battalion, 22d Infantry, during the joint training exercise. Intense heat and high humidity halted daytime training, leaving night training as the only alternative. The U.S. and Thai troops moved in a parallel line and conducted various attacks on "enemy" positions.

A combined arms live fire exercise or CALFEX capped off the 8-day training exercise, using live-fire power from the Cobras, mortars, a TOW system, aircraft from the Air Force and a mechanized unit from the Royal Thai Army. Stressing maximum safety procedures, the participating units accomplished the final objective, clearing a mountainside.

Also conducted during Cobra Gold 1988 were civil action and humanitarian programs. Combined Thai-U.S. mobile medical and dental teams conducted daily clinics in several villages throughout the operational area. School buildings were transformed into primary care areas where villagers were examined and treated for routine medical and dental problems. Off-duty soldiers used their free time to teach English to Thai children in the village of Lampraplerng Dam.

Morale was kept high through the training and activities shared between the two nations. The Thai people were friendly and receptive to division soldiers and other U.S. military members. This contributed to the success of Task Force Lancer at Cobra Gold 1988.

photos by Specialist Todd Perkins

PFC Troy Livingstone, Headquarters and Headquarters Company, 3d Battalion, 21st Infantry, watches as his Royal Thai Army counterparts secure a landing zone.

"Light Fighters" from C Company, 3d Battalion, 22d Infantry, move toward their objective.

PFC Daryl Evans, C Company, 3d Battalion, 21st Infantry, practices hand-to-hand fighting techniques with a Royal Thai Army soldier.

Colonel Lewis J. McConnell
(USA, Retired)

AH-64

A TOTAL SYSTEM FOR BATTLE

This article is the twelfth in a series on the AH-64A aircraft and weapons systems. Actually getting the Apache to the user requires many years of testing these systems. This article addresses the long, complex process required to effect fielding of the Apache. ''Apache Air-to-Air'' concludes this series and appears in the next issue.

Fielding of the Apache

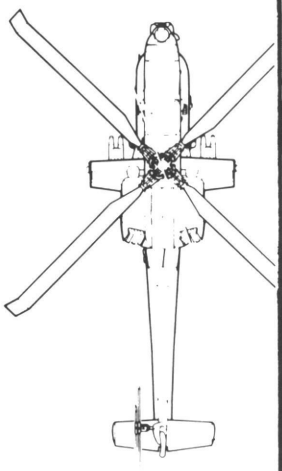
The AH-64A is in operation at four locations in CONUS and one in Germany.

FIELDING OF a complex new weapons system like the AH-64 Apache is a long, involved process. The first Apache prototype (YAH-64) was flown in September 1975. By February 1983, the five Apache prototypes had logged 4,000 flight hours. The first full-scale Apache production began in March 1983 with the first production rollout in September 1983, 2 months ahead of schedule. The Army accepted the first production AH-64A in January 1984. By December 1984, the Army had received a total of 16 production AH-64s. In January 1985, the U.S. Army Aviation Logistics School at Ft. Eustis, VA, and the U.S. Army Aviation Center at Ft. Rucker, AL, had received the first production Apaches. The fielding phase had begun.

Getting the aircraft into the hands of the user is a big event and the culmination of many years of preparation. The many tons of equipment and thousands of pages of technical manuals (TMs) require a tremendous effort on the part of the Army and industry. The more complex the systems, the more difficult the job. The Apache fielding was a tremendous test of these systems. Support elements and functions that played a major role in fielding of the Apache included the following:

Analysts developing data to be used throughout the logistic support system.

Logistics support analysis (LSA) plays a key role in aircraft support. It all starts with the analysis of engineering data to influence design before engineering drawing release. From this analysis, LSA is able to provide data that meets specification require-



Computer aided technical illustrations are used in FMs.

ments for maintenance functions in the TMs, and for development of repair parts and special tools lists.

Other functions of the LSA are—

- Identify requirements for the development of peculiar ground support equipment (PGSE).
- Identify depot repair requirements.
- Predict manhours to repair.
- Recommend maintenance and recovery codes.
- Calculate failure factors.
- Provide repair parts provisioning and the provisioning lead times.
- Last, but not least, recommend the training needed at all levels to support the system properly.

This job is never ending. With each change to the Apache, LSA must go through the whole cycle to ensure that the proper agency or group is made aware of, and can support, the changes. The Apache LSA group must pass the data along to the customer so that their data files are accurate and up-to-date. Through June 1988, LSA has evaluated and processed 15,203 maintenance tasks and has documented 77,804 line items on the Apache. The LSA work continues as long as the Apache remains in the inventory.

Technical publications are a vital part of any fielding process. Supporting fielded helicopters with maintenance, parts and operator's manuals began early. Before fielding, technical publications were developed to support pilot and maintenance personnel training for operational test (OT)-II at Hunter Liggett, CA. Preliminary draft equipment publications were developed for the 10-level soldier for use at the aviation unit maintenance and aviation intermediate maintenance (AVIM) activities. These manuals were written in a step-cue format to be used for training as well as maintenance under an innovative concept set forth in new Government specifications.

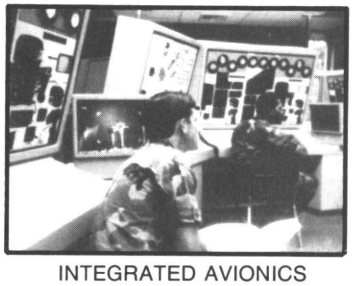
During the initial maintenance training of key personnel, preliminary publications were provided with a continuous update on a 24-hour turnaround basis. Until the U.S. Army Information Systems Command printed manuals became available, McDonnell Douglas Helicopter Company continued to support all Government activities. These included Ft. Rucker; Ft. Gordon, GA; Ft. Eustis and Ft. Hood, TX. Advance copies of the final manuals were provided for maintenance and training. Changes and revisions supporting the fielded helicopters are currently in process. McDonnell Douglas Technical Publications has produced, and is on contract to maintain, 54 AH-64A related manuals. This amounts to almost 18,000 pages of material. Before any of these manuals are released for publication, the contractor on the aircraft and Army personnel verify the contents step-by-step.

As with all support systems for the Apache, the Army and McDonnell Douglas are always searching for new and better ways to provide support to the field. An example is the continuing development and employment of an automated composition system and computer aided technical illustrations.

This system will further expedite the ability of McDonnell Douglas publications to respond to field requirements. In addition, the Army plans to contract with the company to redirect the troubleshooting procedures to make use of the SP-1 or reader codes. These codes will permit the mechanic to diagnose problems more accurately and to a greater depth than is now possible with the existing fault detection and location system. This will be a real challenge to the contractor and Government technical publications experts; however, the results will greatly benefit the mechanic in the field. The improved troubleshooting procedures will also reduce the flow of serviceable parts being returned for repair. History has shown that up to 25 percent of the components returned for

COMPOSITE

ARMAMENT AND FIRE CONTROL



INTEGRATED AVIONICS

CLASSROOM PANEL TRAINER

INDIVIDUAL PANEL TRAINER

AH-64A Apache Maintenance Trainers

repair are still serviceable. This effort should not only improve readiness, but it should result in big savings to the Army.

Training for the Apache was another major challenge for the Army and McDonnell Douglas. During the period October 1980 to February 1981, Army personnel were trained at the company's military maintenance training center in California in preparation for the OTs. This program relied heavily on the use of eight computer-driven panel trainers and five maintenance trainers. It provided training for avionics mechanics, airframe subsystem mechanics, fire control repairers and attack helicopter repairers. At the same time, aircrew personnel were being trained to take part in various test programs. The Army assumed the mechanic training mission for the Apache in August 1985 after the delivery of some 10 trailer loads of equipment. The Army military occupational specialty (MOS) producing maintenance courses included the following: Aircraft Inspector, Attack Helicopter Repairer, Power Plant Repairer, Power Train Repairer, Aircraft Electrician, Pneudraulics Repairer, Armament, Fire Control Repairer, Weapons Repairer and Armament Inspector. By September 1985, the first class of Army pilots had been trained by Army test personnel and instructors and they were on their way to flying the most advanced and potent attack helicopter. Through April 1988, the U.S. Army Aviation Center has trained 701 Apache pilots and 153 Apache instructor pilots.

Training devices were a major part of the concept for training on the Apache. McDonnell Douglas developed a suite of training devices timed to hit the field with the Apache. Army maintenance and pilot training sites share 38 panel sets and 28 consoles that are used to teach basic aircraft systems and mission equipment onboard the AH-64. Hardware trainers used to train maintenance MOSs include the composite; flight controls and power train; engine and auxiliary power unit; integrated avionics; and armament, fire control and visionics trainers. Four cockpit weapons and emergency procedures trainers (CWEPTs) were fielded for pilot training. Training for Apache pilots and technicians takes place at Ft. Rucker, Ft. Eustis and Ft. Gordon.

Were all these training devices worth the time, effort and money? The answer appears to be a resounding "yes." In the words of a captain after 1 week of training at Ft. Rucker, "the CWEPT and the classroom trainers were very helpful. I felt like I was ready to crank the aircraft and go fly. That's a great improvement over other

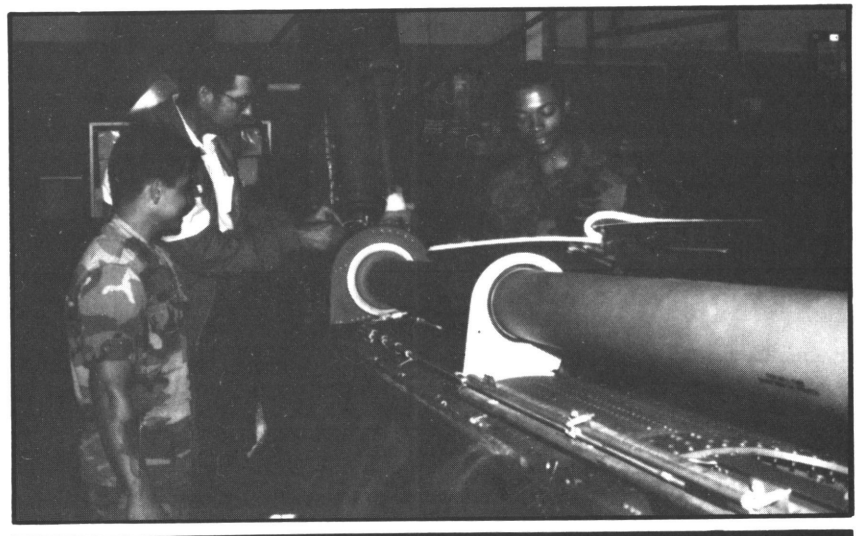
aircraft transitions where you learn everything in the cockpit."

Peculiar ground support equipment for the Apache was held to a minimum as a result of integration within the design phase for provisions to maximize use of common equipment in the Government inventory. Some unique, highly specialized PGSE was required; three examples are the electronic equipment test facility (EETF), captive boresight harmonization kit (CBHK) and 30 mm ammunition loader/downloader.

The EETF, comprised of a test van and a support van, is a mobile test facility designed for AVIM support of most of the AH-64A electronic line replaceable units including the target acquisition and designation system/pilot's night vision sensor (TADS/PNVS) and the HELLFIRE missile electronics. The EETF is designed for worldwide deployment to provide immediate support of any AH-64A mission. At this writing, there are six EETFs deployed for Apache AVIM support: five in continental United States (CONUS) and one outside continental United States.

The second most unique item in the ground support equipment inventory is the CBHK. This kit is the first of its kind in rotary-wing aircraft. It allows the operational unit to boresight and harmonize the AH-64A's weapons and sighting systems (i.e., integrated helmet and display sight subsystem and TADS/PNVS) for accurate delivery of ordnance from the Hydra-70 Rocket System, HELLFIRE missiles and the 30 mm chain gun®. The CBHK's unique capability is the performance of this task entirely on the aircraft without external range targets or special attitude constraints.

The loader/downloader allows for efficient two-man ammunition loading from bulk strip, either linked or unlinked, in support of planned mission scenarios.

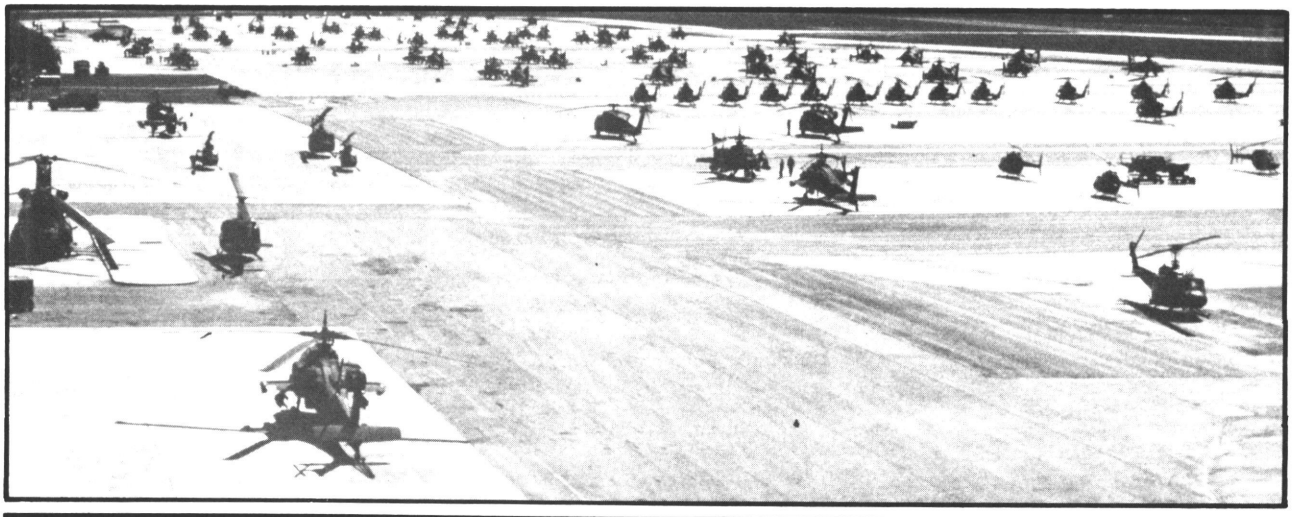


McDonnell Douglas field service representative assisting an Apache crewchief.

Field service support to the Apache is provided by a combination of McDonnell Douglas field service representatives (CFSRs) and Army logistics assistance representatives (LARs). In these times of ever-increasing complexity of weapons systems, a continuing need exists to provide the most up-to-date information to the operating units. These key players must have the experience, training and professional ability to work with the soldier on a daily basis and assist him in solving his current problems. The CFSRs are highly regarded by the company and by the customer. There is a great deal of competition for these positions and, therefore, only the very best are selected. CFSRs selected for support of the Apache have at least 5 years' experience on the aircraft and many of the senior representatives have 8 to 10 years' experience. They communicate with the home office daily, reporting potential or existing problems encountered in the field and obtaining and providing the latest information to the customer.

The LARs selected for the AH-64 program are also highly qualified personnel with many years' experience in aviation. LAR training courses on the Apache are tailored to meet the needs of the four commodity commands: Aviation Systems Command, Armament Munition Chemical Command, Communications and Electronics Command and Missile Command. The courses of instruction can vary in duration from 80 to 280 hours of classroom instruction. The intensive training covers the complete range of aircraft equipment, system functions, troubleshooting and repair. Thus far, McDonnell Douglas Helicopter Company Training Systems Development has trained 83 LARs. They have been good students: intelligent, motivated and eager to learn.

Contractor logistic support (CLS) began with the acceptance of the first AH-64 in January 1984 and concluded on 1 February 1987 when the Army assumed the support mission. During the CLS phase, 155 Apaches were fielded. Support for these aircraft included depot maintenance, provisioning and managing more than 10,000 lines of spares and repair parts, trainer test program sets, 10 authorized stockage lists and eight prescribed load lists at Ft. Hood; Ft.



AH-64A Apaches at Hood Army Airfield.

Rucker; Ft. Eustis; Ft. Gordon; Ft. Bragg, NC; North Carolina Army National Guard (NCARNG) and in Germany. In addition, McDonnell Douglas had to fill all nonmission capable supply requests within 72 hours.

While the helicopter company was responsible for most of the functions under CLS, the Army, because of funding constraints, gave the stock, store and issue function to Red River Army Depot (RRAD). A team of McDonnell Douglas supply specialists were assigned to RRAD to act as a liaison between the company, RRAD and the Army Apache Program Office. In addition, a warehouse function was established at Ft. Hood to handle the issue of certain critical parts and expedite the return of unserviceables. The expediting of unserviceables proved to be a tremendously important function because of the limited number of assets available in the supply system. This activity saved the Army money and increased the number of serviceable assets in the supply system. It returned the repairable to the repair activity instead of allowing these valuable components to be held awaiting an economic shipment quantity.

Apache single station fielding. The Air Force and the Army Air Defense have used the concept of single station fielding effectively. During the 2-year planning effort, lessons learned from other programs were reviewed and applied when appropriate. Selection of Ft. Hood as the single station fielding site has many obvious advantages. Ft. Hood is the home of the III Army Corps, 1st Cavalry Division, 2d Armored Division, 6th Cavalry Brigade (Air Combat) (CBAC) and several other brigade-sized units. Situated on more than 200,000 acres in central Texas, Ft. Hood was ideally suited to accept this tremendous challenge.

Also, to further facilitate the Apache training program, maneuver and landing rights were obtained for much of the surrounding territory. This was done so that Apache units could expand operations to more closely simulate a combat environment. General Crosbie E. Saint, former III Corps commander and now Commander, U.S Army, Europe, a frequent front seat pilot and proponent of mobile armored warfare, has taken a personal interest in developing the operational techniques for the complete integration of the AH-64 into the Army's AirLand Battle doctrine.

General Saint frequently says, "The Apache is a revolution in warfare similar to the impact of the rifled bore, the wheel, the tank." The Apache single station unit fielding and training process began in January 1986 when the 3d Squadron, 6th Cavalry Regiment, 6th CBAC, began drawing equipment. The 6th CBAC, under the command of Colonel Walt Yates, organized and administered the training program. Following the 3d Squadron were the 1st and 2d Squadrons, 6th Cavalry Regiment, 6th CBAC.

Training of these units was completed by May 1987. At that time the Apache Training Brigade assumed the training mission for follow-on units. The Apache Training Brigade has trained the 1st Battalion, 3d Aviation Regiment, 2d Armored Division; 1st Battalion, 227th Aviation Regiment, 1st Cavalry Division; 1st Battalion, 130th Aviation Regiment, NCARNG; and the 1st Battalion, 82d Aviation Regiment, Aviation Brigade (Air-

borne), 82d Airborne Division; the 4th and 5th Squadrons of the 6th Cavalry Regiment; the 4th Battalion, 229th Aviation Regiment; and the 1st Battalion, 101st Aviation Regiment, 1st Airmobile Division. The 1st Battalion, 151st Aviation Regiment, South Carolina Army National Guard, began training last summer. The 2d Battalion, 229th Aviation Regiment, formerly the 2d Battalion, 101st Aviation Brigade, is scheduled to begin training in early December 1988. The 3d Battalion, 1st Aviation Regiment, 1st Armored Division, is now forming and will begin training in early 1989. The total number of battalions and squadrons to be trained depends on Apache procurement action.

The validity of the concept was proven when two of the first three battalions trained deployed to Germany for REFORGER (Return of Forces to Germany) 1987. During the exercise the tactical training was validated by the excellent mission performance both day and night. The maintenance training was verified by the units at an 80- to 90-percent mission capable rate during the exercise. At the completion of the exercise, the 2d Squadron, 6th Cavalry Regiment, with two corps float aircraft self-deployed from the exercise area to its new home in Illesheim, Germany. The 22-ship formation of Apaches was most impressive. At the same time, the 1st Squadron, 6th Cavalry Regiment, relocated to Bremerhaven, Germany, for shipment back to Beaumont, TX, and assignment to Ft. Hood.

The fielding of the Apache has been a tremendous success. On 18 May 1988 a major milestone was passed when the Apache fleet surpassed its 100,000th hour of production flight. At the same time, the Apache has established an excellent record of reliability and maintainability since the first production delivery in 1984. The maintainability measurement of less than 5 maintenance manhours per flight hour compares favorably with the Army's goal of 9 manhours per flight hour.

There have been some rough spots as everyone can attest and there are many challenges yet to be addressed. However, the many thousands of people, both Army and McDonnell Douglas, who have worked on this program can be justly proud of their accomplishments. The world's most advanced attack helicopter is doing well by all standards and the future is bright.

AH-64 A TOTAL SYSTEM FOR BATTLE

The AH-64 requires only 5 maintenance manhours per flight hour.

Colonel Lewis J. McConnell (USA retired) is a Master Army Aviator with more than 5,800 hours' flying time in fixed and rotary wing aircraft. During his 29 years in Army Aviation, he served in numerous command and staff positions including two tours in Vietnam as commander, 178th Assault Support Helicopter Company and later as Commander, 520th Transportation Battalion (Aircraft Maintenance) and as commander, 229th Assault Helicopter Battalion, 1st Air Cavalry Division. He later served as commander, 11th Aviation Group (Combat) and as aviation officer, Europe, before return to CONUS where he served as commander, U.S. Army Aviation Engineering Flight Activity, Edwards Air Force Base, CA, from 1979 to his retirement in May 1983.

He is a graduate of the Command and General Staff College, the Industrial College of the Armed Forces and holds a B.S. degree in business administration and an M.S. in management. The author is currently employed by McDonnell Douglas Helicopter Company as manager, Military Product Support.

ABOUT THE AUTHOR

VIEWS FROM READERS

Editor:

As part of the marketing plan for the Ordnance Regiment, we have developed an Ordnance Corps Certificate of Affiliation. We have used all of the channels of communications we have at our disposal to reach the ordnance soldiers to let them know they can get a certificate. A problem exists in that a large portion of ordnance soldiers do not receive this information because they are in other than ordnance units. The largest portion of those who do not get the information are the organizational mechanics who work in the type of units your publication reaches.

Your cooperation in running the following information in your *Aviation Digest* is greatly appreciated. Questions can be directed to CPT Kane or SPC Ferguson at AUTOVON 298-5400/4400.

COL Dwight E. Hair
Chief of Staff
Office of the Chief of Ordnance
Aberdeen Proving Ground, MD

Ordnance Corps Certificate of Affiliation

The Ordnance Corps Certificate of Affiliation is ready for distribution to all ordnance soldiers. To be eligible to receive a certificate, the individual must hold an ordnance military occupational specialty (MOS) or area of concentration. All ordnance commissioned officers, warrant officers and enlisted personnel are eligible to receive a certificate. Beginning in the 1st quarter of FY 1989, certificates will be issued by schools awarding MOSs or areas of concentration; therefore, units only need to request the number of certificates for soldiers currently in their units.

Requests for these certificates must be consolidated at battalion level or higher and forwarded to: Office Chief of Ordnance, ATTN: ATSL-O-S, Aberdeen Proving Ground, MD 21005-5201. The request must include name of unit, unit identification code, military address, point of contact, telephone number and number of certificates required.

Editor:

I found the July 1988 issue focusing on Army Aviation medicine to be very informative and interesting.

As a former member of the 57th Med Det (Hel Amb), "The Originals," I would like to point out what I believe is an error on page 4. Above the photo of an OH-13 the caption reads: "The Dustoff call sign originated in Korea." The Dustoff call sign actually originated in Vietnam with the 57th Med Det in 1963 when it was adopted from the signal operations instructions book by the commander, Major Spencer. I point this out not to detract from the contributions of Army Aviation in the Korean conflict but rather to "set the record straight."

CPT John H. Gerken
New York Army National Guard
Army Aviation Support Facility No. 1
Ronkonkoma, NY

Major Charles L. Kelly made the Dustoff call sign famous throughout Vietnam in 1964. The *Aviation Digest* is querying its reader audience to see if anyone knows if the call sign was used first in Korea. Send your replies to the address at the bottom of the page.

Editor:

In your printing of my article, "Make These Instruments Read Right—A Spatial Disorientation Primer," in the July 1988 issue, a small but significant typographical error was made in printing. At the start of the first paragraph in the right column on page 43, it reads: "The oculogravic illusion...." It should read "The oculoagravic illusion...."

I do not believe this error creates a hazard to aviation safety, but may cause confusion to aviators reading the article since the oculogravic illusion, an entirely different vestibular illusion, is discussed on page 44 of the article.

MAJ Kenneth R. Brown
U.S. Army School of Aviation Medicine
Ft. Rucker, AL

Readers can obtain copies of material printed in any issue by writing to:
Editor, U.S. Army Aviation Digest, *P.O. Box 699, Ft. Rucker, AL 36362-5042.*

USAASO SEZ

Pilot/Controller Communications

Reprinted from Federal Aviation Administration's *Air Traffic Service Bulletin*, June 1988.

HOW MANY TIMES have you had a pilot on the frequency who constantly questioned every clearance you gave and every move you made, or a pilot who was verbally abusive about not receiving the service expected? How many times have you, in turn, wanted to inform the pilot of just who is running the show? How many times have you actually done just that? Perhaps you know someone who has.

Unfortunately, it is often very difficult for us not to react to verbal provocation. Besides a momentary feeling of satisfaction at having had the last word, what have we really accomplished?

In this time of increased traffic load, the frequencies are often congested enough without a lengthy debate over what a pilot may view as an excessive vector, for example. It is up to us to maintain a professional attitude and to perform at our best, even in the face of adversity. If a misunderstanding occurs, it is best to advise or suggest that the pilot telephone the facility and speak with a supervisor when the matter can be discussed off the frequency and in private. Maybe you have had a situation where another pilot voiced disfavor over the first pilot's negative comments. Peer pressure often works wonders in fostering cooperation. Just as they are unaware of the problems we face, we may not know all that is going on in the cockpit.

Regardless of who is right or wrong, we must work together. It is up to us to instill confidence in the minds of the flying community not because "big brother" may be listening, but because we take pride in being the very best. As controllers, we are subjected to enough scrutiny; thus, we cannot afford to be anything less than professional in the performance of our duties. We must make the first move!

Aircraft Emergencies: They Can Ruin Your Whole Day

One of the most serious problems a controller will ever face is dealing with an in-flight emergency. The fate of the aircraft and the people aboard depend on how the pilot and the controller work together. It is not a work situation anybody wants, but it does occur.

It is important to note that the primary responsibility for the aircraft in trouble rests with the pilot. However, some of that responsibility may be thrust on you depending on the expertise, and composure under stress, of the pilot. You need to provide assistance when you have enough information upon which to act. The minimum required information for in-flight emergencies is listed in Handbook 7110.65, Chapter 9, section 2.

Knowing what information is needed, facilities can take steps to make sure additional Army needed reference materials are available. It is important to keep them handy, know where they are and review them on occasion. However, nothing develops the skills needed to deal with emergencies and points up holes in procedures like simulated emergency drills.

In the day-to-day routine, it is all too easy to neglect contingency planning, but time spent here can pay big dividends in property and lives saved.