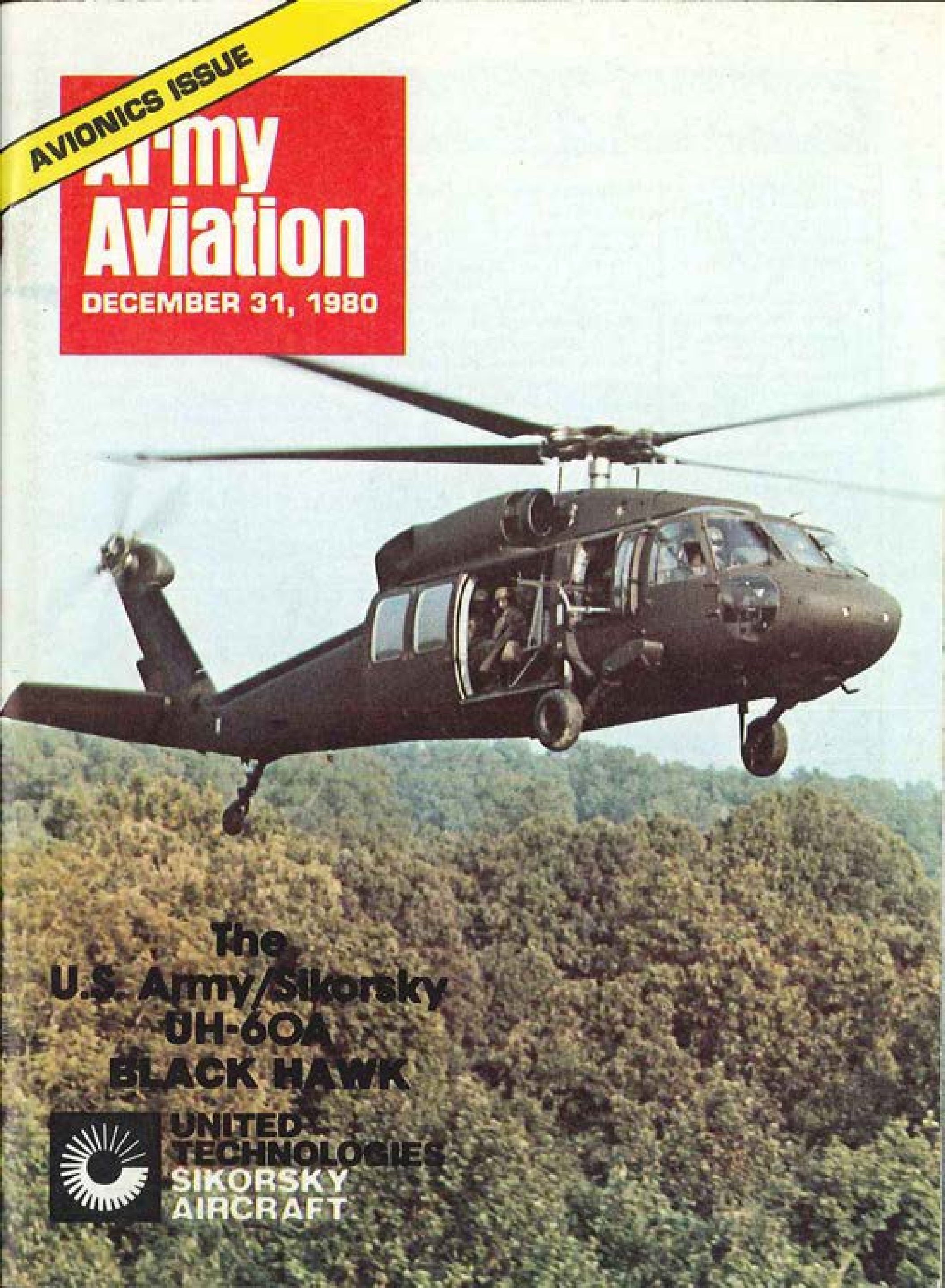
AVIONICS ISSUE

Army Aviation

DECEMBER 31, 1980



ARMY AVIATION

ARMY AVIATION
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Volume 29 — December 31, 1980 — Number 12

FEATURES

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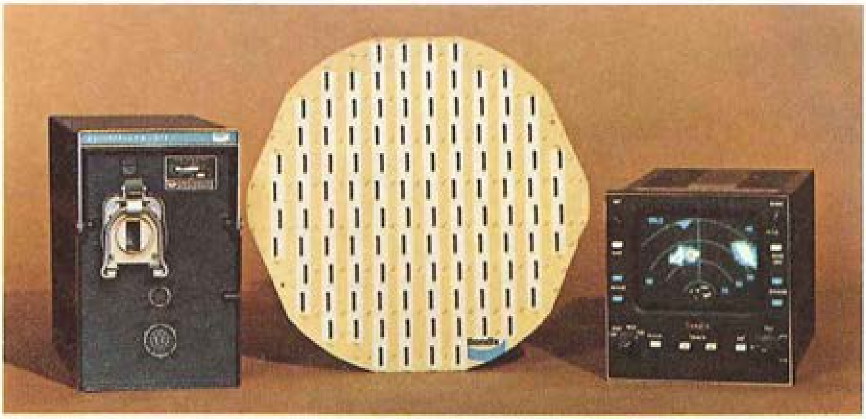

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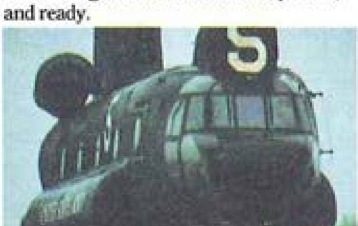

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30 December 1980

BEST WISHES!

There's still a day or two left in 1980 before the year runs out and on behalf of my fellow National Executive Board members, I wish to extend our very best wishes to you and yours for health and happiness for 1981!

A SAD NOTE

It is with sadness that I report to you on the death of former National Executive Board member, **Brigadier General Joseph H. Kastner,** on 1 December. An Army Aviation veteran, **"Joe"** had served AAAA in a wide variety of roles in being President of the Air Assault and Ft. Bragg Chapters, an Awards Committeeman, a National Member-at-Large, and a perennial Convention presenter. He'd returned from his assignment in USARJ and had been undergoing treatment at Walter Reed Army Hospital.

THE HELICOPTER WORLD CHAMPIONSHIP (HWC)

If the situation in Poland is resolved, it appears that we'll be fielding a highly-qualified U.S. Team at the August 1981 HWC. Prior to that event, there'll be Army fly-offs at which AAAA is committed to provide incentive prizes. You'll find the details on page 68.

IT'S GETTING CLOSER

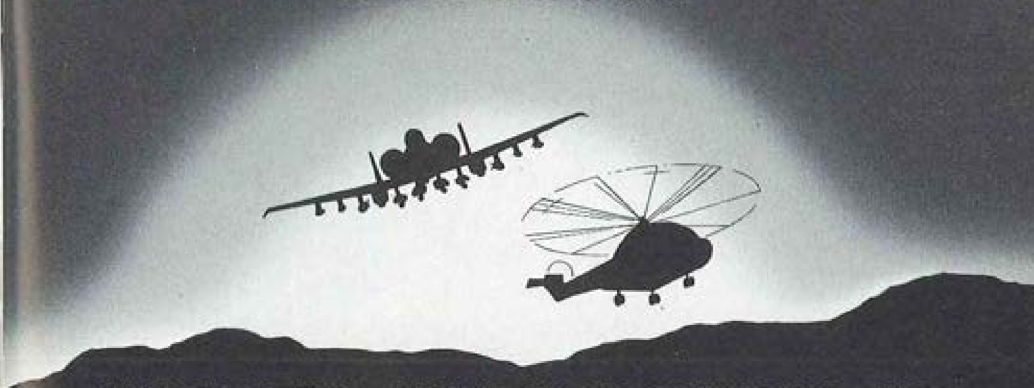
Earlier this month some 2,700 + senior members of AAAA (Field graders, CW4's, top three graders, and DAC's) were invited by direct mail to nominate both deserving individuals and units for CY 1980 AAAA National Awards. Following the 15 January suspense date and the 14 February selection by the National Awards Committee, the "1980 Awardees" will be cited at the 23-26 April National Convention in Washington, D.C. I've just mailed 40-odd letters of invitation to our 25 April Awards Banquet head table guests and our Nat'l Office reports that it has received the final draft of the 1981 Professional Program from Presentations Subcommittee Chairman **BG Richard D. Kenyon.** On the other side of the ocean, the USAREUR Region—AAAA will honor its top people and units at the Region's 25-28 March Convention at Garmisch.

George S. Beatty Jr

GEORGE S. BEATTY, JR.
Major General, USA (Retired)
President, AAAA

CLOSE ENCOUNTERS

OF THE TACTICAL KIND



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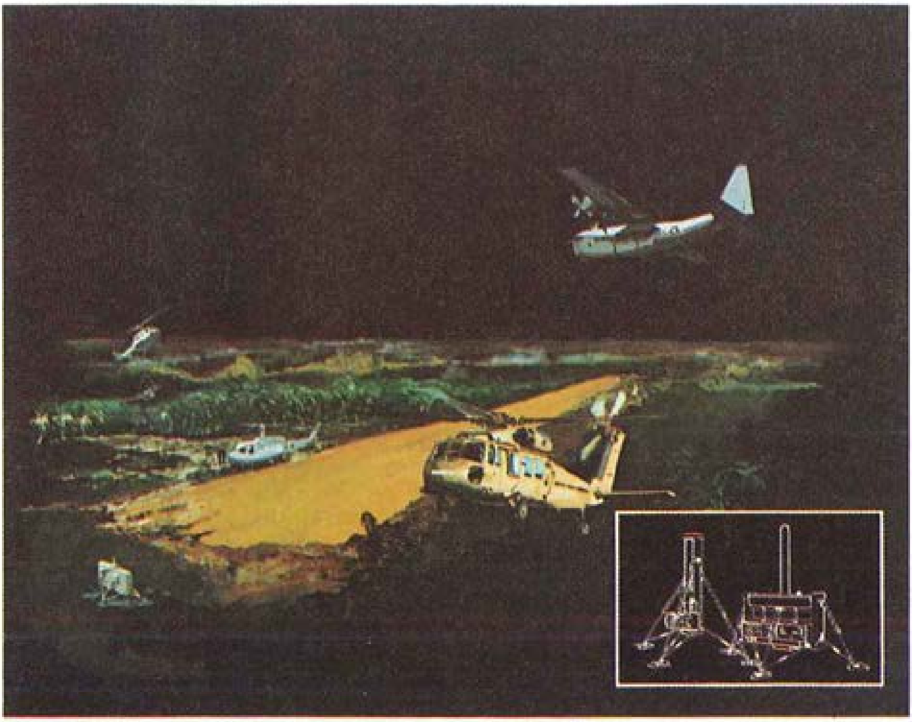

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We speak landing systems

Lessons in Desert Warfare

By Richard Halloran

IN their 10 days in the desert, American soldiers on their first training mission in Egypt were surprised to learn that assault helicopters could fly unseen but that pilots tired more quickly there than elsewhere.

They discovered that motorcycles were good for reconnaissance, but that radio range was cut in half. They had to revise their ground tactics, but leaders found that controlling platoons and companies was easy because they could see so far.

The soldiers were stunned by the vast, barren space of the desert but discovered that they could find places to hide. They saw that their camouflage battle fatigues and their sandbags were the wrong color, and that foxholes had to be dug in a new way.

Sand, sand, and more sand!

The sand, driven by a relentless wind, got into everything. It gummed up rifles and machine guns, eroded rotor blades on helicopters, clogged filters in jeeps and trucks, jammed radio switches, and, late in the exercise, may have caused diarrhea because so much had infiltrated into the food.

The exercise, known as **Operation Bright Star**, was the first overseas venture for the new Rapid Deployment Force. It involved 900 soldiers in a reinforced battalion from the 101st Airborne Division, along with 600 members of the Air Force and the deployment group's headquarters. The operation, which took place in November, was estimated to have cost $25 million.

Helicopters suited to desert

They returned from Egypt just before Thanksgiving and have since been sorting out the lessons learned in the desert for an Army whose middle-grade officers and senior sergeants fought in the jungles of Vietnam and then prepared for a war in the planes, forests and mountains of Europe.

"We learned a thousand new things, mostly little things," said **Major David H. Ohle**, an operations officer. "We could spend months, or a year, in the desert out West and not learn as much as we did in Egypt."

Major Charles T. Chase, a combat support officer, said that "maintenance was a nightmare, but there are ways to beat the sand and we learned them."

Perhaps the most important lesson learned was that helicopters, the main means of transportation for this division, were suited to war in the desert, even against an adversary armed with tanks.

"We found out that we can kill tanks on our own terms as long as we have ammunition," said **LTC W. W. Hunter**, another operations officer. "The guy with the most mobility and who uses it the best will win."

The commander of a troop-carrying helicopter company, **Major William A. Glennon**, said, "We can fly and navigate in the desert and stay hidden. That was the biggest revelation I had."

The desert at first appeared flat. But both helicopter pilots and infantrymen found gullies to move through and high mounds to hide behind. **Major Glennon** said he could fly his helicopter a few feet off the ground at 45 miles an hour and not leave a "signature" of swirling sand because of the way the air flowed horizontally through the rotor blades.

But the flying was hard. That terrain of undulating white sand all looked the same and was blurred by the sunlight and the haze of floating dust. There were no trees or other visual cues.

"You really had to concentrate to pick out the terrain features," **Major Glennon** said. "And with all that concentration, the pilots got tired faster.

Rapid wear through erosion

When the helicopters hovered to pick up sling loads, they stirred great storms of sand that chewed into the rotor blades. "It was like sand-blasting," said **LTC Robert S. Young**, commander of an Air Cavalry Squadron of gunships and reconnaissance helicopters. "We had six months' wear in 10 days of flying."

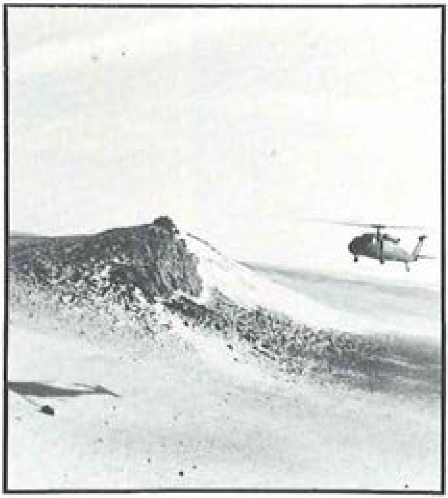
The pilots also found more erosion in the moving parts of the engines. A rubber strip on the edges of the blades cut down on the erosion there, but **Colonel Young** said that better protection for the engines would be needed.

Flying at night, was another challenge. "It was mind-boggling to fly out there and see no lights on the ground at all," **Major Glennon** said.

Motorcycles: A decided plus

The soldiers found that they could have used two or three times the six motorcycles they took for reconnaissance. The four-cylinder dirt bikes with large mufflers were fast and quiet.

"They got within 50 meters of us and we never saw them or heard them," said **Captain**



Carl S. Carrano, whose company played the opposition force. The company used Soviet-made armored personnel carriers borrowed from the Egyptian Army.

Light trucks mounted with anti-tank guns had little trouble moving so long as they went from one rocky area to another.

Constant maneuvering necessary

"We could shoot at 3,000 meters," said **Colonel Hunter**, "then move back and shoot again. We could eat up enemy tanks as long as we had room."

The infantry commander, **LTC H. D. Kuhl**, said he could disperse his troops more than usual to cover more ground and make it harder for an enemy to hit them. **Colonel Kuhl**, who served two tours in Vietnam, said that despite the dispersal he could monitor the movement of the troops. "It gave me a sense of security because I could see everyone," he said.

Colonel Kuhl and other officers noted that in the desert the avenues of enemy approach come from 360 degrees. That made the leaders change their tactics from a linear to a circular front.

Constant maneuvering, especially by helicopters, was the key to success in the desert, **Colonel Kuhl** said.

"Holding ground is not the name of the game out here," he said. "It's to shoot and

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move. If you don't move, you might as well stay home and watch TV."

Sergeant Karl D. Keefer, a squad leader, said the infantrymen found that removing all the oil from the rifles so that the sand did not stick and then cleaning them three times a day made them work. But machine guns jammed from overheating when the oil was removed and if they were oiled they became gummed up and clogged with sand, he said.

Sergeant Keefer also noted that "all of our equipment was green when it should have been brown for the desert."

In digging foxholes, the American soldiers learned to put their equipment upwind, and throw the sand downwind, no matter where the enemy was. Usually a soldier puts his equipment behind the hole and throws the dirt to the front.

The sergeant said: "I was surprised at how quickly we acclimated over there. But the breeze was deceiving. It was hot but dry and you didn't feel hot or sweaty."

That is why the soldiers at first drank less water than expected. But after several became dehydrated or constipated, the orders went out to drink more water. **Sergeant Keefer** said it was the squad leader's responsbility to see that his men drank more when they lined up three times a day for water.

In communications, signalmen found that FM radios lost about half their range because the sand absorbed radio waves. They also found that batteries that might last 24 hours at Fort Campbell ran down in two or three hours in the desert. They said they did not yet know why. □

JRX "Bright Star 81"; An Aviation Overview

By LTC Barry J. Sottak and 1LT Theodore W. Clymer

AS the huge, yet graceful C-5 rumbled to its refueling position at Rhein-Main Airport, aviators from the 101st Airborne Division (Air Assault) participating in Operation **"Bright Star 81"** realized that the entire night had passed without thought of sleep.

The troop compartment has been filled with chatter and excitement as elements of the first major U.S. Army unit to conduct tactical operations in Egypt since World War II sped inexorably towards their destination in the Libyan Desert. Though weary from the myriad activities and frantic pace of the past four days, especially final preparations and loading of vehicles, aircraft and equipment, their spirits were high as they flew across the North Atlantic on the first leg of the historic journey.

Each soldier was fully cognizant of the important role that he would play in the unfolding desert drama. Each now created his own brand of personal excitement, dreaming of what it soon would be like to experience, firsthand, the land of the Pharaohs and ancient Egypt. Expectations were running high. Only days before their departure, pilots and crewchiefs had gone through a series of briefings outlining what they could expect to encounter. But that was behind them now. The briefings were over and the reality of a great adventure lay before them.

Aviator's Dream

With their destination only a scant seven hours ahead, excitement continued to mount. Each soldier freely shared his thoughts and, almost surreptitiously, laid the basis for future tales to bring home to family and friends as the germ seeds of fabulous "war stories" grew in everyone's mind.

Suddenly, as the monstrous engines whirred and the C-5A began its take-off roll, the idea struck him. The ultimate **"Bright Star"** war story was born. **CW2 Tim Hartnett** of Company B, 101st Airborne Battalion, exclaimed, "That's it!" as he looked excitedly at **CW2 Dennis Todd**, also of Company B. "We need to do a **Black Hawk** salute to Egypt with a fly-by at the Pyramids."

The notion spread quickly throughout the

troop compartment as others now agreed, some silently, some openly. And so the stage was set. Somehow, a band of excited, determined, Egypt-bound Air Assault aviators would not only find a way to accomplish all their assigned missions, but would also make a heretofore impossible aviation dream come true: a formation of Army **Black Hawks** silhouetted against the ancient Pyramids of Giza with Cairo and the Nile Valley in the background. Such a magnificent sight would live forever in aviation history.

Shadow of a Crisis

Weeks before their departure from Fort Campbell, rumors concerning certain unnamed U.S. Army units deploying to the Middle East swept the country. Newspaper articles alluded to the possibility of elements of either the 82nd or 101st Airborne Divisions participating in maneuvers somewhere in the Middle East in the November time frame as part of the Rapid Deployment Force.

It did not take long for imaginations to conjure up visions of possible hostage rescue attempts and a variety of other possible contingencies. Thoughts of troop build-up and secret raids raced through untold minds. To underscore this, the pace quickened at Fort Campbell. Scores of vehicles were wiped clean of their familiar green camouflage and now sported new paint jobs of desert beige and brown. With vague explanations, troops received camouflage uniforms, innoculations, and were issued special equipment.

Meetings and briefings were then held in rapid succession at unusual hours. Notwithstanding such curious outward signs, a **business as usual** attitude permeated the Division. News reporters pried soldiers and families of the 101st Airborne Division for any sort of story or lead.

But those who knew of **"Bright Star"** were not telling, and those who did not have a need to know were not told. There was but one course of action for all concerned to take: just work, wonder, and wait.

With an exercise classification of "Secret" right up until the time of departure of the first aircraft, the soldiers of the 101st Airborne Division, but for a select few, were unaware of the combined Egyptian/American mission of training and friendship in which each was a player and had an important role.

The code name **"Bright Star 81"** was first learned by most participants through an article published in the Hopkinsville **New Era** and the November 10th issue of **Army Times.** Even then they had no real idea of the scope and magnitude of the historic exercise.

The Arrival

Out of the early morning desert sky, the majestic C-5 glided down to meet the sand-strewn runway of Cairo West Air Force Base. It was the first of three such aircraft which would carry the 15 UH-60 **Black Hawks**, air crews and maintenance personnel from the **"Wings of the Eagle"** battalion. In all directions one could see and feel the harsh, unforgiving, yet always romantically beautiful, nature of the grandest desert on the face of the earth, the Egyptian Sahara.

It was now 12 November. Only two days before the unit had worked feverishly to break aircraft down, complete load-out preparations, and be on its way. Now it was time to reverse the process — to off-load the C-5A's, build the aircraft back up, and establish a primative operating base. The unit raced against the clock to see how quickly the tired crews could restore the fleet to a mission-ready status.

A race against time was not new to the Company B **"Kingsmen"**. They had done this countless times before and moved as a well-drilled team. Each man knew his job and knew it well. No orders were needed as unloading

(BRIGHT STAR/Cont. on Page 64)

NOTWITHSTANDING the emotional responses generated by "Uniform Madness" which appeared in the August issue, additional points concerning Army flight clothing should be addressed.

To begin with, flight clothing is a component of the **Army's Aviation Life Support Equipment (ALSE)**. Prior to the Vietnam conflict, the Army's ALSE system, and hence flight clothing, consisted pretty much of a mixture of equipment designed and developed by the other services.

The resultant multi-colored ensemble described by the "Uniform Madiness" author therefore evolved. Also, it was not until the U.S. was deeply committed to Vietnam that any concentrated effort went into crashworthy fuel cell development.

We did dress similarly!

With the increase of post crash fires and by order of the commander of U.S. Forces in Vietnam, the Army undertook the development of an Army flight suit with flame retardant qualities. Guidance as to its design and appearance was also provided; specifically, the flight suit would be similar in style and appearance to that of our ground soldiers. The two-piece flight suit was subsequently developed and was the standard flight uniform for years.

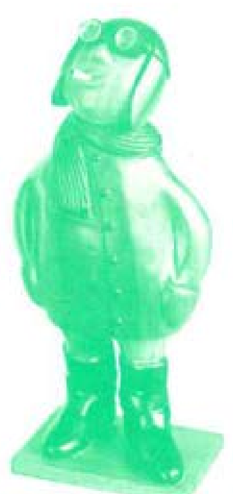
However, it does have design faults and incompatibilities and is being phased out of the system. The Army has now entered into a Tri-Service agreement with the Air Force and

OPINION:

Uniform Madness,

Part III

A final view in the Nomex—No Nomex controversy by LTC Thomas I. Pope, III, Systems Branch Chief, DCD, U.S. Army Aviation Center



Navy and has adopted the present one-piece flight suit. Such Tri-Service agreements save money through standardization which helps buy fuel, ammo, and aircraft.

Everyone recognizes that helicopters and their various subsystems incorporate hydraulic fluids, engine and transmission oils, electrical, oxygen, and armament systems. These necessary systems and the hazardous cargoes many helicopters carry are all potential causes of inflight fires or will contribute to any post crash fire should an accident occur.

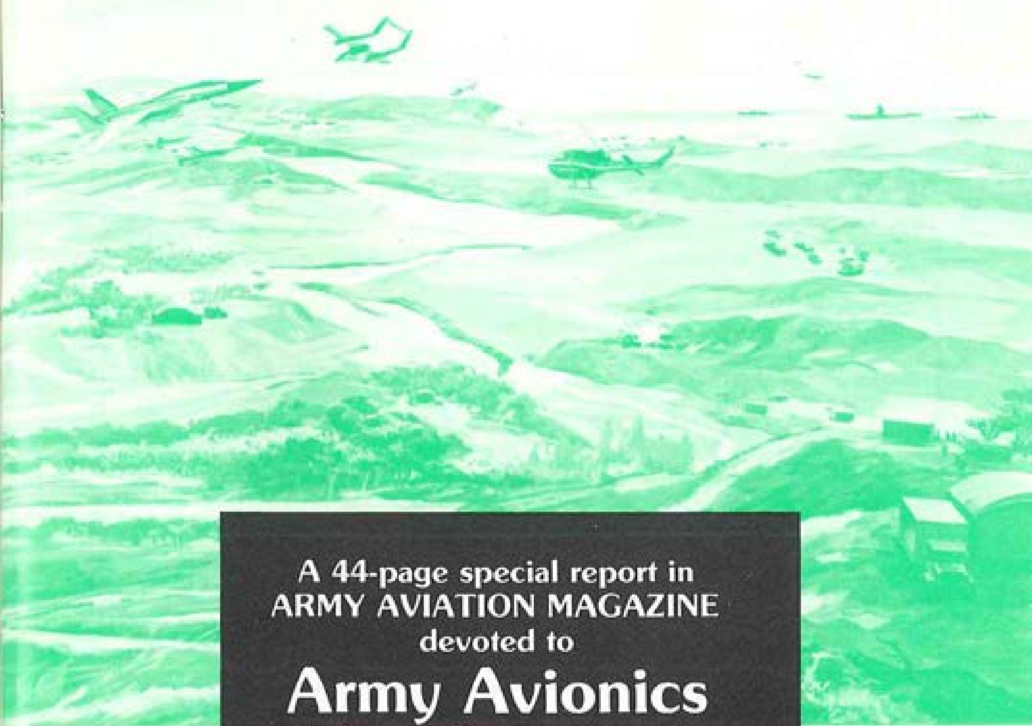
Statistics show fire mishaps

Recent data provided by **U.S. Army Safety Center (USASC)** shows from June 1974 through September 1979, there were 19 inflight fires and 43 post crash fires. All 62 aircraft mishaps were in helicopters equipped with crashworthy fuel cells.

During the same time period, USASC data indicates 141 personnel were involved in survivable fire mishaps in which Nomex clothing either prevented or reduced thermal injuries. One should also keep in mind these statistics recorded during peacetime when military operations are relatively low.

During combat, these statistics will increase

(UNIFORM/Continued on Page 67)



A 44-page special report in
ARMY AVIATION MAGAZINE
devoted to

Army Avionics Development

and the efforts of the
Project Manager for Navigation
and Control Systems and the
Avionics Research and
Development Activity
(AVRADA)

NAVCON

DEPARTMENT OF THE ARMY
HQ, US ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND
P O BOX 209, ST. LOUIS, MO 63166

I am pleased that this issue of the "Army Aviation Magazine" has been devoted to Army avionics development and particularly the efforts of the Project Manager for Navigation and Control Systems (PM NAVCON) and the Avionics Research and Development Activity (AVRADA). The subject is timely and the articles provide a "thumbnail sketch" of some of our present capabilities as well as those which we hope to realize in the future.

As a RESHAPE initiative we are planning the consolidation of PM NAVCON and AVRADA. The primary thrust of this merger is improved efficiency through better utilization of personnel resources. Colonel Roy White is presently serving in the dual role of NAVCON Project Manager and AVRADA Commander. Under his leadership the planning for the reorganization is taking place. This streamlining will permit a cohesive integration of all avionics, navigation, and air traffic control programs, and will enhance our capability to support the developer and user communities.

Both PM NAVCON and AVRADA have well established reputations. The men and women of these organizations have provided unparalleled expertise and responsiveness to the Army Aviation fleet. I am confident that they will continue to be a vital factor in accomplishing the AVRADCOM mission.

Story C. Stevens

STORY C. STEVENS
Major General, USA
Commanding

PM NAVCON: PASSING IN REVIEW

BY COLONEL LEROY WHITE, Commander, Avionics Research and Development Activity/Project Manager, Navigation Control/Systems

PROJECT management offices are unique Army organizations. Their fate is to work themselves out of existence. Develop, produce, field equipment, and disband is the life cycle. The end is one of strong, opposing emotions.

On one hand there is pride and a sense of accomplishment in having put hardware in the hands of the troops, and on the other hand, there's a sense of loss in seeing a team of great people break up and take up other challenges.

Some left before the end, but their contributions were no less significant. **COL Chet McDowell** and **COL Ches Maddox** were former PM's who left their mark. COL (then a MAJ in OCRD) **Bob Gantt** was never offically assigned to NAVCON, but without his help we could never have achieved our goals.

LTC's Bill Johnson, Bill Bosking, and **Bill Wahl** were our standout DASC's in DA. LTC **Dick Richards** and COL **Darwin Petersen**, as former Directors of the Avionics Laboratory, played major parts in many actions.

John Cittadino (now in OSD) did yeoman service for many years as the Deputy Project Manager; so has **Tom Daniels**, the present DPM. **Sherm DuBois** served in two capacities, one as ambassador for our cause in the CE Systems Office of the old Electronics Command and now as NAVCON's Chief Engineer.

There were many players

Many players have been standouts. Space won't permit me to list them all. For sure, our star would not have been so bright had it not been for the project leaders. They muscled the programs along and overcame unbelievable obstacles to reach the goals. They had one heck of a staff supporting them.

I could not have asked for a better bunch. The people, the job, the challenge, and the learning experience all made for the best job of my career. Only those who have been a PM or who have served in a PMO know the feeling. It's a part of the Army and a field I would recommend to anyone, aviator or not.

But since transition time has come, I can't think of a better arrangement than to have the elements of NAVCON and AVRADA put together to form a new, one-of-a-kind organization.

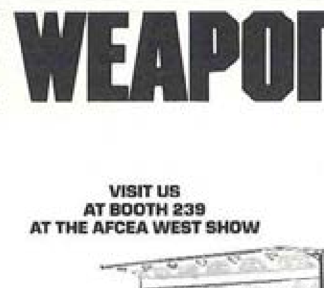
For the time being, I have the jobs of PM NAVCON and Commander of AVRADA. As **General Stevens** mentioned earlier, we're in the process of putting the two together, all of which should be completed by early Spring. In the meantime, we're operating as one organization now in many ways. I can say, without reservation, it is a demanding and challenging undertaking.

Streamlining and the organizational adjustments to sharpen the thrusts of avionics R&D and hardware programs are very timely. There is a little doubt that Army aircraft of the future (and that future is not far off) will depend more and more on avionics systems for their operations and mission accomplishment.

Displays, flight control and management systems, digital multiplexing, high speed data transfer, and much more will change or will be introduced. All will be more reliable and easier to use, reducing crew workloads as we try to wring more out of our aviation assets.

Of equal importance will be the systems and hardware on the ground supporting aviation operations. Things will change in them, too.

It's an exciting time in this business. The articles in this issue cover but a small part of what's going on and what's in the future. They're not exactly bedtime reading material, but they will tell you about what you'll be seeing in our Army Aviation fleet before too long. □


ROANWELL CORPORATION

AN OVERVIEW OF ARMY AVIATION ELECTRONICS

BY BRIGADIER GENERAL RICHARD D. KENYON, Army Aviation Officer, Office, Deputy Chief of Staff for Operations and Plans, Dept. of the Army

AVIATION electronics, or avionics, is sometimes viewed as that necessary evil that messed up the fun of war. After all, without all the black boxes, aircraft would be cheaper and lighter; pilots would not be subject to direction from the ground; anti-aircraft weapons would not be radar-directed or heat-seeking; and aircrews could sleep in on foggy mornings. In short, military flying would be restricted to good weather, composed of uncomplicated operations with pilots master of all they overfly.

Unfortunately or fortunately, the environment of future military conflicts will never again allow such World War I style operations. Aviation will be both an integrated part of a commander's arsenal plus a key target for highly sophisticated weapons. Aviation will need to perform day and night in good weather and foul. Operational areas will range from arctic winters to tropic summers with all the in betweens. Pilots will not be able to do their jobs or survive anymore without the help of a set of black boxes tailored to aid their specific missions.

An extra sensory system

So what will pilots be getting? Think of avionics first as a complement to a pilot's human sensory system.

In order to see at night, a new generation of image intensification **Night Vision Goggles (NVG)** will begin production in 1982. The NVG will snap onto a pilot's helmet whenever he needs them and will provide a lightweight, comfortable vision system allowing pilots to fly at **Nap-of-the-Earth (NOE)** altitudes on the darkest nights.

They will also permit crewmembers to see to move around and provide services on the ground or in the air. For days or nights that include obscuration by smoke or fog, the **Target Acquisition Designation Sight/Pilot Night Vision Sensor (TADS/PNVS)** mounted on attack helicopters provides an infrared system to see to fly, locate targets hidden by camouflage and laser-designated targets for precision guided munitions. Both NVG and TADS/PNVS will extend aviation battlefield support beyond previous daylight and good weather limitations.

Obstacle avoidance

Another vision enhancement for pilots would be a method to avoid wires and wire-like obstacles that are now part of the environment for operating at NOE altitudes. Both civilian phone lines and electrical transmission lines pose severe hazards to Army aircraft. From a mechanical standpoint, wire cutting devices are now being installed on Army helicopters now as an immediate aid.

But laser radars are also under development which will scan ahead of aircraft and pick out these hazards. Such lasers also have the potential to provide input for automatic pilot systems to hover helicopters, designate targets, and navigate by measurement of ground distances covered. A multipurpose laser program is now in advanced development.

Birds do not fly in the fog or generally at night. They know they can't see well enough. Army aircraft must be able to respond to mission taskings regardless of weather. One of the black boxes that will allow aircraft to go or come back after a mission is the **Joint Tactical Microwave Landing System (JTMLS)**. This system entered Advanced Development in 1980 and will begin test flights by 1982. It will provide a lightweight, portable instrument approach system for undeveloped landing zones and on-board equipment compatible with

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standard airport approaches. As a result, the earlier pilot's concern for weather closing in and preventing mission accomplishment will be eliminated. Also eliminated will be the inability of units to get aviation support because the airfield is socked in. Aviators will "see" through the fog via microwave radiation and fly when the birds are walking.

Battlefield scanning

In addition to seeing at night and through the weather, future aviators must also see farther and quicker. We are familiar with optical systems such as binoculars and telescopes to extend our vision. The newest black boxes combine similar optics with television and infrared viewers to afford battlefield scanning and targeting capabilities for pilots beyond the capability of any eagle's eye. The laser-guided HELLFIRE missile planned for the attack helicopter will be targeted by the previously mentioned TADS/PNVS, as an example.

The current missile can also be fired indirectly using the eyes of a remote laser designator operator without ever exposing the attack helicopter. This is like being able to see through hills and is an example of the ever increasing integration of black boxes. But in addition to the optical augmentation of TADS/PNVS, the next generation fire and forget HELLFIRE missile will itself see and lock onto a target when sighted by the gunner and then guide itself after launch.

NUMBER ONE!—CW3 Grant L. South, left, Distinguished Graduate of the WO Senior Class, which graduated Nov. 26 at Ft. Rucker, chats with MG Robert L. Moore, Commander, USA Missile Command, Red-Stone Arsenal, AL, who was the guest speaker at the WOSC ceremonies. South's next assignment will be at Ft Lewis, WA.

Electronic ears

While some black boxes are making it possible to "see" through night weather and even around hills, others provide electronic hearing for Army Aviation. One of these systems is the **Airborne Target Handoff System (ATHS).** When a scout helicopter locates a suitable target for an attack helicopter, current procedures call for a voice-radio communication sequence to describe, locate, and assign the target. Such a communication may require from perhaps 30 seconds to several minutes.

During this time, enemy black boxes may have listened to and located both the scout and attacker. They may also have warned the target or prepared an ambush. The new ATHS makes this much less likely by using a short "burst" communication.

Uncluttering the frequencies

Much harder to eavesdrop on, such a communication may be only a second or two long and can be fed directly into black boxes that automatically tell a pilot how far away the target is, assign the target to the attacker best able to handle it, and acknowledge the mission. One added benefit from such short transmissions will be the uncluttering of limited radio frequences to allow more Army users on unjammed channels.

A similar system to outwit enemy listeners now nearing production is the PRC-112 survival radio for aviators. Current survival radios have an electronic beacon which a downed crewmember can turn on to guide rescuers to him. Unfortunately, it guides the enemy equally well and provides a screamingly loud radio signal that blocks any other use of the same frequency.

The new PRC-112, when turned on, remains silent until pulsed by a coded interrogation signal from friendly searchers. It then responds by transmitting a coded burst giving its exact location. Thus, rescuers can find downed aircrews with a minimum of electronic exposure; survival radios can be turned on and left on for up to 48 hours without running their batteries down; and the wrong side will not be homing in on downed aircrews or decoying potential rescuers.

Selective listening

Another system now under development does electronically what some husbands have been doing for years — selective listening. The **Airborne Steerable Null Antenna Processor (ABSNAP)** program allows an aircraft radio system to automatically direct a radio null at enemy jamming transmitters. The result is that friendly transmitters are heard normally while enemy jammers fade into the background. This is equivalent to being able to comfortably listen to a conversation while standing next to an operating jackhammer.

Even the somewhat mystical capabilities of radios have limitations though. When Army aircraft fly at high altitudes, the inboard radios can operate on a line-of-sight basis with other aircraft and ground users in a wide area.

NOE means new radios

However, now that aircraft must be at NOE altitudes to survive, radios have a severely constrained line-of-sight path. New radios that communicate by bouncing their signals off the ionosphere (sky-wave) or by extended ground wave are needed. Such radios, unfortunately, operate in a dirtier part of the radio spectrum and are subject to easier enemy jamming than before.

To gain the advantage of non-line-of-sight transmission without the disadvantages of interference and jamming, a control system is necessary to automatically select optimum frequencies on a call-by-call basis. Such a radio is expected eventually as an outcome of the NOE-Communications program due to begin in 1981.

Beyond assistance to sight and hearing, black boxes are in development to help aircraft perform their missions. These are devices which integrate work functions or maintain system status thus letting the aviator concentrate on his tactical mission. One of these integration black boxes is an automated map display. Such a device might be a mechanical overlay for standard paper maps which would indicate on the map where the aircraft is at all times.

"FACTS" DEMONSTRATION

Observing the capabilities of the FORWARD Looking Infrared AUGMENTED COBRA TOW Missile SIGHT System are, from left, German Army ***LTC Manfred Weber*** *and British Army* ***LTC Richard Eccles,*** *liaison officers at USAAVNC. The* ***FACTS*** *System provides night vision capability which increases the effectiveness of TOW missile employment. The early December demonstration was given for the Army Aviation Training Symposium attendees at Ft. Rucker.* ***FACTS*** *is not currently in the Army inventory, but contract preparation is underway.*

Freeing the aviator

An alternative device might project a map slide of an area with a moving indicator for aircraft position. Either device would be tied into standard aircraft navigation systems such as Doppler, **Position Locating and Reporting System (PLRS)**, or NAVSTAR. Most importantly, such a device would free the aviator from the present requirement to keep constant reference to a paper map unfolded in his lap in order to navigate through an unfamiliar area while simultaneously looking for targets and maneuvering to avoid becoming one. Map display systems are currently being examined for the **Army Helicopter Improvement Program (AHIP)** and CH-47 aircraft.

Another potential integration action for Army aircraft is the multi-format programmable display device. This would look like a small TV screeen in the cockpit and replace a variety of present cockpit flight instruments and displays. Such an integrated display could superimpose a compass rose image on an artificial horizon which would include altimeter readings, airspeed, and warning displays.

By having all this information in one location, the pilot could see all essential flight information at a single glance. This also leaves the pilot more time to look for targets and concentrate on the tactical mission.

Similar integration of engine and airframe status gauges is part of a development program called **Electronically Monitor Master Advisory Display System (EMMADS)** now underway. This is an attempt to integrate engine RAM, temperatures, fuel status, etc., all in a single display with a memory dump for maintenance purposes after a flight. This kind of black box would ensure that no mechanical problems during flight are overlooked in post flight checks as well as permitting a pilot to concentrate his attention over a smaller area with less chance of missing a vital engine condition because the gauge showing the condition happens to be in an awkward location.

IACS unloads the bundles

Finally, the nerves of an aircraft are currently bundles of copper wire. Because of its weight, few, if any, backup links are available in case of combat damage. The general rule is that for each black box in the aircraft, separate wires lead to a control near an aviator. The result is a large number of similar controls racked around each aviator and large bundles of wiring running from them through the aircraft. This is not necessary! An **Integrated Avionics Control System (IACS)** has been developed along with a dual data bus concept that would allow a single control for almost all communication and navigation radios and provide a lightweight copper cable running along each side of the aircraft (providing 100% backup) to which all black boxes would be connected. This implies large weight savings plus an uncluttering of the cockpit around each aviator.

All of the avionics thus far described are under development now. Most are managed by either the laboratories of the **Avionics Research and Development Activity (AVRADA)** or the Project Manager for **Navigation and Control Systems (NAVCON)** at Fort Monmouth, NJ.

These organizations merged and give the Army a single developer for Army avionics and air traffic control equipment. Night Vision devices are managed by the Night Vision Laboratory at Fort Belvoir, VA and the Project Manager for the TADS/PNVS in St. Louis.

A debt of gratitude

These laboratories and Project Managers are the visionaries of future Army avionics. It is only through their hard work and imagination that new systems get into the Army inventory and Army Aviators everywhere owe them their gratitude.

The pace of future sophisticated conflict will be faster than any war American forces have been in before. Battlefields will, at the same time, be more lethal yet yield more targets than ever before. If either side in such a conflict is unprepared, it will turn into a turkey shoot for the other. Black boxes and their electronic assistance will help Army Aviators see better, hear more, and put it all together.

Aviators cannot be replaced by electronics, however sophisticated, but neither can aviators do their job without electronics.

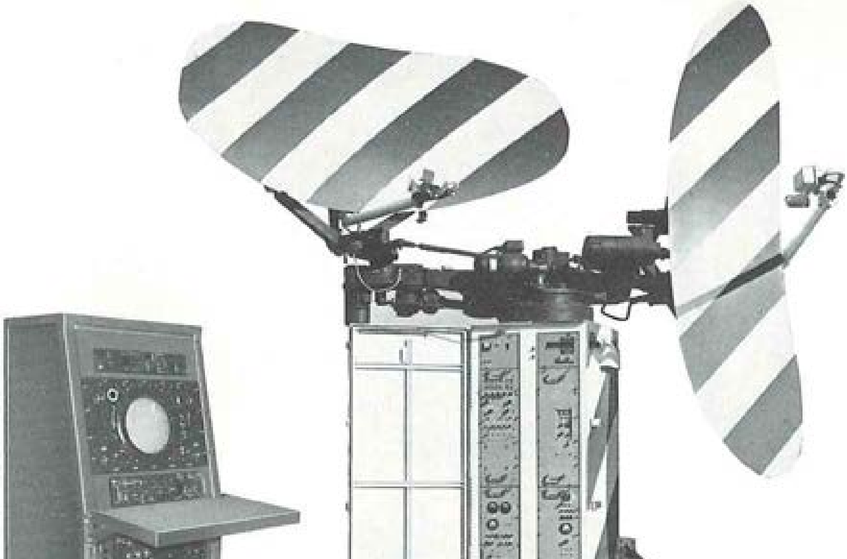
The vital need is that both "human boxes" and black boxes work together effectively. The synergism of men and machines into mission-accomplishing systems is the goal of avionics.

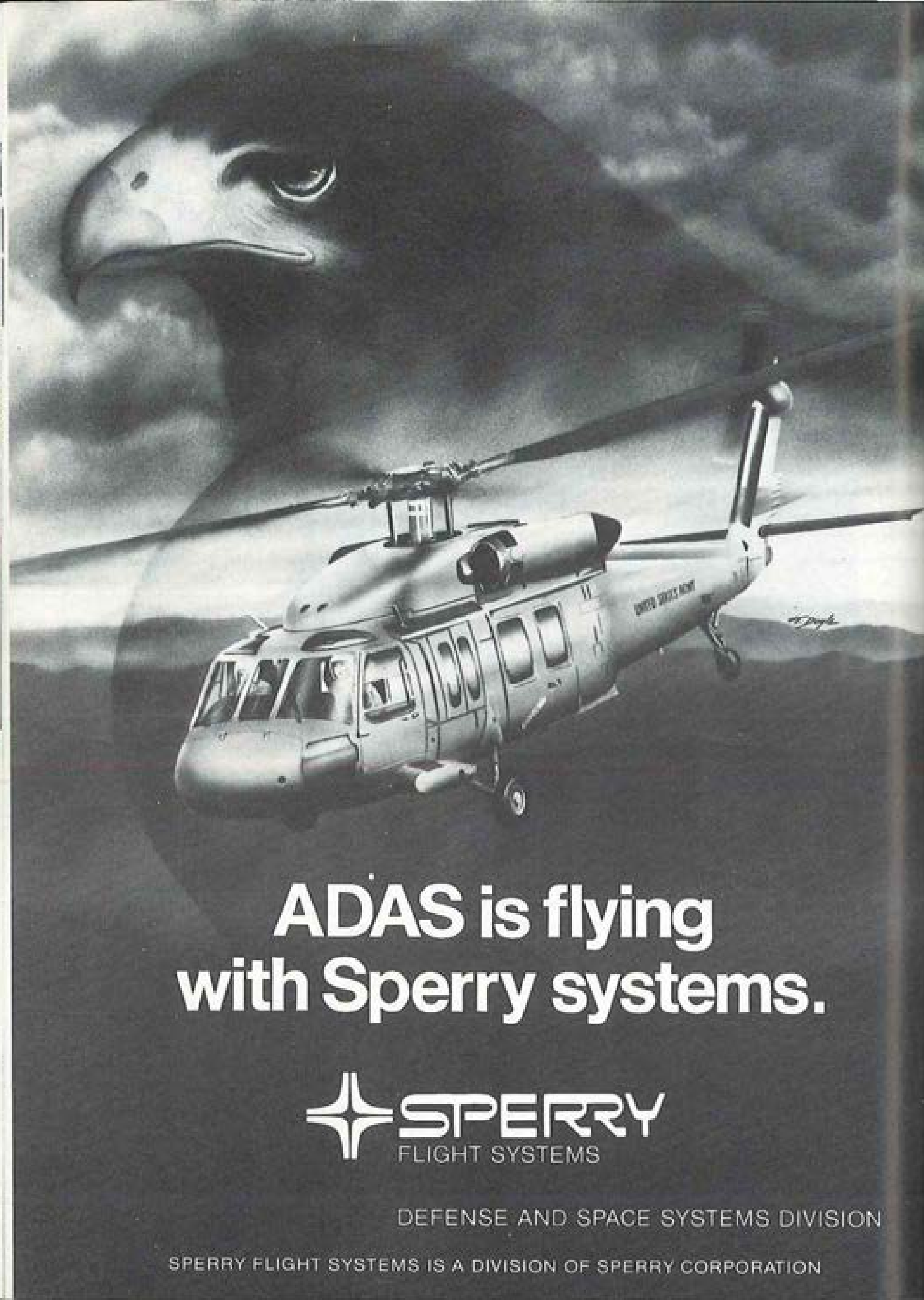
DOUBLEHEADER!

Major General Carl H. McNair, Jr., the Commander of the U.S. Army Aviation Center and Ft. Rucker, will be the guest speaker at back-to-back meetings of the Army Aviation Ass'n (AAAA) in February.

During a visit to the Sikorsky Aircraft plant, he'll address Connecticut Chapter members on Thursday evening, Feb. 5, will visit the AAAA National Office in Westport, CT on the morning of the 6th, and will then continue on to Washington.

On Friday evening, Feb. 6, he'll speak at a joint dinner meeting at Fort Myer, VA, of AAAA's Washington, D.C. Chapter and the Federal City Chapter of AHS. Details of the dinner meetings will be provided to Chapter members by direct mail.




ADAS is flying
with Sperry systems.
SPERRY
FLIGHT SYSTEMS
DEFENSE AND SPACE SYSTEMS DIVISION
SPERRY FLIGHT SYSTEMS IS A DIVISION OF SPERRY CORPORATION

THE ARMY DIGITAL AVIONICS SYSTEM (ADAS)

BY JOSEPH E. DASARO, Chief, Systems Engineering Branch, Advanced Systems Division, USA AVRADA

FUTURE Army aircraft must have the capability of performing a variety of missions in order to counter a threat characterized as being numerically superior in both armor and air forces.

The nature of this postulated battlefield radically influences the requirement for enhanced survivabiity in the design of new systems for Army Aviation. In addition to enhanced survivability, Army aircraft systems of the future must possess a basic architecture which provides a flexibility to reconfigure avionics and mission equipment so that aircraft can be tailored for the variety of missions which must be performed.

The key to providing this survivability and flexibility is the standard interface (MIL-STD-1553) and modular design inherent in the integrated digital system architecture.

In addition, through use of integrated control/displays and automation of many routine monitoring functions, the integrated digital system will reduce crew workload and further enhance the capability of future Army aircraft to perform their missions.

Other advantages which will accrue from the integrated digital system include reduced system weight and reduced cost, both acquisition and life cycle.

ADAS Phase I

In late 1978 the U.S. Army Avionics Research and Development Activity initiated an exploratory development program with the goal of applying the digital system architecture to an entire aircraft system.

This system of the future is called **Army Digital Avionic System (ADAS)**. Sperry Flight Systems was chosen competitively by the Army to develop the hardware for ADAS. The exploratory program for digital avionics can be broken into four distinct phases. During the now completed first phase, Sperry completely defined and characterized the ADAS (with **Human Factors Engineering** (HFE) assistance from Bell Helicopter).

During this first phase, a system architecture was developed for the AVRADA UH-60A **System Testbed for Avionics Research (STAR)** based upon the outputs of the Bell Human Factors Engineering effort and a detailed analysis of the electronic sensors and subsystems on board the aircraft.

Candidate systems for integration/multiplexing were first identified, then definitized by electrical interface parameters, including signal levels, input/output impedances, repetition rates, etc.

Multiplex data bus controller hardware was designed, fabricated, and delivered to the AVRADA digital hot bench along with appropriate software support in order to obtain an early start on the development of operational bus controller software for the hot bench validation phase and the aircraft demonstration phase.

The box on the next page (**Figure 1**) illustrates the substantial reduction in the number of dedicated displays and controls in using the **Army Digital Avionic System** on the UH-60A.

The resulting UH-60A instrument panel and center console design is shown in **Figure 2** on the next page.

ADAS Cockpit

The ADAS control/display subsystem will provide fully integrated control and display capabilities for both flight crew members of the UH-60A STAR. Two 6.8 inch by 6.8 inch CRT displays will be mounted on each side of the cockpit to handle flight, interactive control/display and navigation display functions.

The flight display function will be used to present basic flight information in an integrated format, along with required caution/warning alarms and procedures (**Figure 3** illustrates a typical integrated flight display.) Normally, the flight display function will be presented on the CRT display directly in the front of the crew member selecting the function (outer displays in **Figure 2**). However, the flight display function can be presented on any of the four CRT displays under reconfiguration conditions.

Each of the two inner CRT displays in **Figure 2** will have line select units mounted immediately adjacent on each side. When used with these select units and the keyboard terminal unit (**Figure 4**), the two center CRT displays can be used to present procedures (normal, test and emergency), engine and fuel status, and transmission and rotor status.

The CRT displays can also present secondary systems status and control, advisory/caution/warning information, ASE, navigation status and mode control, and a number of other functions such as command instrument system status and control, aircraft performance guides, and CEOI.

The navigation display function will be used to present navigation/map and status information to the aircraft flight crew (see **Figure 5**). Normally, the navigation display function will be presented on the CRT display directly in front of the crew member selecting the function, however, the navigation display function may be presented on any of the cockpit CRT displays under reconfiguration conditions.

ADAS Phase II and III

At this time ADAS is undergoing hardware fabrication (Phase II) by Sperry. During this phase, ADAS will be evaluated to assure that all functions required can be easily performed. Also, the hot bench facility will be employed for pilot familiarization.

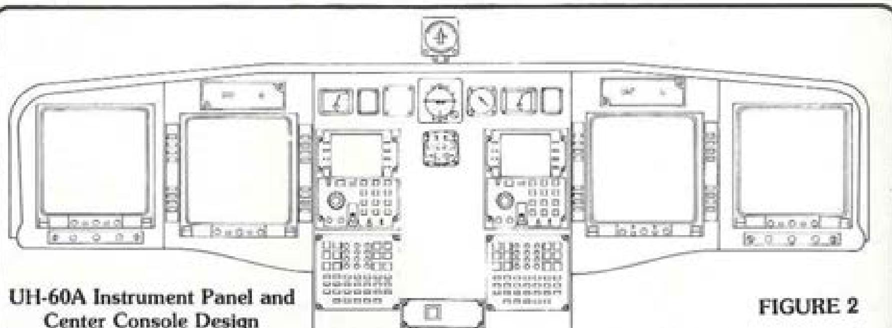
Due to the flexibility of the ADAS architecture, any change required as a result of the hot bench phase will be incorporated by software modification. At the end of the hot bench evaluation AVRADA will begin the installation of ADAS into the UH-60A STAR.

Phase IV and Beyond

During Phase IV ADAS will be flight tested in the UH-60A STAR. This vehicle will provide Army pilots an opportunity to fly an integrated digital aircraft and provide valuable feedback to the AVRADA engineers. This vehicle will also provide a valuable system integration tool for AVRADA. Through its bus oriented architecture ADAS has a flexibility that will revolutionize Army operational aircraft systems. □

FIGURE 1
NUMBER OF DEDICATED DISPLAYS/CONTROLS

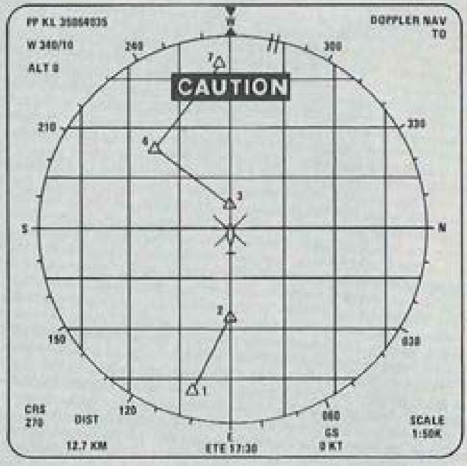
Type of Dedicated Display/Controls on UH-60A's	ADAS UH-60 Acrft	Production UH-60
Mechanical Controls.	11	11
Electrical Switches.	39	89
Circuit Breakers.	30	147
CNI Control Panels.	6	15
Instruments & Indicators.	7	29
Status Annunciation:		
Warning	5	12
Caution.	5	62
Advisory	3	15

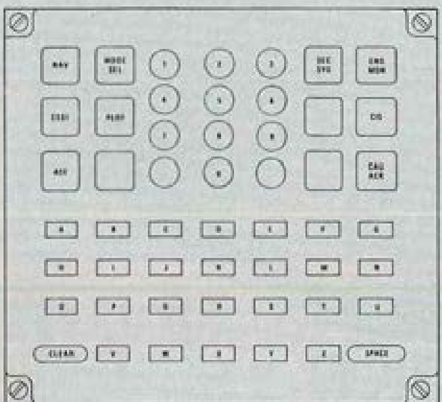


UH-60A Instrument Panel and Center Console Design

FIGURE 2

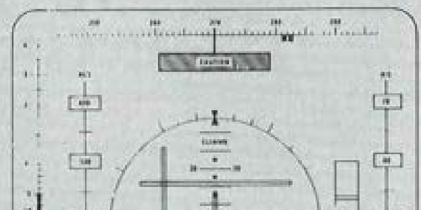
(RIGHT)
A TYPICAL
INTEGRATED
FLIGHT DISPLAY





(LEFT)
THE KEYBOARD
TERMINAL
UNIT

(RIGHT)
THE NAVIGATION
DISPLAY
FUNCTION



FIELD EXPERIENCES ON THE AN/ASN-128 DOPPLER NAVIGATION SYSTEM

BY MERTON S. DUBOIS, Chief,
Technical Management Division, NAVCON

THE AN/ASN-128 Doppler Navigation System has been operational in the field for nearly two years. During this period of time, valuable experience has been gained with each of the aircraft types in which the navigator has been installed.

Specifically, problem areas — as well as mission benefits — have been identified as they relate to the navigator itself, the operation of the navigator by aircraft crews, and the overall systems integration. In addition, experience has been gained in terms of the implementation of the **Reliability Improvement Warranty (RIW)** concept.

It is the purpose of this article to highlight some of the specific lessons learned through field experiences and the corrective actions we've taken, and to provide you with some insight into our planning to further improve overall system performance.

The initial systems off the production line were installed in aircraft and were subjected to various operational and development tests. Some of the initial test findings prompted further engineering tests and evaluations by both PMO NAVCON and the Singer Kearfott Company, contractor of the AN/ASN-128 navigator.

A short Turn-Around-Time

These test efforts resulted in the first implementation of the **Engineering Change Proposal (ECP)** provisions of RIW. This implementation demonstrated the ability of the RIW concept to provide an exceptionally short **Turn-Around Time (TAT)** between identification of a problem or potential problem, follow-on engineering analyses, the formulation of appropriate ECPs, and actual implementation of the ECP on the production line as well as recall of fielded units for ECP modification.

Through the implementation of these initial ECPs and continued efforts in quality control

FIGURE 1-LIGHTWEIGHT DOPPLER NAVIGATION SYSTEM (LDNS) (AN/ASN-128)

the AN/ASN-128 system has demonstrated an acceptable reliability and continuing reliability growth.

As in any case, the introduction of new capabilities and/or hardware to an aircraft presents a series of systems integration and functional compatibility issues which must be addressed if the full capability of the total aircraft system is to be operationally realized.

Addressing alignment problems

As an example, the alignment of the aircraft heading reference unit may not appear to be critical when flying with a map and compass as the source of errors are unknown. However, when the heading reference unit is not properly aligned, the error input provided to the computer of the Doppler Navigator is readily noticeable in the form of Doppler System crosstrack errors.

Alignment procedures have been provided as a part of the AN/ASN-128 Installation and Integration Manual, but experience indicates these procedures are extremely difficult for maintenance personnel in the field to follow.

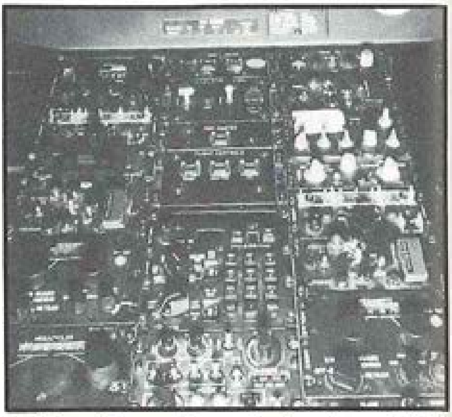
New, simplified alignment procedures have been devised to align many aircraft compass systems and have been used with good and repeatable results. These new procedures can be performed in much less time than the previous method and will be provided to all field units in the near future.

Regarding performance by flight crews and maintenance personnel in operational units, the Doppler Navigator performs well as a system, but its operational performance is a direct function of the level of training received in the operations and maintenance areas.

Every effort has been made to improve the quality of the operator training at the U.S. Army Aviation School, Fort Rucker, AL and the maintenance training at the Signal School, Ft. Gordon, GA.

New level of training

Specifically, a more comprehensive level of training for maintenance personnel is to be implemented early next year. This training will be conducted using the AN/ASN-128 Doppler Navigator both as hardware and as a training aid permitting control of the required aircraft inputs to the Doppler as well as a exercising the system's BITE functions capability.



Secondly, we observe that equipments that have failed repeatedly are being returned for RIW repair without following the procedures established by Supply Bulletin SB-11-643.

Specifically, the procedural errors include a failure to provide complete data in the required messages and the use of other than the reusable containers that are issued for shipment. These procedural errors may either extend the Turn-Around-Time or result in additional costs due to damage in shipment.

Another area of concern is the number of components that are returned because of physical damage due to various causes not expected under normal operating conditions. Most of these cases are exclusions under the terms of the RIW repair contract and accrue additional costs for their repair.

One additional problem area currently being resolved deals with the availability of the 27 field replaceable items for the **Control Display Unit (CDU)**. SLAC decks have been forwarded to operating units so that the parts can be ordered.

A good operational system

In summary, the AN/ASN-128 Doppler Navigator has proven to be a good operational system, and with further concentration on the training aspects, the benefits of its use will be realized fully.

Units desiring additional information or field support, or who wish to discuss their operational experiences, are invited to contact the office of the Project Manager NAVCON, Fort Monmouth, NJ. □

RELIABILITY IMPROVEMENT WARRANTY: A NEW CONCEPT IN ELECTRONICS

BY THOMAS E. DANIELS,
Deputy Project Manager, Navigation/Control Systems

RELIABILITY Improvement Warranty (RIW) is a concept whose time has come for the U.S. Army. Currently this concept is being used for a limited period of time on several Army systems, most notably the Doppler Navigation System AN/ASN-128, the VOR/ Localizer/Glide Slope/Marker Beacon AN/ ARN-123, and the Absolute Altimeter AN/ APN-209.

The RIW is an acquisition concept that improves the reliability of systems going into the field inventory, and provides lower life cycle costs initial support in lieu of organic support. The production contractor, for a fixed price per unit in most instances, agrees to replace or repair over the specified period all equipment which fails, unless the failure is caused by specified reasons not under the control of the contractor.

RIW — How effective is it?

Have the RIW programs been effective and what factors have impacted the effectiveness of the programs?

The Doppler program has passed its first full year of operation under RIW successfully, while some of the other Army RIW programs have already been extended. My comments on the other programs will be general while those on the Doppler will be more specific.

The warranty generally provides for "no cost" reliability **Engineering Change Proposals (ECPs)** to make changes to correct deficiencies in order to improve reliability. Some warranties — in particular, the Doppler RIW — provide for penalties if the contractor does not meet specified goals, e.g., **Mean-Time-Between-Failure (MTBF)**, or repair **Turn-Around Time (TAT)**.

The contractor, on the other hand, has an opportunity to increase his profits if the reliability is better than expectations. The Government must reimburse the contractor if non-verified (false claims of failure) returns exceed those defined in the contract.

The contractor has no obligation under RIW to repair equipment damaged by natural disaster, fire, explosion, enemy action, or willful mistreatment. Failure caused by these reasons are termed exclusions which are covered by a separate contract and terms whereby the Government makes the final determination on exclusions.

Data collection and analysis

One final feature of RIW is that the contractor establishes and maintains a field data collection and analysis system for assessing his RIW program achievements, as specified by contract.

While these provisions are included in the AN/ASN-128 Doppler Navigation System contract, other contracts vary in their provisions. For example, the contract may not have a guaranteed MTBF, or no exclusions for Government induced damage, or may have an operating hours adjustment, or a maximum repair time guarantee with penalty. Whatever acquisition strategy or contractual provisions used, the bottom line is improved reliability and lower life cycle costs.

The Doppler RIW program runs for a period of four years with an option to define the needs for organic maintenance after two years. It has no-cost ECPs for improvement of reliability, and an initial repair TAT of 30 days which is gradually reduced to 15 days after 18 months. It also has Government-owned spare **Line Replaceable Units (LRUs)** in storage, a guaranteed MTBF of 500 hours, and penalties for shortfall.

The measure of RIW effectiveness can be

RIW

(Continued from Page 33)

determined by comparing the actual results to the contracted baseline. This, however, does not assure that all circles within Government share identical views.

Users are concerned about how long the equipment will operate and whether it will be available to perform when needed, and need to know how soon equipment will be repaired or replaced when it fails. The **Developer** shares similar concerns, but must put these requirements into a contract that will be reasonably measurable and enforceable while realizing that quantitative measures are somewhat difficult and often differ from those used to measure contractual performances.

By Government specification, for example, several specific features are addressed in the Doppler RIW contract. The first is an estimated standard of 20 operational hours per unit per month, which is used to determine the expected total operating hours in the reporting period and, further, to develop usage ratios to determine penalty factors for adjustment. If the usage is more than 10% greater than anticipated, then the contractor receives a monetary adjustment. If less than 10%, then the Government is compensated. Contractually defined failures do not cover all failures as previously stated in the RIW contract.

Another feature is the maintenance of sufficient spare LRUs to allow prompt shipment of replacement equipment within 24 hours or, in any case, no more than 96 hours. The notification to the contractor starts the replacement cycle not the shipment of the equipment. The receipt of the equipment starts the TAT for repair.

Instant ECP's

One of the most significant features, a by-product of the RIW, is that engineering changes to improve reliability have been implemented almost instantaneously at no additional cost to the Government.

Under normal processes a deficiency requiring an ECP needs a longer lead time that approaches several years when one considers the time needed for engineering analysis, the preparation of engineering changes, the budget cycle for funding, and, finally, the contracting and implementation.

The Doppler has had several ECPs implemented at no cost by the contractor almost immediately after identification of the problem. These ECP's were not only applied to units on the production line, but to all fielded units as well.

Another yardstick

A system's life cycle cost is another measure of effectiveness with lower cost being the criteria. Comparisons are generally made by comparing contract support cost under RIW to the estimated organic hardware cost with a **Standard Initial Provisioning (SIP)** model being used to calculate organic cost.

The average "RIW cost per unit per year" for the Doppler has been calculated to be about $400 in FY 80 current dollars. By comparison, using the SIP formula of about 8%, the FY 80 adjusted hardware unit cost on a competitive procurement, and a sole source adjustment factor for spare parts, the calculated FY 80 Army unit organic support costs are approximately six times that of the equivalent RIW support cost.

Therefore, the **Reliability Improvement Warranty**, in terms of support, has been cost

OLD AND NEW—WO1 Herbert Hayes sits atop his horse while dressed as the cavalry's traditional figure, "Old Bill", during Dec. 1 activation ceremonies for C Troop, 1st Squadron, 6th Cav, the only combat aviation unit at Ft. Rucker. The unit was previously active at Ft. Hood, but has been manned at zero strength since 1975.

effective. To bridge the gap between contractual effectiveness and the units assessment of effectiveness, the PM NAVCON, the developer, has monitored this program very closely.

The PMO has arranged for the issuance of DA supply bulletin, SB 11-643, to the units explaining the RIW concept and telling them how to secure the attendant contractor support during the warranty period in lieu of organic support. Logistic teams have also been sent to user elements to find out first hand whether the concept is working effectively.

One of the items stressed is the correspondng notification of the contractor and the Project Management Office of prompt replacement units following the return to the contractor of failed units.

The Bottom Line

In summary, the evidence to date reflects that the RIW, as an acquisition strategy, has been successful in improving the reliability of avionics systems now being developed for the Army and has also been more cost effective in providing initial support in lieu of organic support.

Furthermore, it has provided adequate repair **Turn-Around-Time** that generally has met the contract provisions and replacement. The bottom line: units are received in less than four days.

Equally enhanced has been the ability to incorporate engineering changes that improve reliability and to make these ECP's under the RIW contract in the least possible time and at no additional cost.

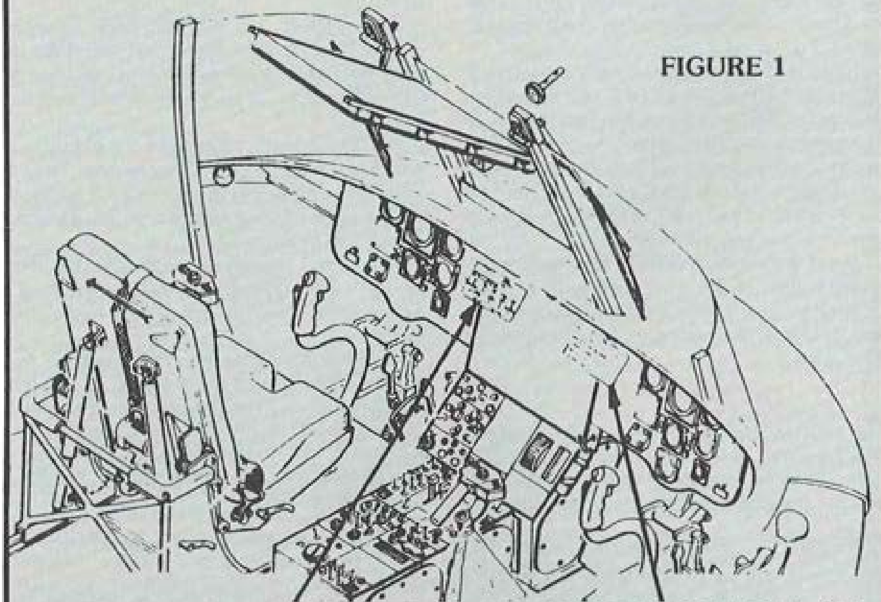
In general, it can be said that the Army Avionics RIW Programs may be considered as being successful in meeting their basic objectives.

Comments and/or recommendations from those readers who are users of avionics equipments are invited, and contact should be made with PM NAVCON, U.S. Army Aviation Research and Development Command, ATTN: DRCPM-NC, Building 2525, Fort Monmouth, NJ 07703. □

*SECOND STAR—**MG Carl H. McNair, Jr.,** the USAAVNC Commanding General, has his second star pinned on by his wife, **Jo Ann,** and **MG John B. Blount,** TRADOC Chief of Staff, at Dec. 5 ceremonies. A Pensacola, FL native, a Master AA with 1,500+ combat hours in Vietnam, and a Life Member and National VP of AAAA, **McNair** has been associated with Army Aviation since 1955.*

*NEW DIRECTOR—**COL Bruce A. Gibbons** is shown strapping on his flight helmet prior to taking off on a routine flight in the USAAVNC area. The 25-year, 4,000-hour veteran Army Aviator came to Ft. Rucker in October for his fourth tour, succeeding the retired **COL Frederick W. Watke,** as the Director of the Department of Flight Training (DOFT) at the Alabama facility.*

FIGURE 1



TYPICAL EMMADS INSTALLATION ON CH-47

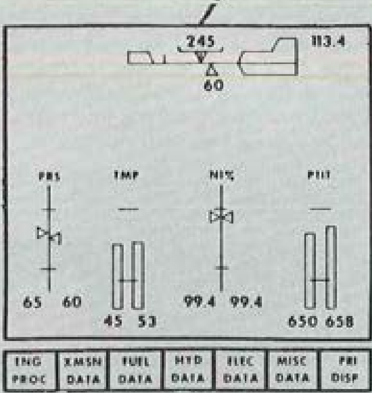


FIGURE 2
ENGINE DISPLAY SYSTEM

FIGURE 3
ENGINE START CHECK LIST

EMMADS: THE ELECTRONIC MASTER MONITOR ADVISORY DISPLAY SYSTEM

BY RONALD KUROWSKY, Project Engineer, Instrumentation Branch, Communications/Sensors Division, AVRADA

WITH the introduction of sophisticated avionics systems, more complex performance requirements of the aircraft, and the need to fly at lower and lower altitudes —to include NOE — the pilot's workload has increased tremendously.

One approach toward reducing crew workloads is to use integrated display systems that unburden the crew by routinely monitoring non-mission related status displays in tactical rotary wing aircraft.

It does the job!

The **Electronic Master Monitor Advisory Display System (EMMADS)** reduces crew workload by using display and control technologies, configured to provide a maximum amount of relevant information, while requiring minimal operator attention or interaction.

Four classes of Army helicopters have been selected as potential EMMADS candidates. These are:

- Cargo — CH-47C
- Utility — UH-60A
- Scout — OH-58C
- Attack — YAH-64

The feasibility model of EMMADS, designed for use in the CH-47, monitors the engine(s), transmission(s), fuel, and electrical and hydraulic subsystems. EMMADS replaces these subsystem instruments as well as the Caution Warning Panel.

Figure 1 (opposite page) shows s a typical dual installation in a CH-47. Preliminary estimates show a decrease in weight and electrical power requirements in the CH-47 when existing wiring and instruments are replaced by EMMADS.

The solid state multifunction display capabilities are shown in **Figures 2 and 3** shown on the opposite page. These are typical formats depicting faulted conditions.

In the CH-47, two remote terminals will be used to convert analog and discrete data to digital form. The programmable symbol generator uses this data to determine out of tolerance, excess rate, or normal conditions prior to display of subsystems parameters.

During NOE and similar operations, the duties of the crew constitute such a demand on attention that certain routine duties, such as intrument monitoring, often receive little or no attention.

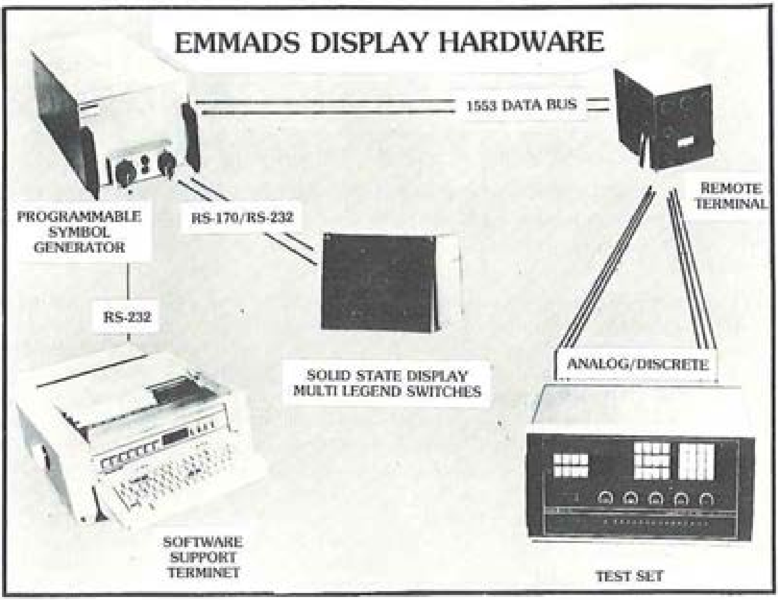
Studies related to quantitative assessment of visual workload (using objective measurers of pilot eye movement and subjective pilot survey techniques) indicate that during NOE flights visual attention devoted to monitoring engine, drivetrain, and related instruments may constitute from zero to 7% of the crew's total visual activity.

With so little attention paid to critical engine and drivetrain instruments, it is entirely possible that an impending problem could go unnoticed and, within a matter of seconds, could become an emergency situation.

The driving force

Throughout all phases of conceptual design and hardware implementation, reduction of the high workload imposed by NOE or other conditions has been the driving force for all trade-offs related to the optimization of the man-machine interface. Although system design has been driven by the need to reduce crew workload, implementation of this philosophy does not prevent manual crew interrogation of subsystem status at any time.

Automatic monitoring of subsystem status is performed by the system as an aid to the crew while they are otherwise occupied. Although



subsystem monitoring is continuously performed by the system, display of this information, either automatically (by exception) or by operator interrogation, is always at the discretion of the crew.

The feasibility hardware shown in **Figure 4** includes ground support equipment (teletype and test set) as well as actual system hardware, the programmable symbol generator, and display and remote terminal(s).

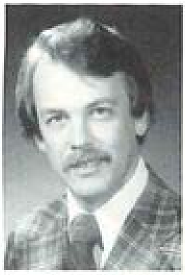
In search of formats

The results of the Exploratory Development Information Requirements Analyses combined with Operational Systems Functions Concepts, and the recommendations of the Basic Testing Program, provided the necessary components for the definition of information handling formats.

The following features are incorporated into the format designs:

- Continuous display of flight critical parameters (Rotor RPM and Engine[s] Torque) and a (quasi) mission essential indication (Fuel Time Remaining) is a prominent, dedicated display location.
- Dedicated display area for the presentation of Warning Message Capsules. A "safety of flight" priority system will determine the order of presentation for simultaneous occurrences. Several alternatives are considered for the total/simultaneous number of message capsules to be available for display.
- Dedicated display area for the annotation of faults (or their subsystem) which have been displayed and, by crew acknowledgement, have been removed from the display.
- Dedicated display area for presentation of a digital countdown and the corresponding parameter. This countdown would display the "allowable" time remaining in an "out-of-limits" condition, e.g., overtorque.
- Time-shared display area for the presentation of (a) subsystem raw data and/or (b) emergency procedures, (c) routine operational checklists, (d) performance checks, and (e) during or in-flight maintenance related parameter excursion summaries.
- The display of crew-entered data such as OAT, Gross Weight, Time of Day, etc.

With the successful completion of our exploratory effort, the fabrication of advanced development models and flight testing will proceed. □



A NEW STANDARD WEATHER SYSTEM FOR AVIATION: RADAR SET AN/APN-215(V)

BY TIMOTHY RYDER, Project Engineer,
Sensor Branch, Communications/Sensors Division, AVRADA

THE Army's goal of accomplishing more with less is underscored by the Airborne Weather Radar AN/APN-215(V) Program by adapting an existing general aviation equipment, the Bendix RDR-1300 full color radar, for Army fixed wing aircraft usage.

The acquisition technique, known as nondevelopment item procurement, allows only minimal changes to be made to off-the-shelf equipment, thereby enabling the contractor to build and test the item on his existing production line. He not only avoids development costs but also all fixed costs associated with setting up a separate military production line.

Top-of-the-line

The AN/APN-215(V), then, is fundamentally a standard Bendix Model RDR-1300; a modern top-of-the-line general aviation weather radar which has been produced since 1976, using a Bendix Model IN-2022A color indicator which originated in 1978. The system features all digital signal processing with weather or ground echoes presented in red, yellow, green, or black in decreasing order of signal strength.

In the weather (WX) mode of operation, the returns are calibrated so that display colors correspond to meteorological standards relating rainfall rate to turbulence expected. Black is used for rates of less than 1mm per hour, green for 1-4mm per hour, yellow for 4-12mm per hour, and red whenever rainfall exceeds 12mm per hour.

This latter rate is considered to be the threshold at which severe turbulence may be expected, and those areas displaying that rainfall rate should be avoided at all times. Since venturing into a red area may have severe consequences to an aircraft, the weather avoidance (WXA) mode blinks all red areas, making them stand out still further from the rest of the display. Otherwise, the WXA mode is identical to the WX mode.

The third basic mode available on the AN/APN-215(V) is called MAP and is employed to produce a topographical map of the area forward of the aircraft. Ground reflections tend to be stronger than those of weather targets so in MAP mode the IF gain is adjustable, allowing the pilot to differentiate between ground targets on the radar display, all of which would otherwise appear in red.

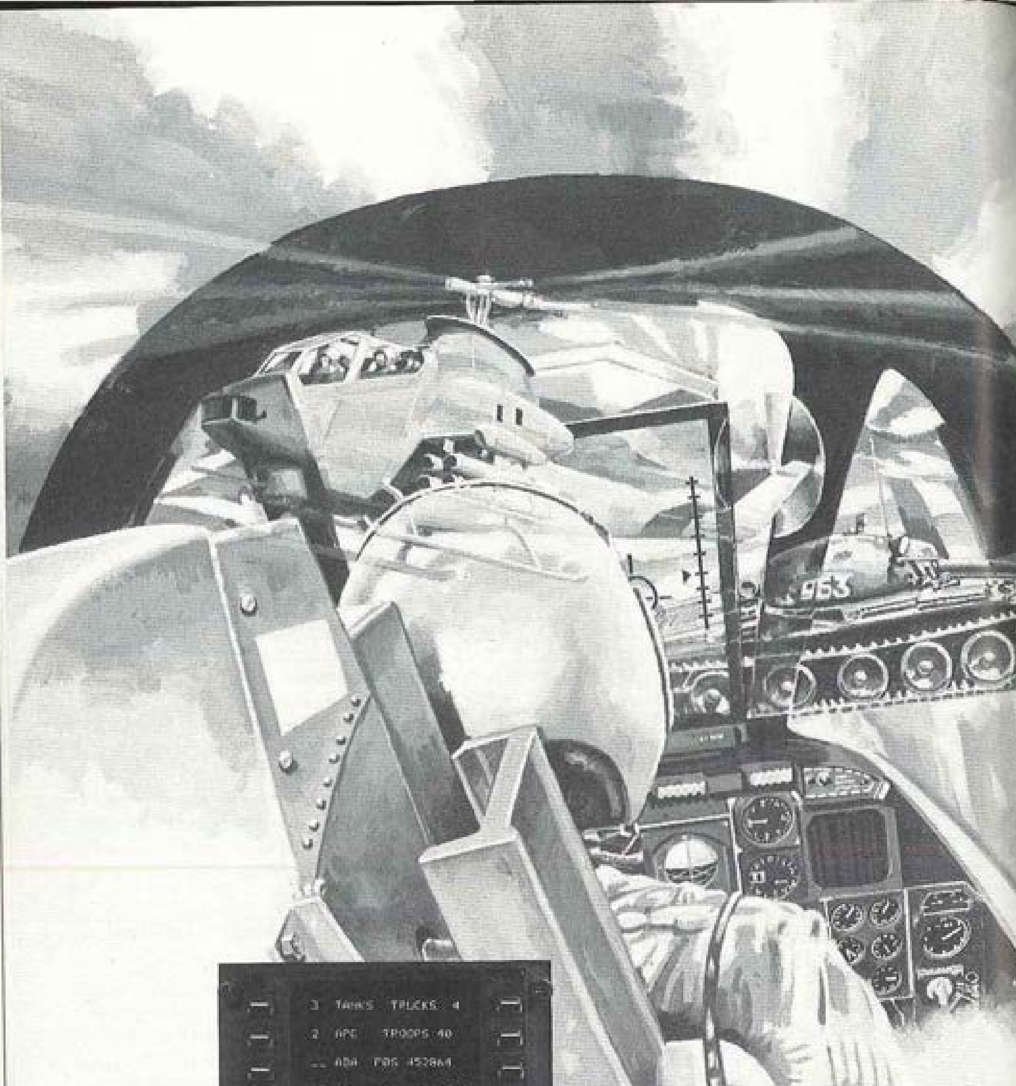
Utilizing the antenna tilt and IF gain controls on the indicator, prominent terrain features, such as shore lines, tall buildings, rivers, and other sizable targets, are easily detected. In the 10mm and 20mm range positions, the MAP mode is enhanced with a shortened RF pulse that sharpens the resolution of the map, and makes even relatively small targets stand out from their surroundings.

Pitch and roll compensation

This task, as well as basic weather tracking, is made considerably easier by the fully stabilized antenna positioner. All pitch and roll variations of the aircraft up to a combined angle of 30°, as detected by the aircraft gyro, are compensated for by the antenna positioner, so position of targets will vary only with altitude, heading, and antenna tilt.

Management of the tilt control, critical to successful radar operation, is mastered with experience, but a normal weather-tracking tilt will be in the range of 4° to 6° up, compensating for the beam width of the antenna.

The color indicator, taking advantage of its TV-type presentation, is embellished with extensive alphanumerics showing range marks, mode of operation, "TEST", or "HOLD" func-




3 TANKS TRUCKS 4
2 APC TROOPS 40
CALL
DPLX
COMM
STAT
DATA
NAV
ZERO
CRT

(LEFT)
XMTR RECEIVER
RT-1352/APN-215 (V)
(CENTER)
ANTENNA
AS-3451/APN-215 (V)
(RIGHT)
INDICATOR
IP-1376/APN-215 (V)
IP-1391/APN-215 (V)

tions when they are in use, a track cursor, and several optional inputs which may be added on in the future. The track cursor is especially helpful in making course corrections to avoid severe weather or to intercept ground targets.

Activating a momentary switch makes the cursor appear as a radial across the display screen; it may then be moved up to 60° right or left of the aircraft's heading. The deviation in degrees from heading is displayed along with the cursor, thereby defining the correction necessary.

The cursor holds its position for 15 seconds after release of the switch, then disappears until it is needed again and reactivated.

Optional add-ons

Optional add-ons currently under consideration are a NAV computer course interface which allows the pilot to overlay weather targets on his plotted course, and an electronic check list, which allows for the display of standard or emergency instructions on the call of the pilot or automatically under emergency conditions.

The NAV overlay is expected to be used in conjunction with the new AN/ASN-132 Intertial Navigation Set in RC-12D aircraft, but no formal requirement has yet surfaced for the check list.

The AN/APN-215(V) was spawned as a replacement for the AN/APN-158 radar sets which are installed in all U-21, RU-21, and U-8F aircraft. The new radar will be installed in the U-21's and RU-21's and will also appear as standard equipment in all future C-12 and RC-12 aircraft.

While the AN/APN-215(V) is fully qualified for use in U-8F's as well, these aircraft are scheduled to be retired from the Army inventory, and plans to provide the AN/APN-215(V) for use in them have been dropped. Properly installed, the AN/APN-215(V) is suitable for helicopter use, but no helicopter requirement has been identified as yet.

The AN/APN-215(V) will be supported through its first five years by a **Reliability Improvement Warranty (RIW)**, covering all repairs necessary during that period. The RIW concept, discussed elsewhere in this issue, places responsibility for field reliability squarely on the contractor who, in turn, is given the authority to make changes in the equipment in the interest of improving its reliability.

Since RIW is funded at the time the radar is procured, there is a strong incentive for the contractor to make such changes, minimize equipment returns, and thereby maximize his profit.

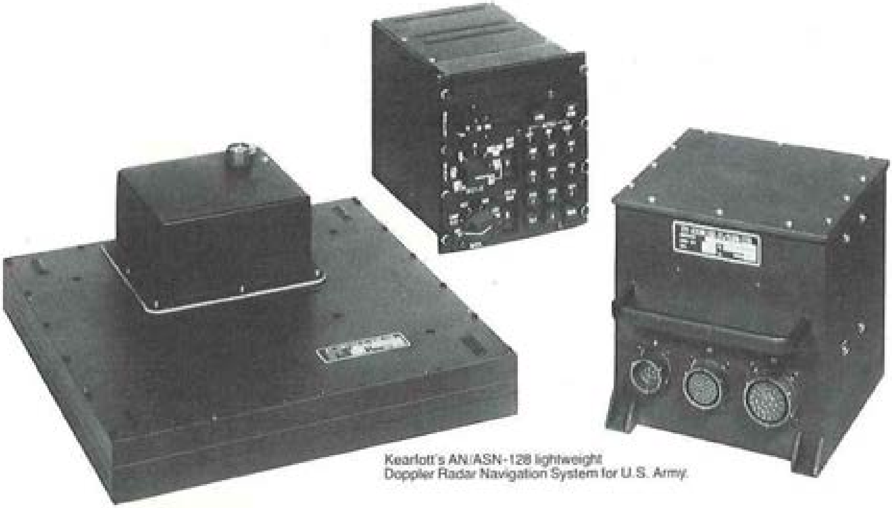
Proper identification mandatory

RIW support for the weather radar will rely for its success on the ability of **Aviation Intermediate Maintenance** (AVIM) personnel to isolate reported failures and properly identify the failed box (RT, indicator, or antenna). The return of equipment for which no failure can be identified will result in a shortage of spares in the field and also will place a monetary penalty on the Government for those returned boxes which "test good".

In order to enhance the ability of AVIM's to confirm failures and absolve non-failures, a special maintenance kit will be fielded. Future plans call for an economic analysis to be conducted after two years of warranty support to determine what means will be used after the five year initial warranty period ends.

Options to be analyzed include RIW extension and full organic support, but due to the item's commercial nature, other approaches may also be considered. □

THE STANDARD FOR DOPPLER RADAR NAVIGATION SYSTEMS



Kearfott's AN/ASN-128 lightweight Doppler Radar Navigation System for U.S. Army.

Kearfott's AN/ASN-128 Lightweight Doppler Navigation System is the U.S. Army's standard airborne doppler navigator.

The Receiver/Transmitter Antenna (RTA) and Signal Data Converter (SDC) constitute the Doppler Radar Velocity Sensor (DRVS), which continuously measures the velocity of the aircraft. The Control Display Unit (CDU) provides control and display functions for the operator, and contains the navigation computer.

With inputs from external heading and vertical references, the ASN-128 system provides accurate aircraft velocity, present position, and steering information. It is completely self-contained and requires no ground based aids.

The DRVS accepts heading, roll, and pitch as synchro inputs and converts them into digital format for transmission to the computer. The DRVS can also be used separately from the ASN-128 to provide velocity inputs to other aircraft equipment.

The CDU accepts beam velocities, heading, roll, pitch and true air speed (in some installations) from the Doppler Radar Velocity Sensor and performs the navigation computations. The front panel includes provisions for entering operator inputs and for displaying system data such as present position, steering information to 10 destinations, and status of the system. The CDU also puts out velocity and navigation data in ARINC digital format.

The CDU performs three functions for the ASN-128:

- Provides mode controls, display controls, and keyboard entry of destinations and other data.
- Performs all computations for LDNS including Doppler processing, velocity coordinate transformations, navigation in both UTM and latitude/longitude, steering signals to 10 destinations, and BITE functions.
- Displays navigation data on its front panel.
- BITE function identifies and displays failed LRU.
- Provides BCD and binary outputs for external equipment.

Operational Advantages:

- Weight 28 lb (12.7 kg)
- FM-CW transmission, with Doppler tracking of the J1 sideband providing accurate velocity measurement from ground level, to over 10,000 feet (3,048m).
- Printed-Grid Antenna—"Land-sea" switch eliminated, because of inherent beam shaping.
- Single transmit-receive antenna, utilizing the full aperture for both transmission and reception, minimizing beam width and reducing fluctuation noise.
- Navigation data in both UTM coordinates and Latitude/Longitude.
- Redundant navigation modes for backup.
- Single time-multiplexed signal processor module—only one-fourth the number of components of previous designs.
- No maintenance adjustments at any maintenance level.
- No special test equipment at the flight line.

For additional information write to: The Singer Company, Kearfott Division, 1150 McBride Ave., Little Falls, N.J. 07424.

Kearfott

a division of The SINGER Company

IMPROVED DOPPLER NAVIGATION CAPABILITIES (AN/ASN-137)

BY A. CHARLES MAROTTA, Project Leader,
Technical Management Division, NAVCON

AS noted in the article **"Doppler: An Automatic "Set and Forget" Navigation System"** in the August-September 1978 issue of **Army Aviation Magazine,** preliminary studies were being conducted at the time of publication to integrate a **Projected Map Display (PMD)** with the **Lightweight Doppler Navigation System (LDNS)** and control the LDNS using the **Integrated Avionics Control System (IACS)**, AN/ASQ-166.

The PMD/IACS integration study was a follow-up to a series of flight tests conducted by the US Army Aircraft Development Test Activity, Fort Rucker, AL, on a complete PMD System (AN/ASN-99) consisting of a PMD, Electronics Control, and Navigation Control units. The test resulted in a number of favorable conclusions relating to reduced pilot workload and mission effectiveness.

Pilot workload confirmed

The control of the LDNS by IACS was dictated by a perceived proliferation of control and display units, the need to centralize avionics control functions, and the desire to put the navigation data on MIL-STD-1553 Bus. When an IACS Customer Test, performed by the US Army Aviation Board, Fort Rucker, during February-March 1980, confirmed the pilot workload, the mission tasking was significantly reduced by the use of IACS as compared to a standard avionics configuration.

The integration study included in August 1978, that the operation of the AN/ASN-128 LDNS with the AN/ASN-99 PMD and AN/ASQ-166 IACS could be achieved with minimum schedule and cost impact in the following manner:

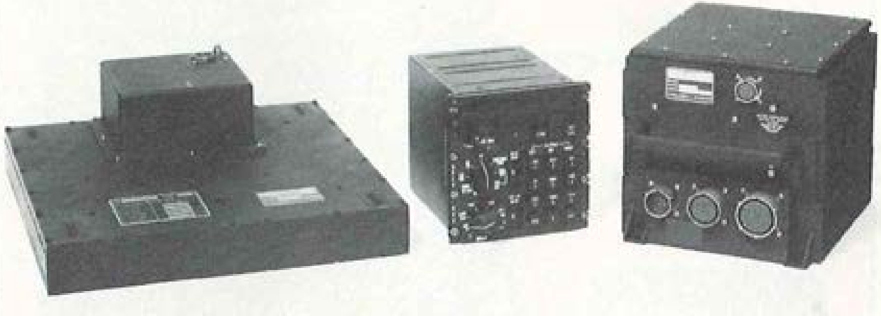
- Transfer the computer and memory functions from the **Computer Display Unit** (CDU) to the **Signal Data Converter (SDC).**
- Use a higher speed microprocessor to improve time-loading and provide growth capability.
- Simplify the CDU-SDC interface.
- Add a power supply to the CDU for power previously provided by the SDC.
- Keep CDU operation and display unchanged.
- Locate the MIL-STD-1553A interface for IACS in the SDC.
- Modify the AN/ASN-128 A/D converter to accept input from a true airspeed sensor and the PMD.
- Retain the existing SDC Power Supply and radar signal processing circuitry.
- Eliminate the Electronics and Navigation Control Units of the PMDS and provide those functions in the SDC PMD interface.
- Expand existing auxiliary data bus to include PMD and CDU data.
- Modify the PMD to accept data from the SDC in ARINC form.
- Accept data from external systms to enable automatic position updates of the LDNS.
- Integrate three existing radar signal processing cards into two cards to reduce SDC size, weight and cost.

A readily available PMD

The AN/ASN-99 PMD was selected for the integration effort because it was the only PMD readily available, off-the-shelf, that could provide the U.S. Army with the capabilities required for evaluation and assessment of an LDNS-PMD hybrid within the timeframe of interest.

A User/Developer Conference was held at Fort Monmouth, NJ, on 24 October 1978 in which the results of the study and a recommended LDNS **Product Improvement Pro-**

THE NEW AN/ASN-137 LIGHTWEIGHT DOPPLER NAVIGATION SYSTEM



gram (PIP) was outlined to elements of the TRADOC or User community for their consideration.

This conference resulted in the development of a PIP that was funded by DA and contracted with the Singer Company producer of the AN/ASN-128 in September 1979.

The PIP objectives

The basic objectives of the PIP effort are to modify the LDNS to:

- Have MIL-STD-1553A/B Data Bus compatibility and thereby:

  a. Accept IACS Control (compatibility with YAH-64 keyboard and display).

  b. Accept Pitch, Roll, and Heading inputs (compatibility with YAH-64 AHRS).

  c. Accept two Axis-True Airspeed Data (compatibility with YAH-64 TAS Sensor).

  d. Accept Range/Bearing from present position to destination for updating and offset targeting.

- Operate with a PMD by having the SDC:

  a. Generate Filmstrip Drive Equations and Logic.

  b. Accept Map Data for Map Drive Equations.

  c. Accept Destination Entry via PMD Slew Signals.

  d. Accept Present Position Update via PMDS Slew Signals.

  e. Provide PMD Test Mode Functions.

- Have flexibility of operating in a different aircraft with multiple system configurations via a Program Plug.
- Display Latitude/Longitude Data (if selected).
- Display metric units in UTM and English units in Latitude/Longitude.

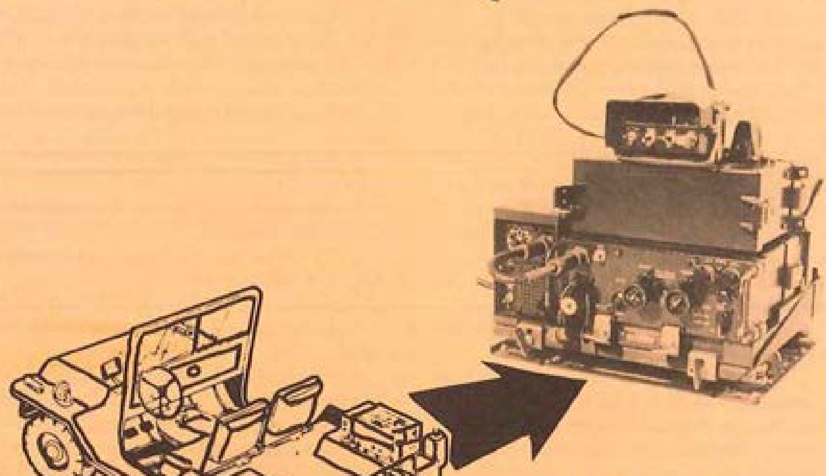
These objectives are to be attained with following constraints:

- No change in **Receiver-Transmitter Antenna (RTA).**
- No change in the CDU Front Panel.
- No change in SDC Mounting Dimensions.
- Maximum Commonality with AN/ASN-128 Modules.

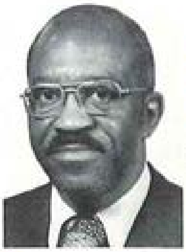
At the present time all basic design effort has been completed and the integration of the IACS and PMD hardware is underway with debugging and verification testing scheduled to be completed in February 1981.

Delivery of the six modified systems is scheduled to be completed by mid-April 1981 for engineering tests and subsequent operational testing in the June-August 1981 time frame. □

AN/PSN-6
LORAN
MANPACK



AN/PSN-6
VEHICLE MOUNT



LORAN C/D MANPACK AIDS ARMY NAVIGATION

BY EARL HAYWOOD, Project Leader,
Logistics Management Division, NAVCON

IN meeting the challenge to provide an all-weather system capable of providing present position information with the highest degree of accuracy and to further enhance the effectiveness of the Army's combat forces, the AN/PSN-6 became a reality after extensive developmental effort.

The predecessor to the AN/PSN-6 had a weight distribution of approximately 28 pounds. Through the evolution of POS/NAV systems and the use of advanced technology, a significant weight reduction was realized without compromising performance.

Subsequent to the development phase and related tests, a limited production contract was awarded to AMECOM Division of Litton Systems to produce a specified quantity of AN/PSN-6 LORAN Manpacks. (See the opposite page). Delivery of production units have since been completed. However, during the production phase, PM NAVCON recognized a logistical support problem which, in effect, precluded fielding the unit.

To correct this situation, the PM initiated an action to retrofit all units delivered under the basic contract. Under this retrofit program, a new processor is being developed for incorporation into the AN/PSN-6 to enhance supportability not achievable with the original processor.

Highly accurate positioning

The operation of the AN/PSN-6 requires signals from a ground chain of either the civil LORAN-C format or of the tactical LORAN-D format. LORAN C/D is a method of radio navigation that provides position fixing accuracies in the order of 100 meters over ranges in excess of 1,500 kilometers.

By using low frequency radio ranging techniques, it is possible to fix the position of a receiver automatically with respect to the earth with speed and accuracy, and at ranges unachievable by any other system of navigation.

All about LORAN C/D

LORAN C/D chains operate at a frequency of 100 kilohertz as a combination of one master station and two to four secondaries per chain, synchronized in such a way that the phase relationship of master and slave transmissions is fixed.

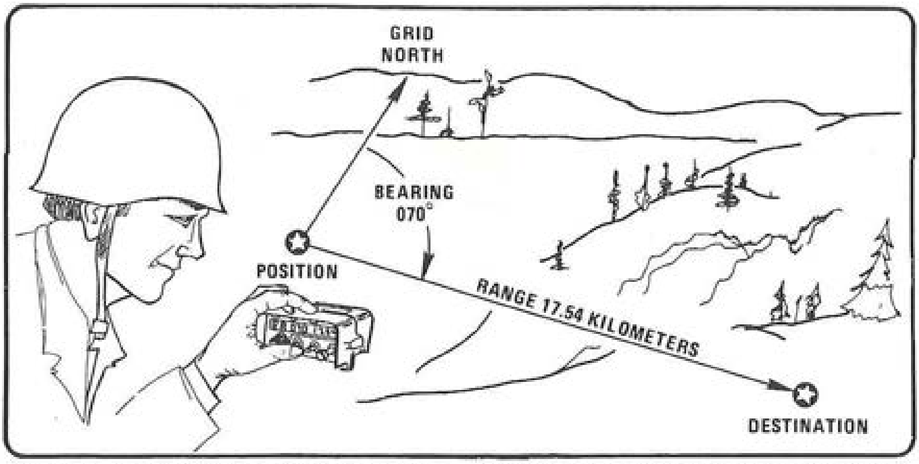
Position is determined within the coverage area by accurately measuring the time of arrival of the signals from the master and at least two of the secondary transmitters. Since low frequency radio waves travel at a constant speed over the surface of the earth, these "time of arrival measurements" are actually range measurements and can therefore be used for accurate position determination.

Operational Uses

The AN/PSN-6 provides precise position location in the Army's standard Military Grid Reference System, commonly called **UTM** for the **Universal Transverse Mercator** maps that are used. Its capability has been expanded to include range and bearing to target and check points as shown in the illustration on the next page.

The need for a manpack position locator is clear. Since the Army is dependent on its mobility to fulfill its total mission, it is vital that it be able to use this mobility under all conditions. Poor visibility conditions caused by fog or darkness or unfamiliar areas, which may lack distinguishable terrain features, must not reduce the speed of advance.

Patrols and platoon elements using the AN/PNS-6 will be capable of arriving more



quickly and reliably at their destinations than they would by using conventional map and compass, the use of which have been inadequate for many missions. In terrain that lacks frequent and identifiable landmarks, map and compass navigation has never been precise.

This is especially true in areas where jungle or forest undergrowth makes straight-line walking or compass-line sighting impossible. Here, the AN/PSN-6 provides an accurate all-weather, all-terrain day/night man-portable position location system that overcomes the limitation of map and compass navigation and the limitations of line of sight radio transmission systems.

A positive method

Command and control capabilities will be greatly enhanced since units or elements will have a positive method of position determination. This will increase the flexibility and effectiveness of the field commander's application of forces. Combat units will have accurate position information to direct close air artillery fire support.

Medical evacuation missions require timely and accurate position reporting from ground units to airborne medical evacuation units. When a helicopter has to search even a small area for the wounded troops, the aircraft is unnecessarily exposed to ground fire, and the wounded have to endure a longer wait for medical assistance. With accurate position reporting from the ground, the aircraft can fly an approach to the exact spot with minimum exposure to hostile fire.

Tests of the AN/PSN-6 in operational exercises have proven its value to assist troops in performing their mission more effectively under simulated combat conditions. Operational exercises have demonstrated successful operation in a desert-type and forest/jungle-type terrain.

Troops using the AN/PSN-6 have been able to complete a 40-mile course hours ahead of troops using the current Army land navigation system (map and compass).

Used as a test vehicle

The AN/PSN-6 is being used as the test vehicle for evaluation of future Electronic POS/NAV Systems since it is the only system presently available. The results will be utilized in a cost and operational effectiveness analysis which will provide decision makers with a tool to establish proper systems mix and aid in the design of future systems.

In the Manpack configuration, as shown, the AN/PSN-6 with control indicator displays present position to the user in LORAN time difference coordinates and UTM coordinates.

The vehicle-mounted system provides the same functional capabilities as the Manpack version. An adapter unit is provided to mount the equipment in an Army vehicle properly. Included as an integral part of the adapter is a DC-DC converter to provide operation from the vehicle power source. □

AIRBORNE TARGET HANDOFF IN THE ARMY TODAY

BY ROBERT SWEIDER, Project Engineer, Communications Systems Division, Communications/Sensors Division, AVRADA

FOR many years now Army Aviation has conducted field exercises to evaluate helicopter organizational and operational concepts. Particular emphasis has been placed on teaming OH-58 and AH-1 (TOW) aircraft to perform anti-armor missions.

These evaluations have not yet considered the effects of the employment of laser-guided ordnance on the team concepts developed to date. With the advent of the AAH-HELLFIRE System, the Army has obtained an anti-armor capability which far surpasses the current TOW-equipped forces.

A close coordination

In the indirect fire mode, however, HELLFIRE requires close coordination between the gunship and a cooperative designating unit. Similarly, the artillery's employment of the Copperhead laser-guided shell presents new requirements to the Tactical Fire Direction System and its ground and Airborne Scouts.

The interactions required to combat the armor threat successfully are shown in the adjoining artist's conception. Not only will the **Near Term Scout Helicopter (NTSH)**crew and the ground-based forward observers be required to locate targets and and then call for or adjust conventional artillery fire, but they will now be required to coordinate and designate targets for Copperhead artillery missions and HELLFIRE indirect fire missions.

In order to improve the survivability of the Airborne Scout, the Army is pursuing a Near Term Scout Helicopter development utilizing a **Mast Mounted Sight (MMS)**.

Large amounts of efforts have been expended to make helicopters more survivable; however, it's still an axiom that the helicopter's survivability depends on its ability to avoid being hit, which is directly related to its ability to remain unobserved by the enemy. Development of MMS, HELLFIRE, and NOE tactics will reduce aircraft visiblility exposure to a minimum.

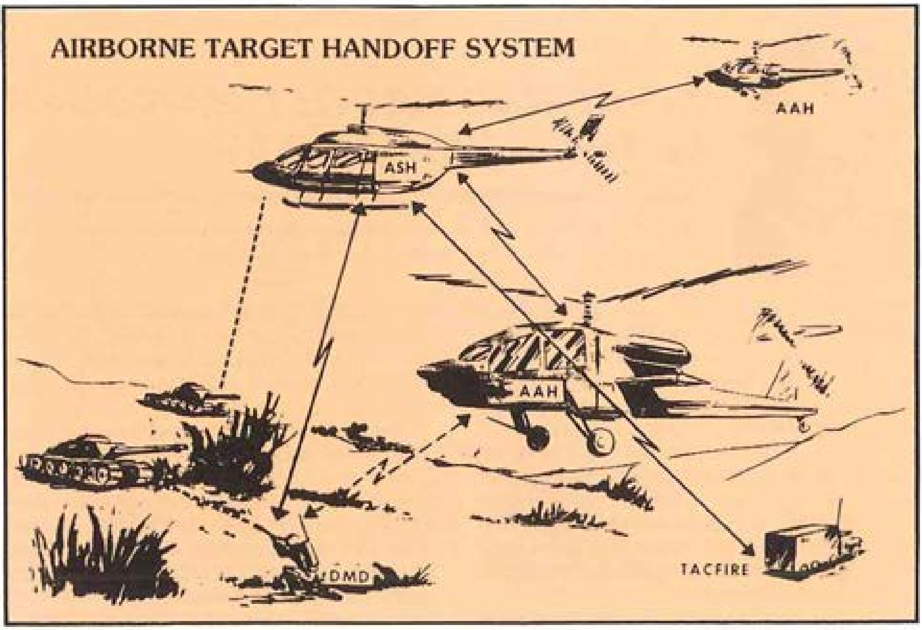
While spread spectrum and frequency hopping techniques are under development today to reduce the RF exposure, current tactical radios will be the mainstay of communication for many years to come. Little, if any, actions have been taken to reduce the radio transmission time required while retaining the accuracy of the information transmitted.

Near term solution sought

With the development of the HELLFIRE indirect mode of fire, the Army began to look for simple, near term solutions to the RF exposure problem. Various tests performed under controlled conditions by MICOM, CORADCOM, and AVRADA have shown that using today's methods to obtain target data, hand it off, and coordinate the mission significantly increases crew workload at NOE and requires sufficient RF transmission times so that a well-trained enemy can't determine the helicopter's position and take evasive action.

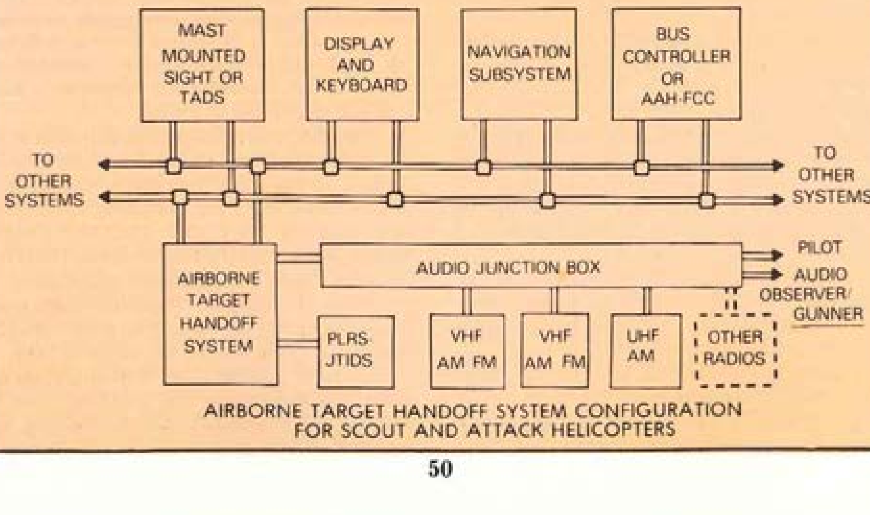
A two-fold effort was then undertaken to reduce the workload and RF exposure times while maintaining or increasing overall mission effectiveness. Further testing, using specially modified AN/PSG-2 TACFIRE **Digital Message Devices (DMD)**, illustrated that fire missions could be completed successfully in less than 60 seconds. While this may seem time-consuming, the same data transmitted by voice would take four to five times as long.

The tests further showed that significant reductions in timelines and workload could be realized by integrating and automating the majority of the target location calculations,



data transcription, message formulation, and transmission functions.

While the AN/PSG-2 DMD significantly shortened the on-the-air communications time, it did little to reduce and in some cases, actually increased the cockpit human factors problems. The DMD was designed for use by an observer in a ground environment as part of the TACFIRE system. While it is in limited use by Air Cav Scouts in OH-58 helicopters it



AIRBORNE TARGET HANDOFF SYSTEM CONFIGURATION FOR SCOUT AND ATTACK HELICOPTERS is not suited to an aircraft environment.

Hand held, it requires two hands for successful operation and demands almost complete attention from the observer, thereby eliminating his usefulness to the pilot in an NOE environment. High ambient light conditions present glare and display washout problems. Finally, the DMD requires large amounts of data to be transcribed by the user between it and the Sighting, Navigation, and Weapons Systems.

ATHS program developed

Based on the previous tests, the Avionics R&D Activity, with the support of TRADOC, initiated the **Airborne Target Handoff System (ATHS)** program to develop an integrated digital communications capability for the Scout and Attack helicopters that is compatible with current and planned communication systems of both helicopters, as well as the supporting ground systems.

The ATHS is not an RF communications device nor a fire control system, but rather can be thought of as an intelligent concentrator and disseminator of target handoff data within the aircraft and controller of its transmission between external users.

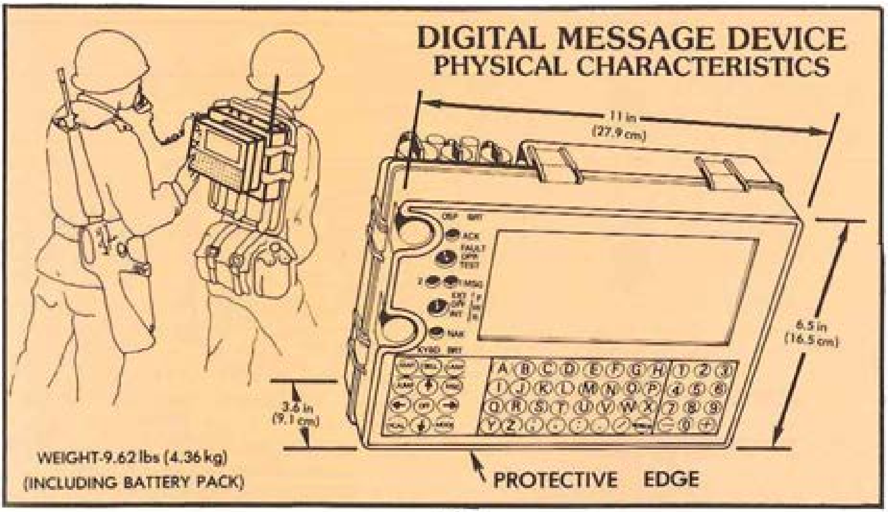
While the ATHS is the name given to a single black box about the size of the DMD, successful target handoff relies on the integration of a number of equipments.

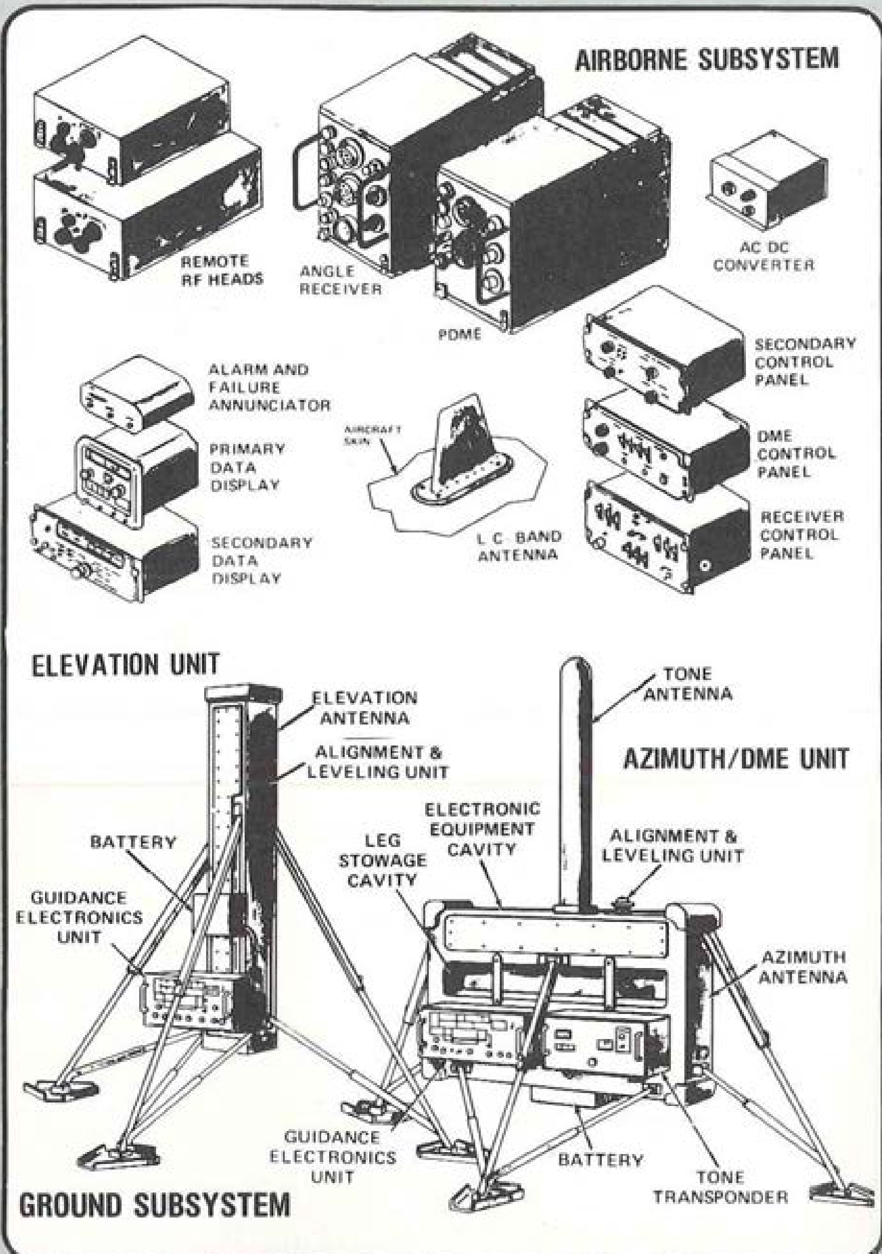
To demonstrate how the ATHS will be employed, let's postulate two scenarios. The first is a Scout 'copter on patrol supporting an artillery unit. Once a target is spotted, via the MMS, the observer initiates the handoff procedure activating a button on the MMS controls.

This automatically enters the location of the target relative to the aircraft into the ATHS and initiates a sequence which requests the helicopter current location and calculates the UTM position of the target.

Concurrently, the ATHS requests, via display prompting, the following data from the observer: number of targets, target type, type of mission (laser/conventional), and the unit to receive the message. Supplementary information, such as target attitude and condition may be entered as time permits, but is not essential to the completion of a mission.

With all the above information, the ATHS formulates the appropriate message and transmits it. An acknowledgment is sent by the receiving unit for positive control. With only five keystrokes and less than 30 seconds a message containing accurate target data has been sent and verified. Actual radio exposure is limited to a few seconds and, using the MMS, the Scout remains visually concealed. □




AIRBORNE SUBSYSTEM
REMOTE
RF HEADS
ANGLE
RECEIVER
PDME
AC DC
CONVERTER
SECONDARY
CONTROL
PANEL
DME
CONTROL
PANEL
RECEIVER
CONTROL
PANEL
ALARM AND
FAILURE
ANNUNCIATOR
PRIMARY
DATA
DISPLAY
SECONDARY
DATA
DISPLAY
AIRCRAFT
SKIN
L C BAND
ANTENNA
ELEVATION UNIT
ELEVATION
ANTENNA
ALIGNMENT &
LEVELING UNIT
BATTERY
GUIDANCE
ELECTRONICS
UNIT
TONE
ANTENNA
AZIMUTH/DME UNIT
ELECTRONIC
EQUIPMENT
CAVITY
LEG
STOWAGE
CAVITY
ALIGNMENT &
LEVELING UNIT
AZIMUTH
ANTENNA
GUIDANCE
ELECTRONICS
UNIT
BATTERY
TONE
TRANSPONDER
GROUND SUBSYSTEM

GET TO KNOW THIS MOST IMPORTANT ACRONYM: JTLMS

BY EDDIE CORNELIOUS, Project Leader,
Technical Management Division, NAVCON

THE objective of the tri-service **Joint Tactical Microwave Landing System (JTMLS)** development effort is to develop a landing system which will provide rotary and fixed wing aircraft with the capability of making safe instrument approaches to and landing on minimally prepared tactical sites under adverse weather conditions.

Advanced Development Contract

On 30 May 1980 the Army, as lead service, awarded an advanced development contract for the JTMLS to Bendix Communications Division, Towson, MD. The Advanced Development Contract effort is for design, development, testing, and delivery of three ground subsystems, four airborne subsystems, an airborne installation pallet, data and nine months of engineering services.

The hardware will be delivered approximately twenty-one months from contract award, with a tri-service test program commencing immediately thereafter. This effort is being funded by the FAA. However, the management responsibilities for the JTMLS has been transferred to DOD.

JTMLS System Description

The JTMLS system consists of a JTMLS ground subsystem and a JTMLS avionics subsystem. The ground subsystem establishes a signal in space covering the landing approach volume (**Figure 1** on the opposite page); this ground-based subsystem includes an angle guidance subsystem and **Precision Distance Measuring Equipment (PDME)** subsystem.

The airborne angle subsystem detects and decodes the signal in space to determine the aircraft's angular coordinates (azimuth angle and elevation angle), and deviations relative to the selected approach path. The airborne PDME subsystem interrogates and receives signals from the ground transponder to determine slant range and range rate information.

This interrogation can also be used by the ground-based subsystem to activate the "signal in space" transmission when the ground-based subsystem is in the service demand mode.

The JTMLS will provide Category II/Category I approach capability. This approach capability will be available within 15 minutes after personnel and ground guidance equipment arrive at the desired installation site. The general configuration of the JTMLS is shown in **Figures 2** and **3** on the next page.

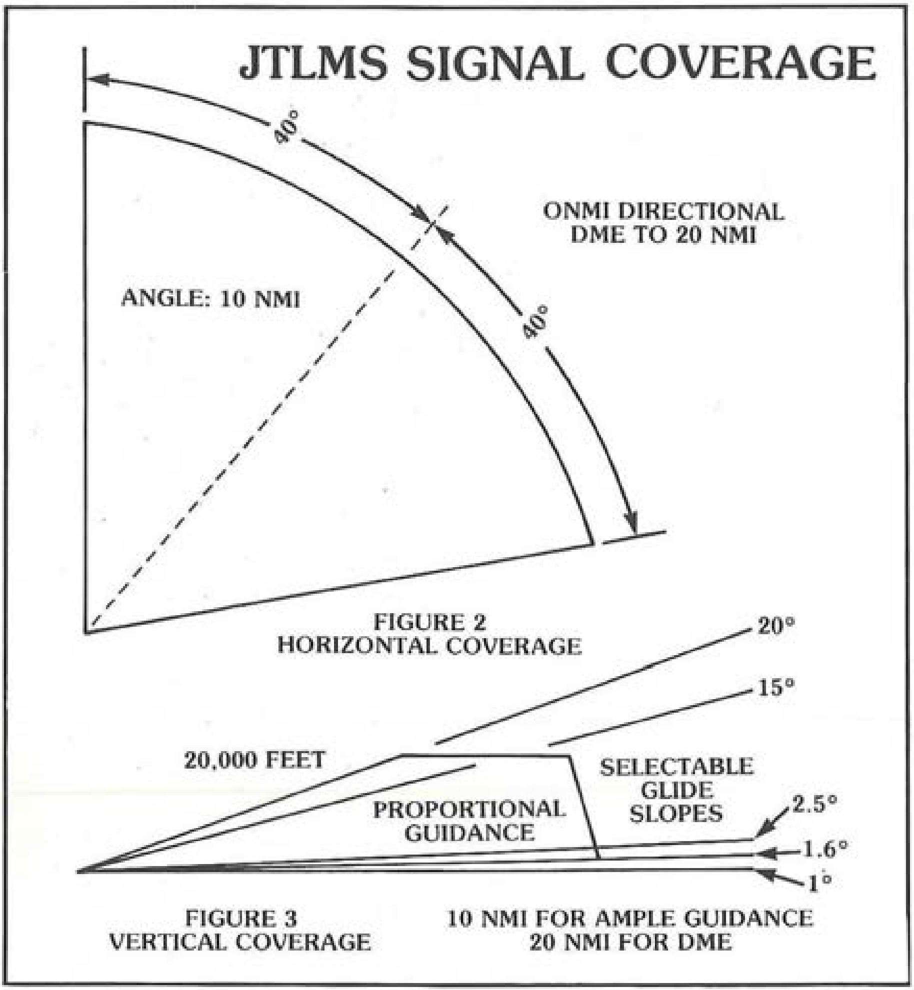
Deployment

The ground subsystem shall be capable of being utilized in either a co-located or split-site configuration. Implementation concepts will enhance this capability without significant penalty to either configuration.

The subsystem will provide guidance to support at least Category I approaches when operated in a split-site configuration on a runway up to 7,000 feet in length, and at least Category II approaches when operated split-site on runways up to 4,000 feet in length.

When deployed in the co-located configuration the JTMLS ground subsystem will be fully capable of providing approach service following an initial setting up procedure that occupies as a design goal no more than 15 minutes time after on-site delivery; and will be capable of being oriented in a new direction by two men in three minutes nominal time. The JTMLS ground subsystem will require no operational adjustments subsequent to being installed, aligned, and placed in operation.

The avionics subsystem of the JTMLS will be permanently installed in many types of



military aircraft, thereby giving them access to landing guidance data at all MLS-equipped bases and civilian airports.

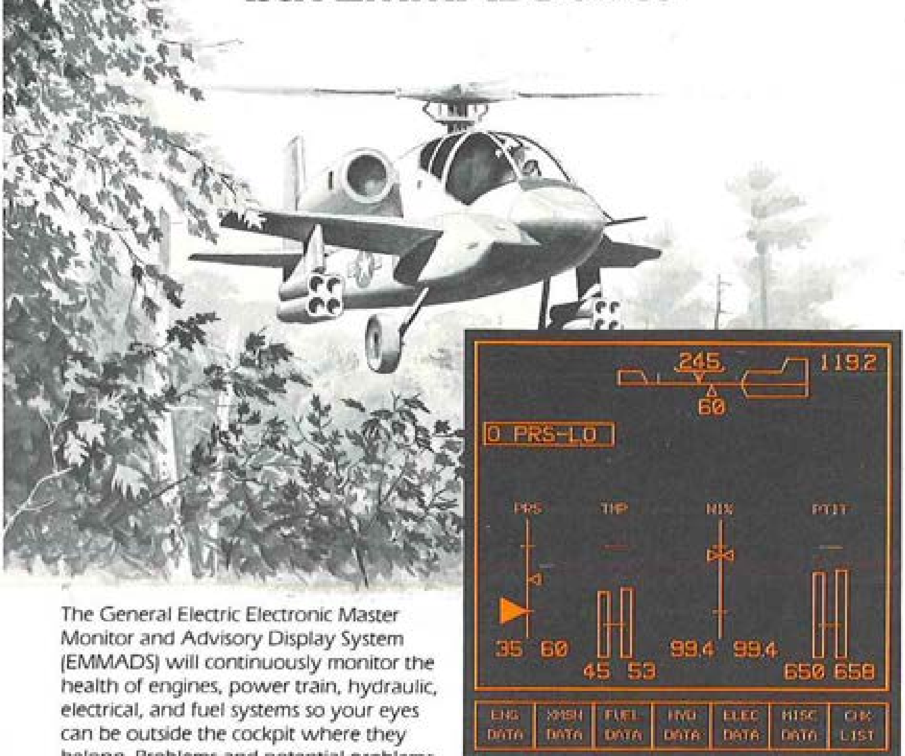
The equipment will provide output signals to drive cross-pointer instruments, attitudes director instruments, and head-up displays in accordance with aircraft deviation from a pre-selected, fixed approach path.

Equipment to be Replaced

The principal tactical approach and landing system currently used by the Army is the **Ground Controlled Approach (GCA)** radar system. The GCA equipment is heavy, cumbersome, limited to a 200 foot decision height operation, and requires a highly skilled ground controller.

The JTMLS ground subsystem is intended to replace the existing tactical GCA systems, with the airborne subsystem replacing existing military airborne **Instrument Landing System (ILS)** equipment.

You don't always have time to worry about engine oil pressure — but EMMADS does.



The General Electric Electronic Master Monitor and Advisory Display System (EMMADS) will continuously monitor the health of engines, power train, hydraulic, electrical, and fuel systems so your eyes can be outside the cockpit where they belong. Problems and potential problems are analyzed by the GE digital computer and clearly displayed on a solid state panel along with corrective actions. EMMADS does even more by indicating routine checklists and maintenance history data.

General Electric is developing EMMADS with the U.S. Army for increased efficiency and survivability in tomorrow's helicopter mission.

AIRCRAFT EQUIPMENT DIVISION

GENERAL ELECTRIC

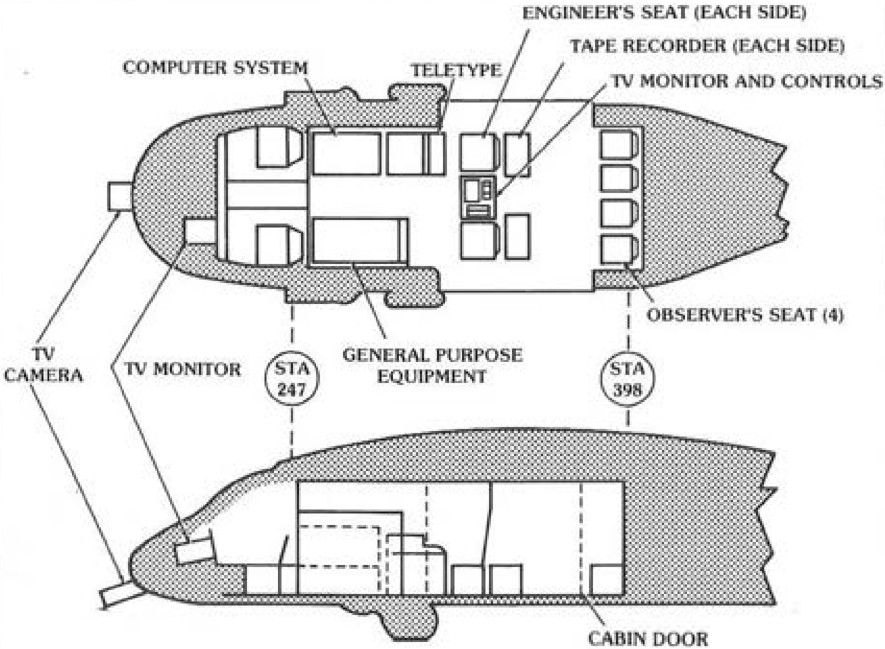


FIGURE 1
EQUIPMENT LOCATIONS ON THE SYSTEMS TESTBED FOR AVIONICS RESEARCH (STAR) AIRCRAFT

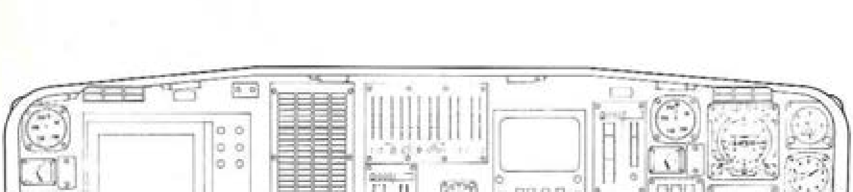


FIGURE 2
STAR INSTRUMENT PANEL ON UH-60 BLACK HAWK

THE SYSTEMS TESTBED FOR AVIONICS RESEARCH (STAR)

BY RAYMOND F. CLARK, Chief, Systems Integration & Evaluation Branch, Advanced Systems Division, AVRADA

STAR, a demonstration/testbed helicopter, is the vehicle being developed to bring together the AVRADA technology program for final system integration and design verification.

The STAR will not only enable AVRADA to verify advanced avionics technology and systems integration techniques but, in addition, will provide a unique opportunity to demonstrate to the user a digitally-integrated system in a modern Army aircraft.

Black Hawk selected for use

A decision was made to use a production UH-60A **Black Hawk** as the STAR aircraft and this aircraft is presently undergoing modification in house.

Specific modifications include installation of the **Integrated Avionics Control System** (IACS), a Singer SKC-2000 general purpose airborne digital computer with extensive input/output and data recording capability, a nose-mounted daylight TV camera, a digital symbol generator, and co-pilot and engineer TV monitors.

Cargo area installation

The majority of equipment is being installed on four specially designed equipment racks in the cargo area of the aircraft. Six crew seats will remain in the cargo area, two for engineering personnel with access to computer, video, power and recorder controls, and four across the rear for observers (**Figure 1** opposite).

Extensive changes are being made to the lower console and co-pilot instrument panel. All communication/navigation radio control heads are being removed from the lower console and replaced by the IACS control panels.

The co-pilot's radar altimeter indicator, vertical speed indicator, **vertical situation indicator** (VSI), **horizontal situation indicator** (HSI), VSI/HSI mode select, and clock will be removed.

The co-pilot's remaining instruments will be relocated and an eight inch color TV monitor will be mounted on the left of the co-pilot's instrument panel, (**Figure 2** below). Digitally generated flight symbology, digital maps, and video from the nose camera will be presented on the TV monitor to aid in NOE flight.

The first phase of flight tests will include elements of the **Night Navigation and Pilotage** (NNP) System. The NNP program consists of several interrelated efforts oriented toward development of a avionics system to enable an aircrew to operate effectively in the NOE environment, day or night.

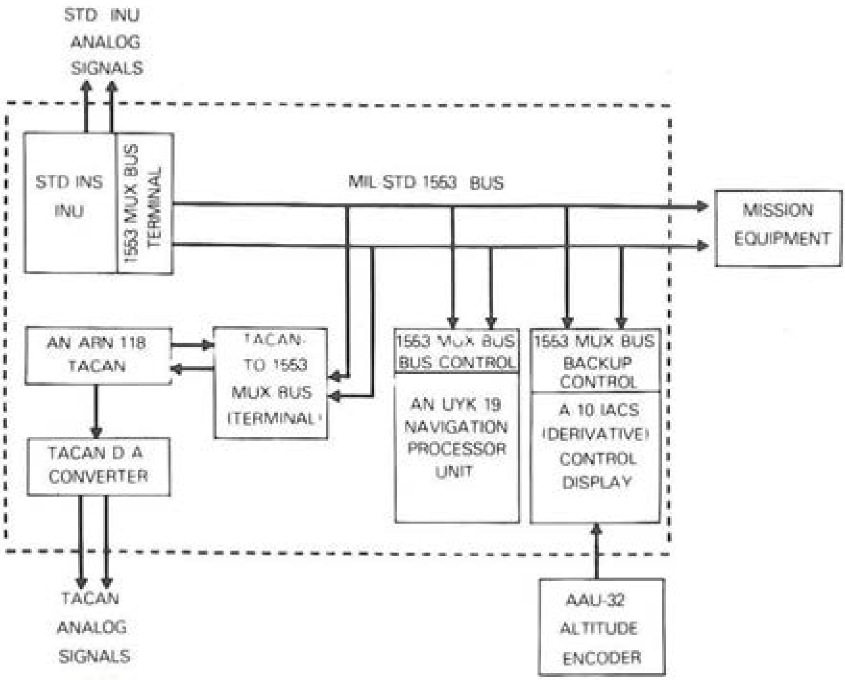
Specific tests to be conducted are the Terrain Correlation Navigation System and the first phase of the Digital Map Program.

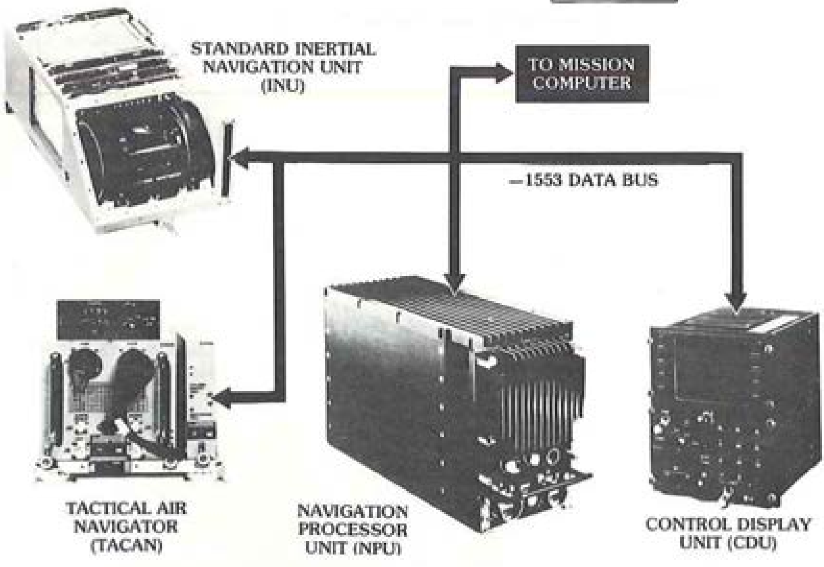
ADAS installation planned

Installation of the **Army Digital Avionics System** (ADAS) in the STAR is also planned. The ADAS, described on pages 33-35, will result in the conventional UH-60A instrumentation system being replaced with a set of integrated controls and displays and all intra-aircraft signal interconnections being achieved via a dual redundant data bus. Advanced phases of the NNP system will also be incorporated as they are developed.

The knowledge gained by the Army through "hands on" experience with digital integrated systems, controls and displays in the STAR will help define future Army avionics requirements and systems. □

The last special issue on NAVCON was published in September, 1978.


STD INU
ANALOG
SIGNALS
STD INS
INU
1553 MUX BUS
TERMINAL
MIL STD 1553 BUS
MISSION
EQUIPMENT
AN ARN 118
TACAN
TACAN
TO 1553
MUX BUS
(TERMINAL)
1553 MUX BUS
BUS CONTROL
AN UYK 19
NAVIGATION
PROCESSOR
UNIT
1553 MUX BUS
BACKUP
CONTROL
A 10 IACS
(DERIVATIVE)
CONTROL
DISPLAY
TACAN D A
CONVERTER
TACAN
ANALOG
SIGNALS
AAU-32
ALTITUDE
ENCODER


STANDARD INERTIAL
NAVIGATION UNIT
(INU)
TO MISSION
COMPUTER
—1553 DATA BUS
TACTICAL AIR
NAVIGATOR
(TACAN)
NAVIGATION
PROCESSOR
UNIT (NPU)
CONTROL DISPLAY
UNIT (CDU)

THE INERTIAL NAVIGATION SYSTEM CAPABILITIES FOR U.S. ARMY AVIATION

BY ROBERT E. TORREGROSSA, Technical Management Division, U.S. Army Aviation Research & Development Activity

PERFORMANCE of several of the U.S. Army classes of systems depends directly on the accuracy of **position and navigation (POS/NAV)** data such as present position, velocity, attitude, and heading. This data must be considerably better and more capable than that provided by the Doppler Navigator which is the Army's primary navigation system.

Why inertial?

It is desirable that the precision navigator for these missions be mechanized as a secure, non-radiating, self-contained system as opposed to use of external radio or electro-optical references. Such a capability has been made practical through extension of the principles for measurement of inertial/gravitational forces first described by the German physicist, Maximilian Schuler, in 1923. By using a digital computer, the fundamental physics of motion equations can be solved relating velocity and position to the sensed accelerations.

In most current day applications, the **Inertial Measuring Unit (IMU)** and computer reside together in a single chassis **Inertial Navigation Unit (INU)**. Unfortunately, the position and heading errors of an unaided inertial navigation system increase with time. Over the lengthy duration of a typical Army mission, these drift errors become unacceptable.

Another source needed

Consequently, another source of position information must be used to limit or bound the inertial errors. Since 1967, the Army has employed the AN/ASN-86 inertial navigation set and AN/ARN-103 **Tactical Air Navigator (TACAN)** for its special applications. By using a roll call of up to ten known surveyed TACAN beacons and computing one's ship's position via multi-lateration, the AN/ASN-86 inertial drift can be bounded.

Technology update

Progress in MSI, LSI fabrication and BITE techniques, as well as in inertial element technology since 1967, now offers significant attraction over the AN/ASN-86 in the areas of life cycle cost, logistics, reliability, maintainability, size, weight and power consumption.

Additionally, the original AN/ASN-86 computer software architecture made its adaptability quite low, with changes being difficult and expensive to implement. TRADOC, perceiving that the time was at hand to update and improve the Army's inertial capabilities, initiated requirements for a new **Integrated Inertial Navigation System (IINS)**.

IINS architecture

The system architecture for this more modern, optimally integrated IINS features a dual redundant MIL-STD-1553 time division **multiplex (MUX)** data bus to interconnect each subsystem, thus eliminating need for the multiconductor discrete wire harnesses presently in use.

The MUX data bus affords ultimate system flexibility whereby hardware changes can be implemented in a most cost-effective manner, e.g., instead of using TACAN to update the inertial, a MIL-STD-1553 compatible NAVSTAR **Global-Position-System (GPS)** or **Position Locating and Reporting System (PLRS)** can be substituted when they become operational.

A digital computer, external to the one in the INU, performs the navigation processing, i.e., TACAN update, as well as controlling the MUX data bus. In a recently concluded advanced development and flight test effort the Army demonstrated feasibility of the IINS concept as well as developing newer adaptable computer software, including modularization of the overall operational program, MUX bus control and a multi-state KALMAN filter algorithm which performs TACAN updating.

The best game in town

The major IINS subsystem are highly complex and employ sophisticated technology with attendant high development costs. Additionally, recognizing their special application as being relatively low in numerically density, the most cost-effective Army strategy is to capitalize on other ongoing Army and sister Service efforts. Fortunately, due to their efforts, the present time is ideal for the Army to minimize or preclude non-recurring hardware development costs. A new IINS, nomenclatured the AN/ASN-132( )(V), can be synthesized optimally by use of the following subsystems.

Inertial Navigation Unit (INU)

The Air Force form-fit-function Standard INU, currently in large scale production for the A-10 aircraft with potential application for F-16, F-111 and F-4, offers the most attractive alternative. The Air Force program is geared toward stopping proliferation of medium accuracy inertial systems and lowering acquisition and life cycle costs by fostering competition in the inertial industry, increasing reliability, promoting equipment interchangeability.

Tactical Air Navigator (TACAN)

The Air Force AN/ARN-118 TACAN is being produced and fielded in high quantity. It meets the Army's accuracy requirements, is demonstrating excellent field reliability, and represents a significant cost savings over the present AN/ARN-103 TACAN. This unit, as well as the Standard INU, can be procured directly from the Air Force thereby offering the economy of scale.

Navigation Processor Unit (NPU)

An Army (CORADCOM) qualified digital computer, the AN/UYK-19, presents the most cost-effective choice. This unit is in production and has a full logistics support program in effect.

Control Display Unit (CDU)

The CDU is a derivative of the one being produced for the Air Force A-10 aircraft as well as the one developed and qualified under the Army **Integrated Avionics Communications Systems** (IACS) program. It features programmable mechanization of the operator man/machine interface and is capable of performing the back-up MUX bus control function.

The time is right

The Army has the opportunity to participate in ongoing competitive large production programs, and is planning to embark on an engineering development effort to assemble the AN/ASN-132( )(V) in a militarized configuration to be installed and flight test in fixed and rotary aircraft. Current life cycle cost analyses indicate that the total AN/ASN-132 ( )(V) RDTE program can be amortized after procurement of as little as 30 systems. □

NEXT MONTH

The January-February 1981 combined issue is a special issue devoted to the US Army Troop Support and Aviation Materiel Readiness Command (TSARCOM).

The issue features a preface by Joseph P. Cribbins, ODCSLOG, HQDA, and an introduction by Major General Emil L. Konopnicki, the TSARCOM Commander.

Other articles in the special issue will report on the Aviation Readiness Project Officers by Colonel Jon R. Telfer, the Director of Systems Management; Electronic Airplanes Worldwide by Colonel Sylvester C. Berdux, Jr., PM—SEMA; and the $2 billion worth of wholesale level aircraft repair parts managed by TSARCOM, as written by Maurice N. Shriber, the Chief of the Aircraft Systems Division of the Directorate for Materiel Management.

Campbell's Brophy leads Sweeps' enrollees

Still the AAAA Sweepstakes' "Top Gun" at the 11½-month point, Captain William S. Brophy of the 101st Airborne Division (Air Assault) leads all individual recruiters in the AAAA's 1980 National Membership Sweepstakes in having enrolled 143 new members during the January 1—December 23 contest period. The following AAAA members have enrolled six or more new members in '80:

1. CPT William S. Brophy, Ft. Campbell. 143
2. 1SG James Neale, Ft Campbell. 79
3. MAJ Dieter W. Krause, APO NY 09031. 47
4. CPT Paul O'Sullivan, Ft Campbell. 44
5. MAJ Roger D. Hill, APO NY 09061. 43
6. CW4 Donald R. Joyce, Newport News. 35
7. CPT Gus M. Meull, II, APO NY 09025. 34
8. MAJ Paul C. Hollowell, II, APO NY 09611. 30
9. MAJ Robert H. Bryant, Eatontown, NJ. 25
10. CW2 Frank M. Candela, Langhorne, PA. 23
11. MAJ Wm. E. Coleman, Ft Rucker. 22
11. Mr William Y. Edgar, Corpus Christi. 22
11. CPT Henry A. Parham, Jr., Ft Campbell. 22
12. MAJ Ace A. Cozzalio, APO NY 09326. 21
13. CW3 Raymond J. Douglas, Savannah, GA. 20
13. 13. LTC Jack E. Easton, APO NY 09039. 20
13. CW2 Robert Whatley, APO NY 09146. 20
14. SGT Ernest D. Anderson, APO NY 09039. 19
15. WO1 Ross Palmer, Ft Campbell. 18
15. Ms Sandra Strub, Corpus Christi. 18
16. CPT Jose F. Campos, Guaynabo, PR. 17
16. CPT John E. Rieder, Newport News. 17
16. MAJ Charles E. Merkel, Jr., Wayne, PA. 17

FT. WORTH, TX—Bell Helicopter Textron's President James F. Atkins, center, draws the winning slip of Clarksville, KY's SFC Ernest C. Salyer from the bowl containing many pre-drawn 'Sweepstakes Recruiter' slips. COL D.W. Ferguson, left, Commander of the Bell Army Plant Activity, holds the AAAA bowl for Mr. Atkins as AAAA Past President Robert R. Williams, right, holds a duplicate of the Cobra model won by SFC Salyer in the Sweepstakes' drawing. (BHT photo)

AAAA CHAPTER TOTAL MEMBERSHIP

(As at 23 December 1980)

Name of AAAA Chapter Activity and Geographical Location	Jan 1	Jul 7	Dec 23
1. Air Assault (Ft. Campbell)	706	1,128	900
2. Army Aviation Center Chapter	433	466	659
3. Washington, D.C. Chapter	506	526	522
4. Lindbergh Chapter (St. Louis)	289	304	341
5. S. California (Edwards AFB)	199	227	229
6. David E. Condon (Ft. Eustis)	155	205	209
7. Monmouth Chapter	182	203	208
8. Connecticut Chapter (Stratford)	186	193	188
8. Corpus Christi Chapter	192	206	188
9. Fort Hood Chapter	184	179	169
10. Rhine Valley Chapter (Heidelberg)	158	146	146
11. Morning Calm Chapter (Seoul)	75	110	141
12. Delaware Valley Chapter (Phila.)	---	---	138
13. Coastal Empire (Hunter AAF)	85	101	133
14. Stuttgart Chapter	81	112	129
15. Taunus Chapter (Frankfurt)	113	141	116
16. Franconia-Marne (Kitzingen)	74	95	114
16. Aloha Chapter (Hawaii)	99	118	114
17. Metro-Atlanta Chapter	---	104	110
18. Fort Leavenworth Area	84	71	105
19. Fort Lewis Area	108	103	102
20. Fort Bragg Chapter	113	102	90
20. Jack H. Dibrell (San Antonio)	97	95	90
21. Old Ironside Chapter (Illesheim)	46	80	83
22. Fort Meade Area	86	84	82
23. Hanau Chapter	58	67	79

Name of AAAA Chapter Activity and Geographical Location	Jan 1	July 7	Dec 23
24. Suncoast Chapter (Tampa)	64	68	78
25. Mainz Chapter	128	90	77
26. Fulda Chapter	77	96	75
26. Schwaebisch Hall Chapter	80	55	75
27. Chicago Area Chapter	50	56	69
27. Embry-Riddle Chapter (Daytona)	75	77	69
27. Fort Ord Area	90	80	69
28. Tennessee Valley (Huntsville)	56	56	63
28. Fort Sill Area	73	72	63
29. Fort Benning Chapter	53	68	62
30. Fort Monroe Area	54	54	58
31. Bonn Chapter	30	32	57
31. San Francisco Area	54	62	57
32. Fort Carson Area	48	52	53
33. Numburg Chapter	59	61	49
34. Fort Bliss Area	51	52	47
35. Birmingham Area Chapter	48	40	46
35. Tarheel Chapter (Raleigh)	63	55	46
36. Checkpoint Charlie (Berlin)	---	8	43
37. Fort Polk Area	47	47	42
38. Miss. Valley (Davenport, IA)	40	39	40
39. Lone Star Chapter (Austin)	44	31	39
40. Fort Knox Area	54	50	37
41. Fort Riley Area	29	33	33
42. Valley View Chapter (Wertheim)	57	30	27

AAAA CHAPTER SWEEEPSTAKES' STANDINGS

(As at 23 December 1980)

CATEGORY I: Largest Membership Gain (Memb. Diff. between 1 Jan and 31 Dec 1980)
Prize: AAAA Plaque and All-Expense Hospitality Suite at 1981 AAAA Nat'l Convention

Name of AAAA Chapter Activity and Geographical Location	Jan 1	Dec 23	Memb Gain
1. Army Aviation Center Chapter	433	659	+226
2. Air Assault (Ft. Campbell)	706	900	+194
3. Delaware Valley Chapter (Phila.)	---	138	+138
4. Metro-Atlanta Chapter	---	110	+110
5. Morning Calm Chapter (Seoul)	75	141	+66
6. David E. Condon (Ft. Eustis)	155	209	+54
7. Lindbergh Chapter (St. Louis)	289	341	+52
8. Coastal Empire (Hunter AAF)	85	133	+48
8. Stuttgart Chapter	81	129	+48
9. Checkpoint Charlie (Berlin)	---	43	+43
10. Franconia-Marne Chapter	74	114	+40
11. Old Ironside Chapter	46	83	+37
12. S. California (Edwards AFB)	199	229	+30
13. Bonn Chapter	30	57	+27
14. Monmouth Chapter	182	208	+26
15. Ft. Leavenworth Area	84	105	+21
15. Hanau Chapter	58	79	+21
16. Chicago Area Chapter	50	69	+19
17. Washington, D.C. Chapter	506	522	+16
18. Aloha Chapter (Hawaii)	99	114	+15
19. Suncoast Chapter (Tampa)	64	78	+14
20. Fort Benning Chapter	53	62	+9
21. Tennessee Valley (Huntsville)	56	63	+7
22. Fort Carson Area	48	53	+5
23. Fort Monroe Area	54	58	+4
23. Fort Riley Area	29	33	+4
24. San Francisco Area	54	57	+3
24. Taunus Chapter (Frankfurt)	113	116	+3
25. Connecticut (Stratford)	186	188	+2
26. Miss. Valley (Davenport)	40	40	+0

Name of AAAA Chapter Activity and Geographical Location	Jan 1	Dec 23	Memb Loss
27. Fulda Chapter	77	75	—2
27. Birmingham Area Chapter	48	46	—2
28. Corpus Christi Chapter	192	188	—4
28. Fort Bliss Area	51	47	—4
28. Fort Meade Area	86	82	—4
29. Schwaebisch Hall Chapter	80	75	—5
29. Fort Polk Area	47	42	—5
29. Lone Star (Austin)	44	39	—5
30. Fort Lewis Area	108	102	—6
30. Embry-Riddle (Daytona)	75	69	—6
31. Jack H. Dibrell (Alamo)	97	90	—7
32. Fort Sill Area	73	63	—10
32. Nurnburg Chapter	59	49	—10
33. Rhine Valley Chapter	158	146	—12
34. Fort Hood Chapter	184	169	—15
35. Fort Knox Area	54	37	—16
36. Tarheel Chapter (Raleigh)	63	46	—17
37. Fort Ord Area	90	69	—21
38. Fort Bragg Chapter	113	90	—23
39. Valley View Chapter	57	27	—30
40. Mainz Chapter	128	77	—51

AAAA CHAPTER SWEEEPSTAKES' STANDINGS

(As at 23 December 1980)

CATEGORY II: Largest Percentage Gain (% Gain at 31 Dec 1980 over 1 Jan 1980)
Prize: AAAA Plaque and $100.00 Award Payable at the 1981 AAAA National Convention

Name of AAAA Chapter Activity and Geographical Location	Jan 1	Dec 23	% Gain
1. Bonn Chapter	30	57	+90.0
2. Morning Calm Chapter (Seoul)	75	141	+88.0
3. Old Ironside Chapter (Illesheim)	46	83	+80.4
4. Army Aviation Center Chapter	433	659	+60.0
5. Stuttgart Chapter	81	129	+59.3
6. Coastal Empire (Hunter AAF)	85	133	+56.5
7. Franconia-Marne (Kitzingen)	74	114	+54.1
8. Chicago Area Chapter	50	69	+38.0
9. Hanau Chapter	58	79	+36.2
10. David E. Condon (Ft. Eustis)	155	209	+34.8
11. Air Assault (Ft. Campbell)	706	900	+27.5
12. Fort Leavenworth Area	84	105	+25.0
13. Lindbergh Chapter (St. Louis)	289	341	+17.9
14. Fort Benning Chapter	53	62	+17.0
15. Suncoast Chapter (Tampa)	64	78	+16.7
16. Aloha Chapter (Hawaii)	99	114	+15.2
17. S. California (Edwards AFB)	199	229	+15.1
18. Monmouth Chapter	182	208	+14.3
19. Fort Riley Area	29	33	+13.8
20. Tennessee Valley (Huntsville)	56	63	+12.5
21. Fort Carson Area	48	53	+10.4
22. Rhine Valley Chapter (Heidelberg)	158	146	+7.6
23. Fort Monroe Area	54	58	+7.4
24. San Francisco Area	54	57	+5.6
25. Taunus Chapter (Frankfurt)	113	116	+2.7
26. Washington, D.C. Chapter	506	522	+1.6
27. Connecticut Chapter (Stratford)	186	188	+1.1
28. Delaware Valley Chapter (Phila.)	---	138	+0.0
28. Metro-Atlanta Chapter	---	110	+0.0
28. Checkpoint Charlie (Berlin)	---	43	+0.0
28. Miss. Valley (Davenport, IA)	40	40	+0.0

Name of AAAA Chapter Activity and Geographical Location	Jan 1	Dec 23	% Loss
29. Corpus Christi Chapter	192	188	—2.1
30. Fulda Chapter (Fulda)	77	75	—2.6
31. Birmingham Area Chapter	48	46	—4.1
32. Fort Meade Area	86	82	—4.7
33. Fort Lewis Area	108	102	—5.5
34. Schwaebisch Hall Chapter	80	75	—6.3
35. Jack H. Dibrell (San Antonio)	97	90	—7.2
36. Fort Bliss Area	51	47	—7.8
37. Embry-Riddle Chapter (Daytona)	75	69	—8.0
38. Fort Hood Chapter	184	169	—8.2
39. Fort Polk Area	47	42	—10.6
40. Lone Star Chapter (Austin)	44	39	—11.4
41. Fort Sill Area	73	63	—13.7
42. Nurnburg Chapter	59	49	—16.9
43. Fort Bragg Chapter	113	90	—20.4
44. Fort Ord Area	90	69	—23.3
45. Tarheel Chapter (Raleigh)	63	46	—27.0
46. Fort Knox Area	54	37	—31.5
47. Mainz Chapter (Mainz)	128	77	—39.8
48. Valley View (Wertheim)	57	27	—52.6

BRIGHT STAR
(Continued from Page 14)

and reassembly commenced. Detailed pre-planning, practice, professionalism and leadership are the only factors which pay off in a contest of this sort. And professionals they were.

These Air Assault soldiers and aviators with blood streaked eyes worked through the night in blowing sand, using portable light sets to ready the aircraft for flight. The last C-5A was unloaded by 2300 hours, and by 0400 all 15 UH-60 were mission ready. After 48 hours without sleep, the crews were then able to get some much needed rest in preparation for the next phase of operations.

A Desert Mentality

The most diligent of students will admit that there is no real substitute for firsthand experience. With this premise in mind, arrangements were made whereby **Screaming Eagle** air crews would participate in desert operation seminars with desert-seasoned Egyptian helicopter pilots prior to initiating the U.S. training program.

On 13 November, 10 English-speaking helicopter pilots conducted seminars with their Air Assault Division counterparts. Such subjects as desert navigation, take-off and landing techniques to minimize brown-outs, night operation, tactics, and a host of other subjects were discussed in detail. The dangerous conditions created by rotor wash and the blowing sand and dust were stressed as they presented their orientation. They likened desert operations to flight over water, the desert being little more than an endless sea of sand.

A Happy Group!

Egyptian helicopter pilots are quite happy to pose for a very informal group photograph at Cairo West AFB.

Dead Reckoning Recommended

They forewarned us that problems would be experienced in the NOE regime, and that judging altitude would be difficult, at best, especially at night. Dead reckoning was stressed as the primary and most dependable means of navigating in the desert with Doppler and radio beacons used as backup systems.

Our aviators learned a great deal from our Egyptian hosts, and the basis for a safe, rapid training program was firmly in hand. Equally as important, new friendships were established — friendships based on mutual, professional respect which will stand the test of time.

The fatigue factor experienced in desert flight at NOE levels was exceptionally high. The physical rigors of desert flying was not a topic addressed by the Egyptian pilots, but rather was learned firsthand by the **Kingsmen**.

Aviation: A Universal Language!

No single factor creates a gap or barrier between individuals more than a difference in language. Many Egyptian pilots spoke English with varying degrees of proficiency, and many did not. Although Arabic intepreters of the 101st Military Intelligence Co were doing an excellent job, they were too few in number to cover all bases and some minor communication problems were experienced initially.

The problem was quickly solved, however, when all concerned realized that the common language was really aerodynamic, instrumentation, pilotage and other universal, aviation-related subject matter. An aviator is, after all, an aviator, no matter where he was taught to fly or what his native tongue might be. Through drawings, Arabic and U.S. field manuals, diagrams, etc., the dilemma was quickly solved.

CW2 Jeffory Hall, Black Hawk Instructor Pilot of Company B, spent many of his flying hours and days demonstrating the capabilities of the UH-60 to one Egyptian aviator after another. "Some had no difficulty with English at all. With those who did have, there was still no problem. They love to fly, just like we do," he said.

CW2 Hall found well-timed gestures and hand signals to be very effective when he wished to explain particular aspects of **Black Hawk** operation. "We both have the same background, being pilots that is. It was amusing to watch one guy get out after an orientation ride and go over to his buddies — and as he moved his hands, gesturing, showing them the maneuvers — I could understand everything about the ride that he was telling them."

A Dream Come True

All phases of operation **"Bright Star 81"**, from the deployment, arrival and set-up, tactical operations with the Egyptian Army and Air Force, brief sightseeing and cultural trips, to redeployment went as well as or better than planned. Lessons learned concerning helicopter operations in a desert environment are indelibly etched in the minds of each participant and are being formalized into valuable after action reports.

Of lesser importance but still significant, the realization of the "impossible dream" come true was something that the Air Assault warriors could now cherish for a lifetime. Word had come down from Task Force Headquarters that the Egyptian government had approved the request for the fly-by at the great Pyramids. **"Kingsmen"** aviators first learned the good news after completing the day's missions. Instantly, morale shot up out of sight as plans for the historic flight were laid. Of course, each aviator volunteered to fly the lead aircraft.

Regrettably, the Egyptian government had limited the total number of aircraft allowed in the fly-by and there simply were not enough cockpit spaces for all B/101 aviators to participate, much less fly in the lead cockpit. The historic event would also be shared with aviators of the 2/17th Cavalry which further reduced the spaces available to B/101. But the brotherhood of aviation causes feelings that transcend personal glory, and the **"Kingsmen"** quickly coordinated with their fellow aviators in the 2/17th Cavalry to plan the once in a lifetime event.

An Army UH-60A Black Hawk is unloaded from a USAF C-5 at Cairo West AFB during Exercise "Bright Star 81."

Late that evening, the tent city was alive with small talk and anticipation as each crewmember carefully went over the mission checklist for the events of the next day: sunglasses, check; camera, check; film, check; and so it went. Someone placed names in a hat. Names were drawn, and crews for the fly-by formation were notified. Many were disappointed that they could not be at the controls, but that did not really change anything.

Those who were not lucky enough to draw a crew position for the flight decided that a back seat was better than no seat at all. As is the trademark of the American soldier, where there is a will, there is a way. And this time everyone had the will and everyone had his way. The dream of **CW2 Tim Hartnett** had grown to fruition as did the hopes of every 101st Aviation Battalion soldier who stood on the sands of Egypt.

Summary

Aviation lessons learned from **"Bright Star 81"** are currently being formalized and will be the subject of a separate, future article. The lessons were many and they need to find their way into formal U.S. Army doctrine for desert operations.

Task Force aviators are convinced that the Air Assault Task Force is ideally suited to fight and survive on the modern desert battlefield, and they are grateful for the privilege of representing their Army and country in Exercise **"Bright Star 81."** □

New Members

MAJ John H. Acock, Jr., Ft. Campbell, KY
2LT Brandt Adams, Ft. Rucker, AL
1LT Gregory A. Adams, APO NY 09702
CPT Russell Adams, Richmond Hill, GA
SGT John T. Addicks, Jr., APO NY 09031
Mr. James E. Alexander, Florissant, MO
1LT Charles W. Allen, APO SF 96251
MAJ Thomas Allen, APO NY 09102
2LT John D. Anderson, Ozark, AL
2LT Kenneth A. Anderson, Ft. Rucker, AL
MAJ Linwood Bailey, Ft. Leavenworth, KS
CPT Allen Baker, Batesville, AR 72501
LTC Wolfgang Balke, West Germany
CW2 Bruce T. Bankert, APO NY 09028
CPT Richard Banks, Lawton, OK
Mr. Richard Barraskas, Marlboro, NJ
MAJ James L. Beahon, Ft. Leavenworth, KS
CPT Ronald K. Bell, APO NY 96271
SGT Ortiz Benjamin
MAJ William E. Benjamin, Gahanna, OH
WO1 Michael Benson, Clarksville, TN
MAJ Brendan P. Blackwell, Arlington, VA
Mr. Bill Blood, McLean, VA
Mr. Dale M. Blum, Corpus Christi, TX
Mr. Robert Bock, Van Nuys, CA
Mr. Cyrus E. Bode, St. Louis, MO
COL James W. Booth, APO SF 96301
MAJ John Bowen, Savannah, GA 31405
Ms. Goldine Boykin, St. Louis, MO
WO1 James P. Bracewell, Hunter AAF, GA
SGT Michael Braden, APO NY 09742
WO1 David Bradford, APO NY 09047
Mr. John P. Brady, Philadelphia, PA
CPT Mark Brannen, APO NY 09028
LTC Arnold T. Bratcher, APO NY 09403
Mr. Jim Brewer, Ft. Worth, TX
SP4 Michael Brewer, APO NY 09031
Ms. Carol Bollington, Corpus Christi, TX
CW3 John Bumpus, APO SF 96251
CPT Parker Bunch, Ft. Rucker, AL
CPL Charles Burnhardt, Cedarlake, IN
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CPT Robert M. Byers, Clarksville, TN
2LT Jennifer Bynum, Ft. Eustis, VA
Ms. Barbara C. Campbell, Fairhaven, NJ
CPT H. R. Canciglia, Savannah, GA
WO1 Kenneth Canup, APO NY 09031
CW3 Kenneth Cardwell, Round Rk, TX
1LT Michael Castelli, APO NY 09036
WO1 Charles Castonguay, APO SF 96251
Mr. James R. Chadwick, El Monte, CA
CW3 Charles Chambers, APO NY 09326
1LT Jimmy Chandler, APO SF 96251
CW3 N. John Charpentier, Ft. Benning, GA
MAJ Dong Sup Chi, Seoul, Korea
CPT Edwin L. Clapp, APO NY 09165
Mr. Francis Clark, Florissant, MO
Mr. Robert B. Claytor, Roanoke, VA
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CPT Nathan Collier, APO NY 09185
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CPT Raul Colon, APO NY 09165
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SGT Michael Costello, APO NY 09742
WO1 Jeffery Cote, APO SF 96251
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1LT David Crowley, APO NY 09039
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MAJ Steven E. Devault, Ft. Leavenworth, KS
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Ms. Hilda Dickhans, Ferguson, MO
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2LT David M. Dobson, Alexandria, VA
1LT John E. Doesz, Wayne, PA
2LT Michael Douglas, Richmond, VA
CPT Tomas Drellinger, Clarksville, TN
CPT Danny Edwards, Lakehurst, NJ
2LT Michael G. Eells, APO NY 09047
Mr. Eulalio G. Elizondo, Corpus Christi, TX
2LT Ronnie Ellis, Ft. Eustis, VA
CSM James Emerson, Wahiawa, HI
SGT Scott Emmett, APO NY 09031
PFC William Ensing, Arlington Heights, IL
SGT Travis W. Epperson, APO NY 09742
WO1 Leonard Eskridge, APO SF 96251
CW3 Burton Etheridge, III, APO SF 96251
Mr. Al Eversgerd, Germantown, IL
CPT John R. Fabry, APO SF 96251
Mr. Cornelius Faerber, Florissant, MO
Mr. Donald Fagan, Arlington, VA
Mr. Columbus Farias, Corpus Christi, TX
SSG David G. Farley, APO NY 09742
CW3 Richard R. Fegreu, Jr., APO NY 09028
CW3 John R. Field, APO SF 96251
CPT John R. Fischetti, APO SF 96251
MAJ John E. Flanagan, APO SF 96251
LTC Roland G. Fontaine, APO NY 09777
MAJ Charles J. Ford, Killeen, TX
CDT Scott C. Ford, Wayne, PA
LTG Eugene Forrester, APO SF 96358
CW3 Curtis Franklin, APO NY 09025
2LT Allen Frederick, Columbus, OH
CPT Ellsworth Funk, APO NY 09061
Mr. Niceford Garcia, Jr., Corpus Christi, TX
Mr. Robert E. Garrison, Little Silver, NJ
Mr. Cesare Gasbarti, Gallarate, Italy
PFC Allan Gendreau, APO NY 09031
PFC Lawrence Gist, Wayne, PA
MG Roland M. Glesner, St. Petersburg, FL
Mr. K.W. Gooch, McLean,VA
PFC Danny Goodermote, Clarksville, TN
LTC Gerald F. Gouge, Granite City, IL
WOC George Graves, Ft. Rucker, AL
MAJ Chris Guppy, APO NY 09047
WO1 Richard Guy, APO SF 96251
2LT Beatriz Guzman, Ft. Rucker, AL
MAJ Richard L. Haley, Huntsville, AL
CW2 Sean Hannah, APO SF 96251
CPT Paul A. Hansen, APO NY 09028
CPT William Harrison, Jr., Savannah, GA
Ms. Shirley Hasse, Florissant, MO
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Mr. R.W. Hicks, Indianapolis, IN
LTC Robert R. Hinton, APO NY 09403
MAJ James A. Hitch, Antioch, IL
Mr. Roger P. Hoffman, St. Louis, MO
CPT Eric Hoffmeyer, Clarksville, TN
CDT John Holsinger, Wayne, PA
CW2 Robert Horowitz, Ft. Walton Beach, FL
CDT Eric Hotung, Wayne, PA
2LT Robert Houghton, APO NY 09093
CW2 Travis Humphries, APO SF 96208
1LT Dale A. Hungerford, Ft. Rucker, AL
2LT John Hurlburt, Newport News, VA
Ms. E. Aileen Hutchens, St. Louis, MO
MAJ Ramon Ivey, APO SF 96208
SFC James Jackson, APO NY 09047
CW3 James Jackson, APO NY 09611
MAJ Larry K. Jackson, Tampa, FL
CSM Emmett F. Jenkins, Jr., Ft. Campbell, KY
CW2 James L. Jernigan, Newport News, VA
CPT Timothy G. Jobe, APO SF 96301
SP4 Chris Johnson, Leavenworth, KS
CDT Daniel D. Johnson, Strasburg, PA
Mr. Donald K. Johnson, McIntosh, AL
CW2 Walter Jones, APO SF 96251
CW3 Julio Julia, Rio Piedras, PR
Paul R. Kambies, Boothwyn, PA
ILT Guenter Kaspar, W. Germany
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SGT John R. Keim, Jr., Wilmington, DE
1LT Clarence Kelly, Jr., APO SF 96251
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WO1 Robert L. Kirby, Ft. Campbell, KY
CPT Paul J. Klauza, APO NY 09031
2LT David C. Kochanski, Milwaukee, WI
MAJ Gerald P. Kokenes, APO NY 09028
MG Emil L. Konopnicki, Granite City, IL
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E4 Mary Laurent, APO NY 09039
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2LT Vincent Lopolito, Newport News, VA
2LT George J. Louigan, Greenville, SC
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SGT John J. Maloney, Morton Grove, IL
2LT David W. Marck, Ft. Rucker, AL
Mr. Charles Marotta, Eatontown, NJ
MAJ Roger Martin, APO NY 09742
E3 Joseph Mast, APO NY 09093
CPT Robert L. McAllister, APO SF 96251
SP5 Carey McCreary, St. Louis, MO
MAJ A. R. McDermott, Ft. Leavenworth, KS
CW2 Don McDonald, Austin, TX
Mr. Michael McFalls, St. Louis, MO
CPT Alton C. McKennon, Jr., APO SF 96209
MAJ George McKenna, San Antonio, TX
Mr. Paul McLaird, St. Louis, MO
2LT Steven McLemore, Ft. Eustis, VA
LTC William P. McMonegal, Tampa, FL
CW3 Jerry McMorrough, Columbus, GA
CPT Bernd Mehs, W. Germany
MAJ Charles E. Merkel, Jr., Wayne, PA
CW4 Billy Miller, Georgetown, TX
CPT Kenneth Miller, Clarksville, TN 37040
MAJ Philip Miller, Ft. Leavenworth, KS
1SG Bobby Milner, Seguin, TX
2LT Samuel A. Mooneyhan, APO NY 09165
Mr. Michael Moore, Florissant, MO
WO1 Eric Morgan, APO SF 96251
Mr. Richard W. Morris, Washington, DC
MAJ Lawrence E. Murphy, Enterprise, AL
SSG Robert Murray, Arlington Heights, IL
CDR Francesco, Musomalli, Shrewsbury, NJ
Mr. Roy Myers, Bridgeton, MO
Dott. Elio Nardi, Chiasso, Switzerland
CPT William F. Nash, APO SF 96251
Mr. Lewis Neri, Pacific, MO
Mr. Leonard Nevenner, O'Fallon, IL
MAJ John Niamtu, Ret., West Haven, CT
CW2 Randy L. Nielson, APO NY 09146
CW4 Theodore P. Nietzold, Enterprise, AL
Mr. Thomas A. Nowrey, Philadelphia, PA
CW3 Dan O'Connor, APO SF 96251
MAJ Jeremiah O'Fihelly
1LT James R. Oates, Ft. Rucker, AL
Mr. Dennis O'Brien, Corpus Christi, TX
CPT James H. Ogden, APO NY 09025
1SG Elias Olivarez, Ft. Hood, TX
WO1 Aaron Oshander, Clarksville, TN
Mr. Nathan Ostrow, Ft. Monmouth, NJ
WO1 John R. Otey, Savannah, GA
CWO Robert E. Payne, Temple, TX
Mr. Edward Pease, Branford, CT
MAJ Richard Pecoraro, APO NY 09061
SP4 Shannon Pederson, Ft. Campbell, KY
CPT Herbert Pennington, Ft. Rucker, AL
WO1 Michael Perkins, APO NY 09047
Mr. Joseph Perrotta, Fair Haven, NJ
Mr. Ronald H. Perry, St. Louis, MO
SP4 Barbara Petersen, Ft. Meade, MD
SFC Ellsworth Petersen, APO SF 96212
LTC Larry D. Peterson, APO NY 09403
Mr. Robert A. Peterson, Ft. Worth, TX
CPT Tome Peterson, Newport News, VA
1LT Frank S. Petty, Olympia, WA
CW3 David Piersee, APO SF 96251
Mr. George B. Pittelkau, Lake Oswego, OR
CPT Klaud Pfeifft, W. Germany
LTC Orin D. Pfloster, MacDill AFB, FL
MAJ William Pohlmann, Eatontown, NJ
CW2 Timothy Powell, Savannah, GA
MAJ Warren L. Price, Ft. Leavenworth, KS
Mr. Klaus Quilitz, W. Germany

Additional New Members Joining the AAAA during September and October

ARMY'S NEWEST FLIGHT SURGEONS—Graduates of the Army Aviation Medicine Basic Class which completed the 10-week flight surgeon program at the US Army Aviation Center in late November are, from left, Drs. (CPTS) James H. Kaye, Harrol L. Cranford, and Anthony R. Piacentile; Dr. (LTC) Charles B. Kennell; Drs. (CPTS) William D. Davis III, and Lewis H. Westmoreland; senior medical student (2LT) William C. Sippo (Distinguished Graduate), physician's assistant CW2 James L. Disco; Drs. (CPTS) Robert C. Jones and Allred J. Kirkwood (Honor Graduate); Dr. (MAJ) David E. Johnson (Honor Graduate); and Dr. (MAJ) Ernesto C. Hernando. (US Army Photo)

UNIFORM

(Continued from Page 16)

due to expanded operations and hostile action. Obviously, the requirement for a fire retardant (Nomex) suit does exist.

New attention is now being focused on the integrated battlefield which is the environment created by the employment of the nuclear, biological, chemical and advanced technology conventional weapons systems. To prepare for this battlefield, efforts are presently underway to produce an overgarment which provides both thermal and chemical protection. Current plans are to issue this uniform to both ground and aviation personnel. Eventually it will be available in a variety of camouflage patterns and incorporate infrared, thermal, and radar suppression features.

An unwise action!

In the meantime, to cast aside the current protective flight suit and opt for a non-protective uniform not designed for aviation use — solely based on good looks — would be neither wise nor cost effective.

In summary, Army Aviators deserve protection from hazards which are peculiar to their profession, and they should not be denied that protection because of esthetic considerations or other events over which they have no control. □

Additional New Members Joining the AAAA during September and October

MAJ Joseph Rollo, Enterprise, AL
LTC Owen Ratcliff, O'Fallon, IL
Mr. Jeffrey Ray, Corpus Christi, TX
MAJ Larry H. Ray, APO NY 09403
CPT Richard Reaphard, APO NY 09146
CPT John Redfearn, APO SF 96251
CPT Terrance Reininger, Wilmington, DE
CPT Vincent Restifolo, Killeen, TX
1LT Joel D. Rhodes, Ft. Rucker, AL
Mr. Carl Richter, St. Ann, MO
Dipl-Ing. Peter Richter, W. Germany
WO1 Ronald Risenhoover, APO NY 09047
Mr. Zorka Ritchie, Granite City, IL
1LT Walter Risen, W. Germany
WO1 Gil H. Robertson, Clarksville, TN
MSG Albert Roll, Sr., Austin, TX
SGT Albert Roll, Jr., Austin, TX
2LT Sheryl A. Rozman, Ft. Rucker, AL
WO1 aniel Runyon, Columbus, GA
LCDR Raymond Russell, APO NY 09611
BM3 Michael Salerno, Jr., Northbrook, IL
E5 Kenneth Sanders, APO NY 09093
CPT John S. Sapienza, Ft. Campbell, KY
MAJ Kenneth T. Satterfield, APO NY 09025
Mr. William D. Schmitz, West Chester, PA
MAJ Carl Schott Ft. Leavenworth, KS
Mr. Albert Schwartz, Oakhurst, NJ
MAJ Harry Sharp, APO NY 09068
WO1 David Shifflett, Savannah, GA
CPT Arthur Siemon-Aparicio, APO NY 09093
CPT Luis Silvestre, Carolina, PR
CW3 Thomas Slaughter, APO NY 09039
SGT Edward Smith, APO NY 09611
Mr. Harry Smith, Sun Valley, CA
CPT Roger Smith, APO SF 96251
CW3 Steven Smith, W. Germany
Maj Alfred D. Snelgrove, Springfield, VA
Mr. John Snyder, Creve Coeur, MO
LTC Mendel S. Solomon, Tampa, FL
Mr. Ronald Sorrells, Samson, AL
SGT Thomas J. Sousa, Wayne, PA
LTC Theodore A. Speaker, APO SF 96343
CPT Hans-Ch. Specht, W. Germany
CPT Carroll Squyres, Newport News, VA
MAJ Bobby L. Starcher, Collinsville, IL
2LT Celeita Stephens, Ft. Rucker, AL
SSG Michael Stephens, APO NY 09742
COL Richard E. Stephenson, MacDill AFB, FL
Mr. William J. Stephens, Sea Girt, NJ
CW2 James E. Stone, Savannah, GA
1LT Michael J. Strang, Newport News, VA
1LT Walter Straub, APO NY 09047
Mr. Albert Stringer, APO NY 09611
Mr. Steve Stuby, Corpus Christi, TX 78411
Mr. Charles Stuppi, Iselin, NJ
COL Charles Suraci, Jr., Kensington, MD
MS. Rosemary Surak, Long Branch, NJ
CW2 Donald S. Taber, Jr., Norfolk, VA
MAJ Kiel S. Tackaberry, APO NY 09326
WO1 Robert Tam, Hunter AAF, GA
WO1 Bruce Taylor, APO SF 96251
BG Dr. Harro Tiedgen, W. Germany
Mr. William Tippin, O'Fallon, IL
CPT John Tisserand, Savannah, GA
CWO Jose A. Tomegrosa, Rio Piedras, PR
SSG Kenneth G. Trickey, Ansonia, CT
CPT Daniel P. Valentine, Savannah, GA
2LT William Van Atta, LaCrosse, WI
COL Kurt J. Veeser, W. Germany
Mr. Antonio Velazquez, Corpus Christi, TX
Mr. Bernard J. Venverloh, Jr., Arlington, VA
MAJ William Vincent, Ft. Leavenworth, KS
Mr. Curtis L. Walker, Bay Village, OH
CPT L. D. Walker, APO SF 96208
CPT Thomas C. Wallace, APO NY 09042
CDT Christopher L. Walter, Wayne, PA
Mr. Robert Waters, Bethesda, MD
CW3 Ralph J. Weber, APO NY 09326
MAJ J. B. West, APO NY 09757
CW3 Michael J. Wheeler, Ft. Wainwright, AK
MAJ Larry Whittington, Ft. Leavenworth, KS
CPT Bernie G. Williamson, APO NY 09093
MAJ Bruce C. Williamson, Jr., Monterey, CA
CPT David Williams, APO SF 96251
CW2 Paul Williams, Clarksville, TN
COL Robert Wilson, Schofield Barracks, HI
SGT Steven Wilton, APO NY 09702
MG Herbert E. Wolff, Fort Shafter, HI
LTC Robert Wood, APO NY 09742
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MAJ Charles E. Yancey, APO SF 96301
CPT Ronald H. Yates, Ft. Benning, GA

USAAVNC to host Army's World Helicopter Championship Competitive Flyoffs in March

THE United States Army Aviation Center (USAAVNC) will host the Army-wide fly-off for prospective participants in the **Helicopter World Championship** at Fort Rucker, Alabama, in early March 1981.

The purpose for this Army level competition is to select the best crews from the 16 submitted by the U.S. Army Forces Command and U.S. Army Training and Doctrine Command.

FORSCOM fly-offs are currently scheduled for February 1981 at Fort Hood, Texas. The eight Army crews selected will compete later with other helicopter pilots from around the U.S. to determine the composition of the U.S. Helicopter Team.

Finals' site under study

The **Helicopter Club of America (HCA)**, an affiliate of the **National Aeronautic Association**, is currently studying the issue of where and when the final U.S. trials will be held. DA representatives have met with HCA officials on the details of the national flyoffs and an announcement of their decision will be forthcoming in January.

The team selected by the HCA will, in turn, represent the U.S. at the **Fourth Helicopter World Championships** to be conducted in Poland in August 1981. The competitive events for the Army fly-off include the five standard events specified by the **Helicopter Club of America**, all of which are being detailed in a five-month series in **Army Aviation Magazine.**

These events are: (1) Timed Arrival and Rescue Event (See **Army Aviation**, Sept, p. 47), (2) Precision Flying Event (See **See Army Aviation**, Oct, p. 102), (3) Navigation Event (See **Army Aviation**, Nov, p. 63), (4) Slalom Event (opposite page), and (5) Free Style Event (Details and diagram to appear in the Jan-Feb 1981 issue of **Army Aviation**).

Scoring for each event will be in accordance with the rules as outlined by the Helicopter Club of America. All events will be staged from one of the USAAVNC's major tactical training sites at Fort Rucker, allowing the two cross-country events to be flown over the sparsely populated terrain of the southeast Alabama country-side, which will readily challenge the participating crews' navigational skills.

The two hovering events (Precision Flying and the Slalom) and the Free Style Event will be staged at the same tactical training site as the cross-country events to consolidate evaluation personnel requirements and to provide a central location for viewing the competitions by interested spectators.

The Army fly-offs in March will afford the participating crews with an opportunity to compete with their peers in an environment approximating that which they will find later in the Army-civilian competition and, hopefully, the actual **International Helicopter World Championship**. Good luck to all Army competitors! □

Application for HCA Membership

TO: Helicopter Club of America
c/o National Aeronautic Association (NAA)
821 15th Street, N.W/, Suite 430
Washington, D.C. 20005

(I) (We) make application for the following HCA membership:

☐ Member ($20) ☐ Charter Membership ($50)
☐ Send information only ☐ Corporate Membership ($500)

Enclosed is a check for the membership made payable to the "HCA"

First Name________ MI____ Last________

Address ________________

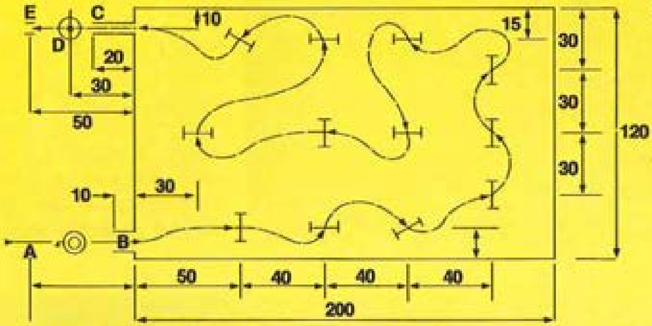
City________ State______ ZIP______

Home Phone________ Bus. Phone________

Briefly outline your interests________

Event #4—Helicopter Slalom Event
Fourth Helicopter World Championship

PART 4 OF AN 8-PART MAGAZINE SERIES



AEROKLUB PRL INSTRUCTIONS

"There will be the square competition field 120x200 m marked on the Aerodrome with entry and exit corridors. 40 m in front of the entry corridor the lift-off line and the starting line, both 10 m wide, will be marked. On the axis of the exit corridor, 10 m of its gate there will be a round table of 1 m dia. 1 one m high. The finish line, 10 m wide, will be also marked on the exit gate axis, 20 m of the table.

"12 gates, each composed of 2 poles 2 m high and placed 1 m apart, will be set within the competition field. The gates will have the different orientation, and have numbers indicating the sequence of passing and the paints indicating the proper side from which the passage should happen.

"It will be the duty of a co-pilot to pass the bucket filled with water weighing 5 kg thru the gates. The bucket will be suspended on a rope 5 m long measured from bucket to grip. The co-pilot will be allowed to maneuver the bucket and rope within the limits created by body bending, hands movements, etc. The co-pilot may occupy any position;but must be properly secured. The securing device will be checked by the technical commission before the event. Communication between pilot and co-pilot will be allowed.

"After having passed the course the pilot will leave the field along the exit corridor and hover above the table. The co-pilot will lower the bucket onto the center of the table without spilling water. Then he will release the rope and the pilot will accelerate the helicopter to cross the finish line and return to the parking area touching there down.

"The event will be timed from the moment of crossing the starting line to the moment of crossing the finish line. Four minutes will be allowed to complete the exercise. A longer time will attract penalty points but there will be no premium points for the shorter time."

SCORING

"Maximum scoring: 200 points."

PENALTY POINTS

"One penalty point will be incurred for each 50 grams of spilled water.

"For each escape of the bucket beyond the limits of the competition area or beyond the limits of the entry and exit corridors (10 penalty points).

"For the violation of the prescribed sequence of gate passages and for the passage from the wrong side (20 penalty points).

"For each second above 240 seconds of flight (one penalty point).

"For the use of the shortened rope (100 penalty points).

"For passing the bucket through the gate outside or above the poles (10 penalty points).

"For each centimeter from the center of the table (one penalty point).

"The lost bucket (200 penalty points). Note: The drop of the bucket outside the table will not be considered as the loss."

The ***1980 AAAA Product Suppor*** ***Symposium*** *sponsored by the Lind-bergh Chapter was "one of the bes yet — attendance — speakers — con tent," according to Co-Chairman* ***Paul L. Hendrickson.*** *He also in-dicated that the 1980 Symposium held in St. Louis "had a total of 121 registered attendees, with over 100 military and industry persons present at the mid-point luncheon, and 110 in attendance at the closeout* ***"1980 AAAA Industry Awards Dinner."***

In the photograph above, ***Colonel(P) James M. Hesson*** *(standing), President of the Lindbergh Chapter "River Rats", is flanked to his left by* ***Lynn Cumpton,*** *award winner from Bell Helicopter Textron; and to his right by* ***Joseph P. Cribbins,*** *Symposium Moderator; and* ***Herb Waldrup,*** *an award winner representing Perkins Plastics. In the photograph at the right,* ***Allan K. Poole, Jr.,*** *left, Vice President—Product Support, Sikorsky Aircraft Division, UTC, accepts the* ***AAAA Major Business Industry Award*** *from* ***Colonel Leslie H. Weinstein,*** *the Chapter's Senior Vice President. The Sikorsky award*

was based on its contractor suppor program for the fielded ***Black Hawk*** *system. In the photograph at the left, Symposium Co-Chairman* ***Donald F. Luce,*** *left, presents a special Lindbergh Chapter Award to* ***Joseph P. Cribbins,*** *Special Assistant to the Deputy Chief of Staff for Logistics, Department of the Army, for the recipient's "dynamic role in making the annual Product Support Symposium a highly professional and most usefu undertaking."*

Shown at the right are **Taylor Lynn Cumpton,** left, and **Colonel M. Walker,** the Vice President—Military Affairs of the Lindbergh Chapter, at the **1980 Product Support Symposium's** Industry Awards Banquet. **Mr. Cumpton** of Bell Helicopter Textron, received the **Individual Member Industry Award** for his exceptional work with the Troop Support and Aviation Materiel Readiness Command's Cobra NETT Teams during the award period.

Herb Waldrup, right, the Vice President—Engineering of Perkins Plastics, Inc., accepts the **AAAA Small Business Industry Award** from **Colonel (P) James H. Hesson,** Lindbergh Chapter President, during the **1980 AAAA Product Support Symposium** sponsored by his Chapter. The award to **Waldrup** was based on Perkins Plastics' accelerated delivery (eight months early) of a critically needed item for the UH-1 helicopter. Photo below: Wall-to-wall conferees. Current planning calls for the conduct of the next Symposium at the time of the April 1982 AAAA National Convention in St. Louis.

Did you know that . . . .

while the Army Aviation Association's **Outstanding Aviation Unit Award** has been won on six occasions by units at the Group, Brigade, and Division level, this highly coveted national award has also been won **nine** times by aviation units at the Company, Squadron, and Battery level? For example, F Battery, 79th Field Artillery, 3rd Brigade, was selected as the **Outstanding (Active Army) Aviation Unit** for 1971.

Calendar

DECEMBER

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APRIL

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AAAA CHAPTER MEETINGS

■■ DEC. 18. Jack H. Dibrell Chapter. Joint Christmas Party with Fifth USA Aviation Division. Food, libation, and NMB. Room 107, Ft. Sam Houston, TX.

■■ DEC. 19. Suncoast Chapter. General membership business luncheon. '81 programs and plans. Lamas Restaurant.

■■ DEC. 27. Morning Calm Chapter. Professional dinner meeting; announcement of Chapter Award Winners. GEN John A. Wickham, Jr., Cdr, USFK/EUSA and CINCUNC/CFC, guest speaker. Eighth Army Officers' Club.

■■ DEC. 30. Stuttgart Chapter. Late afternoon business-social meeting. CPT Scott Wells, guest speaker. Prebrief on 1981 AAAA—Garmisch. Nellingen Officers' Club.

■■ FEB. 5. Connecticut Chapter. Professional dinner meeting. BG Carl H. McNair, Jr., Cdr, USAAVNC & Ft. Rucker, guest speaker. Site to be announced.

■■ FEB. 6. Washington, DC Chapter. Professional dinner meeting. BG Carl H. McNair, Jr., Cdr, USAAVNC & Ft. Rucker, guest speaker. Ft. Myer Officers' Club.

■■ FEB. 7. AAAA National Executive Board. Quarterly business meeting. Shoreham Hotel.

OBITUARIES

McDONALD, Madelyn, wife of Joseph E. McDonald, Jr., deceased, AAAA Past President, on November 24. She is survived by her son, Joseph E. McDonald, III, of Purcellville, VA; her daughters, Patricia Nicassio,, of West Covina CA, and Joan McDonald, of Stamford, CT; and five grandchildren, Rickie, Debbie, Jamie, Gary, and Stefanie. Interment took place at Arlington National Cemetery on December 1. The family requested that memorial donations continue to be sent to the McDonald Memorial Scholarship Fund, c/o AAAA, 1 Crestwood Road, Westport, Connecticut 06880.

■■ FEB. 13-14. AAAA National Awards Committee. Selection of 1981 AAAA National Scholarship Winners; selection of AAAA National Award Winners. Ft. Myer, Feb. 13; Stouffer's Hotel, Feb. 14.

■■ MAR. 25-28. 1981 USAREUR Region——AAAA Convention. AFRC, Garmisch-Partenkirchen, Germany.

■■ APR. 23-26. 1981 AAAA National Convention. Shoreham Hotel, Washington, D.C.

CORRECTION

Two entries in our "Who's Who Roster" of AWO members of AAAA were garbled in our last issue due to a glitch in our typesetting machine. The corrected entries appear below.

DOUGHERTY, JOHN R., CW3 (AAAA-1975) 51-7 Mozart Strasse, Ozterholz-Scharmbec, Germany. Born Aug 16. Wife-Grace. Jenna, 1.

PHONES: Res—Not Provided; Duty-2443-6446.

ASSIGNED as Aviation Safety Officer, 159th Medical Detachment, APO New York 09355.

PROF'L DATA: Total Mil Hrs 2,900; Combat Hrs 800. Mil Rating: SAA. FAA Ratings: Com'l FW & RW, Inst, O&T, Test Pilot. Advanced Acrft: U-21. Safety Crs Grad: Civilian.

★VLECK, BURTON J. . . (CW4) (AAAA-1962). 106 Meadow Lake Circle, Ozark, AL 36360. Born Nov 6. Wife-Sue.

ASSIGNED as Flight Commander, Examiners Course, Department of Flight Training, Ft. Rucker, AL 36362.

PROF'L DATA: Total Mil Hrs 4,500; Combat Hrs 1,200. Mil Rating: MAA. O&T: IFE, SIP, IP.

month's takeoffs

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STATEMENT OF OWNERSHIP, MANAGEMENT, AND CIRCULATION

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I certify that the statements made by me in this statement dated September 24, 1980 are correct and complete.

Dorothy Kesten, Managing Editor

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Support AAAA — Army Aviation's Only Professional Association.

ARMY AVIATION ASSOCIATION

1 Crestwood Road, Westport, Conn. 06880

I wish to join the Army Aviation Ass'n of America [AAAA]. My past or current duties affiliate me with U.S. Army Aviation and I wish to further the aims and the purposes of AAAA. I understand that the annual membership includes a subscription to the AAAA-endorsed magazine, ARMY AVIATION, and that my membership starts on the subsequent 1st of the month.

Note: A home address is suggested, if one's military or firm address exceeds 25 characters.

RANK FIRST NAME LAST NAME

STREET ADDRESS

CITY STATE ZIP

List your AAAA Professional Qualification

Government	Non-Government*
[ ] USA Active Duty	[ ] Manufacturing*
[ ] DA Civilian*	[ ] Small Business*
[ ] Army Nat'l Guard*	[ ] Retailing*
[ ] Army Reserve*	[ ] Consultant*
[ ] Army Retired*	[ ] Professional*
[ ] Other Services	[ ] Other*

*Nat'l Office will request add'l information.

AAAA ANNUAL DUES

New & Renewal Dues for other than below: [ ] 1 Yr, $15-[ ] 2 Yr, $29-[ ] 3 Yr, $43

New & Renewal Dues for Enlisted; GS-6 & below; and Wage Board 12 DACs & below: [ ] 1 Yr, $10-[ ] 2 Yr, $19-[ ] 3 Yr, $28

This is the only application form accepted by the AAAA. It may be reproduced locally.

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Enroll five new members and receive AAAA's 'Aces Club' Certificate

Let us send you an attractive, two-color Certificate — handlettered with your name — when you become an "AAAA Ace". Suitable for framing, the document verifies that you are a "full-fledged ACE . . having "bagged" your quota of five. A pair of three-dimensional plastic feet atop the bonfire lend authenticity to the document. Join the ACES!

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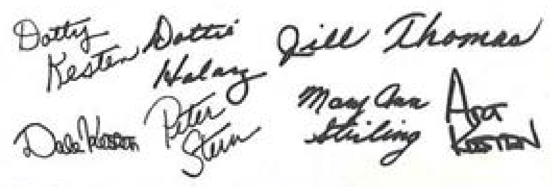
With All Good Wishes for the Coming Year

FROM THE STAFF OF "ARMY AVIATION"



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